



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION



LIMITING CLIMATE BREAKDOWN

Through South-South and Triangular Industrial Cooperation





As we stand on the precipice of an escalating climate crisis, the relevance and importance of South-South and Triangular Industrial Cooperation (SSTIC) has never been more pronounced. SSTIC, as an international cooperative mechanism, holds a compelling potential to strategically address and limit climate breakdown. This publication seeks to outline the technical and economic dimensions of how SSTIC can support global efforts in mitigating climate change and fostering a sustainable, resilient future.

SSTIC functions as a vital platform for technical capacity building, technology transfer, and the promotion of environmentally sustainable industrial practices. The technical capabilities required to limit climate breakdown are often varied and complex, including advanced renewable energy technologies, carbon capture and storage technologies, energy-efficient manufacturing processes, and waste management systems.

Through SSTIC, countries can leverage a pool of shared knowledge, technologies, and best practices. Technology transfer and adaptation, in particular, enable countries to adopt and integrate climate-friendly technologies in their industries. The technical cooperation fostered by SSTIC ensures that nations have the right tools, skills, and technical knowledge to implement sustainable industrial practices, crucial for limiting climate breakdown.

Furthermore, SSTIC plays a crucial role in capacity building. It helps develop the technical competencies and skills needed by countries to identify and implement climate mitigation and adaptation strategies. This includes the deployment of climate-smart industrial processes, improved energy efficiency, and the transition towards a circular economy.

From an economic standpoint, SSTIC assists nations in transforming their economic structures to be more climate-resilient and sustainable. This involves providing policy advice, promoting green industrial development, and facilitating the creation of green jobs and new economic opportunities.

SSTIC supports the development and implementation of sound, environmentally conscious industrial policies. It guides nations on integrating sustainability and climate resilience into their industrial and economic strategies. By providing economic models and analytical tools, SSTIC helps countries assess the

economic impacts and benefits of climate action, thereby enabling informed decision-making.

SSTIC also can play a pivotal role in promoting green industrial development. It supports nations in transitioning towards low-carbon, resource-efficient industrial production, an essential step in limiting climate breakdown. By fostering industrial diversification and value addition, SSTIC enables countries to create resilient, sustainable economies that can withstand and adapt to the impacts of climate change.

The upcoming segments of this publication delve into three primary areas: **Decarbonization, Sustainable Energy, and Climate Technology.**

The Decarbonization section delves into the strategies SSTIC employs to assist nations in transitioning towards low-carbon, resource-efficient industrial production. It outlines how SSTIC promotes carbon capture and storage technologies, encourages the deployment of climate-smart industrial processes, and facilitates the creation of green jobs and new economic opportunities, thereby contributing to climate resilience.

The subsequent section on Sustainable Energy explores SSTIC's initiatives in the proliferation of advanced renewable energy technologies. This portion will shed light on SSTIC's role in capacity building for improved energy efficiency and the transition towards a circular economy, vital components for climate breakdown mitigation.

Finally, the Climate Technology section covers SSTIC's contribution to technology transfer and adaptation, enabling countries to integrate climate-friendly technologies into their industries. Together, these sections aim to provide a comprehensive understanding of UNIDO's multidimensional efforts to utilize the SSTIC modality in combating climate breakdown.



DECARBONIZATION

Decarbonization requires a profound technological transition, which SSTIC can facilitate by promoting the transfer, adaptation, and local assimilation of low-carbon and carbon-neutral technologies. These include, but are not limited to, renewable energy technologies, energy-efficient industrial processes, carbon capture, utilization, and storage (CCUS) technologies, and advanced digital technologies that optimize resource use. Through SSTIC, nations can tap into a collective pool of technical knowledge, skills, and practices, enabling the adoption and integration of low-carbon industrial technologies. While many obstacles exist, SSTIC has a unique potential to facilitate the transfer of green technologies, foster capacity building, and stimulate green industrial growth.



SSTIC AS A MECHANISM FOR THE TRANSFER OF GREEN TECHNOLOGIES

Green technology transfer is paramount for global decarbonization. South-South cooperation can enhance the diffusion of technologies such as renewable energy systems, carbon capture and storage technology, and energy-efficient industrial processes among developing countries. Technical aspects involve identifying technology needs, evaluating technology compatibility with local conditions, addressing intellectual property rights issues, and establishing mechanisms for technology adaptation and adoption.

Triangular cooperation also plays a significant role. By linking Southern, Northern, and multilateral partners, it can bolster the resources available for technology transfer, incorporate broader expertise, and enhance cooperation outcomes. For instance, advanced low-carbon technologies from developed countries can be adapted to local contexts in the South via these partnerships, contributing to more sustainable industrial practices.



CAPACITY BUILDING FOR GREEN INDUSTRIES

Capacity building in green industries is another crucial aspect where SSTIC can contribute significantly. Developing nations often lack the technical skills, institutional capacity, and policy frameworks necessary to foster low-carbon industrial growth. Through SSTIC, countries can learn from each other's experiences, experiment with innovative solutions, and jointly develop skills and knowledge in green industrial practices. Triangular cooperation can further extend this capacity building by integrating technical assistance from developed countries and international organizations.



PROMOTING GREEN INDUSTRIAL GROWTH

The promotion of green industrial growth is a cornerstone of sustainable decarbonization. This involves the technical transformation of industrial processes to reduce greenhouse gas emissions, the promotion of resource efficiency, and the development of circular economy models. SSTIC can facilitate this by creating platforms for collaboration in research and development of green technologies, sharing experiences in green industrial policy design, and joint exploration of market opportunities for green goods and services.



INVESTMENT AND FINANCING

SSTIC can help mobilize investments in decarbonization initiatives. By working together, developing countries can attract more significant funding from international investors and development banks. They can also set up joint financing mechanisms to support decarbonization projects.



POLICY COORDINATION AND ADVOCACY

SSTIC can enable developing countries to coordinate their policies and advocate for international regulations and agreements that support decarbonization. Through collective bargaining, these countries can exert more significant influence on the global stage, promoting policies that facilitate decarbonization and protect the interests of developing nations.



GEOHERMAL POWER: Africa's Sustainable Response to Growing Energy Demands



CHALLENGES AND OPPORTUNITIES

In response to the growing population, economic advancement, and evolving lifestyles in Africa, there is an urgent need for reliable, affordable, and modern renewable energy access. Geothermal power generation and its associated technology have emerged as promising solutions. Geothermal energy offers the advantages of low-carbon base-load generation, resilience against weather impacts, and consistent availability throughout the year. It not only promotes energy access but also fosters inclusive and sustainable industrial development. Additionally, an innovative energy management system can enhance the performance of existing geothermal installations.



MITIGATING CLIMATE DISRUPTION

The program “Generating energy capacity from geothermal power generation and its related technologies for sustainable development”, funded by Ministry of Economy, Trade and Industry of Japan and implemented by UNIDO has the primary objective to promote geothermal power generation and related technologies across African countries through collaborative efforts. This will be accomplished through technology demonstrations, overcoming barriers to accessing information and technical knowledge, capacity building to facilitate technology adoption and domestic replication, knowledge management activities, and identifying viable and sustainable business models. Furthermore, the program aims to strengthen market conditions to attract investments and foster public-private partnerships in targeted countries. Drawing from UNIDO’s expertise and the

successes of similar projects in the region, the program seeks to scale up investments and collaborations for the benefit of Africa. To achieve universal access to sustainable energy, the project focuses on accelerating the market deployment and dissemination of advanced renewable and innovative energy technologies. These technologies face barriers related to the market environment and their innovation stage. The innovation chain includes stages of research and development (R&D), demonstration, deployment, and diffusion/commercialization.



SSTIC IMPACT

The support mechanism must be integrated, considering policy, social, and economic aspects, and align with national and international energy policies. Knowledge transfer and private sector involvement influence technology development and market deployment, thus site-specific conditions and technological maturity levels are considered throughout the process. Furthermore, the project focuses on establishing the connection between technology push and market demand pull in geothermal power generation and related technology transfer. By promoting advanced renewable energy technologies, the project aims to enhance energy access, stimulate economic growth, and alleviate poverty in Africa through the mechanism of SSTIC.

Under the program, the need for capacity-building activities and creation of an enabling environment through an enhanced policy and regulatory framework

and partnerships was identified for uptake of geothermal power generation for effectively addressing challenges of climate change, energy poverty, and sustainable industrialization in the targeted countries. With a view to addressing those identified gaps, UNIDO organized a technical training in cooperation with the Kenya Electricity Generating Company PLC (KenGen), which is the largest electricity company in Kenya and a leading company which operates geothermal power plants in the region.

The technical training is designed to cover three thematic technical areas essential for geothermal operation, namely, geothermal engineering, geoscience, and environmental and social analysis and called for experts from 5 targeted countries Djibouti, Ethiopia, Rwanda, the United Republic of Tanzania, and Uganda.

The geothermal sector is expected to play an important role in the decarbonization of the energy sector across East African countries. Geothermal energy, harnessed from the Earth's natural heat, provides a renewable and environmentally friendly source of power. By harnessing this clean energy, East African nations can significantly reduce their carbon emissions and contribute to global climate goals. Moreover, the development of the geothermal sector in East African countries will create the preconditions to achieving the Sustainable Development Goals, particularly in the context of sustainable industrialization. By utilizing geothermal energy for industrial processes, these nations can reduce carbon emissions and foster eco-friendly manufacturing practices. As a result, the region can make significant strides towards SDG 7 (Affordable and Clean Energy) and SDG 9 (Industry, Innovation, and Infrastructure).



GEOTHERMAL POWER CASE STUDY:

Project title: Generating energy capacity from geothermal power generation and its related technologies for sustainable development

Project ID: 170046

<https://open.unido.org/projects/M0/projects/170046>



SUSTAINABLE ENERGY

Given that the industrial sector is a significant consumer of energy, the transition towards more sustainable, renewable sources of energy is a critical step towards combating climate change. It is not only about generating clean energy, but also about optimizing energy use, improving efficiency, and changing the way we think about energy consumption and distribution.

South-South cooperation can be leveraged as a potent instrument in supporting the transition towards sustainable energy in several critical ways. The emphasis is on sharing resources, knowledge, technology, and policies between developing countries to ensure energy security, affordability, and sustainability.



SHARING OF BEST PRACTICES AND POLICY FRAMEWORKS:

South-South cooperation facilitates the exchange of successful strategies and policy frameworks for implementing sustainable energy solutions. Countries with established renewable energy programs can provide insights and lessons learned, contributing to a reservoir of shared knowledge that can accelerate the deployment of sustainable energy in other developing countries.



INVESTMENT AND FINANCING FOR SUSTAINABLE ENERGY PROJECTS:

South-South cooperation can help mobilize and channel investments towards sustainable energy projects. By pooling resources and creating joint financing mechanisms, developing countries can attract international funding, promote public-private partnerships, and stimulate investment in renewable energy infrastructure.



KNOWLEDGE AND TECHNOLOGY TRANSFER:

Technology transfer is an essential aspect of South-South cooperation. Developing nations that have made significant progress in sustainable energy technologies can share their innovations and technical know-how with other nations. This can span a wide range of areas, from renewable energy generation (such as solar, wind, and hydropower technologies) to energy efficiency measures and smart grid solutions.



CAPACITY BUILDING AND TRAINING:

Through cooperative efforts, nations can help build the human capital necessary for the sustainable energy sector. This can involve technical training, education programs, and professional development initiatives to equip individuals with the skills needed to implement, manage, and innovate in the field of sustainable energy.



JOINT RESEARCH AND DEVELOPMENT (R&D):

Collaboration on R&D can lead to the advancement of sustainable energy technologies tailored to the specific needs and conditions of developing countries. By pooling resources and expertise, these countries can jointly explore new technologies, improve existing ones, and contribute to the global knowledge base on sustainable energy.



REGIONAL ENERGY INTEGRATION:

South-South cooperation can promote regional integration of energy systems, creating a more resilient and robust energy network. This can include the development of cross-border renewable energy projects and regional power grids, which can enhance energy security, enable the sharing of energy resources, and balance supply and demand across regions.



BRIDGING THE ENERGY GAP: How GN-SEC is Revolutionizing Sustainable Energy in Developing Countries



CHALLENGES AND OPPORTUNITIES

When examining the modest growth rates of sustainable energy and climate technology markets in numerous developing nations, it becomes evident that the ambitious goals of SDG-7, 9, and 13 cannot be achieved by 2030 under conventional approaches. The deployment of renewable energy and energy efficiency solutions remains hindered by a broad range of demand and supply-side barriers and constraints. The urgency for rapid progress and economies of scale is apparent.

In this context, the regional level is an important missing link of international climate cooperation and a potential accelerator of the transition. However, in many regions, the efforts towards a net-zero carbon scenario have remained uncoordinated between countries and solutions are not implemented jointly for the benefit of all. In the past, this situation has led to a duplication of efforts, fragmentation, lack of regional agenda-setting and inefficient use of international development and climate funding.

In response to this imperative, in 2010, UNIDO launched the Global Network of Regional Sustainable Energy Centers (GN-SEC) programme, a pioneering south-south and triangular multi-stakeholder partnership. Under a joint platform, UNIDO assists regional economic communities (RECs) in the creation and operation of sustainable energy centres, which drive and accelerate the energy transition “from the region for the region”.

From the very beginning, the centres lie in the ownership of the RECs and their Member States. Throughout the first phase, UNIDO provides support regarding institution-building, technical program development, as well as the mobilisation of partnerships and funding.



MITIGATING CLIMATE DISRUPTION

Currently, the GN-SEC network comprises nine operating centers across various regions, including the Arab and African region (ECOWAS, SADC, EAC, ECCAS, Arab League), Asia and the Pacific (SPC, ICIMOD), and Latin America (CARICOM, SICA). These centers have received approval from over 108 Ministers of Energy and/or Heads of State and serve 41 out of 46 least developed countries (LDCs) and 34 out of 38 small island developing states (SIDS). Further information is available at: www.gn-sec.net.

The centres are part of the economic integration efforts of RECs and work towards the creation of integrated and inclusive regional markets for sustainable energy products and services. They are an important local capacity in support of joint coordination, priority-setting and implementation, as well as the promotion of equal progress, economies of scale and spill-over effects between countries. Through regional approaches, the centres complement national efforts in the areas of policy and regulation, qualification and certification, knowledge management, as well as the promotion of investment, innovation and entrepreneurship.

Over the past years, the GN-SEC centres have developed and implemented important policies, standards and programs, which will influence the energy futures of more than 1.2 billion energy consumers in developing countries. They have become an important platform for all kinds of local and international partnerships, as well as SSTIC.



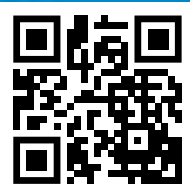
SSTIC IMPACT

The GN-SEC serves as an effective example of how multi-stakeholder partnerships can harness network and resource synergies to bring together a diverse group of stakeholders. The network has been recognized by international organizations including the United Nations, the Organisation for Economic Cooperation and Development, and the European Union, as a successful model of climate multilateralism and South-South and Triangular Industrial Cooperation (SSTIC).

Based on Regional Economic Communities (RECs) and international agreements, the GN-SEC constitutes a significant institutional framework that could play a pivotal role in international efforts to achieve a net-zero carbon future. The approach of UNIDO, aligning with the key principles of aid and development effectiveness as detailed in the Accra, Paris, and Busan Declarations, respects country ownership, enhances local institutional capacities and is anchored in enduring partnerships with shared responsibility.

Utilizing the GN-SEC platform, UNIDO promotes cooperative endeavors, shared learning, and collaborative projects across various centres and regions. This platform acts as a venue for SSTIC to address common energy issues and solutions. For instance, Small Island Developing States (SIDS) commonly face challenges and opportunities related to electric mobility and energy storage solutions. Least Developed Countries (LDCs) in Sub-Saharan Africa also share a mutual interest in renewable energy mini-grid development for rural electrification and productive uses. Moreover, the network presents opportunities to pilot and showcase innovative technologies and business models, such as green hydrogen and Industry 4.0 solutions, in different markets.

Collectively, the centres of the GN-SEC serve as a robust SSTIC advocacy group promoting a “just” and “inclusive” energy transition. This transition is responsive to the unique needs of developing countries, including affordable energy for industrialization, as well as concessional financing and direct investment for low-carbon infrastructure. A truly inclusive energy transition requires the active participation of entrepreneurs and businesses in developing countries in the growing value chains of sustainable energy manufacturing and servicing.



GN-SEC CASE STUDY:

Title: The Global Network of Regional Sustainable Energy Centers (GN-SEC)

Note: This network encompasses multiple UNIDO projects.

Primary Project ID: 180301 (Preparatory Phase for the GN-SEC Platform)

Official Website: <https://www.gn-sec.net/>



CLIMATE TECHNOLOGY

Innovation and technology hold immense potential in our fight against climate change, acting as tools to create new business models, green jobs, and influence consumer behaviours. Notably, they can also drive the development and deployment of technologies to reduce greenhouse gas emissions. As such, the pursuit of climate technology is not just about producing technological solutions, but also about fostering an environment that supports their adoption, adaptation, and scaling. South-South cooperation can serve as a powerful tool to promote and accelerate the development, transfer, and deployment of climate technology. This collaboration is particularly significant considering the shared challenges and similar contexts among developing countries.



TECHNOLOGY TRANSFER AND SHARING:

South-South cooperation can facilitate the exchange and adoption of climate-friendly technologies. Countries that have successfully developed or adopted certain technologies can share their expertise and knowledge, helping other countries to implement these technologies effectively. This can be instrumental in areas such as clean energy generation, carbon capture and storage, climate-smart agriculture, and climate-resilient infrastructure.



INVESTMENT AND FINANCING:

South-South cooperation can also mobilize investments in climate technology projects. By working together, developing countries can attract more significant funding from various sources, including international financial institutions, private investors, and climate funds. They can also establish joint financing mechanisms to support technology development and deployment.



JOINT RESEARCH AND DEVELOPMENT (R&D):

Collaborative R&D activities can accelerate the development of new climate technologies or improve existing ones. By pooling resources, knowledge, and expertise, countries can work together to create technologies that are suited to their specific needs and circumstances, enhancing the effectiveness and scalability of these technologies.



POLICY DEVELOPMENT AND ADVOCACY:

South-South cooperation enables developing countries to coordinate their climate policies and advocate for international rules and agreements that support climate technology development and transfer. Through collective bargaining, these countries can exert more significant influence on the global stage, promoting policies that enable technology access and protect the interests of developing nations.



CAPACITY BUILDING AND TRAINING:

South-South cooperation can support capacity building and training initiatives to equip people with the skills and knowledge necessary to develop, implement, and manage climate technologies. This can include technical training, academic exchange programs, and the development of knowledge-sharing platforms.



DEVELOPMENT OF TECHNOLOGY PLATFORMS AND NETWORKS:

South-South cooperation can lead to the creation of shared platforms and networks that enhance access to climate technologies. These platforms can facilitate the exchange of information, foster partnerships, and stimulate innovation, serving as valuable resources for countries seeking to advance their climate technology capabilities.



ENERGIZING RURAL DEVELOPMENT:

The Role of International Standards in Small Hydropower Development



CHALLENGES AND OPPORTUNITIES

Hydropower stands as the key pillar of low-carbon electricity generation, currently accounting for nearly half of the world's supply. Surpassing nuclear power by 55% and surpassing all other renewables combined, including wind, solar PV, bioenergy, and geothermal, hydropower contributed 17% to global electricity generation in 2020, ranking as the third-largest source, following coal and natural gas. Over the past two decades, global hydropower capacity has surged by 70%, yet its share of total generation remains stable due to the growth of other energy sources such as wind, solar PV, coal, and natural gas.

Steering Committee, comprising representatives from the Ministry of Commerce (MOFCOM) of the Government of China, UNIDO, the International Center on Small Hydro Power (ICSHP), the Standardization Administration of the People's Republic of China (SAC), and other key stakeholders. As the primary national executing agency, ICSHP will collaborate with UNIDO and SAC to carry out the project effectively. The valuable input of international experts from stakeholder organizations is expected, with various international peer reviews to guide the development of the technical guidelines and, subsequently, the international standard for SHP.



MITIGATING CLIMATE DISRUPTION

This project aims to foster the development of technical guidelines for Small Hydropower (SHP), serving as a foundational framework for the establishment of international standards in SHP development. The primary goal is to facilitate ecologically responsible, regulated, organized, and healthful growth of SHP.

Following the ISO International Workshop Agreements (IWA) model, the project will be overseen by a Project



SSTIC IMPACT

Recognizing the success of certain countries in SHP technologies and related guidelines/standards, these achievements have proven instrumental in supporting SHP planning, design, manufacturing, construction, operation, and management at both national and regional levels. A noteworthy 129 experts in small hydropower and standards from 29 countries and international/regional organizations actively participated in the IWA33 workshops in June

2019 and October 2021, hailing from diverse nations like India, Nigeria, Kenya, Zambia, Micronesia, Nepal, Mexico, Madagascar, Papua New Guinea, Guyana, Cuba, Argentina, Brazil, Burundi, Ghana, Mozambique, and Uganda. In these workshops, the technical guidelines were meticulously drafted, reviewed, and achieved a consensus.

An internationally recognized standard for SHP holds the potential to invigorate investments and empower local businesses within rural areas, where SHP potential

lies. These investments will culminate in the provision of reliable energy services and renewable energy to individuals and enterprises, acting as a catalyst for rural development and income generation activities. This process will furnish enhanced energy access to communities while simultaneously linking energy services to productive uses, thereby realizing the vision of sustainable and inclusive development.



SMALL HYDROPOWER CASE STUDY:

Project title: Technical guidelines for the development of international standards for small hydropower plants

Project ID: 170216

<https://open.unido.org/projects/M0/projects/170216>

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