GLOBAL CLIMATE & SDG SYNERGY CONFERENCE

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TECHNICAL BRIEF

Discussion on Delivering Efficient Power Supply Networks for all in the Southern Africa Region

CONTRIBUTING ORGANIZATION

United Nations Environment Programme -

United for Efficiency

This technical brief is developed with the support of the contributing organizations to inform the 3rd Global Conference on Strengthening Synergies between the Paris Agreement and the 2030 Agenda for Sustainable Development.

The findings, interpretations, and conclusions expressed in this document do not necessarily reflect the views of any of the contributing organizations or the conference coordinating organizations.

I. Abstract

The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries - developed and developing - in a global partnership.

Sustainable Development Goal 7 (SDG7) calls for "affordable, reliable, sustainable and modern energy for all" by 2030, and doubling the global rate of improvement in energy efficiency by 2030 is one of its three core targets. As the Sustainable Energy for All (SEforALL) Appliances and Equipment Accelerator, the United Nations Environment Programme's United for Efficiency initiative (UNEP-U4E) is committed to help realise this objective.

UNEP-U4E is a global market transformation initiative, supported by the leading global electrical product manufacturing companies and organizations with a shared interest in transforming markets for lighting, appliances and electrical equipment. **By encouraging countries to implement a proven integrated policy approach to eco-efficient electrical products, a lasting, sustainable and cost-effective market transformation globally can be achieved and worldwide energy related greenhouse gas emissions and air pollution can be cut by more than 20%** [UNEP 2019, IEA 2021a, IEA 2021b].

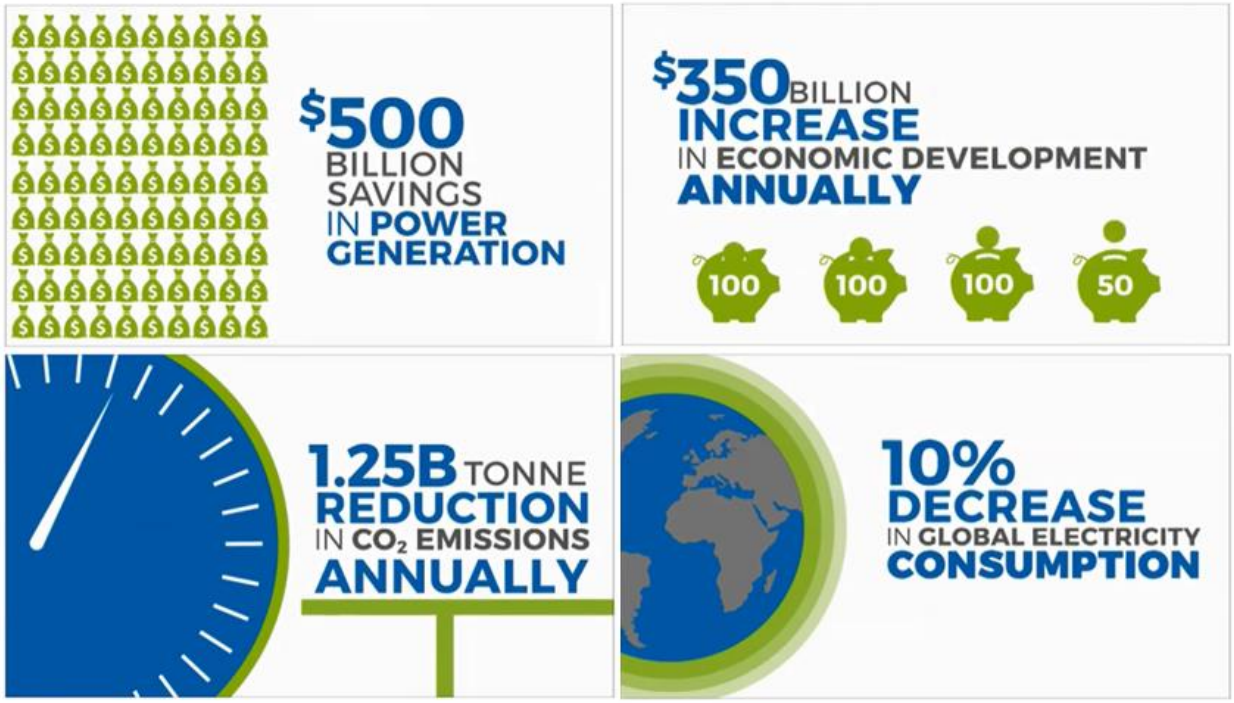
One of the main electrical products are power distribution transformers which are indispensable in today's societies, run 24/7, and with the installed stock of transformers in developing countries expected to nearly triple by 2030. Transformers are used to transfer electrical power everywhere, operate non-stop and often have very long service lifetimes. However, in African countries the lifetimes of transformers are often extended to well over 40 years. **Older power transformers consume typically much more energy in losses. Today, for example, the Sub-Saharan region has a transmission and distribution loss factor of about 17%, twice the global average** [African Union 2021, IEA 2019]. In addition, older transformers contain polychlorinated biphenyls (PCBs) as an insulating fluid. PCBs are persistent organic pollutants which are targeted for phase out in existing equipment by 2025 through the Stockholm Convention.

UNEP-U4E is working as lead technical partner with the Governments of Botswana, Eswatini, Lesotho, Malawi, Namibia, Tanzania, Zambia and Zimbabwe to advance policies, strategies and actions for the phase-out of inefficient power distribution transformers and is cooperating with UNEP's Chemicals and Health Branch PCB project to enable the environmentally responsible disposal of PCB oils contained in older power transformers and capacitors across 12 countries in Southern Africa.

II. Interlinkages, synergies and trade-offs

As the SEforALL Appliances and Equipment Accelerator, UNEP-U4E is working directly to contribute to the success of SDG7 and **delivery of a globally sustainable energy system with eco-efficient electrical products as the norm.** By 2030, it aims to achieve:

- $500 billion in power generation cost savings
- **A 10% decrease in global electricity consumption**
- A 1.25 billion tonne reduction in CO_2 emissions annually
- **A $350 billion increase in economic development annually**



By bringing together key global and local stakeholders such as technical institutions, the leading manufacturers and governmental organizations, UNEP-U4E can reliably assess global market trends, product innovations and the international best practice policies and strategies needed to deliver large scale financial, environmental, energy and societal benefits for all – thanks largely to the **successful implementation of energy efficiency standards and policies (mainly, minimum and higher energy performance standards).**

UNEP-U4E's market transformation programmes follow an integrated policy approach – a combination of proven policy measures based on the latest international best practice which defines the minimum efficiency levels and quality criteria which products must satisfy in order to be sold in the market. Based on detailed market research, its public-private partnership approach and in collaboration with dozens of experts from various sectors, U4E has developed a wide range of independent tools and resources for countries to apply. Its international model regulation guidelines, for example, contain details on the essential elements to start transforming markets, including product scope, definitions, test methods, minimum efficiency levels and a set of minimum performance requirements, along with market surveillance measures which ensure consumers can purchase quality efficient products with confidence. As such, they provide guidance to assist Governments in developing and emerging economies that are planning and designing a regulatory or legislative framework for use with incentive programmes, public procurement, minimum energy performance standards (MEPS), energy labels and other key market transformation interventions.

UNEP-U4E has successful examples from more than 30 countries around the globe of the effective application of this proven integrated policy approach to the implementation of energy efficiency programmes. By strategically supporting developing and emerging economies (where electricity demand is set to more than double by 2040), to accelerate their transformation to higher efficiency products (e.g., lighting, refrigerators, room air conditioners, electric motors and power distribution transformers), inefficient products are removed from the global market and substantial financial and CO_2 emission savings achieved.

II. Lessons learned on opportunities and challenges

Based on the UNEP-U4E 2020 Country Savings Assessment analysis, annual electricity savings from the transition to more energy-efficient distribution transformers in emerging and developing countries could reach almost 60 TWh of electricity in 2040.

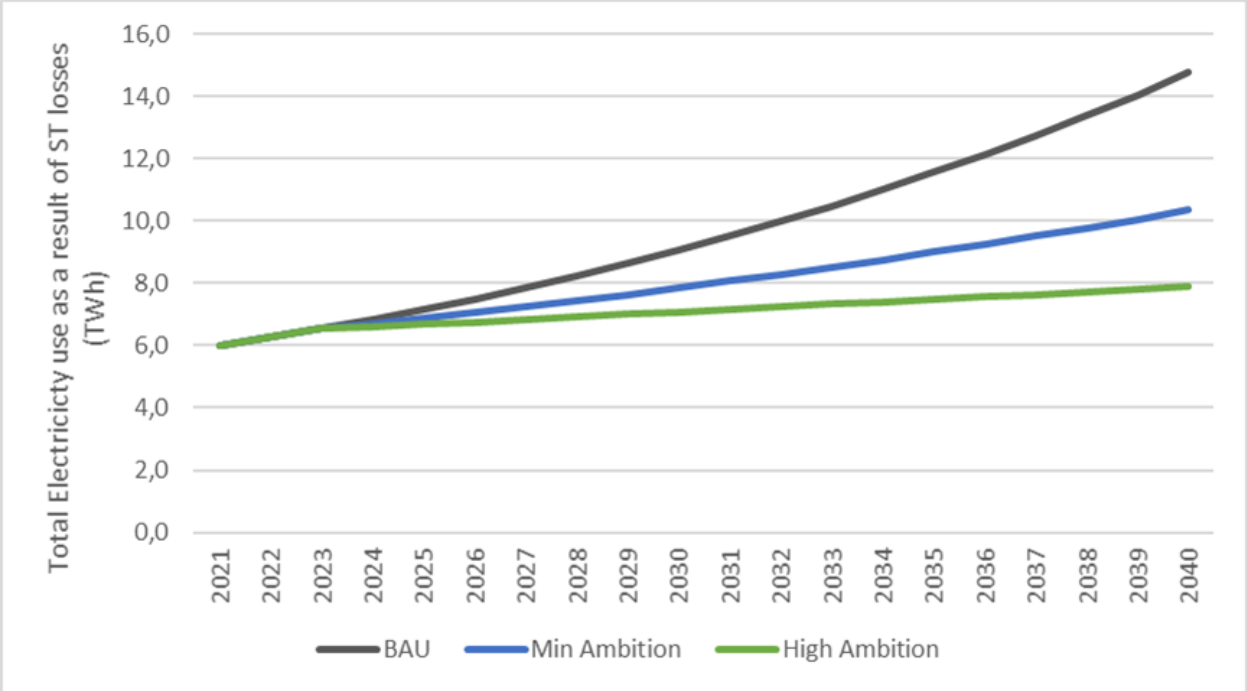
Transformers are used to transfer electrical power everywhere, operate non-stop and often have very long service lifetimes. However, in African countries the lifetimes of transformers are often extended to well over 40 years. **Older transformers consume typically much more energy in losses.** Today, for example, the Sub-Saharan region has a transmission and distribution loss factor of about 17%, twice the global average [African Union 2021, IEA 2019]. In addition, electricity consumption is expected to more than double in Africa by 2040, including in Sub-Saharan Africa, requiring increased electricity transmission capacity. **Adoption of energy-efficient distribution transformers will also contribute to strengthening the transmission and distribution infrastructure, help expand access to electricity and increase reliability.**

Against this background, **UNEP-U4E has been coordinating the implementation of dedicated, Green Climate Fund-supported, eco-efficient power transformer projects with eight countries in the Southern Africa region (Botswana, Eswatini, Lesotho, Malawi, Namibia, Tanzania, Zambia and Zimbabwe) to develop and implement the required policy, regulations and institutional frameworks for low-loss power networks**.

The eight market transformation projects are each conducting a market assessment to understand the baseline status of the national market, developing MEPS, new procurement specifications for utilities, national policy roadmaps, including monitoring, verification and enforcement plans, and modern financial mechanisms for much more energy efficient power systems as the norm.

The projects are using the UNEP-U4E model regulation guidelines for power distribution transformers [UNEP-U4E 2019a] to develop their national standards to current international norms and are supported by experts from various sectors and global regions. **The deployment of best relevant practices and new technologies via strategic programmes will free otherwise wasted electricity for the benefit of the hundreds of millions of new modern energy consumers in the region**. UNEP-U4E has also developed new financing models such as the bulk procurement of eco-efficient transformers and a total cost of ownership tool [UNEP-U4E 2022] to enable the region's utilities to make the best use of scare capital resources and to make well-informed purchases of the millions of new transformers to be installed there by 2040.

If these countries implement effective policies to switch their markets to energy-efficient transformers, they could save electricity equivalent to 10 medium sized power stations, worth more than USD 500 million in consumer savings by 2040. By implementing a higher ambition policy (e.g., to current EU power transformer standards), these savings can be increased further (as shown in the graph).



Savings in the Southern African Region from Eco-Efficiency Power Distribution Transformers
Source: UNEP-U4E Country Savings Assessments 2022

IV. Recommendations for action: means of implementation and partnerships to accelerate progress

Following the UNEP-U4E **integrated policy approach** to accelerate adoption of energy-efficient lighting, appliances and electrical equipment ensures that the priorities and perspectives of key stakeholders – consumers, businesses, civil society and officials – are addressed during the market transformation process. This results in a powerful approach focused on consumer purchasing and new eco-efficient technology procurement which results in a relatively very fast, more robust and sustainable programme at national level scale. **The five stages in the typical United for Efficiency integrated policy approach are:**

1. **Standards and regulations which the specify energy efficiency and other requirements for a product to be sold in the market.** MEPS, testing standards and definitions should reference international best practices. Mandatory standards are essential to market transformation.
2. **Supporting policies where labelling, information, education, training and outreach supports standards by ensuring that requirements are understood clearly and consistently conveyed.** Labels affixed to products help purchasers and procurers understand performance and other attributes so they can make informed decisions. Outreach efforts raise awareness of the benefits and activities associated with market transformation activities.
3. **Finance, incentives and financial delivery mechanisms which support consumers to offset the higher purchase price of efficient products.** Governments may use existing budgets or outside sources (e.g., fees, donors), while consumers may tap grants or financing options (e.g. loans, leases, utility bill assessments) to cover the incremental cost. Incentives can be a very fast and effective way to drive large scale market changes in many electrical product sectors, introducing and bringing down prices for higher performance eco-efficient products at the same time.
4. **Monitoring, verification and enforcement which involves overseeing products sold in the market, verifying compliance with standards and labels (e.g., by testing the products), enforcing these requirements, and reporting on the results so that consumers and businesses trust and benefit from market transformation activities.**
5. **Environmentally sound management and health considerations are crucial to ensure products do not cause undue harm to people or the planet during manufacturing, operation, or recycling/disposal.** Potentially hazardous ingredients (e.g., mercury, toxins, ozone depleting or global warming refrigerants) must be handled according to global best practices in eco-design and end of product life management, including national collection systems.

V. Guiding questions

- **Do you have a thorough understanding of the current electrical product market, it's national energy implications and the relevant stakeholders?**
- How will you sustainably fund your programme?
- **What policy options will you select? Why?**
- How will the policies be enshrined effectively in national legislation and procurement practices?
- **How will you set the levels for your regulations and procurement guidance?**
- How will you ensure compliance and ongoing engagement of the main stakeholders?
- **How will you engage with stakeholders on the development of the new policies and practices?**
- How will you communication information on the new policies to consumers and stakeholders?

References and additional reading list

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