

IEA SHC Welcomes Three New Organizations

SACREEE, the South African Centre for Renewable Energy and Energy Efficiency, joins four other UNIDO Global Network of Regional Sustainable Energy Centres (GN-SECs) members in the IEA SHC Programme. What is exciting is that each GN-SEC member brings a different regional focus to our work. SACREEE brings the perspective and experiences of sixteen Southern African countries.



Southern African Governments Navigating Implementation of Their Solar Thermal Roadmaps

One project that will no doubt benefit from the new collaboration between SACREEE and IEA SHC is the well-established SOLTRAIN (Southern African Solar Thermal Training and Demonstration Initiative) project. This regional initiative is supporting capacity building and demonstration of solar thermal systems throughout the Southern African Development Community (SADC) region. A project funded by the Austrian Development Agency (ADA) and OPEC Fund for Development (OFID) since 2009.



Six SADC countries – Botswana, Lesotho, Mozambique, Namibia, South Africa, and Zimbabwe – have developed Solar Thermal Roadmaps and Implementation Plans as part of the SOLTRAIN project. The purpose of these roadmaps and plans is to outline the path towards a national vision for solar thermal applications in the country, targeted at enhancing the quality of life of the citizens through the provision of a sustainable and quality-assured solar thermal technology value chains.

The current Phase IV of the project is focussing on the implementation of the Solar Thermal Roadmaps and Implementation Plans in a medium-term in close coordination with the renewable and solar energy policies and programmatic activities of the partner countries. The SADC Centre for Renewable Energy and Energy Efficiency (SACREEE) is supporting the execution of these Roadmaps and Plans. SACREEE is a regional inter-governmental organization established in 2015 with a mandate to promote market-based adoption of renewable energy and energy efficiency in increasing access to clean and modern services as well as regional energy security.

SACREEE's role, as an inter-governmental organization, is to ensure that the implementation of the Solar Thermal Roadmaps receives wider political support, thus ensuring alignment with regional strategies such as the SADC Renewable Energy and Energy Efficiency Strategy and Action Plan (REEESAP) and the SADC Industrial Energy Efficiency Programme (SIEPPP). Some of the activities to support this goal include:

- Providing policy and administration advice to different application groups.
- Communicating the goals of the Roadmaps and Implementation Plans.
- Coordinating capacity building programs.



▲ Harare Children's Home, Harare, Zimbabwe.

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- Supporting national measures to implement the Roadmap and Implementation Plan.
- Supporting the mobilization of national and international funds for implementation.
- Supporting governmental bodies with the necessary legal information and industry wanting to venture into manufacturing solar collectors, tanks, or complete solar thermal systems with technical skills.

Between January and February 2020, SACREEE, together with the SOLTRAIN coordinator, AEE – Institute for Sustainable Technologies (AEE INTEC), held various national policy workshops in Namibia, Lesotho, South Africa and Zimbabwe in partnership with national implementing partners. The objective of these national policy workshops was to:

- Inform policymakers on Phase IV of the SOLTRAIN project.
- Work on national measures to implement and realize the goals of the Solar Thermal Roadmap and Implementation Plan.
- Mobilize national and international funds for the implementation, and
- Support governmental bodies on policies for different application groups for the acceleration of installation of solar thermal systems in the country.

The outcome of the workshops is that countries have prioritized the preparation of bankable solar thermal projects that support the implementation of the roadmaps and action plans. The preparation of these projects is supported by national, regional, and international financing institutions.

According to the SADC Industrial Energy Efficiency Programme (SIEEP), there are significant opportunities for solar thermal applications in the food, beverage, and mineral processing sectors. The SIEEP is focused on objectives and actions that provide an enabling environment (policy, regulatory, institutional, financial frameworks) and projects that demonstrate energy savings and the co-benefits of reduced costs of doing business, greenhouse gases (GHG) emissions, job creation, and contribution to industrialization. These industries in the SADC region need to adopt solar thermal technologies and energy efficiency to reduce the cost of production, create competitiveness, and minimize GHG emissions.

Financiers and solar thermal solutions providers are invited to work with the Southern African countries in implementing solar thermal solutions to make them economically competitive in the wake of the COVID-19 pandemic while reducing their GHG emissions. Solar thermal solutions are essential in the fight against COVID-19 as warm water preparation is ideal in maintaining hygienic standards at home, health facilities, and work environment.

The vast experience of the Solar Heating and Cooling Programme will be valuable in supporting the Solar Thermal Roadmaps and Implementation Plans through co-operative research, development, demonstration, and exchange of information regarding solar heating. This new level of collaboration will constructively support the scaling up of solar thermal technology in the SADC region.

This article was contributed by Kudakwashe (Kuda) Ndhukula, the Executive Director of SACREEE and IEA SHC Executive Committee representative. For more information on SACREEE visit www.sacrenee.org



SACREEE Partner Countries

- Angola
- Botswana
- Comoros
- Democratic Republic of Congo
- Eswatini
- Lesotho
- Madagascar
- Malawi
- Mauritius
- Mozambique
- Namibia
- Seychelles
- South Africa
- Tanzania
- Zambia
- Zimbabwe



◀ **SOLTRAIN demonstration project at the Susanne Grau Heim Old Age Home, Windhoek, Namibia.**

EACREEE, the East African Centre for Renewable Energy and Energy Efficiency, joins four other UNIDO Global Network of Regional Sustainable Energy Centres (GN-SECs) participating in the SHC Programme. Each of these GN-SEC members brings a new regional focus to our work. EACREEE brings the perspective and experiences of six East African countries, Burundi, Kenya, Rwanda, South Sudan, Tanzania, and Uganda.



East African Region Sees Huge Potential for Solar Water Heating Industry

Resource Potential

East Africa Community (EAC) Partner States collectively have a huge solar energy potential, exploited only marginally. The region continues to enjoy nearly uniform solar insolation throughout the year. This is mainly because of the geographic location along the Equator that offers the EAC region climatic conditions that are technically favorable for solar energy exploitation. For example, even during seasons that are classified as rainy – that is mostly cloudy – there is sufficient daily insolation. More precisely, the daily sunshine produces between 4 - 6 kWh per m² per day, with an annual average of 8 hours of sun per day. The average solar radiation per year in the EAC region is about 1825 kWh/m², and therefore solar heating systems can offer average total heating energy of 800 kWh/m²/year.



This abundant solar resource presents excellent opportunities and benefits for both solar photovoltaic and thermal applications in the region. It is well documented that shifting to solar photovoltaic and thermal applications can contribute substantially to climate change mitigation in the building sector and hence to meeting the target of keeping the global temperature not more than 1.5°C above pre-industrial levels. In the EAC region, shifting to solar water heating has the additional advantage of releasing electric power from the grid for other applications. This is a real benefit as the region still lags significantly behind in electrification rates.

Despite the tremendous solar potential in the region, the adoption of solar water heating in the region is still very low. The main reason is that the region faces a number of barriers to exploit solar thermal resources effectively. Some of these limitations include inadequate technical skills, high upfront costs, lack of innovative business models, limited financing options, limited awareness/interest and demand, unclear policy requirements, lack of water, disjointed institutional mandates, inadequate technical standards, limited enforcement capacities among mandated institutions, low-quality products and services, and owner-occupier mismatch. With ongoing measures, though incrementally slow, to catalyze the adoption of solar water heating systems, the huge untapped market will eventually fully open up.

Regulatory Environment

Efforts are underway by the EAC countries to create a conducive environment for solar water heating through the development and implementation of enabling policies and legislation in renewable energy sectors. For instance, all countries have made solar energy equipment tax-exempt according to the East African Community Customs Act (2004) and Legal Notice No. EAC/23/2014 of 20 June 2014. In addition, to stimulate the solar water heating market, the EAC Partner States have instituted various interventions, including capacity building, promulgating and enforcing regulations and tax incentives, and other measures. For example, in 2012, Kenya promulgated the Energy (Solar Water Heating) Regulations, which required that all commercial facilities (e.g., hotels) install and use solar water heating systems if their hot water requirements exceed one hundred liters (100 L) per day. In 2015, Rwanda put in place Regulations N°004/

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ENERGY/SWH/RURA/2015 on Solar Water Heating with similar requirements. These measures have had a tremendous impact on the adoption of solar water heating systems.

Solar water heating market potential

According to the EAC Renewable Energy and Energy Efficiency Status Report 2016¹, Kenya was the leader in the solar water heating market in the EAC, accounting for 80% of the market volume. Uganda and Rwanda had smaller but growing solar water heating markets due to the enabling environment for renewable energy investments. As of June 2017, the Kenya Revenue Authority (KRA) data revealed that Kenya had imported a total of 65,789 solar water heating systems. Considering those imported outside the scope of the KRA data and those locally manufactured systems, it was estimated that there were about 77,000 units installed with a collector area of approximately 415,524 m², corresponds to 0.3GWth of installed capacity. Based on the average annual imports of about 7,500 units, it was estimated that there were a total of 90,000 units of solar water heating systems. The potential market for solar water heating units in Kenya today is expected to be about 3.5 million units, assuming 100% market penetration. This clearly shows that only about 2.6% of the potential market has been exploited, leaving over 97% of the market potential untapped. With the current population growth rate and a housing deficit of about 2.5 million units, these figures are likely to increase. It is important to note, however, that due to the lack of credible data on restaurants and eateries as well as laundry facilities in Kenya, the potential market could be marginally larger. This substantial untapped market could be harnessed through awareness-raising and enforcement of the 2012 Energy (Solar Water Heating) Regulations combined with a variety of financing mechanisms to promote the uptake of solar water heating systems. And both these actions should go hand in hand with the rigorous enforcement of the regulations.

Technology and market segments

Residential, commercial, institutional, and industrial buildings are the four largest market segments for solar water heating potential. Most systems installed in the region are domestic solar water heating systems with tank capacities ranging from 150 to 300 liters. Many commercial organizations, such as hotels with solar water heating systems, also use modular domestic systems to meet their demand. The gross collective area of a domestic thermosiphon system ranges from 2.0 – 4.0m². Flat plate collectors are the most common systems in the EAC region (Figure 1). Although there appear to be widespread installations of evacuated tube systems, they are generally perceived to be weaker in performance and are of sub-standard quality. This perception could be due to their fragile nature and propensity to overheat combined with performance issues in areas with 'hard' or saline water, including some underground water supplies and areas along the coastline. Although these types of systems require regular maintenance, due to their affordability, the market for evacuated tube systems is growing in the EAC region, especially among end-users.

Navigating through the COVID-19 Pandemic

It is becoming evident that the COVID-19 pandemic threatens to reverse the enormous progress that solar thermal companies have made in increasing the installed capacity of solar water heating systems in the past few years. The new global economic crisis will make it more difficult for new and existing customers to pay for new solar thermal systems and related services. At the same time, disrupted supply chains and reduced investment flows may cause companies to run out of cash, thus reducing activity. With eminent dwindling liquidity, companies dealing with solar thermal systems will be forced to lay off staff, resulting in possible reductions of customers' access to services. As the EAC region prepares for the COVID-19 aftermath, there is a tremendous opportunity for a regional reset.



EACREEE Partner Countries

- Burundi
- Kenya
- Rwanda
- South Sudan
- Tanzania
- Uganda

¹ EAC Renewable Energy and Energy Efficiency Status Report (2016)

EACREEE has just put in place an ambitious business plan that can provide green stimulus plans for the region to restore its targets while deepening its energy transition. The Centre will seek to support businesses temporarily closed due to the pandemic by working with partners to provide technical assistance, with stakeholders to provide sector-wide policy interventions, and with our partners to provide financial support for solar water heating companies.

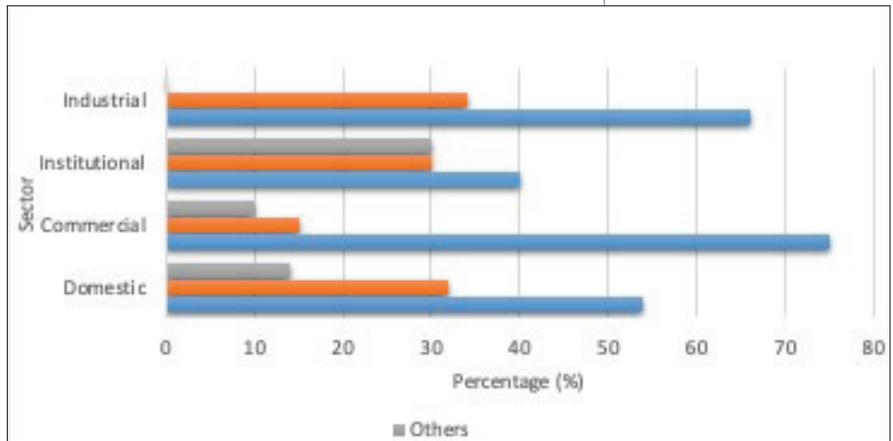
Going Forward

Clearly, the Kenyan experience shows that sound policy and legislative framework can help catapult solar water heating use to a very high level. However, there is still the need for strengthening the enforcement of regulations and providing more incentives to scale up the solar water heating market. It is also important to note that the six EAC Partner States are not at the same pace when it comes to solar water heating adoption and a regulatory policy framework. While Kenya and Rwanda have enforceable regulations, Uganda has only encouraged policy and incentives. Burundi and South Sudan, on the other hand, have neither a policy nor enforceable regulations. There is, therefore, a need to harmonize policies and regulatory frameworks across the region to ensure that no one is left behind. In addition, based on the Kenyan experience, increased adoption in other countries will require stimulating the demand for solar water heating technologies.

To address the multitude of barriers hampering the exploitation of renewable energy technologies, like solar water heating, in a cross-linked and inter-linked manner in the public and private sectors, EAC with support of the United Nations Industrial Development Organization (UNIDO), established the East African Centre for Renewable Energy and Energy Efficiency (EACREEE). The Centre has the mandate to promote renewable energy and energy efficiency through policy harmonization, capacity building, investment promotion, research and development, and knowledge management. The activities of EACREEE strategically ensure resource efficiency in policy development, learning and sharing from best practices regionally and beyond, and deepened integration.

With this new partnership, EACREEE looks forward to receiving support from the global pool of SHC experts and learning best practices from other countries. This collaboration will surely help to accelerate the pace of solar thermal technology development and deployment, promote standardization of solar thermal systems, enhance regional solar thermal technical capacity, and with higher learning institutions strengthen research and development in this region of Africa.

This article was contributed by experts from the East African Center of Excellence for Renewable Energy and Efficiency (EACREEE): Prof. Mackay Okure, the Interim Executive Director, Mr. Fred Ishugah, the Sustainable Energy Expert and Mr. Michael Kiza, the Project Management Expert. For more information on EACREEE visit <https://www.eacreee.org/>



▲ **Figure 1. Distribution of solar water heating technologies among end-users in the EAC region.²**

2 Study of the Solar Water Heating Industry in Kenya (2017)

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Our newest member, CCREEE, the Caribbean Centre for Renewable Energy and Energy Efficiency Centre, joined the IEA SHC in early June. This Centre brings a unique regional focus to our work, and we are looking forward to working with CCREEE's staff in Bridgetown, Barbados and the fifteen member countries.



Energy Challenges and Sustainable Energy Opportunities

The creation of CCREEE responds to the difficult energy situation in much of the Caribbean. Caribbean countries are facing how to access to modern, reliable and affordable energy services, energy security, and climate change mitigation and adaptation simultaneously. The primary energy challenges are:

- Lack of access to modern, reliable and affordable energy services is still a challenge in the remote areas of some Caribbean countries (Belize, Guyana, Haiti, and Suriname). This also includes lack of access to modern cooking services;
- Very high electricity tariffs and generation costs represent a burden for the economy, private households, local companies, and key industries in most Caribbean territories. Electricity tariffs charged to residential consumers in CARICOM (Caribbean Community) States range from as low as 4.5 U.S. cents per kWh to over 38 cents per kWh;
- Widening demand-supply gap in urban areas;
- Weak financial status of some utilities due to high diesel generation costs and technical and commercial efficiency losses;
- Low energy efficiency in buildings, appliances, industrial processes, and technical and commercial grid losses result in power cuts and load shedding in some countries;
- Frequent power outages have led to the installation of private diesel generators in some countries;
- National access rate to modern energy services remains at low levels on some islands;
- Untapped Renewable Energy and Energy Efficiency (RE&EE) potential; and
- Increasing extreme weather events impact infrastructure and energy planning.

By developing renewable energy sources and implementing energy efficiency measures, many countries in the region could reduce their overall fossil fuel consumption, and thus promote clean economic growth and decreased dependence on costly, imported petroleum fuels. The development of sustainable energy is interrelated with a broad range of positive socio-economic impacts (e.g., reduction of fossil fuel imports, increased affordability for low-income groups through the reduction of electricity consumer prices in the long term, improved financial situation of utilities, increased competitiveness of companies and industry, reduction of stand-by diesel generators, creation of green jobs).

The Caribbean is blessed with a broad range of renewable energy sources (bioenergy, solar, wind, hydro, tidal, and geothermal energy). Plus, there is significant potential for energy efficiency improvements in lighting, appliances, buildings, transmission and distribution, and industrial processes, particularly in urban areas. Small-scale decentralized RE solutions can be cost-effective options to satisfy the needs of the rural population located far away from the main grid, which is particularly relevant for parts of Belize, Guyana,

Haiti, and Suriname. RE&EE solutions can be an important driver to increase the productivity and competitiveness of industrial key sectors - such as food processing, fishery, manufacturing of high-value niche products and services, and tourism. A growing sustainable energy market also creates new income and job opportunities for energy service and manufacturing businesses.



▲ 64 collectors on a carport supply the hot water for a resort in Barbados. Photo: Solar Dynamics

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Navigating through the COVID-19 Pandemic

As Dr. Gary Jackson, the Executive Director of CCREEE, noted in his April 2020 Opinion Piece, “COVID-19 Highlights Caribbean Community’s Need to Build Resilience, “...COVID-19 presents a very real concern for the Caribbean’s energy sector. This becomes crucial when we consider that energy demands have changed with the advent of the crisis and, they will continue to change in unpredictable and unprecedented ways. Currently, commercial and industrial energy use are reduced as many businesses are closed or have reduced operations but, use at the household level has increased due to government mandates to stay at home. Utilities will therefore have to adapt to these changes since the amount of energy being consumed and the pattern of its consumption have changed considerably. If energy generation capabilities exceed the demand, utilities may also consider running the powerplant at a reduced capacity, with possible negative financial implications and impacts on the quality of service provided. Importantly, as energy intersects with health, the ability to reliably power essential medical equipment – like ventilators – becomes critical.

Significant shifts in oil prices have also been predicted and are already emerging. Globally, there has been a steep decline in oil prices, due to decreased demand. These dynamics do not augur well for our Member States who have recently found large deposits of oil. Conversely, an increase in prices is expected when the crisis recedes and commerce and industry are able to function in earnest again. In anticipation of this, the Caribbean Community (CARICOM) needs to be prepared and use this time to ramp-up renewable energy and energy efficiency capacity, where possible. The timing is right, as most CARICOM Member States desire an energy transition to achieve energy security.

Householders can also prepare by reducing consumption now, as much as they are able. Pay attention to your electricity bill, track your usage and unplug appliances and devices when they aren’t in use. Amidst the hundreds of thousands who are now unemployed due to COVID-19, a spike in household electricity bills and other energy-related costs to be met by the most vulnerable can have an untold impact. Though high unemployment rates have incredible impacts on economies, businesses and households, these unemployed individuals do now have the option of learning new skills, to place them at an increased advantage when the crisis has passed.

In 2008 when oil prices rose above US\$140 per barrel, the region’s thrust toward renewable energy peaked. Subsequently, our renewable energy targets became very ambitious. Let us not wait until our backs are against the wall again, to see the necessity of energy resilience and self-sufficiency. We need to implement energy efficiency and renewable energy measures now throughout our operations, particularly in high-energy use sectors such as tourism. Tourism industries can benefit from sustainable operations as they seek to rebuild the tourism product during this period of inactivity.

Renewable energy and energy efficiency can provide tremendous benefits to Caribbean territories by minimizing costs and improving our environment. We can accomplish this and more with the long-term view of transforming the energy sector, for the benefit of Caribbean people. We can appreciate, it is not business as usual.”

For more information on CCREEE visit www.ccreee.org.



CCREEE Partner Countries

- Antigua and Barbuda
- Barbados
- The Bahamas
- Belize
- Dominica
- Grenada
- Guyana
- Haiti
- Jamaica
- Montserrat
- Saint Kitts and Nevis
- Saint Lucia
- Saint Vincent and the Grenadines
- Suriname
- Trinidad and Tobago