Development, transfer and dissemination of clean and environmentally sound technologies

Proposal by the United Nations Industrial Development Organization (UNIDO), June 2013

Introduction: The UNIDO Approach - Technology Networks and Centres as a vehicle for international cooperation in technology transfer

Technology plays a pivotal role as means of implementation in efforts to address contemporary global challenges and to move towards sustainable development. This is recognized in the outcome document of the Rio+20 United Nations Conference on Sustainable Development, "The Future We Want", which emphasizes the importance of technology transfer to developing countries, and in particular the development, transfer and diffusion of environmentally sound technologies and corresponding know-how. In this connection, the outcome document calls upon relevant UN agencies to identify options for a facilitation mechanism that promotes the development, transfer and dissemination of clean and environmentally sound technologies by, inter alia, assessing the technology needs of developing countries, options to address them, and capacity building.

As the specialized agency of United Nations system mandated to promote socially inclusive and environmentally sustainable industrial development, UNIDO has acquired a considerable experience and expertise in demonstration, transfer and dissemination of cleaner and environmentally sound technologies as demonstrated through its technical assistance projects. Examples include:

- **Off-grid Tidal Power Generation** - the Kobold II Indonesia project is being implemented by UNIDO along with the Italian company Ponte di Archimede S.p.A (PDA) and the Indonesian State Ministry of Research and Technology (RISTEK). The project tests the commercial feasibility of the technology - a vertical axis marine current turbine (together with a generator-frequency converter system, an onshore power station with grid-forming bi-directional battery inverters and battery banks for energy storage) and aims at the electrification of a remote village in Indonesia, Ketapang which comprises approximately 200 houses which currently do not have access to electricity.

- **Non-Combustion Techniques for Treatment of Persistent Organic Pollutants (POPs):** In Philippines, UNIDO along with its counterparts helped demonstrate the viability of available non-combustion technologies for destruction of Persistent Organic Pollutants. Sodium reduction technology for the decontamination/disposal of PCBs oil, PCB-containing equipment and waste. This technology was selected as it met the criteria of an intrinsically low environmental impact, was mobile and scalable, could be used for a variety of applications and it produced useful by-products.

- **Transfer of Environmentally Sound Technologies in the South Mediterranean Region** (MED-TEST) Project – the MED-TEST project has helped reduce pollution from land-based activities of priority industrial pollution hot spots. Applying the UNIDO-TEST integrated approach, it has facilitated the transfer of environmentally sound technologies in order to improve the environmental performance and the productivity of priority industrial installations in Egypt, Morocco and Tunisia. Technical assistance was provided to some 43 companies and savings of USD 17 million/ year achieved along with annual reductions in water consumption of 9.7 million m^3/year and in energy of 263 GWh/year. The second phase of the project, sponsored by EU- SWITCH will be jointly implemented by UNIDO and UNEP and will now focus on Algeria, Egypt, Israel, Jordan, Lebanon, Libya, Morocco, occupied Palestinian territory, Syria and Tunisia and in addition to implementation of TEST demonstration activities will promote policy and planning for SCP in the context of the Barcelona convention and networking for further dissemination of results.

UNIDO has also established a variety of specialized networks and centres aimed at promoting the development, diffusion and dissemination of such technologies, often in collaboration and partnership with other leading players in the field. These networks and centres, which will be described in greater detail below, include:

- National Cleaner Production Centres (NCPCs) located in various developing countries to assist national industries, and in particular SMEs, to adopt sustainable
- production techniques; these have been linked with each other through a Resource Efficiency and Cleaner Production (RECP) network.
- The Climate Technology Centre and Network (CTCN) aimed at responding, through a network of selected specialized institutions, to the demands for technical assistance by developing countries, that is currently being established.
- International Technology Centers (ITCs) located in various countries, including developing countries, to develop specific technologies, especially in the field of renewable energies.
- A networked series of national ozone units established in various developing countries in connection with UNIDO's implementation of the Montreal Protocol on Substances that deplete the Ozone Layer.
- Investment and Technology Promotion Offices (ITPOs), located in a number of industrialized countries for the purpose of supporting and facilitating investment and technology flows to developing countries.
- The UNIDO Centres for South-South Industrial Cooperation located in emerging economies and expected to be expanded to other middle income countries with the objective of promoting South-South investment and technology flows.
- The UNIDO Institute for Capacity Development aimed at building up national capacities in developing countries to meet the challenges of industrial development, including the selection, acquisition, adaptation and adoption of suitable technologies.
- The multi-stakeholder UNIDO-UNEP Green Industry Platform aims to helps mainstream and scale-up Green Industry policies and practices throughout global manufacturing.

With a proven track record and an extensive outreach, these institutions are well suited to serve as the potential operational elements of the future technology facilitation mechanism.

The conceptual approach underlying these networks and centres is based on UNIDO's belief that technology cooperation by a developing country with outside partners must be oriented towards that country's own sustainable development objectives, including building national capacity in science, technology and innovation. The promotion of endogenous capacity lies at the core of UNIDO's strategy to address the barriers that impede developing countries acquiring, developing or deploying environmentally sound technologies. The services that the UNIDO technology networks and centers typically offer may include targeted capacity building; information access and training; support for project preparation; identification and development of solutions for the removal of barriers to a wide deployment of environmentally sound technologies; joint research and collaboration in technology development; support for innovative financial mechanisms and private/public partnerships; as well as the support for local and regional partnerships for technology transfer.

The UNIDO networks and centres are consciously designed to offer a delivery model that integrates the elements of capacity building, access to information and an enabling environment for a comprehensive approach to the transfer, adaptation and adoption of environmentally sustainable technologies. They thus represent an approach that adds up to more than the sum of its individual components and supports the creation of national innovation systems and culture.

The UNIDO networks and centers have been supporting sustainable industrial development in developing countries and economies in transition by offering technical support and information on new processes, efficient energy, materials and resource use, recycling, environmental legislation and regulatory policies and voluntary agreements between government and industry, helping to build national capabilities for the successful transfer of environmentally sound industrial technologies. Functioning as a well defined clearing house, they have been especially useful to small and medium-size enterprises, which often do not have resources and to access information and technologies.

A. Global Network of Resource Efficient and Cleaner Production (RECPnet) and National Cleaner Production Centers

As part of the implementation of Agenda 21, UNIDO and UNEP launched the National Cleaner Production Centers programme with the support of the Governments of Switzerland and Austria and other bi-lateral and multi-lateral donors. Following its initial success, the programme was expanded to over 50 countries. Many of the established NCPCs have become increasingly independent over time, both financially and administratively. To date, the demand for new NCPCs on a national or regional level continues to be high.

The Joint UNIDO-UNEP RECP Programme aims to scale-up and mainstream RECP activities and results, nationally, regionally and globally. Principal intervention modules are aimed at: strengthening and expanding the RECP service delivery network; targeted and enhanced contributions of RECP to thematic progress on resource efficiency, waste minimization and safe and responsible production; improved policy and financing incentives; and innovation support. It offers developing and transition countries and their development partners an important vehicle that facilitates the required transition towards more resource efficient and cleaner production systems.

The NCPCs were established to deliver services to business, government and other stakeholders in their home country and to assist them with the implementation of Cleaner Production methods, practices, policies and technologies. Moreover, NCPCs were expected to act as public advocates for Cleaner Production. Each NCPC was initially set up as a project that was hosted by a national industry association or technical institute of a university.

The key service of those centers include: information dissemination and awareness creation; professional trainings; in plant assessments and demonstrations; policy advice; and support for the transfer of Environmental Sound Technologies.

So far NCPCs have demonstrated the potential and benefits of resource efficient and cleaner production in numerous enterprises among multiple industry sectors in over 50 developing and transition countries. Waste, effluents and emissions have been reduced, the use of energy, water, materials and chemicals has been decreased and work places and communities have become safer. Typically this was beneficial for the enterprises themselves, as costs reduced, and productivity and product quality increased.

The scale of the RECP achievements, however, does not yet match the scale of the global challenges of providing for all global citizens in a sustainable manner. It is imperative to scale-up from somewhat isolated demonstrations to wide-spread implementation and replication of RECP methods, practices and technologies. Substantively larger numbers of enterprises need to get started with RECP, for example, using cluster, sector and/or value- chain approaches and employing innovative methods and tools. Moreover, it is important to ensure that options for deep cuts in emissions and resource use are also implemented. These could involve adaptation and adoption of state of art Environmentally Sound Technologies, sustainable product designs and innovative business models. Such a transition requires incentives to be in place, including policy and enforcement where necessary. Furthermore, technology, knowledge and finance need to be made available in ways that are appropriate and accessible for enterprises in developing and transition countries.

The RECP model is based on the fact that the countrywide application of resource efficient and cleaner production can only come about if the concept is promoted by professionals in the country itself and adjusted by them to suit the local conditions.

Based on a multi-stakeholders approach, national centers are initially established as a UN-backed technical cooperation project and are hosted by a national industry association, technical institute or university. Over time the centers start generating their own revenues from service fees, become financially and administratively independent, and acquire a separate legal entity, generally with buy-in from government, business sector and civil society.

No single initiative or policy is likely to succeed in this undertaking. Joint efforts of national governments, development partners, international organizations, the business sector and civil society, could, however, lead to success. The NCPCs and the RECP-Net are a natural partner and platform for launching and implementing such cooperative initiatives.

The UNIDO experience shows that successful programme delivery is contingent on the effective networking and knowledge management among NCPCs and other organizations that deliver resource efficient and cleaner production services (RECP).
To that end, in 2010 UNIDO and UNEP established a global **Resource Efficient and Cleaner Production Network(RECP*net*)**, to improve networking and best practice sharing between NCPCs and other providers of RECP services.
Members of RECP*net* (52 to-date) are organizations or initiatives that have as a core activity the delivery of RECP services in developing and transition countries, including by no means restricted to National Cleaner Production Centres. Membership is structured in three categories, each with their own eligibility requirements and rights and obligations. An Executive committee has been established to direct the activities of RECP*net* and is supported by UNIDO ans UNEP as Patron Agencies.
This global network is an excellent example of a successful international sector-specific network that incorporated the lessons learned from NCPCs.
What makes the RECP*net* a successful model is its sectors specific, impact-oriented nature, as well as its governance structure that brings together international development aid, public and private sector, which warrants ownership, financial sustainability and responsiveness to country needs worldwide.
The establishment of RECP*net* marks an important milestone in the 20 years' success story of the joint UNIDO-UNEP programme that develops and supports national capacities for adaptation and adoption of cleaner production and resource efficiency in developing and transition countries. It reflects the maturity of National Cleaner Production Centres and other services providers and engages them in an innovative partnership to realize green industry

B. Climate Technology Center and Network[1]

UNIDO and UNEP, together with partners and stakeholder technical organizations, (see below) formed a consortium to set up the **Climate Technology Center** that aims at responding, through a Network of selected specialized institutions, to the demands for technical assistance by developing countries.

[1] At the 16th session of the Conference of the Parties to the UNFCCC (in Cancun in December 2010), governments decided to create a new cross-cutting network and an associated "centre" that will in part address LEDS issues. The so-called Climate Technology Centre and Network has a stated mission of stimulating technology cooperation and enhancing the development and transfer of technologies to developing country Parties at their request. The CTCN is to "build or strengthen [developing country] capacity to identify technology needs, to facilitate the preparation and implementation of technology projects and strategies … to support action on mitigation and adaptation and enhance low emissions and climate-resilient development." The CTCN will be governed by an Advisory Board that answers to Parties, and is expected to become operational in 2013.

The issue of technology transfer has been a cornerstone for the United Nations Framework Convention on Climate Change (UNFCCC) since its establishment. This is mostly evident as at each Conference of the Parties (COP) decisions about the promotion of the development and transfer of relevant climate technologies have been made.
At COP 16 in Cancun (December 2010) a technology mechanism was established. This technology mechanism consists of a Technology Executive Committee and a Technology Centre and Network.

The mission of the **Climate Technology Centre and Network (CTCN)** is to enhance the development and transfer of technologies with a special focus on developing countries. Parties who are members of the COP can request, consistent with their respective capabilities and national priorities and circumstances, to receive assistance in order to' build or strengthen their capacity to identify technology needs, with the goal to facilitate the preparation and implementation of technology projects ad strategies to enhance low emissions, climate-resilient development and support action on mitigation.

The three key functions of the CTCN as agreed upon at COP 16:
1) Management of requests and responses in the technology cycle
2) Fostering collaboration to accelerate technology transfer
3) Strengthening networks, partnerships and capacity building for technology development and transfer, and fostering collaboration to accelerate technology transfer.

The Core Center of the CTCN would be led by UNEP together with UNIDO. Other partners identified would support the Core Center in preparing country response plans and the provision of strong technical links to the Network, constituting a Technical Resource Pool to be tapped quickly in response to specific country needs.

Technical Resource Pool and Partners:
- Asian Institute of Technology (AIT) – Thailand
- Bariloche Foundation (BF) – Argentina
- Council for Scientific and Industrial Research (CSIR) – South Africa
- The Energy and Research Institute (TERI) – India
- Environment and Development Action in the Third World (ENDA-TM) – Senegal
- Tropical Agricultural Research and Higher Education Center (CATIE) – Costa Rica
- World Agroforestry Centre (ICRAF) – Kenya
- Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) – Germany
- Energy Research Centre of the Netherlands (ECN) – The Netherlands
- National Renewable Energy Laboratory (NREL) – United States
- UNEP Risø Centre, including expertise from UNEP-DHI Centre (URC) – Denmark

C. International Technology Centers (ITCs)
UNIDO is coordinating a number of International Energy Technology Centres aiming to stimulate applications of sustainable energy technologies. The Centres include the International Centre for Hydrogen Energy Technology (Turkey), the International Centre for the Promotion and Transfer of Solar Energy (China), and three International Centres

for Small Hydropower (China, India and Nigeria). The Centres focus on developing and strengthening the scientific and technological capabilities in the developing world and economies in transition and will help close the gap between research and development organizations, innovative enterprises and the marketplace. UNIDO's Technology Centres implement demonstration projects which help to raise awareness on local renewable energy potentials in a number of developing countries. Stakeholders from governments and the financial and private sectors are addressed, with the economic, financial, technical and environmental sustainability of renewable energy technologies brought to their attention.

UNIDO's experience shows that that ITCs can act as national or regional hubs to deliver a broad suite of services, supporting environmentally-sound technology innovation in developing countries. They support join research, help to develop and deploy locally appropriate technologies and catalyze new industries to create jobs and growth, serving at the same time as a serve as a global forum on international industrial cooperation.

The UNIDO ITCs serve as a mechanism that links technology development with investment opportunities and the creation of new industries through international cooperation, establishment of business relationships and forming strategic partnerships. The ITCs have been particularly helpful in building an extensive network of associated local experts, increasing the awareness of developing countries in new technologies, ensuring access of scientists in these countries to applied research and development, as well as their training in new technologies. In the new context of international competition technological centers and their networks are a link between research in science and commercialization of new technologies on an industrial scale.

D. Networks for the implementation of the Montreal Protocol and other Multilateral Environmental Agreements (MEAs)

UNIDO, as one of the implementing agencies of the Montreal Protocol on Substances that Deplete the Ozone Layer, works to ensure the transfer of the latest technologies to developing countries. UNIDO's policy is to select the most suitable alternative technology to be implemented through its Montreal Protocol projects. These alternatives should have zero ozone-depleting potential, low global warming potential, minimum energy consumption and at the same time be cost efficient.

The transfer of new, proven, state-of-the-art technologies from prominent technology providers guarantee that beneficiary companies remain competitive and productive while using green technologies. Energy savings and less maintenance costs come to the benefit of local companies and guarantee sustainability of projects. All these factors contribute to industrial development of beneficiary countries while guaranteeing the country's compliance with the Montreal Protocol. Over the last 20 years, UNIDO's performance has continuously been highly ranked among the four implementing agencies of the MLF.

UNIDO is confident that it will continue providing the outstanding technical support and expertise to its Member States in finding solutions to complex ODS phase-out issues,

such as the replacing of HCFCs, especially from the scientific and technological point of view. In this regard, the UNIDO networks and centers play an important role in identifying the available technologies and the adoption capacity of the recipient countries to eliminate the ODS substances and transform their manufacturing sector and allied industry sectors into more competitive and resource efficient.

Regional **networks of national ozone units**[2] (NOUs) provide a workable model for the participation of developing countries in the global dialogue on the ODS phase out, as well for their full engagement on technical issues, pertaining to the transfer and deployment of environmentally sound technologies that prevent ozone layer depletion. These networks, now numbering nine, have helped National Ozone Units (NOUs)[3][4] in some 148 developing countries to overcome challenges they face in complying with the Montreal Protocol and its subsequent Amendments (see e.g., UNEP, 2001; UNEP, 2002). UNEP (2002) shows how important the influence of neighboring countries is on creation of a successful national ODS phase-out strategy,[5] and how the progress initially made by some developing countries, attracted their regional counterparties to join the Regional Network. This experience appears to suggest that regional networks are useful for enhancing the participation of developing countries especially in cases of highly technical issues.

E. The UNIDO Investment and Technology Promotion Office (ITPO) network

The Investment and Technology Promotion Offices (ITPOs) are linked to public and private institutions working in the field of industrial development. Drawing on these linkages, ITPOs are redressing the industrial development imbalance by bridging investment and the latest technology to those countries most in need of a promotional helping hand. At the same time, ITPOs are opening up new opportunities for investors and technology suppliers to find potential partners in developing countries and countries with economies in transition.

The ITPO network provides a unique combination of value-added services to client institutions and entrepreneurs from developing countries and countries with economies in transition which want to forge new alliances in international industrial investment and technology transfer:

- Disseminate the latest information on legal and economic conditions, investment

[2] Regional networking provides a regular, interactive forum for officers in NOUs to exchange information and experience, brainstorm innovative regional solutions, and enhance cooperation with developed countries as well as the regional counterparts (UNEP, 2002).

[3] UNEP (2002) reveals that based on the judgment of the Ozone Officers, networking activities have exerted an important positive effect on improving their skills, knowhow and experience. The most significant improvements have been identified in the areas of reporting, data collection, promotion of public awareness and the level of information relating to alternative technologies and substances.

[4] Networking activities have resulted in improved data reporting, policy making, refrigerant management plans and the development of peer pressure among ODS Officers to take early steps to implement the MP. Some of the most notable results of the Regional Networks are accelerated ratification of the MP and its Amendments; earlier development of national ODS legislation and other policy measures; more regular data reporting and improved compliance with the ODS phase-out schedules. (UNEP, 2007).

[5] Some of the examples mentioned include Malaysia, Philippines, Laos, Dominican Republic (see UNEP, 2002).

financing and opportunities for industrial cooperation;
• Identify and promote specific investment opportunities;
• Provide expert advice at all stages of the business cycle;
• Facilitate business contacts between project sponsors and potential foreign investors.
ITPOs maintain active links with the business community and development agencies in the Offices' of host countries as well as extensive data banks of companies interested in industrial partnerships in developing and transition economies. These offices are also playing an increasingly important role in promoting the transfer of environmentally sound technologies – in November 2011 the ITPO Japan played a leading role in organizing the Tokyo Green Industry Conference.

UNIDO operates a global network of 7 ITPOs:

- UNIDO ITPO Bahrain
- UNIDO ITPO China in Beijing
- UNIDO ITPO China in Shanghai
- UNIDO ITPO Italy
- UNIDO ITPO Japan
- UNIDO ITPO Republic of Korea

F. The UNIDO Centres for South-South Industrial Cooperation

UNIDO operates two Centres for South-South Industrial Cooperation in India and China, respectively. Their objective is to contribute to the industrial development and economic growth of developing countries by identifying and mobilizing the technical, financial, managerial, and other resources required for projects and programmes within the framework of South-South cooperation.

The Centres work to create a practical, institutional, and operational framework for South-South industrial development in partnership with relevant institutions, counterparts and stakeholders. The programmatic functions of the Centres are fully in line with the Millennium Development Goals and the Brussels Programme of Action for the LDCs, contributing toward mutually beneficial partnerships providing regional cooperation and integration.

The strategy aims at strengthening and facilitating:
· The exchange of experience in industrial policy orientation, formulation, and implementation.
· Institutional and enterprise networking for enhancing productive capacities, trade, technology, and investment flows.
· The replication of best practices for poverty reduction through industrial development and grassroots innovations serving as rural growth impulses.
· Strengthening of national and local innovation systems for using modern technology and enhancing domestic capacity building and adaptive capabilities to commercialize new knowledge.
· Promotion of regional trade, investments, and regional integration.

G. Capacity Building for Technology Transfer: The UNIDO Institute for Capacity Development

UNIDO's experience in the field of technology transfer suggests that this needs to be accompanied by effective capacity-building efforts. In this connection, UNIDO has recently established the UNIDO Institute for Capacity Development, in order to support its Member States in responding to the industrial development challenges they face.

The overall aim of the Institute is to strengthen UNIDO's academic partnership, networking efforts, capacity-building and training activities. It provides training on key issues pertaining to sustainable industrial development. It serves as a platform for knowledge creation, knowledge sharing and as a catalyst for innovative solutions and ideas for addressing specific policy challenges for achieving more inclusive and sustainable patterns of globalization. Its functions are related to the areas of knowledge sharing, training and education, joint research, policy dialogue, and strategic networking and partnership. As such, it has the potential to serve as the capacity development vehicle for the proposed future technology facilitation mechanism.

H. The UNIDO-UNEP Green Industry Platform

The Green Industry Platform, jointly launched by UNIDO and UNEP at the United Nations Conference on Sustainable Development (Rio+20) in June 2012, is a global, high-level, multi-stakeholder network in which participants commit to promote and implement a series of policies and practices geared toward mainstreaming and scaling up green industry throughout global manufacturing processes. The Green Industry Platform brings together leaders from business, government and civil society with the aim of putting into practice concrete and measurable actions that encourage the more efficient use of energy and raw materials in manufacturing processes and services, as well as the reduction of negative environmental impacts of manufacturing.

In the Platform's initial phase of activities, emphasis is being placed on best practice showcasing and dissemintation. Considering the variety and range of Platform members, a very likely next step would be the use of the Green Industry Platform as a facilitation mechanism for the transfer of not only knowledge, but also technologies, amongst key stakeholders in different fields and stages of national and regional industrial development.