OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org
| CONTENT |
|-------------------------------|-----|
| Foreword                      | 1   |
| Introduction: Energy Vision 2020 | 2   |
| Three Pillars of the UNIDO Energy Vision 2020 | 8   |
| Flagship Programmes           | 10  |
| Industrial Energy Efficiency  | 16  |
| Renewable and Rural Energy Programme | 26  |
| Climate Policy and Networks   | 38  |
| Energy Partnerships           | 44  |
| Energy Vision 2020: Emerging Opportunities | 46  |
| UNIDO’s Global Energy Portfolio – Projects | 54  |
Disclaimer:
This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as "developed", "industrialized" and "developing" are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO. The selection of projects to illustrate UNIDO’s engagement aims at demonstrating their geographic and thematic variety and scope and is not endorsed by UNIDO.

Design > red hot ‘n’ cool | Vienna
Cover picture: dollarphotoclub.com
Picture Page: 22: istock
The global energy agenda is being shaped by two predominant forces:

**ENERGY POVERTY/SECURITY**
The need to address energy poverty through reliable, affordable and sustainable forms of energy

**CLIMATE CHANGE**
The need to shift energy production and consumption towards cleaner, efficient and greener patterns to ensure these forces create opportunities and challenges for all countries to meet twin objectives for ensuring inclusive and sustainable development

- 1 in 5 people on the planet (around 1.3 billion) lack access to electricity
- 66% of global GHG emissions stem from the energy sector
- 82% of the global energy supply is generated from fossil fuels
UNIDO Energy Programme

FOREWORD

Over the past 30 years, I have witnessed tremendous changes in the political, economic and social conditions prevailing in the world. Billions of people have been lifted out of poverty, and nowhere have these changes been more visible than in my own country.

In order to eradicate poverty, and to allow for a better life and prosperity for the billions that are still excluded from a dignified human existence, the world needs to grow its industries in an inclusive and sustainable manner. In line with its mandate of promoting Inclusive and Sustainable Industrial Development (ISID), UNIDO has a major catalytic role in the fields of energy and climate. This includes scaling up investments in clean energy solutions; strengthening policy frameworks to create an enabling environment including funding for increased market penetration of renewable energy; and the promotion of energy efficient and low-carbon technologies that advance ISID. We focus on manufacturing industries and enterprises and make them more competitive, productive and sustainable. Our experience in promoting green industry and green growth shows that sustainable energy solutions accelerate human progress, from job generation to industrial competitiveness, from strengthening security to empowering women, and from energy security to climate action.

The crucial role of industry is rightly recognized by the 2030 Agenda for Sustainable Development, and particularly by Sustainable Development Goal (SDG) 9: “Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation”. The interrelated nature of the SDGs makes it imperative to promote industrialization patterns that are socially inclusive and environmentally sustainable and that reduce pollution and greenhouse gas emissions compared to traditional technologies and practices. It is thus not surprising that UNIDO also contributes considerably to the cross-cutting areas of SDG 7 on Sustainable Energy and SDG 13 to combat climate change and its impacts.

In our endeavor to facilitate sustainable energy solutions, we believe that the role of partnerships is pivotal. Our partners seek to support our efforts in a range of activities – from funding mechanisms to technical expertise. UNIDO’s Energy Programme prioritizes energy security, job creation, gender mainstreaming, and energy access for enhancing the productivity of enterprises, specifically recognizing the nexus between food, water, health, and energy. It is clear that the sustainability of energy solutions lies in addressing these issues in tandem rather than individually.

This brochure presents UNIDO’s multi-faceted Energy Programme, which is based on three strategic pillars: (i) Industrial Energy Efficiency, (ii) Renewable Energy for Productive Uses, and (iii) Climate Policy Networks. A focus is given on the Programme’s core fields of activities, including new thematic areas and partnership programmes, addressing the universal concerns regarding environmental sustainability and energy in the context of the 2030 Agenda for Sustainable Development.

Li Yong
Director General
Introduction: Energy Vision 2020

“Energy is the golden thread that connects economic and social development with environmental sustainability, and allows the world to thrive. Development is not possible without energy, and sustainable development is not possible without sustainable energy.” - UN Secretary-General Ban Ki-moon

Sustainable energy is at the forefront of the new development and climate agenda for the reason that it enables and empowers inclusive development. Sustainable energy contributes to every aspect of economic growth and development - from jobs creation to productive capacities; from poverty reduction to the empowerment of women; and from energizing enterprises to environmental sustainability of natural ecosystems. Sustainable energy lies at the heart of global action for people, planet, prosperity, peace and partnership.

With the new wave of industrial revolution, represented by Industry 4.0, changing consumption patterns, growing population, increasing urbanization and varying energy systems present an increasing challenge to climate change while impacting both the energy and industrial sectors. UNIDO’s activities in the field of sustainable energy and climate change are driven by challenges, opportunities and concerns over energy poverty, energy security, and climate change issues.

In the context of landmark agreements reached by the global community on Sustainable Development Goals (SDGs) and climate change in 2015, the Energy Vision 2020 seeks to articulate UNIDO’s role, approach and focus related to sustainable energy for the period 2016-2020 in line with its mandate on inclusive and Sustainable Industrial Development (ISID). It envisages an integrated and holistic approach to link SDG 9 on sustainable industrialization closely with SDG 7 on sustainable energy for all and SDG 13 on climate action.

The UNIDO Energy Vision 2020 promotes sustainable energy solutions for making industry more competitive, productive and climate resilient. The main focus is to assist Member States to transit to a sustainable energy future that would address the key challenges of energy poverty, energy security and climate change by scaling up the use of renewable energy for productive purposes and the efficient use of energy and low carbon technologies by industry.

The international development agenda

In the past few years, the international community has made an exponential leap in advancing new approaches to accelerate progress and pave the way for a more ambitious, inclusive and universal development framework beyond 2015.

In 2016, the Sustainable Development Goals (SDGs) of the 2030 Agenda officially came into force. The SDGs form an intergovernmental development blueprint consisting of 17 goals and 169 targets, intended to stimulate action, through collaborative partnership, over the next 15 years in areas crucial for humanity and our planet. The 2030 Agenda establishes environment, society and economics as the three dimensions of sustainable development.
The Sustainable Development Goals
the new development discourse strongly features inclusive and sustainable economic growth, industrialization and engagement with the private sector, which are integrated into SDG 9 - build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation. SDG 9 embeds UNIDO’s universal mandate into the new policy framework and reaffirms its global leadership role. With half a century of experience, UNIDO is following through on its efforts to strongly promote the achievement of Inclusive and Sustainable Industrial Development within this new development architecture.

Inclusive and Sustainable Industrial Development

UNIDO recognizes that the 2030 Sustainable Development Agenda, cohesive in its content and universal in form, will require effective, improved and innovative approaches and tools to support its implementation. Among those tools are the ones offered by sustainable energy, which acts both as an enabler and a catalyst for the efforts of countries with regard to progressing towards Inclusive and Sustainable Industrial Development, the internationally agreed SDGs and targets of the Paris Agreement. The fundamental importance of energy within the 2030 Agenda is reflected in SDG 7 - ensure access to affordable reliable, sustainable, and modern energy for all. While SDG 7 confirms the general understanding that sustainable energy solutions should be operationalized for the benefits of humankind and the environment, we can see that its use is inadequate and unequal as only a fraction of countries utilize it efficiently.

The UNIDO Energy Vision 2020 is based on three strategic pillars, namely:

- industrial energy efficiency
- renewable and rural energy
- climate policy and networks.

Building on its competitive advantage in clean energy innovation, productive capacities, low-carbon industrialization, and climate action, UNIDO bases...
the Energy Vision on the foundations of: technology transfer and demonstration, knowledge management, policy and standards, and capacity building to provide clean energy solutions. The Vision 2020 also focuses on mainstreaming the role of women and promoting youth employment in the design and implementation of energy projects, creating job opportunities, and fostering clean energy technological innovations. These combined efforts are intended to drive the progress towards Inclusive and Sustainable Industrial Development.

By developing integrated, multi-focal and holistic programmes the three strategic pillars will trigger strong co-beneficial components including green jobs, increased productive capacities, water efficiency, food security, health and sanitation improvements. Accordingly, UNIDO takes a central role in contributing in the fight against climate change in both mitigation aspects - that is, efforts to reduce greenhouse gas emissions from industry in order to limit global warming - and adaptation aspects - meaning, taking appropriate action to make industries and industrial value chains more resilient to the adverse effects of climate change, or taking advantage of opportunities that may arise.

As the 2030 Development Agenda is aspiring to initiate change on a global level, a reliable global network is necessary to support it. For this reason, UNIDO will make use of the leveraging power of synergetic partnerships by operationalizing its strategic energy alliances, networks and conventions including, but not limited to, UN-Energy, SE4ALL and the United Nations Framework Convention on Climate Change (UNFCCC). The Energy Vision 2020 aims to provide substantive support for the convening role of UNIDO on energy and climate change issues, and promote cooperation and partnerships with relevant UN and non-UN organizations and institutions. Additionally, UNIDO recognizes the significance of convening world energy leaders at global forums to engage in debates for addressing global issues through sustainable energy solutions, inclusive industrial development, and climate change mitigation and adaptation, and thereby contribute to the achievement of the 2030 Development Agenda on energy, industry and climate change.

Furthermore, several global initiatives, developed by UNIDO, will be part of the Energy Vision 2020. These initiatives focus on a programmatic approach to addressing national, regional and global issues related to energy and ISID. Such an approach has led to the creation of Flagship Programmes including: the Global Network of Regional Sustainable Energy Centres; the Global Cleantech Innovation Programme (GCIP) for SMEs; the Low-Carbon Low-Emission Clean Energy technology transfer (LCEt) Programme; the Private Financing Advisory Network (PFAN); and the Vienna Energy Forum (VEF).

Three strategic pillars of the UNIDO Energy Vision 2020

<table>
<thead>
<tr>
<th>Thematic Focus</th>
<th>Industrial Energy Efficiency</th>
<th>Renewable Energy</th>
<th>Climate Policy and Networks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy</td>
<td>EE Policy for Industry</td>
<td>RE Policy for Access and Industry</td>
<td></td>
</tr>
<tr>
<td>Standards</td>
<td>EnMS-ISO 50001 and System optimization</td>
<td>RE quality and standards</td>
<td></td>
</tr>
<tr>
<td>Partnerships</td>
<td>SE4ALL IEE Accelerator</td>
<td>REEEP, REN 21, IRENA</td>
<td></td>
</tr>
<tr>
<td>Funding</td>
<td>GEF, GCF and Multi / Bilateral Funds</td>
<td>GEF, GCF and Multi / Bilateral Funds</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Austria, Japan, Spain and GEF</td>
</tr>
</tbody>
</table>
UNIDO’s programmatic approach is a response to the demands from Member States and funding mechanisms such as the Global Environmental Facility (GEF), Green Climate Fund (GCF), EU funds, development finance institutions (DFIs), etc. UNIDO views the seventh GEF replenishment cycle, as well as the strategic developments in other funding mechanisms, as an additional prospect wherein it can unfold its full operational potential in arias identified as emerging opportunities in the Energy Vision 2020.

The existing funding mechanisms should only be the beginning. New innovative financing models should be explored, which will further enhance investments in research and provide market incentives to develop new technologies, and then make these technologies accessible and affordable for poorer countries. Therefore, UNIDO joined hands with the Renewable Energy and Energy Efficiency Partnership (REEEP) to co-host the next generation of the Private Financing Advisory Network (PFAN). PFAN identifies and nurtures promising, innovative clean and renewable energy projects by bridging the gap between investors, clean energy entrepreneurs and project developers. It is one of few actors in the climate finance space addressing the barriers for small and medium enterprises (SMEs) in developing countries and emerging economies.

On the other hand, the Low-carbon Low-Emission Clean Energy Technology Transfer (LCET) Programme, supported by the Government of Japan, provides opportunities for the adoption of innovative business models and strengthening market conditions to enable the scaling up of LCET investment in targeted countries. By building capacity to better absorb and domestically replicate such technologies the industrial value chain for LCETs is being promoted globally while at the same time facilitating access to energy and reducing dependence on unsustainable energy solutions.

For more details see the “Energy Vision 2020: Emerging Opportunities” section.

Energy Vision 2020: Emerging opportunities

For more details see the “Energy Vision 2020: Emerging Opportunities” section.
Energy Vision 2020:

“Promoting sustainable energy solutions for productive capacities, industrial competitiveness and job creation: in the process, making industry climate resilient.”

The international development and energy agenda gives UNIDO a new framework for action. Now, through the core building blocks of the Energy Vision 2020, UNIDO will scale up its ambition to help poorer countries leapfrog destructive forms of energy and thereby ensure that no-one is left behind in benefiting from Sustainable and Inclusive Industrial Development which will not condemn future generations to a planet beyond their capacity to repair.

Core building blocks of the Energy Vision 2020
Providing Inclusive, Clean and Sustainable Energy Solutions
Three Pillars of the UNIDO Energy Vision 2020

1. Industrial Energy Efficiency
2. Renewable and Rural Energy
3. Climate Policy and Networks

The structure of UNIDO’s Department of Energy is built around three divisions; first one dealing with industrial energy efficiency (Industrial Energy Efficiency Division), second one with renewable energy (Renewable and Rural Energy Division), and third one oversees climate policy, partnerships and global forums, as well as promoting low carbon- low emission technologies (Climate Policy and Networks Division).

**Industrial Energy Efficiency Division**

UNIDO’s Industrial Energy Efficiency (IEE) Division is responsible for promoting the efficient use of energy by industry and the dissemination of industrial energy efficiency best operating practices and technologies in order to accelerate economic growth and enhance competitiveness and job creation, while addressing climate change.

The IEE Division places particular emphasis on addressing the energy efficiency requirements of SMEs, as they represent the backbone of socioeconomic development in a country. As of November 2016, the IEE Division’s project portfolio amounts to around US$ 105 million, 36 projects with a widespread geographical coverage of over 20 countries, including 4 least developed countries.

The three core thematic areas of the UNIDO IEE programme are:

(a) policy development and standards;
(b) capacity-building and awareness-raising;
(c) technology demonstration and upscaling.

Furthermore, UNIDO’s IEE programme focuses on promoting the implementation of energy management systems based on the International Organization for Standardization’s (ISO) 50001 energy management standard, and energy system optimization; both approaches assist industry in continual and system-wide IEE improvement.

Other IEE programmes focus on improvements to the energy efficiency of energy intensive industrial equipment, energy-efficient and low-carbon transport vehicles, and related infrastructure.

*For more details see the “Industrial Energy Efficiency” section.*

**Renewable and Rural Energy Division**

UNIDO’s Renewable and Rural Energy Division is responsible for enhancing greater use of renewable sources of energy by industry and facilitating access to affordable and sustainable energy by the communities in rural areas to support productive activities as sources of income and employment opportunities and further contributing to the mitigation of climate change in developing countries and countries with economies in transition.

UNIDO’s RRE programme focuses on mainstreaming the use of renewable energy for productive uses and industrial applications. UNIDO’s ongoing RRE project portfolio as of November 2016 amounted to around US$ 155 million, more than 77 projects with a widespread geographical coverage including over 40 countries.

UNIDO’s RRE activities place a specific emphasis on promoting business models for renewable energy based mini-grids for enhancing access to energy, and on demonstrating the social and economic viability of selected renewable energy technologies. In the field of RRE, UNIDO seeks to strengthen the capacity of counterparts and local entrepreneurs to create sustainable energy enterprises and industrial prosumers that can
deliver reliable and affordable energy services based on renewable energy technologies and promote global standards on renewable energy technologies, appliances and systems, technology transfer, and local manufacturing of renewable technologies.

For more details see the “Renewable and Rural Energy” section.

Climate Policy and Networks Division

UNIDO’s CPN Division responds to the increasing demand for innovative partnerships, multi-level and integrated solutions to address the energy, climate and development challenges simultaneously. The Division is responsible for developing and implementing integrated policies, global and regional multi-stakeholder partnerships, as well as advocacy and outreach activities in the field of sustainable energy and climate change.

The Unit positions UNIDO strategically in the global energy and climate change forums, and facilitates the execution of global and regional programmes on low carbon and climate resilient technology innovation and entrepreneurship, as well as networks and centres. The Division focuses on promoting programmatic approaches, and coordinate work related to new and ongoing global and regional programmes, cross cutting themes, nexus and knowledge management issues. In addition, the Division also coordinates work related to global forums such as the Vienna Energy Forum, and participation in meetings of the Conference of the Parties and other relevant energy and climate conferences and events. In discharging its responsibility, in line with overall strategy of the Department, the Division cooperates closely with the RRE and IEE Division, as well as other relevant organizational units within UNIDO, in particular with the Department of Environment, Technology Networks and Field Offices.

Policy, Partnerships and Global Forums

UNIDO participates in global forums and establishes partnerships with groups and organizations sharing its inclusive and sustainable industrial development goals. There are three major types of partnerships concluded and maintained by UNIDO’s Energy Programme: multi-stakeholder platforms, strategic partnerships and knowledge partnerships.

Multi-stakeholder platforms are those concluded with a large number of stakeholders from the public and private sectors. A multi-stakeholder platform aims to act as a catalyst in changing complex systems, shifting existing norms and improving structures (e.g. UN Energy, SE4ALL, and CTCN).

A strategic partnership is concluded with multilateral or bilateral donors and the private sector. In recognition of the important role played by the private sector in inclusive and sustainable industrial development, UNIDO’s ties with the private sector are growing (e.g. Global Environment Facility (GEF), ECREEE, and the Cleantech Open).

Knowledge partnerships work from the ground up through projects designed to serve as examples of ‘best practices’ for the industry in question and as catalysts that can support successful projects and transform them into longer-term programmes (Austrian Energy Agency (AEA), the Renewable Energy and Energy Efficiency Partnership (REEEP), and The Energy and Resource Institute (TERI)).

For more details see the “Partnerships” section.
Flagship Programmes

UNIDO’s Energy Programme, capitalizing on its extensive and diverse experience in servicing Member States, strives to identify high-impact opportunities linked to its core thematic areas that can be replicated in other countries and regions of the world. Successful models created by UNIDO grow popular and spur an impetus for up-scaling. Through this ‘leapfrogging’ effect, the Energy Programme creates new partnerships in other states that wish to benefit from these models. Such areas of intervention are known at UNIDO as ‘Flagship Programmes.’

Low-Carbon Low-Emission Clean Energy Technology Transfer (LCET) Programme

Supported by the Government of Japan, the Low-Carbon Low-Emission Clean Energy Technology Transfer (LCET) Programme promotes rapid deployment and dissemination of new low-carbon low-emission clean energy technologies, products, services and systems globally. This is achieved through demonstration projects, awareness raising and capacity building as well as through enhancing knowledge management strategies in selected developing countries.

Following close consultations with the funding and implementing partner of UNIDO under this programme, the Ministry of Economy, Trade and Industry (METI) of Japan, Phase 1 of the programme focuses on Ethiopia and Kenya. In both countries, deployment and dissemination of LCETs is achieved not only by removing existing barriers in access to information and technical knowledge but also by building capacity to better absorb and domestically replicate such technologies; technology demonstration and market development.

The LCET Programme aims to link sustainable energy services with productive uses to stimulate the creation of new jobs, increase profits, reduce pollution, spur local economic growth, increase energy independence and improve the overall quality of life. It also contributes to improved energy access and security through improved energy supply, reduces dependence on fossil fuels and promotes low-carbon growth paths through reduced GHG emissions. Moreover, the LCET Programme provides opportunities for adopting innovative business models and strengthening market conditions to enable scaling up of LCET investment in targeted countries. Thus, promoting the industrial value chain for LCETs globally.

The Global Cleantech Innovation Programme (GCIP) for SMEs

The Global Cleantech Innovation Programme (GCIP) for SMEs is focused on enhancing Cleantech startups in each participating country, as well as on improving the local entrepreneurial ecosystem and policy framework. It currently encompasses 7 countries, and more than 10 countries have already expressed interest for the Programme to be developed in their countries. The GCIP for SMEs demonstrates the significance that UNIDO places on nurturing innovation in clean energy technologies, strategic partnerships and enhancing private sector
involvement. The programme involves four key features – a competition to create an ecosystem for sustainable growth, the showcasing of innovative technologies, the provision of mentoring and training through the Cleantech Accelerator, and the enhancement and facilitation of access to capital.

In response to the successful 2014 pilot year of the Cleantech Competition and Accelerator, a number of countries have already requested UNIDO to develop new follow-on projects under the gCiP for SMEs to provide further support to the most promising alumni of the Programme. This would include incubation, specifically focusing on helping startups in clean technologies take their innovative ideas from the concept stage to national, regional and global markets.

For more details see the “The Global Cleantech Innovation Programme for SMEs” section.

Global Network of Regional Sustainable Energy Centres (GN-SEC)

The Global Network of Regional Sustainable Energy Centers (GN-SEC) Platform is a powerful post-2015 south-south and triangular multi-stakeholder partnership, which is executed by UNIDO in cooperation with various regional economic communities and organizations. The expanding partnership comprises of various Centers in Africa, Caribbean and the Pacific. UNIDO provides key technical assistance for the establishment and operation of the Centers.

The Centers respond to the urgent need for enforced regional cooperation and capacities to mitigate existing barriers for renewable energy and energy efficiency investments, industries and markets. They assist in creating an enabling environment through tailored regional methodologies and interventions. The centers form a strong global advocacy group for sustainable energy issues and provide a strong link between international energy and climate agreements and concrete implementation on the ground. The centers will strengthen the implementation capacities of the Sustainable Energy For All (SE4ALL) initiative.

For more details see the “A Global Network of Regional Sustainable Energy Centres” section.

The Climate Technology Center and Network (CTCN)

The CTCN is the mechanism of the United Nations Framework Convention on Climate Change (UNFCCC) to stimulate technology cooperation and enhance the development and transfer of technologies to developing country Parties at their request. The CTCN is co-hosted by UNEP and UNIDO supported by a consortium of eleven partner organizations around the globe. These 13 organizations constitute what is called the Climate Technology Center (CTC). The CTC is complemented by the Climate Technology Network (CTN), a global network of organizations with experience in technology development, deployment and transfer.

To fulfill its mandate the CTCN has three core functions:

• Technical assistance to developing countries to enhance transfer of climate technologies
• Provide and share information and knowledge on climate technologies
• Foster collaboration and networking of stakeholders on climate technologies

Technical assistance is provided based on a demand driven process that begins with a request from a country’s National Designated Entity (NDE). The dissemination of information and knowledge is carried out via trainings for NDEs as well as the CTCN Knowledge Management System (KMS), an online platform that facilitates access to existing climate technology related data. The Network is a cornerstone and delivery channel for Technical Assistance and contributes to the KMS.

UNIDO contributes to the CTCN by utilizing its strong expertise and experience in climate technologies, established partnerships with governments and the private sector, as well as its global network of field offices.

The Vienna Energy Forum (VEF)

The VEF is a biennial forum with the mandate to address the developmental challenges of the 21st century from the perspective of energy. It brings together key policy and opinion makers and leading experts from all over the world to facilitate the exchange of multi-sectorial perspectives and knowledge, identify challenges and opportunities, forge networks and initiate tangible action.
The VEF was born of a joint initiative by the Austrian Government, the International Institute for Applied Systems Analysis (IIASA) and the Energy and Climate Change Branch of UNIDO in 2008. Thanks to the expertise of its co-organizing institutions, its favorable establishment in the energy-hub Vienna, and partnerships with other key energy initiatives and institutions, the VEF has since then played a key role in the global debate on sustainable energy, and has thus developed into a leading forum in this field.

VEF 2017 will highlight the multiplier effects of integrated approaches for sustainable development at the national, regional and global levels. The Forum will also accentuate the potentials of the sustainable energy NEXUS – linking energy to water, food and health – as well as innovation as a global driver for accelerated sustainable growth.

For more details see the “The Vienna Energy Forum” section.

Gender mainstreaming

Women’s empowerment is recognized as not only a normative right but also an important economic and developmental strategy for ISID. The World Bank’s World Development Report 2012 states, “countries that create better opportunities and conditions for women and girls can raise productivity, improve outcomes for children, make institutions more representative and advance development projects for all.”

The UNIDO Energy Programme also recognizes that women’s empowerment and sustainable energy are mutually reinforcing goals. Increased access to energy can reduce the burden of the household chores typically assigned to women, thus allowing women to engage in productive activities, leading to women’s empowerment and gender equality. In turn, gender mainstreamed energy initiatives are more likely to achieve sustainable impact as recognition of women’s roles in energy use will facilitate more comprehensive and long-term energy solutions for inclusive growth and development.

To achieve optimal impact and effective results on the ground, UNIDO’s Programme analyses and captures the potentials and opportunities in gender mainstreaming of its projects and programmes. Building on the existing gender mainstreaming efforts, the Energy Programme has recently launched an initiative to develop an action plan at the strategic level, and also an operational level guideline for all project stakeholders, including gender analysis tools and indicators to be applied throughout the project cycle. Gender mainstreaming of its sustainable energy Programme will allow UNIDO to continue its political leadership and strengthen its comparative advantage in promoting and accelerating ISID.

Private Financing Advisory Network (PFAN)

In 2016 UNIDO joined hands with the Renewable Energy and Energy Efficiency Partnership (REEEP) to co-host the next generation of the Private Financing Advisory Network (PFAN). PFAN is a multilateral public private partnership initiated by the Climate Technology Initiative and the United Nations Framework Convention on Climate Change (UNFCCC). PFAN
works in climate finance to reduce greenhouse gas emissions, promote adaptation to climate change, and contribute to achieving the goals of the 2016 Paris Agreement on climate change - including mobilizing USD 100 billion per year by 2020 of private and public financing globally - and the 2030 Agenda for Sustainable Development.

PFAN identifies and nurtures promising, innovative clean and renewable energy projects by bridging the gap between investors, clean energy entrepreneurs and project developers. It is one of few actors in the climate finance space addressing the barriers for small and medium enterprises (SMEs) in developing countries and emerging economies - shortage of bankable projects on the demand side and ability to assess risk and conservative lending culture on the supply side, all by leveraging private sector investment with a small amount of public funds. As of September 2016, PFAN has raised total financing of $1.2 billion, which is being used to build, install and operate 701 megawatts (MW) of clean power for 87 projects across Africa, Asia and Latin America.

Global partnerships and Networks

UNIDO has been actively involved in supporting the UN Sustainable Energy For All (SE4ALL), both at the level of the delivery of relevant technical assistance for capacity building and policy advice for sustainable energy solutions (e.g. industrial energy efficiency, renewable energy for industrial applications and energy for productive uses), and at the level of the UNIDO senior leadership, which has been championing the cause of SE4ALL through its chairmanship of the UN-Energy and the Secretary-General’s initiatives in the area of energy and climate change, such as the Advisory Group on Energy and Climate Change (AGECC).

UNIDO is one of ten implementing/executing agencies of the Global Environment Facility (GEF) and has been very successful in obtaining GEF funds and leveraging co-financing for the implementation of large renewable energy and industrial energy efficiency projects.

For more details on UNIDO’s Energy Programme partnerships see the “Partnerships” section.

CASE STUDY: 2015 Cleantech Competition and Accelerator Programme

2015 marked the second year of the Cleantech Competition and Accelerator under the GCIP for SMEs, with seven countries implementing their national programmes for innovative startups in clean technologies. The GCIP for SMEs, simultaneously implemented in Armenia, India, Malaysia, Pakistan, Thailand, Turkey and South Africa, identified a pool of promising entrepreneurs through its competition-based approach, and supported them with ongoing mentoring, webinars and networking events to grow their innovative concepts into full-fledged products ready for the national, regional and global markets.

Under the 2015 competition cycle, a total of 902 applications were received across the seven countries, from which 186 innovative clean energy technology entrepreneurs were selected to take part in the Accelerator Programme. The entrepreneurs were chosen across 4 clean energy technology categories: Renewable Energy, Energy Efficiency, Waste to Energy, and Water Efficiency.

Having progressed through the Programme, the very best entrepreneurs from the GCIP for SMEs were given the
opportunity to attend the Cleantech Open Global Forum in Silicon Valley, USA, involving more than 100 cleantech exhibitions and networking events. This opportunity gave the 2015 GCIP winners a high level of exposure to broaden their networks, benefitting from the global linkages of the programme. The exposure will be further strengthened through ongoing networking events and global forums, such as the Vienna Energy Forum, in May 2017.

The Global Cleantech Innovation Programme for SMEs

Every year a number of selected clean technology startups progress through the Cleantech Competition and Accelerator, where they are trained, mentored and assessed. The best startups from each country gather at the Global Forum in Silicon Valley, as well as other national and global networking events, and connect with potential partners, customers and investors from around the world.

Under the Global Cleantech Innovation Programme (GCIP) for SMEs, each country leverages $1-2 million in funding from the Global Environment Facility (GEF), matched by $4-6 million in co-financing (including in-kind) from national public and private sector partners. The programme in each country is led by a local executing partner, and supported by local stakeholders and advisors. An integral part of the programme is the development of institutional capacity of local implementing partners which are typically government agencies focused on SME development, clean technology and innovation.

A Global Network of Regional Sustainable Energy Centres

The Global Network of Regional Sustainable Energy Centers (GN-SEC) Platform is a powerful post-2015 south-south and triangular multi-stakeholder partnership, which is coordinated by CPN in cooperation with various regional economic communities and organizations.
The expanding partnership comprises of various Centers in Africa, Caribbean, Central America, Pacific and the Himalaya-Hindukush. CPN provides key technical assistance for the establishment and operation of the Centers. The global platform provides a common umbrella for promoting south-south cooperation between the various regions. The Centers respond to the urgent need for enforced regional cooperation and capacities to mitigate existing barriers for renewable energy and energy efficiency investments, industries and markets. They assist in creating an enabling environment through tailored regional methodologies and interventions.

The centers form a strong global advocacy group for sustainable energy issues and provide a strong link between international energy and climate agreements and concrete implementation on the ground. The centers will strengthen the implementation capacities of the Sustainable Energy For All (SE4ALL) initiative.

The following Centres are operational or under development:

- ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE)
- SICA Centre for renewable Energy and Energy Efficiency (SICREE)
- East African Centre for Renewable Energy and Energy Efficiency (EACREEE)
- South African Centre for Renewable Energy and Energy Efficiency (SACREEE)
- Regional Centre for Renewable Energy and Energy Efficiency - Arab Region (RCREEE)
- Caribbean Centre for Renewable Energy and Energy Efficiency (CCREEE)
- Pacific Centre for Renewable Energy and Energy Efficiency (PCREEE)
- Himalayan Centre for Renewable Energy and Energy Efficiency (HCREEE)

The Vienna Energy Forum (VEF) in 2017

The outlines of the next Vienna Energy Forum (VEF) are taking shape on the horizon, with the theme “Sustainable Energy: Nexus and Innovation”. VEF 2017 will highlight the multiplier effects of integrated approaches for sustainable development at the national, regional and global levels. The Forum will also accentuate the potentials of the sustainable energy NEXUS - linking energy to water, food and health - as well as INNOVATION as a global driver for accelerated sustainable growth.

The nexus between energy, climate, transport, food, water and health are inseparable and an essential contributor to social progress and human well-being, which needs to be approached in an integrated manner to best synergize solutions.

Ensuring sustainable energy for all, whilst adhering to the 2030 Agenda and the implementation of the Climate Agreement, remains one of the greatest challenges of our time. Fostering innovation provides us with an opportunity to develop a new capacity for jobs and wealth creation whilst safeguarding the environment and ensuring affordable and clean energy access for all.

The Sustainable Development Goals (SDG) adopted by the world leaders aim to address the interlinked problems of inequality, hunger and climate change. VEF 2017 will focus specifically on addressing the linkages among the key SDGs and their contribution to the 2030 Development Agenda, with an emphasis on better policy analysis and institutional arrangements needed to spur innovation, as well as tools necessary to increase the role of innovation as a driver of economic growth, job creation and sustainable development.

It is expected to have over 1600 participants, including Ministers, Vice-Ministers, high-level government officials, Permanent Mission representatives, Chairs of the regional groups, donors, as well as representatives of the European Union (EU), the private sector and development finance institutions. Over the four- day conference, delegates will be addressed by more than 100 eminent speakers in a series of ministerial gatherings, high-level panels, plenary and parallel sessions.

The Forum will continue to be the global high level platform for discussing the pivotal sustainability challenges of our age, and the catalytic role of energy in achieving inclusive and sustainable development.
Achieving sustainable and lasting gains in energy productivity and industrial efficiency calls for continuous improvement of industrial facilities. The UNIDO Industrial Energy Efficiency (IEE) Programme builds on more than three decades of experience and its unique expertise in the field of industrial technology, as well as on ‘best practices’ transfer and development. UNIDO’s objective is to improve energy efficiency in industries and ultimately transform the market for industrial energy efficiency.

To capture this objective, UNIDO’s IEE Division provides policy and regulations development support, as well as capacity building for all market players. The Division is responsible for promoting the efficient use of energy by industry and the dissemination of industrial energy efficiency best-available practices and technologies in order to accelerate economic growth and enhance competitiveness and job creation, while addressing climate change.

UNIDO’s IEE Division places a special focus on addressing the specific characteristics of small and medium-sized enterprises (SMEs), particularly their limited resources to implement energy efficiency. SMEs represent the backbone of socio-economic development in most developing countries and have the highest potential for energy savings and increased productivity.

UNIDO aims to integrate energy efficiency into enterprises’ existing management structures for continuous improvement and daily operations. To that end, the IEE Division combines the energy management systems (EnMS) and standards approach based on the ISO 50001 Standard with a whole-system approach to identifying and capturing energy savings in industrial applications.

Under the IEE Unit, UNIDO promotes and supports the deployment of low-carbon and advanced-process technologies that combine energy efficiency with the principles of product quality, sustainability and cost-effectiveness.

The IEE Unit also focuses on benchmarking, monitoring, reporting and verification frameworks in order to enable enterprises and governments to measure their performance and demonstrate the benefits of their projects and investments in energy efficiency. This is essential to secure the sustained support of top management and policy-makers for the consistent improvement and upgrading of industrial energy efficiency at the enterprise and country levels.

Taking into account countries’ contexts and priorities, their industry structure and development stage, UNIDO projects are designed to respond to stakeholders’ needs while leveraging opportunities offered by the economy. In line with the overall strategy of the Department, the Division cooperates closely with the RRE and CPN Divisions, as well as other relevant organizational units within UNIDO, in particular with the Department of Environment and Department of Trade, Investment and Innovation.
Industrial Energy Efficiency Programme: Core Focus Areas

**POLICY DEVELOPMENT AND STANDARDS**
- Technical regulations
- Voluntary standards
- Fiscal and other incentives
- Benchmarking
- Public-private partnership agreements
- Information and education
- Recognition
- Monitoring, verification and reporting
- Personnel certification

**ENERGY MANAGEMENT, TECHNOLOGY DEMONSTRATION AND UPSCALING**
- Energy management systems
- Energy systems optimization
- Low-carbon process technologies
- Energy-efficient manufacturing
- Energy-efficient industrial equipment and appliances
- Carbon capture and storage for industrial applications
- Low-emission transport systems

**ISID**
- Inclusive & Sustainable Industrial Development

**INSTITUTIONS AND MARKET PLAYERS**

**DEMAND & SUPPLY-SIDE CAPACITY-BUILDING AND AWARENESS-RAISING**
- Energy efficiency agencies/centres and service providers
- Energy efficiency knowledge networks
- Financing schemes
- Technology innovation platforms
- Supply chain
- Power utilities

**ENERGY VISION 2020**
Sustainable Energy for Inclusive Industrial Development and Climate Action
CHAD Promoting Energy Efficient Cook Stoves in Micro and Small-scale Food Processing Industries

Over the last 10 years Chad lost more than 12% of its forests. Deforestation is the primary factor contributing to the ecological destruction in Chad. The commercial sectors of beer brewing and meat grilling are two of the main consumers of wood in Chad with an annual consumption of 14,000 tons. Traditional cook stoves used in the two sectors have very low heat transfer and fuel efficiency consuming wood and thus energy wastefully. They also have harmful effects on the health and the well-being of the users, their families and their communities (risk of burns, respiratory, ophthalmological and back problems).

**Objectives**
The main objective of this project is to stimulate the market demand for energy efficient cook stoves in traditional agro-food processing industries in Chad with a focus on 2 sub-sectors: traditional sorghum based beer brewing (bili bili) and meat grilling (tchéle).

**Achieved and Expected Results**
- Creation of 5 clusters comprising of 1,230 beer brewers and meat grillers in five geographical zones (N’Djamena 1, N’Djamena 2, Mandelia 1, Mandelia 2, Guelendeng).
- Formation of 65 cooperatives of beer brewers, 26 cooperatives of meat grillers and 5 cooperatives of cook stove manufacturers.
- Skills improvement and increased access to finance and credit by the industrial sector in Colombia represents about 25 percent of national energy consumption. Significant opportunities to save energy have been identified and Government entities have focused their efforts on raising awareness and disseminating information about energy-efficiency (EE) measures through the national programme: “Comprehensive Energy Management System.” However, highly industrialized intermediate cities and regions are not all covered by this training programme. The two main barriers remain to encourage enterprise to adopt energy efficiency measures: (a) higher dissemination amongst the private sector (b) a personnel certification scheme to ensure the quality of services offered by Energy Management System (EnMs) implementers.

**Objective**
The project objective is to strengthen the technical and financial capacities of relevant stakeholders to enable the scale-up of the EE measures that have been piloted by nationally driven programmes. It aims to improve Colombian industries’ energy performance by focusing on adopting energy management systems and a number of technical measures, such as motor, steam and pump systems optimization. The project seeks to produce energy savings and to help raise industry profitability and competitiveness, thus contributing to national welfare.

COLOMBIA Promotion of Industrial Energy Efficiency in Colombian Industries

The industrial sector in Colombia represents about 25 percent of national energy consumption. Significant opportunities to save energy have been identified and Government entities have focused their efforts on raising awareness and disseminating information about energy-efficiency (EE) measures through the national programme: “Comprehensive Energy Management System.” However, highly industrialized intermediate cities and regions are not all covered by this training programme. The two main barriers remain to encourage enterprise to adopt energy efficiency measures: (a) higher dissemination amongst the private sector (b) a personnel certification scheme to ensure the quality of services offered by Energy Management System (EnMs) implementers.

**Objective**
The project objective is to strengthen the technical and financial capacities of relevant stakeholders to enable the scale-up of the EE measures that have been piloted by nationally driven programmes. It aims to improve Colombian industries’ energy performance by focusing on adopting energy management systems and a number of technical measures, such as motor, steam and pump systems optimization. The project seeks to produce energy savings and to help raise industry profitability and competitiveness, thus contributing to national welfare.

EGYPT Industrial Energy Efficiency in Egypt

Egypt faces substantial barriers on the way to achieving optimal energy efficiency and making a lasting change to how Egyptian industry manages energy. The final energy consumption per unit of output in the most important industries of Egypt is typically 10 to 50% higher than the international average. Therefore, increased energy efficiency in Egyptian industry has the potential to make a significant contribution to meeting the growing energy supply challenges facing the country.

**Objectives**
The ultimate goal is to reduce GHG emissions by establishing a policy environment that enables and supports sustainable adoption of energy efficient technologies and management and to train a pool of experts in system optimization and energy management to assist industries in developing and implementing energy efficiency improvement projects.

**Achieved Results**
- IEE policy recommendations have been finalized and presented to relevant ministries.
- 81 experts were trained on EnMS, 448 Industry users received EnMS user training and 45 experts were trained on System Optimization (SO)
Food Processing Industries

beer brewers, meat grillers and manufacturers.
- Training, capacity building, construction and diffusion of energy efficient (EE) cook stoves.
- Improvement of the livelihoods and the wellbeing of direct and indirect beneficiaries.
- Development of national platforms of interaction for EE cook-stoves.
- Reduction of carbon emissions by 12,162 t per year in addition to reduced concentrations of smoke and greenhouse gas emissions, reduced pressure on forests and related resources.

Donors and Partners

Expected Results
- Mandatory regulations, voluntary standards and Monitoring and Evaluation schemes to support the adoption of EE developed;
- Development of industry-specific capacities promoted, establishing a cadre of highly specialized energy management experts from the public and private sectors;
- Technical capacities on audit and system optimization for energy end-use leading to measurable energy savings in industrial facilities are strengthened;
- A national financing scheme for the implementation of EE measures in the industrial sector will be assessed and financing institutions will be strengthened to assess IEE projects.

Donors and Partners
GEF, Mining and Energy Planning Unit (UPME), Administrative Department for Science, Technology and Innovation (Colciencias).

- 53 companies are being assisted to implement EnMS
- Peer to peer network for Petrochemical companies has been created facilitating EnMS implementation and training in the sector
- Benchmarking reports have been finalized for four sectors: ceramics, cement, iron and steel and fertilizers.
- National awareness campaign “Kafaza has been successfully institutionalized under the Industrial Modernization Centre (IMC).

Donors and Partners
GEF, Egyptian Environmental Affairs Agency (EEAA), Ministry of Industry and Foreign Trade (MiFt) of Egypt, Federation of Egyptian Industries (FEI), Industrial Development Authority (IDA), Industrial Modernization Centre (IMC) and Egyptian Organization for Standardization and Quality (EOS).
Industrial Energy Efficiency – Projects

CHINA, MALAYSIA & SOUTH AFRICA Energy efficient and low-carbon transport

The transport sector in many developing countries has become the largest contributor to overall GHG emissions in the economy. Electric vehicles (EVs) have a high potential to reduce carbon emissions, particularly if powered by renewable energy sources. However, there are substantial barriers preventing the market acceptance of EVs, such as lack of enabling policy, low awareness of the public, lack of infrastructure, etc. Non-motorized transport, i.e. cycling, also has a high potential to contribute to reductions in GHG emissions, while bringing about other benefits.

Objectives
- Improved policy and regulatory frameworks, strengthened local manufacturing capacity, incentive schemes, support programmes and awareness towards user-market acceptance of EVs and cycling.
- Broader awareness and acceptance of EVs.
- Developing supporting infrastructure and encouraging investment.

Expected Results
- Policy research to determine incentives schemes for EV adoption and a policy framework for LCT.

INDIA Promoting Energy Efficiency and Renewable Energy in Selected Micro, Small and Medium Enterprise (MSME) Clusters in India

In terms of primary energy consumption, industry remains the largest consumer of energy in India – accounting for over 50% of total energy consumption in the country. The Indian industry comprises of many micro, small, and medium-sized enterprises (MSME) which carry out energy- and emissions-intensive activities in sectors such as the metallurgical and metals, glass and ceramics industry, agricultural activities, and brick-making. In most of these MSME sectors, energy costs account for as much as 20%–40% of the total cost of production.

Objectives
The project aims to develop and promote a market environment for introducing energy efficiencies and enhanced use of renewable energy technologies in process applications in 12 selected energy intensive MSME clusters in India in order to improve the productivity and competitiveness of units as well as to reduce overall carbon emissions and improve the local environment.

Achieved and Expected Results
- Capacity strengthened and awareness rose of institutions, industry, suppliers and service providers to support the expansion of EE/RE in the clusters.
- Increased end-use demand and implementation of energy efficiency and renewable energy technologies and practices in MSMEs.
- Enhanced policy, institutional and decision-making frameworks and up-scaling of the project to a national level.

INDONESIA Promoting Energy Efficiency through System Optimization and the Introduction of ISO Energy Management Standards

The Government of Indonesia has initiated several actions to promote energy efficiency, including the establishment of government regulation 70/2009 on energy conservation that obliged energy consumers of more than 6,000 TOE to implement an EnMS and all heavy energy-consuming industries to employ an energy manager. Despite these encouraging efforts by the Government, limited achievements have been observed and industries tend to take an ad hoc approach with energy efficiency measures focused on single equipment replacement rather than on a sustainable energy management system and system-based optimization approach.

Objectives
The project aims to promote industrial energy efficiency through a system optimization approach and the introduction of ISO energy management standards.

Achieved Results
- ISO 50001 has been adopted as the reference for the national competent standard on energy managers.
- 39 national experts attended the EnMS Expert training, and 425 energy managers and production operators have been trained on ISO 50,001 implementation.
Transport in China, Malaysia and South Africa

development will be created and public acceptance of EVs raised.
• Capacity building for the public and private sector in relevant policies and technologies.
• Design of pilots to test EV charging infrastructure at urban level.
• Promoted infrastructure for the use of non-motorized vehicles.

Donors and Partners
GEF, the China International Center for Economic and Technical Exchanges (CICETE), Society of Automotive Engineers of China (SAE-China), South African National Energy Development Institute (SANEDI), Ministry of Energy, Green Technology and Water of Malaysia (KeTTHA).

• 54 energy audits completed in 9 clusters, BoPs developed and shared through 27 dissemination workshops with appointed cluster leaders.
• Developed common parameters for regular monitoring and online collection and monitoring of energy performance data initiated in 2 clusters.
• 2 enterprises already adopted energy efficient solutions and shown improved energy savings with pay-back periods of 1-2 years, with 3 more demonstration projects under implementation.

Donors and Partners
GEF, Bureau of Energy Efficiency (BEE), Ministry of Micro, Small and Medium Enterprises (MSME), Ministry of New and Renewable Sources of Energy (MNRE).

Energy Management Standard

• 78 national experts attended the SO Expert training, and 412 industry personnel have been trained on pump, steam and compressed air system optimization.
• Almost 500 high-level managers took part in the EnMS awareness seminars organized.
• 66 industrial enterprises adopted energy management plans with technical assistance from project-trained national experts, of which 6 enterprises received ISO 50001 standard certification.
• 64 SO assessments have been completed and implementation of SO projects is ongoing.

Donors and Partners
GEF, Ministry of Energy and Mineral Resources (MEMR), Ministry of Industry (MIO), National Standardization Body (BSN).
Industrial Energy Efficiency – Projects

**MYANMAR** Improvement of Industrial Energy Efficiency in Myanmar

Myanmar has begun an economic overhaul aimed at attracting foreign investment and its reintegration into the global economy. Reforms, abundant natural resources, a young labor force, and proximity to Asia’s dynamic economies have attracted foreign investment in the energy sector and significantly impacted the role played by industry. One of the main objectives of The Energy Policy and Strategy Framework, prepared by the National Energy Management Committee (NEMC), is to promote energy efficiency and conservation. While improvement has been seen, an action-oriented strategy for achieving energy savings is still lacking and many daunting barriers to the widespread use of energy efficient practices and technologies remain.

**Objectives**

To promote sustained GHG emissions reduction in the Myanmar industry by improving policy and regulatory frameworks and institutional capacity building for industrial energy efficiency and the implementation of EnMS, based on ISO 50001, and optimization of energy systems in industry.

**Achieved Results**

- 130 EE consultants trained at expert level in EnMS and ESO
- EnMS under implementation in 42 industrial plants
- 300 million kWh of direct end-use energy savings achieved and 250,000 tons of CO2 emissions avoided
- More than 85 enterprises trained in industrial energy efficiency BAT
- 150 officials from government trained on IEI policies development and implementation
- 5 Expert level training curricula developed in Russian and disseminated
- Innovative City- and Regional-based EnMS capacity building and implementation programmes under...
**Expected Results**

- Improved policy and regulatory frameworks, incentive schemes and awareness to facilitate sustainable energy efficiency improvements in industry.
- Strengthened capacity of institutions, industries, consultants and equipment suppliers on energy management systems, energy system optimization and EE project financing.
- At least 50 establishments are expected to implement EnMS, and 20 optimization projects are foreseen.

**Donors and Partners**

GEF, Ministry of Industry (MOI), Ministry of Environment Conservation and Forestry (MOECaF), Ministry of Energy (MOE).

---

**Improve energy efficiency in GHG-intensive industries**

- Policy research and development support provided in areas of energy monitoring and verification, energy efficiency obligations and white certificates; policy incentives and conformity assessment for implementation of EnMS and ISO 50001
- Innovative Russian methodology and guidelines for EE benchmarking for industry developed and piloted together with REA
- Developed online distant-learning platform for EnMS and energy performance indicators

**Donors and Partners**

GEF, Russian Energy Agency, Ministry of Energy, Ministry of Environment, Russian industrial enterprises, higher education institutions.

---

**Access to finance increased with the energy and cost saving benefits of EnMS and ESO proven within the South African industrial context with industry actively and progressively pursuing enhanced IEE.**

**Donors and Partners**

GEF, Department of Trade and Industry (dti), Department of Energy (DoE), Department of Environmental Affairs (DEA), National Cleaner Production Centre of South Africa (NCPC-SA), South African National Energy Development Institute (SANEDI), Industrial Companies.
**THAILAND** Greening Industry through Low Carbon Technology Applications

Despite many policy and regulatory measures implemented by the Government of Thailand to promote low-carbon technologies and energy efficiency, the uptake by SMEs remain limited due to a lack of awareness and capacity, which prevents the initiatives from having a wide-reaching and sustainable impact in the country. SMEs tend to use outdated and inefficient technologies and high turnover of plant personnel lead to a lack of persistence and a short term approach to facility improvements and energy management. Until now, a targeted approach to catalyze investment in low-carbon technologies at the SME level of Thailand has not been implemented and the potential for energy savings and efficiency improvements in the sector remains large.

**Objectives**

To promote and support adoption of energy efficient practices and technologies in selected Small and Medium Enterprises (SMEs) in Thailand for improved competitiveness and a greening of industry.

**Expected Results**

- Enhanced policy and regulatory framework through identification and improved understanding of existing gaps and barriers, resulting in key recommendations to develop enabling policies for Thai SMEs;
- Raised awareness and understanding of benefits associated with the adoption of low-carbon technologies and relevant financing schemes through awareness

**Achieved Results**

- Enhanced policy and regulatory framework through identification and improved understanding of existing gaps and barriers, resulting in key recommendations to develop enabling policies for Thai SMEs;
- Raised awareness and understanding of benefits associated with the adoption of low-carbon technologies and relevant financing schemes through awareness

**UKRAINE** Introduction of Energy Management System Standard in Ukrainian Industry

As a result of a planned economy with energy prices that are subsidized by the state in the recent past and the insufficient efforts on introduction of the efficient energy use, Ukraine has very low energy efficiency levels. Consequently, there is a considerable potential for energy use reduction as well as the reduction of the greenhouse gas (GHG) emissions through increasing energy efficiency and promoting the use of renewable energy sources in such sectors as industry, transport, housing-communal services and buildings.

**Objectives**

The project aims at contributing to a sustainable transformation of industrial energy usage practices in Ukraine. The project will do this by advancing and promoting the concepts of Energy Management System (EnMS) and Energy System Optimization (ESO), along with the application and promotion of the ISO50001 Energy Management Standard.

**Achieved Results**

- Policy and institutional frameworks supporting implementation of EnMS strengthened through the adoption of ISO 50001, ISO 50002, ISO50003, ISO50004, ISO50006 and ISO 50015 as national standards;
- National capacity for implementation of EnMS and ESO in industry developed through a total of 15 Advanced-, Expert- and Awareness-level trainings conducted in the relevant focus regions (Odessa, Kyiv, etc.)

**VIETNAM** Promotion of Energy Efficiency Industrial Boiler Adoption and Operating Practices

With the Vietnamese industry’s high growth rate in the last decade and its contribution to the country’s GDP, energy efficiency has become a priority issue for the government. Despite the existence of regulations on EEC implementation at the policy level and a national standard related to minimum boiler efficiency, there is still a lack of technical regulations and guidelines provided to industry for their compliance, as well as the lack of an institutional network able to monitor and enforce compliance with these requirements. As a result, a general lack of information on the energy savings obtained from EE boiler adoption and operating practices persists. Locally produced, inefficient coal- and oil-fired boilers are heavily represented in the market and the capacity of boiler manufacturers to produce and support EE boilers is generally poor. Industrial end-users tend to focus more on safety and stability of industrial boiler operation, and lack awareness on the financial and environmental benefits of EE industrial boilers.

**Objectives**

To reduce energy consumption and reduce greenhouse gas (GHG) emissions through promoting the widespread adoption of energy efficiency boilers and best operation practices in industry.
sustainable Energy for inclusive industrial Development and Climate Action

UKRAINE

Introduction of Energy Management System Standard in Ukrainian Industry

Expected Results

• Operationalized regulations and guidelines on industrial boiler standardization system.
• Increased awareness of and information availability on EE industrial boilers for end-users (industrial enterprises), energy consultants, ESCOs and industrial boiler providers.
• Improved technical capacity of local producers on EE boiler manufacturing.
• Increased access of financial sources for investment projects on EE boiler adoption and manufacturing.

Donors and Partners

GEF, Ministry of Industry and Trade (MOIT).

VIETNAM

Promotion of Energy Efficiency Industrial Boiler Adoption and Operating Practices

Donors and Partners

GEF, Department of Industrial Promotion (DIP), Department of Industrial Works (DIW), Department of Alternative Energy Development and Efficiency (DEDE).

THAILAND

Greening Industry through Low Carbon Technology Applications for SMEs

Donors and Partners

GEF, Department of Industrial Promotion (DIP), Department of Industrial Works (DIW), Department of Alternative Energy Development and Efficiency (DEDE).
According to estimates, about 80% of the world’s energy demand could be met by renewables by 2050. Further, increased usage of renewable energy could lead to a reduction in CO₂ emissions of about 220-560 GT between 2010 and 2050. This could be a huge contribution to the goal of maintaining the increase in global temperature below 2°C. At present, only about 2.5% of the globally available technical potential of renewable energy is used. This why UNIDO’s Renewable and Rural Energy (RRE) Programme strives to promote renewable energy at the local level, with specific attention to industrial applications for the benefit of people and enterprises.

The RRE Division responsible for enhancing the use of renewable sources of energy by industry and facilitating access by the rural poor to affordable and sustainable energy to support productive activities and the income and employment opportunities they create, thereby contributing to the mitigation of climate change developing countries and countries with economies transition. In line with the overall strategy of the Department, the Division cooperates closely with the IEE and CPN Division, as well as other relevant organizational divisions within UNIDO, in particular with the Department of Environment, Department of Agri-Business Development and the Department of Trade, Investment and Innovation, donors such as the GEF, and other international and national institutions.

It is crucial that the progress of industries should be focused on addressing energy poverty, energy security and climate change simultaneously. UNIDO has consistently promoted industrial development in an environmentally friendly manner and recognizes the adoption and increased use of renewable energy as key measures to meet these challenges.
Renewable and Rural Energy Programme: Core Focus Areas

**MINI GRIDS**
UNIDO helps in creating capacity to develop renewable energy projects for communities that are isolated from national grids. Small hydro power, solar and photovoltaic, wind, biomass and biogas power schemes are used.

**BUSINESS MODELS**
UNIDO promotes renewable energy production as a viable industry. There is great potential for the creation of markets for renewable energy entrepreneurs and adding value to agribusiness.

**CROSS-CUTTING POLICY & CAPACITY BUILDING**
In addition to the three prime strategic areas of intervention, the RRE Division also focuses on creating an enabling policy and market environment for increasing the adoption of renewable energy and for developing the technical capacity and business skills to encourage entrepreneurship.

**INDUSTRIAL APPLICATIONS**
UNIDO encourages enterprises to use locally available energy sources by promoting sustainable patterns of energy use, such as fuel switching from fossil fuels to locally available renewable sources. This increases industrial competitiveness and creates jobs.

**Productive uses**
- Renewable energy enterprises
- Green industry (local manufacturing)
- New business models for distributed energy

**MINI-GRIDS**
- INDUSTRY APPLICATIONS

**BUSINESS MODELS**
- INDUSTRY APPLICATIONS

**CROSS-CUTTING POLICY & CAPACITY BUILDING**
- INDUSTRY APPLICATIONS

**ENERGY VISION 2020**
Sustainable Energy for Inclusive Industrial Development and Climate Action
Renewable and Rural Energy – Projects

SOLAR ENERGY

Of the various solar technologies available, the RRE Division promotes the use of solar thermal energy and photovoltaic. These technologies can be used to generate heat and energy.

CAMBODIA Access to energy through scaling up of solar technologies and enhancing quality of fabricators of biomass gasifiers

Cambodia has small isolated electricity grids that serve around 12% of the population. Around 1,500 battery charging stations are operated by rural electricity enterprises to recharge lead acid batteries for off-grid areas, mainly operating diesel generators with high losses and high costs.

Objectives and Results
- The project facilitated the formation of public-private partnerships to disseminate renewable energy technologies and demonstrate the viability of solar photovoltaic, solar drying and biomass gasification.
- Photovoltaic battery charging stations were installed in six remote villages, providing energy for 1,073 households, replacing diesel generators thereby cutting charging costs by two thirds and saving 32 tons of CO₂ emissions/year. A solar dryer technology was installed to improve dried fish production, replacing wood fuel heat, which boosted the capacity of local businesses.

CÔTE D’IVOIRE Promoting renewable energy based grids in rural communities

The Government is dedicated to increase rural access to electricity grids. These efforts are impeded by high costs of grid extension and other factors. 61% of the population, around 11.6 million people, still lack access to electricity.

Objectives and Results
- The UNIDO Department of Energy project, in cooperation with the EU, is helping the country design and implement seven pilot mini-grid systems using solar energy, totaling over 200 kW of capacity and serving approximately 4,000 households and small businesses.
- The project assisted the government to establish a stimulating policy environment, and is preparing 10 additional sites suitable for the development of solar based mini grids.
- The estimated reduction of CO₂ emissions.

KYRGYZSTAN Supply of reliable energy to rural first aid stations

Kyrgyzstan’s rural and remote areas lack reliable electricity supply, where losses account for up to 70% of transmitted electricity. In other areas, the national grid has ceased to function and around 60% of the population experience regular disruption of power supplies. This has a serious effect on hospitals and first aid stations, prohibiting the use of laboratories, vaccinations, medicine refrigerators and sterilization equipment.

Objectives and Results
- The project on supplying first-aid stations with renewable energy resulted in around 2,640 local residents of 16 villages receiving steady access to health services.
- A training event on the usage and maintenance of solar photovoltaic and small hydro power equipment was conducted in cooperation with the Kyrgyz-Russian Slavic University.
CAMBODIA

Access to energy through scaling up of solar technologies and enhancing quality of fabricators of biomass gasifiers

• The capacity building component ensured the training of staff from the Institute of Technology of Cambodia, Ministry of Industry, the University of Battambang and the private sectors.

Donors and Partners

CÔTE D’IVOIRE

Promoting renewable energy based grids in rural communities for productive uses

• Assistance was provided for setting up a clear institutional framework for modern energy access in rural areas.

Donors and Partners
GEF, Ministry of Mines and Energy of Côte d’Ivoire.

KYRGYZSTAN

Supply of reliable energy to rural first aid stations

• An information campaign on the use of renewable energy in local media and on the Internet was conducted.

Donors and Partners
UNDP, UNIDO, UNV and WHO
Renewable and Rural Energy – Projects
SMALL HYDRO APPLICATIONS

**GUINEA** Promoting development of multi-purpose mini-hydro power systems

Guinea’s energy consumption is relatively low and over 80% of the consumed energy is produced from biomass, 18% from hydrocarbons and only 2% is generated electricity. Only 18.4% of people had access to electricity in 2003, with a plan to raise this number to 65% in 2015.

**Objectives and Results**
- Under the project, a 800-kW hydro facility will be constructed at one site by 2016, serving 20,800 persons with access to electricity;
- Feasibility studies for two mini hydro facilities were conducted. Both facilities are ready to be developed by potential investors.

**NIGERIA** Small hydro power plant for Tea factory in Kakara, Taraba State

With a population of about 50,000, the area’s main economic pillar has been the Highland Tea Factory in Kakara and its tea plantation consisting of 6,000 outreach farmers. Running on diesel generators and wood fuelled boilers for drying, the tea factory was economically drained by the energy costs involved and at the verge of closure. Furthermore, the lack of power supply meant no businesses or industries could be established.

**Objectives and results**
- The project provided clean, affordable and sustainable energy to the tea factory, which was the mainstay of local economy that was financially crippled by use of diesel and wood fuel for its operations.
- The project facilitated the start of local economic activities and creation of new jobs, particularly through a set-up of small-scale businesses such as milk and meat processing.
- The project has a positive impact on

**TANZANIA** Mini grid based small hydropower sources for rural electrification

Less than 14% of the total population has access to electricity from the national grid. About 70% of the total population lives in rural areas and less than 2% have access to electricity. Lower levels of electricity access and commercial energy use are the major challenges faced by the Tanzanian energy sector, which in turn holds the country’s economy back.

**Objectives and Results**
- Detailed feasibility studies for nine demonstration sites.
- The Rural Electrification Agency (REA) is undertaking mapping for all mini hydropower sites in Tanzania with the aim to create mini hydropower atlas for Tanzania.
- Mini Hydropower Centre has been established at the University of Dar es Salaam which was officially inaugurated on October 2014.
- Technology transfer and licensing for local manufacturing turbines up to 125kW; Seven local fabricators have been trained on fabrication of T-15 cross flow turbines.
- The guidelines for SHP standards are under preparation. Draft Feed-in-tariff document has been prepared.

**ZAMBIA** Renewable energy based electricity generation for isolated mini

Only 50% of the country’s urban and 3% of the rural population is connected to Zambia’s national grid. As a consequence, economic prosperity and social development are seriously hindered by the lack of access to energy.

**Objectives and Results**
- A 1 MW small hydro power plant was constructed and is fully operational. It supplies electricity to 25,000 people in the Shiwang’andu area and surrounding settlements.
Hydropower is the electricity generated using moving water. UNIDO primarily promotes small and micro hydro power plants. Small hydro projects produce 10 megawatts or less and micro hydro projects typically produce from a few kilowatts to a few hundred kilowatts of electricity to power-isolated homes, villages and small industries.

**Donors and Partners**
GEF, Ministry of Mines and Energy of Guinea.

- The project is also strengthening local policy and regulatory framework for renewable energy by providing training and capacity building, and introducing incentive mechanisms for hydro power use.


**The Donors and Partners**
The United Nations High Commissioner for Refugees (UNHCR),

Some 6,000 families that solely depend on the tea factory for living.

- A number of local communities were electrified using excess energy produced at the SHP plant.

**The Donors and Partners**
The Global Environmental Facility,

By the Energy and Water Regulatory Authority (EWURA) in collaboration with other stakeholders as part of the Government of Tanzania co-financing contribution.

- A total installed capacity of 3.331 MW of SHP are under development.

**The Donors and Partners**

**i-grids in Zambia**

**The Donors and Partners**
GEF and Zambia’s Electricity Supply Corporation (ZESCO), Rural Electrification Authority (REA) of Zambia, United Nations Environment Programme (UNEP), UNIDO International Centre on Small Hydro Power (ICSHP).
The uptake of renewable energy in the Gambia has faced several barriers and there is an urgent need to create a market environment conducive to investments in renewable energy. In addition, considering the increasing energy needs of the country, there is an urgency to demonstrate the technical feasibility and commercial viability of renewable energy through pilot plants.

**Objectives and Results**
- Six demonstration plants were constructed with a total capacity of 1.5 MW, generating 1,250 MWh of renewable energy per year. Total reduction of GHG emissions is estimated to be 31,000 tons of CO₂ over 2012-2013.
- 60 companies, 20 renewable energy experts and 40 stakeholders were trained and made aware of opportunities in renewable energy.

**WIND ENERGY**

A typical wind turbine comprises rotor blades which convert wind to rotational energy and a generator which converts this rotational energy to electricity. Wind energy, apart from being renewable, has already reached grid parity, which is the point where cost of wind power
In 2013, UNIDO’s Department of Energy, RRE Division collaborated with the International Center on Small Hydro Power (ICSHP) to develop a small hydropower knowledge platform and produce the World Small Hydropower Development Report 2013. This flagship initiative of UNIDO is the first compilation of valuable information on global small hydropower. It serves as a crucial guide for policymakers and investors. The World Small Hydropower Development Report aims to promote the increase of the share of this valuable source of energy in the energy mix, through informing policy on energy planning and guiding investors in entering renewable energy markets, through information and knowledge sharing.

The same effort is again coordinated in 2016, UNIDO and ICSHP, along with partners, launched this updated version of the Report, continuing the mission of informing world leaders on the status and potential of small hydropower development, and encouraging stakeholders in the sector to share and disseminate this knowledge.

matches that of traditional sources. Even though wind power is capital intensive, it requires no fuel costs and hence its price is much more stable than the volatile costs of traditional fuels. With a negligible environmental impact, wind energy is a powerful renewable source of energy.

Donors and Partners
GEF, the European Union (EU), GAMWIND, Q-Cell, National Water and Electricity Company (NAWEC).

• An electricity master plan and a renewable energy law were developed, including a standard power purchase agreement which has since been adopted and enforced.
Renewable and Rural Energy – Projects

BIOMASS/BIOGAS HEAT AND POWER GENERATION

Biomass or biogas energy refers to the conversion of biological waste to energy. The energy in biomass essentially comes from the sun because plants (which constitute biomass) grow using the sun’s energy. This, coupled with the fact that biomass can grow back over short periods of time, makes biomass energy a renewable source of energy. Among various ways to convert biomass to bio-power, UNIDO promotes the use of biomass gasification by way of which biomass is heated in the presence of controlled amounts of oxygen and under pressure, resulting in a mixture of hydrogen and carbon monoxide called syngas. Syngas, after purification, can then be burned or run through a gas turbine to generate electricity. Though biomass qualifies as a renewable energy resource it is crucial to use the kind of biomass that will result in relatively less harmful emissions. Furthermore, UNIDO emphasizes the use of agricultural waste streams to generate heat and electricity not only via combustion and gasification but also via anaerobic digestion. Such biogas projects also have the potential to significantly contribute to enhancing the environmental sustainability of agro-industries.

CUBA Promoting the development of biomass energy amongst selected small- and medium-sized agro-industries

A number of financial, institutional, technical, information and human resource-related barriers hamper the increased use of renewable energy sources in isolated areas in Cuba. On the Isla de la Juventud, Cuba’s second largest island, diesel-based power and heat generation was commonly used, which lead to high levels of GHG emissions. Given the high cost of generating electricity on the island and the demonstrated engagement of private sector investments in fossil fuel-based power generation, Isla de la Juventud presents a priority opportunity to support renewable energy technologies.

Objectives and Results
- A large-scale biomass gasification plant has been constructed in the northern part of the island; the plant is designed on the modular basis of a 0.5 MW component.
- The UNIDO Cocodrillo biomass gasification plant has been operational since 2010 and supplies electricity to 96 households (325 GWh/year).

CHILE Promoting the Development of Biogas Energy Amongst Select Small- and Medium-Sized Dairies

Chile’s energy sector is strongly dependent on imported fossil fuels resulting in 34% of total national GHG emissions. In light of this, the project aims to reduce GHG emissions by promoting investment and market development of biogas energy technologies with a focus on the small- and medium sized dairy industry in the Los Lagos and Los Rios regions. Concurrently, costs for electricity consumption are to be reduced and environmental benefits achieved.

Objectives and results
- A portfolio of biogas energy projects in the dairy sector for a cumulative 750kW capacity will be established.
- A training and certification programme for project developers, suppliers, installers and operators of biogas energy systems in agro-industries will be conducted.
small- and medium-sized agro-industries

- A fund was established within Compañía Fiduciaria to finance renewable energy projects in Cuba and to set up an incentive mechanism for local companies to invest into the renewable energy sector.

Donors and Partners
GEF, UNEP, the Government of Cuba.

all - and Medium-Sized Agro-Industries

Donors and partners
GEF, Ministry of Energy of Chile, private sector actors.
Renewable and Rural Energy – Projects

**BIOMASS/BIOGAS HEAT AND POWER GENERATION**

**URUGUAY** Towards a green economy: Stimulating sustainable production and technologies in prioritized sectors

The large majority of farm holders in Uruguay are generally not fully aware of the environmentally appropriate management of residues and waste flows related to their business. The project aims to transform the different kinds of waste generated in the agriculture and the agro-industry production chains in Uruguay into various types of energy with the aim of reducing GHG emissions, while contributing to the development of a low carbon sustainable production model supported by an adequate technology development and transfer.

**Objectives and results**
- Four large-scale demonstration projects for waste valorization and renewable energy technologies will be supported
- A range of pilot projects applying various low-carbon technologies will be implemented in the prioritized sectors to demonstrate innovative solutions
- This will lead to around 126,341 t CO2e of overall emission avoidance per year.

---

**ARMENIA** Sustainable livelihood for socially vulnerable refugees, internally displaced and local families

Over a quarter of the Armenian population lives below the official poverty line. Income inequality and lack of opportunities are two major current challenges, particularly for refugees, internally displaced persons, women and other vulnerable groups. The project supports the empowerment of poor and vulnerable rural households by encouraging their participation in economic life, with a special focus on women and youth. This project will create a microcredit facility to support local businesses and facilitate access to modern and clean energy services through the construction of pilot biogas plants, and training activities for the local population in the operation and maintenance of these energy systems.

**Objectives and Results**
- Following the assessment of business interests and training needs, 103 persons were trained in entrepreneurial skills; 35% of participants were women.
- A community-based biogas plant

---

**KENYA** Sustainable conversion of waste to clean energy for GHG emissions reduction

Kenya, like other sub-Saharan African countries, faces the uncertainty and potential risk of climate change. Already almost 50% of the country’s key biodiversity hotspots are at risk due to reduced habitat and other human induced pressures. In 2011, 72.4% of the total primary energy supply in Kenya was dependent on wood fuel and other biomass. Kenya’s vulnerability to climate change is furthermore affected by, inadequate technology and information infrastructure. This project will facilitate the wide uptake of clean energy in the agro-industries sector as part of large countrywide efforts in mitigating the anticipated climate change impacts.

**Objectives and results**
- Improved human and institutional capacity for continuous development of WTE projects.
- Improved human capacity for sustainable operation and maintenance of WTE projects.
- WTE demonstration projects on a private-public partnership (PPP) basis for a cumulative 765 kWe and 558
Sustainable conversion of waste to clean energy for GHG emissions reduction

• Favorable investment environment through creation of incentive scheme, leading to replication of at least 14 MWe and 6 MWth plans. This would lead to an overall emission reduction of around 617,423 t CO₂e.

Donors and Partners

of 15 kWth capacity and two household biogas plants of 3 kWth are being installed in a remote rural, while the establishment of an SME-support fund is underway.

Donors and partners

Towards a green economy: Stimulating sustainable production practices and low-emission technologies in prioritized sectors

Donors and Partners

Donors and Partners
Climate Policy and Networks

The promotion of inclusive climate policies and strong networks for SMEs, start-ups and entrepreneurs, has the potential to contribute to the mitigation of climate change, while also simultaneously strengthening the comparative advantage and competitiveness of the industrial sector in developing and emerging economies; thereby contributing to job creation, improved living standards and the development of sustainable and inclusive regional and global value chains.

The Climate Policy and Networks (CPN) Division responds to the increasing demand for innovative partnerships, multi-level and integrated solutions to address the energy, climate and development challenges simultaneously. The Division is responsible for developing and implementing integrated policies, global and regional multi-stakeholder partnerships, as well as advocacy and outreach activities in the field of sustainable energy and climate change. The Division positions UNIDO strategically in the global energy and climate change forums, and executes global and regional programmes on low carbon and climate resilient technology innovation and entrepreneurship, as well as networks and centres. Additionally, the CPN Division focuses on promoting programmatic approaches, and coordinates work related to new and ongoing global and regional programmes, cross cutting themes, nexus and knowledge management issues. In addition, the Division coordinates work related to global forums such as the Vienna Energy Forum, and participation in meetings of the Conference of the Parties and other relevant energy and climate conferences and events. In discharging its responsibility, in line with the overall strategy of the Department, the Division cooperates closely with the RRE and IEE Divisions, as well as other relevant organizational units within UNIDO, in particular with the Department of Environment, the UNIDO ITPOs and Field Offices.

Climate Policy and Networks – Global Programmes

Global Network of Regional Sustainable Energy Centres (GN-SEC)

The GN-SEC Platform is a powerful post-2015 south-south and triangular multi-stakeholder partnership, which is coordinated by UNIDO in cooperation with various regional economic communities and organizations. The expanding partnership comprises of various Centers in Africa, Caribbean, Central America, Pacific and the Himalaya-Hindukush. UNIDO provides key technical assistance for the establishment and operation of the Centers. The global platform provides a common umbrella for promoting south-south cooperation between the various regions.

Objectives

The Centers respond to the urgent need for enforced regional cooperation and capacities to mitigate existing barriers for renewable energy and energy efficiency investments, industries and markets. They assist in creating an enabling environment through tailored regional methodologies and interventions.

The Centers enjoy high-level support by the counterpart ministries, operate according to local procedures and respond to the individual needs of the respective national Governments. The Centers complement and strengthen ongoing national activities in the areas of policy and capacity development, knowledge management and awareness raising, as well as investment and business promotion. They assist in building up local sustainable energy industries and maximizing local value creation along the value chains of sustainable energy investments. The centers form a strong global advocacy group for sustainable energy issues and provide a strong link between international energy and climate agreements and concrete implementation on the ground. The Centres will strengthen the implementation capacities of the Sustainable Energy For All (SE4ALL) initiative.
Climate Policy and Networks Programme: Core Focus Areas

GLOBAL NETWORKS & PLATFORM

- Strengthen global, south-south and triangular partnerships, centers and programmes to promote sustainable energy and climate resilience.
- Promote global and sub-regional awareness raising, knowledge exchange, advocacy and policy leadership in the area of sustainable energy and climate resilience.

LOW CARBON TECHNOLOGIES & CROSS CUTTING ISSUES (NEXUS)

- UNIDO promotes clean energy production as a viable industry. There is great potential for the creation of markets for renewable energy entrepreneurs and adding value to agribusiness.

GLOBAL NETWORKS & PLATFORM

- ISID
- Inclusive & Sustainable Industrial Development
- Knowledge Management

GENDER RESPONSIVE CLIMATE POLICY

- Promote integrated and adapted renewable energy, energy efficiency and other low carbon energy policies and solutions, achieving gender equality and empowering women in the energy sector.
- Promote global and regional awareness raising, knowledge exchange, advocacy and policy leadership in the area of sustainable energy and climate resilience.
The network is acknowledged as priority initiative in various UN outcome documents such as the Vienna Declaration and Programme of Action (VPoA) for Landlocked and Least Developed Countries (LLDCs) or the SAMOA Pathway for Small Island Developing States (SIDS). Currently the following centers are operational or under development:

- ECOWAS Centre for Renewable Energy and Energy Efficiency (ECrEEE)
- Regional Centre for Renewable Energy and Energy Efficiency - Arab region (RCrEEE)
- East African Centre for Renewable Energy and Energy Efficiency (EACrEEE)
- Southern African Centre for Renewable Energy and Energy Efficiency (SACrEEE)
- Caribbean Centre for Renewable Energy and Energy Efficiency (CCrEEE)
- Pacific Centre for Renewable Energy and Energy Efficiency (PCrEEE)
- Himalayan Centre for Renewable Energy and Energy Efficiency (HCrEEE)
- Mesoamerican Centre for Renewable Energy and Energy Efficiency (MCrEEE)
- SICA Centre for Renewable Energy and Energy Efficiency (SiCrEEE)

Donors and Partners
Austrian Development Agency (ADA), Spanish Agency for International Development Cooperation (AECiD), the United States Agency for International Development (USAID), the European Union (EU) and the Global Environment Facility (gEF), SIDS Sustainable Energy and Climate Resilience Initiative (SIDS DOCK).

Climate Technology Centre and Network (CTCN)
The CTCN promotes the accelerated transfer of environmentally sound technologies for low carbon and climate resilient development at the request of developing countries. CTCN provides technology solutions, capacity building and advice on policy, legal and regulatory frameworks tailored to the needs of individual countries. The Climate Technology Centre & Network facilitates the transfer of technologies through three core services:

- Providing technical assistance at the request of developing countries to accelerate the transfer of climate technologies;
- Creating access to information and knowledge on climate technologies.

- Fostering collaboration among climate technology stakeholders via the Centre’s network of regional and sectoral experts from academia, the private sector, and public and research institutions.

UNIDO and United Nations Environment Programme (UNEP) cohost the CTCN with the support of a consortium of partners that are engaged in some 1,500 activities related to climate technologies in over 150 countries.

Objectives
To build or strengthen the capacity of developing countries to identify technology needs, to facilitate the preparation and implementation of technology projects and strategies to support action on mitigation and adaptation, and to enhance low-emission and climate-resilient development.

Results
The formal submission of requests for CTCN technical assistance has grown steadily since the CTCN opened for business in December 2013 due to high interest of Non-Annex 1 countries. This trend has been accelerating since the end of 2015. As of 19 July 2016, 63 Non-Annex 1 Parties have formally submitted a total of 127 Requests for technical assistance to the CTCN. CTCN has successfully designed and developed a comprehensive Knowledge Management system, has engaged in targeted capacity building activities and is nurturing a growing network of institutions to service its mandate.

Donors and Partners
Norway, European Commission, Denmark, Japan, Canada, USA, Germany, Switzerland, Finland, Ireland, and Global Environment Facility (GEF).

Low Carbon Low Emission Clean Energy Technology Transfer Programme (LCET)
UNIDO and the Ministry of Economy, Trade and Industry of Japan (METI) initiated the global collaborative Low Carbon Low Emission Clean Energy Technology Transfer (LCET) Programme. Over the years, low carbon low emission technologies, products, and services (LCETs) have emerged as potential solutions that address global key challenges of climate change, energy poverty, and adverse impact of industrialization in developing countries. The programme concept promotes rapid deployment and dissemination of innovative Japanese LCET products, services, and systems worldwide. In its first phase, two pilot projects on ultra-low head micro hydro power (ULH-MHP) technology systems have been implemented in Ethiopia and Kenya.
Objectives
Rapid deployment and dissemination of innovative low carbon technologies, services, and products (LCETs) through implementation of demonstration projects, capacity building and knowledge management activities, as well as the identification of suitable business models for replication.

Results
Three 10 KW ULH-MHP technology systems installed at 2 sites in Mwea (Kenya) and Fentale (Ethiopia). Awareness raising workshops, Operation & Maintenance trainings, capacity building panel discussions and workshops, training of trainers courses conducted.

Donor
Ministry of Economy, Trade and Industry (METI) of Japan.

Partners

GEF-IIASA-UNIDO partnership on integrated solutions for energy, water and land
To achieve innovative, inclusive and scalable transformative change, analytical approaches that are geared towards integrated systems analysis are required. The Institute for Applied Systems Analysis (IIASA) is at the forefront of these methodological advances to investigate the potential of land-use conflicts between food and energy production. In partnership with the GEF and UNIDO, the integrated solutions will focus on the energy-water-land nexus in the context of other major global challenges such as urbanization, environmental pressure and equitable and sustainable futures.

Objectives
The partnership will provide tools of analysis that facilitate integrated solution development and that are useful to both the GEF itself, as well as to policy and decision makers who benefit from GEF’s efforts.

Results
The project is in its initial phase, results are not solidified yet.

Donors and Partners
GEF, IIASA

Global Cleantech Innovations Programme for SMEs (GCIP)
In 2011, the United Nations Industrial Development Organization, with the support of the Global Environment Facility and the Government of South Africa, successfully implemented the ‘Greening the COP17’ project. Building on the success of the 2011 Clean Technology Innovation Competition, UNIDO and the GEF developed a global flagship programme, the Global Cleantech Innovation Programme (GCIP) for SMEs. It currently encompasses 7 countries, and more than 10 countries have already expressed interest for the Programme to be developed in their countries. The GCIP for SMEs demonstrates the significance that UNIDO places on nurturing innovation in clean energy technologies, strategic partnerships and enhancing private sector involvement. The programme involves four key features – a competition to create an ecosystem for sustainable growth, the showcasing of innovative technologies, the provision of mentoring and training through the Cleantech Accelerator, and the enhancement and facilitation of access to capital.
Objectives
The GCIP for SMEs, in strong partnership with the Cleantech Open, USA and currently operating in Armenia, India, Malaysia, Pakistan, South Africa, Thailand and Turkey, takes an innovation ecosystem approach to identify a pool of promising entrepreneurs and start-ups, and supports them through ongoing mentoring, webinars and networking events to grow their innovative concepts into full-fledged business models ready for the national and global markets.

Results
Under the 2014 competition cycle, a total of 555 applications were received across the six countries, from which 159 innovative clean energy technology entrepreneurs were selected to take part in the Cleantech Accelerator. The entrepreneurs were chosen across four clean energy technology categories; 58 in Renewable Energy, 41 in Energy Efficiency, 32 in Waste to Energy, and 28 in Water Efficiency.

Donors and Partners
GEF, The Cleantech Open.

Vienna Energy Forum (VEF)
The Vienna Energy Forum (VEF) is a biennial, global and multi-stakeholder forum with a mandate of exploring 21st century developmental challenges from the perspective of sustainable energy and providing a platform for debate on practical solutions to these challenges. Given that the complex issues connected to sustainable energy need to be addressed in a holistic manner, the VEF brings together all sectors of society and participants from all over the world, thereby paving the way for tangible partnerships on the ground.

Objectives
The main purpose of the VEF 2017 is to facilitate a multi-sectorial, multi-stakeholders and inter-disciplinary dialogue on sustainable energy for inclusive development and productive capacities. The Forum brings together policy makers, civil society and private sector representatives and academia to identify opportunities and challenges, share best practices, forge networks, intensify international cooperation and engage in concrete energy business partnerships in the context of SE4ALL.

Private Financing Advisory Network (PFAN)
The Private Financing Advisory Network (PFAN) is a multilateral public-private partnership initiated by the Climate Technology Initiative (CTI) in cooperation with the United Nations Framework Convention on Climate Change (UNFCCC). To scale up operations for larger impact, it has recently made governance changes; PFAN is now hosted by UNIDO in collaboration with REEEP.

PFAN identifies and nurtures promising, innovative clean and renewable energy projects by bridging the gap between investors, clean energy entrepreneurs and project developers. It is one of few actors in the climate finance space addressing the barriers for small and medium enterprises (SME) in developing countries and emerging economies – shortage of bankable projects on the demand side and ability to assess risk and conservative lending culture on the supply side, all by leveraging private sector investment with a small amount of public funds (leverage rate of USD 80-100 for every USD 1 of donor funds).

Objectives
The main objective of the PFAN Programme are increasing investments in low carbon, climate resilient projects for sustainable development, leading to reductions in emissions of greenhouse gases and enhanced climate resilience and sustainable development, including energy access in developing countries. The Programme will address major barriers in project development and financing capacity identified in previous sections, and bridge the gap between investors, entrepreneurs and project developers by nurturing promising, innovative projects.
PFAN has raised total financing of $1.2 billion, which is being used to build, install and operate 701 megawatts (MW) of clean energy for 87 projects across Africa, Asia and Latin America (status as of September 2016). These projects – which include solar and wind farms, biomass and biogas power plants, small hydro generation, decentralized renewable energy mini-grids for underserved areas, and others – together translate to over 2.6 billion tones of avoided CO2 emissions that would otherwise be released into the atmosphere annually. PFAN works in different countries in all the regions of the world. Asia and Africa currently dominate, at the same time, PFAN is expanding across Latin America and the Caribbean, and recently launched activities in Ukraine, Georgia and Uzbekistan.

Donors and Partners
Australia, U.S. Agency for International Development (USAID), Japan, Norway, the Climate Technology Initiative (Austria, Canada, Germany, Japan, Norway, the Republic of Korea, Sweden, and the United States), International Center for Environmental Technology Transfer (ICETT), NREL, IRENA and other strategic partners.

**PFAN track record**

- 87 projects
- USD 1.2 billion raised
- 701 MW installed capacity
- Leverage ratio: 1 / 80
- 141 GWh pa energy savings
- 2.6 million tonnes CO2e pa
- 358 projects
- USD 8.7 billion Pipeline
- 4,900 MW capacity
- 17.6 million tonnes CO2e pa
UNIDO’s Energy Programme works with many partners to deliver a wide range of projects in the field of energy. In recent years, the number and scope of partnerships have steadily increased. These ties range from traditional links with UN organizations and other inter-governmental bodies to innovative initiatives involving the private sector and civil society.

By expanding the scope of its partnerships UNIDO improves the outcomes of its technical cooperation programmes with the ultimate goal of enhancing national and regional capacity building in line with local priorities. This expansion of partnerships also supports UNIDO’s goal to develop growth with quality, engaging with multiple diverse partners creates networks that can help UNIDO transform lives.

UNIDO distinguishes between three types of partnerships: multi-stakeholder platforms, strategic partnerships and knowledge partnerships.

**MULTI-STAKEHOLDER PLATFORMS**

A multi-stakeholder platform involves a large number of stakeholders from the public and private sectors and acts as a catalyst for change. These partnerships provide platforms that address major challenges faced by the world: inequality, global poverty, lack of energy access and climate change.

Energy is largely seen as a core sustainable development component. In 2009, the UN Secretary-General Ban Ki-moon set up a High-Level Advisory Group on Energy and Climate Change tasked to produce a set of recommendations on the respective subjects. The group’s report in 2010 formed the basis for a new UN initiative: Sustainable Energy for All (SE4ALL), which was launched in 2011 and led by UNIDO, UN Energy, UNDP and the World Bank. This collaboration between the UN, governments, institutions, private companies and civil society was designed to tackle the issue of energy poverty by changing the world’s energy system by 2030. SE4ALL was launched in 2012 at the UN Conference on Sustainable Development (Rio+20), where it received over $50 million in committed funding from investors and businesses. In total, over $500 billion was mobilized with over 700 commitments made, primarily in the field of sustainable energy. The Climate Technology Centre and Network (CTCN) is a consortium led by the United Nations Environment Programme (UNEP) in collaboration with the United Nations Industrial Development Organization (UNIDO) with the support of 11 Centres of Excellence, including UNEP Risø Centre, which are located both in developing and developed countries. It is the operational arm of the UNFCCC Technology Mechanism. The CTCN was born out of United Nations Framework Conventions on Climate Change (UNFCCC) negotiations. In December 2010, at COP 16 in Cancun, Mexico, an agreement was reached to establish a new technology mechanism consisting of a Technology Executive Committee and a Climate Technology Centre and Network.

In the recently operationalized CTCN, UNIDO is leading the establishment of the climate technology network and is tasked with implementing relevant procedures and delivering training. By the end of August 2016, CTCN with the support of a consortium of partners engaged in some 1,500 activities related to climate technologies in over 150 countries. CTCN has secured a total of USD 31.3 million from bilateral and multilateral sources.

PFAN is an existing multilateral public private partnership, initiated by the Climate Technology Initiative (CTI), a technology cooperation mechanism under the International Energy Agency, and the Expert Group on Technology Transfer (EGTT) of the UNFCCC. At its 23rd meeting in May 2015, PFAN’s governing body, the CTI Executive Committee (ExCo), decided PFAN should be institutionalized as a clean energy finance initiative of a multilateral organization with the ability to smoothly accept funds from donors with a variety of financial requirements and disburse funds for PFAN operations through a pooled financing mechanism. The ExCo agreed to identify a new host for PFAN operations and established a taskforce composed of the United
States (lead), Canada, Norway, Korea and Sweden to research hosting options. In October 2015, the ExCo decided that PFAn operations would be hosted by UNIDO in collaboration with REEEP as the strongest option from technical/operational and responsiveness perspectives, especially regarding ease of contracting.

The PFAN network consists of independent businesses and investment advisors, specializing in business development in middle income and lower income countries. These businesses need a counterpart organization that can handle small scale contracts rapidly and yet accountably, can engage with and maintain a wide network of businesses around the globe, and has the necessary expertise in technology, business modeling, and finance to run the day to day operations.

STRATEGIC PARTNERSHIPS

Strategic partnerships include those with multilateral and bilateral donors, as well as with the private sector; UNIDO’s ties with the private sector are growing.

UNIDO is one of the ten implementing/executing agencies of the Global Environment Facility (GEF) and has been very successful in obtaining GEF funds and leveraging co-financing for the implementation of large energy efficiency and renewable energy projects in developing countries and countries with economies in transition.

The overarching objective of all GEF-UNIDO projects is the reduction of global GHG emissions and consequent environmental impact through improved industrial energy efficiency and sustainable renewable energy solutions.

The Global Environment Facility Strategic Programme for West Africa (GEF SPWA) and the ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE) are also examples of strategic partnerships. The Cleantech Open, a non-profit organization supporting business startups, is another example of a partnership through an operational project, the Global Cleantech Innovation Programme (GCIP) for SMES, aiming to act as an agent for broader change. In this endeavor, UNIDO is supported by the GEF, which has a long history of supporting UNIDO in its work on energy, climate change and ozone depleting substances.

KNOWLEDGE PARTNERSHIPS

UNIDO forms knowledge partnerships with governments, businesses, civil society, international organizations and academia to streamline the delivery of development solutions that are ever more effective and efficient. To this end, UNIDO has cooperated with a number of institutions and organizations with knowledge and experience in the field of energy efficiency and renewable energy as part of efforts to shift to a sustainable economic model. By pooling resources with organizations that often have a greater presence on the ground, UNIDO-led projects benefit from faster delivery times and develop more targeted solutions to promote inclusive and sustainable industrial development.

Since 2011, as part of the strategy to streamline technical cooperation activities, UNIDO has signed Memoranda of Understanding with five nongovernmental partners:

- The Austrian Energy Agency (AEA);
- The International Institute for Applied Systems Analysis (IIASA);
- The Renewable Energy and Energy Efficiency Partnership (REEEP);
- The Energy and Resources Institute (TERI); and
- The NL Agency of the Ministry of Economic Affairs of the Netherlands.
Energy Vision 2020: Emerging Opportunities

Sustainable Cities-Hubs of Innovation, Low Carbon Industrialization and Climate Action

As the world continues to urbanize rapidly, the importance of shaping cities that provide opportunities for developing synergies, such as decoupling economic growth from environmental degradation, while at the same time creating employment and fostering clean energy innovation, has begun to receive widespread recognition. This is particularly true in developing countries where urban growth is relatively high and the existing systems and infrastructure are not sufficient. Research reveals that more than 80% of the new energy demand will come from cities in developing countries. Estimates show that more than half of the global population currently lives in cities, and is expected to reach two-thirds by 2050. This global megatrend of accelerated urbanization, while bringing greater opportunities for growth and human well-being, will increase the inter-relations between cities and climate change. According to the World Bank and UN-Habitat, cities are the main sources of global greenhouse gas emissions, responsible for 80% of global CO2, with urban transport producing around 23% of global CO2 emissions.

By 2030
60% of world's population will live in cities by 2030
80% of all urban growth in the next 20 years will take place in Africa and Asia

The Energy Vision 2020 aims to utilize the great potential of cities to prevent and resolve the climate problems and contribute to human prosperity. Cities have their own local contexts (local infrastructure, culture, institutions and knowledge) and provide space to incubate new green technologies. Sociotechnical experiments can be carried out for clean energy innovation via observing and analyzing the interactions among technologies, users, infrastructure and institutions at city scale. The technology demonstration can shape the frontline for larger green innovation by being replicated and scaled up later. Additionally, local governments, unlike national ones, are free from military, economic, diplomacy and historical issues, which makes it easier for cities to efficiently tackle climate change through city networks by sharing knowledge and encouraging participation in climate action.

Although industry is a key engine of economic growth, the industry sector has been overlooked in sustainable cities as it consumes a large amount of energy and produces high carbon emissions. However, economic growth, supported by industry, is one of the three pillars of sustainability which requires greater consideration. In this regard, low-carbon industries can empower city economy and provide solutions for decoupling economic growth from carbon emissions, while at the same time creating green jobs for youth employment. It is particularly urgent for the pre-industrialized countries to guide the path towards low-carbon industrialization. In line with its mandate of ISID, UNIDO plays a lead role in promoting sustainable energy solutions for sustainable cities through its Global Forums and large portfolio of technical cooperation projects around the world.

Sustainable cities require comprehensive and integrated knowledge, having considered this, UNIDO seeks for cooperation with other players such as private companies, governments and research institutes to complement knowledge and promote integrated nexus approaches. To maximize the impact of interventions the Energy Vision 2020 also focuses on urban transport, energy and industries, taking full advantage of the specialties of UNIDO. Accordingly, UNIDO’s work on sustainable cities also supports the Sustainable Development Goals (SDGs) and the 2030 Agenda: SDG 7 (affordable and clean energy), SDG 9 (industry, innovation and infrastructure) and SDG 11 (sustainable cities and communities).
Sustainable cities case studies

**Sustainable cities initiative for Senegal**
- Cities included in the initiative: Diamniadio, Dakar and Saint Louis
- Project budget: $9.5m GEF Grant; $51m co-financing
- Project co-implementing agency: World Bank
- Project donors and partners: Global Environment Facility (GEF), Ministry of Environment and Sustainable Development, Municipal Development Agency
- Short description: Diamniadio Industrial Park in Greater Dakar and Saint Louis aim to integrate climate risks and sustainability in planning and promote resource efficiency.

**Integrated adoption of New Energy Vehicles in China**
- Cities included in the initiative: Yancheng and Shanghai
- Project budget: $9m GEF Grant, $117m co-financing
- Project donors and partners: Global Environment Facility (GEF), Ministry of Urban Development - Government of India
- Short description: Yancheng and Shanghai will focus on waste management: the utilization of biogas from sewage treatment plant (STP) or from organic waste, solid waste-to-energy, a compost plant, and landfill gas management.

**Sustainable Cities Integrated Approach Pilot in India**
- Cities included in the initiative: Vijayawada, Mysore, Guntur, Jaipur and Bhopal
- Project budget: $13.5m GEF Grant, $80-100m co-financing
- Project donors and partners: Global Environment Facility (GEF), Ministry of Urban Development - Government of India
- Short description: Vijayawada, Mysore, Guntur, Jaipur and Bhopal will focus on waste management: the utilization of biogas from sewage treatment plant (STP) or from organic waste, solid waste-to-energy, a compost plant, and landfill gas management.

**Sustainable-city Development in Malaysia**
- Cities included in the initiative: Melaka
- Project budget: $3m GEF Grant; $18m co-financing
- Project donors and partners: Global Environment Facility (GEF), Malaysian Industry-Government Group for High Technology (MIGFHT)
- Short description: Melaka will address energy, transportation and buildings segments within its city planning activities.

**Abidjan Integrated Sustainable Urban Planning and Management in Cote d’Ivoire**
- Cities included in the initiative: Abidjan
- Project budget: $6m GEF Grant; $21m co-financing
- Project co-implementing agency: African Development Bank (AfDB)
- Project donors and partners: Global Environment Facility (GEF), Ministry of Urban Development, Ministry of Environment, District of Abidjan
- Short description: Abidjan aims to improve mobility planning, resilient transport infrastructure, and various initiatives to improve the urban air quality.

**Climate Change, Clean Energy and Urban Water in South Africa**
- Cities included in the initiative: Small and medium cities with about 100,000 inhabitants
- Project budget: $1.7m
- Project donors and partners: European Union (EU), Renewable Energy and Energy Efficiency Partnership (REEEP)
- Short description: The project will catalyze market-based approaches to reducing GHG emissions in municipal waterworks.
Industrial corridors and clusters have become keywords in the policy debate in industrialized and developing countries alike. The promotion of corridor-based development for channeling industrial growth is based on the premise that organization of industrial activities in clusters along transit corridors can create economies of agglomeration, which trigger competitive advantages, job opportunities and sustained growth. However, in the absence of coherent policies, institutional support and best practices, the opportunities for reducing the carbon impact of such rapid economic growth can be lost.

UNIDO seeks to seize the opportunity made possible by industrial corridors and clusters, and assist developing countries to further their growth aspirations in a low-carbon manner by presenting low-carbon concepts, best practices, interventions and policies. These processes will assist target countries, especially to begin with a clear focus on middle-income countries, to develop low-carbon industrial corridors and clusters without stifling their ambitious targets for job creation and economic growth. UNIDO does not confine the objectives of industrial corridors to efficiency and productivity alone. In line with its mandate, UNIDO strives to promote industrial corridors that can generate new economic opportunities for the poor, and to do so inclusively, especially for the benefit of women and marginalized communities.

Examples of internationally renowned industrial clusters, such as that of the Silicon Valley cluster...
in California, the information technology cluster of Bangalore in India, or the Australian and Chilean wine clusters demonstrate that innovative industrial clusters provide an enabling environment where enterprises can develop a competitive and global edge, while at the same time generating wealth, jobs and local economic development. UNIDO highlights the fact that the advantages associated with clustering do not always emerge automatically unless there are targeted policies, incentives and institutional support to make things happen on the ground. Relatively few industrial clusters in the developing countries have been able to achieve high and sustained growth rates. In many cases, they are trapped in a cycle of cut-throat competition, stagnation and negative growth, and are unable to spontaneously achieve the transition to innovation and growth.

An essential feature of UNIDO’s approach is its focus on the existing industrial clusters, rather than creating new ones unless there are concrete opportunities for the same. While existing clusters often demonstrate significant unrealized potential, the creation of clusters from scratch is likely to lead to a top-down process, with private sector having limited incentives to assume a leading role. Correspondingly, UNIDO strives to make existing industrial corridors and clusters more productive and inclusive. As a specialized UN Agency, UNIDO is well-placed to mediate the different interests in an industrial corridor, be it inter-regional or international, and promote cooperation.

Industrial corridors, such as those planned in India and China, are mega-projects and futuristic vehicles of economic growth. Projects of this mammoth nature need thorough visualization, planning and meticulous execution. Comprehensive policy frameworks and their implementation are mandatory for the success. Lessons learnt from similar projects implemented in the past are vital clues and the basis for the future. With 50 years of experience in the area of industrial policy and development, UNIDO strives to ensure that these developments happen in a low-carbon fashion and to improve corridors’ abilities to harness the potential of clan energy technologies by promoting technology transfer, fostering innovation, strengthening entrepreneurship, and facilitating international partnerships. UNIDO’s efforts in creating a better-coordinated vision of industrial and energy policy at all levels will further support the low-carbon development of such mega-projects.

The UNIDO Energy Vision 2020 will foster the provision of safe, reliable, effective, efficient, and fully integrated sustainable energy solutions which will best meet the needs of industrial corridors and clusters at improving levels of productivity and costs, and thereby contribute to the industrial development as a whole in a fashion which supports government strategies for all round economic and social development whilst being environmentally sustainable.
To date, there have been incredible development achievements along various fronts: science, technology, health, and even lowering the percentage of people living under extreme poverty, to name but a few. Despite these major accomplishments the benefits associated with economic progress and human wellbeing are not shared evenly across the global population. One and a half billion people still do not have access to electricity or clean water, and almost one billion go hungry every day. To improve and sustain human welfare, it is critical that access to modern, reliable, and affordable energy, water, and food is expanded and maintained. Looking ahead to 2050, up to 60% more food production will be required globally, with an even larger increase in developing countries, while electricity generation is expected to double. With increasing energy and food demand, water demand is also expected to increase by 55%, with 40% of the world’s population living under severe water stress by 2050. Humanity has already reached or even exceeded the carrying capacity of several of the earth’s ecosystems and the growing needs for energy, water and food will only exacerbate existing challenges over the next decades.

**NEXUS: Energy-Water-Food-Ecosystem**

1. Dematerializing products
2. Switching to low-carbon inputs
3. Increasing process efficiency
4. Minimizing process emissions
5. Closing the carbon loop

**Estimated increase in energy, water and food demand by 2050**

- **ENERGY**: +80%
- **WATER**: +55%
- **FOOD**: +60%
Currently energy, water, and land resources tend to be managed, studied, and assessed within sector-specific silos, including within research, government, and business institutions. However, there are a myriad of interactions among these sectors. For instance, access to reliable and affordable energy is a pre-requisite for all economic activities and there is a strong linkage between energy, water and food production. For example, energy is used for pumping and treating water, with the share of energy attributed to water supply expected to increase in arid regions that rely more heavily on energy-intensive approaches, such as inter-basin transfers, desalination, and groundwater pumping. Furthermore, energy is used in the agro-forestry sector for fertilizer production, irrigation, cultivating and harvesting crops, and drying and processing products.

As a result of the interdependencies among sectors, solutions designed for an individual sector can have negative consequences for others. Despite the trade-offs, synergies among solutions covering energy, water and food security do exist. UNIDO recognizes that, given these interdependencies, the sustainable management and provision of energy, water, and food should be conducted using integrated approaches that are based on a broader systems perspective. The nexus approach adopted by UNIDO along with its partners such as the International Institute for Applied System Analysis (IIASA) and the Global Environment Facility (GEF) focuses on all three sectors, and strives to identify the linkages and interactions among sectors to better understand the synergies and trade-offs involved in meeting future resource demands of both human and natural systems in a sustainable way. The ultimate objective is to identify solutions that capitalize on potential synergies and co-benefits, minimize counterproductive policies and investments, and ensure that humanity remains within planetary boundaries.

As a first step towards operationalizing the potential of the nexus approach and for creating a baseline for future projects, UNIDO together with its partner, IIASA and the GEF, launched the Integrated Solutions for Energy, Water, Food and Ecosystem Security project. The new project aims to identify integrated solutions to energy, water, food, and ecosystem security in selected regions of the world and answer questions about how to achieve the Sustainable Development Goals.

The project will build upon UNIDO’s and IIASA’s expertise in the energy, water and land sectors to together develop and demonstrate a next-generation systems analysis framework capable of exploring and identifying synergistic technical and policy solutions to environmental and human development challenges related to the nexus. This framework will be applied in both regional and global contexts and will lay the foundations for developing integrated approaches to identify evidence-based policy and investment strategies that will inform decision making across the water, energy, and land nexus.

UNIDO has made a clear commitment to pursue its mandate of Inclusive Sustainable Industrial Development while engaging in sustainable energy, water and food security by a nexus approach. As part of the Energy Vision 2020, UNIDO will deepen the understanding of the nexus to provide an informed and transparent framework that is required to meet increasing global demands without compromising sustainability. Active participation by and among government agencies, the private sector and civil society is critical to avoiding unintended adverse consequences. A true nexus approach can only be achieved through close collaboration of all actors from all sectors. The nexus approach will also allow decision-makers to develop appropriate policies, strategies and investments, to explore and exploit synergies, and to identify and mitigate trade-offs among the Sustainable Development Goals related to industry, water, energy, food security, climate change and health.
Clean Energy and Migration

Recent events have brought unprecedented attention to migration as a global crisis. Among other issues, current global challenges such as climate change, human security, political instabilities and economic inequalities have further contributed to the largest migration of vulnerable communities between countries and continents since World War II. However, like any crisis, the migration crisis also presents an opportunity to provide integrated energy services and related skills to migrants in an effective, low carbon and cost efficient manner that would empower them to lead a better quality of life.

It is evident that current energy systems often used in migrants’ countries of origin and in temporary or transit camps and settlements are inefficient, costly and emission intensive. Recent studies have highlighted the possibility for a reduction of 6.85 million tons of CO2 in a year, and savings of 296 million euros spent on fuel for migrants and refugees. The unique mandate and pursuit of UNIDO in promoting ISID represents an opportunity to address energy needs of displaced communities that include refugees and migrants and empower them in terms of knowledge, skills and self-reliance.

The strategic approach envisaged by UNIDO is based on the premise that it is critical to enhance the access of poor communities to reliable, affordable and sustainable energy for creating productive capacities and job opportunities, and in addition this approach emphasizes the equally important imperative to meet the energy needs of migrants and refugees when they are in transit as well as empower them with skills, tools and knowledge to ensure that they are able to sustain their daily lives with dignity in countries of their settlement. Therefore, the UNIDO Energy Vision 2020 proposes a four-phase programmatic approach to address the varying energy needs of migrants and the displaced communities as under:

At the outset, it will be critical to address the challenges in the country of origin that can impact the root causes of migration resulting from, among other things, lack of appropriate energy access and services. At the same time, it is important to deploy clean and safe energy technologies (i.e. clean cooking stoves, solar power) in refugee/migrant camps and settlements as these places typically use cooking fuels and lighting that are unsafe and cause health risks, especially for women and children. For instance, in refugee camps, 90% of families do not have access to electricity and often there is no street lighting, leading to increased risk of violence against women and children.

The large-scale strategic deployment of renewable energy technologies would not only facilitate access to reliable clean energy, but would also contribute significantly to cost saving and lowering carbon footprints. There is a need not only to light the camps but also prepare migrants/refugees for post-camp activities by providing them with relevant skills, tools and knowledge in clean energy systems. This would help them in seeking employment opportunities in new countries of settlement. In this phase technical/vocational trainings could be provided on various aspects of the sustainable energy production and supply value chain; operations and maintenance; financial management and capacity building. This would greatly enhance opportunities and competitiveness of migrants in seeking jobs in clean energy industry and services at the country of destination.

In collaboration with key development partners as well as various funding agencies, specialized agencies and the private sector, through the Energy Vision 2020, UNIDO can assist the migrant community through the implementation of integrated energy solutions aimed at reducing poverty, creating wealth and building peace, while at the same time protecting the environment in a clean, innovative and sustainable manner.

Three types of migration

I. Climate Change migration- due to changing environmental conditions, altered ecosystem services and extreme weather events.

II. Humanitarian migration- due to conflicts, political instabilities and human right violations.

III. Economic migration- to seek improvement in living standards or opportunities compared to the migrant’s own region.
### Programmatic Approach to Sustainable Energy and Migration

#### Component 1: Prevention of Migration at Origin
- Enhanced access to clean and sustainable energy (linking to SE4ALL Goals)
- Green jobs (ISID)
- Support RE, EE and Clean technologies at Transit camps / Settlements

#### Component 2: Assisting Migrants during Transit
- Collaboration with, UN Agencies, MDBs, IASC, Civil Society and Partners
- Provision of clean energy solutions at transit camps
- Solar lighting, Waste to Energy Technologies, efficient cookstoves etc.
- Resource and water efficiency

#### Component 3: Empowering Migrants for a Sustainable Future
- Building capacity and skills through training programmes on clean energy technologies and systems – production, operations and maintainance
- Women/youth entrepreneurship
- Partnerships with the private sector and civil society

#### Component 4: Forging Strategic Partnerships and Networks
- Forging strategic partnerships and networks in the field of clean and sustainable energy
- Proactive involvement of private sector, civil society and financial institutions.
- Integrating gender and inclusiveness as guiding principles across all programme components

---

**ENERGY VISION 2020**
Sustainable Energy for Inclusive Industrial Development and Climate Action
UNIDO Global Energy Portfolio – Projects

AFRICA

Burundi
Promotion of Small Hydro Power (SHP) for productive use and energy services in Burundi (RE)

Benin
Technical assistance in establishing a biomass gasification knowledge and technology centre in Songhai Centre in Porto Novo (RE)

Cape Verde
Promoting market-based development of small to medium scale renewable energy systems (RE)
One UN Programme for Cape Verde (RE)

Cameroon
Promoting investments in the fight against climate change and ecosystems protection through integrated renewable energy (RE)

Côte d’Ivoire
Promoting renewable energy based grids in rural communities for productive uses (RE)

Investment promotion and capacity building programme (RE)

Chad
Promoting renewable energy based mini-grids for rural electrification and productive uses (RE)

Promoting energy efficient cook stoves in micro and small-scale food processing industries (EE)

Eastern Africa
Start-up and first operational phase of the East African Centre for Renewable Energy and Energy Efficiency (EACREEE) (CPn/EE/RE)

UNIDO-KEMCO Africa sustainable energy & climate change capacity building project (RE)

Ethiopia
Supporting the local manufacturing of energy efficient MITAD stoves (EE)

Promoting the development of low-carbon technology in rural areas (CPn)

Egypt
Industrial energy efficiency (EE)

Utilizing Solar Energy for Industrial Process Heat in Egyptian industry (EE)

The Gambia
Promoting renewable energy based mini-grid for productive uses in rural areas (RE)

Greening the productive sectors: promoting the use and integration of small to medium scale renewable energy systems in the productive uses (RE)

Ghana
Supporting green industrial development in Ghana: biogas technology and business for sustainable growth (RE)

Guinea
Promoting development of multi-purpose mini-hydro power systems (RE)

Supporting job training for youths in Guinea (RE)

Guinea Bissau
Creating of an enabling environment for small to medium scale renewable energy investments in the electricity sector (RE)

Kenya
Sustainable conversion of waste into clean energy to reduce GHG emissions in Kenya (RE)

Supporting integrated and comprehensive approaches to climate change adaptation in Africa (RE)

Promotion of waste to energy in agro industries (RE)

Promoting the development of low-carbon technology in rural area (CPn)

Climate change adaptation by using renewable energy power systems for productive use (RE)

Sustainable conversion of waste into clean energy for GHG emission reduction (RE)

Enhancing opportunities for clean lighting industry in Kenya (RE)

Liberia
Installation of multi-purpose mini-hydro infrastructure (for energy and irrigation) (RE)

Madagascar
Increased energy access for productive use through small hydropower development in rural areas (RE)

Morocco
Greening COP22 in Marrakesh (EE/RE)

Programme for Clean tech innovation and green jobs in Morocco (RE)

Mozambique
Joint Programme on environmental mainstreaming and adaptation to climate change in Mozambique (RE)

Towards sustainable energy for all: promoting market-based dissemination of integrated renewable energy systems for productive activities in rural areas (RE)

Nigeria
Mini-grid based on renewable energy (biomass) sources to augment rural electrification (RE)

Promoting locally available renewable energy resources for productive use (RE)

Scaling Up of Small Hydro Power (SHP) for Augmenting Rural Electricity Access (RE)

Senegal
Senegal Partnership Country Programme (RE)

Sustainable Cities Management Initiative for Senegal (RE)

Sierra Leone
Sustainable Energy Applications within the Sierra Leonean Brewing Sector (EE)

Promoting mini grids based on small hydro power for productive uses (RE)

Demonstrating biomass gasifier technology for productive use (RE)

South Africa
Energy efficient and low-carbon transport in South Africa (EE)

Industrial Energy Efficiency Improvement in South Africa (EE)

Industrial energy efficiency improvement through mainstreaming the introduction of energy management systems and energy systems operation (EE)

GEF UNIDO Clean tech Programme for SMEs in South Africa (EE/RE)

Promoting organic waste-to-energy and other low-carbon technologies in small and medium-scale enterprises in South Africa (RE)

Climat change, clean energy and urban water in Africa (EE/RE)

Southern Africa
Industrial Organic Waste-to-Energy (RE)

Establishment and first operating phase of the SADC Sustainable Energy Centre (SACREEE) (CPn/EE/RE)

Sub-Saharan Africa
Pilot initiative aimed at creating model pathways of market-based approaches to the cost effective deployment of clean energy technologies in municipal waterworks in Sub-Sahara Africa (RE)

Tanzania
Mini-grids based on small hydropower sources to augment rural electrification (RE)

Promotion of waste-to-energy applications in agro-industries (RE)

UN Trade cluster (RE)

Uganda
Promoting Biomass Gasification Technology for Productive Activities and Energy Services in Northern Uganda (RE)

Promoting biomass gasification technology for productive activities and energy services (RE)

Western Africa
Building resilient rural communities in West Africa by supporting inclusive and sustainable local production of Shea butter (EE)

ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE) (CPn/EE/RE)

Regional Programme under GEF-SPOA-Energy (RE)

Zambia
Upscale small hydropower mini-grid development in Zambia to deliver renewable energy for productive uses - feasibility study phase (RE)

LATIN AMERICA and the CARIBBEAN

Brazil
Biogas applications for the Brazilian agro-industry (RE)

Argentina
Reducing Argentina’s greenhouse gas emissions from the energy sector through the utilization of organic waste for energy generation in agriculture and agroindustries (RE)

Caribbean States
Establishment and first operational phase of the Caribbean Centre for Renewable Energy and Energy Efficiency (CCREEE) (CPn/EE/RE)

Chile
Promoting the development of biogas energy amongst selected small- and medium-sized agro-industries (RE)

Colombia
Promotion of industrial energy efficiency in Colombian industries (EE)

Dominican Republic
Stimulating industrial competitiveness through biomass-based, grid-connected electricity generation (RE)

Uruguay
Towards a green economy in Uruguay: stimulating sustainable production practices and low-emission technologies in prioritized sectors (RE)

Central America
Preparatory and first operational phase of the Mesoamerican Centre for Renewable Energy and Energy Efficiency (MCREEE) (CPn/EE/RE)
ASIA AND THE PACIFIC

Cambodia
Climate Change Related Technology Transfer for Cambodia: Using Agricultural Residue Biomass for Sustainable Energy Solutions (RE)
Access to energy through scaling up of solar technologies and enhancing quality of fabricators of biomass gasifiers (RE)
Reduction of GHG Emissions Through Promotion of Investments in Biogas Mini-Grids (RE)

China
Promoting EE in industrial heat systems and HEC equipment (EE)
Vehicle technologies in China (EE)
Integrated adoption of new energy vehicles in China (EE)

China and South-East Asia
South-South Cooperation in the Energy-saving and Environmentally-Friendly Industry (EE)
Promotion and transfer of marine current exploitation technology in China and South-East Asia (RE)

India
GEF UNIDO Cleantech Programme for SMEs (EE/RE)
Promoting business models for increasing penetration and scaling up of solar energy (RE)
Organic waste streams for industrial RE applications (RE)
Promoting low-head micro hydropower mini-grids (RE)
Promoting energy efficiency and renewable energy in selected micro SME clusters in India (RE/EE)
Promoting Market Transformation for Energy Efficiency in Micro, Small & Medium Enterprises (EE)

Indonesia
Promoting energy efficiency in the industries through system optimization and energy management standards (EE)

Iran
Industrial energy efficiency in key sectors in the Islamic Republic of Iran (EE)

Lao
Reducing of Green House Gas Emissions in the Industrial Sector through Pelletization technology in Lao PDR (RE)

Malaysia
GEF UNIDO Cleantech Programme for SMEs (EE/RE)
Industrial energy efficiency for Malaysian manufacturing sector (EE)
Energy efficient low-carbon transport in Malaysia
GHG emissions reductions in targeted industrial sub-sectors through thermal EE and application of solar thermal systems (EE)

Myanmar
Improvement of Industrial Energy Efficiency in Myanmar (EE)

Pacific Island States
Preparatory and first operational phase of the Pacific Centre for Renewable Energy and Energy Efficiency (PCREEE) (CPn/RE/EE) - second phase (EE/CPn)

Pakistan
GEF UNIDO Cleantech Programme for SMEs (EE/RE)
Sustainable energy initiative for industries (RE)
Promoting Sustainable Energy Production and Use from Biomass in Pakistan (RE)

The Philippines
Industrial energy efficiency (EE)

Thailand
Promoting small biomass power plants in rural Thailand for sustainable renewable energy management and community involvement (RE)
Overcoming policy, market and technological barriers to support technological innovation and South-South technology transfer: the pilot case of ethanol production from cassava (RE)

EUROPE

Albania
Biomass energy for productive use for small and medium enterprises (SMEs) in the olive oil sector (RE)

Armenia
GEF UNIDO Cleantech Programme for SMEs (EE/RE)
Sustainable livelihood for socially vulnerable refugees, internally displaced and local families - energy component (RE)

Bosnia and Herzegovina
Development of a full-scale proposal on increased use of low-carbon technologies in Bosnia & Herzegovina (RE)

Former Yugoslav Republic of Macedonia
Catalysing market transformation for industrial energy efficiency and accelerating investments in best available practices and technologies (EE)

Georgia
Reducing GHG emissions through Improved Energy Efficiency in the Industrial Sector in Georgia (EE)

Moldova
Reducing greenhouse emissions through improved energy efficiency in the industrial sector (EE)

Russia
Market Transformation Programme on Energy Efficiency in GHG-Intensive Industries in Russia (EE)

Turkey
GEF UNIDO Cleantech Programme for SMEs (EE/RE)

Ukraine
Improving energy efficiency and promoting renewable energy in the agro-food and other small and medium enterprises (SMEs) (EE/RE)

Introduction of energy management system standard in Ukrainian industry (EE)

Regional Europe
Reducing GHG emissions through improved energy efficiency in the industrial sector in Armenia and Georgia (EE)

GLOBAL

UNIDO-IASA Integrated Solutions for Water, Energy and Land (CPn)
Private Finance Advisory Network (CPn)
Climate Change, Clean Energy and Urban Water in Africa. Promoting Market-based development of clean energy technology in municipal waterworks: Pilot Initiative in South Africa (CPn)

UNIDO-DSCE Regional Business Incubator for Sustainable Energy (EE/RE)
Preparatory assistance for development of renewable energy projects (RE)

Vienna Energy Forum 2017 (CPn)

UNIDO-LCET (Low-Carbon Technology Transfer) Programme (CPn)

Global Network of Regional Sustainable Energy Centres (GN-SEC) comprising of various centres (CPn)

Publication of the World Small Hydropower Report (RE)

Strengthening the International Solar Energy Centre for Technology Promotion and Transfer (ISEC) - second phase (EE/CPn)

UNIDO support to implement SEA4ALL (CPn)

Fostering women’s empowerment through gender mainstreaming sustainable energy programmes and initiatives (CPn/RE/EE)

Promoting Accelerated Transfer and Scaled-up Deployment of Mitigation Technologies through the Climate Technology Centre and Network (CTCN) (CPn)