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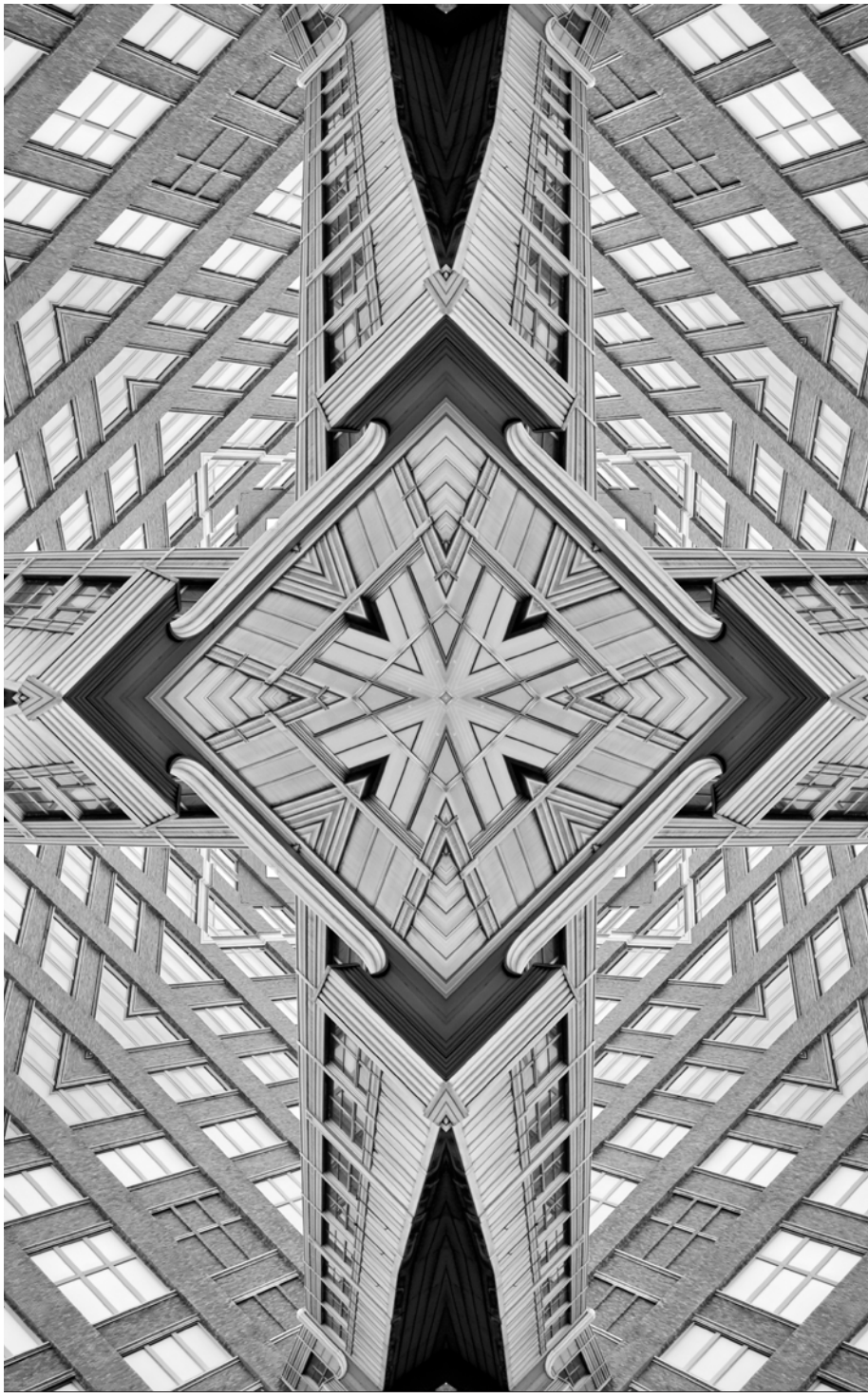

India and the Global Commons: A Case Study of the International Solar Alliance

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Abstract

This brief reviews the crucial role of India in global climate politics and highlights the country's partnerships on sustainable energy in Africa through the India-led International Solar Alliance (ISA). The brief finds that, beyond contributing to climate change mitigation, India—through ISA, in particular—is helping ensure energy security and sustainable livelihoods in sub-Saharan Africa by providing poor communities access to natural, economic, human, and social capital. It calls for complementary initiatives from policymakers in Africa to align efforts towards ensuring sustainable livelihoods for the continent's more than 1.33 billion people.

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Introduction

Climate is a global commons.[a,1] In the past few decades, worsening climate change has been threatening to severely disrupt the stability of global climate, which in turn carries many devastating implications. The mitigation of global warming, therefore, is a global public good.[2] The international community recognises this and has negotiated various agreements over the years. Three principles underlie these climate change negotiations: (a) no country (or continent) can be prevented from enjoying their benefits; (b) every country gains from such efforts, regardless of whether it contributes to them; and (c) one country's benefitting from climate mitigation does not affect the benefits available to other countries.[3]

The concept of 'global commons' as it relates to climate change means that global policies and actions are needed to address the anthropogenic factors that cause global warming, even if some of these factors could also be tackled effectively at the local level.[4] This shared global responsibility underlies the 2015 Paris Climate Agreement, which aims to enable states to coordinate their national efforts towards a global common property regime for the atmosphere. The agreement primarily aims to strengthen the global response to the threat of climate change by keeping global temperature rise this century well below 2 degrees Celsius relative to pre-industrial levels, and preferably below 1.5 degrees Celsius. Limiting greenhouse gas (GHG) emissions to mitigate climate change requires transition to a sustainable post-fossil economy by implementing techno-economic, environmental, and energy-efficiency policies, initiatives and programmes.

"The concept of 'global commons' as it relates to climate change means that global action is needed to address the anthropogenic factors that cause global warming."

a Global commons are areas and resources defined as being beyond any national jurisdiction. See: Stoll, "The Climate as a Global Common," 131.

Over the years, India has played a key role in the North–South politics of climate negotiations. It is a leading member of the Global South,[b] not only because of its vast population and position as an emerging economic power, but also as it has shifted from its earlier defensive, 'neo-colonial' attitude on the matter of climate responsibility to a more proactive and internationalist approach in recent climate engagements.[5,6] Even so, overall, in global negotiations, India has held on to its position as a developing country. It has consistently argued for state sovereignty, principles of equity, and common but differentiated responsibilities regarding cuts in GHG emissions.[7,8]

International climate negotiations are important forums for India to use diplomatic leverage in pursuing its foreign policy objectives and strengthening its role as a globally responsible actor. While its historical GHG emissions and responsibility for climate change may be low, its current and projected emissions are on a steep rise.[9] It has chosen a cooperative strategy to emphasise its responsibility through diplomacy and sustainable energy investments, in the process buttressing its role as a global powerhouse and widening its influence on partner countries.[10]

The establishment of the International Solar Alliance (ISA) in November 2015 is an example of India's progressive and cooperative climate engagement. The alliance, set up jointly by India and France during the Paris Agreement talks, is a treaty-based, member-driven forum aimed at trans-regional solar energy cooperation to both reduce fossil fuel dependence and bring about a more equitable and just energy order. Most of ISA's members are countries in Africa, with the continent contributing 36 of the 101 ratified members.

The global energy system is dominated by fossil fuels.[11] Energy-related GHG emissions increased nearly 20 percent in Africa between 2008 and 2017, albeit starting from a very low initial level relative to other developing economies. Energy demand in African economies is expected to nearly double by 2040, as populations grow and living standards improve.[12] Without a climate policy and transition to renewable energy sources, Africa's share in global energy-related carbon emissions is projected to increase 3–23 percent by 2100.[13] Enabling developing economies to decouple their energy consumption from their GHG emissions by replacing carbon-intensive fossil fuel use with renewable solar energy, is one of ISA's cardinal goals.

b The term 'Global South' refers broadly to regions outside Europe and North America, mostly (though not all) low-income and often politically or culturally marginalised. See: Nour Dados and Raewyn Connell, "The Global South," Contexts 11 (2012): 12.

Energy is essential for development in the contemporary world—[14,15] one might say as necessary today as air, water, and earth; it is vital for poverty reduction.[16] Ensuring "access to affordable, reliable, sustainable and modern energy for all" by the year 2030 is enshrined as Goal 7 among the United Nations Sustainable Development Goals (SDGs).[17,18,19]

Energy is 'secure' if it is adequate, affordable and reliable.[20] There are four dimensions to energy security: physical availability; economic affordability; accessibility from a socio-political standpoint; and environmental acceptability.[21] The scope of energy security has also been expanded to include supply side and demand side options. Neither is met in Africa[22] – be it in areas such as energy efficiency, or environmental sustainability (including addressing contemporary environmental concerns, especially climate change) or socio-political challenges, such as fuel poverty.[23,24] More comprehensively, it also includes notions of geopolitics and social acceptability.[25]

Despite an abundance of energy resources, energy insecurity is a stark reality in sub-Saharan Africa. The region suffers from the most debilitating energy poverty in the world. It has the lowest energy access rates and is home to the majority of least developed countries (LDCs).[26] More than 600 million of its 1.2 billion inhabitants have no access to modern energy services.[27] Approximately 120 million households lack access to adequate electricity, and it is projected that 60 million of them will continue to lack such access even after 2030.[28] The appalling state of energy generation and distribution has continued to stifle economic growth and sustainable development in the region.

"Despite an abundance of energy resources, energy insecurity is a stark reality in sub-Saharan Africa."

India and sub-Saharan Africa share the misfortune of being disproportionately vulnerable to the impacts of climate change. They are responsible for only a small share of the historical, cumulative global GHGs,[29] yet they face their sharpest consequences.

Indo-African relations have consolidated over the years beyond the movement against colonialism and racial discrimination,[30] to increased trade and investment,[31] and scientific and technological cooperation.[32] One shared characteristic of the global commons is their close association with scientific discovery and development of technological capability.[33] The 'leapfrogging' hypothesis postulates that low-income countries can expand their economies with modern, low-carbon technologies without relying on conventional fossil fuels as the advanced countries did while they were developing.[34] Knowledge and technology transfer is thus a critical part of India-Africa collaboration in energy security.[35] Such transfer is critical and urgent for the paradigm shift to happen—from fossil fuel energy sources to renewable energy.

India is a model in the renewable energy sector. The country's path towards a more sustainable energy future, distinguished by the use of renewable sources, offers several lessons.[36] The country has over 35 GW of cumulative solar installations, with a target of 100 GW and 300 GW of solar energy capacity by 2022[37] and 2030,[38] respectively. Moreover, the country's installed wind energy capacity stands at 39.2 GW and is projected to increase by another 20 GW in the next five years.[39]

India continues to play a leading role in Africa's energy security by providing and supporting access to clean energy through renewable energy technologies. Some of these developmental efforts, specifically in solar energy, are as follows:

(a) Training and empowering illiterate and semi-literate Malawian women under the 'Solar Mamas' rural electrification project to become solar engineers and simultaneously electrify their rural communities;

(b) Facilitating construction of power transmission lines in Kenya;

(c) Supporting solar electrification at primary schools in Zambia;

(d) Assisting a self-help electrification project in Ghana;

(e) Backing a solar-diesel hybrid rural electricity project in Mauritania; and

(f) Setting up solar photovoltaic module manufacturing plants in Mozambique.[40]

The Role of Solar Energy in Energy Security and Sustainable Livelihoods

SDG Target 7.2 aims to "substantially increase the share of renewable energy in the global energy mix" by 2030. This target, and the increasing global demand for energy security and sustainable development has made it imperative for Africa to engage in a paradigm shift from fossil fuel energy sources to a clean solar powered energy system.

Historically, economic development is strongly correlated with increasing energy use and growth of GHG emissions. Solar energy decouples such correlation, contributing to climate action and sustainable development.[41] Such decoupling calls for three crucial technological changes: replacement of fossil fuels with solar energy; energy savings on the demand side; and improved efficiency in energy production.[42]

Increased energy consumption is a measure of reduced poverty and enhanced economic growth, particularly in developing nations. Renewable solar energy improves energy services for the rural poor and alleviates poverty in sub-Saharan Africa.[43,44] Mitigating climate change, enhancing energy security, and alleviating rural poverty can all be complementary in Africa through transition from fossil resources to solar energy systems.[45,46]

Solar energy has been proposed as one means of improving energy security.[47,48] In addition to being a favourable influence on a country's energy mix, it is compatible with energy security targets of accessibility and acceptability.[49] The availability of solar radiation in any region is less susceptible to changes in geographic and meteorological conditions and is, therefore, largely evenly distributed during daylight hours.[50] Market and political forces cannot disrupt the sun, unlike oil and gas supplies.[51] The global distribution of solar energy is more evenly spread than fossil fuels; therefore, its increased use will lessen the impacts of geopolitical conflicts on energy security. Solar energy is also more amenable to distributed production, which is inherently more secure than the fossil fuel paradigm. These sustainable and reliable features are relevant to usher in an era of energy democracy, where a network of decentralised prosumer systems will play the role once dominated by large-scale power generators.[52]

Solar energy is one of the cleanest sources of energy with remarkable environmental, social, and economic benefits for society. Immediate and long-term impacts of solar home systems enrich all kinds of livelihoods assets—human, social, financial and physical.[53] Solar energy also has positive impacts on household savings' capability, health, education and women's economic productivity and empowerment,[54] thereby playing an important role in the implementation of SDGs.[55] A recent review[56] found that solar energy technologies

improve energy access, security, and resilience, create employment along their value chain, reduce energy dependence on imports, improve public health, and afford users greater freedom to deploy electricity for personal and communal benefits. Further, it has been proven that solar technologies are suitable options for achieving sustainable agriculture and food security in distant rural areas.[57,58] Indeed, solar energy has helped build pandemic-resilient livelihoods in the face of the disruptive effects of COVID-19.[59]

Solar Energy Potential in Africa

Africa is often referred to as the 'Sun Continent'—the continent where solar radiation is greatest.[60] The continent is located between latitudes 37°N and 32°S and spans a vast area that crosses the equator and both tropics. The solar energy potential of Africa is arguably limitless. It is observed that, with falling solar generation costs over the past decade, solar can be the cheapest source of electricity in Africa.[61] The total solar potential of all countries in sub-Saharan Africa is about 10,000 GW.[62] Solar potential is fairly distributed across all the countries, with an average of 6 kilowatt hours (kWh) of solar energy per sq m available per day.[63] A joint study by custodian agencies of SDG7 found that 49 percent of the 105 million people who had access to off-grid solar solutions in 2019 resided in sub-Saharan Africa.[64] A significant portion of Africa currently uses solar energy to meet relatively basic needs like lighting, charging mobile phones, and powering low-capacity appliances.[65]

> "Solar energy decouples the correlation between economic growth and GHG emissions."

Technological developments, falling costs of renewable energy, innovative approaches, network effects, and digitisation are opening new opportunities and making an indisputable business case for renewables in Africa.[66] The biggest options for solar power generation in Africa are photovoltaic (PV) and concentrated solar power (CSP), as well as small-scale PV systems suitable for off-grid power generation.[67] The technical potential of solar PV across Africa has been estimated at 6.5 petawatt hours (PWh) a year,[68] while that of CSP is approximately 625 PWh a year.[69] Both PV and CSP technologies are crucial for rural communities in Africa given their diverse potential uses ranging from energy generation, to agriculture, food processing, waste treatment, and water supply.[70]

Most African countries have yet to effectively utilise the abundant solar energy available to them. The constraints are many: the newness of the technology, the relatively high cost, especially for CSP (and despite the overall drop in solar module prices); insufficient and expensive domestic finance; unstable and weak economies; problems of social acceptance and weak institutions; lack of supportive policies and legal frameworks; and inadequate technical and human resources.[71,72,73] Other constraints include the limited capacity of customers to afford solar products, market uncertainty (which impacts business running), high costs of serving last-mile populations, cash-flow issues stemming from paucity of working capital, and instability in the political and economic environment.[74] There are, however, recommended solutions for these problems too, such as strengthening the institutional and regulatory framework, capacity building, harmonising financial resources, and improving the security and political environment to attract investors.[75]

The Case of ISA

The ambitious 'One World, One Sun, One Grid' initiative of Indian Prime Minister Narendra Modi led to the birth of the ISA at the 2015 UN Conference of Parties 21 (COP21) in Paris. The formation of ISA underlined India's presence as a dominant global force in the challenging politics of climate change. The multilateral treaty status accorded to ISA by the UN came into force on 6 December 2017. ISA was proposed as a multi-country partnership organisation with membership from the 'sunshine belt' countries lying fully or partially between the Tropic of Cancer and the Tropic of Capricorn. (The ambit has been subsequently expanded to include several European countries and the US as well.) The goal is to mobilise more than USD 1 trillion in investments to set up 1,000 GWs of solar installations globally, thereby making clean power affordable and universally accessible by 2030.

Apart from having member states, ISA also grants 'partner organisation' status to entities that can help it achieve its objectives. It seeks to provide a collaborative platform to leverage the technical expertise, financial capacity, and global networks of these partner organisations to scale up deployment of solar energy technologies to meet the energy needs of member countries in a safe, convenient, affordable, equitable, and sustainable manner. It provides a platform for the global community, including transnational institutions, multilateral development banks (MDBs), development finance institutions (DFIs), institutional investors, private and corporate organisations, industries, and stakeholders. The aim is to make positive contributions to the common goals of improved energy access, enhanced energy security, and provision of more opportunities for better livelihoods in rural and remote areas.

Despite the fall in solar module prices in the past decade, solar energy is still a capital-intensive proposition that comes with risks and uncertainties. Yet, without state funding, ISA's de-risking efforts have mobilised substantial private investments in solar technologies in developing countries. ISA's risk pooling and demand aggregation from multiple projects within and across countries has helped reduce risks for investors and lowered both cost of borrowing and capital costs.[76]

ISA has established a Common Risk Mitigation Mechanism (CRMM), along with other stakeholders, to act as an insurance pool for financiers. The USD1-billion guarantee from this mechanism could attract up to USD15 billion in investments, which could set up 20 GW of solar PV capacity in more than 20 countries. Another such initiative is the Sustainable Renewables Risk Mitigation Initiative (SRMI), launched at COP24 in 2018 by ISA and some of its partners.[c]

c These are the World Bank, the French Development Agency, and the International Renewable Energy Agency.

The objective is to leverage private investments to support governments in developing, financing and implementing sustainable solar programmes and projects.[77] The goal of SRMI is to mobilise USD 850 million of concessional finance to unlock 8 GW of renewables which can provide access to reliable electricity in over 20 developing countries including Botswana, Central African Republic, Democratic Republic of Congo, Kenya, Mali, and Namibia by 2025.[78]

Following the first summit of ISA held in March 2018 in New Delhi, India announced assistance of USD1 billion for the implementation of solar power projects across 10 African countries.[d] These projects include setting up of solar PV power plants, mini-grid and off-grid plants, irrigation systems, rural electrification, street lighting, and solar-powered urban infrastructure, including hospitals, schools and government establishments.

ISA has launched three flagship programmes—Scaling Solar Applications for Agriculture, Affordable Finance at Scale, and Scaling Solar Mini-grids. Two more are in the pipeline: Scaling Residential Rooftop Solar and Scaling Solar E-mobility and Storage. Scaling Solar Applications for Agriculture focuses on providing greater energy access and sustainable irrigation solutions to farmers in member countries. It also supports development of solar energy linked cold-chains and cooling systems for agricultural use. Affordable Finance at Scale aims to leverage private sector investments to promote the development of bankable solar programmes in developing countries. The Regional Off-Grid Electrification Project seeks to accelerate access to electricity in the 19 countries of West Africa through the use of stand-alone solar photovoltaic systems. ISA is working with MDBs and DFIs to deploy innovative financial instruments to scale-up low-cost financing for solar investments.

Countries participating in the Scaling Solar Applications for Agriculture programme include Mauritius, Senegal, Sudan, and Uganda. They have all received solar pumps to replace diesel-fuelled agricultural pumps for irrigation. Moreover, under this programme, some countries[e] are part of an initiative to support resilience in agriculture and health amidst the COVID-19 crisis. Uganda is also participating in the Affordable Finance at Scale programme, under which Mali is developing a 500 MW Solar Park. It is also part of the Regional Off-Grid Electrification Project. Burkina Faso, Uganda, and Tanzania are part of the USD 1-billion public investments in solar facilities and solar home systems.

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d These countries are Benin, Burkina Faso, Chad, Mali, Niger, Togo, Guinea, Democratic Republic Congo, Ghana, and Nigeria.

e Benin, Burundi, Comoros, Djibouti, Ethiopia, Mali, Malawi, Mozambique, Niger, Senegal, Sudan, Togo, Uganda, and Niger.

ISA also has a Solarising Heating and Cooling Systems programme, where, working with the Climate and Clean Air Coalition (CCAC), it has piloted solarised and efficient cold food chains in Nigeria. The development of solar powered pack houses and cold storages in Senegal and Ghana is being financed by a Euro 1.3-million grant from the French Facility for Global Environment. The project focuses on developing innovative business mechanisms to make sustainable cooling infrastructure available at low cost to all. The objective of the programme is to solarise the growing thermal demand from commercial, industrial, and residential sectors. An initial area of focus is developing solar-powered cold chains for safer and longer preservation of food, significantly reducing post-harvest food loss and potentially doubling farmers' incomes.

'Light Up and Power Africa' is part of the African Development Bank's (AfDB[f] 'New Deal on Energy for Africa' scheme to support fast and affordable means of delivering energy access. AfDB and ISA are working together to create new financial instruments. They seek to provide local lenders with risk mitigation instruments to support distributed energy service companies and thereby accelerate off-grid energy access in sub-Saharan Africa at scale. ISA provides technical assistance and knowledge transfer to support both off-grid solar projects and large-scale solar independent power producers. The aim is to provide an additional 10,000 MW of electricity to 250 million people in African ISA member countries. Once this is accomplished, the region will be the world's largest solar powered zone.

The concept of sustainable livelihood requires shifting the focus of environmental action towards people and livelihood activities to improve the quality of life of the poor.[79,80,81] The Sustainable Livelihoods Approach (SLA) has increasingly been employed in policy and development intervention designs to assess the impact of off-grid electrification by solar energy, especially in developing countries.[82,83] This framework shows how sustainable livelihoods are achieved through access to a range of livelihood resources—natural, economic, human, and social capital.[84] The SLA is a valuable tool to evaluate the activities of ISA in sub-Saharan Africa, beyond geopolitics and global commons, towards enhancement of sustainable livelihoods among rural households in the region.

f The AfDB is a multilateral DFI established to contribute to the economic development and social progress of African countries.

Electricity generated from solar can be used to power household appliances such as televisions, radios and mobile phones, which increase rural communities' access to information and provide security updates to communities in crisis, thereby contributing to the people's social capital. Increased incomes from agricultural practices positively impact economic growth, as well as human capital, through access to quality education, thereby contributing further to sustainable livelihoods.[85]

The International Panel on Climate Change's Sixth Report (AR6)[86] submitted that climate change is making both agricultural and ecological droughts more frequent, severe and pervasive in Africa. Climate-smart, solar-powered water pumping irrigation systems help tackle challenges of frequent droughts and unreliable rainfall, leading to improved productivity and establishing resilient livelihoods in water-scarce areas.[87,88] Improved access to solar energy ensures sustainable consumption and production, and also contributes to environmental conservation by reducing deforestation and land degradation.[89] Other benefits[90] include reduction in risk, especially among women and children, of death from indoor air pollution due to cooking by firewood. Sub-Saharan Africa has the lowest rates of primary school electrification in the world. Solar energy technologies can enable rapid deployment of clean, reliable and affordable energy in schools and households.[91] It gives children in rural areas a chance to study longer and thus perform better.[92,93] Many health facilities in the region operate with unreliable energy sources. Solar electrification of hospitals and other health facilities can help power life-saving equipment and services, and store vaccines and medical supplies better, improving access to quality healthcare and reducing the costs.[94]

Indeed, there is a strong link between adoption of solar energy technologies and improved human and economic capital.[95] There is also correlation between solar energy consumption and economic growth.[96] The solar energy value chain fosters economic growth and improves employment opportunities. The use of local labour for installing, operating and maintaining solar technologies creates more jobs, too.[97]

Conclusion

Energy insecurity is a stark problem in many developing countries, including those in sub-Saharan Africa. This is particularly true for the poorer and more vulnerable populations in the rural regions. Solar energy offers potential socio-economic and environmental solutions to the energy gap. Clean and sustainable, its adoption reduces GHGs emissions—the primary cause of climate change. Solar energy also provides access to affordable, reliable, and sustainable energy for all by 2030, as set out in the UN's SDG 7.

Collaboration on energy is a critical aspect of India–Africa partnership, as India's investments in sustainable energy development in sub-Saharan Africa through ISA continue to strengthen its influence in the region. While most of ISA's efforts in sub-Saharan Africa are in their initial stages, early evidence shows that the existing framework of Indo-African cooperation, and the ISA in particular, are indeed helping the region to address the fundamental challenges of climate change, energy access and energy security, while contributing to the achievement of SDG 7.

An appraisal of initiatives and activities of ISA in sub-Saharan Africa, using the SLA framework, shows their significant contribution to livelihood resources—natural, economic, human and social capital—through job creation, poverty reduction, improved productivity, quality education and healthcare, food security, sustainable production and social stability. These spinoffs from climate change mitigation extend beyond protection of the global climate system to ensuring climate adaptation and sustainable livelihoods in sub-Saharan Africa.

For ISA to realise its lofty objectives of improving the livelihoods of hundreds of millions of African citizens, it is imperative for elected policymakers in the different countries to ensure their policies are complementary, so they can jointly address the developmental issues of climate change mitigation, energy security, and sustainable livelihoods.

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