(SEYCHELLES EDITION)

CONCEPT NOTE FOR UNCTAD TECHNOLOGY ASSESSMENT PROJECT ON ENERGY AND AGRICULTURE

NATIONAL STAKEHOLDER WORKSHOP

2-3 March 2022

Introduction

Technology assessment (TA) is becoming a powerful toolbox for making strategic choices on new technologies' procurement, development, introduction, and governance. It is about a critical and participatory assessment of a particular technology's social, economic, and environmental benefits and risks.

TA is still in its infancy in Africa, including in the Seychelles. Its application as a vital tool for technology policymaking is just starting to attract the attention of academics, technocrats and policymakers, and legislatures on the continent. However, there have been various TA-like initiatives in health, energy, water, agriculture, and some TA on specific technologies such as biotechnology and nanotechnology in Africa.

Demand for TA in Africa is likely to grow for at least three reasons. First, African countries are increasingly emphasizing the role of new technologies in sustainable development. This is reflected in the kinds of national science, technology and innovation (STI) policy frameworks that many countries in the continent are adopting. Second, countries are exposed to a large and growing pool of technologies and technological options, making it critical to adopt specific tools and approaches for making wise technology choices. In this regard, TA is recognized as a vital 'methodological toolbox' for selecting particular innovations from an extensive global pool of technologies.

Third, TA capacity is urgently required across all countries to cope with the current COVID-19 pandemic and related systemic socio-economic crises as well as other challenges of sustainable development.

To develop the capacity for undertaking Technology Assessment in the Seychelles, (The Department of Science Technology and Innovation (DSTI) of the Ministry of Investment,

Entrepreneurship and Industry) participate in the pilot phase of the United Nations Conference on Trade and Development's (UNCTAD) project on Technology Assessment in the Agriculture and Energy sectors in Sub-Saharan Africa. South Africa and Zambia are also participating in this project.

This UNCTAD project seeks to strengthen the capacities of national Science, Technology, and Innovation (STI) policymakers and other stakeholders in Sub-Saharan Africa and propose policies and mechanisms that support the learning, diffusion, and adoption of technologies, for example, in the energy and agricultural sectors and to help build resilience in countries to health pandemics and other large external shocks, and recovery from the COVID-19 and related crises.

The expansion of renewable energy, and new and emerging technologies applied to the energy sector, could contribute to ensuring more universal access to affordable, reliable and modern energy services, as well as other sustainable development challenges such as reducing poverty, increasing competitiveness, improving health, promoting gender equality and supporting climate action.

Women and girls play a significant role in developing countries' energy and agricultural sectors. Access to electricity can also increase gender equality by increasing the likelihood of girls finishing primary school, increasing the incomes of self-employed women, and increasing employment opportunities for women by increasing the efficiency with which household tasks can be completed.

The national workshop will take place over 2 days. The first day will focus on agriculture/fisheries, and the second day will focus on energy.

Objective

To better prepare for the coordinated participation of the Seychelles in the project through engagement with the key relevant stakeholders in the Seychelles. The Division of Science Technology and Innovation plans to organize a national stakeholder workshop with support by Seychelles Energy Commission, Department of Agriculture & Seychelles Fishing Authority. The workshop is expected to help achieve the following:

- To understand better the concept of TA and the methodology to be used in the project;
- To identify gaps in TA, especially in Agriculture/Fisheries and Energy;
- To determine the priority areas for TA to be investigated under the project, in either Energy or Agriculture/Fisheries, for the Seychelles;
- To develop a work plan for the Seychelles' participation in the UNCTAD project.

The following areas may help guide the discussions.

AGRICULTURAL/FISHERIES SECTOR

Agriculture and Fisheries remain priority economic sectors. In the agricultural sector, the emphasis is being put on Food Security. As for Fisheries, the focus is more on export.

Agricultural-related technologies that may be relevant to the local context are:

- Climate-proof technologies for mitigation and adaptation to climate change;
- Digitization of supply chain, value chain and distribution chain in the sector;
- Green technologies in the sector that are environmentally-friendly;
- Technologies that will help the optimization of space, which is a scarcity as a Small Island State; and
- Precision agricultural technologies that allow farmers to maximize yields by controlling every variable of crop farming such as moisture levels, pest stress, soil conditions, and micro-climates.

In the Fisheries sector, the focus will be on:

- Aqua-culture for export;
- Data Collection, processing and dissemination
- Fisheries Management
- Scientific surveys and research
- Fish processing and post-harvest handling
- Fisheries Monitoring, Control, Surveillance & Enforcement/ Electronic monitoring and reporting
- Property Management
- Infrastructure project development- Artisanal & Industrial
- Ice production
- Technologies to support value-addition;
- Sustainable fishing technologies as a substitute to the existing technologies that are damaging to the ecosystem; and
- Digitization of the supply chain, value chain and distribution chain of the sector.

ENERGY SECTOR

Solar Energy

Solar energy is a crucial component for the renewable energy portfolio. As a tropical country, the intake needs to be compensating the lack of land for installation of big farms. Opportunities for using the sea surface and roof available, modernization of the building regulations to support solar PV panel integration needs to be assessed. New technologies with high conversion efficiencies and low production costs are required to enhance the deployment of solar energy. New photovoltaic concepts that aim to achieve efficiencies approaching the thermodynamic limits for solar energy conversion, and organic-based thin films such as conjugated-polymer-based cells, that may substantially decrease the cost of photovoltaics. Other solar technologies are also considered, such as solar thermal and photo-electrochemical cycles.

Wind Power

Using turbines to harness wind energy is a mature technology that is commercially applied on a large scale. Further technical research in the subject, specific to use in Seychelles, could include innovative turbine designs, high efficiency, and lower costs. Areas of promise include wind resource assessment and forecasting, especially for offshore turbines and grid interconnection.

Biomass

Biomass is another energy resource with potential to be a significant contributor to a renewable energy portfolio. It has a unique range of physical, chemical and biological parameters that sets it apart from fossil fuel analogs. There are several categories of research needs to address the barriers to deployment. These topics include combustion, gasification, fuel synthesis, biological processes, crop growth, anaerobic digestion, and alcohol fermentation.

Marine Energy

Marine renewable energy refers to renewable energy that is installed and operated at sea and requires access to offshore grid and distribution systems. This can include offshore wind, tidal stream, tidal range and wave energy technologies. Proper assessment of these resources based on different regions of our exclusive economic zone is to be carefully planned.

Green Hydrogen

Hydrogen has been widely used in industry but the potential for renewable or 'green' production of hydrogen and other byproducts such as ammonia is opening its use as an option in the drive for

large-scale decarbonisation of the economy. This assessment explores the notion of using hydrogen as an energy carrier to replace fossil fuels. Since hydrogen must be manufactured and a large-scale infrastructure does not exist, there persist fundamental issues in production, byproducts, transportation, distribution, storage, and utilization.

Green Mobility

In this area are options explored for both increasing transportation efficiency and utilizing energy carriers that emit zero net CO_2. Higher efficiency could result from significant changes and improve public transportation using electric vehicles powered by renewable sources.

Energy Storage

Energy storage is a crucial issue to be addressed to allow intermittent energy sources, typically renewable sources, to match energy supply with demand. There are numerous storage technologies that are capable of storing energy in various forms, including kinetic energy, chemical solutions, magnetic fields, or other novel approaches. Improvements in the density and safety of carbon-free energy carriers such as electricity or hydrogen could foster the use of renewable energies in mobile applications.

Carbon Capture and storage (CCS)

Carbon Capture and Storage (CCS) is the process of capturing and storing carbon dioxide before it is released into the atmosphere. The technology can capture almost 90% of CO2 released by burning fossil fuels. Therefore, it could be an essential technology for tackling global climate change. When combined with bioenergy technologies for power generation (so-called BECCS – bioenergy with carbon capture and storage), CCS has the potential to generate 'negative emissions,' removing CO_2 from the atmosphere.

The following policies (some current and others in progress) will have the most impact on a move towards a net-zero economy. The most relevant policies are as follows:

Science, Technology and Innovation:

Seychelles Science Technology and Innovation policy 2016- 2025

Energy:

The Seychelles Energy Policy 2010 - 2030

The updated Nationally Determined Contributions

The National Development Strategy 2019 - 2023

Environment, Forestry and Fisheries:

Seychelles National Climate Change Policy

Protected Area Policy

Seychelles Fisheries Sector Policy and Strategy 2019

Trade, Industry and Competition:

Seychelles Inclusive Industrial Competitiveness Policy

Seychelles Investment Policy.

We are currently preparing the National Entrepreneurship Strategy but the first draft is not ready and so cannot be shared yet.

With regards to the industrial sector, Seychelles faces challenges with respect to energy cost, shortage of labour both in terms of numbers and in terms of skills and qualifications, climate change and modernization in terms of technology. Seychelles is also very limited in term of diversification.

As such, relevant technology for the enhancement of local production and competitiveness would require, renewable and efficient energy sources, industrial technology that helps reduce labour requirements, improves productivity and helps modernize our production facilities or introduces new opportunities which would allow for diversification in the economy. Additionally, technology that would help enhance control and or mitigate against climate change would also be most relevant.

Expected Outcomes

The expected outcomes from the workshop are as follows:

- A summary of the workshop discussions.
- List of key stakeholders to participate in the TA project.
- List of TA priority areas/technologies in the energy and/or agriculture/fisheries sector.

- Selection of the priority sector to focus on in the TA project.
- Timelines for next activities of the TA project.

Stakeholders/Partners

- United Nations Conference on Trade and Development (UNCTAD)

Other national organizations

- Seychelles Energy Commission
- Public Utilities Corporation
- Ministry of Agriculture, Climate Change and Environment
- Department of Transport
- Department of Agriculture
- Seychelles Public Transport Corporation (SPTC)
- Registration's Office
- Seychelles Fishing Authority (SFA)
- Department of Trade
- Seychelles Investment Board (SIB)
- Department of Industry and Enterprise Development
- Ministry of Finance
- Sustainability for Seychelles (S4S)
- Nature Seychelles
- Seychelles Island Foundation (SIF)
- SIDS Youth AIMS Hub (SYAH)
- Seychelles Hotels Association
- University of Seychelles
- TGMI
- Blue Economy Research Institute
- Post-secondary institutions/ SIT/STA/SMA/SAHTC/SBSA

Annex

The Seychelles prioritised the energy industries (or power sector) and land transport as priority sectors deserving technical assistance under the Technology Needs Assessment (TNA) project. The choice of these sectors is squarely aligned with several factors, including among others: their importance to society and economy; their significant contributions in the national greenhouse gas (GHG) inventory; alignment with government policies and strategies, including the mitigation contribution in the Seychelles Nationally Determined Contributions that was submitted in light of the Paris Agreement. Only two priority sectors were chosen because of constraints of financial and time resources. While noting that other sectors also deserve technology transfer to support the low-carbon development of Seychelles, it is proposed that the TNA process be extended to additional GHG emitting sectors during the implementation of the Third National Communication (TNC).

Technology working groups (TWG) were set up bearing in mind local expertise in technologies to address electricity supply side diversification using renewable energy sources, and end-use energy efficiency in the power sector, and a combination of spatial planning to ease congestion and modal shifts towards low-carbon transport options for both the public transport system and the private fleet of vehicles, especially cars. The members of the TWG were drawn from government, civil society, academia and the private sector. Different types of stakeholder engagement approaches were utilised, including: a national workshop to introduce the entire TNA process to stakeholder and to initiate the process of technology identification and prioritisation using MCA; working sessions of the TWGs; bilateral meetings; and communications by email. The last two approaches were particularly useful as not all stakeholders were able to attend working sessions of the TWG.

The participative and inclusive approach adopted by the TNA project ensured that members of the TWGs were regularly updated on the progress of the technology identification and prioritisation process. The technology fact sheets (TFS) were also developed in close consultations with the members of the TWG. The TFS were used to score technology options in multi-criteria analysis (MCA).

MCA calculators were customised for the TNA project, and the open-source tools were made available to all stakeholders. The criteria and indicators used for the MCA exercise for both sectors were customised using the MCA4Climate framework as the starting point. In order to minimise bias in MCA, five out of the seven indicators retained by stakeholders were objective indicators. The sensitivity of technology ranking on weights was carried out for three different sets of weights. The weights were assigned by the members of the TWGs, and were found to have no bearing on the rankings of the top three prioritised technologies (for both sectors), implying that the MCA results were robust.

The top three ranked mitigation technologies for the power sector are:

1. Waste heat recovery at Roche Caiman thermal power plant for electricity generation;
2. Waste-to-energy (centralised anaerobic digester); and
3. Centralised utility-scale PV (with some battery storage).

The prioritised mitigation technologies for land transport are:

1. Low-carbon private car fleet consisting of a combination of hybrid and electric cars;
2. Victoria Traffic Management Plan (VTMP); and Electric scooters.