GREEN BUSINESS GAZETTE

ISSUE 3 2020

CAN ARTIFICIAL INTELLIGENCE (AI) CONQUER CLIMATE CHANGE?

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ISSN 0270-837X

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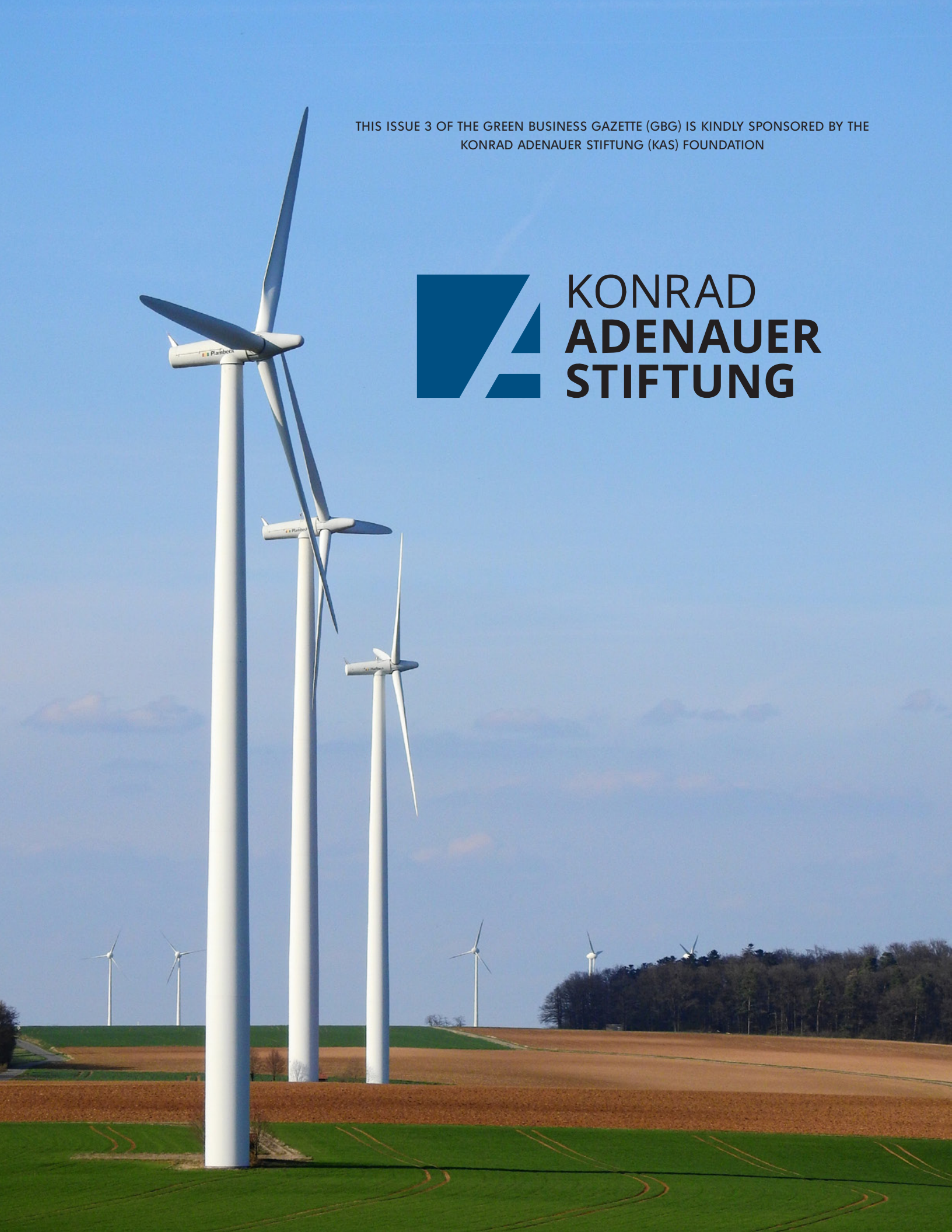
Save River Siltation Gets Serious

UNIDO Accredited to Green Climate Fund

Sand Mining Gets Out Of Control



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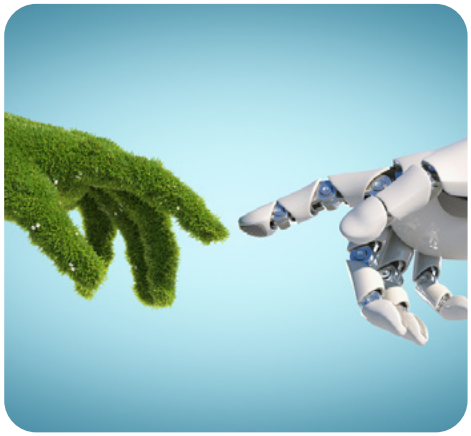

GREEN BUSINESS GAZETTE

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FROM THE EDITOR'S DESK

Refreshing welcome to our esteemed readers! Welcome to Issue 3 of the Green Business Gazette. The leading environmental magazine in Zimbabwe. It is so inspiring how the GBG has grown in a very short space of time and managing to reach all continents of the world. I would like to take this opportunity to thank Konrad Adenauer Stiftung (KAS) for sponsoring the production of this Issue 3 of the Green Business Gazette and strengthening the ability of the media to report on environmental sustainability.

It is encouraging to note that the COVID-19 pandemic is being managed gradually with countries coming out of lockdowns. Caution and vigilance is still necessary as we adjust to the new normal. The COVID-19 period has seen a reduction in global Greenhouse Gas (GHG) emissions, at the same time with depressed economic activity. From an environmental perspective, the rise of COVID-19 waste (used masks, gloves, sanitizer packaging) continues to pose headaches to many countries. Precocious countries are developing strategies and national plans to deal with COVID-19 waste streams in order to curb reinfections.

In this issue, we explore the emergence of Artificial Intelligence (AI) in different facets of our lives and we ponder on whether it could be a solution to climate change and other environmental problems. The rise of drone technology in climate change monitoring, crop assessments, flood monitoring and other applications is an interesting prospect of our generation. We delve into the prospects of using automation in the promotion of efficient industrial processes. The emergence of robotics in agriculture, promises to revolutionize production of crops, although there are trade-offs with jobs. Attaining climate mitigation and energy efficiency can easily be accelerated by promoting the Internet of Things (IoT) and Digitalisation.

This issue of the Green Business Gazette celebrates the accreditation of United Nations Industrial Development Organisation (UNIDO) to the Green Climate Fund (GCF). It is an unprecedented milestone in the attainment of Inclusive and Sustainable Industrial Development (ISID) in developing and transition countries. In the same issue, we feature UNIDO's Manufacturing Sector Technical Note based on the survey undertaken in Zimbabwe.

Issue 3 brings to our attention, the unsustainable sand abstraction practices in various parts of the country, leaving permanent scars on mother earth. Issue 3 notes that sand abstraction is becoming a major environmental challenge. We discuss the fire incident at Pomona dumpsite and encourage local authorities to adopt Integrated Waste Management Strategies.

We take a look at the situation regarding overfishing and the dwindling fish stocks. The zest to nourish our population is well meaning, but it should be done with the future in mind.

For wine consumers and those who wallow in the vines, we assess the climate change impact of wine making and other environmental impacts. The aim of Issue 3 is to promote responsible production of wine and other beverages in order to ensure that the value chain manages ecological impacts.

Energy Efficient appliances in the home are put on the spotlight as potential low hanging fruits for families to save money. The time has come for individuals to take energy efficiency labelling seriously. This is a means of reducing the greenhouse gas emissions affecting the world. Issue 3 recognises the role of households in dealing with climate change and minimizing emissions by purchasing energy efficient appliances.

The world cannot afford to wait any longer whilst environmental damage occurs. The time has come for us to increase our ambition towards sustainability. The Sustainable Development Goals (SDGs) require accelerated implementation in all sectors of the economy. The gusto and delectation for attaining a Green Economy is urgent today than tomorrow.

As the Editor, I welcome suggestions, comments and new approaches of dealing with environmental sustainability issues. Our environment needs each one of us to play a part. I have never been more optimistic than I am today, that a Green Economy is now within our reach.

On behalf of the editorial team, I would like to wish you a memorable reading experience.

Tawanda Collins Muzamwese
EDITOR IN CHIEF

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RENEWABLE ENERGY TAKES GLOBAL CENTRE STAGE – AS GERMANY LEADS THE WORLD IN PER CAPITA RENEWABLES

THE importance of energy in the socio-economic development of the world is an unprecedented reality. As governments across the globe grapple to find solutions to the energy situations in their respective countries a lot of lessons can be drawn from the experiences of Germany. Scaling up and replication of renewable energy by the European industrial giant, has led to many predicting that it will continue to show leadership and excellence in clean energy until another giant rises from the ashes. Currently, Germany uses 46% of renewable energy in its energy mix. This has been attained through deliberate investments in renewable energy sources such as solar and wind technologies. Smart Energy International attribute the surge in Germany to be due to reduced usage of coal in their energy mix. In terms of per capita renewables each person can use 1.4 kilowatts (kW), the highest for any country in the world. This is in comparison to the global average of 0.2 KW.

The emergence of renewable energy as a core element of the energy mix shows the enhanced commitment to addressing the impacts of climate change as well as promoting decarbonisation. Both developed and developing countries have a responsibility to scale up clean energy sources as a means of reducing carbon footprint and also creating green jobs.

Zimbabwe has recently launched a National Renewable Energy Policy in the year 2020. The policy is meant to steer advanced implementation of renewable energy in the country. The National Renewable Energy Policy is also anchored on policy incentives and the encouragement of stakeholders such as Independent Power Producers (IPPs) to invest in renewable energy. Implementing the policy can set the country on a trajectory of climate mitigation and energy security.

Boosting local economic performance and regional industrial growth, needs harnessing sustainable sources of energy. Close cooperation and bilateral projects with advanced economies is a necessary step to benchmark performance in renewables. Green jobs can be necessitated by a green energy transition as seen by over 360 000 jobs created in Germany's renewable energy sector. It is very encouraging to note that a green economy can sustain social goals whilst achieving environmental outcomes and targets of the Paris Agreement. North-South cooperation, technical assistance and exchange programmes will be necessary in order to harness the lessons learnt in the path towards a green economy in Germany as a means of developing capacities in other parts of the world. Developing countries such as Zimbabwe can also take a leaf and benchmark strategies, policies and case studies.

CAN ARTIFICIAL INTELLIGENCE (AI) HELP TO CONQUER CLIMATE CHANGE?

Tawanda Collins Muzamwese

Artificial Intelligence is one of the fastest growing technological breakthroughs in the world with the potential of assisting society to deal with perennial problems such as climate change. Soaring temperatures, extreme weather events and exponential rise in the Greenhouse Gas (GHG) emissions continue to ravage the planet at an alarming rate without a clear solution in sight. Communities and countries alike have become victims of climate change. With the livelihoods of humanity already being threatened and people fighting for water in some parts of the world, it has become increasingly clear that climate change is an unequivocal reality. Several solutions have been sought without success and a time has come when questions are being asked at the prospects of Artificial Intelligence (AI) coming to the rescue of humanity. This is still a contentious issue with practical and ethical controversies, but those countries which have developed Artificial Intelligence solutions are better able to fight climate change. Dealing with climate change is no longer an issue to be approached using traditional conventional mitigation and adaptation methodologies. The rise of AI and machine learning can be an opportunity for fighting climate change. Several countries have already started deploying artificial intelligence in the fight against climate change. The mind-boggling question is to what extent AI can be deployed in all countries of the world. Robots can change the way we produce and consume and can range from operating production processes in a more resource efficient manner (water, energy, chemicals and raw materials). Scaling-up digitalisation is also a key step forward in the quest for climate mitigation and adaptation.

Through digitalisation, it is now possible to monitor industrial processes remotely through Continuous Environmental Monitoring Systems (CEMS) which monitor atmospheric pollution from emission sources in real time. Governments can no longer afford to watch deteriorating environmental quality, when in actual fact, AI can be used to clean-up environmental systems

Application # 1: Predictive Modelling

The erratic rainfall patterns which are existing in the world due to climate change are very difficult to predict and manage for many governments across the world. The rise of AI allows predictive modelling of future climatic conditions. The AI can initiate predictive modelling based on algorithms fed into the systems using data from past events. Huge data sets on environmental parameters can be easily inputted into artificial intelligence systems resulting in predictive analysis. Human mind and intellectual capacity is limited in handling large data sets and masses of technical information. Harnessing Artificial Intelligence will be the key to unlocking future opportunities. Predictive modelling can assist in setting up future scenarios and thought processes. It also ensures that society is better able to deal with situations that may arise in a particular sustainability domain such as climate change.

Cyclones can be easily identified and early warning systems deployed with the aid of satellites, Geographical Information Systems (GIS) and remote sensing. Gone are the days when manual logging of daily weather statistics would wait for an individual to arrive at work. Predictive modelling and automated weather data recording is on the rise. Error prone systems are on their way out. In the context of Disaster Preparedness and Response, artificial intelligence will be one of the best alternatives to inform policy makers.

Application # 2: The internet of Things

The Internet of Things (IoT) has been successfully deployed in the energy efficiency sector and also monitoring renewable energy output. Energy efficiency of refrigeration systems and furnaces now deploys the internet of things. Industries with Variable Speed Drives (VSDs) and Programmable Logic Controllers (PLCs) find themselves better

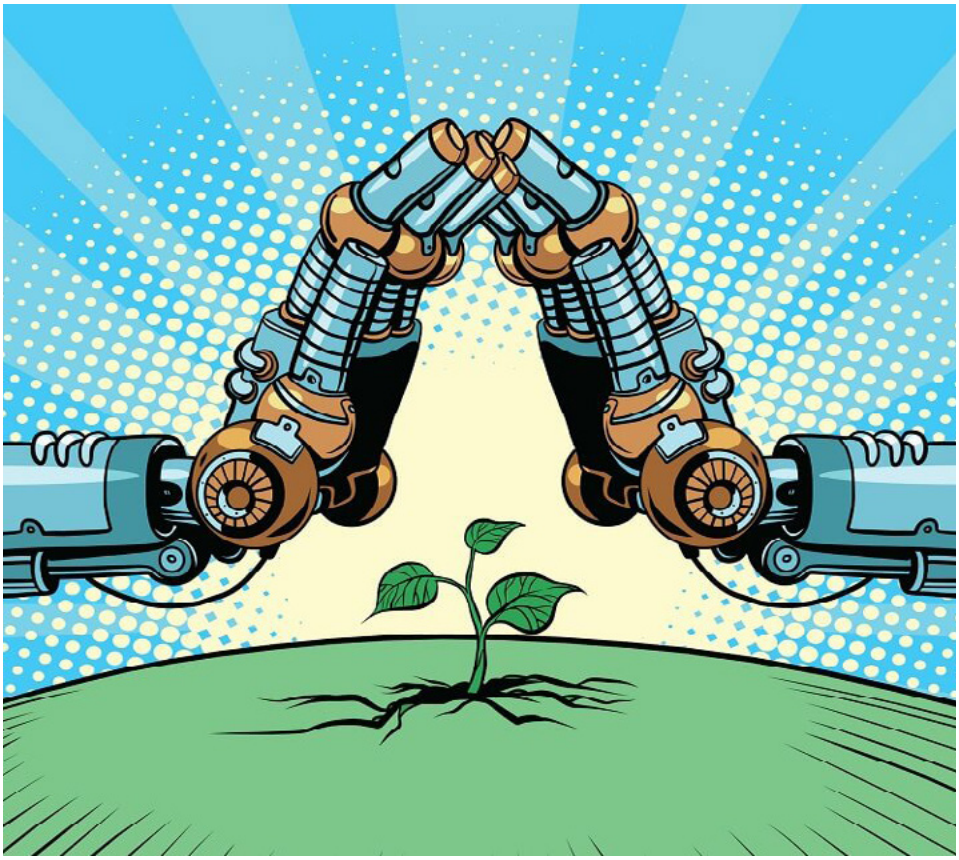
able to monitor their resource usage and production processes. The Internet of things is also being deployed in consumer households where gadgets and appliances can be monitored, managed, switched on and switched off through online means in places where there is internet connectivity. This innovative breakthrough has enabled significant reduction in energy consumption. Manufacturing processes can now be augmented with the internet of things and processes managed online.

Application # 3: Automation

It is very clear that industrial processes can be automated to a level where processes can be operated with the aid of robotic systems. This has a net result of reducing resource usage as well as energy wastage. Accuracy and minimisation of defects is also a key milestone that can end up reducing the need for rejects in the workplace. Implementation of sustainable development has already been boosted by the automation of production systems. In the context of climate adaptation and mitigation; automated systems can achieve high levels of precision and help in achieving de-carbonisation. On the other hand, in sectors such as the beverages sector, it is evident that artificial intelligence can result in the efficient water utilisation. This has a net result of reducing water footprint. Although industrial automation is dubbed as a global breakthrough, it is resisted in many countries around the world for the mere reason that it can result in loss of jobs. However, in the quest of greenhouse gas emission reduction, automation can deliver.

Application # 4: Drone Technology

Drone technology is fast growing in all regions-both developed and developing. The flexibility of drone technology to reach areas which are affected by climate change is unparalleled. During national disasters such as Cyclone Idai, drone technology was used to monitor the extent of damage and inform search and rescue operations.



Drones can also be used to monitor areas affected by climate change and exposed to drought conditions. The potential of drone technology in the environmental sustainability sector needs to be maximised as it can save costs of deploying human beings, reduce fuel costs and reduce risk of accessing dangerous areas. Crop assessments can easily be carried out using drone technology and facilitate preparation for national emergencies and disasters. Governments, the world over are being strongly encouraged to deploy artificial intelligence in combating climate change. There is no reason for communities to continue to suffer the brunt effects of climate change, floods and droughts; when artificial intelligence solutions such as drone technology can be used to inform decision making.

Application # 5: Artificial Intelligence (AI) in mechanised agriculture and irrigation of greenhouses

Failing to afford technology should not be an excuse for denigrating technology. If your country, institution or you as an individual cannot afford the best technology, the least you can do is to admire, aspire and learn from others. Significant progress has been made in advanced economies in using robotic arms in irrigating crops in greenhouses. Using such systems can be able to achieve higher water efficiency application rates in a water constrained world. This technology has been proven to increase the efficiency of water usage as well as promoting sustainable production and consumption. Agricultural activities that incorporate artificial intelligence are better able to withstand the effects of climate change and use the meagre resources more efficiently.

Application # 6: Tele-monitoring and Continuous Environmental Monitoring Systems (CEMS)

Many environmental protection authorities across the world are moving towards tele-monitoring systems, where environmental quality

is monitored remotely and in real time. Air emissions from processes can be tracked at the regulatory agency using sensors and continuous monitoring systems. Traditional environmental protection agencies focus on deploying environmental inspectors on a regular basis, incurring transport costs and merely relying on consultant reports. This system is prone to errors and also a consultant can easily produce a fake report on behalf of a client in order to get a favourable license category. With artificial intelligence, regulatory agencies are now able to monitor remotely compliance parameters. Sensors and continuous gas analysers will play a leading role in monitoring emissions at power stations, industrial facilities, mining sites and construction companies. Real time and accurate data can only be provided by artificial intelligence. In this context the capricious element of the future is removed as there is more certainty. Dealing with climate change will need real time data in order for rapid decisions to be made in the field.

Challenges of deploying artificial intelligence

The deployment of artificial intelligence in many sectors of the economy has been met with mixed feelings across the globe. The major is issue is an ethical one. There are fears that robots will take over the world. The trade unions who have worker interests at heart predict that the rise of machines will result in workers being unemployed and rendered useless in the workplace. No-one envisages a world where their skills are deemed redundant and excess baggage. Financial constraints are also another main reason why artificial intelligence has not yet garnered universal deployment globally. In order to navigate this unprecedented challenge, countries must invest in research and development whilst at the same time setting aside budgets for innovation and technological research. The compatibility with local context is another issue of concern. Some of these concerns are perceived, whereas some of them are real. It is becoming increasingly clear that some fears around artificial intelligence are mere myths that need to be busted, otherwise society risks to miss out on the generational opportunities of a lifetime. Research Centres must step up their innovative capabilities and develop projects that harness the power of artificial intelligence.

NB: The attainment of the Nationally Determined Contributions (NDCs) will require innovation and technology transfer through many means including but not limited to artificial intelligence.

TOP 10 MYTHS ABOUT ARTIFICIAL INTELLIGENCE

There are many myths which have to be busted in order to increase the penetration of Artificial Intelligence in all economies of the world:

Myth # 1: Robots will take over the world and destroy it
Myth # 2: Artificial Intelligence will take away people's jobs and everyone will be unemployed
Myth # 3: Artificial Intelligence is for the first world countries
Myth # 4: Artificial Intelligence is for the next generation
Myth # 5: Robots are for movie scenes and they cannot assist us in climate mitigation
Myth # 6: Technology is evil – real life should have hard work and everything should be manual
Myth # 7: Climate change is too complicated to be predicted using artificial intelligence
Myth # 9: Artificial intelligence is a security threat that can destabilise countries
Myth # 10: Digitalisation is very expensive, costly and can only be afforded by rich countries

A Green Economy: Rebuilding Post COVID - 19 Pandemic

By Diana Tapedzanyika

THE YEAR 2020 MARKED THE BEGINNING OF A NEW DECADE DUBBED THE "**DECADE OF ACTION**" AS COUNTRIES ACCELERATED ACTIONS TOWARDS THE ACHIEVEMENT OF THE 2030 AGENDA FOR SUSTAINABLE DEVELOPMENT. HOWEVER, THE COVID-19 PANDEMIC HAS BEEN A MAJOR SETBACK TO THE STRIDES MADE TOWARDS THE ATTAINMENT OF SUSTAINABLE DEVELOPMENT GOALS (SDGS). THE GLOBAL ECONOMIC RECESSION AS A RESULT OF THE COVID-19 PANDEMIC HAS EXACERBATED POVERTY AND FURTHER INCREASED INEQUALITIES AMONG COUNTRIES, DENTING THE PROSPECTS OF ACHIEVING SDGS BY 2030.

Despite the negative impacts on human life and global economies, the COVID-19 pandemic has brought about some relief to the fight against global climate change. This is because air emissions have been reduced during the current lockdowns. Climate activists have been continuously lobbying for action to address the climate crisis. They have been calling upon national governments to take urgent action towards reducing Greenhouse Gas (GHG) emissions in order to achieve the goals of the Paris Agreement The long term temperature goal of the Paris Agreement is to hold the increase in the global average temperatures to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels.

The 10th Edition of the United Nations Environment Emissions Gap Report for 2019 shows that the emissions gap is now greater than before. UN Environment defines the emissions gap as the difference between where global GHG emissions are heading under the current Nationally Determined Contributions (NDCs) and where science indicates emissions should be in 2030 to be on the least cost pathway to achieve the goals of the Paris Agreement. According to UN Environment, national commitments will only contribute a third to the reduction of emissions required to meet climate targets. Under such a trajectory, it will be impossible to achieve the long term temperature goals of the Paris Agreement.

The year 2020 has been a historic year in terms of GHG emission reductions as annual global emissions are declining at unprecedented rates as a result of the COVID-19 pandemic. The International Energy Agency (IEA) Global Energy review 2020 report shows that there was a 3.8% decline in the global energy demand for energy in the first quarter of 2020 which resulted in the decline of global Carbon dioxide emissions in 2020. Global Carbon dioxide emissions are expected to continue declining and the decline is set to be almost twice as large as all previous declines since the end of World War 2 combined " according to this report.

Before the pandemic, the "**Business As Usual**" approach was causing environmental destruction, social injustice and economic inequality as a result of unsustainable investment and behaviour which promoted environmental degradation. Despite the major setback to the attainment of SDGs, Covid-19 has resulted in the decline of GHG emissions below unprecedented rates and has therefore presented the world with an opportunity to rebuild sustainably and in a climate sensitive manner. One way to achieve sustainable development post-Covid-19 is through a Green Economy which promotes economic development, environmental sustainability and social inclusion.

Every change has implications and a transition to a low carbon or green economy has social and employment impacts. However, it is critical to manage change by minimizing risks whilst also maximizing the opportunities brought about by the change. Climate change action has benefits and the Just Transition has been developed to optimize the benefits of the action. Just Transition is a framework used to achieve climate action and social inclusion. It addresses climate action taking into account human rights, labour standards and inclusive growth. The focus now is towards the creation of Green Jobs so as to simultaneously address SDGs 1, 8, 13 and 15. Green Jobs promote economic growth whilst reducing negative impacts on the environment.

Zimbabwe became a signatory to the United Nations Framework Convention on Climate Change (UNFCCC) in June 1992 and ratified the convention in November 1992. In October 2015, Zimbabwe submitted its Intended Nationally Determined Contribution (INDC) to the UNFCCC to cut per-capita energy emissions by 33% by 2030 under a 'business-as-usual scenario" and currently in the process of revising its NDCs. As a result of the social and employment implications of climate action, an assessment of these implications should guide the development and implementation of the NDCs so as to ensure a Just Transition by incorporating measures to address their impacts.

In 2020, Zimbabwe started to assess the potential for Green Jobs and Just Transition with an aim of creating a model of the Green Jobs economic assessment to see the outcome of adopting the Just Transition model in Zimbabwe. An Inception workshop to assess social and employment impacts of NDC policy to guide Just Transition and NDC enhancement was done in June 2020. The modelling is currently progress in progress and results are expected end of October.

GREENING THE SUSTAINABLE SUPPLY CHAIN - A GLOBAL IMPERATIVE

By Freedom Kudakwashe Muranda

ACCORDING TO THE UNITED NATIONS ENVIRONMENT PROGRAM (UNEP), GLOBALIZATION IN THE BUSINESS SECTOR HAS RESULTED IN AN INTENSE GROWTH OF THE CROSS BORDER MOVEMENT OF MERCHANDISES. THE MOVEMENTS HAVE HOWEVER BEEN DISRUPTED BY THE CURRENT COVID- 19 PANDEMIC. SUBSEQUENTLY WE NOW SEE AN INCREASE IN THE COMPLICATION OF SUPPLY CHAINS OF COMMODITIES FROM VARIOUS COUNTRIES WHERE DIFFERENT SOCIAL AND ECONOMIC REGULATORY FRAMEWORKS ARE AT HAND. THERE IS A NEED FOR TRANSPARENCY IN THE SUPPLY CHAIN BECAUSE OF THE LACK OF A COMMON PLAYING FIELD REGARDING THE IMPORTANT ASPECTS OF SUSTAINABILITY.

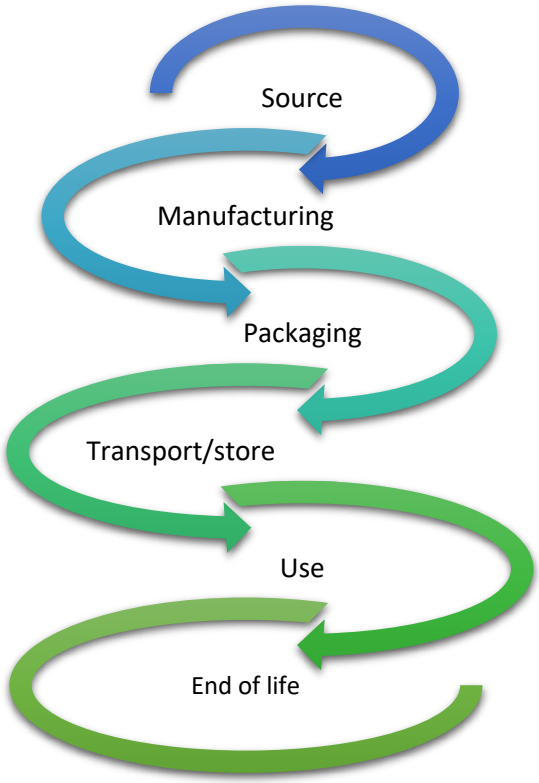
Businesses should care about having green and sustainable supply chains because sustainability it makes business sense. Implementing green supply chains helps companies to combat climate change whilst saving money and attracting new clients. Research has proven that green products are more appealing to clients. Consumers are even boycotting unsustainable products and companies that don't attempt to achieve sustainability.

A green supply chain is sustainable for future generations and an imperative that will have environmental, social and economic benefits. The way a government procures products and services has a large impact on an economy's social and ecological footprint. Many businesses, consumers and stakeholders are becoming more involved in the growing green movement. Businesses are trying more and more to make their supply chains greener by introducing sustainable strategies throughout their organizations and supplier relationships. This is due to influence by customer loyalty shifting towards environmentally friendly products.

The Harvard Business Review (HBR) mentions that a rising number of Multinational Corporations (MNCs) have pledged to work only with suppliers that adhere to social and environmental standards. Naturally these Multinational Corporations will expect their first-tier suppliers to comply with those standards. These MNCs ask that suppliers ask for compliance from their suppliers who then also ask the same from their suppliers. The intention is to create a smooth surge of sustainable practices throughout the Supply Chain Network (SCN). The recent focus on sustainability has resulted in a growing need for integrating environmentally safe choices into supply chain management practices.

The model of Green Sustainable Supply Chains involves using environmentally friendly inputs and converting them through change agents into outputs that can be regained and re-used at the completion of their lifecycle. This cycle creates a sustainable supply chain. Green and sustainable supply chain are implemented to reduce costs while helping the environment. Sustainability is a much broader term which considers implications of those products and services used over a much longer period of time. Green supply chains on the other hand, refer to the raw material eco-friendliness, the manufacturing process, products and services of a certain supply chain. It also gives emphasis to environmental compliance and executes supply chain management functions through business partner collaboration and operational management.

The diagram below illustrates a retail supply chain:



Over the years, there has been growth in the need for greener technologies. Businesses have to adapt to new times and go green. Digital Capability in the green supply chain gives businesses visibility from end to end. Going green is more than using recycled paper and energy-efficient light bulbs but involves changing the supply chain to portray a much greener image. Companies can benefit a lot form implementing a green supply chain and there are various ways this can be done.

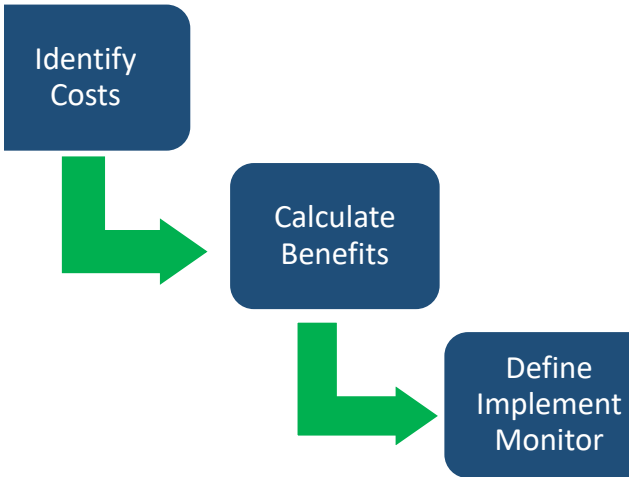
A green supply chain can be implemented in the service sector for companies like news organizations, accounting firms and consulting companies. Service-based firms can reduce the amount of paper they produce, cut back on the amount of plane travel and even reduce the number of workers that drive to work. These companies can also reduce, re-use and recycle their waste products. These measures will reduce their impact on the environment by producing less waste and lowering greenhouse gas emissions. Manufacturing companies can create a green and sustainable supply chain through adopting a circular economy which means less impact on the supply chain and reduced demand for raw materials. Companies can implement the green supply chain to combat climate change, save money and attract new clients.

The model illustrates a four-step framework. This is used to identify and use environmental information to improve financial performance whilst greening the supply chain:

- Identify costs
- Determine opportunities
- Calculate benefits and
- Decide, Implement and Monitor.

Significant management aspects being emphasized are the requirement for integration of environmental considerations into each and every core industry program and the need for tools to monitor and benchmark the results. A Green Sustainable Supply Chain integrates environmental factors and supply chain management principles to identify the ecological impact of an organization's supply chain processes. Many businesses are now seeking out solutions and guidance on how to implement a sustainable supply chain because they are now aware of the importance of this integration to enable a sustainable business strategy. The sustainable supply chain is no longer solely about green issues, but also about generating efficiencies and cost containment.

The following diagram shows the EPA Lean and Green Supply Chain model:



12 RESPONSIBLE CONSUMPTION AND PRODUCTION

Goal 12 of the United Nations Sustainable Development Goals (SDGs) was set to ensure Responsible Production and Consumption patterns. The United Nations defines the Marrakech Process as a global multi-stakeholder process to support the implementation of Sustainable Consumption and Production (SCP) and to develop a Global Framework for Action on SCP. The United Nations further states that SCP also improves the management of natural resources, and aids countries and businesses delink economic growth from environmental degradation. The Marrakech process stipulates that sustainable products should promote sustainable and efficient management of resources through the whole life cycle, and in all stages of the supply chain of goods and services. SCP is an opportunity to leapfrog to more resource-efficient, environmentally-sound and competitive technologies whilst promoting resource and energy efficiency, sustainable infrastructure, and providing access to basic services, green and decent jobs and a better quality of life for all. Companies of different sizes are responsible for the delivery of goods and services, and thus also for the management of supply chains.

Ethical, environmental and social issues have to be dealt with in order for the green supply chain to become more sustainable. There needs to be continuous improvement in aspects of supply chain.

OVERFISHING

A threat to a billion dollar Industry

By Diana Tapedzanyika

United Nations Sustainable Development Goal (SDGs) number 12 promotes Sustainable Consumption and Production patterns. This is after realizing that one of the major drivers of biodiversity loss and extinction of species is unsustainable harvesting of natural resources. Aquatic species are among the most overharvested natural resources.

The Fishing Industry is a large, billion-dollar industry which is dependent on natural resources. Globally, the commercial fishing industry stood at $240.99 billion dollars in 2017 and is expected to reach $38.59 billion by 2026. Zimbabwe is among the top 10 countries in Sub-Saharan Africa when it comes to the magnitude of fish farming with an estimated 10 600 tons produced in 2014 according to the FAO database.

The powerhouse of Zimbabwe's fishing industry is Lake Kariba. Lake Chivero, Lake Manyame, Lake Mutirikwi and Mazvikadei are other reservoirs which significantly contribute to the vibrant fisheries industry in the country. This industry plays an important role in the food and economic security of communities living around these water bodies.

However, the fishing industry has been declining as a result of declining fish populations attributed to the unsustainable harvesting practices such as overfishing. Overfishing has become the leading threat to the sustainability of the fishing industry. Global fish populations have declined by a third, with some species being endangered and threatened by extinction. Human population growth has been the driver of this decline, resulting in the demand for fish exceeding the supply. The failure of the supply to meet the demand results in an increase in the frequency of harvesting which in turn shortens the breeding season of fish replenishing.

Causes of overfishing

One of the many causes of overfishing is poaching. The demand for fish is also on the increase due to fish being a cheaper source of protein compared to other sources. The evolution of fishing technologies to more advanced technologies which makes fishermen to easily detect the presence of fish is also contributing to overfishing.

Some water bodies are shared by two or more countries. An example is the Lake Kariba which is shared between Zimbabwe (55%) and Zambia (45%) and at risk of the "Tragedy of the Commons" and management of such a water body becomes complicated.

Impacts of overfishing

- Natural ecosystem processes are linked and disruption of one process affects and comprises the whole system. According to the World Wildlife Fund (WWF), overfishing can impact entire ecosystems. It can alter the size of the fish remaining, as well as how they reproduce and the speed at which they mature. When too many fish are taken out of oceans and other water sources, it creates an imbalance that can erode the food web and lead to a loss of other important marine life, including vulnerable species like sea turtles and corals.

- Decline in the fish population means that the capacity to sustain the increasing human population will also decline. Fish is a source of protein for most communities in fishing areas and contributes significantly to the daily diet and eliminating fish can possibly lead to malnutrition.

- Overfishing disrupts reproduction cycles of fish species as it results in the rate of removal exceeding ability of fish stocks to replenish. This shortens the breeding cycle contributing to biodiversity loss, which eventually leads to the extinction of fish species.

- The Fishing Industry significantly contributes to the Gross Domestic Product (GDP) directly through fish sales and indirectly through tourism and manufacturing sectors. Overfishing leads to the decline in fish populations, negatively affecting the fishing industry and other sectors dependent on fish which in turn impact the country's GDP.

- Millions of people in largely developing, coastal communities depend on the fishing industry for their livelihood and half the world's population relies on fish as a major source of protein. When fish disappear, so do jobs and coastal economies. High demand for fish continues to drive overexploitation and environmental degradation, especially close to water resources.

Strategies to address overfishing

Solutions to curb overfishing require scientific research to inform the strategies to be implemented. The first thing required is to carry out an inventory of fish species and their populations in order to make informed decisions and come up with research-based solutions. Providing alternative food sources so as to reduce sole reliance on fish can be a solution to overfishing. Establishment of household and community fish farming projects to reduce pressure on Lake Kariba as well as other reservoirs is an imperative. Establishing strong policies with efficient enforcement, as well as harsh penalties for law-breakers, so as to reduce cases of fish poaching incidents.

Raising awareness to local communities by embarking on education and awareness programs in local communities on the importance of fish resources and the importance of sustainable fishing can reduce overfishing. Educational campaigns and government programs could help inform fishing stakeholders about the consequences of overfishing and help them to learn to comply with regulations without sacrificing profit or productivity.

Traceability standards should be established so that fish importers and vendors label sold fish with information about where the fish came from. These disclosures help make the supply chains that deliver fish from water resources to markets more transparent and help root out illegal fishing. The standards also better inform consumers about where their fish is coming from.

Overfishing is an activity that has always been in existence in the past years, and will be in existence in the years to come. There is still a lot of work to be done to ensure that overfishing practices are curbed. Efforts must be made, especially in developing countries such as Zimbabwe, Mozambique, the Democratic Republic of Congo and Zambia, where these practices are at high scale, to educate local communities on the importance of fish resources and how their depletion will affect their future. The good news is that the disastrous consequences brought about by overfishing can be reversed, if we all cooperate, and be sustainable in the harvesting and utilization of fish resources. It's not too late to start now!

ZIMBABWEAN LEGISLATORS ADVANCE CLIMATE CHANGE PROGRAMS

By Tendai Keith Guvamombe

ZIMBABWE IS AMONG MANY AFRICAN COUNTRIES AFFECTED BY CLIMATE CHANGE. THE COUNTRY HAS EXPERIENCED EXTREME WEATHER EVENTS SUCH AS CYCLONE IDAI, CYCLONE ELINE AND OTHER RELATED CATASTROPHES. THE TRIBULATIONS ENDURED FROM THE CYCLONE IDAI IN CHIMANIMANI, FLASH FLOODS IN HWANGE AND BINGA, HAVE HAD FAR REACHING EFFECTS ON MANY SECTORS OF THE ECONOMY. IT IS AGAINST THIS BACKGROUND THAT LEGISLATORS HAVE TAKEN THE INITIATIVE TO TAKE ACTION ON DEALING WITH CLIMATE CHANGE.

The Government of Zimbabwe through Ministry of Environment, Climate, Tourism and Hospitality Industry came up with a number of programs to ensure a low-carbon and climate resilient society. Key among these include National Adaptation Plan (NAP), Low Emissions Development Strategy (LEDS), Nationally Determined Contributions (NDCs).

It has been noted that implementation of these programs requires multi-sectorial engagement and the Parliament of Zimbabwe (PoZ) is among key stakeholders expected to play a pivotal role.

As the law makers, they are an essential arm of the government responsible for initiating legislative reforms, policy implementation frameworks and key informed decisions.

During the month of July 2020, Ministry of Environment, Climate, Tourism and Hospitality Industry through Climate Change Management Department (CCMD) engaged Parliament of Zimbabwe Portfolio Committee on Environment for a three day Workshop in Nyanga. This feat is hailed as transformative and promoting capacity building of parliamentarians.

The high level engagement came after the Climate Change Management Department held a similar capacity building on Climate change with a number of stakeholders in the government and private sectors. Speaking on the sidelines of the workshop, Lawrence Mashungu, Climate Mitigation Expert from the Climate Change Management Department (CCMD) said the Parliamentary engagement was meant to build capacity to the Law-Makers so that they first appreciate various pertinent issues on Zimbabwe's Climate agenda.

"This time around, the Climate Change Management Department prioritized the need to build capacity and raising awareness on climate change targeting the law makers." According to Mashungu, it is essential to first engage Parliamentarians before taking the awareness to the general population. This also enhances them to develop interest and become climate sensitive.

"By engaging them, it is logic to engage law-makers before taking the awareness mode to the general citizens. This also makes them to develop interest and to become sensitive on climate issues." Zimbabwe is on course to achieve a low carbon economy. This is enshrined in the Low Emissions Development Strategy (LEDS) document that went under a successful validation workshop in 2019. This was subsequently followed by the launch of Renewable Energy Polices and Biodiesel Policy early this year.

The projected mitigation actions resonate well with renewable energy and biodiesel polices as they all point to a low carbon economy in which green mechanisms are essential. Despite having a National Policy on Climate Change of 2013, the proposed actions on climate change in the country require effective involvement of legislators for further enhancement of climate polices. Shifting way from business as usual activities towards a Green Economy needs a strong legislative framework to enhance a smooth transition. Stakeholders have lauded the involvement of parliamentarians in the climate change discourse.

> "The Implementation of the Low Emission Development Strategy and the National Adaptation Plan is made smooth by a conducive policy and legislative architecture. The creation of such a framework calls upon the informed participation of legislators. Departing from the business as usual operations will entail policy and legislative reforms and also coming up with new polices and laws altogether."

Mr Nesbert Samu, Parliament of Zimbabwe - Executive Programs Director reiterated that Zimbabwe has no exception to climate catastrophes and this speaks a lot on the need to engage law makers to enhance polices that act to the advantage of marginalized sections of the society.

"Parliamentarians world over make laws, provide oversight on the executive and represent people who elected them. Zimbabwe is no exception. Zimbabwe's geographical position exposes it to many environmental and climate change effects such as droughts, cyclones floods and tempestuous winds. It is imperative now and in the future that MPs embrace and acquire climate change knowledge. They should fully understand the uncertainties it brings upon humanity especially Zimbabwe's vulnerable rural and urban poor," he said.

Apart from this, Mr Samu sees the parliamentarians playing an oversight role in relaying climate awareness and simultaneously agitating for green climate initiatives that help transform the livelihoods of people they represent in their constituencies. "Members of Parliament should be equipped with knowledge and skills on climate change response to enable them to make good climate change laws and enact policies that drive economic investment into new job creation technologies, reducing Greenhouse Gas emissions and enhance the resilience of the communities they represent."

Making WINE More Sustainable And Greener – Confronting Climate Change

by Tawanda Collins Muzamwese

SIPPING A GLASS OF RED WINE OR WHITE WINE IS A MOMENT OF REMINISCENCE FOR A LOT OF IMBIBERS WORLDWIDE. Occasional sippers and recreational tasters are seized with excitement of the organoleptic properties of their favourite wines. However, rising pressure from environmental protagonists has brought to the fore emerging issues in the winery sector especially related to reduction of greenhouse gas emissions. The environmental impacts of wine making are no longer hidden in the cellars.

It is now apparent that there is an increased call on how we can make wine in a more sustainable manner, with less ecological intensity. The green revolution across global economies has reached fever pitch levels to an extent where most products are being traced within their life cycle. Wine is no exception and we can trace many stages which need to be greener.

The ancient and traditionally revered practice of wine making has always been known for generating greenhouse gas emissions. The establishment of vineyards requires clearance of large tracts of land, thereby causing deforestation and reduction of carbon sinks. Removal of trees is a major concern in vineyards especially during the early stages of the life cycle. Sustainable wineries are carrying out afforestation programmes in order to replace the tree stocks that would have been damaged.

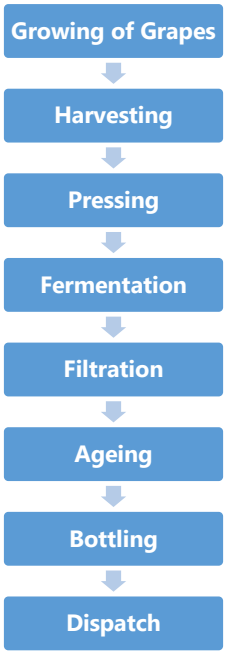
It is key for wine producers to come alive to the reality of biodiversity loss caused by the activity of growing grapes for wine production. However, the prospects of producing value-added wine, foreign currency from wine exports and employment creation are some of the benefits that cannot be ignored. What is important is to ensure that economic benefits of wine making are balanced with the ecological impact on climate change and other facets of the environment.

Water usage in wine making industry is also an issue of concern that needs strategies of sustainable management. In the context of climate change adaptation, water should be used sparingly to ensure a reduction in water conflicts. Competing uses of water and increased water stress call for a pragmatic approaches in managing water usage in wineries.

Nearly 25% of material extracted from grapes will become waste pomace comprising of skins residues, seeds and organic materials and stalks. This organic material can be used for generating energy such as biogas. If left to decompose haphazardly, there is a potential of generating greenhouse gases such as carbon dioxide and methane. Carbon dioxide and methane are well known Greenhouse Gases whose emission is governed by the United National Framework Convention on Climate Change (UNFCCC) as well as the Paris Agreement.

Increasingly, wine making facilities are adopting renewable energy technologies such as solar energy to support their operations and reduce the dependency on electricity derived from carbon intensive sources.

France and Italy are some of the leading wine producers in the world producing some of the best wines and cognacs. Zimbabwe is also a decent producer of wine, whose brands have mesmerised tourists and international buyers who have picked local wine from international retail shelves. If wine is going to end up in the furthest shelf of another part of the world different from the origin, sustainability of the product cannot be ignored. A thorough analysis of the life cycle of wine making is the first step required to clearly zoom into the ecological impact of wine making.



Overview of the Wine Making Process

Usage of chemical pesticides in the process of growing the fruit grapes is an issue which has gained global attention and wine producers have been working on strategies to adopt integrated pest management to reduce chemical intensity. Inorganic fertiliser usage is another area of concern which requires innovative measures of limiting the effects of chemical fertilisers on groundwater quality.

Production of glass bottles used for packaging wine, is an issue of ecological concern in many countries as it is an energy intensive process. Whether sourced or undertaken on site, it surely contributes to a high carbon footprint due to its insatiable energy needs.

Air emissions from farm equipment and farm operations contribute to the overall greenhouse gas emissions emanating from the wine making process.

Concepts such as "cradle to bottle" as well as "cradle to retail" have gained notoriety in the wine making sector in order to arrest the rising impact of wine making on the environment.

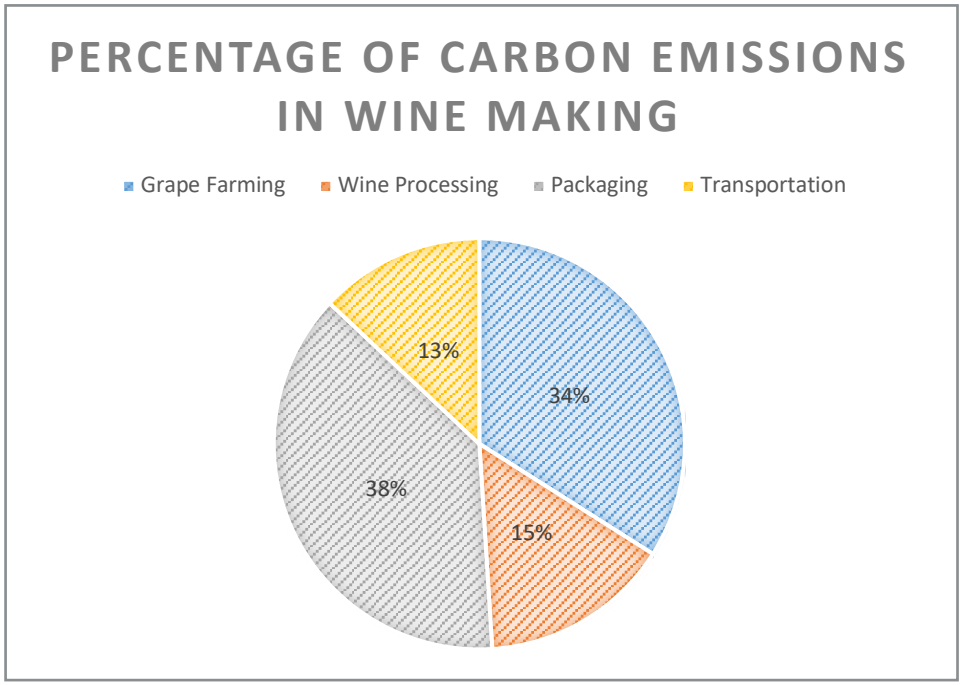
A typology of emissions from wine making are presented in the diagram based on the carbon footprint analysis carried out by the California Wine Carbon Footprint (CSWA).

Transport of bottled wine to various retail outlets and shipping wine to international destinations is responsible for 13% of greenhouse gas emissions generated from the sector

Wines that will compete in the 21st Century are those which have evolved in their production process to incorporate environmentally sustainable practices and Life Cycle Assessment (LCA).

Advanced economies have begun to banish wines produced from polluting countries and wineries which care for the environment. Certification schemes and labelling of wines is also currently underway.

Your next glass of wine should be with a difference and you can do a lot to influence production of wine in a greener approach that considers future generations. Upholding a traditional process of wine making, carried over many centuries, is essential, but the key realisation is that the current generation can make it cleaner and greener, with a limited impact on the environment. The world can make wineries greener and indeed every product in current use more sustainable.



SAND MINING GETS OUT OF CONTROL

By Bright Beven Chituu

Sand is an important component of the soil matrix which takes years to be formed but extracted in a matter of days.

Each year, huge tons of sand are excavated from various places as raw materials to aid in the construction of developmental projects. Different categories of sand have unique properties used in different industries such as: construction, metal production, chemical production, ceramics and refractories, glass manufacturing, foundry industry, paint and coatings, filtration and water production, oil and gas recovery and recreational products

Despite the significance of this resource in many industries, sand mining has significant environmental consequences for the mother earth, which eventually poses safety risks to people. Extraction of sand is being done excessively without considering the impact it has on the environment. In most cases, over exploitation of the soil leaves behind deep pits on river banks whilst widening rivers. The effects of sand and gravel mining results in disturbances to ecological balance, as it is closely associated with land use change and river degradation. Construction activities in newly developed areas is creating a demand for sand abstraction activities.

The activities of sand mining are resulting in the destruction of vegetation, agricultural and non-agricultural lands. In Zimbabwe, sand mining activities have led to the reduction of agricultural land. The effect of this is a situation where many people face food security problems. The extraction of sand along rivers has led to the destruction of several hectares of fertile land every year. Similarly, a lot of valuable timber resources and wildlife habitats have been lost due to the activities of sand mining.

Sand miners have created gullies on agricultural lands and forest reserves in several places. Traditional and commercial fishing, is also affected through destruction of benthic environment- an ecological region at the lowest level of the water body. Sand mining has direct impacts on climate change, through Greenhouse Gas (GHG) emissions generated from the transport of sand over long distances from where the sand is quarried. The activities of

sand mining are directly responsible for the destruction of social amenities such as roads, electricity poles, telephone masts, underground pipes and other public infrastructure. Apart from this, sand abstraction activities have brought land use conflicts due to fighting for claims of sand deposits.

REGULATORY AND POLICY IMPLICATIONS

In Zimbabwe a regulatory system governing all mining activities, including sand abstraction, has been designed to meet SDG 15 which aims at combating desertification as well as reversing land degradation. Section 3 of the Statutory Instrument 7 of 2007 for EIA and Ecosystem Protection prohibits the excavation, removal, possession or licensing the removal of clay or sand deposit for commercial purposes without a license issued by the Environmental Management Agency (EMA). According to the SI; "Any person who wishes to extract, excavate, possess or license the removal of sand or clay shall apply to the Agency in Form EMA A and the application shall be accompanied by an appropriate application fee." The applicant is required to engage the local authority and the local inspector and develop a detailed excavation and environmental rehabilitation plan for submission to the Environmental Management Agency for review before any extraction or excavation is done.

STRATEGIC APPROACH TO SUSTAINABLE SAND MINING

Sand mining is causing multiple adverse effects to the environment. The following measures can be implemented to reduce the negative environmental effects of sand mining.

REDUCING NEGATIVE IMPACTS OF SAND EXTRACTION

Sand excavation should be done in a way that limits negative environmental impacts through implementing Environmental Management Plans and using clean technologies for sand mining operations designed to minimize adverse impacts on the environment.

REDUCING SAND CONSUMPTION

Substitutes for sand or optimizing the use of existing buildings and infrastructure represent only a few steps that can be made to reduce sand consumption. Different substitutes can be used for in selected application such as crushed granite, barite powder, quarry dust, etc.

Law enforcement and monitoring
Government and public authorities regulating sand abstraction should only permit sand mining operations based on license in accordance with Statutory Instrument 7 of 2007 for EIA and Ecosystem Protection. Regular monitoring and inspection should be done by responsible authorities in sand abstraction hot spots to ensure that sand miners fulfill all obligations arising from environmental laws and regulations.

Setting taxes on sand extraction to create incentives on alternatives
Sand is seen as a cheap resource, therefore to attain a profit, land developers need to only cover the exploitation cost (costs of equipment, labor, fuel, and transport). Overexploitation of sand will continue unless sand abstraction is correctly priced and taxed so that other options become economically viable.

UNIDO gets accredited to the Green Climate Fund (GCF)

By Tawanda Collins Muzamwese

The United Nations Industrial Development Organisation (UNIDO) has attained accreditation to the Green Climate Fund (GCF). This milestone achievement of the industrial oriented international organization, presents an opportunity for scaling up climate change action across the world. An announcement was made by Green Climate Fund (GCF) during the 26th Board Meeting conducted virtually, online from 18 to 21 August 2020.

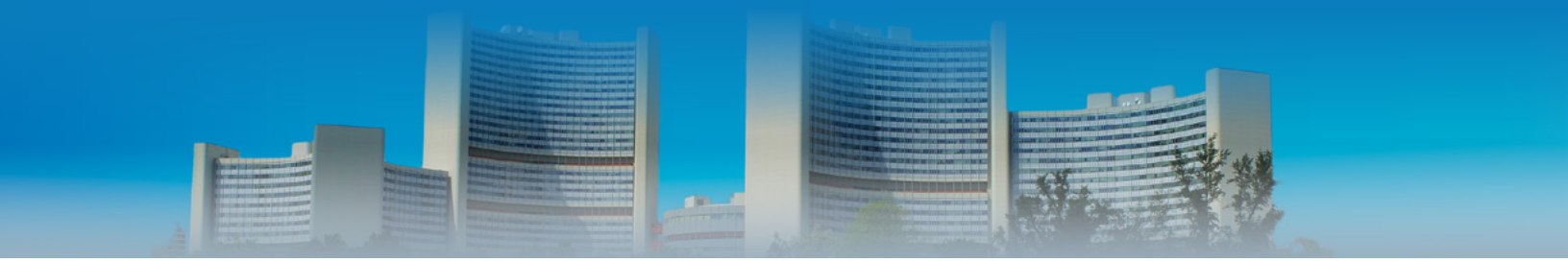
The Green Climate Fund is the largest fund for climate mitigation and climate adaptation related financing for developing and transition countries. It is estimated that the GCF mobilises approximately 100 Billion United States per annum of climate finance. UNIDO, which is headquartered in Vienna, Austria has continually shown excellence in the implementation of Inclusive and Sustainable Industrial Development (ISID), climate technologies, Resource Efficient and Cleaner Production (RECP), Energy Efficiency and Renewable Energy. UNIDO and its partners expressed optimism that the accreditation will strengthen the ability to scale-up and replicate climate projects in different parts of the world.

Accreditation to the Green Climate Fund is attained after fulfilling specific requirements, amongst them fiduciary measures to demonstrate ability to manage climate finance. According to the Green Climate Fund, "accreditation involves assessment of an entity's policies, procedures, track record and demonstrated capacity to implement projects". The application process for accreditation is on a rolling basis and there is no deadline for submission.

Stakeholders across the globe, expressed optimism that this development will facilitate technology transfer and speed up efforts to reach the commitments of the Paris Agreement on Climate Change. The UNIDO Office in Zimbabwe led by Mr Tichaona Mushayandebvu expressed confidence that this watershed moment will provide opportunities for Green Industry Initiative and other related projects.

Accreditation requires rigorous scrutiny of environmental, social and fiduciary guidelines of an entity's operations. In the context of the Green Climate Fund (GCF), track record in handling financial instruments such as loans, grants, guarantees and equity is a clear added advantage.

The 197 parties of the Paris Agreement see the GCF as a significant opportunity for reducing Greenhouse Gas Emissions in collaboration with National Designated Entities (NDEs). Online assessment is carried out as well as independent assessment. Back and forth requests of information may also happen to verify certain aspects of the application and then a recommendation is made to the GCF Board to consider accreditation. If application is successful, an Accreditation Master Agreement can be developed to serve as an overarching agreement between GCF and accredited entity. Many organization across the world are working on accreditation, and there is a clear reason to learn from UNIDO's accreditation to the GCF understand the roadmap to accreditation.



Environmental Impact Assessment (EIA) gains ground

By Wadzanai Diana Manyame

IMPLEMENTATION OF DEVELOPMENT PROJECTS SUCH AS INFRASTRUCTURE, MINING, INDUSTRY, IRRIGATION AND TRANSPORT PLAY AN IMPORTANT ROLE IN ECONOMIC GROWTH. HOWEVER, THESE ACTIVITIES ARE ASSOCIATED WITH ENVIRONMENTAL AND SOCIAL IMPACTS. Before such activities, it is essential to study the projected effects on the environment and develop measures to prevent serious damage.

Environmental Impact Assessment (EIA) is a tool for environmental conservation, management and sustainability. EIA takes a precautionary approach and covers all pillars of the environment thus the physical, social and economic environment. EIAs are pivotal components in all development projects that involve exploitation of the environment, natural resources and projects which have contact with human beings.

In most developmental projects; flora and fauna, water bodies, land (physical environment) and human beings (social environment) are affected in many ways. The EIA therefore stands in as a planning and decision making tool to address the biophysical, economic and social cultural impacts during all stages of the project cycle.

Environmental Impact Assessment is not a once off process, where all is forgotten after receiving an EIA certificate, it is an ongoing process that stretches into the day to day environmental management system of the project when operations commence right up to decommissioning. Hence the need to renew the EIA certificate and ensure quarterly reporting of environmental management performance.

EIA processes in Zimbabwe are governed by the Environmental Management Act Chapter 20:27, Sections 97 to 108, the First Schedule of the Environmental Management Act Chapter 20:27 and Statutory Instrument (SI) 7 of 2007 on Environmental Impact Assessment and Ecosystems Protection Regulations.

According to the First Schedule of the EMA Act Prescribed Projects shall only be implemented after following a comprehensive evaluation and issuance of an EIA certificate from the Environmental Management Agency (EMA). The legislation also calls for engagement and participation of community, statutory bodies as well as interested and affected stakeholders;

Environmental Impact Assessments have been carried out in and around the world since their introduction in the late 1960s. Legislation and standards of best practice have been drafted to guide their operations and execution in order to achieve set goals. These have improved over time and are still evolving as new ideas and discoveries are made during the carrying out of the assessments.

As the world embraces different technological advancements such as the Geographical Information Systems (GIS) being brought on board for the prediction and assessment of environmental impacts, EIAs are becoming detailed studies. Efforts are being made by environmental practitioners to ensure the uplifting of the environmental management banner to ensure absolute environmental protection and management.

EIAs in Zimbabwe are carried out by environmental experts commonly known as environmental consultants on behalf of the project proponent, developer or investor. The main objectives of EIAs are to achieve conservation and sustainable use of natural resources, protect and enhance the quality of all forms of life, minimise social and security risks. EIAs integrate environmental and social considerations in development planning processes, promote public awareness on public health, social and security concerns.

Despite the set legislations and standards of best practice, EIAs are regarded as burdensome by some project developers. This perception is counterproductive to the attainment of sustainable economic development. Some envisage EIAs to be business development barriers that attenuate or affect development. Challenges have therefore been experienced where developers have gone on to implement environmentally detrimental projects which are posing severe environmental effects some of which have a ripple effects and cannot be reversed.

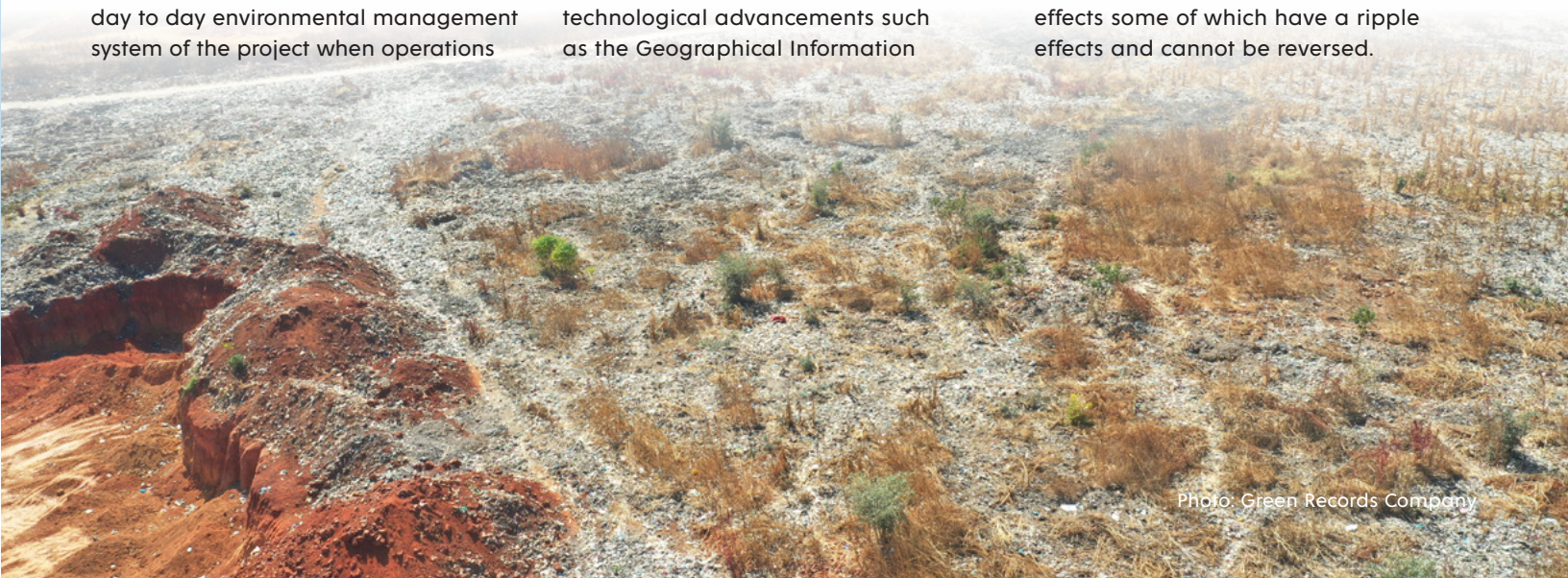


Photo: Green Records Company

LOCAL AUTHORITIES FAIL TO COMPLY WITH DUMPSITE REGULATIONS

EMA Raises Concern

By Wallace Mawire

The Environmental Management Agency (EMA) has raised serious concern on the on-going lack of adherence by local authorities to properly manage dumpsites within their jurisdictions. EMA regulates and controls waste disposal in Zimbabwe whereas local authorities are responsible for the collection and disposal of waste at designated and licensed disposal sites in their respective areas.

According to EMA Environmental Education and Publicity Manager, Mrs Amkela Sidange, poor waste management remains an environmental challenge in most urban local authorities in Zimbabwe. She said that chief among the drivers of poor waste management is the continued use of unlined dump sites, despite the provisions of Statutory Instrument 6 of 2007 which mandated all local authorities to have constructed and using standard sanitary landfills for waste disposal by 31 December 2012.

It is reported that the agency has since the expiry of this period served orders to defaulting local authorities, with failure to comply to the orders leading to court cases, with some cases still pending before the courts. "Few local authorities have made efforts to comply with this statutory provision, among them Gwanda, Norton and Kadoma," Sidange said.

She however said that failure by most local authorities to construct and use standard landfills has resulted in a plethora of environmental challenges, chief among them dumpsite fires, and identified Pomona dumpsite in Harare as one of the worst affected. Pomona dumpsite is used by the Harare City Council as a waste disposal site which over the years has turned to be both an environmental and health hazard to nearby residents due to perennial fires from the dumpsite.

She added that local authorities in Zimbabwe are implored to discard the traditional linear model of waste management which is basically a cradle to grave system and has challenges, but adopt the circular model which impress on resource efficiency, and has more business opportunities in waste management, lasting solutions and sustainability.

The Laws which govern the management of solid waste in Zimbabwe are the Environmental Management Act (Cap 20.27), Statutory Instrument 6 of 2007 Environmental Management (Effluent and Solid Waste Disposal) Regulations, Statutory Instrument 98 of 2010 (Plastic Bottles and Plastic Packaging) Regulations. All these laws should be strictly adhered to by every citizen, local authorities and enterprises dealing with waste management in Zimbabwe because it is everyone's responsibility to protect the environment.

Pomona Dumpsite Fire Surpasses **Prescribed WHO Air Pollution Levels**

By Wallace Mawire

THE ENVIRONMENTAL MANAGEMENT AGENCY (EMA) OF ZIMBABWE HAS ADVISED THE HARARE CITY COUNCIL TO TAKE URGENT ACTION TO STOP THE POMONA DUMPSITE FIRES IN BORROWDALE SUBURB WHICH HAVE BEEN RAGING FOR A LONG TIME NOW. THIS PHENOMENON IS CONTRIBUTING TO SERIOUS AIR POLLUTION AND A HEALTH THREAT TO HARARE RESIDENTS.

According to EMA, although this is a challenge affecting many local authorities around the country in terms of management of their dumpsites, Pomona dumpsite has been singled out to be the worst affected. EMA Environmental Education and Publicity Manager, Amkela Sidange said that major fires at the dumpsite have been recorded in 2016, 2018 and the recent one in August this year.

"EMA has issued an Environmental Protection order to Harare City Council to urgently allocate enough financial, technical and human resources to put out the fire at Pomona dumpsite and the budget allocation should be in relation to the action plan with clear timelines, roles and responsibilities,"Sidange said.

She said that failure to treat the matter urgently will force EMA to institute further prosecution processes. "This follows observation of lack of commitment by the local authority to give the matter the urgency it deserves despite the environmental effects of the on-going fire, chief among them being pollution from the smoke emanating from the fire," she said.

EMA has conducted ambient air monitoring over three days at strategic locations to ascertain the level of pollution by the fire using micro-dust samplers. The results indicated that the 24 hour Mean for Ground Level Concentrations (GLC) of PM10 was over the Standard Association of Zimbabwe (SAZ) prescribed limit and higher than the World Health Organization (WHO) guideline.
"This is seriously outside permissible levels of pollution from the dumpsite fire indicating a high probability of serious environmental and human health implications, hence the burning of the dump should be classified as an environmental emergency and should be given the urgency it deserves," Sidange said. According to EMA, this presents an urgent need for intervention in order to protect people's constitutional right to an environment that is safe and is not harmful to their health.

Before the outbreak of the current fire at Pomona dumpsite, orders were issued to City of Harare to decommission Pomona and to construct a properly lined landfill. Following failure to comply with the directive, the local authority was brought for a hearing before the Environmental Management Board on various environmental issues including poor waste management in general and Pomona dump site in particular.

According to EMA, poor waste management remains an environmental challenge in most urban local authorities, chief among the drivers of poor waste management is the continued use of unlined dump sites despite the provisions of Statutory Instrument 6 of 2007 which mandated all local authorities to have constructed and using standard sanitary landfills for waste disposal by 31 December 2012.

The agency says that it has since the expiry of this period served orders to defaulting local authorities with failure to comply with the orders leading to court cases with some cases still pending before the courts.

Government Intensifies Commitment Towards More Renewable Energy Projects

By Wallace Mawire

THE GOVERNMENT OF ZIMBABWE is intensifying efforts and mechanisms for the promotion of renewable energy and energy efficiency initiatives, emphasizing the need for development of renewable energy projects and supporting energy efficiency in all sectors to achieve a low carbon development path.

According to recent information availed by Mr Elisha Moyo, Principal Climate Change Researcher in the Climate Change Management department of the Ministry of Environment, Climate, Tourism and Hospitality Industry and the Green Climate Fund (GCF), the National Designated Authority (NDA) is calling for input which will shape the upcoming Readiness Project and GCF country pipeline. Mr Moyo is also the Climate Technology Centre and Network (CTCN), National Designated Entity and Green Climate Fund Alternate National Focal Point (NFP) contact person.

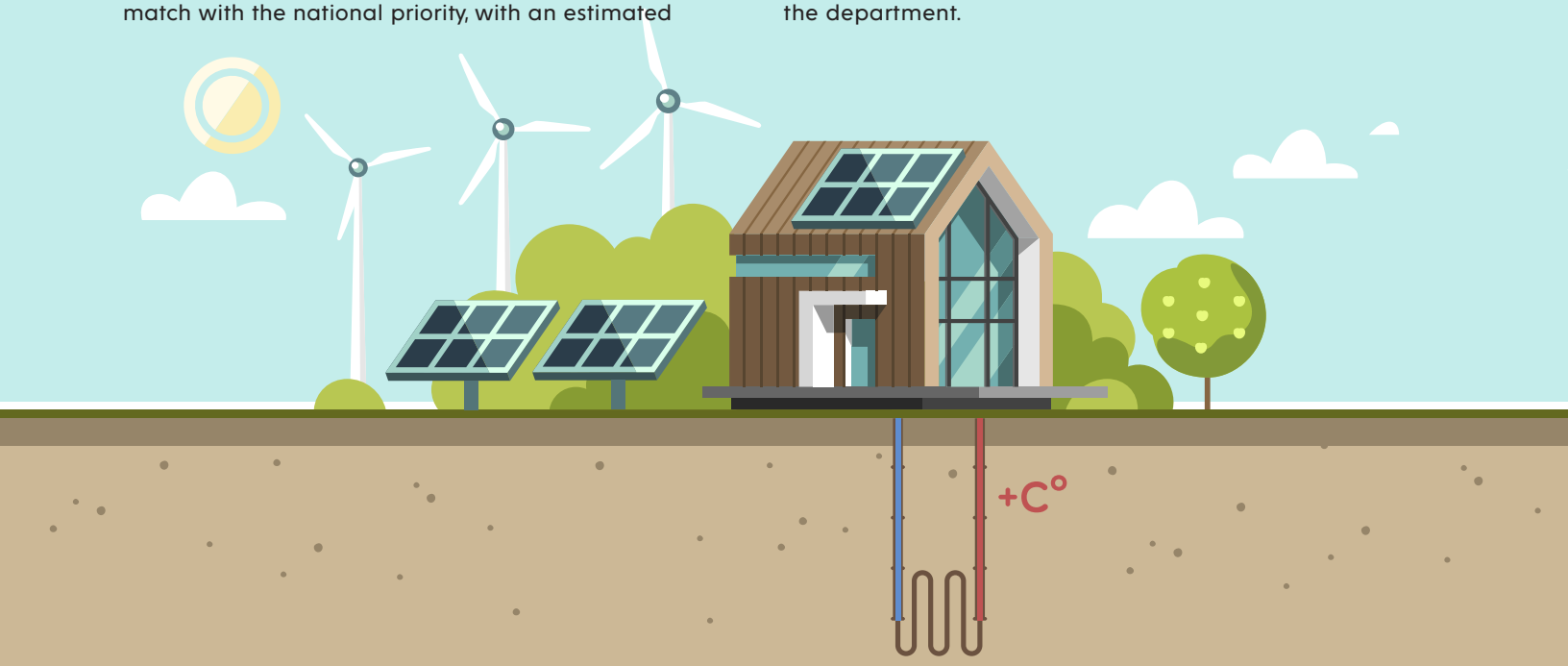
According to the Climate Change Management Department, the energy sector is responsible for 23% of Green House Gas (GHG) emissions in Zimbabwe and there is need for further development of renewable energy projects to enhance access to sustainable energy for all.

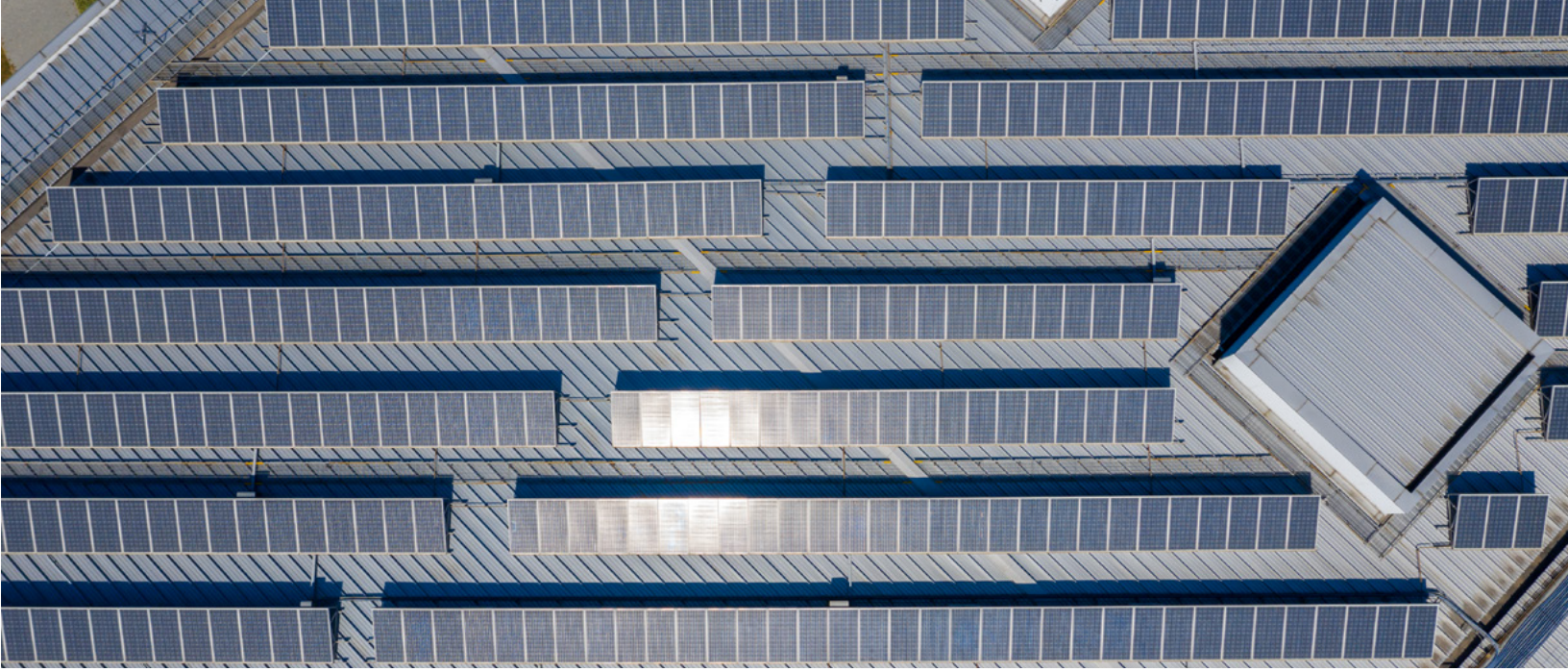
Developing renewable energy projects and supporting energy efficiency in all sectors is a key pre-requisite to support a low carbon development pathway, which ultimately address the National Climate Policy vision of a "Climate Resilient and Low Carbon Zimbabwe."

To date, there are three projects in the portfolio which match with the national priority, with an estimated combined total request for funding from GCF of USD $35.6 million and combined co-financing of USD $80.9 million. The responsible office reports that the National Biodiesel Project, established by the government of Zimbabwe, stands out in the section as it provides a multiplicity of socio-economic benefits. It is reported that the project is seeking a USD $9.8 million loan from GCF, with co-financing of up to USD $12 million from the International Renewable Energy Agency (IRENA), Abu Dhabi Fund for Development (ADFD) and co-financing of USD 52.2 million from the government of Zimbabwe. The total amount is USD $74 million.

The project has already begun processing biodiesel for the market, with a biodiesel plant with an installed capacity of 3000 litres per day and 60 000 hectares out of 15 000 hectares of Jatropha estate being certified by Environmental Management Agency (EMA). Plans for the project include the establishment of a 5MW solar power grid to support climate smart irrigation addressing the challenge of financing irrigation schemes in natural farming Region V and feeding excess energy into the national grid.

The Low Emission Development Strategy (LEDS) highlights biodiesel under the road transport category alone, whereas it can also provide an alternative source of electricity generation. Another renewable energy project entails the distribution and installation of Pay As You Go or use solar at home, commercially, for water pumps and hot water systems for both rural and urban clients for a total of USD$23 million. One other project targets energy efficiency through refrigeration and air conditioning within the industrial sector for a total of USD$2.5 million, according to the department.





GREEN DIALOGUE SERIES – UNIDO OFFICE IN ZIMBABWE

'GREEN INDUSTRY INITIATIVE IN ZIMBABWE

Interview with UNIDO Country Representative Mr Tichaona Mushayandebvu

GBG: Can you briefly introduce yourself?

TM: Well it's a very difficult task, but basically I am the Country Representative for UNIDO in Zimbabwe. As you are aware UNIDO is one of the specialised agencies of the United Nations and we focus mostly on industrial development. I am part and parcel of a regional group or Regional Office which has got a base in Pretoria, South Africa which covers the whole SADC region. That is a little bit about myself. I joined UNIDO in 2006 I am an Old Guard you know!

GBG: What is the role of UNIDO in developing and transition countries?

TM: Specifically as I mentioned before, our mandate is really to implement what we call Inclusive and Sustainable Industrial Development (ISID) Agenda. In Zimbabwe specifically, we are implementing a program which is based on ISID which we call Zimbabwe Country Program for Inclusive and Sustainable Industrial Development 2016 to 2021. This country program has got six components of different areas which we feel need to be addressed through programing and projects to enable Zimbabwe to move towards recovery of the industry and growth of the industry and increasing its competitiveness within the country and outside its borders.

GBG. Zimbabwe is implementing the Green Industry Initiative. What is the concept of Green Industry and what does it seek to achieve?

TM: The country program has got six components and component number five relates to the Green Industry Initiative and we call it business responding to climate change. This initiative started long back in 2012 when UNIDO brought together key stakeholders the Business Council for Sustainable Development of Zimbabwe (BCSDZ) and three key ministries The Ministry of Industry and Commerce, The Ministry of Environment, Climate and Water and The Ministry of Small to Medium Enterprises (SME). They realised that for Zimbabwe to compete and pursue the Industrial Development Program Agenda, we needed to look at issues to deal with 'Greening of Industry'. From that perspective, we then developed a concept note. We then undertook a study tour of South Korea and also participated in a Green Industry Conference in China. We came back and developed a full blown program which we call 'Green Industry Initiative '. This initiative is the one which later became a component of the country program for Inclusive and Sustainable Industrial Development for Zimbabwe. Basically what we want to do is to ensure that business in Zimbabwe Responds to Climate Change that is the best way we can move the industry forward with respect to climate change.

GBG: How can local companies benefit from Green Industry technologies?

TM: Well that is a mouthful. There is lot to benefit from Green Industry Technologies especially by participating in the Green Industry Program in a more structured manner through the Business Council for Sustainable Development of Zimbabwe (BCSDZ)

because we know for sure that the business Council has been on the ground for the last 27 years and they really understand the issues of sustainability. So my encouragement to local companies is that first and foremost they need to come together and be part and parcel of the business council for sustainable development of Zimbabwe and then also become part and parcel of the green industry initiative which brings together the private sector, government and the international community in terms of pushing the Green Industry Initiative forward. That way I think that is the path that will really open up avenues for companies to benefit from Green Industry Technologies and Production Systems.

GBG: UNIDO is also implementing a Country Programme in Zimbabwe. How does the Country Programme complement the Green Industry Initiative?

TM: As I said earlier on, the Green Industry Initiative is one of the five components of the broader country program for industrialisation of Zimbabwe. The Green Industry is a key initiative. Its part and parcel of the country program for inclusive Sustainable Development in Zimbabwe.

GBG: Which other initiatives have you implemented in Zimbabwe and what has been the impact of these initiatives?

TM: Basically there are other five programs of the Country Program which we have been implementing since 2016. The first one relates to coming up with strategies and policies for re – industrialisation of Zimbabwe and the second component touches on issues to do with Agro – Industrial Value Chains because we believe Zimbabwe needs to pay attention to the Agro Industrial value chains which really can move the economy forward. The third initiative relates to what we call Quality Technical Infrastructure, this relates to issues that have to do with standards. These standards are cast across the board whether it's in the area of climate change or general industrial development but they are very key for a country to move the economy forward. We need to pay attention to our quality and standard issues. The fourth area which we have been focusing on is called Industrial Upgrading and Modernisation of SMEs. We believe that Zimbabwe needs to upgrade to compete with local markets and regional markets. There is no way Zimbabwe is going to compete if it does not upgrade its technologies, its production systems going forward. The other area, the fifth one which is very important is on Industrial Statistics. There is a challenge in Zimbabwe because there is lack of industrial statistics and we have been collaborating with the government through ZIMSTATS so that at least we have industrial statistics to inform us of where we are and the progress in terms of recovery of industry. The other area we have been trying to support government, is local Production of Pharmaceuticals. So all this is what we have done to develop projects. We have submitted packages to the government of Zimbabwe and the government of Zimbabwe is supposed to identify funding sources so that they start implementing those projects. These projects support the Inclusive and Sustainable and Industrial Development of Zimbabwe Climate but also touch upon the Climate Change Agenda. That is what we have doing since 2016. Right now we are waiting to see how far we can engage potential funding partners for these projects.

GBG: UNIDO has now been accredited by the Green Climate Fund (GCF). How can this accreditation increase the scaling-up and replication of climate technologies?

TM: When I talk about the Green Industry Initiative, I am not really talking about a donor driven program. I am talking about an Investment because the Green Climate Fund provides investments to boost, support companies to Green their processes or adapt production systems which are pro green. So for us this really has been a welcome development. It has been quite a long process. I still remember in 2013 when we visited South Korea on that study tour we did really engage the Green Growth Initiative. This is an institution that then later gave birth to the Green Climate Fund. So for us we are happy you know after a long process of engaging you know these powers at long last now UNIDO is going to be also involved in accessing those resources. We really looking forward to submitting application proposals apply to try and get some resources from the Green Climate Funding.

GBG: How can local industries harness standards and trade offered by your trade and capacity activities as UNIDO, in order to leverage funds from international markets?

TM: In terms of the standards we had in the country program which I spoke about a specific component or project which we wanted to boost the Quality Technical Infrastructure, that is where issues to do with standards, Measurements, Compliance Activities etc. were grouped together under the National Quality Infrastructure project which we developed together with the Government of Zimbabwe. It was through that project that we would then be able to support the local industry to ensure that the infrastructure is in place. With UNIDO, it's just a matter of upgrading those issues to make sure they are responding to the needs of the international markets and supporting the companies to go through those standards and other trading regimes which are in place.

GBG: Zimbabwe has targets of reducing emissions by 33% by 2030 with focus in the energy sector. How can Green Industry enhance the attainment of Green Industry?

TM: Specifically, we have worked together with the Ministry of Environment, Tourism and Hospitality Industry; Ministry Energy and Power Development and the Ministry of Industry and Commerce. One of the three projects which I was talking about under the Green industry Initiative or Green Industry Program, relates to what we call Energy Efficiency and Renewable Energy for Industry. We believe that program should be costed to 6 million USD over a period of 4 years. If we were to implement that program through the Business Council for Sustainable Development Zimbabwe and, Government, we would be able to achieve that target of 33% but the sticking point at the moment where do we get the funding? And this is the reason which we have submitted this project for with the Green Climate Fund for their consideration.

GBG: How is UNIDO helping scaling up technologies in renewable energy efficiency?

TM: This relates to question number 9. We are a UN organisation and we work with, Government of Zimbabwe, private sector and parastatals like ZESA. We had a very successful pilot project two to three years ago when we received support from an organisation called Climate Technology Centre Network (CTCN) which is a UNIDO owned entity. That initiative gave us the information to see the opportunities for industry to move towards Renewable Energy.

GBG: According to UNIDO which policies would favour Industrial development in developing and transitioning countries?

TM: That is a very difficult question. The policy depends on the government through key ministries like the Ministry of Agriculture, Ministry of Industry, and Ministry of Finance. We believe that this is an issue which is very pertinent. This is why I said component number one of the country program for inclusive and Sustainable Industrial Development for Zimbabwe is on supporting government to come up with key strategies and policies. As UNIDO we don't want to be prescriptive because each country has got its own different context and it is up to the country working together with the business associations which relates to industrial issues to come up with the policies in terms of pushing the industrial agenda forward. Basically this is the approach which we take as UNIDO. The policy should not just be dropped into a country. The country needs to be empowered so that they will able to come up with policies that are favourable to industrial development.

GBG: What are the barriers to Industrial development in these countries?

TM: In Africa there three key barriers which I see. First and foremost is the issue to do with appropriate strategies and policies. Very few countries have taken the industrial development strategy seriously like what China and the other Asian countries have done in the past 50 years. The issue of access to energy. Without energy forget about industrialisation. You can't move forward. Thirdly, it's about markets. They should be able absorb production that is coming from industry. Fourthly, it's about throughput. Industry cannot be in a vacuum. You need to have the backwards and forwards in place. Lastly it's about finance. I don't think industrial development will happen through the support of grants or donations from donors or from other groups. Industrial development is pushed by structured Investments.

GBG: You have just completed a study on the impact of COVID-19 on industry. Can you shed more light on the outcomes of this study?

TM: Basically it's not really on COVID -19. What we have done is a comprehensive study on the manufacturing sector in Zimbabwe going back thirty years and we have shown how Zimbabwe is comparing with other countries like Egypt, South Africa, Kenya, Tanzania and Zambia. It's about industrial development and how it has panned out. We have made some suggestions as UN so that we raise funding so that we do an assessment on COVID -19 as industry but we haven't done something specifically on impact of COVID-19 on industry.

GBG: What are the challenges and opportunities in bolstering the economy and simultaneously building a climate-compatible future?

TM: Opportunities are great. As you are aware the climate change agenda is becoming very topical. Industry is subdued hence it is our recommendation that there is need to strengthen attention to industry to avoid becoming a trading destination for cheap goods. I think this is a very good time to revisit the industrialisation agenda. We have tried to make a case within the framework National Development Strategy 2021 to 2026.

We have also made some suggestions that there is need to pay attention to the industrial development agenda in order to create the formal sector jobs we need in Zimbabwe. It is also essential for us to create export earnings from value added goods. There is no other way we can attract investments into the formal production sector if we don't really push the industrial development agenda.

THE RISING CLIMATE IMPACT OF THE HEALTH SECTOR

By Wadzanai Manyame

CLIMATE CHANGE IS A NON-REFUTABLE DAWNING REALITY that is already being felt in different countries across the globe. This human induced phenomenon is already eroding the delicate balance of ecosystems in many economic sectors. Health sector impacts on climate change are beginning to be seen in various countries.

There is still inadequate data on the level of carbon footprint which the health sector contributes globally. In Zimbabwe for example the health sector is not forecast when surveys are being done and hence might be covered under the 'other' category (a group which is considered to encompass other contributing factors with no specifics). If a robust system climate change management system is to be employed, there is need to consider aligning all contributors and their specific contributing rates. This allows for the employment of different climate change mitigation and resilient strategies such as the green industry initiative, green hotels and green hospitals.

A first ever made estimation of the health care sector's emission contribution by the World Bank in 2011, stated that health care generates 5% of world's greenhouse gas emissions, adding up to 2.6 billion metric tons of CO2e. This is according to a report made by the Global Green and Health Hospitals in 2015.

The Environmental Protection Agency recognises the health sector as having a fairly significant impact on their surrounding environment and thus contributing to the 'biggest threat of the 21st Century', climate change. Approximately 2.4 million tons of waste are injected from the health sector into the environment for processing and disposal every year. A lot of infectious, hazardous and toxic waste is generated, most of which cannot be directly deposited into the general hospital bin to be sent to the dumpsite, but will have to be incinerated to destroy any infectious pathogens.

Hospital waste is not the only cause of concern. The health sector also contributes largely through the use of mercury in medical devices and equipment, very high energy consumption during machinery operation and lighting, high water usage, greenhouse gas emissions from incineration of waste and running coal fired boilers. The processes of running a generator as an electricity backup and vehicle emissions in transporting goods and patients to the hospitals are also part of ecological footprints. In a nutshell, the health sector releases greenhouse gases while delivering care, procuring products and technologies from a carbon intensive supply chain.

The health sector does contribute to environmental degradation which in turn contributes to climate change. High consumption of energy, release of solid and liquid waste, hazardous waste from the day to day operations require environmental management plans. The health care sector can contribute greatly by employing resilience and low-carbon development initiatives within their sector, while at the same time working towards improving population health.

Vicious Pomona Dumpsite Fires
A Cause Of Concern

By Bright Chituu

Fire-fighting team at Pomona dumpsite, Source: EMA

PERENNIAL FIRE OUTBREAKS FROM LANDFILLS AND DUMPSITES HAVE BECOME A WORLDWIDE CAUSE FOR CONCERN AS THEY POSE A MENACE TO THE ENVIRONMENT AND HUMAN EMISSION OF HAZARDOUS CHEMICAL SUBSTANCES.

In Zimbabwe, open burning of waste is usually practiced in many dumpsites established in major towns and cities as a way of reducing the waste volume. The practice of open burning results in adverse effects on public health and the environment.

On the 18th of August 2020, a fire incident occurred at Pomona Dumpsite, releasing dense smog which engulfed nearby suburbs in the northern residential areas of Harare. The smog contained high concentrations of pollutants which significantly reduced the visibility and air quality. The smoke which originated from the smoldering dumpsite fire triggered obscurity and a significant risk to commuters.

Health Impacts of dumpsite fires
Dumpsite fires release significant amounts of greenhouse gases into the air. The gases include carbon dioxide, methane, nitrous oxides and sulphur dioxide. Particulate matter is also associated with air pollution and can lead to severe cases of respiratory diseases.

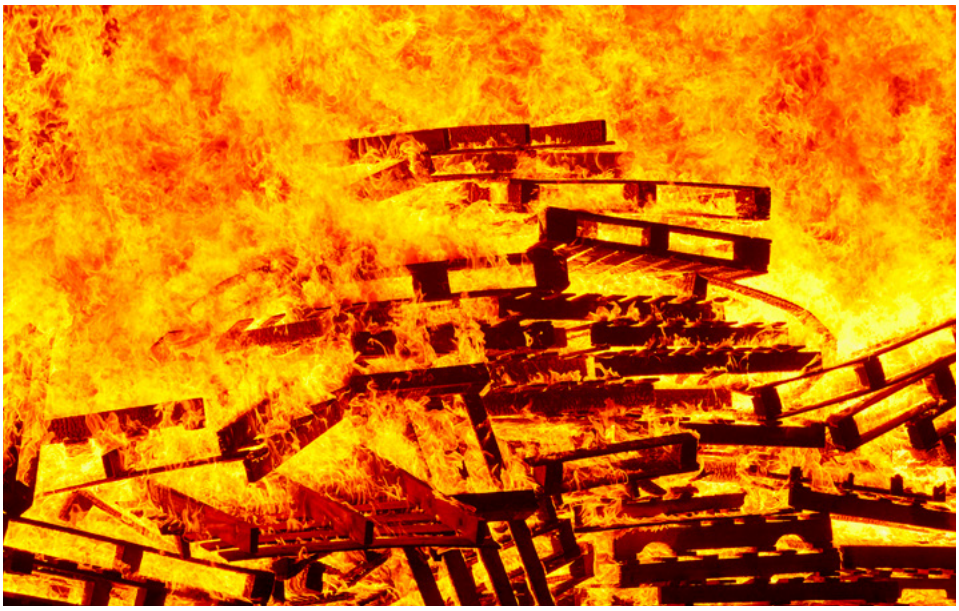
Open burning of waste is mainly accompanied with the release of persistent organic pollutants (POPs). These include polycyclic aromatic hydrocarbons, dioxins and furans, all of which are carcinogenic and have been linked to reproductive impairment. The effects of these pollutants are harmful to fetuses, infants and children who can be exposed to these pollutants directly or indirectly.

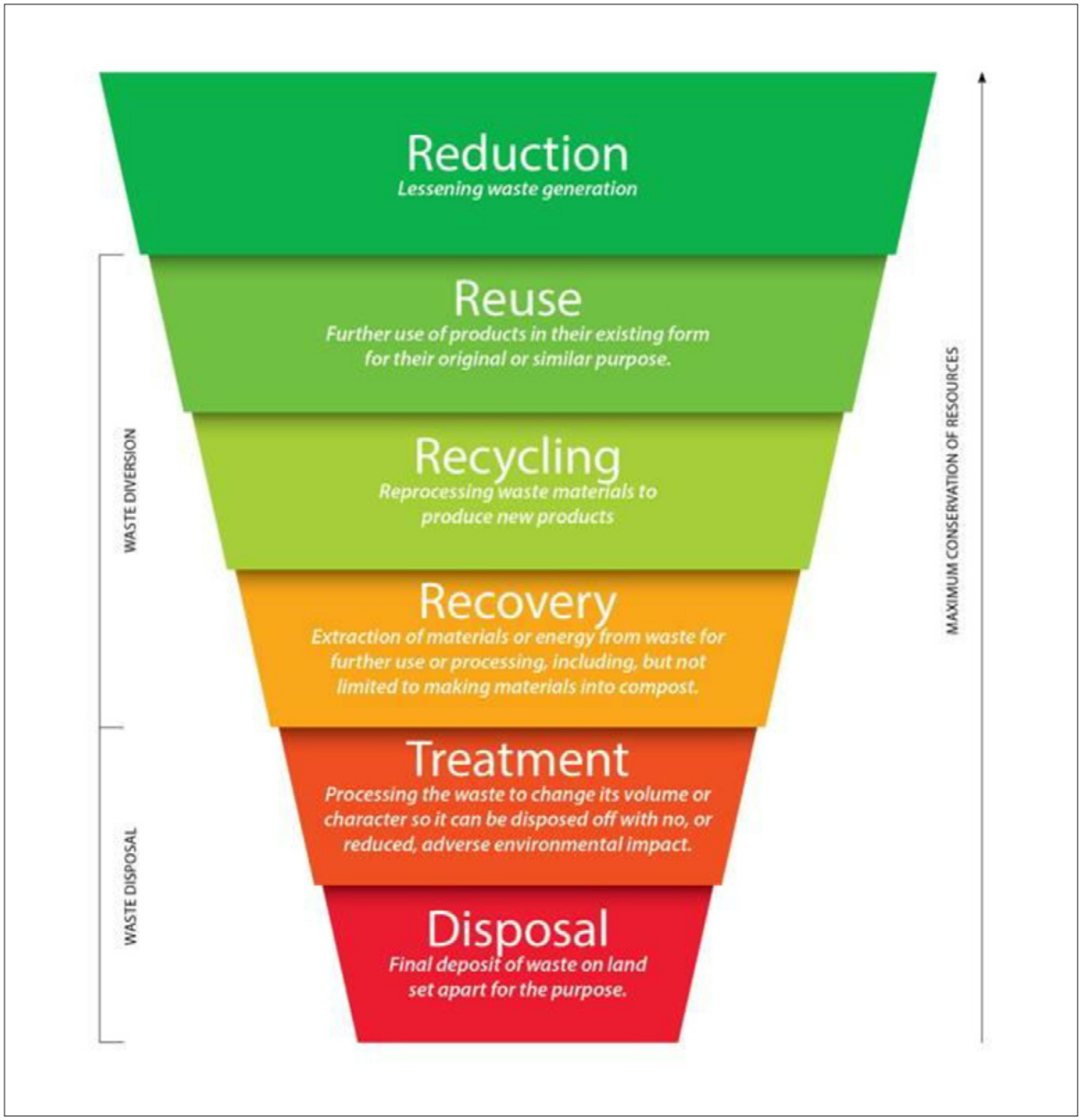
The continuous inhalation of pollutants by humans can cause loss of coordination, nausea, vomiting and eventually death due in the case of prolonged exposure. Scientific researchers have discovered that smoke emitted from landfill or dumpsite fires when inhaled or ingested by humans, symptoms such as nose and throat irritations, bronchoconstriction and respiratory problems, especially in asthmatic patients. These effects can trigger asthma attacks in asthmatic patients.

Open burning in dumpsites is considered extremely dangerous to the nearby residents because it occurs close to the ground rather than through stacks which are high up where air pollutants can be dispersed more properly to minimize their impacts on health. Dumpsite fires also pose a health risk to fire fighters due to prolonged exposure to pollutants emitted on top of the actual fire and explosion risks. Given the hazards of the harmful products of combustion, there is a need to advise the public of the fire and inform them of the level of concern about potential for health issues

Prevention of dumpsite fires

Solid waste management problems require a holistic approach due to its complexity as there is no simple solution to open waste burning. However, measures must be put in place to prevent open waste burning through improved collection, improved disposal, recycling or general awareness of the dangers of open waste burning. Mitigating the recurrence of dumpsite fires can reduce injury, health, and environmental hazards as well as property damage. The cost of prevention is generally much less expensive compared to the cost of firefighting.





The ideal method of waste management follows the zero-waste model, which emphasizes the reduction of waste quantity

Expansion of dumpsite yards as well as the creation of new recycling facilities could be a prolific method for minimization of open dumpsite fires.

Other options that can be used for reducing the recurrence of open dumpsite fire include excavation, overhauling and ground wetting. Regular compacting of waste is also recommended so that there isn't enough air to feed the flames.

In the event of a fire outbreak, water supply should be delivered at any point on the dumpsite for the fire fighters. At each of the fires incidents, the fire services should have additional resources necessary for control and extinguishing of the fires.

The risk posed by open burning of waste is very high in Harare and other cities in Zimbabwe where the dumpsites are not engineered and commonly cited close to residential quarters. Fire incidents on open dumpsites, if there is no stringent measure put in place, will continue to pose a serious risk to the health of nearby residents through prolonged or repeated exposure to the toxic pollutants they emit.

BAOBAB

Myths, Traditional Systems And Non-Timber Products

By Tendai Guvamombe

THE ICONIC BAOBAB TREE is famously known as the "Tree of Life" because of the multiplicity of its life serving functions. It is also known as "Elephant Tree" due to its enormous physical appearance. Adonsonia digitata is the most common species of Baobab found in Africa.

Southern African countries including Zimbabwe, South Africa, Botswana, Zambia, and Madagascar are endowed with a variety of Baobab tree species. Zimbabwe and Zambia are examples of countries where the baobab tree has contributed to the enhancement of people's livelihoods. The Baobab is a flagship tree species across many ethnical and cultural groups in Southern Africa. However, the major area of concern pertains to the different laws governing the protection and conservation of natural resources in rural communities. Since time immemorial, traditional systems used to be the governing rules behind the conservation of baobab trees.

Nevertheless, the enactment of statutory instruments under national laws further strengthened the already existing traditional laws on natural resources conservation. Research has also revealed myths and traditional systems governing the Baobab in Southern Africa as a way of protecting them against the commercial demand of its products.

Zimbabwe is an example of a country where customary laws and statutory instruments coexisting known as Dual Governance.

The government realized that baobab tree presents huge opportunities in the development of people's livelihoods especially in rural communities. This has seen the Baobab classified as one of the few tree species regulated by dual governance. Dual governance is when national laws empower traditional leaders to play an oversight role in the management and conservation of natural resources in their respective communal areas. This upholds norms and values of a particular community.

According Amkela Sidange, Environmental Management Agency (EMA) Spokesperson the Statutory laws gives a broad framework on how local communities manage their natural resources. "Some pieces of governance include SI 61 of 2009 Environmental Management (Access to Genetic Resources and Indigenous Genetic-Resource based Knowledge) regulations 2009, Traditional Leaders Act and Forestry Produce Act," she said. These frameworks provides for the conservation and sustainable use of all natural resources. This also gives communities the rights to access and enjoy the benefits of country's biodiversity.

The statutory laws have given absolute powers to local leaders to play an oversight role in governing natural resources with the assistance of Rural District Offices. The Traditional Leadership Act Chapter 29: 13- empowers traditional leaders to participate actively in the conservation of all natural resources that fall within their jurisdiction and Act No 25 Confers a wide range of powers on traditional leaders.

Lewis Radzire, Forestry Commission Operations Manager confirmed the existence of Statutory Instrument governing natural resources. "We have Statutory Instrument 116 of 2012 and Communal Land Forest Produce Act. These are the main two pieces of legislation." In line with this, the Communal Lands Forest Produce Act No 37 Sets up the Forestry Commission as the regulatory authority which grants permits to all timber and non- timber forest product harvesters.

The Green Business Gazette crew visited the South Western parts of Zimbabwe during the month of July this year. Ethnic tribes in Esigodini and Beit Bridge communal areas are still bound by the traditional myths that govern what they regard as elephant tree. These play an important role in the regulation of the use of Non-Timber Forest Products. Sibongile Hlatshwayo, a 26 year old married woman of the Venda origin and from Esigodini told this news crew that the tree carried high esteemed value in the area.

Access to the Baobab tree is also regulated. External migrants wishing to access the baobab are expected to first seek permission from traditional leader. Failure to adhere to the traditional laws will attract penalties and sanctions. "We still believe that our baobab trees are still secretive and there are certain norms and values which are supposed to be followed by both locals and externals coming to access baobab products. Failure to observe the norms will see visitors exposed to untold mysterious sufferings, the likes of getting lost in the forest, sickness and sometimes coming across a rare animal," Hlatswayo said.

Apart from this, the Venda and Suthu tribes in the south western region believe that the baobab tree has certain mythical properties that can make a woman conceive many children. What was usually done to girls before entering into marriage was that they were made to sit in a kraal encircled by baobab trees. "Sometimes we were told to sit inside a kraal surrounded by many baobabs and this was done for us to have many children without complications. This is derived from the view that the baobab is the only tree species which survives for many years during both dry and rainy conditions," she added. Various research projects have suggested that the Iconic baobab species have a life span of up to 5000 years.

Researches have also revealed that the Tonga people in Zambezi and the Gumbu clan in modern day Buhera (Vahera) believes that the baobab tree through its enormous shadow provides spiritual rest to the dead. A traditional headman from Buhera commented on condition of anonymity and confirmed the spiritual uses of the baobab tree in his community. "The baobab is a sacred tree. We have a number of places which I cannot reveal to the public that are burial sites. Our ancestors told us that the Baobab shadow is spiritual and therefore provides a resting place for the dead. This explains many reasons why it is rare for one to encounter a ghost during the night," he said.

"Externals wishing to visit baobabs either for tourism purposes or trade intentions, are expected to seek permission first from us traditional leaders so that they may not face problems during the course of touring. Failure to respect these norms and values of our land or committing what is forbidden in the area surrounding baobabs by both externals and local people results in suffering spiritual turmoil. Some will suffer from memory loss on the direction of where they are going. One can encounter a large baboon or a large scaring snakes like African python (Python sebae) and Black-mamba (Dendroaspis polylepis) as a sign of disapproval. When one transgresses the laws of the land, they will have to visit the local traditional leader in order to be forgiven, which takes place after paying either a goat or money depending on the extent of transgression " revealed the traditional headman.

"This would require one to first visit the local traditional leader to cast an apology. This will be done after paying either a goat or cattle and sometimes money. However, if one refuses all these they will face a death punishment," he added. The Tonga people encamped in the Lower Zambezi both in Zimbabwe and Zambia believe that during pre-historic times, the tree was created upright and proud, but later dominated other surroundings. This made gods to become angry and uprooted it and replanted it upside down.

Besides the cultural value of the Baobab species, the tree holds a commercial value and significantly contributes to local economies at both household and community levels. There is a great potential for the tourism sector in the baobab and its products which can are sold as curios. . This pertains to both domestic and International tourism business sectors. Zimbabwe's Elephant Hills in Victoria Falls has unique baobab trees located in front of the resort hotel. South Africa's Musina is also identified by a gigantic baobab as most travellers usually visit it for photo shoots. The Avenue of Baobab lines in Madagascar has become an epitome of a tourism hub inspiring visitors from Africa and the Globe to visit the majestic area.

There are high chances of external people developing keen interest to visit places where people bear testimonies to baobab mythical properties. A good number of tourists who have tasted the products will surely find it interesting to visit the sources of the non-timber products. History has it that Gumbu clan from modern day Buhera were into craft making businesses where they would make fibre bags from the bark of the baobab tree.

The Baobab fruits have nutritional value and Communities have been making use of the fruit which contains Vitamin C, Potassium, Carbohydrates and Phosphorus. The local trade has been helping to enhance the livelihoods across societies. Most people from Mashonaland area in Guruve earn a living from selling (Mauyu) baobab fruits. These are usually delivered to the Capital City for enhancement of local trade. Recently commercialisation of baobab fruit juice has made it a delicacy in urban centres. Both young and old folks admire the baobab.

The baobab pulp has in the past two decades created ready market in the USA due the fact that baobab presents edible fruits which contain various nutrients needed in the European Markets, Canada and United States of America (USA).

Through its medicinal properties, the baobab tree plays a very crucial role to the health of rural communities in Sub-Saharan Africa where access to health services is limited and they resort the tree or purchase baobab medicinal products at local markets (Musika). The most prominent baobab products include its powder, salad supplements among other essentials. It is believed that the product is needed in the developed nations due to its natural health ingredients. These include improving digestion, supporting immune system, general hydration and skin health. Apart from this, it is said to have antioxidant properties which are useful to prevent anaemia and asthmatic diseases. The United States of America (USA) Food and Drug Administration (FDA) in 2009 certified the baobab's products. Other medicinal properties needed by the USA residents include loss weight programs which have benefited many people. Baobab trees have been presenting a lot of opportunities in Tourism Industry.

Green Dialogue Interview Series

CHENAI Waste Recycling Project

SCALING UP WASTE MANAGEMENT PRACTICES in Small Scale Enterprises in Zimbabwe. The Green Business Gazette interviews Mr Never Gariromo (NG), the Founder of CHENAI Project. This is an innovative project involving plastic recycling and value addition of plastic waste into pavers.

GBG: Can you briefly introduce yourself?

NG: I am Never Gariromo from the Community Health and Natural Resources Initiative (CHENAI) Waste Recycling Project in Karoi.

GBG: What is CHENAI and what does it do?

NG: Community Health Environmental and Natural Resources Initiatives (CHENAI) is a community service program established and founded by Never Gariromo and volunteers from Christian Faith Centre Assembly of the Apostolic Faith Mission in Zimbabwe based in Chikangwe Township in Karoi. In partnership with the Karoi Town Council and Environmental Management Agency (EMA) we conduct assessment studies, track and evaluate environment-related health problems through surveillance systems. We do this by working closely with local authorities and stakeholder organizations in preparing for and responding to natural, technological, humanitarian, and environmental management issues. According to CHENAI, the environment is everything around us - the air we breathe, the water we drink and use as well as natural resources.

GBG: What programs and initiatives have you undertaken so far in your waste recycling projects?

NG: Our waste recycling projects include turning plastic into construction pavers. The concept makes use of molten LDPE, PET and HDPE plastic as a binder to make construction pavers used on driveways, homestead car parks, garden and park pathways etc. We make use of used oil as a lubricant and part of the raw materials to make the bricks. We also make easy chairs and garden chairs from used tyres. We are into the production of organic fertilizer and manure from a mixture of hyacinth, market vegetable and food waste, cow dung and agriculture crop waste (e.g. maize stalks, rice husks, groundnuts husks etc.)

GBG: In the context of CHENAI, explain the concept of Waste to Energy and what it entails in detail

NG: The waste to energy concept is innovative technology that helps collection of waste separated at source. Waste is collected and deposited to a Waste Transfer Centre and then transported to the waste to electricity plant which is usually designated at an isolated plant site. At the plant, waste is incinerated to produce heat which will boil water into steam which eventually steam turns the turbines and generate power and we feed into the national grid.

Apart from making money through sale of electricity into the national grid, the innovation gets money from waste collection as the municipality will privatize the waste transfer Centre which collects gate fees. The incineration process also produces ash (which is used as typical cement for making roads etc.) and the separated metal and glass is sold to other recyclers on good fees. The waste to energy technology proposed by CHENAI is a waste incineration power plant equipped with the best available flue gas treatment technology. All waste incineration flue gases that are formed in the incineration process are treated and cleaned using the latest technologies so as to eliminate harm on the environment and people. The flue gas treatment of the technology fulfills highest norms and standards.

The waste-to-energy incineration process consists of following main segments and processes:
1. The grate and 1st furnace chamber, where the fuel is incinerated
2. The second furnace chamber, where the gaseous materials ignite and burn
3. The empty passes, where the flue gas thermal energy begins to transfer into the working fluid and most toxins are burnt out (2 seconds at 850 °C)
4. The heat transfer unit where the remaining thermal energy in the flue gas is transferred into the working fluid
5. Flue Gas Treatment (FGT) unit collecting the harmful substances in the flue gas. This system is commonly referred also as the Air Pollution Control (APC).
6. Stack that disperses the cleaned flue gases to outside air.

Each tonne of incinerated solid fuels and waste produces solid and gaseous pollutants like dust and heavy metals, Carbon monoxide (CO), Nitrogen oxides (NOx), Sulphur dioxide (SO2), Nitrous oxide (N2O), Hydrogen chloride (HCl), Hydrogen fluoride (HF).

Combinations of several individual flue gas treatment components are utilized to provide an effective overall Flue Gas Treatment system. The waste to energy

incineration plant follows UNFCCC Emission limits with flue gas cleaning to provide a sustainable and efficient solution.

GBG: On a large scale, how can Zimbabwe benefit from Waste to Energy conversion initiatives?

NG: Waste to Energy concept can contribute more than 300MW to the national grid. The gains are fivefold:

1. Municipal waste is dealt with in a scientifically eco-friendly manner
2. The urban dwellings are automatically made sustainably clean
3. More than 1 000 000 jobs are created nationwide (this includes engineers, technicians, skilled labor etc.)
4. A new industry will emerge thus enabling and directly contributing towards the vision2030 which Zimbabwe is to attain upper middle income economy
5. The whole process will contribute towards remarkable reducing effects of climate change regionally and globally

GBG: What challenges have you faced in your waste recycling operations and how are you addressing these challenges?

NG: The waste management industry is not yet a popular industry in Karoi, Mashonaland West and Zimbabwe at large. Resources like waste management oriented machinery and equipment are imported at a high cost. However, we are lobbying with universities and colleges through innovation hubs to develop technologies, machinery and equipment to cut off import bills. As CHENAI we are devising and lobbying with councils, Parliament and relevant ministries for the crafting of a Waste Management policy.

GBG: How can local communities benefit from Waste recycling?

NG: Local communities will benefit from waste recycling in many ways. Firstly, separation of waste at source will be introduced thus making their homesteads more environmentally clean. Waste recycling leads to job creation across the value chain in the waste to energy industry thus household income levels will be increased. Communities will also benefit from skills transfer in the industry and local businesses development.

GBG: Which other projects have you done as CHENAI Waste recycling and how have these impacted the community?

NG: CHENAI did a community green (renewable energy project). This was an installation of solar energy at Dete clinic, Karuru clinic in Hurungwe District, and a clinic and two schools in Mutasa District benefited from the one time project. We have also worked with the Ministry of Environment, Water and Climate Change in 2016 in the installation of the solar power supply to the 3 clinics and 2 schools.

GBG: How are you contributing to climate change in your recycling projects?

NG: Our plastic recycling project uses biogas as source of energy for melting the plastic. The Biogas is produced from biodegradable materials which would have been dumped at the dumpsite to generate methane, a Greenhouse Gas into the environment. Our manure making project also avoids methane because of the anaerobic process. Therefore our contribution to climate change is climate change mitigation through the reduction of GHG emissions from waste.

GBG: What is your contribution to Sustainable Development Goals and what kind of support do you need in your operations from the relevant stakeholders?

NG: Our project contributes in creating sustainable clean cities. The manure making project contributes towards food security as we provide access to organic fertilizer which is cheap and easily available for small scale farmers supporting the Pfumvudza concept

GBG: What is the feedback you are getting from stakeholders regarding your work?

NG:

- Karoi municipality provides land and working space
- EMA provides technical support
- Colleges provides with academic and scientific support such as Chinhoyi CUT and University of Zimbabwe

ENERGY EFFICIENT APPLIANCES

A COST SAVING STRATEGY FOR HOUSEHOLDS

By Freedom Kudakwashe Muranda

PREPAID METERS HAVE MADE MANY HOUSEHOLDS RECOGNISE THE IMPORTANCE OF REDUCING ENERGY COSTS. AS A RESULT THERE IS AN INCREASED ADOPTION OF ENERGY EFFICIENT APPLIANCES TO FACILITATE REDUCTION IN ENERGY COSTS. THE USE OF ENERGY EFFICIENT APPLIANCES IS ON THE RISE WITH THE RACE TO REDUCE GREENHOUSE GAS (GHG) EMISSIONS AND ENERGY COSTS CURRENTLY UNDERWAY.

Consumers require information on the appliances they buy, for them to make informed decisions as they choose between various models. Generally, people are not well informed about the available energy efficient appliances. Certain information providers are not transparent about products provided. The producers of these technologies are usually well informed about the energy efficient capabilities of these appliances as compared to potential buyers.

Information needs to be specific, vivid, simple, and personal to increase its credibility so as to establish more trust with potential buyers of these appliances and technologies. Some of the products that have adopted energy labelling to inform consumers include but are not limited to;

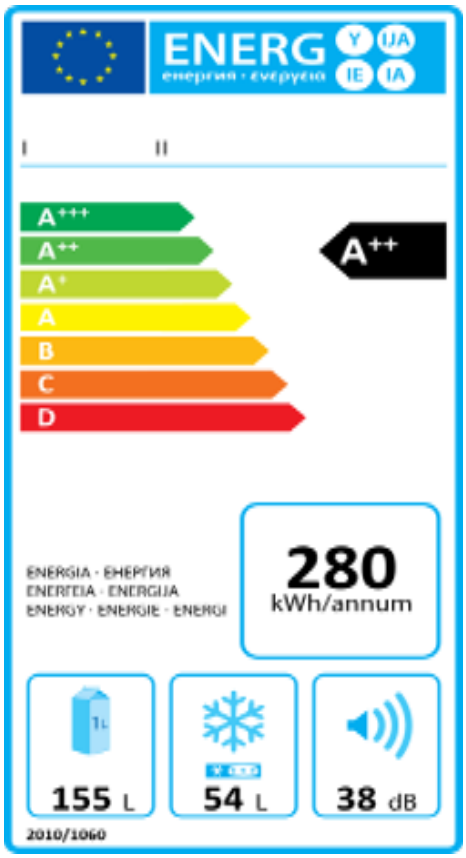
- **Washing machines**
- **Dryers**
- **Refrigerators**
- **Freezers**
- **Electric ovens**
- **Televisions**
- **Dishwashers**
- **Light bulbs**

Appliances have energy efficiency ratings in terms of a set of energy efficiency classes. These ratings range from A to G, with A as the most energy efficient and G the least. A+, A++ and A+++ were introduced on several products in an attempt to keep up with energy efficient grades. The labelling makes use of pictograms and this allows manufacturers to use a single label for appliances sold in different countries around the world. Consumers need to look for products that have efficiency arrow pointing to the green section on the label as compared to red ones.

In addition to purchasing energy efficient appliances, consumers can also perform home energy audits; these are also known as home energy assessments. Home energy audits will help consumers understand the total energy consumption at household level. This can determine how much energy your home uses and where energy is being lost in your house. Solutions can then be implemented to the problem areas to make the home more energy efficient and comfortable. The home audit can also help home owners to determine the capacity of installing solar energy which reduces the burden on the national grid and ultimately leads to reduced GHG emissions.

The first step in making home energy and cost saving improvements before adding a renewable energy system is an energy audit.

Efforts to save energy and reduce costs at household level require an understanding of how energy is billed. When you look at your electric utility bill, it will tell you the amount of energy bought, the energy charge, tender amount and applicable tax. Ideally the bill should also show you how much power you used but it may not give you a breakdown of all these charges. Obtaining a copy of the rate schedule that applies to this bill and recalculating the total using consumption information from the bill always helps to understand the charges. Understanding your utility bill may then serve as a means to reducing utility costs and using energy more efficiently.



The kilowatt hour (kWh) of electrical energy is the standard billing unit for electricity. This unit is a measure of rate of energy use multiplied by the length of time it is used, (kW x hours = kWh). The higher the power rating on your electrical equipment, and the longer you use it, the more kWh meaning the more energy you consume. Most all rate schedules include an energy charge per kWh for electricity consumption. The energy charge is based on the total number of units logged over the billing period, generally about one month.

The International Energy Agency has estimated that one third of our energy requirements can be reduced by 2050. Being energy efficient will significantly cut down on Greenhouse Gas emissions and contribute the Sustainable Development Goal 7 on access to Affordable and Clean Energy. Energy efficiency means using less energy to do the same tasks whilst provide products and services.


Photo: Green Records Company

Livestock And Humans Struggle For Water As Climate Change Takes Its Toll

CLIMATE CHANGE IS ONE OF THE LEADING CHALLENGES OF THE 21ST CENTURY. IT THREATENS THE ABILITY OF HUMANITY TO DEVELOP. SCIENTISTS AGREE THAT THE RATE AT WHICH CLIMATE CHANGE IS HAPPENING THREATENS LIVELIHOODS AND SURVIVAL OF HUMANITY.

Due to the threat of climate change, there is another challenge associated to how livestock and other animals can also access resources. Water scarcity in dry parts of Zimbabwe is resulting in humans having to compete for water resources with livestock. Due to the fact that human beings also need the livestock as food, assets, vitality and social pride; it is inevitable that strategies are devised of ensuring that livestock also accesses water. In some community boreholes, it is common to see livestock looking for water at community boreholes. Incessant droughts also threaten to worsen this problem if they persist. It is high time that we develop strategies to conserve and harness water resources for both humans and other organisms. Priority for water access is always given to human beings in the world over. As climate change persists, livestock and other animals will continue to come closer to water bodies where humans reside to seek the precious liquid.

Improved Cooking Stoves – Useful For Mitigating Climate Change And Energy Efficiency

ENERGY is a key enabler to socio-economic development in both developed and developing countries. Many communities in developing countries lack access to electricity and rely on biomass in the form of wood. More than 1.2 billion people lack access to electricity in the world. In order to manage the usage of wood and reduce environmental impacts it is worth noting that deployment of improved cooking stoves has been very useful in many developing countries especially Africa and South East Asia.


Photo: Green Records Company

Some of the benefits of improved cooking stoves include the following:

- Improved combustion efficiency
- Reduced air emissions
- Consumption of less firewood
- Improved air quality
- Reduced incidence of respiratory diseases

SAVE RIVER SILTATION GETS SERIOUS

RIVERINE ENVIRONMENTS ARE A HAVEN TO A MULTITUDE OF SPECIES. However, accumulation of sand due to erosion, poor catchment management practices, unsustainable mining activities and streambank cultivation have resulted in siltation of one of Zimbabwe's main rivers called Save River. Not only is this aquatic body home to irrigation water for the South Eastern part of Zimbabwe, but it is even believed that even the Spirit Mediums drink from Save – "Mhondoro dzinomwa munaSave". The old adage can no longer hold fort as siltation has reached fever pitch levels. The Birchenough Bridge which runs across Save River, is a tourist attraction located about 62 Kilometres from Mutare. If water levels in Save River dwindle, there is a possible knock on effect on the tourism potential of the bridge. The Save River needs urgent environmental protection in order for it to be restored to its original vibrant state.

A lot of livelihoods depend on Save River including irrigation schemes, fishmongers, aesthetic comfort and spiritual satisfaction. Perennial droughts induced by climate change have also been a cause for concern leading to the lack of adequate water levels in Save River. Water Stress at the Save River and across the country is not an isolated scenario, but a global concern which climate change experts and the protagonists of the Paris Agreement aim to arrest. Apart from water stress due to droughts, the emergence of siltation as a significant problem is a cause for concern.

Annually there is greater than 2 tonnes per hactre per year lost from agricultural fields in Sub-Saharan Africa due to poor soil and water management. Farmers should avoid carrying out cultivation along steep slopes and totally avoid streambank cultivation. The aforementioned are precursors of siltation. Furthermore, mining activities on the streambank should be prevented. It is an urgent call for all stakeholders to preserve Save River and ensure that it is protected from further siltation.

Photo: Green Records Company

Natural Resources And Livelihoods – Inseparable Paradox As Arts And Crafts Soar In Demand

ARTS AND CRAFTS FROM HONDE VALLEY in the Eastern Highlands of Zimbabwe are a thriving source of livelihood for local communities. The beauty of nature and value added products emanating from natural products has been exploited by communities for decades. In a region like Africa, natural resources are a mainstay of the livelihoods of communities. Reliance on land, plants, water and natural raw materials continues to inspire creativity. Striking a balance between human needs and ecological balance is one of the biggest challenges of our time. A total elimination of the use of natural resources is theoretically asserted by die-hard environmentalists. However conservation and wise use is what is emerging as a realistic option. The crafts from the Eastern Highlands of Zimbabwe, will continue to be amongst crafts and arts that the world marvels at. In the quest to adapt to climate change, communities should be creative to find other activities to support their livelihoods beyond the rain-fed agriculture. Diversification of income sources through arts and crafts is amongst one of the tacit ways to cope up with the environmental challenges of our time. Communities relying on arts and crafts must ensure that they balance use of natural resources and local socio-economic development.

Photo: Green Records Company

End of Life Vehicle (ELV) Management As An Environmental Nuisance

Photo: Green Records Company

EVERYONE CELEBRATES THE RECEIPT OF A BRAND NEW VEHICLE and more recently taking ownership a good used vehicle into one's fleet. Cars are very useful during their operational life cycle as a means to transport both people and goods. At the end of their operational use, there is very little knowledge about how to manage end-of0life vehicle waste.

Very little progress has been made in the area of end-of vehicle life cycle. The sight of wretched and abandoned car bodies in residential and industrial areas is becoming a common site. From an economic perspective, it is very difficult for many individuals to envisage that a vehicle can reach a stage where it is totally without value. Many waste products are generated when a vehicle passes its useful life cycle. Some of this material includes metal waste from the car bodies, rubber, hazardous lubricants, leather, fabric and glass.

Used car bodies are normally left as empty shells after car breakers salvage some vehicle parts which can be retrofitted on other car bodies. Vehicle workshops, distributors, garages and automotive companies have yet to devise new strategies to deal with end of life vehicles. Once seen as a developed country problem, it is slowly growing in developing countries. Countries should develop policies and legislation to deal with end of life vehicle including recycling opportunities.

Photo: Green Records Company

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Cleaning Up The Mindset

by Jack Chimbetete

HALF OF MY LIFE HAS BEEN ENGINEERED IN THINKING ABOUT WHAT CULMINATES IN THE MINDSET OF PEOPLE IN ORDER FOR THEM TO CREATE A SEQUENCE OF RESULTS THAT CONTRIBUTE TO THEIR HABITS, CHARACTERISTICS AND BEHAVIOUR. One common element in Zimbabwe which I have observed is that there has not been a deep urge and need to have a healthy, pure and clean mindset. It all starts with what one takes in, processes and eventually throws out. In that same pattern the same can be said about daily intake of materials for various purposes, tools, food, stationery among other consumables. Is our mind engineered to having an absolute thought process about where this material comes from, how it is created, its composition and ultimate impact to the environment or do we just ignorantly consume and after consumption look for the easiest way to dispose of all the remains.

As we are talking about the mindset I have raised various thought points in which I would like you as a reader to pose and think of initially the benefits of thinking about this background against what then becomes the output or residue of that which will have been consumed. In countries like Singapore and our own African nation Rwanda policies have been installed in the mindset of people to always have a well defined thought process of their intake of products, their composition so as to be knowledgeable of how best to dispose of all remains.

Photo: T. Muzamwese

The issue that I am going on and on about hear is really the way in which litter is an issue which is not well thought of by most Zimbabwean's although the country has been on a positive note for the last few month's with monthly national clean-ups which allowed the government, corporate world and civil sector to come together and show exemplary behaviour sweeping the streets and also carefully disposing of litter, the mindset of responsible behaviour still has a long way to go because on all other days of the month the cities accumulate litter and in other areas unofficial dumpsites. Volunteer organisations have taken the liberty to have clean up trucks, bins, and support the council in various ways but the mind of the citizens needs to be re-engineered to start thinking more aggressively around recycling, careful disposal of litter and community designated dumpsites which can be eco-friendly in consultation with various friends of the environment and the city fathers.

Where there is a clear cohesion of efforts dumping as shown in Sherwood Golf Course among other various areas which are naturally designed as leisure, sport, tourism or parks becomes a real concern and deterrent to the intended purpose. This Magazine will be an eye of progress in the mindset shift of Zimbabwean behaviour and will begin to challenge the status quo by having conversations with sectors involved so as to encourage a systematic behavioural change in attitude. It begins with you. How will you dispose of your litter today after buying a snack, a drink, the newspaper and so many other things. Let us begin to wash our mindset and prepare for a refreshed atmosphere all throughout.

Photo: Green Records Company

ECOLOGY vs THEOLOGY

by Jack Chimbetete

THIS ARTICLE IS WRITTEN IN MEMORY OF THE LATE REV SAMUEL SIFALENI A FORMER ANGLICAN PRIEST WHO PASSED ON LATE SEPTEMBER OF 2020. He was a man who believed in the preservation of Nature to a point that wherever he served he spoke about a sharp connection between religion and the environment. This great man is attributed to having been a pioneer in the green church movement in Southern Africa and also an Environmental chaplain for many years in his ministry. And whether one is Christian, Hindu, Islamic or whichever religion the fundamentals of morality and preservation of the surroundings of man are unarguable. It is with this premise that we look at the connection of peoples understanding of ecology which is according to Merriam Webster - a branch of science concerned with the interrelationships of organisms and their environment and theology which is a study of religion and religious beliefs according to the Cambridge dictionary.

It is important to note that the belief that the Creator (God) Created the world, people and all creation to co-exist and live together with man being given the overall responsibility to take care of the world in Samuel Sifelanis life journey among others who are biased and passionate about this topic he tried to remind people that we have not been as responsible as we should have been according to our mission.

His discourse of many subjects especially the the role of the Church in natural resource governance where he said "The Church and other faith institutions clearly have an important role to play in ensuring sustainable natural resource governance. As holders of moral authority within communities, the church can support efforts by communities to defend their rights and protect their livelihoods" Sifelani (2017) motivates the need for religious organisations who hold 80% of Zimbabwe's population accountable to becoming more vocal active and conscious about specific environmental concerns to observe and start implementing.

In this tribute I will mention Samuels legacy points in the sustainability sector even in his time as an officer at the Zimbabwe Council of Churches he personally oversaw the planting of trees in the institution and encouraged Church leaders to relay the message to their followers in their various home churches (Parishes) districts, and regions. In looking forward from the environmentalist we have been left with a torch in which we should begin to look at with a desire to continue evoking discourse within the religious sector and conservation of natural resources.

The discourse will need to be imprinted in the futuristic environmental teachings that the Church will begin to do and as it continues advocating for peace and justice so will it also stand up for a more responsible world citizen joining hands with the corporate world, civil sector and government. Let us reflect on our care, are we truly caring for our surroundings.

UNIDO Manufacturing Sector Technical Note - July 2020

By Tichaona Mushayandebvu (UNIDO Country Representative – Zimbabwe)

SECTION 1: OVERVIEW

Manufacturing – a key driver of economic growth and structural transformation

There is overwhelming global consensus that industrialization plays a pivotal role in a nation's economic growth and competitiveness. Pursuing systematic and sustained industrialization has long lasting benefits on economic development as confirmed by history of industrialization in Europe, North America and Asia. Kaldor's law provides a conceptual framework for the link between manufacturing and economic growth. "Manufacturing sector displays levels of productivity that are higher compared to those of other sectors and has a greater capacity to absorb labour force. It also promotes savings, boosts the process of capital accumulation and offers higher investment opportunities. In addition, Engels law states that demand for manufacturing products increases as the economy grows and a country gets richer. "Not only the absolute amount spent on manufacturing, but the proportion of share of your income spent on manufacturing increase.

CONTEXT

The analysis of the performance of Zimbabwe Industry (herein referred to as the manufacturing sector) is based on UNIDO's Country and Industry profile methodology which uses five group indicators reflecting the (i) Scale and intensity of Manufacturing activities, (ii) Inclusiveness within the manufacturing sector, (iii) Sustainability of the Manufacturing sector, (iv) Technological capabilities and innovation and (v) Subsector level analysis. Subsector level analysis has two components namely diversification & specialization and subsectors competitiveness. In addition, Zimbabwe's Industry performance is benchmarked with four competitors, selected members of SADC and COMESA, namely Zambia, Tanzania, Kenya and Egypt and South Africa. All figures used

in this section are based on UNIDO SDG 9 indicators. During the past 30 years, the manufacturing sector in Zimbabwe has gone through a major structural transformation. These changes require further analytical work so as to identify the most affected subsectors underpinning de-industrialisation and inform future strategy and policy making processes.

According to UNIDO's Department of Policy Research and Statistics (PRS), it is too early to have statistical evidence to show the impact of COVID 19 pandemic on industry. However, anecdotal evidence and opinion pieces seem to suggest that COVID 19 pandemic has the potential to have adverse effect on Industries worldwide, especially for smaller enterprises and in less developed regions of the world. In response to COVID 19 pandemic, many firms have started to promote digitalisation of their labour activities and production processes, while other global manufacturers have started to consider introducing more flexibility in their business models, e.g. with regard to their product lines, sources of inputs, people and skills , while others are looking to source inputs from less distant suppliers and to re-shore their production.

In addition new production related concepts such as 'just in case' alongside the popular 'just in time' and 'near shoring' alongside 'reshoring' have emerged. These developments will have serious consequences for developing countries as they become increasingly excluded from participating in Global Value Chains (GVCs).

Unpublished results of UNIDO's Africa wide rapid survey carried out early in June is expected to confirm that the pandemic and its 'shutdowns' of March to May 2020 negatively impacted on the manufacturing sector. This rapid survey targeted Ministries of Industry and Commerce in all 54 African countries. The survey results for Zimbabwe show that the most affected manufacturing subsectors were the Food & Beverages and the Plastics, Packaging & Printing subsectors. The Clothing & Textiles subsector recorded minimal gains due to increased demand for work suits, facemasks and bed sheets for hospitals. Challenges experienced by the manufacturing sector included shortages of raw-materials and inputs sourced locally or externally depending on their technological complexities. In addition, effective demand for goods and services also declined on the back of travel restrictions and shorter working-hour regimes.

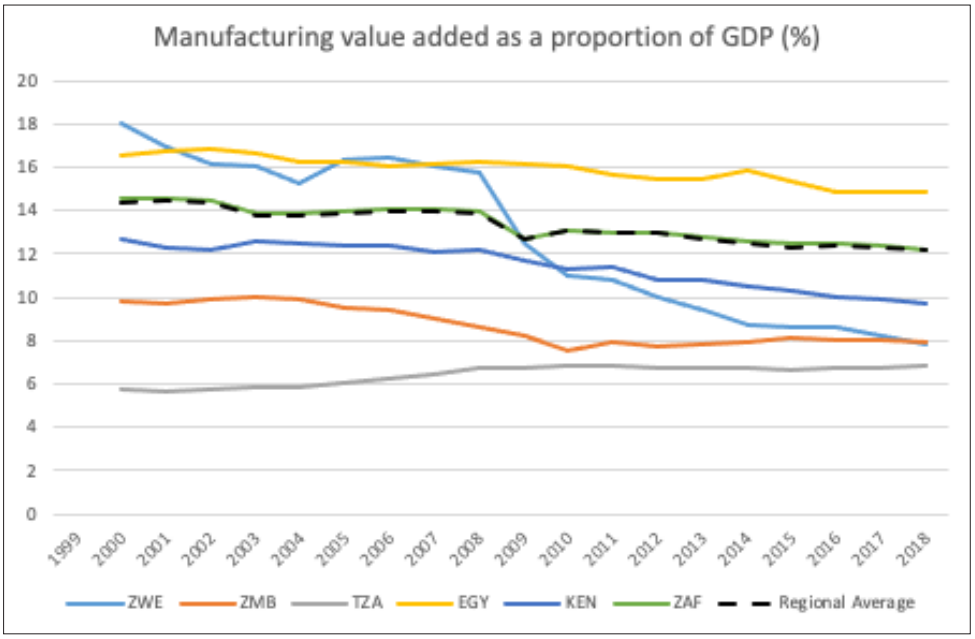
SECTION 2: MANUFACTURING ANALYSIS

The performance of Zimbabwe's Manufacturing sector is best shown when it is analysed in relationship with regional counterparts in SADC/COMESA namely Zambia, Tanzania, Kenya and Egypt and South Africa.

Scale and intensity of manufacturing activities

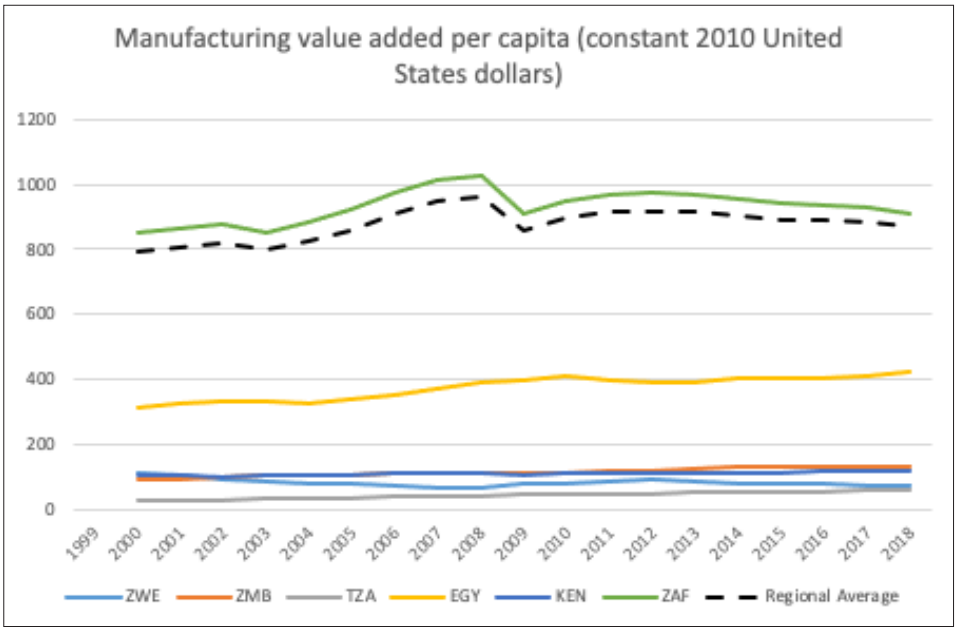
Both the share of MVA in GDP and per capita MVA can be used to compare the manufacturing sector's significance role in different countries. The two indicators are important measures to analyse growth enhancing structural change in the economy. MVA as a share of GDP and per capita MVA are calculated by dividing the manufacturing sector's total value added in a given year by the total GDP and population size, respectively.

Figure 1: Manufacturing value added as a proportion of GDP



Source: UNIDO SDG Indicators

Figure 2: Manufacturing value added per capita (constant 2020 United States dollars)



Source: UNIDO SDG Indicators

Figure 3: Manufacturing exports per capita

Source: UNIDO CIP index

All the three indicators MVA/GDP, MVA/capita and Manufacturing exports/capita should be interpreted together as a proxy for the strength of the country's manufacturing sector. Generally, the stronger the country's performance in all three indicators , the more successful is its manufacturing sector. The development of the Zimbabwe's National Development Strategy 2021 -2025 offers a great opportunity for recovery, growth and enhancing competitiveness of Zimbabwe's manufacturing sector and selected key subsectors.

Inclusiveness within manufacturing Industrialization is only beneficial to the society when it creates employment opportunities in the formal economy. This is captured by the SDG indicator on manufacturing employment based on the share of manufacturing employment in total employment. This indicator also measures Inclusiveness in manufacturing employment disaggregated by gender. Figure 4, show that manufacturing sector employment in Zimbabwe is at 4% of total employment. However, this compares well with its comparators such as Zambia and Kenya at 4% and 3% respectively. Employment of women is still a challenge in Zimbabwe and the Africa region and there is need for more work in ensuring gender parity and inclusiveness. Gender mainstreaming is a key hallmark of Inclusive and Sustainable Industrial Development.

Sustainability of the Manufacturing sector

A country's economy must not grow at the expense of its natural environment, a valuable asset of the country's industrial sector and above all, the long-term welfare of its current and future generations. To achieve Inclusive and Sustainable Industrial Development (ISID), therefore, focusing on the promotion of inclusiveness alone is not sufficient. Instead, the country must introduce specific measures to make manufacturing production cleaner, greener and more circular. In line with SDG indicators, a country's emission intensity (kgCO2 per unit of MVA) is a proxy for its manufacturing sector's sustainability.

Figure 5, shows that Zimbabwe's emission intensity (carbon dioxide emission per unit of manufacturing value added in kgCO2) of 2kgCO2 in 2000 increased to 2.27kgCO2 in 2007. This emission intensity was above that of its comparators which averaged below 0.65 kgCO2 during the period

under review. Closer to Zimbabwe's performance was Egypt which had an emission intensity of 1.30kgCO2.

Zimbabwe's emission intensity reduced from a high of 2.27kgCO2 in 2007 to a low of 0.51kgCO2 in 2009. With this average, Zimbabwe's emission compares reasonably well with those of Egypt at 0.79kgCO2 and South Africa of 0.87kgCO2. Working papers developed under the auspices of Zimbabwe's National Determined Contribution (NDC) exercise of UNFCCC processes indicate that in 2017, Energy production (coal based) contributed 57% of the total CO2 emissions, followed by ferroalloys and cement production at 22.7% and 19.8% respectively.

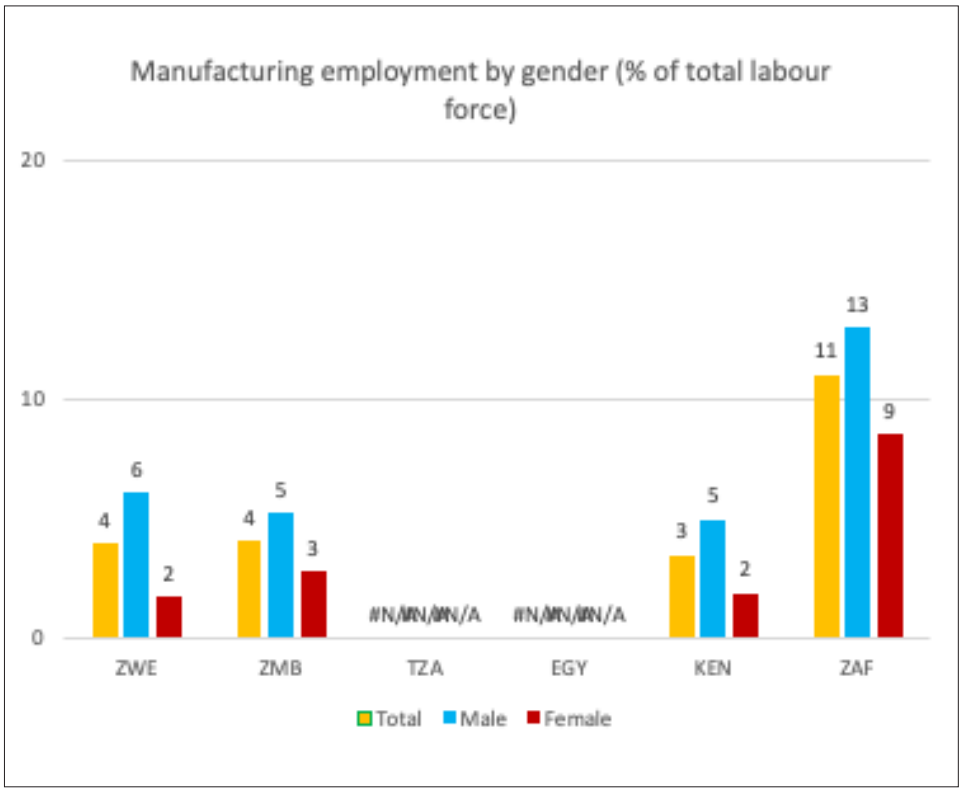
Technological capabilities and innovation

Growth enhancing and competitive structural change does not only entail moving away from agriculture to manufacturing but can also occur within the manufacturing sector itself. It is generally accepted that by enhancing technology content of activities and progressively shifting from low- to medium and high-tech industries, greater value addition will take place in the economy.

Figure 6, shows that in 2000 Zimbabwe's proportion of medium and high-tech industry value added in total value added (MHT indicator in %) stood at 9.9% compared to its comparators average of 26.07% (excluding Kenya whose MHT indicator was 9.5% from 2005).

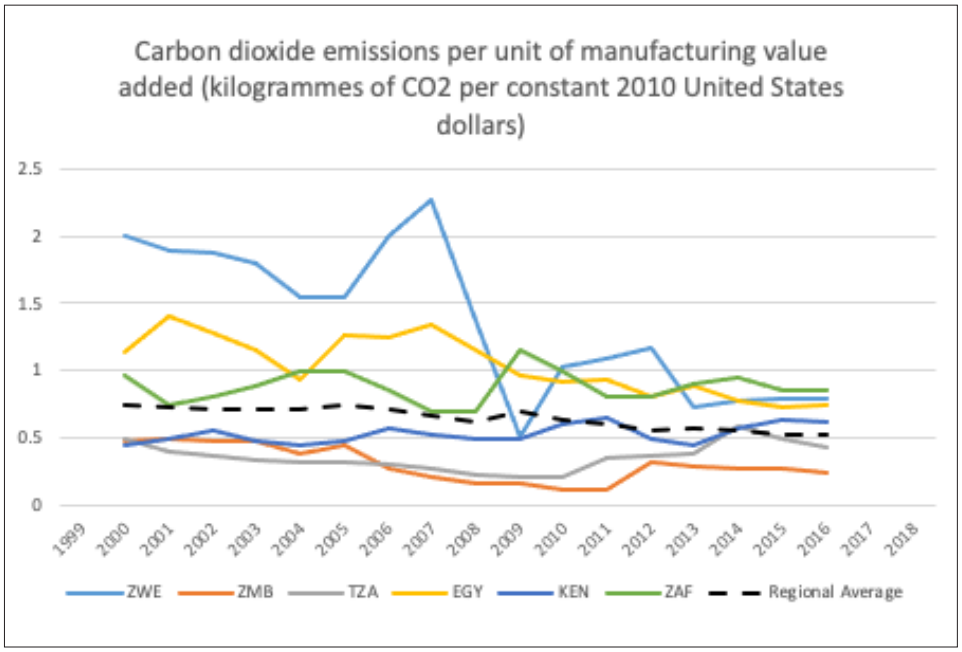
Zimbabwe maintained that status quo up-to 2009 with Tanzania being the only comparator country having its MHT indicator at 8.56%. In 2010, Zimbabwe's MHT indicator more than doubled to 24.65% and outpaced all its comparator countries though lower than South Africa MHT indicator level of 25.16%. The MHT indicator slightly decreased thereafter to end 2016 at 21.82%

Figure 4: Manufacturing Employment by Gender (% of total labour force)



Source: ILO

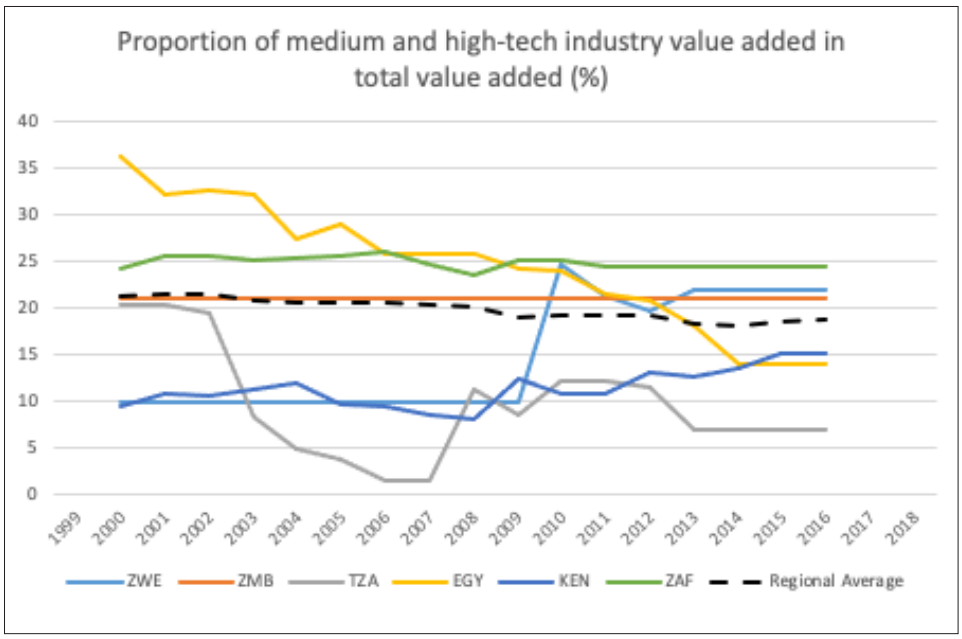
Figure 5: Carbon Dioxide Emissions per unit of manufacturing value added



Source: UNIDO SDG indicators

and above all its comparators but lower than South Africa. The upsurge of MHT indicator Zimbabwe experienced post 2009 require further subsector analysis to understand the characteristics and trends of both the MHT and Low tech investments undertaken in Zimbabwe.

Figure 15: Proportion of medium high-tech industry value added in total value added



Source: UNIDO SDG Indicators

Table 1: Industry share of total manufactures exports (%)

Industry share of total manufactures exports (%)

Zimbabwe		Share %	Change
1	= (M) Basic metals	75.0	+35.9
2	= (L) Food & beverages	8.0	-12.2
3	↑ (L) Tobacco	5.0	+4.1
4	↑ (L) Leather & footwear	2.6	-1.3
5	↑ (H) Machinery & appliances	1.4	-0.8

Show all +

2016

Southern African Customs Union		Share %	Change
1	= (M) Basic metals	41.8	+0.0
2	= (L) Food & beverages	11.3	+0.0
3	= (H) Chemicals	10.0	+0.0
4	= (L) Paper products	5.7	+0.0
5	= (H) Machinery & appliances	5.4	+0.0

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SECTION 3: WITHIN MANUFACTURING ANALYSIS ON INDUSTRY SUB-SECTOR LEVEL

To further understand and appreciate the performance of the manufacturing sector, it is necessary to analyse the structure of the manufacturing sector itself as well as the competiveness of the different sub-sectors.

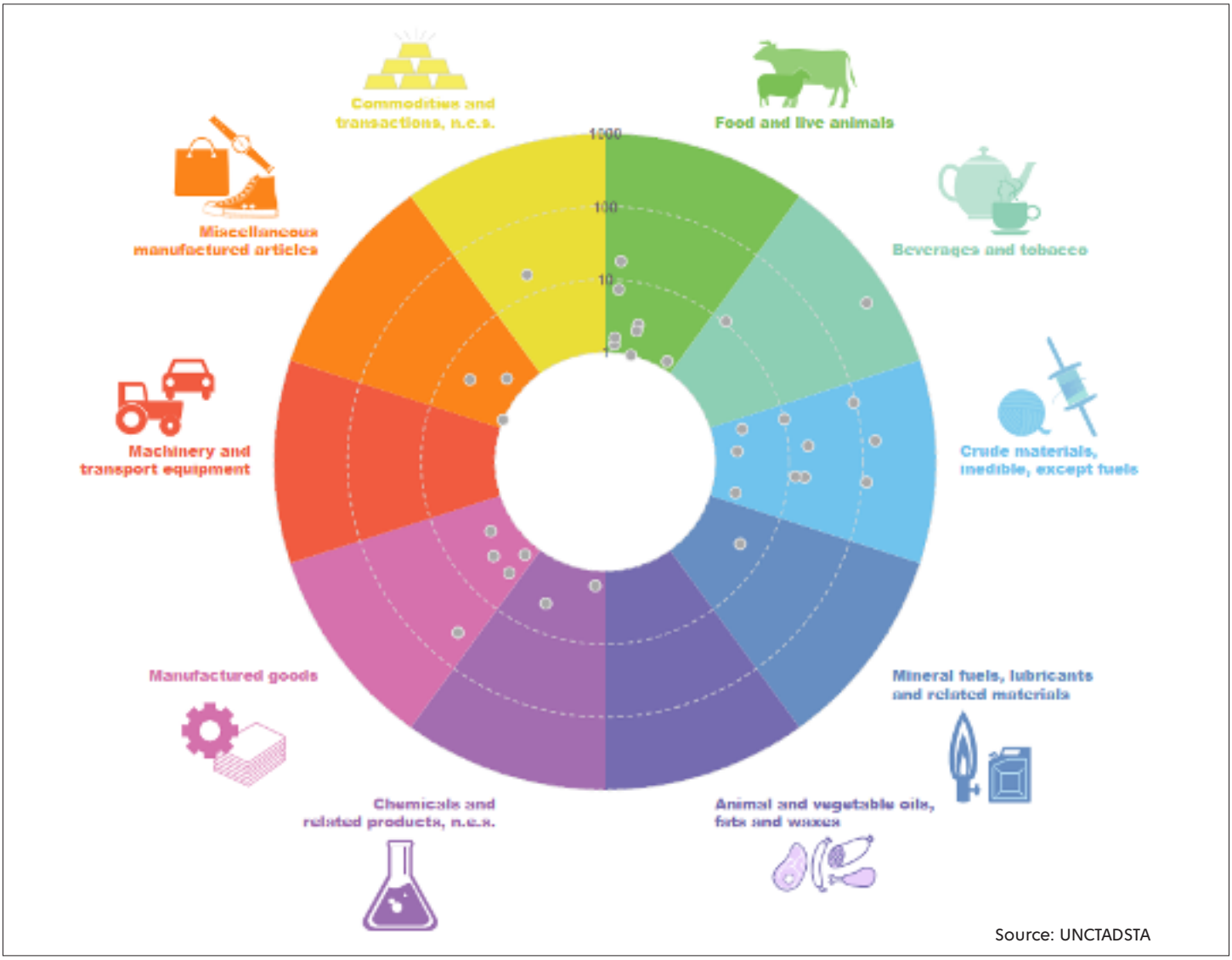
To analyse the size and performance of different subsectors, we make use of the International Standard Classification of all Economic Activities (ISIC) within the sector D which covers classification 15 (Food and beverages) to 37 (Recycling).

Diversification and specialisation

While diversification is generally considered desirable, specialization and higher manufacturing value added based on fewer industries can lead to higher value retention or earnings in country than lower manufacturing value added derived from a larger number of industries. Thus, diversification itself should not be the goal of manufacturing development but could be considered a means to achieving the upgrade of the manufacturing sector's industrial structure to secure sustained growth of manufacturing value added and higher levels of technological and innovation capabilities. In addition, as a country seeks to grow or expand its industrial base, it should also pay attention to whether it has adequate capacities and capabilities to sustain such growth.

Table 1, shows that Basic Metal production (medium tech) dominates the percentage share of total manufactured exports of Zimbabwe. Basic metal share stood at 75%, followed by Food and Beverages (low tech) at 8.0% and Tobacco (low tech) at 5.0%.

Radar Plot 1: Revealed Competitive Advantage



Source: UNCTADSTA

The above RCA radar plot shows that Zimbabwe has 5 products classified as 'Manufactured goods', 2 products under the 'Chemical and related products' and 3 under the 'Miscellaneous manufactured articles'. Under these three manufacturing categories, 'Pig iron and spiegeleisen' valued at $327 450k leads with an RCA of 37.8 whilst 'Printed matter' (valued at $41 040k) is second and followed by 'Dyeing and Tanning extracts' (valued at $2 027k) with RCAs of 4.5 and 4.0, respectively.

In terms of number of products with an RCAS above 1, Zimbabwe's exports are dominated by the 'Crude materials, inedible, except fuels' and the 'Food and live animals' sectors which have a total of 10 and 8 products, respectively.

In terms of level of RCA, 'Tobacco, unmanufactured, tobacco refuse' under the 'Beverages and Tobacco" sector dominates at RCA of 465.5 and with export value of $1,161m in 2018. In terms of export value earned, the 'Gold, no monetary excluding ores and concentrates' under the 'Commodities and transactions' sector dominates at $1,236m in 2018 and with an RCA of 18.7.

The above shows that Zimbabwe's manufacturing sector may have to 'move up the value chain' as an industrial competiveness strategy and produce more medium to High tech products in the 'Crude materials and inedible', 'Food and live animals', 'Beverages and Tobacco' and 'Commodities and transactions' subsectors. In addition, the number of manufactured products with an RCA greater than 1 (one) may need to be increased from the current total of 10 by a targeted factor established in the framework of revised ZNIDP and or the NDS TWG 5. In particular, Tobacco and Gold which has both outstanding RCAs and export volume offer the best opportunities upon which value addition based manufacturing could reap huge rewards and impact for Zimbabwe's industrialization and structural transformation agenda.

SECTION 4. POTENTIAL OUTCOMES - RECOMMENDATIONS

The analysis provides a 'bird's view' of the performance of industry. It introduces objective and globally accepted

indicators which potentially could be used to measure outcome and outputs of the proposed Thematic Result 5 "Moving the economy up the Value Chain and Structural Transformation" of the NDS 2021 -2025. To suggest some outcome and outputs for Thematic Result 5, I am proposing a couple of assumptions based on Zimbabwe's broad vision to attain the 'upper middle income' status by 2030 with a minimum GNI (GDP per Capita) US$4,000. Assuming that Zimbabwe target GDP per Capita for 2030 is at US$4,000, given its current capacities and capabilities, it is possible to increase its current GDP per Capita of US$1,200 to US$2,000 by end of 2025 and subsequently doubling the same to meet its 2030 target. Zimbabwe's a current MVA/GDP is 8% i.e. US$96 per capita. I am also assuming that MVA/GDP ratio target will increase to 10%, i.e. US$200 per capita by end of 2025. It is my view that suggested key interventions or activities listed below, if adequately resourced and systematically implemented, could support recovery, structural transformation and growth on the manufacturing sector. The interventions could also enhance competitiveness of the manufacturing sector in Zimbabwe and potentially double MVA/GDP rate to between 18-20% by 2030.

The NDS and Vision 2030 Agenda should directly reflect the urgent need to bolster the manufacturing sector, structurally transform the sector, introduce opportunities for growth in selected key value chains and put in place capacities and capabilities to enhance manufacturing sector competitiveness, i.e. it is about the broad Inclusive and Sustainable Industrial Development agenda for Recovery, Growth and Competitiveness. In short, Thematic Result 5 of the NDS could be ISID for Recovery, Growth and Competitiveness.

At the Outcome level, the following indicators and targets are proposed for use to measure performance;

(i) Growth indicator – Percentage share of MVA to GDP Increased to 10% by 2025 (up from 7.85% in 2018);
(ii) Competitiveness indicator – MVA Exports per capita increased to US$60 by 2025 (up from US$48.82 in 2017); UNIDO's Industrial Competitiveness Index (ICI) can be used as a potential outcome indicator. A target rank of below 100, i.e. 90 by 2025 is potentially feasible. Further work could be undertaken led by the Competitiveness Commission to refine this indicator and targets for 2025.
(iii) In addition, GoZ could track on an individual basis – top 5 Manufacturing subsector value added to total manufacturing exports; to include Base Metals; Beverages & Tobacco, etc.
(iv) Inclusivity indicator – Percentage share Manufacturing sector employment to total employment doubled to 8% by 2025 (up from 4% in 2018). This indicator should also be gendered;
(v) Sustainability Indicator- Emission Intensity (Carbon dioxide emission per unit of MVA in kgCO2 maintained at 0.85kgCO2: 2012). Further studies or input from the Climate Department of the Ministry of Environment, Tourism and Hospitality Industry working closely with the private sector (i.e. BCSDZ) could be used to come up with a refined indicator and target for 2025.

Output level indicators could include the following:

(i) Total number of manufacturing units/firms categorized by ISIC revision 3 subsectors operating, total number of manufactured products, their contribution to MVA. A baseline survey need to be undertaken to reveal the current status (2020) and come up with a specific indicator and target for 2025
(ii) Total number of manufactured exports categorised by subsectors with RCA of greater than 1. UNCTDASTA Trade Matrix Data Centre of 2018 indicate that Zimbabwe had 10 products with an RCA >1. The target could potentially be set at 15 products by 2025. Further studies involving the Competitiveness Commission could refine this indicator and target for 2025.
(iii) Total number of formal employees employed in manufacturing sectors categorized by ISIC revision 3 subsectors. In addition this output indicator needs to be gendered. A survey is required to establish a base line and targets for 2025.
(iv) Total number of manufacturing firms implementing sustainability programs and number of new or upgraded manufacturing products or services with technical and biological circularity features. A survey undertaken as a component of the Green Industry Program and led by BCSDZ, is essential to establish the baseline and targets for 2025.

The above recommendations and those identified its Zimbabwe National Industrial Development Program (ZNIDP) 2019 -2023 and Zimbabwe- UNIDO Country Program for Inclusive and Sustainable Industrial Development 2016 - 2021 (CP 4 ISID) are key to strategically and systematically unlock the manufacturing sector's potential in sustaining and creating formal Jobs, enhancing MVA export revenues and attracting much needed technologies and MVA investments. In addition there is a clarion call to all key stakeholders in Zimbabwe, (Government, the private sector, the academia, organized labour, consumers, development partners/donors and IFIs) to work together and make an effort to make the manufacturing sector and the broader ISID, the engine of growth and competitiveness so as to achieve objectives of the Zimbabwe's National Development Strategy 2021 – 2025 and Vison 2030.

Short term activities

Manufacturing sector short term needs include activities required to set the sector on a firm growth path after two to three years. The sector needs to be restructured, empowered and appropriately funded so as to respond any external challenges it may face. In response to COVID 19 pandemic, the following activities could be undertaken;
(i) a rapid survey on the impact of COVID 19 on Industry to inform adjustments required in implementation of the

ZNIDP 2019-2023 and responses for Thematic Result 5 of NDS, (US$50,000);
(ii) project to assess feasibility of boosting local manufacturer of COVID 19 medicines and medical supplies through a revised Pharmaceutical Strategy 2019 -2023, (US$5m)
(iii) project targeting urban SMEs clothing and leather manufacturing businesses (5,000) in natural clusters to sustain jobs and enhance productivity, (US$5m); and
(iv) UNIDO COVID 19 Industrial Recovery Program (CIRP) to guide appropriate manufacturing sector recovery strategies and activities, (US$2m)

Under the leadership of Ministry of Industry and Commerce, there is need to, among other things, establish a Private Public Partnership (PPP) Industrial Intelligence Unit (IIU) or framework to make it feasible to leverage donor resources for implementation of the industrialization agenda. The IIU is best established as a specific activity under CIRP project with different manufacturing subsectors expected to play a pivotal role in pushing forward sectoral interests. Below are potential projects and programs which could be undertaken during the growth phase of the TWG 5;
(i) capacity building of the national statistical systems to produce quality and timely Industrial Statistics and Industrial Intelligence, (US$2,5m);
(ii) structured and systematic capacity building for the Industrial Intelligence Unit/system to include selected departments of economic ministries, business associations, public sector organizations, the academia and research institutions through programs such as EQUIP, COMFAR, etc. (US$2,5m);
(iii) project to systematically integrate Science Technology and Innovation (STI) into Zimbabwe's ISID agenda. This project could focus on building synergies and collaboration between selected Ministries (MIC, MHTEST, MOFED, MOARD, SIRDC, etc.) and between Government and key ISID stakeholders. Issues to be jointly explored would include R&D, Industry 4.0, Digitalization and Innovation, (US$3m)
(iv) Industrial Value Chain Project under which 5 key anchor VC with highest and quick potential to create MVA jobs, exports and investments would be selected, diagnosed and supported (through structured TA and public/private investments, (US$3m);
(v) project to undertake assessment, re-organize and capacitate ISID financing mechanisms focusing on IDC, Public sector procurement, Buy Zimbabwe and fiscal incentives and penalties, (US$3m)

Medium term outputs/activities

The tail end activities of the NDS 2021-2025 would focus on enhancing further manufacturing sector growth and set a firm foundation to address manufacturing sector competitiveness agenda. These activities assume that most short term activities /outputs were achieved in a systematic, inclusive and sustainable manner. Key medium term activities could include;
(i) Public sector support through the Annual National Budget (PSIP) or related allocations for Implementation of business/investment plans of the 5 anchor Industrial VCs, (US$2,5m); This is will show Government commitment and ownership of the project and be an essential signal to potential local and foreign investors.
(ii) Public sector investment enhancement for IDC and IDBZ to leverage private sector investments/IFIs facilities, (US$3m); This will also show Government commitment, ownership and serve as a pro industrial growth signal to investors.
(iii) Survey on infrastructure/capabilities gaps for ISID (energy, water, transport, markets, R&D, IT & connectivity), (US$500,000);
(iv) Technical Quality Infrastructure System upgrade and revitalization project (standardization, metrology & calibration, accreditation, conformity/testing & inspection, consumer protection, etc.), (US$5m)
(v) Buy Zimbabwe and 'Made in Zimbabwe' brand project, (US$3m) ; These are great market based strategies to boost local production, sustain and create local formal sector jobs
(vi) Zimbabwe Industrial Competitiveness Project (US$1m); Result of this project would feed into UNIDO's biannual Industrial Competitiveness Index. The next issue is expected to be published in 2021. This project will also be used to capacitate the recently established Competitiveness Commission so that they learn by doing.
(vii) Zimbabwe Industrial and technology parks project (to support the transition from low tech manufacturing products to medium and high tech products, (US$4m)
(viii) The Green Industry Program (in the context of Circular Economy - CE) and with funding from GoZ, GEF/GCF and other green funding sources, (US$15m).

Potential funding sources

Zimbabwe will have to rely on its public sector and local resources to support the above mentioned projects and programs. Historically, domestic resources or investments have driven the initial process of industrialization with FDI later coming in when economic growth is firmly rooted in the country. Zimbabwe needs to systematically identify, cultivate and leverage in support of the economic agenda within the NDS 2021 – 2025 and Vison 2030 to include the following donors:

- The EU (under its 2021-2027 funding framework)
- Government of Japan
- Government of South Korea
- Government of Sweden
- United Kingdom
- China
- GEF/GCF
- AFDB/AFREXIM/DBSA, etc.

SECTION 5: CONCLUSION

Government of Zimbabwe, the Ministry of Industry & Commerce as the lead Ministry for the TWG 5 'Moving the economy up the Value Chain and Structural Transformation',

private sector bodies especially those representing the manufacturing sector (industry) and the academia, are strongly encouraged to make use of this Manufacturing Sector Technical Note as they develop and implement the National Development Strategy 2021 -2025 and beyond.

This note has greatly benefitted from UNIDO's competency as (i) the United Nations specialized agency for supporting the Inclusive and Sustainable Industrial Development (ISID) agenda, (ii) as lead UN implanting agency for SDG9 and (iii) UN agency with global experience and linkages in successfully supporting the Industrialization agenda to include INDUSTRY 4.0.

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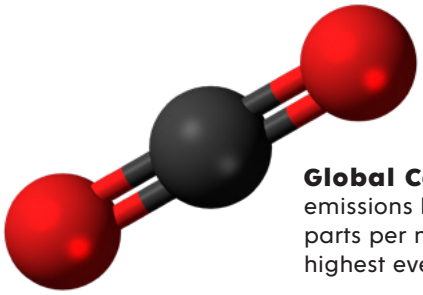
[i] Generally manufacturing is used interchangeably with industrialization because of the dominance of manufacturing in processing and value addition activities.
[ii] Rama Shankar Pandey, 2020.
[iii] Oxford Business Group, 2020.
[iv] The Pharmaceutical Medicines and Medical Supplies subsector did not record any gains. Most Governments, including those in selected developing countries took advantage of increased effective demand for COVID 19 related medicines and medical supplies to boost local production.
[v] MVA is the total estimate of the net output of all local manufacturing activity units obtained by adding all outputs and subtracting the intermediate inputs. In simple terms it is the difference between the price of product and the cost of producing it.
[vi] 'Structuralist school of thought' view development not simply as economic growth but as a transformation of the economy's structures. In simple terms, structural transformation is a change in the composition of the economy (traditionally divided between primary sector, i.e. mining and agriculture, the secondary sector, i.e. industry, and tertiary sector, services.
[vii] While the three indicators should be interpreted together, the country diagnostic should also highlight differences in the performance of the indicators, e.g. when a country has a large manufacturing sector (MVA/GDP and MVA/capita) but performs comparably poorer in terms of exports (manufacturing exports per capita)
[viii] Higher total employment in manufacturing can generally be interpreted as implying that the manufacturing plays an important role and that it has a higher multiplier effect for job creation compared to Mining and agriculture. Countries which largely depend on extraction and processing of natural resources may have a large share of MVA in GDP, but comparably low employment figures confirm that only a small proportion of the population actually benefits from profits generated by these activities.
[ix] Emission intensity reflects changes in the average carbon intensity of the energy mix used in the manufacturing sector's structure, in the energy efficiency of each subsector's production technologies and in economic value of the various outputs. Emission intensity can be regarded as the inversion of emission efficiency, i.e. the lower a country's emission intensity, the better its performance on this indicator.
[x] Notably subsistence and subsidised agriculture in Zimbabwe
[xi] New and or expansion investments undertaken by Coca-Cola, Schweppes Holding, Pepsi- cola, Commonwealth Development Corporation, several oil pressing companies, etc.
[xii] The concept revealed comparative advantage (RCA) is key when analysing a country's competitiveness. A country is said to have a revealed comparative advantage in a given product when the country's ratio of exports of this particular product to its total exports of all products exceed the same ratio for the world as a whole. When a country has a RCA for given product of RCA>1, it is inferred to be a comparative producer and exporter of that product relative to a country producing and exporting that good at or below the world average. The higher the value of a country's RCA for a given product or industry, the higher its export strength in this product or industry.
[xiii] This potential competitiveness strategy should not ignore other key Industrial strategies to stop further decline of the sector, and support inclusive and sustainable recovery and growth of the industry. Therefore there may be need reconsider renaming the Thematic Working Group 5 to reflect much needed efforts for Industrial Recovery, Growth and Competitiveness.
[xiv] Defined as having GNI (GDP) per capita of between US$3,958 – US$12,235 in 2018
[xv] Premature de-industrialization has also negated the industry's technological capabilities and innovation.

DID YOU KNOW?

There are over 30 000 known species of fish in the world

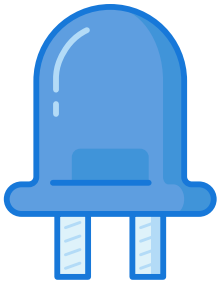


Global Carbon Dioxide emissions have risen to 416 parts per million (ppm) – the highest ever in human history

2019

is the second hottest year in the history of mankind

EVERY ZEBRA HAS A UNIQUE PATTERN OF BLACK AND WHITE STRIPES.



Over 14% of the world's population does not have access to electricity

Energy Saving LED bulbs can attain an average life span of 20 000hours, which is 20 times the lifespan of a conventional light bulb.

Climate change will cause sea level to rise by 90cm by the year 2099 to the detriment of the world and cause flooding in certain countries.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