Green Industrialization in Sub-Saharan Africa:

A GUIDE FOR POLICY MAKERS

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Table of Contents

Introduction

This guide provides information for policy makers and planners on formulating policies and programmes that are supportive of green industrialization in countries in Sub-Saharan Africa (SSA). The guide is structured in the following six sections.

Section 2 defines "green industrialization" and the related concepts of "green economy", "green growth" and "green jobs".

Section 3 identifies potential data sources and indicators for measuring industrial resource use and environmental pollution, which are essential for assessing and monitoring progress towards green industrialization.

Section 4 describes common policies, programmes and instruments for directly greening industries and services.

Section 5 identifies other national policies that can contribute to green industrialization.

Section 6 presents an overview of assessments of green industrial policy in three Sub-Saharan countries: Nigeria, Ghana and Senegal.

Section 7 concludes the guide.

[1] *For further discussion on challenges and policy responses for green industrialization in Africa, see Greening Africa's Industrialization (United Nations Economic Commission for Africa (UNECA), 2016) and Policies and Programmes for Green Industrialization in SSA Countries: Potential Research Topics for UONGOZI (Luken & Clarence-Smith, 2017).*

Section

02

Green Industrialization

Defining “green industrialization” and the related concepts of “green economy”, “green growth” and “green jobs”

2 *What is Green Industrialization?*

In this section, the term "green industrialization" is defined along with three closely related concepts: green economy, green growth and green jobs.

2.1 GREEN INDUSTRIALIZATION

This paper uses the definition of "green industrialization" from the United Nations Industrial Development Organization (UNIDO, 2009 & 2011). In that definition, green industrialization has two main dimensions: 1) industries green themselves; and 2) green enterprises—i.e., enterprises which offer environmental goods and services—are created.

With respect to the first dimension, industries can green themselves by:

Reducing the environmental impacts of industrial processes For example, enterprises can:

- *Use resources more efficiently.*
- *Phase out the use of toxic substances.*
- *Introduce new, cleaner technologies.*
- *Substitute fossil fuels with renewable energy sources.*
- *Improve occupational health and safety.*
- *Reduce pollutant discharges and waste disposal to move towards compliance with environmental norms.*

Reducing the environmental impacts of the products manufactured. For example, enterprises can:

- *Redesign products and/or business models to use less materials and energy;*
- *Extend the effective life-times of products, especially complex ones; and*
- *Incorporate closed-loop, circular systems, i.e., repair, re-manufacturing and recycling at the end of life, while ensuring that the same functionality is delivered.*

incorporate closed-loop, circular systems, i.e., repair, re-manufacturing and recycling at the end of life, while ensuring that the same functionality is delivered.

Reducing the environmental impacts along the supply chain, in particular, in the logistics and transport systems which move products around.

Making industry resilient to the effects of climate change and disasters.

Central to understanding the first dimension of green industrialization is the concept of decoupling. At the enterprise level, decoupling is used to describe improvements in the use of materials, energy and water inputs, and/or a reduction in the release of pollutants, with respect to product outputs.

[2] *UNECA also distinguishes between greening industries and greening services. 'Greening of industry can be achieved through three routes: transitioning out of brown industries; greening existing industries by increasing resource productivity, cutting pollution, and managing chemicals more safely; and creating new green enterprise, such as producing green capital goods, generating renewable energy and providing environmental advisory services.' (UNECA 2016, 69)*

Absolute decoupling implies an absolute reduction in inputs and/or pollutants, which is rare for individual enterprises. Relative decoupling, which is more frequently attainable, implies positive growth rates in inputs and perhaps pollutant discharges, although at rates which are lower than the growth rate for the enterprise's product output.

The second dimension of green industrialization involves the establishment of new enterprises—or the expansion of existing enterprises—that deliver environmental goods and services which industries and, more broadly, the economy as a whole—requires to green itself.

These green enterprises encompass a diverse set of industrial activities, including (at a minimum):

Manufacture of renewable energy equipment;

Material recovery and recycling;

Waste treatment and management;

Manufacture of pollution control equipment;

Provision of environmental and energy consulting and services; and

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Provision of monitoring, measuring and analysis services as well as service activities such as finance and insurance.

2.2 GREEN ECONOMY/GREEN GROWTH

The terms "green economy" and "green growth" are closely related and several organizations have proposed similar definitions. Summarizing the various definitions, a green economy is one that promotes structural transformation which:

Leads to the relative decoupling of natural resource use and environmental impact from the growth process, through the efficient use of natural resources and the minimization of pollution and other environmental impacts;

Ensures that natural assets continue to provide resources and environmental services on which our well-being relies; and

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Ensures that environmental sustainability contributes to, or at least does not come at the expense of, improved human well-being and social equity.

Comparing the definitions of green economy/green growth with that of green industrialization, both can be viewed as important practical pathways towards achieving sustainable development. A green economy aims to improve human well-being and social equity while simultaneously diminishing environmental risks and reducing ecological scarcities. Green industrialization transforms manufacturing and allied industrial sectors by introducing more efficient, productive and responsible use of raw materials so that they contribute more effectively to sustainable industrial development.

2.3 GREEN JOBS

Similarly, green industrialization and the term "green jobs" are linked; presumably green industrialization should create green jobs. Therefore, green jobs have been defined as decent jobs that contribute to preserving or restoring the environment, whether they are in traditional sectors such as manufacturing and construction, or in new, emerging green sectors such as renewable energy and energy efficiency (UNEP/ILO/IOE/ITUC, 2008).

Green jobs help to improve efficiency in the use of energy and raw materials, limit greenhouse gas (GHG) emissions, minimize waste and pollution, protect and restore ecosystems, and support adaptation to the effects of climate change. At the enterprise level, green jobs can produce goods or provide services that benefit the environment, for example, green buildings or clean transportation. However, these green outputs (products and services) are not always based on green production processes and technologies (ILO, 2016).

[3] *See UNEP (2011), OECD (2011), World Bank (2012), United Nations Economic Commission for Africa (2016), United Nations Commission on Trade and Development (2016) and the African Development Bank (2013).*

Section

03

Measuring Industrial Resource Use and Environmental Pollution

3 Measuring Industrial Resource Use and Environmental Pollution

Documenting current industrial resource use and environmental pollution in most developing countries is a difficult challenge. In SSA countries in particular, few reliable statistics exist on the use of industrial inputs and there are virtually no aggregated data for pollutant releases. Measuring resource use and environmental pollution, therefore, is best achieved by drawing on both national and international data sources.

3.1 NATIONAL DATA SOURCES

National-level data are potentially available from national statistical offices, energy and water ministries, as well as environmental protection agencies. National statistical offices may collect data on the number and location of industrial establishments, and on the transition to less resource use and pollution within industrial sectors over time. In most countries, energy ministries collect, at a minimum, energy consumption by industry (manufacturing, construction and mining). Water ministries are not likely to have collected data on water withdrawal, but they might have undertaken assessments for specific manufacturing sectors. Environmental protection agencies might have undertaken pollutant inventories at various points in time.

A search for published industrial pollution data in SSA countries found one overview of air pollution problems resulting from all human activity (Akumu, 2016) and a few journal articles about industry-related pollution problems in specific countries, for example, in Nigeria (Oketola & Osibanjo, 2011; Bichi & Bello, 2013) and in Ghana (Karikari et al., 2006). However, this very limited information is not sufficient to characterize the industry-related pollution problem in SSA countries.

3.2 INTERNATIONAL DATA SOURCES

Another potential source of resource use and pollution data is that being compiled to report on progress towards meeting the 17 UN Sustainable Development Goals. Of these, five goals address economic development and environmental concerns. In particular, Goal 9 sees industry, herein defined as manufacturing, as the primary engine not only for job creation and economic growth but also technology transfer, investment flows and skills development. Industry is also central in contributing to Goal 6 (ensuring availability and sustainable management of water and sanitation for all), Goal 7 (affordable and clean energy) and Goal 12 (responsible consumption and production). Of the 169 targets that have been developed to measure the 17 SDGs, four targets and their 12 associated indicators will be directly impacted by industrial development.

Of these 12 indicators, five are relevant either for documenting industry-specific progress or providing an overview of resource use and environmental pollution in a country. These are:

- *Industrial CO2 emission data, compiled by the International Energy Agency (IEA). However, data are available for only 22 out of the 47 SSA countries (IEA, 2016a).*

- *Industrial water withdrawal data, compiled by the Food and Agriculture Organization (FAO). Data are available for industrial water withdrawal for some periods between 2000 and 2017 for all 47 SSA countries. There are no data on water consumption and wastewater treatment (FAO, 2016).*
- *Industrial energy use intensity data are estimated by combining data from the IEA and UNIDO. Data for the industrial sector as a whole are available for only 22 out of the 47 SSA countries. Data for the manufacturing sector and s ub-sectors are scarce (IEA, 2016b and UNIDO, 2016).*
- *Industry material consumption data, compiled by the Sustainable Europe Research Institute / Vienna University of Business and Economics, are not yet available for any of the 47 SSA countries (SRI & UW, 2014).*
- *Hazardous waste generation data are compiled by the United Nations Statistics Division. Data are available for some countries and some years between 1995 and 2011 for seven SSA countries (UNSTAT, 2016).*

An alternative but dated source of pollution data is the World Bank Industrial Pollution Projection System (IPPS), which can be used to estimate a comprehensive profile of the pollutant intensities for the manufacturing sector as a whole and its sub-sectors (Hettige et al., 1994 and 1995). Although the modelling system was developed in the 1990s based on environmental and economic data from the late 1980s for approximately 200,000 facilities in all regions of the United States, it has been applied in several developing countries including Nigeria (Oketola & Osibanjo, 2009). It can be used to estimate air emissions, water effluents and solid waste loadings, and it incorporates a range of risk factors for human and eco-toxic effects.

Section

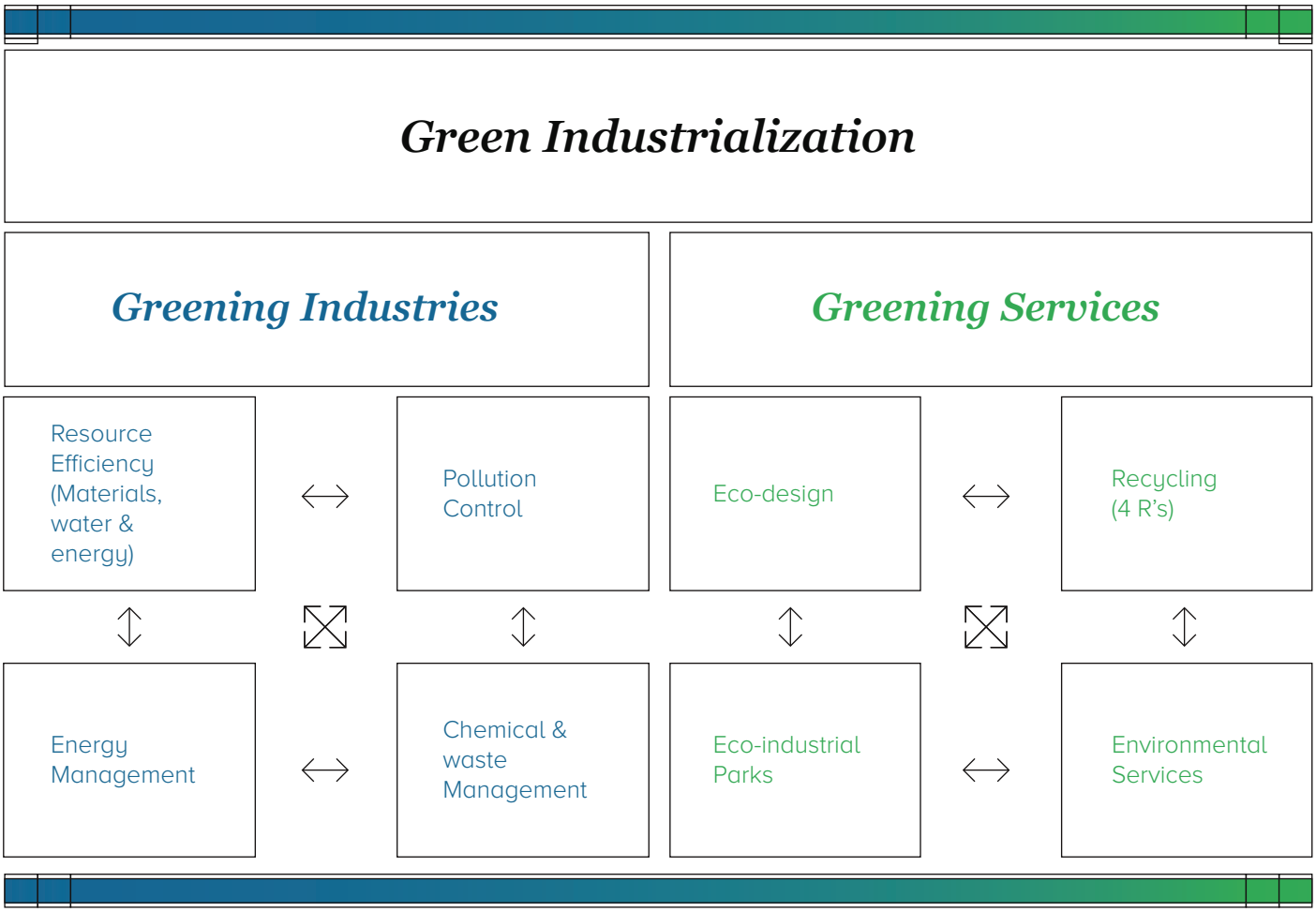
04

Common Policies, Programmes and Instruments for Greening Industries and Services

4 Common Policies, Programmes and Instruments for Greening Industries and Services

This section summarizes the most common policies, programmes and instruments for greening industries and services, based upon UNIDO's categorization of different aspects of green industrialization (Figure 1).

Figure 1: Key aspects of green industrialization



[4] *It is important to recognize that many aspects of "green industrialization" were the subject of policy-making before the term itself existed.*

As the figure shows, the analysis is divided into the two broad categories identified in the definition of green industrialization:

1. Greening Industries

which is what any enterprise can do to green itself; and

2. Greening Services

which are those goods and services required by enterprises, primarily small and medium-sized enterprises (SMEs), to green themselves.

Eight complementary and to some extent overlapping policy areas are discussed. Under the category "greening industries", the following four policy areas are described (see Section 4.1).

- ***Pollution control policies,*** *which aim to abate the quantities and/or the toxicity of conventional pollutants which are released from industrial enterprises, or from the products which they have manufactured, and which enter into the natural environment (air, water and/or soil);*
- ***Resource efficiency and cleaner production policies,*** *which aim to increase the efficiency with which enterprises use materials, water and energy in their operations, or with which the products they manufacture use materials, water and energy;*
- ***Energy management policies,*** *which aim to increase energy efficiency and use of renewable energy in order to reduce greenhouse gas emissions, both within their industrial operations and in the products they manufacture; and*
- ***Chemical and waste management policies,*** *which aim to ensure an environmentally protective management of chemical products that enterprises use as well as the waste that they generate, not only within their enterprises but also externally since they continue to be responsible for their proper management outside of the enterprises.*

Under each area for greening industries, the various policy instruments that governments can use are then categorized into four main approaches:

A. Command-and-control regulations;

B. Market-based instruments/economic incentives;

C. Voluntary actions; and

D. Transparency and disclosure requirements

[5] *The term "conventional pollutants" refers to statutorily listed pollutants that are well understood by scientists. These may take the form of organic or inorganic chemicals or chemical radicals, solid matter, acids-bases, nutrients, oil and grease, or heat.*

Table 1: Pollution Control Instruments

Command and Control	*Economic Incentives*
Standards Licenses or permits Compliance monitoring Enforcement	Charges and taxes Grants and subsidies Fines for non-compliance Tradable permits
Voluntary Actions	*Transparency and Disclosure*
Cleaner production programs Environmental management systems Covenants Product labelling Corporate social responsibility	Toxic release inventory Public disclosure Corporate reporting Corporate environmental performance awards

Source: *OECD (1997)*

In addition to these direct policy approaches, governments can also indirectly alter the behaviour of industrial polluters through the use of planning approaches, such as requirements for enterprises to undertake environmental impact assessments and life-cycle assessments, and by integrating environmental considerations into various economic policies including industrial trade and technology policies. For example, industrial policies that aim to influence the scale, sub-sector composition, technological configuration and location of industrial growth can have important environmental implications.

Under the category of greening services, a further four policy areas are discussed (see Section 4.2). They are:

- ***Environmental services,*** *which includes all those services which enterprises need to control their pollution effectively, such as wastewater treatment and air emissions abatement;*
- ***Eco-industrial parks,*** *a service which allows enterprises to be more effective in their greening activities by bringing them together in formalized clusters;*
- ***Eco-design,*** *a service which allows enterprises to green the products which they manufacture;*
- ***Recycling,*** *which includes reuse, remanufacturing, refurbishing, and similar services, all of which allow enterprises to ensure that the materials locked up in their products can be effectively reused.*

4.1 GREENING INDUSTRIES

4.1.1 Pollution Control

This is the policy area where government involvement in the environmental field has traditionally been strongest—and will likely continue to be strong. The justification for the government's focus in this policy domain is due to market failures that cause environmental externalities. In perfectly competitive markets, these externalities would automatically be internalized in enterprises' decision-making. Unfortunately, such idealized market systems are not fully realizable in practice. Therefore, the objective of a government's pollution control policies is to change market behaviour in ways that are more closely consistent with behaviour when externalities are internalized, using methods that are feasible and cost-effective.

A. Command-and-control regulations

Governments use the command-and-control regulatory approach in most countries, including countries in SSA, to control pollution. It consists of four activities: (i) standard-setting; (ii) issuance of licenses; (iii) compliance monitoring; and (iv) enforcement in cases of non-compliance. The combined purpose of these four activities is to encourage and guide conduct that is favourable to the environment, or prohibit conduct that is detrimental.

B. Market-based instruments/economic incentives

Market-based instruments include fees, pollution trading systems, grants and fines. Market-based instruments, or economic incentives more broadly, have a number of advantages over the command-and-control approach described above. First, these instruments give polluters an incentive to reduce pollutant discharges below the permitted amounts when it is relatively inexpensive to do so. Second, technological improvements and innovation will be stimulated, resulting in greater opportunities to abate pollutant emissions and discharges at lower cost. Third, economic incentives are uniquely well suited to many of the pollution problems that countries face today and can be used in specific localities or regions as well as nationally.

C. Voluntary instruments

Voluntary instruments are those which encourage enterprises to voluntarily green themselves. These include programs to encourage and support the uptake by enterprises of cleaner production activities, of environmental management systems, of corporate social responsibility programs, of covenants with government agencies, of eco-product labelling, and of various industry codes of good practice.

D. Transparency and disclosure requirements

Information disclosure schemes are provisions, either voluntary or mandatory, for enterprises (and the public authorities themselves) to disclose information relating to the release of pollutants and/or their effect on the environment. These schemes include Pollutant Release and Transfer Registers (PRTRs), public disclosure requirements, and corporate awards and reporting. The only known public disclosure program in SSA countries is Ghana's Environmental Performance Rating and Public Disclosure programme and its successor, AKOBEN, which show how well enterprises have met the commitments they made in their environmental impact assessments.

4.1.2 Resource Efficiency and Cleaner Production

In 1991, the United Nations Environment Programme (UNEP) developed the following definition of cleaner production (CP) that is still commonly used:

> ***"Cleaner Production is the continuous application of an integrated preventive environmental strategy to processes, products and services to increase efficiency and reduce risks to humans and the environment."***

[6] *"Environmental externalities refer to the economic concept of uncompensated environmental effects of production and consumption that affect consumer utility and enterprise cost outside the market mechanism. As a consequence, private costs of production tend to be lower than its broader social cost. It is the aim of the "polluter/user pays"principle to prompt enterprises and households to internalize externalities in their plans and budgets."For example, air pollution from a factory causes widespread negative externalities such as health hazards and environmental damage. OECD Glossary of Statistical Terms https://stats.oecd.org/glossary/*

Since 2010, UNIDO and UNEP have substituted Resource Efficiency and Cleaner Production (RECP) for CP. The term RECP will be used in this guide.

To drive the uptake of RECP by industry, governments need to set realistic long-term policy objectives and targets, apply an appropriate mix of policy instruments, and then measure progress towards meeting their objectives. GTZ (2006) proposed that governments use a number of instruments to create a sound policy framework that supports the uptake of RECP across the entire production system. GTZ identified 18 policy instruments that are particularly relevant for driving RECP uptake. These policy instruments are summarized below utilizing the four-fold categorization of approaches described in Table 1.

A. Command-and-control regulations

It is generally agreed that the uptake of RECP options by enterprises in their industrial operations cannot be driven directly by command-and-control instruments; it is not practical to order enterprises to improve the resource efficiency of their industrial processes. However, the use of these instruments is seen as particularly important in giving an indirect, economic incentive to enterprises to adopt RECP options. By reducing the amount and toxicity of wastes and emissions, RECP options reduce the costs to enterprises of having to comply with the "end-of-pipe" standards regulating the amounts of pollutants which they can emit or discharge into the natural environment. The same cannot be said of the products which enterprises manufacture. Command-and-control instruments are commonly used to regulate the resource efficiency of products. Product standards regulating the energy efficiency of products, in particular, are used in many countries, as are standards that regulate (often ban) the presence of certain toxic chemicals in products.

B. Market-based instruments/economic incentives

As in the case of command-and-control instruments, a number of economic instruments are available to policy-makers to indirectly support the uptake of RECP in industrial operations, and for the same reason, i.e., they increase the cost to enterprises of generating waste or pollution and this increased cost can encourage them to reduce the amounts they generate through RECP. The economic instruments considered most relevant are environmental taxes, fees and user charges, certificate trading schemes, and fines for non-compliance. It also includes the removal of subsidies which artificially reduce the cost of virgin materials, non-renewable materials, and toxic and hazardous materials.

As in the case of command-and-control instruments, the impact of economic instruments on RECP in products is quite different. Economic incentives can directly drive RECP in products. For instance, governments can use their research and development budgets to encourage the development of green (i.e., energy-efficient or resource-efficient) products and technologies. Governments can also use subsidy instruments, such as grants or loan guarantees, to encourage the private sector to develop such products and technologies through the use of eco-design.

C. Voluntary instruments

Given the essentially voluntary nature of RECP, voluntary instruments which support industry's adoption of RECP are where government policies most directly promote the uptake of RECP by enterprises. Governments can work at several levels to provide support to enterprises, primarily SMEs, which are considering or have decided to adopt RECP measures. They can:

- *Raise the awareness of enterprises on the advantages of adopting RECP approaches, both for their industrial operations as well as for their products;*
- *Publish self-help manuals of various kinds, for example, on how to perform RECP assessments or how to perform eco-design, on commonly used clean technologies, or on the sources of such technologies;*
- *Run training programmes on the same topics; and/or*
- *Offer free or subsidized consulting services from specialized centres.*

In many countries, governments have supported the establishment of centres, which offer many or all of these services in a single location, as "one-stop shops".

D. Transparency and disclosure requirements

With respect to RECP, instruments promoting transparency and disclosure have the most direct impact with products. Through voluntary programmes, such as eco-labelling, governments can give support, through positive branding, to enterprises which have voluntarily decided to make their products more resource efficient. Governments can also require forms of labelling which directly drive RECP. One of the most commonly used is energy efficiency labelling, which aims to encourage consumers to purchase more energy-efficient products. Other commonly used labels are safety-driven, such as chemical labelling. These can indirectly promote RECP in products, by encouraging consumers to purchase products which do not contain toxic or hazardous components, or by encouraging producers to design out the toxic/hazardous components so as to avoid the negative impacts on their brands of having to put these labels on their products. With respect to industrial operations, some Pollutant Release and Transfer Register (PRTR) schemes aim to directly encourage RECP by requiring the reporting enterprises to provide information about the RECP options which they have adopted. Even without such disclosure requirements, PRTRs can be used by third-parties to track, and publicly report in newspapers or other news media, the trends in resource use at the reporting enterprises.

4.1.3 Energy Management

Instruments for energy management encompass: (i) industrial energy efficiency; and (ii) renewable energy. These are discussed in turn in the sub-sections below.

4.1.3.1 Industrial Energy Efficiency

Whereas RECP policies promote complete resource assessment (energy, water and raw materials) with the aim of improving resource use efficiency,

Instruments for energy management encompass: (i) industrial energy efficiency; and (ii) renewable energy. These are discussed in turn in the sub-sections below.

energy policies promote energy use assessments with the aim of improving energy productivity and reducing GHG emissions. These assessments fall into two categories. One focuses on improving energy productivity based on energy audits or similar instruments. The other focuses on supporting the use of modern renewable energy sources as a viable alternative to fossil fuels.

Many developing countries, primarily in Asia, have formulated a wide range of National Energy Plans and more specifically National Energy Efficiency Strategies or Plans. More recently, these plans have morphed into Green Economy and Climate Resilience Plans. These plans are essential for increasing the adoption of energy-efficient practices by overcoming informational, institutional, policy, regulatory and market-related barriers. They also provide enabling environments for industrial enterprises to more easily implement energy-efficient technologies, practices and measures. Initiatives in SSA countries along these lines are the South African Energy Efficiency Strategy (Republic of South Africa, 2008) and the Ethiopian Climate-Resilient Green Economy Strategy (Federal Democratic Republic of Ethiopia, 2011).

UN Energy (2009) has posited that national strategies for promoting industrial energy efficiency ideally should include the following policies, which are discussed under the same four categories of approaches introduced earlier.

A. Command–and-control regulations

Energy efficiency target-setting. *The establishment of ambitious, but also appropriate, energy efficiency or GHG emissions reduction targets can provide a strong incentive to enterprises to adopt energy-efficient technologies, practices and measures. They usually focus on energy-intensive sectors and involve business associations in setting the targets.*

[7] *See AfDB (no date), EC (no date), Afrepren (no date) and Gujba et al. (2012) for descriptions of international and national financing programmes for SSA countries.*

Industrial equipment standards. *The energy-consuming equipment most widely used in industry today (e.g., motors, boilers, pumps, fans and compressed air equipment) perform at levels well below the high-efficiency models currently available. Therefore, the adoption of minimum efficiency performance standards has been shown to be the most effective way generally to improve the energy efficiency of industrial equipment over a given period of time.*

System assessment standards. *The overall performance of the systems in which energy-consuming components (motors, furnaces, boilers, etc.) are embedded can also be the source of very significant industrial energy inefficiencies. System assessment standards define, on the basis of current expert knowledge and techniques, a common framework for assessing the energy efficiency of industrial systems.*

B. Market-based instruments/economic incentives

Financing mechanisms and incentives for industrial energy efficiency investments. *The World Bank, the African Development Bank (AfDB) and many UN agencies have established energy efficiency financing projects. In addition, a number of governments have promoted investment in industrial energy efficiency through various financial instruments such as taxes, subsidies and programmes that improve access to capital. Also, there is the oft-repeated need to reduce rather than extend energy subsidies.*

C. Voluntary actions

ISO 50001. *Through awareness raising, training and other measures, governments can encourage enterprises to voluntarily adopt international standard ISO 50001 Energy Management Systems.*

Demand-side management. *Through the same kinds of actions, governments can encourage enterprises to adopt demand-side management (DSM) options. For example, the demand for energy can be shifted, with so-called "load-shifting" measures. Peak demand can be changed by, amongst other things, improving the efficiency of appliances that contribute to peak demand.*

Energy service companies. *Governments can also encourage and support the creation of energy service companies (ESCOs). Companies can hire ESCOs to provide them services related to the development, installation and financing of energy efficiency improvements. ESCOs can also help enterprises overcome informational, technical and financial barriers by providing skilled personnel and identifying financing options for the enterprises.*

D. Transparency and disclosure requirements

Certification and labelling of energy efficiency performance. *Governments can promote energy efficiency by helping to create a framework for certifying and labelling enterprises' energy efficiency performance. Ideally, such a certification framework should include three building blocks: (i) energy management standards; (ii) system assessment standards; and (iii) measurement and verification protocols. Two certification programmes that incorporate all three building blocks are the Superior Energy Performance Partnership managed by the US Department of Energy and the Programme for Improving Energy Efficiency in Energy Intensive Industries managed by the Swedish Energy Agency.*

4.1.3.2 Renewable Energy

To pursue green industrialization, renewables also need to be further integrated into national and regional energy plans. As African countries move to develop their renewable energy potential, they are pursuing a range of policy instruments. These are mostly embedded in National Energy Plans, which include various targets for the contribution of renewables in the total energy mix. To date, 37 out of 47 SSA countries have introduced at least one type of renewable energy target for specific technologies or for specific sectors. Most targets are numerical, although they take the form of non-binding, aspirational goals embedded in energy planning tools or at a broad policy level.

[8] *See https://www.iso.org/standard/69426.html*

Devising regional plans for renewable energy deployment and applying regional cooperation and integration can help take advantage of efficiencies and economies-of-scale by increasing renewable energy supply capacity, managing shared natural resources, and adopting an integrated approach of trans-boundary issues such as trade, regulatory frameworks and policies, regional infrastructure and other cross border issues (IRENA, 2015).

A. Command-and-control regulations

SSA countries have adopted a wide variety of regulatory policies to promote renewable energy. For example, several SSA countries, including Ghana, Kenya and South Africa, have overcome many obstacles to adopt feed-in tariffs (FiTs). Regulatory policies include electric utility quotas and net metering.

B. Market-based instruments/economic incentives

The prevailing policies in SSA countries are fiscal incentives, including tax reductions, public investments, low-interest loans and grants. Tax reductions—the most widespread incentive—require no additional budget allocation (but do imply a budget loss), fewer administrative procedures, and minimal regulatory supervision compared to other support policies.

4.1.4 Chemical and Waste Management

This policy area includes: (i) the use of industrial chemicals; and (ii) hazardous waste management.

4.1.4.1 Industrial Chemicals

While all chemicals, regardless of their use, can have impacts on the natural environment, this section considers "industrial chemicals" only. This recognizes that separate regulatory regimes exist everywhere for pharmaceutical and psychoactive chemicals, radioactive substances, and chemicals used in weaponry. Chemicals used in agriculture also often have their own regulatory regimes.

Mirroring these distinctions, the government authorities regulating industrial chemicals are typically different from those regulating other types of chemicals.

As with other aspects of industrial environmental management, the various instruments for the control of industrial chemicals can be grouped under the four types of approaches outlined in Table 1.

A. Command–and-control regulations

These measures have been the dominant policy instrument for the environmental management of industrial chemicals. Standards limiting the presence of specific chemicals in wastewaters or air emissions released from certain industrial sectors have been imposed since the beginning of environmental regulation. In cases where the risks posed to the environment have been considered great enough, national bans or severe restrictions have been imposed, for example, on DDT and several other pesticides, polychlorinated biphenyls (PCBs), and lead in gasoline. In some cases, the bans or restrictions have been imposed by multilateral instruments, for example, the Montreal Protocol on Substances that Deplete the Ozone Layer, the Stockholm Convention on Persistent Organic Pollutants, and the Minamata Convention on Mercury.

However, it quickly became apparent that it was difficult if not impossible to make a reasoned judgment on the effects on human health and the environment of many if not most of the chemicals in commercial use due to the lack of data available. In addition, new chemicals are continuously entering the market. Governments have reacted to this situation in broadly similar ways, by placing on enterprises (to a greater or lesser degree) the burden of collecting and presenting data and information to the authorities on the toxicological and environmental effects of the chemicals which they are planning to manufacture, import and/or use (so-called "new chemicals"), and now more on those chemicals which they already manufacture, import and/or use (so-called "existing chemicals"). Governments can then decide if they accept to have "new chemicals" enter their market or continue to allow the use of "existing chemicals", and if so under what conditions.

[9] ***A feed-in tariff*** *(FiT) is a premium rate paid for electricity fed back into the electricity grid from a designated renewable electricity generation source.*
See https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/Browse_by_Topic/ClimateChangeold/governance/domestic/national/feed

B. Market-based instruments/economic incentives

To date, economic instruments have been used much less for the environmental management of industrial chemicals. There are some isolated examples of taxes on certain classes of chemicals, for example, taxes on pesticides in Nordic countries (Danish Ecological Council, n.d.). Green public procurement is also used by some governments in their purchase of chemical products, such as cleaning products, to prioritize the purchase of products with less or no toxic chemicals, for example, the European Union's Green Public Procurement (GPP) programme (European Commission, n.d.).

C. Voluntary measures

Governments have also used policy instruments which encourage enterprises to voluntarily control the chemicals they use. Since the instruments are not specific to industrial chemicals but are used for general environmental management, readers are referred to sub-section 4.1.3 on pollution control for a discussion of these instruments

D. Transparency and disclosure requirements

Transparency and disclosure policies have seen strong use as instruments for the environmental management of industrial chemicals. In particular, governments have enacted regulations requiring labelling of chemical products or products containing chemicals to alert users (from factory workers to end users) on the potential chemical hazards they face when using those products, and to advise on handling and disposal of the products.

4.1.4.2 Hazardous Waste Management

Hazardous wastes are normally regulated separately from industrial chemicals. Yet many of the hazardous wastes are defined as such because of the toxic and/or hazardous chemicals they contain.

A. Command–and-control regulations

Command-and-control policies have dominated the menu of instruments used for the environmental management of hazardous wastes. The purpose of most regulatory regimes has been to ensure that industrial wastes categorized as hazardous are managed so as to minimize their impacts on human health and the environment. Generally speaking, regulatory regimes have focused on ensuring that:

- *Wastes are sent to enterprises which have the proper facilities for treating and/or disposing of the wastes, or, in the case of enterprises reusing/recycling wastes, are bona fide reuse/recycling enterprises;*
- *Wastes are transported to these enterprises by enterprises which have the proper vehicles to do so; and*
- *A chain of custody exists between the original waste generator and the final recycler, treater or disposer, to check that the wastes actually arrived at their planned destination.*

B. Market-based instruments/economic incentives

Economic incentives have primarily taken an indirect form. The regulatory regimes described above have resulted in the treatment and disposal of hazardous wastes becoming a significant cost to the waste generators, thus increasing the economic viability of not generating the wastes in the first place. In some countries, enterprises can benefit from grants, subsidies, and exemptions or reductions in import duties, which give them incentives to invest in cleaner, less waste-generating technologies.

C. Voluntary measures

Governments have also used policy instruments which encourage enterprises to voluntarily control the hazardous wastes they generate. Since the instruments they have used are not specific to wastes but are used for general environmental management readers are referred to sub-section 4.1.3 on pollution control for a discussion of these instruments.

D. Transparency and disclosure requirements

Transparency and disclosure policies have seen strong use as instruments for the environmental management of hazardous wastes. In particular, governments have enacted many regulations requiring labelling of hazardous wastes, to ensure that these wastes are properly managed as they move from the point of generation to the point of recycling, treatment or disposal.

4.2 GREENING SERVICES

4.2.1 Environmental Goods and Services (EGS)

Individual enterprises can do much to green themselves by being more efficient, reducing their consumption of materials and energy, phasing out their use of toxic chemicals, minimizing the pollution and waste they release into the environment, and redesigning their products so that they consume less during use and are easier to reuse, recover and recycle. However, enterprises, and especially SMEs, cannot be expected to manage all their environmental impacts alone. For their efforts to be truly sustainable, they will require the support of environmental goods and services. Government policy will be key in making sure that these third parties exist.

4.2.1.1 Planning to Establish a Domestic EGS Sector

Before governments start developing programmes to support the development of an EGS sector, they need to set priorities so as to channel scarce funds into developing the green services which the country most needs. Governments therefore need to undertake some sort of strategic planning exercise.

4.2.1.2 Developing the EGS Sector

Once a government has determined through the development of a national strategy what environmental goods and services it requires, these services will need to be developed. Approaches for developing an EGS sector are similar to those needed for developing other industries or sectors.

First, governments can support the necessary local research and development (R&D) to develop green technologies, systems and business models that currently do not exist or are weak. Second, they need to ensure that their universities are turning out graduates with the necessary green skills to service the growing EGS sector. Third, governments can provide access to capital for enterprises wishing to offer environmental goods and services, through such instruments as incubation programmes, green credit lines and loan guarantees.

Fourth, they need to recognize that, at least at the beginning, they should encourage the import of technologies, products and systems needed for many environmental services which in the short-term domestic markets cannot offer. Lastly, once local entrepreneurs have built strong green businesses, they can support these businesses to export locally-made green technologies, products and systems by identifying markets for them, providing them training in the mechanics of export, and by offering them export financing and insurance.

4.2.1.3 Creating an Enabling Environment for industry Support institutions

An important element in the creation of a thriving EGS sector is the establishment of the relevant industry support institutions. It is generally recognized that enterprises wishing to become greener need access to support institutions that can help them build up the knowledge and skills they need to adopt new, green procedures, processes and products. This is especially the case for SMEs, which badly need support to build up the skills they require to green themselves.

Governments have often intervened to create such support institutions, which they either fully or partially fund. An example of such an industry support institution relevant for green industrialization is the National Cleaner Production Centres (NCPCs). As of 2016, there were 12 NCPCs in SSA countries. Similar "service centres" are found in the energy field.

The implementation of an energy management standard within an enterprise requires a change in existing institutional approaches to the use of energy, a process that can benefit from assistance from a source of external expertise. Such service centres can also create and disseminate relevant technical information through energy efficiency assessment and self-auditing tools, case studies, reports, guidebooks and benchmarking tools. These services can be provided by government entities in the form of energy efficiency centres. In addition, or alternatively, governments can encourage other entities in the private sector, such as utilities, consulting engineers, equipment manufacturers or vendors, or energy service companies (ESCOs) to offer these services.

4.2.2 Eco-industrial Parks

Industrial parks (IPs) are known by different names, including industrial estates, industrial regions, industrial areas, industrial zones, industrial investment regions, special economic zones (SEZs) or industrial corridors.

They are planned and developed for the purposes of industrial activities and supportive commercial, infrastructure and service activities. Typically, they involve a collection of businesses undertaking manufacturing and processing with the aim of maximizing profitability. These activities can produce significant negative environmental externalities, which either come from point sources or dispersed sources, principally in the form of air emissions, water pollution and land contamination.

More recently, governments have been supporting the development of eco-industrial parks (EIPs) (UNIDO, World Bank Group and GIZ, 2017). These are IPs but their management goes beyond traditional practices. The management practices of EIPs include ensuring, to the extent possible, that:

- *The waste streams of enterprises in the EIP are recycled and/or exchanged with other enterprises in the same EIP (industrial symbiosis);*
- *Individual enterprises in the EIP improve the efficiency of their resource use with the implementation of cleaner production programmes;*
- *Due consideration is given to backward linkages outside the EIP to ensure protection of the natural resource base (e.g., forest stewardship programmes);*
- *Enterprises in the EIP use common environmental management practices; and*
- *Enterprises make a quantitative commitment to low-carbon production.*

Low-carbon, green SEZs are thought to be the most comprehensive and advanced concept of environmental sustainability (Yeo & Akinci, 2014). Through regulations and economic incentives, governments can encourage the establishment of EIPs.
Government policies and programmes also need to ensure that best environmental management practices are adopted for industrial estates and industrial clusters in urban areas, including proper siting to avoid disruption or destruction of unique environmental areas, buffer zones between industrial activities and human settlements, and requirements for properly operated collective wastewater treatment plants, proper collection of solid and hazardous waste, and the adoption of air pollution control technologies where necessary.

4.2.3 Eco-design

Eco-design has been defined as a process that aims to reduce environmental impacts and continually to improve the environmental performance of products over their full life cycles. It is also intended that eco-design be integrated within the overall design and development processes of the enterprise (ISO 2011).

No legislation directly requires enterprises to carry out eco-design on their products. However, as mentioned earlier, a considerable body of command-and-control legislation exists that establishes environmentally-related performance standards for products, such as energy consumption standards and others which ban the use of certain toxic and eco-toxic chemicals from products.

While such standards do not require enterprises to use eco-design, using the methodologies of eco-design can be a way for enterprises to more easily redesign their products to meet the standards. More recently, governments are moving to implement Extended Producer Responsibility (EPR) regulations. These are regulations requiring the producers of certain types of goods to be responsible for the management of these goods once they become waste (e.g., packaging, vehicles and tyres). The aim of these regulations is to encourage the recycling of waste products. EPR regulations can be a strong incentive for enterprises to undertake eco-design, so as to reduce the cost of managing the products once they become waste.

Tools are available to help guide design groups wishing to undertake eco-design. The best known is ISO 14006 "Guidelines for Incorporating Eco-Design", part of the ISO 14000 series of standards on Environmental Management Systems (ISO 2001). However, for SMEs especially, it can be very onerous to try to undertake eco-design alone. Governments can help to ensure that product design centres are available which specialize in eco-design.

4.2.4 Recycling

Given its importance to green industrialization, recycling merits particular attention. Given the breadth of the materials and products that can be recycled, this section will focus on the recycling of electronic waste (e-waste), which is beginning to significantly impact most SSA countries.

In general, with respect to recycling electronic waste, SSA countries:

- *Lack inventory data on e-waste;*
- *Face illegal imports of e-waste under the category of second-hand goods;*
- *Face the flouting of regulations under the Basel Convention by 'importers' being unable to track the flow of products over borders in personal luggage or other smuggling operations;*
- *Have unclear or poor labelling standards for countries exporting to them;*
- *Keep under-paid and under-trained customs staff;*
- *Have weak or non-existent legislation, regulation and policies, and lack financial resources to enforce authority where it exists; and*
- *Confront toxic compounds in the electrical and electronic equipment (EEE) waste stream, including heavy metals, persistent, bio-accumulative and toxic substances, and brominated flame retardants (WB/GEF, 2017).*

Both Ghana and Kenya have strategies for managing e-wastes. Ghana has a National Strategy for E-Waste (2011), draft e-waste legislation, and guidelines for the importation of useable electrical and electronic equipment (UEEE). There is no formal e-waste collection system, but rather a vibrant informal collection system with inappropriate disposal. Kenya has prepared guidelines specifically for e-waste management and, in 2013, further developed the country's draft e-waste regulations, which are yet to come into force. In addition, the Environmental Management and Coordination Regulations (2006) may apply to e-waste where it can be classified as hazardous waste (World Bank/GEF, 2017).

An overall approach to e-waste management in SSA countries should focus on the establishment of e-waste management strategies at national and regional levels. An e-waste management strategy includes all stages of the e-waste recycling chain, i.e., the design of collection schemes; the establishment of sustainable business models to set-up new dismantling facilities or to up-scale existing facilities to operate more efficiently; and the connection of the facilities with national, regional and international downstream markets for appropriate end-processing of each fraction and to ensure a high recovery rate of precious materials.

[10] *The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, which is usually known as the Basel Convention, is an international treaty designed to reduce the movement of hazardous waste between nations, especially to prevent the transfer of such waste from developed to less developed countries. See http://www.basel.int/*

Section

05

Other Domestic Policies that Contribute to Green Industrialization

5 Other Domestic Policies that Contribute to Green Industrialization

While the main purpose of domestic industrial policy, broadly defined, is to accelerate structural change, it can contribute indirectly to green industrialization. Trade-related import policies as well as resource-pricing policies can support efforts to green industry.

The industrial policies considered to have the most influence on green industrialization are those that support openness to foreign direct investment (FDI), export promotion, privatization, and the creation of industrial estates. Increased openness to FDI affects factor markets, in particular the availability of technology, finance and skills, when foreign enterprises bring more advanced (usually cleaner) technologies into a country along with the skills needed to operate them. Governmental incentives for export promotion affect product markets by supporting domestic producers in exporting since this normally requires the producers to manufacture more competitive goods, using more advanced techniques and technologies than those normally used in production for the domestic market. Privatization of state-owned enterprises affects factor markets by forcing enterprises to be more efficient in their use of production inputs, which often results in the use of cleaner technologies. Finally, the creation of industrial estates affects factor markets by lowering the costs of basic services, such as communication and transport, as well as those of environmental services for collective abatement of pollutants.

Trade-related import policies, in particular the lowering or raising of tariffs and non-tariff restrictions (quotas), work their way through the institutional network via factor and product markets. Low tariffs and fewer quantitative restrictions on 'intermediate inputs' affect factor markets by making imported cleaner chemicals, goods and technologies less costly. Low tariffs and fewer quantitative restrictions on 'finished goods' affect product markets by putting cost pressure on domestic manufacturers to compete with imported goods, which gives them an incentive to use cleaner technologies to lower production costs. In general, higher resource prices—i.e., those that reflect full production cost and, in a limited number of cases, pollution damage—are incentives for green industrialization,

particularly the adoption of resource-efficient technologies. Higher resource prices typically motivate the managers of enterprises to reduce total expenditure on resource inputs by using efficient technologies that lower raw material, water and energy use per unit of output. The price effect depends on the share of resource costs in total production and the extent to which costs can be passed on to consumers.

Resource-pricing policies work their way through factor markets to influence the behaviour of individual enterprises. Most often these policies interfere with free market prices by subsidizing the costs of production inputs, primarily for energy and water. In some cases, the policies are ones of neglect to the extent that they fail to set any price, which happens in the case of groundwater. Below market prices for these production inputs encourage their excessive use by enterprises.

[11] *Additional information about greening industrial policy can be found in Green Industrial Policy: Concept, Policies, Country Experiences (Altenburg & Assmann, 2017). This report defines green industrial policy "as including any government measure to accelerate structural transformation towards a low-carbon, resource-efficient economy in ways that also enable productivity enhancements in the economy".*

Section

06

Assessments of Green Industry Policy in SSA Countries

ASSESSMENTS OF GREEN INDUSTRY POLICY IN SSA COUNTRIES:

6.1 Nigeria

In 2012, within the framework of UNIDO's Green Industry Platform, a report was prepared on the status and challenges of green industrialization in Nigeria (UNIDO, 2012). The report follows the guidance set out in Policies for Supporting Green Industry (UNIDO, 2011). The analysis identified the following policy gaps which need to be addressed if the country is to move along the path towards green industrialization:

Policy integration:

Although Nigeria has a comprehensive policy and regulatory framework to support the greening of industries, the policies and plans related to green industry are peripheral or subordinate to the dominant dynamics of industrialization and urbanization. The analysis found that development, environmental and energy institutional mandates are not effectively integrated.

Low productivity:

Overcoming the country's low productivity (labour and factor productivity) is both a challenge to and an opportunity for improving resource efficiency for Nigerian manufactures.

Industrial energy efficiency:

A green industrialization policy needs to focus on improvements in the efficiency of energy use. A survey of industrial energy-efficiency policy measures in place in 31 developing countries (including Nigeria) found that only four out of 21 potential measures were in place in Nigeria.

Financing the greening of industries:

Enterprises in Nigeria have more difficulties than those in many other SSA countries in accessing finance, and at a reasonable cost. Consequently, government-led financing schemes are needed to promote investment in resource-efficiency measures, e.g. favourable loan and loan guarantees.

Improved infrastructure:

Inadequate infrastructure for waste and water management is a serious problem in Nigeria. For example, among the five industrial estates in Lagos that house the majority of medium-sized and large industries, only one estate has a common effluent treatment plant and that plant is reported not to be operating properly. To keep pace with Nigeria's growing emphasis on clustering enterprises within industrial estates or in common facility centres, finance will need to come from the government or the private sector to build common effluent treatment plants and to ensure collection and proper disposal of solid wastes.

Creating business incentives

The government should encourage industry-led initiatives such as Corporate Social Responsibility (outside of the oil-producing region), eco-labelling, ISO standards and voluntary agreements, which have yet to gain any foothold in Nigeria.

Policy implementation and enforcement:

Although Nigeria has a comprehensive range of strict environmental quality and pollutant discharge standards that are in line with those put forward in the World Bank guidelines, the problem of limited enforcement remains. Only in the case of Lagos state is there a noticeable enforcement effort.

Commitment to systematic data collection:

An effective green industrialization policy needs to be designed and monitored based on systematic and routinely collected data about the industrial sector, its energy and water use and its pollutant generation and discharge. At this time, none of these data are available.

Resource efficient and cleaner production:

A smart RECP policy and programme, perhaps under the National Productivity Centre, could become an essential component of a national effort to increase productivity in the industrial sector.

ASSESSMENTS OF GREEN INDUSTRY POLICY IN SSA COUNTRIES:

6.2 Ghana

In 2015, within the framework of the United Nations Programme of Action for a Green Economy (PAGE) , a report was prepared on the status and challenges of green industrialization in Ghana (PAGE/UNIDO, 2015a). The report identified several initiatives supportive of a transition to a green economy:

Resource Efficient Green Industry Initiative:

The National Cleaner Production Centre should work together with specific manufacturing sectors (steel rolling is a promising first choice) to reduce resource use (energy) by a specific date, as a showcase.

Enforcement of environmental regulations:

The Environmental Protection Agency should expand its permits scheme to all medium-sized and large enterprises. Currently, it has provided permits to only 250 to 300 enterprises out of an estimated population of 500 to 600 medium-sized and large enterprises.

Industrial energy efficiency:

A green industrialization policy needs to focus on improvements in the efficiency of energy use.

Pollution Disclosure Programme:

The AKOBEN programme should be expanded. Currently, there are around 200 participating enterprises out of a population of 300 to 500 enterprises. Many more enterprises should be enrolled into the programme.

Systematic data collection:

Essential to all of the above, the Ghana Statistical Service, the EPA, and the National Energy Commission should collect timely and comprehensive economic, environmental and energy use data. Such data, which are currently not available, are essential for identifying the most promising sub-sectors for improved resource efficiency and determining whether decoupling is actually happening.

Industrial zoning regulations:

The Government needs to enforce its industrial zoning regulations. Effective enforcement would reduce populations exposed to industrial pollution. Successful confinement of industrial activity to specific geographic areas would also allow for use of common wastewater treatment plants and common collection and disposal of solid and hazardous wastes.

Import bans:

The Government needs to selectively ban the import of resource inefficient (dirty) technologies. In the absence of bans, enterprises importing technologies should be required to undertake technology audits. The current importation and use of resource inefficient technologies clearly increases the challenge of greening industry.

Renewable energy:

Government support is needed for manufacturing accessories for renewable energy technology and for setting up assembly plants for solar panels. This support could come in the form of finance from the proposed Ghana Green Fund and tax exemptions.

Public advocacy for green economy:

There is an important need to promote dialogue amongst stakeholders and to strengthen the national capacity for communication on the green economy and sustainable development.

[12] *See http://www.un-page.org/*

ASSESSMENTS OF GREEN INDUSTRY POLICY IN SSA COUNTRIES:

6.3 Senegal

In 2015, again within the framework of the Programme of Action for a Green Economy (PAGE), a report was prepared on the status and challenges of green industrialization in Senegal (PAGE/UNIDO, 2015b). The following summarizes the recommendations for the government:

- *Strengthen the necessary capacities to offer detailed diagnostics to industrial enterprises, particularly SMEs, using green industry criteria, and to define with them, and in partnership with the Upgrading Office, a programme for their upgrading.*
- *Support an evaluation of the "Plan Sénégal Émergeant" [the country's framework document for its development], in light of the challenges of green industrialization and climate change.*
- *Strengthen the efficiency and effectiveness of the legislative and regulatory framework, and, in partnership with the private sector, define the modalities which will allow the latter to better master the framework's requirements.*
- *Identify the new challenges posed by the transition to green industrialization and integrate them into the legislative and regulatory framework.*
- *Support an increase in financial incentive schemes, taking into account the specific needs of industrial actors, in particular the SMEs.*
- *Undertake a detailed analysis of the barriers to the development and scale-up of renewable energy, and establish the necessary corrective measures as well as a timetable for their implementation.*
- *Raise the awareness of the private sector, in particular SMEs, about the need to use green industrialization as the principal tool for achieving sustainable development in the industrial sector.*
- *Raise the awareness of other stakeholders, including consumers, civil society organizations and the informal sector, about green industrialization, and support the development of a programme of action.*

Section

07

Conclusion

7 Conclusion

This guide has been written as a reference tool for policy makers and planners on formulating policies and programmes that are supportive of green industrialization in SSA countries. In particular, the guide has aimed to provide a workable definition for green industrialization and to identify common policies, programmes and instruments for directly greening industries and services.

In closing, two important factors will need to be considered by policy makers in the region in pursuing the path towards green industrialization. First, governments will need to recognize that greening industry requires more than a focus on reducing greenhouse gas emissions, to which African industry is a minor contributor globally. Rather, the successful greening of industry also requires significant reductions in conventional pollutants in urban areas with concentrated industrial activity, improvements in energy efficiency needed to reduce the energy intensity of outdated technologies, and the effective management of chemical and hazardous wastes.

Second, countries throughout the region will need to correct the data deficit regarding the economic and environmental dimensions of green industrialization and the implementation of existing policies and support programmes that have the potential to drive green industrialization.

The lack of information about domestic industrial economic structures and their environmental impacts is a central finding in all three green industrialization country assessments in Section 6 of this paper and in the review of the past progress of SSA countries meeting SDG industry-related targets (Luken and Meinert, 2018). Hence, focused research efforts will be required to close information gaps and provide robust evidence on policy design, implementation and monitoring for greening industries and for greening services. As per General Assembly Resolution 70/1 efforts to strengthen statistical capacities and to support capacity-building capacities in developing countries will need to be intensified (UN, 2015) together with greater financial investments in statistical systems (SDSN, 2017).

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