



## **TIPS FORUM 2019**

### **INNOVATION AND INDUSTRIALISATION**

**TITLE:**

**INNOVATION AND SUSTAINABLE GROWTH AND GREEN  
INDUSTRIES, INCLUDING THE TRANSITION TO A LOW-  
CARBON ECONOMY**

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## Abstract

Each industrial revolution possesses considerable internal logic but is less flexible in regard to mitigation and adoption to climate change in industry implies the development and wide-scale application of technologies. Innovation and sustainable growth requires harnessing technological innovation to improve human well-being in current and future generations. Green industry including the transition to a low-carbon economy offers a development pathway consisting of two mutually supportive components: a) improving the environmental, social and economic performance of existing industries, and b) creating new competitive industries delivering environmental goods and services. Green industry for sustainable growth aims to help governments; industry leaders and related stakeholders design solutions to advance sustainable development through the greening of industry. In order for economies to develop along a sustainable trajectory, it becomes necessary to address economic growth and negative environmental impacts in tandem.

Today's technology deserves renewed world attention. During the 20<sup>th</sup> century, greenhouse gas emission doubled, provoking an accelerating climate disorder. The international convention on global warming, the Kyoto Protocol and Paris Agreement aim at reducing these emissions at seeking climate equity. In fact, although the southern African countries, emissions are weak they still undergo quite severely the effects of warming. No individual, organization, business or government can ignore technological changes. The new terrain requires shifts in national and global, public and private policies to harness today's technological transformations as a tool to promote local, profitable innovation and poverty alleviation in our own countries. This is our duty.

**Keywords:** sustainable growth, technology, innovation systems, green industries, complex adaptive systems, low-carbon economy.

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## Abbreviations

CCR	Constant Capital Rule
CO <sub>2</sub>	Carbon Dioxide
CP	Cleaner Production
CSIR	Council for Scientific Industrial Research
GHG	Green House Gases
GIP	Green Industrial Policy
HCFC	Hydro-chlorofluorocarbon
ILO	International Labour Organization
IPCC	Intergovernmental Panel on Climate Change
LEDS	Low Emission Development Strategies
LEDSGP	Low Emission Development Strategies Global Partnership
MDGs	Millennium Development Goals
PPA	Power Purchasing Agreements
POP	Persistent Organic Pollutants
RECP	Resource Efficient and Cleaner Production
R&D	Research and Development
UN	United Nations
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UN SDGs	United Nation Sustainable Development Goals
UNIDO	United Nations Industrial Development Organization
US\$	United States Dollar
WCED	World Commission on Environment and Development
WB	World Bank



# 1. Background Information

Innovation is one of the essential factors of enterprise performance as well as regional economic growth. Sustainability also requires an adapted governance system in the region. Today's technology deserves renewed world attention. The world confronts multiple crises; the green transition depends on the development and diffusion of new technological, economic, social, behavioural and business model innovations. The world of today faces increasing environmental pressures, including rising air and water pollution, climate change, biodiversity loss and waste generation. Numerous policies and initiatives have emerged at the international level to respond to these challenges, but more must be done to ensure a rapid green transition and a cleaner global environment. These changes will need to happen in a context of other major structural transformations, including economic convergence between developed and developing economies countries.

Innovation and industrialization aims to link the micro-level changes in firms, as the source of production behaviour, with meso-level<sup>1</sup> changes in industrial structure and macro-level changes in growth and development performance. Each industrial revolution possesses considerable internal logic but is less flexible in regard to mitigation and adoption to climate change in industry implies the development and wide-scale application of technologies.

Innovation and sustainable growth requires harnessing technological innovation to improve human well-being in current and future generations<sup>2</sup>. However, significant challenges remain, including access to training and funding, and responsive public policy and regulation. Green industry can be promoted to deliver environmental goods and services. These industries by themselves are a sustainable source for further structural diversification, jobs, income and prosperity. To further address this challenge, during the 20<sup>th</sup> century, greenhouse gas emission doubled, provoking an accelerating climate disorder. The international convention on global warming, the Kyoto Protocol and the Paris Agreement aim at reducing these emissions at seeking climate equity.

Sustainable growth is not yet a strong enough organizing principle in most innovation systems to align actor behavior to systematically take into accounts the interests of marginalized populations or future generations. Our duty is not just to put to rest the debate over whether innovation for sustainable growth can help development. This debate is arid but to help identify the regional policies and institutions that can best accelerate the benefits of innovation for sustainable growth while carefully safeguarding against the risks that inevitably accompany them.

The paper highlights critical areas of innovation and sustainable growth and green industries, including the transition to a low-carbon economy can be turned into creating profitable work and human sustainable growth in the region. The paper will argue that, up to now, the way that innovation and sustainable growth and green industries, including the transition to a low-carbon economy can be turned into creating profitable work and human sustainable growth in the region. After background information let's discuss sustainable innovation.

## 2. Sustainable Innovation

### 2.1 What is Innovation?

Natural resources provide the raw materials necessary for economic activity, as well as the foundations for life itself. However, many of the ecosystem services provided by natural resources cannot easily be reflected in market prices. Sustainable management of natural resources requires getting their prices right, by taking fully into account both their use and non-use values. In order to

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<sup>1</sup> **Note:** In general, a meso-level analysis indicates a population size that falls between the micro- and macro-levels, such as a community or an organization. However, meso-level may also refer to analyses that are specifically designed to reveal connections between micro- and macro-levels.

<sup>2</sup> **Note:** The 2015 UN Sustainable Development Goals and Paris Agreement on climate change heightened global attention to sustainable development. Innovation in technologies such as cleaner energy production is important. Ensuring access to clean water and sanitation is one of the core pre-requisites for sustainable development.

better focus efforts to address the innovation in business there is a need to understand that innovation is really about responding to change in a creative way. It's about generating new ideas, conducting research and development (R&D), improving processes or revamping products and services in a modern world. According to Geroski (1995), it is well established in the economic literature that R&D activities provide not only private returns to innovators, but also return to the society which are not captured by inventors.

On other side of the coin, it is also about a mindset in business where entrepreneurs have made or are making their mark. Furthermore, innovation can be a large-scale venture where new product or service has changed fundamentally how we do business. It could be a low-cost internal initiative such as improving a process in business that can lead to dramatic saving in overhead coast with positive outcomes. An important thing for all of us today is to remember about innovation to increase company's value in the marketplace as technology are being created in response to market pressures - not the need of poor people, who has little purchasing power.

Historically, industrial development is the most dynamic driver of prosperity and collective wellbeing. Industrial development is a global objective that torches upon the economic, social and environmental aspirations of all. According to UNIDO, the link to innovation and infrastructure further strengthens inclusive and sustainable industrialization as the locomotive of sustainable development, a dynamic process that entails entrepreneurship, continued diversification and industrial upgrading, technological innovation and growing trade relations<sup>3</sup>.

We all agree that innovation-the creation and diffusion of new ideas- is at the heart of the transition to a cleaner global environment the world is facing today and in the coming years. This includes not only technological innovation, but also innovation in economic and social systems and in lifestyles. Innovation is the main source of modern economic growth, which implies that the green transition is not only compatible with long-term economic growth; it also opens up a vast range of economic opportunities for businesses.

The green transition depends on the development and diffusion of new technological, economic, social, behavioural and business model innovations. These include electricity production, distribution and storage, agriculture and forestry, natural resource exploitation, buildings structures, transportation system, water supply and treatment, waste management, and environmental remediation. Many of the necessary innovations in each of these sectors already exist and now need to be diffused and scaled up. Research and development, personnel and finance are concentrated in developed economies countries the so called "rich countries" led by global corporation and following the global market demand dominated by high-income consumers<sup>4</sup>.

As capitalist principles, successful innovation should be rewarded with incentives such as bonuses or other compensation. It will help the capitalist company to keep most creative and innovation workers. In a highly competitive environment, companies can no longer compete simply on tangible assets such as the largest equipment, or by offering the lowest costs to costumers. The ability to innovate also affects market potential and provides company with a means of competing against emerging markets, a shrinking labour force and accelerated technological change. As a capitalist tool, innovation has become a key strategy to attract and retain customers in a fickle market. Table 1 show types of innovation business which can be implement to meet the goals of innovation and industrialization.

**Table 1: Type of Innovation Business Can Implement**

No	Type of Business
1	New ways to get your products to your clients.
2	A new design to respond to customer demands.
3	Improved use of technology to update your ordering processes and improve interaction with suppliers and customers.

<sup>3</sup> UNIDO (2015): The 2030 Agenda for Sustainable Development: Achieving the Industry-Related Goals and Targets. Vienna.

<sup>4</sup> UNDP (2001). Human Development Report: Making New Technologies Work for Human Development. New York Oxford University Press.

4	An increase in your product or service range to reach more targeted customers.
5	A more efficient plant layout to lower your production turnaround time.

**Source:** Compiled by Authors from different sources.

In this regard, in a highly competitive environment in the capitalist world, companies can no longer compete simply on tangible assets such as the largest equipment, or by offering the lowest costs to costumers. The ability to innovate also affects market potential and provides company with a means of competing against emerging markets, a shrinking labour force and accelerated technological change. The core of innovation in any business is really are staff and their positive attitudes. In this regards, smart businesses encourage their employees to always think creatively such as to set up a means for employees to bring their innovative ideas to the table without hesitation. Today, many governments, recognizing the sustainability challenge are exploring synergies between growth and environmentally protection. Let's look on innovation and production.

## 2.2 Innovation and Production

We all aware that already our people are facing a day to day experience of declining standard of living, reduced capacities for personal and social achievement, an increasingly uncertain future and diminished capacity to maintain what has been secured over past decades in terms of social and economic development. In most cases, new technologies which are developed by our local research institutions such as Council for Scientific and Industrial Research (CSIR) of South Africa must be made available to the public for the inventor to reap the rewards of invention. However, by making new inventions public, some (if not all) of the knowledge embodied in the invention should becomes public knowledge. This public knowledge may lead to additional innovations by CSIR and other research institutions.

Moreover, committing to sustainable production patterns makes business sense as it reduces wastage of costly resources, and contributes to increased competitiveness. Green industry including the transition to a low-carbon economy offers a development pathway consisting of two mutually supportive components: a) improving the environmental, social and economic performance of existing industries, and b) creating new competitive industries delivering environmental goods and services. Green industry for sustainable growth aims to help governments; industry leaders and related stakeholders design solutions to advance sustainable development through the greening of industry. In order for economies to develop along a sustainable trajectory, it becomes necessary to address economic growth and negative environmental impacts in tandem.

These knowledge spillovers should provide benefits to the public as a whole, and to the innovator. An obvious example of such a spill-over is Android-based smart phones. Apple first launched the now dominant design of smart phones. However, other companies such as Google were also able to benefit from Apple's original R&D investments by building upon or improving the original design. Economists studying the returns to research consistently find that knowledge spillovers result in a large wedge between private and social rates of return to R&D. Since firms make investment decisions based on their private returns, the wedge between private and social rates of return suggests that socially beneficial research opportunities are ignored by firms because they are unable to fully capture the rewards of such innovations. Let's look on UNSDGs.

## 3. United Nations Sustainable Development Goals (SDGs)

The Sustainable Development Goals (SDGs) are a collection of 17 global goals set by the United Nations General Assembly in 2015 for the year 2030. The SDGs are part of Resolution 70/1 of the United Nations General Assembly, the 2030 Agenda. Key to making the SDGs successful is to make the data on the 17 goals available and understandable. Goal 9: Building resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation acknowledges that industrialization is one of the main drives of sustained economic growth and sustainable development. This is based on the recognition that modern livelihoods have generally been built on and further developed by industrialization. Today, steady progress has been made in the manufacturing industry. To achieve inclusive and sustainable industrialization, competitive economic forces need to be unleashed to

generate employment and income, facilitate international trade and enable the efficient use of resources<sup>5</sup>.

Manufacturing is a major source of employment and trade is a key driver of economic growth. Exports provide the foreign currency to import essential capital equipment and inputs. In order to achieve adequate growth rates, developing economies countries must have broader access to markets. When developing economies countries export to developed economies countries they face tariffs four times higher on average than those applied in trade between developed economies countries. Developed economies countries impose higher taxes on processed goods than on raw materials, hampering efforts by developing economies countries to diversify out of poverty. Developed economies nations continue to preach economic liberalization abroad while practising protectionism at home.

### **3.1 Sustainable Development Growth**

Sustainable development is the organizing principle for meeting human development goals while at the same time sustaining the ability of natural systems to provide the natural resources and ecosystem services upon which the economy and society depend while growth is the process of developing or of increasing in size. Sustainable development, however, gained worldwide attention through the report of the World Commission on Environment and Development (WCED) entitled: "Our Common Future" otherwise known as the "BRUNDTLAND REPORT"<sup>6</sup>.

The major challenge of sustainable development is its sustainability. The social concept of sustainability is people-centred, and seeks to maintain the stability of social and cultural systems. Any policy that gives emphasis only to growth without considering incomes distribution will not be sustainable in a long run because of the likely upheavals and sub-optimal labour utilization. In order to achieve sustainable development in a twenty first century, therefore, there ought to be a trade off between economic optimization, management of the natural resources stock and provision of optimal social goals. This suggests the need for a multi-criteria analysis to achieve a balance among the three pillars of sustainable development namely: **ECONOMIC, SOCIAL AND ENVIRONMENTAL**.

It is often thought that sustainable development aims at the creation of sustainable improvements in the quality of life for all people as the principal goal of development policy.

Accordingly, sustainable development has many objectives. Besides increasing economic growth and meeting basics needs, the aim of lifting standards involves a number of more specific goals such as bettering people's health and education opportunities, giving everyone the chance to participate in public life, helping to ensure a clean environment and promoting intergenerational equity<sup>7</sup>. We need to adjust quickly to be able to "say something" about the sustainable innovation towards growth.

What is required to attain the nirvana of sustainable development that lies at the heart of national economic aspirations? It is clear that it is connected with increasing the net worth of the nation through expanding the stocks of capital that are inputs into societal development. The capital required for sustainable development comprises the natural resources, the social framework and the human capital available to a country.

### **3.2 Hope for Sustainable Development**

Sustainable development is the central drama of our time. The world's governments are currently negotiating a set of Sustainable Development Goals (or SDGs) for the period 2015-2030, following the success of the Millennium Development Goals (MDGs). The world economy is not only remarkably unequal but also remarkably threatening to earth itself. The unprecedentedly large scale of the world economy is creating an unprecedented environmental crisis, one that threatens the lives and well-being of billions of people and the survival of millions of other species on the planet, and perhaps even our own. People all over world have high hope that new technologies will lead to better live for all. At the same time, there is a great fear of the unknown. Technological change, like all change, poses risks

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<sup>5</sup> The Sustainable Development Goals Report 2018 by United nations Secretary General.

<sup>6</sup> **Note:** The commission defined sustainable development as: "Development that needs of the present without compromising the ability of the future generations to meet their needs". Brundtland 1987.

<sup>7</sup> World Bank (1992).

and opportunities. New technology policies can spur progress towards reaching sustainable growth in the region.

The concept of sustainable development resulted from gradual shift in development theories and their focus. The sustainable development paradigm was conceived as a result of lack of social and economic progress for most developing economies countries, especially those in Africa from the development strategies undertaken over the period from the 1950s to the end of the 1990s<sup>8</sup>. We can argue that well-accepted systems of good governance, a widely and highly regarded independent judiciary, free media, and functioning educational and health systems are as important for development as the reserves of iron ore, the fertility of farm land, the number of computers and mobile phones per capita<sup>9</sup>. It has been argued theoretically that any development strategy that does not balance social, economic and environmental concerns in an ultimate manner will not achieve sustainable development growth in the twenty first century.

It important to know that that environmental and social concerns are integrated in the economic development agenda if development is to be sustainable. Sustainable development should integrate economic growth, social development and environmental protection and treat them as interdependent, mutually supportive and reinforcing pillars of a long-term development in the continent. It is more appropriate that global agreements need to be incorporated into national policies and strategies as well as other implementation instruments before any meaningful action can take place towards innovation and industrialization. Achieving sustainable development on our crowded, unequal and degraded world is the most important challenge facing our generation. The world's governments, within the framework of the United Nations, are implementing a framework to help guide humanity through the very difficult environmental crises of our own making.

### **3.3 Sustainable Development Policy Options**

Scientific progress and technological development are major forces underlying improvements in productivity and living standards. New technologies offer considerable promise for de-coupling economic growth from long term environmental degradation. But there is no guarantee that innovations will appear when and where they are most needed, or at a price that reflects all environmental and social externalities associated with their deployment. Governments need to create a policy environment that provides the right signals to innovators and users of technology processes, both domestically and internationally; to fund basic research; and to support private initiatives in an appropriate manner.

Business and industry play a crucial role in the social and economic development of a country, and they should be full participants in the implementation and evaluation of sustainable development activities. Trade has long been considered a “primary instrument of development”. Today, innovation requires actionable and differentiated insights-the kinds that excite customers and bring new categories and markets into being. Business-model innovations-which change the economics of the value chain and diversify profit streams-have always, have been a vital part of a strong innovation portfolio.

Policies specifically aimed at securing sustained economic growth, a healthy environment or inclusive social developments are important in their own right for sustainable development. Economists routinely refer to economic growth as a measure of increasing human welfare. That economic growth is used as a proxy for welfare is not surprising. After all, consumption possibilities are a major component of welfare as the public understands it. But that same public is also aware that economic growth alone cannot fully describe its needs and wants. It is reminded of this by some of the negative consequences of economic activity – health risks from transport emissions and ozone depletion, declining bio-diversity from loss of habitat, and new forms of inequality associated with changes in

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<sup>8</sup> Economic Commission for Africa (2005): Africa's Sustainable Development Bulletin. Addis Ababa.

<sup>9</sup> Mlosy CD (2003): African Renaissance. Economic Development Policies for Africa. New Partnership for Africa's Development (NEPAD) priorities Conference. Port Elizabeth, South Africa.

technologies and production patterns. This is the context in which the concept of sustainable development has taken root – i.e. that of linking the economic, social and environmental objectives of societies in a balanced way.

Concern for the interests of future generations will, for many people, be reason enough to look beyond economic growth as an indicator of welfare. But there are other reasons as well. The long term sustainability of economic growth itself depends on maintaining basic ecosystem services, a healthy environment and cohesive societies. Balancing these elements will require stronger co-operation with developing and developed economies countries. A key issue for sustainable development is the extent to which different types of capital can be substituted for each other. When substitution at the margin is possible, depletion of one type of capital is consistent with sustainability if it can be offset by an increase in other types. However, substitution between different types of capital is not always possible.

Threats of exceeding critical thresholds in the regenerative capacity of the environment are subject to uncertainty. Accordingly, when designing policies for sustainable development, countries should apply precaution as appropriate in situations where there is lack of scientific certainty. With deepening international interdependency, spillovers become more pervasive. A narrow focus on national self-interest is not viable when countries are confronted with a range of environmental and social threats that have global implications. A participatory approach is important to successfully meeting the challenge of sustainable development, as the criteria for sustainability cannot be defined in purely technical terms. This requires that the process through which decisions are reached is informed by the full range of possible consequences, and is accountable to the public.

## **4. Green Industries**

### **4.1 Green Industries in the Twenty-First Century**

Addressing the challenges relating to green industries, respect for planetary boundaries is no longer confined to the realm of environmental policy. The protection of our planet calls for drastic changes to the very fabric of our economies and to the way we understand development. We know that the current rules of market economies or the so called capitalist system allow economies agents to externalize many environmental costs. As consequences, individuals and firms do not factor such costs into their economic decisions, but pass them on to society and whole. Governments need to take measures to internalize environmental costs that are to ensure they are included in market price. Contrary to what traditional industrial policy suggests, there is a need for governments to select and support certain technologies well before they become commercially viable and to back the potential for cost effective environmental protection. This will mean creating strategic niches in which green innovations can emerge and bridging the valley of death in which to grief before they achieve marketability for sustainable growth.

Therefore, greening' the economy, transforming it to ensure environmental sustainability, it becoming increasingly urgent at current rates of natural resource depletion. It is, however, goals which require enormous investment. As markets in their current form are falling to provide the required incentives, governments must take the responsibility to lead the process. We understand that governments will face lobbying from various groups, with a serious risk of political capture, windfall profits and rent seeking. Managing rents is therefore at the heart of green industry policy. Taking support for renewable energy technologies, governments can manage rents to mobilize both public and private investments in clean technologies while avoiding inefficiencies. We know that, if we are to maintain acceptable living conditions for ourselves and future generation, there will need to be radical change in the way we use and manage our natural resources in region.

Climate change is one of the most urgent environmental problems and it exacerbates the impact of several other environmental and social problems. Keeping the global average temperature rise well below 2°C requires large-scale transformations and is to avoided of the global energy–agriculture–land-economy system, affecting the way in which energy is produced, agricultural systems are organised, and food, energy and materials are consumed. Admittedly, many economies are already developing and deploying technologies that increase resources efficiency. However, the current speed

of efficiency gains is far too slow and the resources saving effects of new technologies are at least partly offset by growing consumption. Let's have a look on United Nations Industrial Development Organization (UNIDO) a specialized agency of the United Nations concept on green industry. The Organization's primary objective is the promotion and acceleration of industrial development in developing countries and countries with economies in transition and the promotion of international industrial cooperation.

## 4.2 UNIDO Concept on Green Industry

The United Nations Industrial Development Organization (UNIDO)<sup>10</sup> coined the concept "Green Industry" to place "Sustainable Industrial Development" in the context of new global sustainable development challenges. Green industry means economies striving for a more sustainable pathway of growth, by undertaking green public investments and implementing public policy initiatives that encourage environmentally responsible private investments. Greening of Industry is a method to attain sustainable economic growth and promote sustainable economies. It includes policymaking, improved industrial production processes and resource-efficient productivity. UNIDO as a Specialized Agency of the United Nations works with governments to support industrial institutions that in turn provide assistance to enterprises and entrepreneurs in all aspects relating to the greening of industry<sup>11</sup>.

The main objectives of UNIDO are to identify gaps in normative policy frameworks in terms of incentives, environmental laws and regulations and other policies which promote the greening of industry. UNIDO strategy aimed at removing gaps in the support system by promoting the establishment of specialized enterprises in the environmental goods and services sector, and by supporting entrepreneurs in assuming the risks of launching businesses in that sector; and to remove gaps in the industrial sector's knowledge and skills set by partnering with institutions of higher learning and assisting governments to develop green technical and managerial knowledge and skills in enterprises; and to develop public-private partnerships in the environment field<sup>12</sup>. The following brief in table 2 show green industry initiative by UNIDO.

**Table 2: UNIDO Green Industry Initiative**

<b>Initiative</b>	<b>What is all about</b>
<b>Resource Efficient and Cleaner Production (RECP)</b>	Taking care of materials, energy, water, waste and emissions makes good business sense. RECP is the way to achieve this. RECP covers the application of preventive management strategies that increase the productive use of natural resources, minimize generation of waste and emissions, and foster safe and responsible production.
<b>Cleaner Production (CP)</b>	ECP uses CP to accelerate the application of preventive environmental strategies to processes, products and services, to increase efficiency and reduce risks to humans and the environment. It addresses, a) Production Efficiency: optimization of the productive use of natural resources (materials, energy and water); b) Environmental management: minimization of impacts on environment and nature through reduction of wastes and emissions; and, c) Human Development: minimization of risks to people and communities and support for their development.
<b>The Stockholm Convention and Persistent Organic Pollutants (POPs)</b>	The Stockholm Convention is a global treaty to protect human health and the environment from chemicals, Persistent Organic Pollutants (POPs) that remain intact in the environment for long periods of time, become widely distributed geographically, accumulate in the fatty tissue of humans and wildlife, and have adverse effects to human health or to the environment.

<sup>10</sup>**Note:** On 17 November, 1966, the United Nations General Assembly passes resolution 2152 (XXI) establishing the United Nations Industrial Development Organization (UNIDO) as an autonomous body within the United Nations. Its mission is to promote and accelerate the industrialization of developing countries.

<sup>11</sup> UNIDO (2010): Green Industry for a Low-Carbon Future: A Greener Footprint for Industry Opportunities and Challenges of Sustainable Industrial Development. Vienna.

<sup>12</sup> Ibid.

<b>The Montreal Protocol (MP)</b>	The Montreal Protocol is an international environment treaty designed to protect the ozone layer by phasing out the production of a number of substances believed to be responsible for ozone depletion. Since 1989, a time table establishes the different phase-outs; for example, it has been agreed to initially phase-out hydro-chlorofluorocarbon (HCFC) – a chemical compound containing hydrogen – by 2015, with a final phase-out by 2030.
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Source: UNIDO, Vienna.

### 4.3 Green Industrial Policy

Green industrial policy (GIP) is strategic government policy that attempts to accelerate the development and growth of green industries to transition towards a low-carbon economy. Green industrial policy is necessary for the reasons that green industries such as renewable energy and low-carbon public transportation infrastructure are faced with high costs and many risks in terms of market economy, and therefore, they need support from the public sector in the form of industrial policy until they become commercially viable<sup>13</sup>. Any structural transformation of the economy faces generic barriers that are not specific to the green transition. Industry is related to a greater or lesser extent to all these environmental impacts. Because human economies are intimately intertwined with global ecosystems, through the feedback loops established, they will have growing impacts on industry.

Green technologies will require a huge amount of coordinated investments. For example, the large scale deployment of renewable energy will require investment in grid infrastructure and a positive agreement on Power Purchasing Agreements (PPA) between the private sector and governments. An effort by the international community to reverse ozone depletion has intimately involved industry, since it is both the producer of ozone-depleting substances and the prime consumer of them. For the same reasons, any attempts to control the manufacture and commercialization of chemicals will have a strong impact on industry. As for efforts by the international community to minimize climate change, they can be expected to have a very large impact on industry. Enterprises will almost certainly be required to find ways of drastically reducing their use of fossil fuels, or drastically reducing their use of electricity generated from fossil fuels.

But the impact of climate change on industry will not stop there. Industries, along with the rest of society, will need to adapt to climate induced changes by relocating out of newly flood-prone zones, making do with less water, adapting to higher temperatures, and so on. And it can be expected that industry will become involved in making available the technologies and other goods and services that society will require to adapt to climate change.

The region should be aware that the new technologies require new skills to enable the technologies to be developed and diffused, and new infrastructure to be deployed. Thus, a successful green transition is likely to entail, for example, upgrading skill sets in industries experiencing only minor adjustments; gearing up educational institutions and firms to provide the new skills for new occupations and sectors that will emerge from the green economy; and retraining and realigning skills in sectors that will decline as a result.

More generally, strong innovation capabilities will be required. This includes not only the training of researchers, but a well-functioning innovation ecosystem. In particular, the financing of R&D and innovative activities is notoriously difficult in a freely competitive market or the so called capitalist system because the primary output of resources devoted to invention is the knowledge of how to make new goods and services, and this knowledge can be easily appropriated by competitors. Financial barriers emerge because investors lack the knowledge necessary to accurately evaluate the risk return profile of new technologies. Lack of adequate financing along the entire innovation chain is one of the main obstacles in the commercialisation of science. Alongside these “direct” benefits to green and greening sectors, there will be indirect benefits spanning the economy, such as from technological and non-technological knowledge spillovers and productivity improvement from better health due to low air pollution.

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<sup>13</sup> Cosby, Aaron (2013-10-30) Green Industrial Policy and World Trading System.

## 5. Green Industries Transition to a Low-Carbon Economy

### 5.1 Background Information on Low-Carbon Economy

Research examines how emerging economies, particularly China and India, are pursuing transitions from high-carbon to low-carbon development, the approaches these countries take to investments in renewable energy, and low-carbon innovation. This new focus also impacts on climate change mitigation, energy security, and economic competitiveness, and can have implications for other countries not yet on the same path<sup>14</sup>. The transition to a low carbon economy involves the substitution of fossil fuel energy with other energy sources, primarily renewable energy such as solar, wind, biogas and others. Shifting to low-carbon economy on a global scale could bring substantial benefits both for developed and developing economies countries.

Many countries around the world are designing and implementing low emission development strategies (LEDS). These strategies seek to achieve social, economic and environmental development goals while reducing long-term greenhouse gas emissions and increasing resilience to climate change impacts. Globally implemented low-carbon economies are therefore proposed by those having drawn this conclusion, as a means to avoid catastrophic climate change, and as a precursor to the more advanced, zero-carbon economy. New scientific evidence suggests that most of the warming observed over the past half-century is attributable to human activities (IPCC, 2001a).

The negotiators of the agreements, however, stated that the NDCs and the 2 °C reduction target were insufficient; instead, a 1.5 °C target is required, noting "with concern that the estimated aggregate greenhouse gas emission levels in 2025 and 2030 resulting from the intended nationally determined contributions do not fall within least-cost 2°C scenarios but rather lead to a projected level of 55 gigatonnes in 2030", and recognizing furthermore "that much greater emission reduction efforts will be required in order to hold the increase in the global average temperature to below 2°C by reducing emissions to 40 gigatonnes or to 1.5°C. Though not the sustained temperatures over the long term that the Agreement addresses, in the first half of 2016 average temperatures were about 1.3 °C (2.3 degrees Fahrenheit) above the average in 1880, when global record-keeping began.

### 5.2 Low-Carbon Economy International Protocols

The United Nations Framework Convention on Climate Change is an international environmental treaty adopted on 9 May 1992 and opened for signature at the Earth Summit in Rio de Janeiro from 3 to 14 June 1992. It then entered into force on 21 March 1994, after a sufficient number of countries had ratified it. The Kyoto Protocol is an international treaty which extends the 1992 United Nations Framework Convention on climate Change (UNFCCC) that commits state parties to reduce greenhouse gas emissions, based on the scientific consensus that (part one) global warming is occurring and (part two) it is extremely likely that human-made CO<sub>2</sub> emissions have predominantly caused it.

The Kyoto Protocol was adopted in Kyoto, Japan on 11 December 1997 and entered into force on 16 February 2005. Global climate policy is moving slowly but relentlessly, with the Paris Agreement setting the rules to reduce emission. The Paris Agreement is an agreement within the United Nations Framework Convention on Climate Change (UNFCCC), dealing with green house-gas-emission mitigation, adaptation, and finance signed in 2016<sup>15</sup>. The Paris Agreement's long-term goal is to keep the increase in global average temperature to well below 2 °C above pre-industrial levels; and to limit the increase to 1.5 °C, since this would substantially reduce the risks and effects of climate change<sup>16</sup>.

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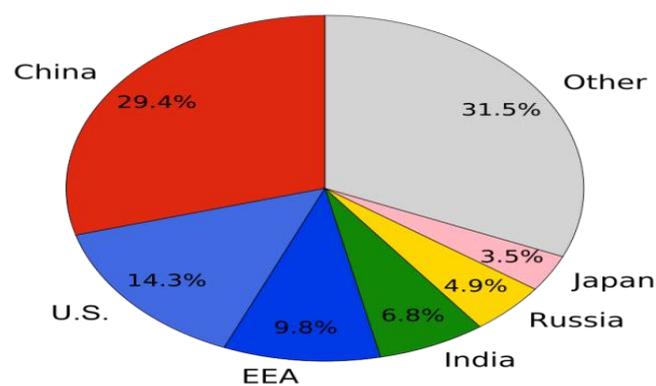
<sup>14</sup> <https://www.chathamhouse.org/research/topics/low-carbon-development>

<sup>15</sup> **Note:** The Paris Agreement has a 'bottom up' structure in contrast to most international environmental law treaties, which are 'top down', characterised by standards and targets set internationally, for states to implement. Unlike its predecessor, the Kyoto Protocol, which sets commitment targets that have legal force, the Paris Agreement, with its emphasis on consensus-building, allows for voluntary and nationally determined targets. Another key difference between the Paris Agreement and the Kyoto Protocol is their scopes.

<sup>16</sup> Paris Agreement: United Nations Treaty Collection. 8 July 2016.

Under the Paris Agreement, each country must determine, plan, and regularly report on the contribution that it undertakes to mitigate global warming. No mechanism forces a country<sup>17</sup> to set a specific target by a specific date, but each target should go beyond previously set targets<sup>18</sup>. Across the region, scientists, engineers and entrepreneurs are using their understanding of the needs of their communities to innovate in order to solve problems and drive sustainable growth. The Paris Agreement has a 'bottom up' structure in contrast to most international environmental law treaties, which are 'top down', characterised by standards and targets set internationally, for states to implement. Unlike its predecessor, the Kyoto Protocol, which sets commitment targets that have legal force, the Paris Agreement, with its emphasis on consensus-building, allows for voluntary and nationally determined targets. Another key difference between the Paris Agreement and the Kyoto Protocol is their scopes.

**Figure 1: Global Carbon Dioxide Emission by Jurisdiction**



**Source:** Climate Change Documents.

### 5.3 Low-Carbon Economy Benefits

Innovation, sustainable growth and green industries, including the transition to a low-carbon economy need to be sustainable as a large challenge for climate policy is a lack of industry and public support. Today's global economy is driven by carbon-based fossil fuels- coal, oil and gas. These are used for transportation and to produce most of the world's electricity and petrochemicals. However, the world is already in transition to a low-carbon economy, driven by two major factors: climate change and technical development. The green economy requires that economic development is decoupled from the use of resources and environmental degradation. Decoupling refers to reducing the environmental impact in terms of both resource use and the generation of pollution and wastes associated with any economic activity. We are being informed that technical development is accelerating, in materials science, energy, digitalisation, connectivity and computer processing power. Further were being told that, in many counties, electricity from solar and wind sources now has less than half the generation cost of coal and nuclear generation.

Low-carbon economies present multiple benefits to ecosystem resilience, trade, employment, health, energy security, and industrial competitiveness. Recent advances in technology and policy will allow renewable energy and energy efficiency to play major roles in displacing fossil fuels, meeting

<sup>17</sup> **Note:** Paris Climate Accord marks shift towards low-carbon economy.

<sup>18</sup> **Note:** In June 2017, U.S. President Donald Trump announced his intention to withdraw the United States from the agreement. Under the agreement, the earliest effective date of withdrawal for the U.S. is November 2020, shortly before the end of President Trump's current term. In practice, changes in United States policy that are contrary to the Paris Agreement have already been put in place.

global energy demand while reducing carbon dioxide emissions. Renewable energy technologies are being rapidly commercialized and, in conjunction with efficiency gains, can achieve far greater emissions reductions than either could independently. Energy for power, heat, cooling, and mobility is the key ingredient for development and growth, with energy security a prerequisite economic growth, making it arguably the most important driver for energy policy. Scaling up renewable energy as part of a low emission development strategy can diversify a country's energy mixes and reduces dependence on imports. Installing local renewable capacities can also lower geopolitical risks and exposure to fuel price volatility, and improve the balance of trade for importing countries (noting that only a handful of countries export oil and gas). Renewable energy offers lower financial and economic risk for businesses through a more stable and predictable cost base for energy supply.

Low-carbon economies present multiple benefits to ecosystem resilience, trade, employment, health, energy security, and industrial competitiveness. Low emission development strategies for the land use sector can prioritize the protection of carbon-rich ecosystems to not only reduce emissions, but also to protect biodiversity and safeguard local livelihoods to reduce rural poverty - all of which can lead to more climate resilient systems, according to a report by the Low Emission Development Strategies Global Partnership (LEDS GP).

Transitioning to a low-carbon, environmentally and socially sustainable economies can become a strong driver of job creation, job upgrading, social justice, and poverty eradication if properly managed with the full engagement of governments, workers, and employers' organizations. Estimates from the International Labour Organization's (ILO) Global Economic Linkages model suggest that unmitigated climate change, with associated negative impacts on enterprises and workers, will have negative effects on output in many industries, with drops in output of 2.4% by 2030 and 7.2% by 2050<sup>19</sup>. Transitioning to a low-carbon economy will cause shifts in the volume, composition, and quality of employment across sectors and will affect the level and distribution of income. Research indicates that eight sectors employing around 1.5 billion workers, approximately half the global workforce, will undergo major changes: agriculture, forestry, fishing, energy, resource intensive manufacturing, recycling, buildings, and transport<sup>20</sup>.

## 6. Responding to Climate Change

Innovation, sustainable growth and green industries, including the transition to a low-carbon economy is important to respond to climate change. Green industrial policy can induce a green spiral and can also break path dependence. Economists view carbon pricing as the most compelling approach to the mitigation of climate change, but their opinion ignores the political cost of radical adoption of carbon pricing and its lack of political feasibility. The Intergovernmental Panel on Climate Change (IPCC) Special Report on Global Warming highlights climate impacts at the current ~1°C global warming as well as the risks of reaching a 1.5°C and the irreversible losses that would take place at 2°C or more warming. We need political leadership to immediately cut emissions across all sectors of the economy, in order to limit warming to 1.5°C.<sup>21</sup> Climate change policies that address market failure and induce innovation in low-carbon technologies can therefore increase welfare (depending on the extent to which increased R&D investment in low-carbon technologies comes at the expense of investments in other welfare-enhancing technologies). Develop policies to guide mitigation over the long term, for stabilising concentrations at levels that avoid dangerous interference with the climate system by identifying and evaluating emission limits consistent with the objectives of the Framework Convention on Climate Change is important.

Therefore, addressing climate change is a particularly urgent challenge, requiring strong international co-operation as well as leadership from all regional countries to act rapidly to achieve the mitigation levels envisaged under the Kyoto Protocol and Paris Agreement. The regional countries also need to introduce market-based measures, such as emission trading systems, carbon taxes and subsidy

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<sup>19</sup> ILO (2016): Global Economic Linkages Model. Geneva.

<sup>20</sup> LEDSGP (2016) Create Green Jobs to Realize the Benefits of Low Emission Development.

<sup>21</sup> <https://www.wwf.org.uk/effects-of-climate-change>

reforms, and to combine these policies with focused programmes for technology development and diffusion (e.g. low carbon emissions energy sources). And finally, there is a need to develop long term mitigation policies and to strengthen their partnerships with developing economies countries, in order to stabilise concentrations at levels that avoid dangerous interference with the climate system. Table 3 show approaches to climate change mitigation in general.

**Table 3: Approach to Climate Mitigation**

Comprehensive Approach to Climate Mitigation	Extending mitigation to all sources of greenhouse gases and carbon removal through sinks.
	Incorporating into climate policies both the ancillary benefits of mitigation policies, and the climate benefits of other policies (e.g. energy efficiency and diversification).
	Reforming subsidies that increase emissions or reduce uptake by sinks, especially in transport, energy and agriculture, and consider measures to ease adjustment.
	Supporting research and technology projects that remove barriers to the uptake of more energy-efficient technologies and less carbon-intensive energy sources, as well as research on the social adjustments likely to arise from policy changes.
	Developing adaptation strategies to reduce exposure to risks of climate change and to facilitate the transition to patterns of living that are less vulnerable to climate impacts.
	Raising awareness of climate change, its impacts, costs and the benefits of policy actions, through information and dialogue with the communities and sectors most affected, so as to facilitate the transition to new forms of work and consumption.
	Developing consistent approaches for monitoring and tracking emissions, to enable transparent reporting, verification and review, and to enhance compliance.

**Source:** Compiled by Authors from different sources.

## 7. Conclusion

Innovation, sustainable growth and green industries, including the transition to a low-carbon economy is a complex subject which will continue to develop in the coming years. Nurturing creativity requires flexible, competitive, dynamic economic environments. This means building on reforms that emphasize openness to new idea, new products and new investment especially on innovation and sustainable growth towards green industries including the transition to a low-carbon economy. But open market and competition are not enough, development to be sustainable, each generation must leave the next a stock of productive capacity, in the form of materials, socio-technological and human assets, that is capable of sustaining and improving the level and growth of utility or well-being per capita enjoyed by the current generation, or at the very least, is equal to that enjoyed by the current generation. In other words innovation, sustainable growth and green industries, including the transition to a low-carbon economy requires that the stock of natural, man-made, social and human capital should not decline. This has come to be known as the Sustainable Constant Capital Rule (CCR). Innovation, sustainable growth and green industries, including the transition to a low-carbon economy seeks to establish a path along which development can progress while enhancing the quality of life of humans and ensuring the viability of the natural systems on which that development depends. Experience suggests that technology and innovation creators in the market sector respond to the demands of high-income consumers rather than the needs of those who have little purchasing power. The current economic and social crisis invites FORUM participates to discuss on innovation, sustainable growth and green industries, including the transition to a low-carbon economy as a basis for a new techno-economic paradigm founded on savings of energy, resources on the development of renewable energies and protection of climate change. The economic analysis of the relationship between innovation and performance should include the environmental constraint as the ultimate limit of the development of suppression. We all know that Green industrial policy and industrial policy have similarities. Both seek to promote the development of industries and the creation of new technology. Each involves government intervention in the economy to address economic issues and market failures. Historically, economic growth has meant transforming much of societies' stocks of natural resources into other forms of capital. Today, maintaining functioning ecosystems that can support economic and social development is recognised as crucial for development to last, especially

when no substitutes are available. Our duty is to make innovation, sustainable growth and green industries, including the transition to a low-carbon economy to sustain and the results from applying it into something that is profitable for all. This is our absolute duty as a majority of natural scientists agree that an enormous reduction in greenhouse gases is essential to mitigate the effects of climate change, such as a rise in global temperatures, droughts, floods, extreme weather events, diseases, food shortages, and species extinction.

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## References

- Africa Regional Report on the Sustainable Development Goals Summary (2015). United Nations Economic Commission for Africa, Addis Ababa, Ethiopia.
- Africa Development Report (2015). Power People Planet: Seizing Africa's Energy and Climate Opportunity. Africa Progressive Panel.
- ILO (2018), World Employment and Social Outlook 2018 – Greening with Jobs
- United Nations (2015). Sustainable Development Goals. New York.
- United Nations (2016). Department of Economic and Social Affairs, Development Policy and Analysis Division.
- United Nations. World Economic and Social Survey (2013). Sustainable Development Challenges. New York.
- United Nations Development Programme (2014). Human Development Report Sustaining Human Progress. Reducing Vulnerabilities and Building Resilience. New York.
- UNIDO (2015). The 2030 Agenda for Sustainable Development: Achieving the Industry –Related Goals and Targets. Vienna.
- Mlosy, CD (2003). "African Renaissance" Economic Development Policies in Africa: NEPAD Conference, Port Elizabeth, South Africa.
- Mlosy, CD (2017). Poverty, Growth and Inequality (PGI) in Africa: 2030 Sustainable Development Goals (SDGs) Achieving the Industry – Related Goals and Targets – Analysis. 2017 Africa Unity Renaissance International Conference South Africa. Pretoria.
- UNEP (2011), Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication, United Nations.
- UNCTAD (2001). United Nations Conference on Trade and Development World Investment Report. Promoting Linkages. Geneva.
- World Economic Forum (2015-2016). The Global Competitiveness Report, Geneva.
- World Bank (2015), Finance Climate Action: A snapshot of the World Bank Group's Climate Work.

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