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SUSTAINABLE URBAN DEVELOPMENT IN EGYPT

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Abstract

The *Thesis* is intended to prove that integrating environmental considerations in urban and physical planning promotes sustainable economic development and helps achieve social justice and environmental integrity. It also argues that achieving sustainable urban development can drive the achievement of sustainable development and the sustainable development goals (SDGs).

Urban development has been identified as the focus of the *Thesis* due to a number of reasons. First, is the rate of population growth in Egypt and the large level of Government spending to meet the increasing demand for housing, particularly for low income and poor families. Second, is the lack of an integrated and holistic approach in providing housing and in the development of efficient and sustainable communities in Egypt. Third, is the large amount of investments allocated by the Government to this sector, thus creating pressure on already strained natural resources such as water and energy. Moreover, informal settlements and the encroachment of urban development on agricultural land are another challenge facing Egypt that is requiring immediate attention.

Housing and new cities and communities is one of the sectors given high priority by the Egyptian Government in order to close the gap between supply and increasing demand and satisfy the housing needs in the country, particularly for low and poor income families. Its importance is also represented in the pressure government spending on this sector creates on available financial and natural resources, primarily water and energy.

Moreover, promoting sustainable communities has the potential for driving sustainable economic development and achieving the SDGs. On the other hand, the development of new communities following conventional and business as usual approach represents a missed opportunity for providing sustainable communities that support economic development, promote social integration and cohesion, and environmental integrity.

Water, energy and food security continue to be a priority in Egypt, which is now considered to be a water scarce country, with about 80% of its water resources coming from outside sources, and with unsustainable patterns of production and consumption characterizing water use in the country. Energy security is another challenge facing Egypt due to increasing demand triggered by population increase, increased level of economic activity and rate of urbanization. Food supply is another challenge given increased demand due to the rate of population growth and volatility of world food prices.

Housing and new communities are large users of energy and water and at the same time generators of large volumes of waste and pollution. Solid waste has been and continues to be of concern to the Government, and is yet to be addressed more effectively.

Generally speaking, cities are where most of the economic activities are undertaken and therefore if well planned can be the engines for economic growth and development. It is estimated that cities generate more than 80% of global GDP and are therefore considered an engine for economic growth. It is also estimated that cities consume about 70% of energy and generate about 70% of CO2 emissions globally as earlier stated.

Main key considerations to be taken into account in the design of macroeconomic, sectoral and regional policies, as well as plans and programmes is integrating environmental considerations in a manner that complements and supports economic and social objectives. The selection of the policy objective and the policy package necessary to achieve this end should be identified on the basis of the extent to which the selected policy, plan, and programme achieves sustainable development. Moreover, promoting urban resilience is essential in achieving sustainable development, end poverty and promote the sharing of prosperity.[1]

The main objective of the *Thesis* is therefore not simply to produce an argument for the importance of integrating the environment in the housing sector, but to make a case for the need to create sustainable urban communities that drive the economy, promote social integration and environmental integrity. It is intended to emphasize how sustainable urban communities which integrate environmental as well as social dimensions achieve economic and social objectives, promote urban resilience, while at the same time conserving the environment.

In most cases, it is not evidently clear in the mind of practitioners and policy makers the linkages between investing in the environment and the positive economic and social implications that result. This work is intended to demonstrate these linkages. It should be considered as an eye opener for practitioners and policy makers to chart a new sustainable path for development, following an integrated approach that fully takes into account account the three dimensions of sustainability. The outcome of this work may be used to provide insights for city and urban planners and practitioners on the need to adopt such

[1] Investing in Urban Resilience, Protecting and Promoting Development in a Changing World, The World Bank 2015,

an approach in the design of sustainable urban communities that contributes to sustainable economic development.

The research proposes a set of objectives and priorities that are needed in order to achieve resource efficiency, promote social integration and cohesion, and achieve environmental integrity and good governance in the urban development sector. It also proposes a set of measures and policies that are needed to achieve the objectives.

The *Thesis* benefited from consultations with relevant stakeholders in the public and private sector.

Acronyms

AFD	Agence Francaise de Développement
CCRMO	Climate Change Risk Management Programme
CO_2	Carbon Dioxide
COP	Conference of the Parties
CUSCRE	Central Unit for Sustainable Cities and Renewable Energy
DEAT	Department of Environmental Affairs and Tourism
EEAA	Egyptian Environmental Affairs Agency
EGBC	Egyptian Green Building Council
EIA	Environmental Impact Assessment
EPR	Extended Producer Responsibility
ESI	Environmental Sustainability Index
EC	European Commission
EU	European Union
FwD	Financing for Development
GDP	Gross Domestic Product
GEF	Global Environment Facility
GGGI	Global Green Growth Institute
GHG	Green House Gases
GOPP	General Organization for Physical Planning
GPRS	Green Pyramids Rating System
GUDF	Green Urban Development Fund
HCPSD	High Council for Planning Sustainable Development
HFCs	Hydrofluorocarbons
IA	Integrated Assessment
IRP	International Resource Panel
ISDF	Informal Settlement Development Facility
ISWM	Integrated Solid Waste management
JPOI	Johannesburg Plan of Implementation
LA21	Local Agenda 21
LCA	Life Cycle Assessment
MDGs	Millennium Development Goals

MERE	Ministry Electricity and Renewable Energy
MHUUD	Ministry of Housing, Utilities, and Urban Development
MID	Ministry of Industrial Development
MoD	Ministry of Defence
MoE	Ministry of Environment and Energy
MoI	Ministry of Investment
MoLD	Ministry of Local Development
MoT	Ministry of Transportation
MPMAR	Ministry of Planning, Monitoring, and Administrative Reform
MSWNS	Municipal Solid Waste National Strategy
MTI	Ministry of Trade and Industry
MURIS	Ministry of Urban Reform and Informal Settlements
MWRI	Ministry of Water Resources and Irrigation
NALRA	National Association of Local and Regional Authorities
NCR	National Communication Report
NCSD	National Council for Sustainable Development
NDP	National Development Plan
NEAPs	National Environmental Action Plans
NFSD	National Framework for Sustainable Development
NIS	National Inventory System
NSDS	National Sustainable Development Strategies
NSSD	National Strategy for Sustainable Development Strategy
NUA	New Urban Agenda
NUCA	New Urban Communities Authority
NWRP	National Water Resources Plan
ODA	Official Development Assistance
OECD	Organization for Economic Cooperation and Development
PCSD	Presidential Commission on Sustainable Development
PES	Payment for Ecosystem Services
PPP	Polluter Pays Principle
P-P-P	Public-Private-Partnership
R&D	Research and Development

SA	Sustainability Assessment
SCE	Supreme Council of Energy
SD	Sustainable Development
SDGs	Sustainable Development Goals
SDI	Slum/Shack Dwellers International
SDS	Sustainable Development Strategy
SEA	Strategic Environmental Assessment
SNA	System of national account
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention for Climate Change
UNIDO	Industrial Development Organization
USA	United States of America
WDR	World Development Report

Introduction

It has become increasingly recognized that environmental strategies and action plans prepared in isolation from mainstream macroeconomic and sectoral policies have not yielded the expected results. This is because economic considerations and priorities have been given precedence over environmental and social considerations. The outcome has been that in many instances policies, plans and programmes have resulted in negative impacts on the environment and society and did not result in sustainable economic growth and development.

Conventional policymaking processes have therefore not yielded the desired outcome of achieving sustainable development and human welfare. Developing policies, plans and programmes that do not consider environmental considerations at their core have proven their deficiencies. Considering environmental aspects as an isolated exercise or after a policy, plan, programme, or project has been developed has proven to be ineffective. Environmental as well as social considerations should be considered alongside economic considerations in the planning and decision making process of macroeconomic and sectoral policies. The recognition of this imperative, particularly in the last decade has resulted in the immergence of new approaches and tools designed to achieve this objective. These included strategic environmental assessment (SEA), sustainability assessment (SA), and integrated assessment (IA). Though the advocates of these tools may lay emphasis on certain aspects over the other, they all aim more or less at achieving the same objective, which is mainly to ensure that proposed policies, plans and programmes do not result in environmental degradation and ecosystem damage.

In order to ensure the integration of the three sustainability dimensions in the policy and decision-making process, the benefits of the economic, social and environmental aspects and the inter linkages between the three dimensions should be clearly identified and brought to the attention of policy and decision makers and practitioners.

In order to achieve this end a number of measures need to be introduced. There is a need to institutionalize integrated policymaking as an approach to be adopted in the design and formulation of policies, plans and programmes in Egypt. Relevant stakeholders should participate in the process and throughout the policy cycle in order to ensure that concerns and priorities of different stakeholders and segments of the population are taken into account. Public participation reduces potential resentment to the proposed policy, plan, or programme, and increases the likelihood of their successful implementation. Raising awareness of the importance of integrating sustainability considerations in the decision

making process is also an important component of an effective integrated policymaking process. It is therefore essential to establish modalities for continuously communicating the outcome of the different stages involved in the policy formulation process to the different stakeholders.

Monitoring the implementation of proposed policy, plan, and programme should also be an integral part of the process. This should be followed by an evaluation of the outcome of implementation of the selected policy, plan, or programme, and the drawing of lessons learned through the policy formulation and implementation process, to be taken into account in subsequent planning processes.

The last several decades have witnessed an increased rate of urbanization worldwide. While this is resulting in increased pressure on the environment and the ecosystem, it also provides opportunities for the adoption of more sustainable lifestyles and efficiency in resource use. About half of the world population now live in urban areas. Low and middle-income countries are experiencing growing urbanization, where more people are moving from rural to urban areas. Urban communities provide investment and employment opportunities as well as social and cultural activities. As recognized by the Cities Alliance, cities are essential for economic and social development. Economic growth has been generally associated with rapid urbanization.[2]

Globally, people living in urban areas increased from 14% to 54% during the period between 1900 and 2015 and is expected to reach 66% by 2050. According to the International Resource Panel (IRP), at the current rate of expansion of cities following a business as usual approach, material consumption by cities is estimated to grow from 40 billion tonnes in 2010 to about 90 billion tonnes by 2050.[3]

With such a fast pace of urbanization accompanied by the influx of investments and skills, cities have become major growth engines generating more than 80% of Gross Domestic Product (GDP) and contributing to poverty alleviation. However, cities continue to face serious challenges represented in increased levels of pollution, widening gap between rich and poor, deterioration of building stock and the mushrooming of informal settlements. According to the World Bank, about one billion people living in urban areas live in informal

[2] David Dodman, Gordon McGranahan and Barry Dalal-Clayton, United Nations Environment Programme (UNEP), Integrating the Environment in Urban Planning and Management, Key Principles and Approaches in the 21st Century, 2013

[3] World Economic Forum, Circular Economy in Cities, Evolving the model for a sustainable urban future, in collaboration with PwC, 2018

settlements worldwide.[4] Informal settlements continue to be one of the main problems facing countries around the world. It is estimated that one in seven of the total world's population live in informal settlements in urban areas. In middle and low-income countries, it is estimated that one third of the population live in informal settlements. In order to address this phenomenon, the city and national federations of networks of slum/shack dwellers (Slum/Shack Dwellers International – SDI) has been created and is now active in over 30 countries [5]

According to the Ministry of Housing, Utilities, and Urban Development (MHUUD), it is estimated that over 40% of the urban population in Egypt live in informal settlements.

Moreover, climate change and natural disasters are expected to further exacerbate the situation, where according to the World Bank this may cost cities US$ 314 billion annually and drive some 77 million urban inhabitants into poverty. Action is therefore urgently needed to address these challenges. Habitat III conference held in October 2016 in Quite, Ecuador, adopted a new urban agenda that provides new global standards for sustainable urban development and directs global efforts towards achieving the SDGs and addressing climate change challenges. This was further reemphasized by governments at the Ninth Session of the World Urban Forum held in February in Kuala Lumpur, Malaysia.[6]

According to the World Bank, between US$ 4.5 and US$ 5.4 trillion are required to fill the urban infrastructure gap. Official Development Assistance (ODA) only provides 3% of this amount. Half of the world production comes from only 1.5% of the world's land, thus resulting in inequalities, which is negatively affecting development. Efforts should therefore be exerted to promote inclusive sustainable economic growth through territorial development, which promotes connectivity between cities thus allowing more access to jobs and promoting economic growth. Due to the potential negative impacts of climate change, future cities should be resilient to natural disasters, this is particularly important since globally more than 90% of urban communities are located along coastal areas.[7]

Increased levels of urbanization are translated in significant increases in the level of waste being generated and the resultant negative environmental and health impacts. According to the World Bank, cities generate large amounts of waste estimated at 1.3 billion tonnes

[4] The World Bank, 3 Big ideas to Achieve Sustainable Cities and Communities, 2018
[5] Celine d'Cruz. Sonia Fadrigo Cadornigara and David Satterthwaite, Tools for Inclusive Cities, the roles of Community-Based Engagement and Monitoring in Reducing Poverty, IIED, June 2014
[6] The World Bank, 3 Big ideas to Achieve Sustainable Cities and Communities, 2018
[7] The World Bank, 3 Big ideas to Achieve Sustainable Cities and Communities, 2018

of waste annually, and is expected to reach 2.2 billion tonnes by 2025. Since current disposal practices of waste result in landfills and environmental pollution, more innovative solutions need to be devised to reduce the negative impacts of waste on health and the environment.[8] Moreover, it is estimated that cities consume two thirds of the world's energy, which account for 70% of global CO_2 emissions.

It is estimated that by 2030 three billion people will need housing globally. Providing affordable housing for the different segments of the population is considered as a basic human right and contributes to social, cultural, and economic development for communities. On the other hand, inadequate housing has negative implication on these matters, in addition to negative environmental impacts. Though around one billion people live in informal settlements around the world, it should be pointed out however, that slum dwellers declined by 20% between 2000 and 2014 thus representing 23% in 2014 down from 28% .[9]

As clearly articulated *"We are on the cusp of a new economic era: one where growth is driven by the interaction between rapid technological innovation, sustainable infrastructure investment, and increased resource productivity. This is the only growth story of the 21st century. It will result in efficient, liveable cities; low carbon, smart and resilient infrastructure; and the restoration of degraded lands while protecting valuable forests. We can have growth that is strong, sustainable, balanced, and inclusive."*[10]

As a concept that fosters sustainability, *circular economy* is not a new concept, it has gained increased recognition over the last 50 years. Related concepts include sustainable development, green economy, performance economy, life cycle approach, cradle to cradle, and shared value, industrial ecology, extended producer responsibility, and eco design. Introducing and applying the circular economy approach in cities operating under a resource constrained environment can result in immediate benefits.[11]

Adopting a circular economy results in a number of benefits for stakeholders, which includes decoupling economic growth from resource consumption thus enabling cities

[8] World Economic Forum, Circular Economy in Cities, Evolving the model for a sustainable urban future, in collaboration with PwC, 2018
[9] Tracking Progress Towards Inclusive, Safe, Resilient and Sustainable Cities and Human Settlements, SDG 11 Synthesis Report: High Level Political Forum 2018
[10] Unlocking the Inclusive Growth Story of the 21st Century: Accelerating Climate Action in Urgent Times, The New Climate Economy
[11] World Economic Forum, Circular Economy in Cities, Evolving the model for a sustainable urban future, in collaboration with PwC, 2018

thriving without damaging the environment, improving the quality of life, ensuring the sustainability of the systems, and creating new job opportunities.[12]

According to the Geneva UN Charter on Sustainable Housing, positive impacts of housing can be enhanced by ensuring the adoption of the following four main principles: environmental protection, economic effectiveness, social inclusion and participation, and cultural adequacy. The Charter contributes to the implementation of relevant SDGs on cities and human settlements and the implementation of the UN HABITAT Global Housing Strategy Framework.[13]

The role of cities in addressing global environmental issues has become prominent with the launch of the Liveable Cities report in 2007 "Liveable Cities: the benefits of urban environmental planning". Since then a number of cities worldwide have taken actions to promote sustainable cities. These included cities in the developed world such as Stockholm to developing countries such as Curitiba, Ahmedabad in India, and Bogota in Colombia. The experience of such cities and other demonstrate that taking environmental concerns into account result in economic and social benefits. This actually draws and builds on the main underlying principles and approach behind the "*Green Economy*" approach.

Sustainable urban development does not only result in positive outcomes for cities and towns, but also results in global benefits. This is represented in the opportunities provided by urban areas to reduce pressure on the earth's ecosystems.[14]

Urban communities will be increasingly important for integrating social, economic and environmental objectives as well as achieving all Sustainable Development Goals (SDGs). This is because cities are home to most economic activities, cities drive innovation, and attract investment, thus contributing effectively to sustainable economic growth and development. In addition to generating about 80% of GDP, cities use about 70% of global resources, and about 70% of energy consumption that results in 70% of global carbon emissions. Cities are also characterized by being overpopulated with high levels of social segregation and inequalities, unemployment and poverty, unaffordable and inadequate housing, informal settlements, and deteriorating environment with high levels of pollution.

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[12] World Economic Forum, Circular Economy in Cities, Evolving the model for a sustainable urban future, in collaboration with PwC, 2018

[13] United Nations Economic Commission for Europe, Geneva UN Charter on Sustainable Housing, 2015

[14] David Dodman, Gordon McGranahan and Barry Dalal-Clayton, United Nations Environment Programme (UNEP), Integrating the Environment in Urban Planning and Management, Key Principles and Approaches in the 21st Century, 2013

These challenges also offer opportunities that may be taped on through integrated policymaking. It has been increasingly recognized that well designed urban developments not only can address the challenges faced by cities but can also drive sustainable development.

International Agenda

At the Millennium Summit held in 2000 world leaders called for a new global partnership for poverty reduction. As a consequence, the Millennium Development Goals (MDGs) were proposed following an extensive consultation process. The United Nations Secretary-General presented the proposed MDGs to the UN General Assembly in 2001, were member states recommended that they be used to guide the implementation of the Millennium Declaration by 2015. The MDGs comprised of 8 goals, which included the eradication of poverty, achieve universal primary education, promote gender equality and empowerment of women, reduce child mortality, improve maternal health, combat HIV/AIDS, malaria, and other diseases, ensure environmental sustainability, and global partnership for development. The achievement of these goals by different countries were varied, but it was evident that the sustainability dimension was lacking across sectors.

Following a consultation and a participatory process, governments negotiated what is referred to as the "Post 2015 development agenda", which included 17 sustainable Development Goals (SDGs). The agenda includes: an introductory declaration, the SDGs, targets, means of implementation, a new Global Partnership, and a framework for follow up, review and implementation.

The implementation of the SDGs and the outcome of the Third International Conference on Financing for Development (FfD) represents an opportunity to begin to treat internationally driven environmental, social, and economic matters with the same degree of urgency and importance as a security crisis. It is also an opportunity to advocate a new structural alignment at the UN system appropriate to the scale of contemporary globalization and its rafimications.

After an extensive negotiating process, the following SDGs were adopted by Governments at the UN Summit on the Post-2015 Development Agenda held in New York in September 2015:

1. End poverty in all its forms everywhere
2. End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.
3. Ensure healthy lives and promote wellbeing for all at all ages.
4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
5. Achieve gender equality and empower all women and girls.
6. Ensure availability and sustainable management of water and sanitation for all.
7. Ensure access to affordable, reliable, sustainable and modern energy for all.
8. Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all.
9. Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.
10. Reduce inequality within and among countries.
11. Make cities and human settlements inclusive, safe, resilient and sustainable.
12. Ensure sustainable consumption and production patterns.
13. Take urgent action to combat climate change and its impacts (taking note of agreements made by the United Nations Framework Convention for Climate Change (UNFCCC) forum).
14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development.
15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably

manage forests, combat desertification and halt and reverse land degradation, and halt biodiversity loss.

16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.
17. Strengthen the means of implementation and revitalize the global partnership for sustainable development.

A number of challenges face the SDG related to cities and communities (SDG11) as reflected in the Synthesis Report prepared by the UN Human Settlement Programme (UN Habitat. The report which represents a joint position by the UN family related to urbanization, lays special emphasis on the value added of sustainable urbanization as a necessary prerequisite for achieving sustainability and prosperity. The report indicates that in the first year of implementation of the SDG more than 55% of households in sub-Saharan Africa spent more than 30% of their income on housing with growing number of people living in informal settlements. It also reveals that cities are growing at a faster rate than population growth thus contributing to urban related disasters, climate change with dire implications on government budgets, planning and policies. In order to address the challenges facing the achievement of SDG11, the report identifies a number of issues that need to be dealt with. These include, a global agreement of what constitutes an urban area, develop quantitative and qualitative and spatial analysis approaches to ensure that no one

is left behind, establish new partnerships to reinforce monitoring and reporting mechanisms.[15]

Annex I provides a list of SDG11 targets and indicators.

Achieving goal 11 aims at making human settlements and cities, safe, resilient, and sustainable. These objectives are to be realized by solving the informal settlement phenomenon in cities, arresting environmental degradation and pollution, providing affordable and accessible transportation, and making available affordable housing It also includes enhancing participation in decision making and in the management of cities, providing affordable social services in the form of education and health and recreational services, providing sufficient public space, and making cities resilient to climate change and natural disasters.[16]

In the words of the urban economist Edward Glaeser,

"The strength that comes from human collaboration is the central truth behind civilization's success and the primary reason why cities exist… building cities that foster interactions and the exchange of goods and ideas is the biggest challenge confronting us today"

It is becoming evidently clear that in order to realize the SDGs objectives, countries would need to transform the way policies and programmes have been developed in order to ensure that they are developed in a more participatory, inclusive, integrated and sustainable way. The following section provides a brief review of the emergence of the concept of sustainable development and the experience of a number of selected countries around the world in initiating and implementing sustainable development policies.

The EU Sustainable Development Strategy (SDS)

The concept of sustainable development (SD) goes back to Agenda 21, agreed upon at the 1992 Earth Summit (UNCED) held in Rio de Janeiro, Brazil. Agenda 21 called upon countries to transition to sustainability in the 21st century. It was not only the first comprehensive statement of principles for the sustainable management of the environment, but also the first document that called on all-countries to "ensure socially

[15] Tracking Progress Towards Inclusive, Safe, Resilient and Sustainable Cities and Human Settlements, SDG 11 Synthesis Report: High Level Political Forum 2018

[16] United Nations, Tracking Progress Towards Inclusive, Safe, Resilient and Sustainable Cities and Human Settlements, SDG 11 Synthesis Report, High Level Political Settlements 2018

responsible economic development, while protecting the resource base and the environment for the benefit of future generations."[17]

Agenda 21 being a non-binding voluntarily action plan, only a few European Union (EU) countries moved on from their conventional environmental policy strategies launched during the 70s and 80s into what the UN had called for, namely "a coordinated, participatory, iterative and cyclical process of thoughts and actions to achieve economic, environmental and social objectives in a balanced and integrated manner"[18]. Thus, the 1997 Rio +5 summit called for the completion of the SD strategies by the year 2002 and to begin implementation by 2005.[19]

The European Union

The 1997 Treaty of Amsterdam included sustainable development as an overarching objective of the EU policies. Not only, the call was reiterated in June 2001 at the Gothenburg European Council, but also EU leaders launched the first EU sustainable development strategy (SDS) based on a proposal from the European Commission. By the of 2002 and prior to the Johannesburg World Summit for SD, the SDS of most of the EU Member States were already formulated and in-effect.

In June 2006, the European Council reviewed the EU SDS with the purpose of ensuring that it lives up to their ambitions. This resulted on a renewed strategy, which set out a single coherent strategy on how the EU will more effectively live up to its long-standing commitment to meet the challenges of sustainable development.[20]

It provided guidelines that, according to the Resource Book for SD strategies was intended to guide the development of "*an underlying vision through a consensual, effective and iterative process.*"[21] Thus, the development and implementation of SDSs moved on from being a one off fixed plan into a process that can continuously be developed and improved.

In general, SDSs are considered to be a transition from inflexible planning schemes to flexible strategy processes. They were also a transition from being the mandate of *"clear-*

[17] United Nations Conference on Environment and Development, Earth Summit, Agenda 21, June 13, 1992, paragraph 8.7

[18] UNDESA, 2001b, paragraph 3

[19] UNGASS, 1997, paragraph 24

[20] European Commission's site on SD

[21] European Sustainable Development Network, "Basics of SD Strategies"

cut sectoral authorities to cross-cutting competencies, from pure hierarchies to an amalgamation of hierarchies and networks, from top-down control to process and policy assessments, and from knowing to learning."[22]

In July 2009, the Commission of the European Communities conducted a review of the EU SDSs. The review commended actions taken to combat climate change and to promote a low carbon economy, yet found that despite the efforts made towards incorporating sustainable development in the EU policies and practices, unsustainable trends still persisted. The review proposed that efforts need to be intensified to promote sustainable development policies and practices.

In 2010, the EU Commission published the Europe 2020 Strategy. The strategy was adopted by the European Council in the same year. The Strategy included five targets, namely; employment, research and innovation, climate change and energy, education, and combating poverty. It stressed the importance of coordination between the EU leaders, the involvement of relevant stakeholder and the integration of the three dimensions of SD in EU policies. It defines timeline and key performance indicators. It is referred to as a strategy for *"smart, sustainable and inclusive growth."* [23]

In response to the 2009 review and the Europe 2020 Strategy, the period from 2010 to 2012 marked the adoption of the revised national SDSs in many European countries. The main purpose of the revision was to update the current national SDSs and promote collaborative efforts between actors involved at the regional level.[24]

In 2012, the Rio+20 Conference, took place in Rio de Janeiro, Brazil. The Conference produced a document entitled "*The future We Want*." The outcome document provides a firm foundation for social, economic and environmental well-being as well as a package of commitments for action and agreement by leaders of the world attending the Conference on the path for a sustainable future.[25]

[22] European Sustainable Development Network, "Basics of SD Strategies
[23] The European Commission, "Europe 2020 Strategy," March 2010
[24] Umberto Pisano, Katrin Lepuschitz & Gerald Berger, the European Sustainable Development Network (ESDN) Quarterly Report 29, "National Sustainable Development Strategies in Europe 2013: taking stock and exploring new developments," July 2013
[25] Rio+20 United Nations Conference on Sustainable Development press release, 2012

Experience of selected OECD Countries in SDSs

Germany [26]

In 2000, the State Secretaries' Committee on Sustainable Development was established in Germany. It was not before 2002 though that the Government adopted its first National Sustainable Development Strategy (NSDS). In its formulation, the German Government consulted a wide range of national and regional stakeholders. The Strategy consisted of 21 targets and indicators with the purpose of making sustainability quantifiable. The first comprehensive progress report was issued by the German Government in 2004 followed by a short report in 2005. In 2007, subsequent to the 2006 EU SDS, which was proposed by the European Commission, Germany published a report on the implementation of the EU SDS. In order to strengthen the EU linkage, the progress reports of 2008 and 2012 stressed the importance of the EU SDS as an important point of reference for the NSDS by using national sustainability-indicators in line with those identified by the EU SDS. Since 2008 and to-date, the current strategy includes 38 indicators for sustainable development in 21 areas. Key topics covered in the 2008 report were: climate change, energy efficiency, natural resources, social inclusion and international food crisis. The 2012 report focused on four key topics: sustainable economic activities, climate change, energy efficiency and sustainable water policy.

The German NSDS integrates all three dimensions of SD. This forms the framework for the main goals of the strategy and the identified indicators. The importance of covering the three dimensions of SD was clearly stated in the 2008 progress report, then again was reiterated in the 2012 progress report. The Government adopted as a basis of its NSDS an approach to sustainability which combines economic capacity with ecological responsibility and social justice. The strategy emphasizes sustainability as the basis for sound policy-making, with short-term thinking replaced by a comprehensive and holistic long-term policy design.[27]

In order to ensure that the NSDS lives up to its expectations, the German Government implemented both horizontal and vertical integrations. Being the high-ranking coordinating and monitoring body for sustainability, the State Secretaries' Committee on Sustainable Development created for this purpose, consists of representatives from all ministries and chaired by the Head of the Federal Chancellery. This horizontal integration

[26] European Sustainable Development Network, "Single Country Profile"
[27] The Federal Government, "The National Sustainable Development Strategy 2012 progress Report," February 2012

mechanism[28] is considered a key success factor for the NSDS. Because sustainability is a cross-cutting concept, this mechanism has prevented any kind of conflict between the respective ministries and ensured proper coordination, consistency and commitment. The vertical integration mechanism is implemented to strengthen linkages between the main strategy and sub strategies, and between the NSDS and the EU SD.[29] The latter is achieved by making the renewed EU SDS an important benchmark for national activities.

Norway [30]

In 2002, the Government of Norway adopted its first NSDS, but it wasn't before 2004 that the strategy was implemented. The 2002 NSDS was known as the Local Agenda 21 (LA 21) since its goals were based on the Agenda 21. LA 21 is distinguished from the earlier local environmental protection plan by its broadness. LA 21 emphasized the links between environmental impacts and socio-economic pressures and between local and global problems. Moreover, it stressed the importance of building sustainable development policies and strategies following a cross-sectoral approach.[31] LA 21 initiatives were later on replaced by the Vital Municipalities agreement and the Green Energy Municipalities cooperation agreement. The Former agreement was signed in 2006 between the National Association of Local and Regional Authorities (NALRA) and the Ministry of the Environment agreeing that municipalities direct attention to topics central to any of the three dimensions of SD. The second agreement was signed in 2007 between the local authorities and the Government agreeing to make municipalities support work on energy efficiency and renewable energy.

A new Strategy was presented in 2008 followed by an update in 2011. The 2011 NSDS focuses on 7 policy areas that cover the three dimensions of SD, namely; the economic, the environmental and the social. Progress is monitored by 17 indicators. The consulted multi stakeholders, include but not limited to representatives from all ministries, NGOs, industry and the public, participated by reviewing the document and by providing feedback and recommendations.

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[28] Horizontal Integration: There is only one main strategy implemented by all
[29] Vertical Integration: an indirect link between the sub strategies and the main strategy
[30] European Sustainable Development Network, "Single Country Profile"
[31] Tony Jackson**,** Journal of Environmental Planning and Management**,** "From the Earth Summit to Local Agenda 21: Working Towards Sustainable Development " November 1999

The Norwegian Ministry of Finance has a secretariat that coordinates and monitors progress in the implementation of the NSDS locally. It also guides how Norway can contribute to sustainable development globally.

Denmark [32]

In 2002, the Government of Denmark announced its first NSD Strategy, titled "A Shared Future – Balanced Development". The Strategy covers the three dimensions of SD from national and international perspectives. The Strategy consists of 21 objectives and a total number of 200 priorities. In 2007, in response to the 2006 EU SDS, the Government of Denmark published its first national report on the endorsement and the implementation of the EU SDS using the mechanism of vertical integration coupled with proposed amendments to the NSDS. Around 230 participants representing different stakeholders participated in the debate over the proposed amendments. This resulted in the 2009 revised NSDS. Denmark is currently participating in the development of a new Nordic Sustainable development strategy inclusive of indicators.

At the national level, each Danish municipality has its own SD strategy, which is being renewed every 4 years. The Ministry of Environment has been assigned the responsibility for the coordination and monitoring of all activities and initiatives related to sustainable development in the country. Accordingly, municipalities as well as all involved ministries report periodically to the coordination body established for the purpose.

Experience of selected Non-OECD Countries in SDSs

South Africa

In 1995, The South African Department of Environmental Affairs and Tourism (DEAT) started developing a policy paper on environmental management, but it was not before 1997 that the policy was adopted. The policy was in response to the Agenda 21, the product of the 1992 United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, Brazil. The policy defined 7 strategic goals for achieving a sustainable environmental management system in the country. During the Johannesburg Summit, South Africa pushed for an action oriented outcome with a set of targets for sustainable development. The Johannesburg Plan of Implementation (JPOI), which is a detailed course of action for the implementation of Agenda 21 was thus adopted. In 2003, South Africa prepared a response strategy to the JPOI. For South Africa to successfully implement the JPOI, it was necessary to adopt integrated sustainable development principles. In 2004, the

[32] European Sustainable Development Network, "Single Country Profile"

Government of South Africa announced the development of the first draft of its National Strategy for Sustainable Development Strategy (NSSD) under the environmental pillar.[33]

In 2008, the Government of South Africa launched the National Framework for Sustainable Development (NFSD) – also known as NSSD 1 (2011–2014). It is a strategy that covers the three dimensions of sustainable development. NSSD is therefore a strategy that combines environmental protection, social equity and economic efficiency. Rio+20 identified two essential themes to support the country's efforts. These are the green economy, within the context of achieving sustainable development and poverty eradication and the necessary institutional framework to achieve this end.[34] The strategy identified 5 strategic objectives which are: "enhancing systems for integrated planning and implementation; sustaining our ecosystems and using natural resources efficiently; towards a Green Economy; building sustainable communities and responding effectively to climate change."[35]. All role players were engaged in the development of the strategy. The evaluation of the progress of the NSSD 1 guided the formulation of the NSSD 2 (2015–2020).

Costa Rica [36]

In 1994, Costa Rica adopted a sustainable development policy. There had been no unified national sustainable strategy but rather a set of decentralized activities. However, steps were continuously taken towards integrating the country's sustainable development endeavours and related activities. In 1998, the Government established the National Council for Sustainable Development (NCSD) with the mandate of promoting dialogue between the relevant sectors and stakeholders involved in the field of environmental management and sustainable development. With the council failing to achieve its set objectives, in 1999 the Government assigned the task to the Ministry of Environment and Energy (MEE). The MEE focused its work on the implementation of the Agenda 21 strategies at the local level.

In 2006, the Government launched its National Development Plan (NDP) covering the period between 2006 – 2010. The NDP addresses cross-sectoral issues, with each sector allowed a maximum of 10 strategic actions with budget estimates. The Ministry of Planning, Monitoring and Administrative Reform (MPMAR) is assigned the task of coordination of the implementation of the NDP at the national level. The MPMAR is also

[33] Stratos Inc., "Analysis of National Strategies for Sustainable Development," June 2004
[34] South Africa's Department of Environmental Affairs and Tourism, "The National Strategy for Sustainable Development Strategy - NSSD1 (2011-2014)," November 2011
[35] South Africa's National Strategy for Sustainable Development (NSSD)
[36] European Sustainable Development Network, "Single Country Profile"

in-charge of the development of the specific objectives and goals and the prioritization of programmes and initiatives.

South Korea

The Korean National Strategy for Sustainable Development (NSSD) can be traced to the 1992 Agenda 21. The first national action plan to implement Agenda2 focused primarily on environmental issues. In 2000, the Korean Government announced the establishment of the Presidential Commission on Sustainable Development (PCSD). Immediately after its establishment, the PCSD started to develop a cross-sectoral NSSD. At the 2005 world environment day, Korea announced that its national vision for sustainable development is *"to continue Korea's growth as an advanced country while maintaining balance between the economy, society and the environment."*[37] The strategy covers the three pillars of SD, yet focuses on five themes, two of which are the integration of economic growth and environmental conservation, and the establishment of an environmentally friendly economic structure. The PCSD was assigned the task of coordination and monitoring. Together with 22 ministries and Governmental offices and based on multi stakeholder consultations, including civil society organizations and business, the PSCD developed Korea's NSSD. In 2005, Korea recognized the need to move on from a mere environmental policy to a broad sustainable development strategy. In addition to its poor environmental performance (ranked 122nd out of 146 nations according to the 2005 Environmental Sustainability Index (ESI) of the World Economy Forum), Korea's level of social integration was falling. The rapid economic growth of Korea in the 60s (ranked 10th out of 30 Organization for Economic Cooperation and Development (OECD) countries in gross domestic product (GDP) increase), was coupled with "*weak socio-economic structure in terms of pollution prevention comprising industrial structure, production and consumption patterns and people's attitudes."*[38]

In 2006, the PCSD officially requested all Government departments to start implementing the agreed upon strategy. The strategy covered the period of five years (2006-2010), and is subject to review and update every five years. Based on the outcome of the evaluation of the previous strategy, lessons learnt and the current Korean situation, the next five-year NSSD is to be developed.

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[37] Dr. Young-Keun Chung and Dr. Kumju Hwang, "A background report on the Korean National Strategy for Sustainable Development," December 2006

[38] The Presidential Commission on Sustainable Development (PCSD), "National Strategy for Sustainable Development of the Republic of Korea (2006-2010)", October 2006

Environmental Challenges facing Egypt

Addressing the challenges facing urban development in Egypt should be addressed within the context of sustainable development. It was therefore important to provide an account of the experience of a selected number of countries, both developed and developing regarding the adoption of the sustainable development concept and the institutional set up introduced to support it. This is intended to assist in the identification and development of policies and measures that support the development of sustainable urban communities in Egypt.

This section of the *Thesis* will provide an account of the environmental challenges facing Egypt and the current institutional set up that supports it. It will review the state of the environment, including air pollution, and ozone depleting substances, noise pollution, water, coastal areas, biological diversity, forest cover, green belts and green areas, Energy, and solid and hazardous waste.

Recognizing the importance of the environment for human health and the right of future generations for access to natural resources, the Egyptian Government has created in 1982 the Egyptian Environmental Affairs Agency (EEAA). The main responsibility of EEAA is to coordinate national environmental projects and activities. Furthermore, in 1997 the Government created the State Ministry of Environment, which has been elevated to the status of a full Ministry in 2015. In order to regulate environmental activities in Egypt, the Government issued Environmental Law Number 4 for the year of 1994 and its Executive Note amended by Law number 9 for the year 2009. Moreover, Item 46 of the new Egyptian Constitution has stated that every person is entitled to a safe environment and that its protection is a national obligation. The Government is responsible for all necessary measures for its protection, and for the rational use of natural resources that ensures their sustainable use and the rights of future generations access to these resources..

Regarding air pollution, in 1998 the Ministry of Environment has initiated the creation of a network of air pollution monitoring stations in 1998, which has now reached 87 stations distributed in the different parts of Egypt. These cover industrial areas (19), urban areas (36), traffic-congested areas (10), multiple use areas (21), and one reference area. Based on air pollution monitoring data for 2013 sulphur dioxide resulting from the burning of fossil fuel revealed that average annual emissions at the national level in urban areas did not exceed the permissible level of 50 micro grams/m3. In industrial areas, emissions were 60 micro grams/m3, which is the maximum permissible level of emissions. Regarding Nitrogen dioxide (NO_2), emissions were also within the permissible limits in urban areas,

while for the industrial areas it was 80 micro gm/c^3 carbon monoxide which is still within acceptable limits. Ozone emissions were also within acceptable limits. As for solid particles of less than micro meter PM10 in urban areas, in Cairo and the Delta it was 172 micrograms/c^3 which exceeded the permissible level of 70 micrograms/c^3 by 150% resulting from emissions from cars and open air burning of solid waste (agriculture and municipal) due to the limited control over these practices. As for industrial areas, it was 206 microgram/c^3, which exceeded the annual acceptable levels of 70 microgram/c^3 by 195%. For solid particles of less than micro meter PM2.5, which results from the burning of car fuel, energy generation facilities and factories emissions in Greater Cairo area figures were 104 micro gram/c^3 exceeding the permissible level of 50 by 108%. As for led, monitoring stations in 2013 have recorded .24 micrograms/c^3 in urban areas and .5 in Shobra El Kheima industrial area, which are within the permissible levels of .5 microgram c^3 per annum and 1 microgram per annum, respectively.

Air quality assessment revealed a general reduction in solid particles in the air in 2013 as compared to the years 2008 up to 2013. This is mainly attributed to the current economic situation in the country and the shortages in fuel which resulted in the disruption of operations in factories.

Regarding agricultural waste, particularly rice husks, an assessment was undertaken to assess pollution emanating from the burning for rice husks for 2008-2009. The results which were analysed in newly established labs in Egypt indicate that the burning of rice husks revealed the burning of rice husks resulted in the suspended particles amounting to 10 kg/ tonne, Sulphur Dioxide 0,0685 of a kg/tonne, and Nitrogen Oxide 0,409 kg/tonne

It should be noted that while the amount of recycled rice husk in 2012 was 312,000 tonnes, the amount dropped down to 200,000 in 2013 or by 35%, with the resultant negative impacts on air quality due increased emissions of SO^2, T.S.P, an NO^2. This was mainly due to the prevailing political situation in the country at that time, and the reduced control and monitoring over the area cultivated rice. The black cloud phenomenon has started in Egypt since 1998 during the autumn season and was found to be linked to the burning of risk husks.

Increased population growth, economic activities, and increased number of vehicles in Egypt have all contributed to increased levels of air pollution in the country. Increase in the number of vehicles is one the main sources of CO^2 emissions in Egypt, where registered cars have reached 7 million cars across the country with 3.2 alone in the Greater Cairo region. In recognition of the significance of the transport sector to pollution in Egypt, the

Government have started in 2009 a project on sustainable transportation in the country. The main objective of the project is to provide an efficient and affordable mass transit system, which connects the new cities such as the 6 October and El Sheikh Zayed cities. The project also includes the provision of space for pedestrians and cyclists in the Governorates of El Fayoum and El Menoufia improving the efficiency of petrol consumption for transportation trucks, and construction of parking lots. This project is being complemented by an urban transport system for the city of Cairo with the support of the Agence Francaise de Développement (AFD). The other project was replacing 41,165 old taxis with new ones that run on natural gas. This project should be extended to cover all taxis that are more than 20 years old across Egypt. It should also be necessary to establish a factory for recycling of old vehicles. Other efforts should also include emission inspections of vehicles, trucks, and public buses.

Egypt's efforts to address climate change include the preparation of the National Communication Report (NCR) for the UNFCCC. The project aims at creating a system for monitoring GHG emissions from different sources in Egypt. The project also includes the creation of a National Inventory System (NIS) for a national dbase on GHG emissions. Other related projects include the Low Emission Capacity Building project being implemented within the framework of an international project, including 25 countries, including China, Brazil, Malaysia, Mexico, the Philippines and Indonesia for capacity building in developing strategies fir clean development and reduction of GHGs. Seven clean development mechanism projects were launched in 2013 in the field of renewable energy, waste recycling, energy efficiency to reach a total of 24 projects resulting in 4.1 million tonnes of CO^2. Moreover, a portfolio of 39 clean development mechanism was prepared with an estimated reduction of 5.3 million tonnes of CO^2 reduction. Due to the importance of identifying the negative impacts resulting from climate change and measures needed to adapt to it, Egypt launched a national strategy to adapt to climate change and reduce the potential damage that is likely to happen as a result.

Potential negative impacts resulting from climate change include:

- Inundation of the Delta, where most to the agricultural and industrial and marine transportation activities are located.
- Damage of the coastal sand strip, which is important for the protection of shallow and low lakes and reclaimed land.
- The erosion of the beach and damage of the coastal sand strip may result in the encroachment of the sea on the lakes as is expected for lake El Manzala.

- Change in water quality, which will impact on most of the fresh water fish.
- Damage to the buildings constructed on low lands in Alexandria, Port Said with negative impacts on tourism.

Other potential impacts of climate change include negative impacts on agriculture represented in increased water consumption and the spread of plant related diseases and infections due to increased temperatures. Ministry of agriculture together with the National Centre for agricultural research is introducing measures to adapt to the negative impacts of climate change. Tourism is another sector that is likely to be affected due to coastal erosion and increased temperatures. Climate change is expected to have negative health impacts due to the increased incidence of disease associated with hotter climatic conditions.

Globally, climate change has significant impacts on cities, particularly on coastal cities. Variations in temperatures and weather forecasts has resulted in serious and sever climatic conditions around the world resulting in increased incidence of floods, rains, tsunamis, as well as long periods of draughts and water shortages. Signs of such negative impacts have already been seen in Egypt. This is being represented in extreme high temperatures in summer, heavy rains, showers and floods in some parts of Egypt, and the submergence of some parts of the Delta due to sea level rise. Climate change is therefore expected to have serious implications on Egyptian cities thus necessitating the need to integrate climate change consideration in the planning and design of cities not only to address the potential implications of climate change but also to contribute to mitigating its effects.

In order to address climate change concerns in Egypt, EEAA has created the National Committee for Integrated coastal zone management to develop an integrated plan for potentially impacted areas. Other projects include the World Food Programme project "Building Resilient Food Security Systems to Benefit the Southern Egypt Region", the "Clima South" project supported by the European Union, the "Climate Change Risk Management Programme (CCRMO)" project supported by the Spanish Development Fund, Assessment and Strategy Development to respond to the impacts of sea-level rise on human mobility in Egypt supported by the International Immigration Organization. The General Department for Climate Change and Technology and Research is exerting efforts for enhancing local capacity to provide clean and sustainable energy and providing non-conventional solutions for environmental problems. Global Environment Facility (GEF) projects implemented by the United Nations Industrial Development Organization (UNIDO) in Egypt seeks to increase energy efficiency in industrial sector.

Regarding ozone depleting substance, the Government developed a National Strategy to phase out hydrofluorocarbons (HFCs) used in industry, including foam, thermal isolation, refrigerators, and cooling and the use of methyl bromide. Plans include gradually getting rid of HFCs in all sectors and restricting its importation starting 2013.

Regarding sound pollution, monitoring data in 2013 has indicated in most locations (industrial, commercial and administrative locations in the Greater Cairo area and Giza) an increase in noise above the set standards in the Executive Order of Environment Law number 9 for 2009 of 70 decibels.[39]

Three Scenarios for Climate Change

According to the Intergovernmental Panel on Climate Change, (IPCC) 2014 (Synthesis Report), there are three possible scenarios for climate change:

i. The best case scenario with CO^2 emissions not resulting in an increase in global temperature beyond 2C°.
ii. A 3C° above pre-industrial level, which is the most case scenario, and
iii. The worst case scenario of 4.5 C°.

In case global emissions will result in an increase in global temperatures above 3C°, impacts include coral bleaching, the dying of most coral reefs (Frieler et al 2012, Kiessling et at. 2012), food production is expected to decline, and sea level may rise by 1 meter by 2100, with up to 30% of global species being at the risk of extinction. With a 3-4 C° warming, between 40-70% of global species will be at risk of extinction accompanied by widespread coral mortality, coastal flooding, severe water shortages, destabilization of the Green land and West Antarctic ice sheets.

Strategic directions

Integrated policymaking if properly designed may set the economy on a sustainable green economic growth path. Developing national environmental action plans (NEAPs) in isolation from macroeconomic and sectoral policies is no longer the approach to follow. What is being advocated in this research is that environmental policies need to be developed as an integral part of macroeconomic and sectoral policies. Since the ultimate end is to achieve sustainable development, the three pillars of sustainability need not only

[39] Egyptian Environmental Affairs Agency, Report on the Environmental Conditions in Egypt, 2013

be fully considered, but closely linked in developing a sustainable human settlement strategy.

In designing the strategy emphasis should be laid on investing in environmental infrastructure as a means of sustaining the ecosystem and the services it provides, and consequently provide the enabling environment for supporting sound economic development and social justice and equality. In doing so it should contribute to diversifying the economy by creating new economic activities and business opportunities, promote the efficient allocation and use of resources; enhance competitiveness and market access of local products in local and international markets, and create new job opportunities. This should also encourage waste avoidance and reduction, pollution abatement, ecosystem conservation, and consequently improved environment, human health and welfare for the Egyptian population.

Integrated policymaking can be an effective tool for designing policies, plans, and programmes that can achieve environmental and sustainable development objectives. Several criteria may be used to evaluate the effectiveness of integrated policymaking. Apart from the economic viability of the proposed policy, plan, and programme, other criteria include rigor of the techniques used to assess the costs and benefits of the different sustainability objectives, extent and effectiveness of stakeholder participation, enhanced inter ministerial coordination and cooperation, enhanced public awareness, involvement of different stakeholders in the decision making process, and the practicality of implementing the proposed policy options.

The current transition period the Egyptian economy is going through is placing tremendous pressure on the economy. It also however, provides an opportunity to introduce national policies and strategies conducive to sustainable development and adoption of green economy as a tool for transitioning the economy into a more resilient and productive one. Greening policies and budgets have the potential of addressing Egypt's current economic challenges. These include the high levels of foreign debt, growing macroeconomic instability, scarcity of foreign exchange, the depreciating value of the Egyptian pound, faltering growth rates, food security concerns, increasing demand on water and energy, high levels of poverty, and high unemployment rates.

Egypt is also facing serious environmental challenges and heightened climate change threats that are likely to have adverse economic and social impacts. Transitioning to green economy has the potential of putting Egypt on a sustainable path of development. It promotes an integrated and all-inclusive economic green growth that enhances the

competitiveness of the nation, diversifies and revitalizes the economy, creates new jobs, achieves equity and social justice, while at the same time preserving the environment and the ecosystem.

At the national level, the SDS for 2030 was launched by the Egyptian Government in 2016 following a consultative process engaging all ministries, relevant stakeholders from civil society, academia and the private sector. The strategy is currently undergoing an extensive review process. This was necessary mainly due to the structural adjustment programme that Egypt has introduced in 2017, which included the floating of exchange rate of the Egyptian pound and a subsidy reform package on energy. Other reasons include the increased rates of population growth now estimated at 2.56% annual growth rate.

Main challenges facing the development of the SDS include, the need to adopt an integrated approach in the design and implementation of policies, and establishing clear understanding of the inter linkages and feedback loops between the different dimensions of sustainability. Moreover, ensuring cross sectoral linkages, collaboration and synergies between sectoral policies is key in achieving sustainable development.

Physical Planning -The Physical Planning Law of 1981 prepared by the General Organization for Physical Planning (GOPP) established the necessary planning framework for the physical development of master plans for cities These were not fully implemented as they far exceeded available resources and gap between design and realities on the ground. Moreover, there is a lack of an institutional setup and a regulatory framework that promotes integrated community and city development.

Water Resources – The National Water Resources Plan (NWRP) developed covers the period 2017-2037. The NWRP provides an update to earlier guidelines, policies and plans making them dynamic in nature to allow for changing conditions, risks, and unforeseen measures. All relevant stakeholders have been involved in the development of the new plan with the purpose of ensuring that the strategy document reflects the concerns and views of different stakeholders and that it has their support and commitment. The Government is taking serious measures to promote water efficiency. Measures include the gradual removal of water subsidies, the use of treated wastewater for irrigating fodder crops, wood plantations, the introduction of water saving techniques in the agriculture sector, and directing large investment in water desalination projects. Emphasis are being established in Egypt on adopting integrated water management programmes, including regulatory and incentive measures to promote water efficiency and the use of renewable sources of water.

Energy - The Government has recently finalized a strategy for the energy sector. The strategy has been finalized and should be endorsed by the Supreme Council of Energy in the next few months. Ministry of Electricity and Renewable Energy (MERE) is the main Government entity responsible for implementation. Since energy is a necessary requirement needed to support economic activities, different ministries need to be involved in the design and implementation of a sustainable energy strategy. Measures taken by MERE include increase investments in renewable energy, upgrading of existing power stations, and the introduction of energy efficiency measures. With the support of the World Bank Egypt has embarked into a world largest solar energy plant in Banban. Lack of innovative technologies and energy efficient practices, & unsustainable consumption patterns continue to be the main impediments for achieving an efficient and sustainable energy sector.

Waste - Egypt has developed a Municipal Solid Waste National Strategy (MSWNS) for Integrated Municipal Solid Waste Management based on the National Strategic Directive for Waste Management in Egypt. The main objective of the strategy is to improve the existing solid waste management system in order to reach acceptable levels of public health, environmental protection, and resource conservation. Initiated in 2013 through the establishment of a national Think Tank and was completed and launched in November 2014. One of the recommendations of the Strategic directive document was to establish a central regulatory entity for SWM and to develop strategies for special the different streams of waste. EEAA entrusted with the implementation of this strategy in coordination with relevant ministries. The Government recently decided to update the strategy for solid waste management taking into account recommendations contained in the November 2014 Strategic document. Main impediments in the implementation of the strategy are the lack of clear division of labour between different ministries and Government bodies involved in SWM and the centralization of the decision making process and finances with the central Government.

Circular Economy

There are seven principles related to the transition towards a circular economy, these include: Closed loop where all material enters an infinite cycle, reduced emissions with energy mainly derived from renewable sources, value generation, where resources are used to generate financial as well as other values, modular and flexible design, where products and production chains are flexible and adoptable to changing conditions, innovative business models in the production processes as well as distribution, and consumption that enable the shift form possession of goods to use of services, region-oriented reverse

logistics, natural systems upgrades with human activities allowing the ecosystem to regenerate. Applying a circular economy approach in cities enhances the potential of cities to provide economic, social and environmental benefits for its inhabitants and improving their quality of life.[40]

Applying the circular economy approach for the management of waste in cities should cover all types of waste, including electronic waste, medical waste, organic waste, industrial, and demolition waste. The goal should be to reduce the amount of waste dumped in landfill. Cities should incorporate in their design an integrated waste management system that relies mainly on the recycling and reuse of all types of waste.

Green Economy

Green Economy is an economy characterized by sustainable economic growth, employment generation, and making the market work for the poor, while preserving natural resources and the ecosystem. As defined by the United Nations Environment Programme (UNEP) a green economy is one that results in *"improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities."*[41] The concept has been gaining worldwide recognition since its re launch by UNEP in October 2008, in response to the financial and economic crisis. Mounting global concerns over food, energy, and water shortages are further exacerbated the challenges facing Egypt.

More than ever before, the world has come to realize that climate change concerns and rapidly degrading ecosystems and natural resources are seriously affecting sustainable economic growth. Egypt's transition to a green economy could therefore be considered as an imperative if the country is to address current and future economic, social, and environmental challenges that meet the priorities of present and future generations. Following this path of development is also expected to attract international financial support and investment.

It is becoming increasingly recognized that investing in environmental infrastructure is a necessary pre-requisite for sustainable development. Green Economy advocates investing in environmental infrastructure as a means to revitalize and diversify economies, promote resource efficiency, and reduce waste, hence increase competitiveness, create jobs, protect the environment, and improve health and human welfare.

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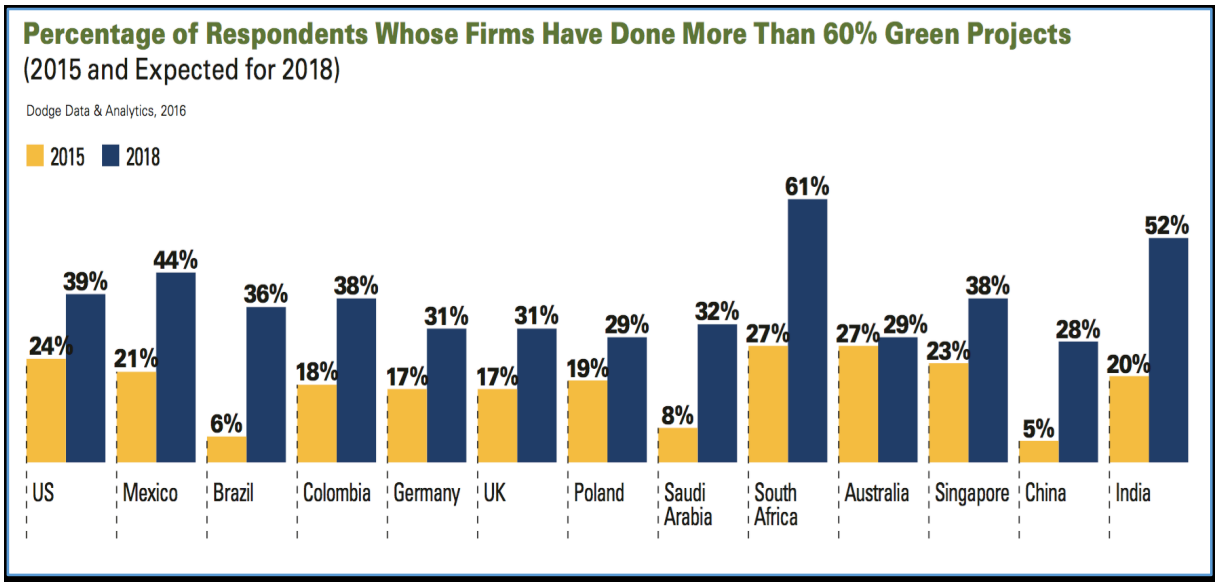
[40] World Economic Forum, Circular Economy in Cities, Evolving the model for a sustainable urban future, in collaboration with PwC, 2018

[41] Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication, UNEP 2011

Green Building

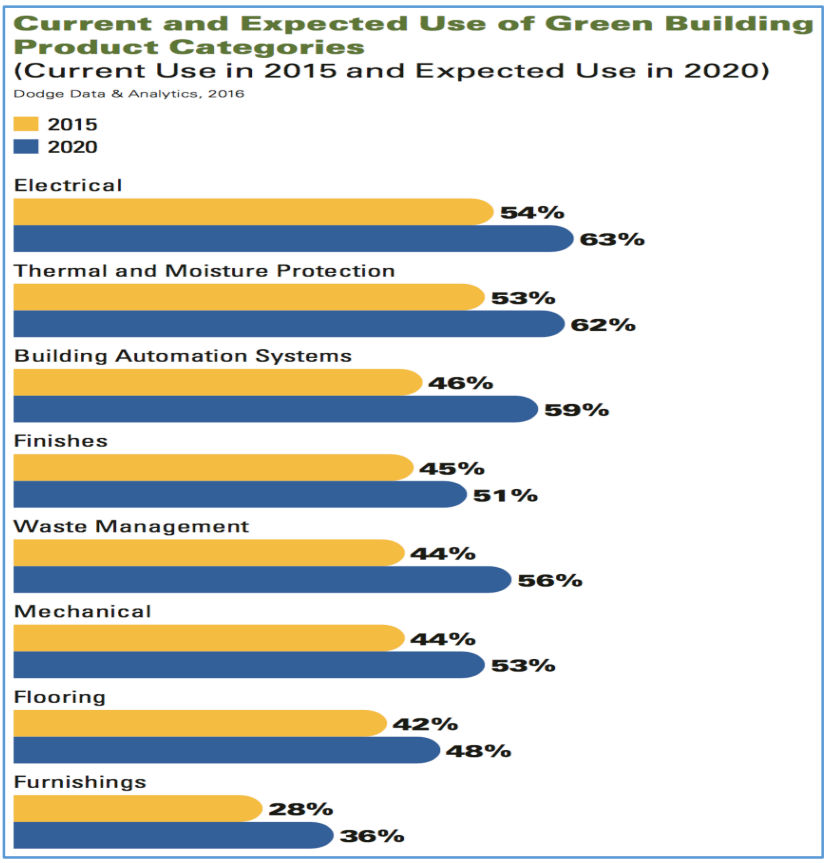
The concept of green building is growing at a rapid pace worldwide. As can be seen from the two figures below, new construction and renovation projects have the largest opportunities for green building worldwide. It is estimated that about 63% of firms around the world have new commercial projects planned between now and 2025, 45% have plans for new green projects and 50% have plans for green renovation projects. This demonstrates the growing international trend in investments in green building.



Source: DODG, Data Analysis, United Technologies, SmartMarket Report, World Green Building Trends, Developing Markets Accelerate Global Green Growth, 2016

Based on the survey conducted by McGraw-Hill, construction in 2008 around the world, reported business benefits from new green building investment resulted in 15% and 13% increase in profits for green retrofitting and reduction in operating costs over a five-years period, respectively. Payback period for green investments was reported as 8 years and 7 years for new green building and green retrofitting, respectively.[42]

[42] McGraw Hill Construction, World Green Building Trends, Business Benefits Driving New and Retrofit Market Opportunities in over 60 countries, 2013



Source: DODG, Data Analysis, United Technologies, SmartMarket Report, World Green Building Trends, Developing Markets Accelerate Global Green Growth, 2016

This is further exacerbated by rapid population growth, increased rate of urbanization, and environmental and climate change concerns. About slightly less than half of the African population live in urban centres. Moreover, the proliferation of informal settlement continues to represent one of the main challenges facing urban areas in Africa, as well as in Egyptian and other cities around the world.

With these challenges, it is evidently clear that there is a need to adopt a non-conventional approach to urban planning development. Sustainable and green communities offer opportunities for meeting many of the challenges most urban centres face today. Greening the urbanization process in Africa for example seems to hold the solution for many of the ills African cities are currently facing. Financing sustainable urban development through the establishment of a green urban development fund can go a long way in facilitating this transition.[43]

[43] UN Habitat, The State of African Cities, Re-imaging sustainable urban transitions, 2014

As far as the North African sub-region is concerned (Algeria, Egypt, Libya, Morocco, Sudan, Tunisia, and Western Sahara), population in these countries has grown from 200 million in 2010 to 202.7 million in 2011. About 51.1% or 104.4 million live in urban areas while 48.5% or 98.3 million in rural area. Most of the population of North African cities live in urban areas with the exception of Egypt 43.4% and Sudan 33.1%. Countries with predominant urban population experience a growth rate of urban population of 2% and are expected to decline to 1.7% annually from 2020 to 2030. Cairo remains the largest North African city with a projected annual population increase of 220,000 annually until 2020. It is estimated though that population growth for Cairo over the period between 1996-2006 was estimated at 1.512 % annually.[44] However, it is estimated to reach 2.11% annually from 2015-2025. This figure though is slightly lower that the national population rate of increase estimated at 2.4%.[45]

Sustainable urban development and cities offer a number of opportunities on the economic, social and environmental fronts. These include the following:

- Lower economic and biophysical costs per capita for providing water, sewer systems, waste collection and other infrastructure such as the electrical grid and road network.
- Reduced per capita demand for land.
- A larger potential for wastewater treatment and solid waste recycling and reuse.
- Greater potential solutions for district heating and cooling, co-generation and generation of energy from waste.
- Public transport systems that reduce reliance on individual cars, thus reducing fossil fuel consumption, traffic congestion and sound pollution.
- Promote the concept of low throughput industrial ecology, where material waste from some industries is used as an input for other industries.
- Promote design that reduces commuting by vehicle, promote public transport systems, cycling and walking to access work, commercial, social and recreational services.

Cities cannot be sustainable without ensuring reliable access to safe drinking water and adequate sanitation. Two main challenges related to water are affecting the sustainability of human urban settlements: the lack of access to safe water and sanitation, and increasing water-related disasters such as floods and droughts. These problems have enormous

[44] Sawsan Badr

[45] Central Agency for Public Mobilization and Statistics (CAPMAS), 2015

consequences on human health and wellbeing, safety, the environment, and economic growth and development. The lack of adequate water and sanitation facilities leads to negative health impacts. Those who suffer the most of these water-related challenges are the urban poor, often living in slum areas or informal settlements following rapid urbanization. Rapid urban population growth creates unprecedented challenges, particularly for large urban centers, among which the provision of water and sanitation have been pressing.

Increased levels of population growth rates, increased levels of economic activities, and the potential negative impacts of climate change are expected to increase demand on already strained water resources in Egypt. This necessitates the need to diversify reliance on conventional sources of water adding nonconventional resource mix. This includes, increasing the potential of cities to capture storm water, recycling wastewater, and water desalination. There is a need to shift from a linear engineering approaches to a circular one, where for example instead of disposing of storm water into the sea it can be used to recharge ground water aquifers.[46]

A series of measures need to be introduced to address water shortages, these include the following:

- Improved demand management and efficiency. This can be achieved by reducing water losses in the water distribution network, provide incentives for consumers to save water, and altering consumption and production patterns.
- Diversification of water resources in order to ensure the sustainability and continued water supply to satisfy the needs of different users.
- Rely on sources of water that is less likely to be affected by climate change. Desalination offers a long term solution that is resilient to climatic changes. For example, Malta a water scarce country has opted for desalination since 1980, where 60% of its water needs is desalinated water.
- Efficient management of the various water resources within cities, including storm water, rain water, aquifers, reclaimed water. In cities like Tuscan, water is collected and filtered for reuse. Other cities diversifying sources of water include Singapore, San Diego, and California.

[46] The World Bank Group, Water Scarce Cities, Thriving in a Finite World, 2018

- Building water systems that can cope with uncertainty, including economic, political, and climatic conditions.[47]

In addition to creating new jobs resulting from the new economic opportunities offered by greening cities, environmental and health benefits are numerous. These include improved ecosystem services in the form of energy, water, and improved environmental conditions, which is reflected in a healthy and better quality of life for inhabitants.

Several countries worldwide have had successful experiences with sustainable communities these include Potragia, the administrative capital of Malaysia, which is considered to be an intelligent garden city, providing a model of a well connected city, an attractive environment for living and working, with vast green areas and public space, taking into account the environmental and cultural heritage of the area. The city of Dongtan in China was designed to be a carbon neutral city producing its own energy needs from bio fuel, recycling of solid waste, enhancing the use of sustainable technologies in transport systems and production processes and providing a network of walkways for pedestrian. The city also promotes organic agriculture in cultivation.[48]

It is estimated that cities consume between 60-80% of electricity, which is responsible for 33% of CO_2 emissions, while buildings consumed 52% of electricity in 2013 and 68% in 2014. Energy subsidies in Egypt have resulted in the excessive use of energy resulting in excessive demand that far exceeded supply.

In Egypt, building and construction contribute 6-12% of GDP and employs 8-10% of the total labour force. Moreover, the sector is considered to be one of the most strategic economic sectors in Egypt due to the large number of associated industries estimated at more than 90 industries. These include the steel and cement industries, gypsum, ceramics, paint, wood, marble, and electric and sanitary equipment.

Principles of smart urbanization

The real opportunity for making a coastal community sustainable is developing a green city that capitalizes on the unique geographic location of the site and developing it on sustainable guidelines, completely capturing the ecological limits of the area and ensuring its resilience against changing climatic conditions. This is captured in the types of selected economic activities that ensure that sustainability considerations are fully taken into

[47] Ibid

[48] Nisreen El Lahham, Towards Creating New Sustainable Cities and Communities in Egypt, A critical View for Planning for New Cities, 2011

account in the design and implementation of these activities, the urban layout and design of the city that ensures the efficient use and allocation of resources and increased reliance on renewable sources of energy, promoting water recycling, waste avoidance, recycling, reuse, and recovery. Developing the city itself and the required infrastructure adhering to sustainable guidelines as well as the proposed activities identified on the basis of the location. This enhances the city's attractiveness for new incoming inhabitants, investors, as well as its sustainability and resilience. Al Alamein city along the North coast of Egypt has been developed as an eco city. Sustainability principles have been embedded in the design, physical infrastructure and selected economic activities of the city.

1. Maintaining harmony with nature

Urban development should be designed in a manner that allows the ecosystem to function and continue to provide the services it provides. This could be achieved by integrating environmental as well as social considerations in the provision and functioning of urban areas. This should fully take into account fragile ecosystems that should be properly assessed with the necessary tools, such as zoning and density control measures introduced in order to ensure the regeneration and environmental equilibrium of these ecosystems.

Nature-based solutions in most cases can help cities address planning challenges and are usually the least cost. These include the planting of trees that contributes to heat and pollution reduction. Rain gardens and green roofs and artificial wetlands may be used to absorb storms in vulnerable locations. Moreover, the physical layout and architectural design of buildings should be in harmony with the geographic characteristics of the site and depend primarily on drawing building and construction material from local resources.

2. Social integrity

Due considerations to social and cultural aspects of the local community should be taken into account in the design of urban areas. This includes traditional and cultural practices of the local communities. Indigenous knowledge and practices should also be integrated in building and urban design. Moreover, the design and layout of urban areas should take into account the needs and priorities of the different segments of the existing inhabitants and potential incoming ones. It should also ensure and promote social cohesion, integration, and interaction among the different the different segments of the population. For example, while high income families may have their open green space, public green areas should be made available for middle and low income families.

3. Technology and Innovation

Appropriate technologies that suit local conditions are to be used in the production of construction material, infrastructure and management systems. Due consideration should be given to the existing work force and the need to ensure that skills of existing labour force are upgraded to use new technologies and innovative building techniques. Innovative technologies should be used to promote the production of building material, construction and management of urban systems.

4. Efficiency

Full consideration should be given in the design of urban communities, building and construction to promoting efficiency in the use of resources, particularly natural resources such as water and energy. However, a balance should be maintained between the use of resources and ensuring safety, security, accessibility, performance and maintaining a healthy environment. Design should however, encourage the sharing of public space, roads, services and infrastructure, and reducing cost per family, while increasing accessibility, affordability, and productivity. Sustainable urban communities should promote walkability, and the use of bicycles and public transport systems over public car ownership. It should also promote missed use residential areas in order to promote accessibility and reduce costs.

5. Economic growth

Apart from ensuring that the city should have a sound economic foundation that contributes to GDP, it should be a centre for knowledge and skills development and sharing through access to institutions, facilities, and services, health, education, and cultural and recreational facilities. Communities should not only be regarded as a physical development, but as an economic as well as a social setup that provides employment as well economic and social opportunities for the different segments of the population.

6. Regional Integration

Cities should be developed as part of a larger socioeconomic, environmental, and cultural system. A city should be considered as part of a larger region, which may include a number of cities with specific characteristics that offer themselves based on the natural endowment and potentials of the site. Cities in a specific region may represent a set of features, characterized by specific economic, social, cultural, and recreational activities that provide the specific identity or character of the region.

7. *Balanced Mobility System*

A smart city should cater for the needs of the different segments of the population with the objective of providing accessible, reliable and affordable means of mass transport systems (rail, metro, bus) that is mainly based on non fossil fuel means of energy. Cities should be designed to promote walkability and cycling. A well designed regional hub should be one that is dense and intensive along urban centres and mass transit axis.

8. *Good Governance*

The operation and functioning of cities should be based on a transparent, accountable, and participatory process. Sufficient and reliable data systems that is continuously updated should be made available to inform management decisions for physical planning and land use, which should be made public. This should assist investors, the private sector and the general public in making investment decisions.*

A number of considerations should be taken into account in the design of cities and new communities, these include:

- Coastal flooding, extreme heat, frequent power cuts and the possible shortages of water and food exacerbated by climate change. Around 350 cities globally today accommodate about 200 million people face an average daily temperature of 35 degrees Celsius for a period of two to three month annually. It is expected that by 2050, more than 1.6 million people in 970 cities will be facing such conditions. According to a study released by C40 Cities, inhabitants living in poverty and struggling severe weather conditions are expected to rise tenfold. Moreover, the study further indicates that by the middle of this century over 800 million people living in 570 coastal cities will be at risk of flooding and sea level rise.

- Water scarcity is expected to be a major concern for most part of the world. Egypt is already a water scarce country, and with the current rate of population increase, consumption and production patterns, level of economic activities, and potential impacts of climate change, the situation is expected to worsen if safeguard measures are not taken. This requires the introduction of measures across all sectors and activities that uses water more efficiently and optimizes its use through recycling and reuse. It is estimated that over 650 million people in 500 cities are expected to face a reduction in their access to water.

* This article is summarized and re-concretized from Principles of Intelligent Urbanism (PIU) on Wikipedia. The term of Principles of Intelligent Urbanism was coined by Professor Christopher Charles Benninger, evolved from the city planning guidelines formulated by the International Congress of Modern Architecture (CIAM), the urban design approaches developed at Harvard's pioneering Urban Design Department under the leadership of Josep Lluis Sert, and the concerns enunciated by Team Ten.

- Preservation and restoration of cultural heritage, urban regeneration, and sustainable tourism can be an effective way in achieving economic development, poverty reduction, and social integration. Urban regeneration should fully take into account the aesthetic characteristics of the site. This is complemented by proper management, procedural, and institutional arrangements in order to ensure the sustainability of the heritage site.[49]

- Urban development should include respect for the needs and priorities for local communities, activities should be economically viable, sustainable, and meet the needs of the population. It should also take fully into account the cultural heritage and surrounding environment of the local community. The introduction of appropriate management systems is also necessary to ensure the conservation of the local cultural heritage, biodiversity and the ecosystem. Following this line of action promotes tourism as well as education thus creating jobs and generating incomes.[50]

- Technological advancement is expected to change the way cities function and the way services are provided. The following are the main technological innovations with major impacts on cities: [51]

    - Fifth generation networks that are expected to be 40-60 times faster than current systems. According to the World Bank, it is estimated that there will be a 10% increase in high-speed internet. This will contribute to an increase in economic growth by 1.3%. A 5G mobile networks will make it possible to use low cost, low power sensors in buildings, equipment and transportation systems. The use of high-

[49] The workshop, "Lessons Learned from Seoul on Cultural Heritage, Sustainable Tourism, and Urban Regeneration: A Pathway to Green Economic Growth Investments," was held on November 27 – December 1, 2017 in Seoul. It was supported by Seoul Metropolitan Government (SMG), Seoul Urban Solutions Agency (SUSA), World Bank Group Korea Office, the Korea Green Growth Trust Fund (KGGTF) and UNESCO. Fifteen senior officials, presenters, panelists from SMG, SUSA, UoS, Seoul Institute (SI), Cultural Heritage Administration (CHA), and Korea Land and Geospatial Informatix Corporation (LX) came to share Korea's unique experiences.

[50] The World Bank, Achieving the twin goal of using cultural heritage, urban regeneration and sustainable tourism: Lessons Learned from Seoul

[51] The World Bank, Abhas Jha, World of Opportunity, Top 7 disruptive technologies for cities, 2018

speed internet systems in the management and operation of cities is expected to have positive significant impacts.

- Blockchain integration is a system that discreetly verifies the inception of products as they move across a supply chain sending proactive alerts about unexpected diversions that could signal potential damage or negative environmental consequences. This system is immune to human intervention and is entirely machine to machine, thus eliminating human error. This will ensure that building products, equipment and material remain "green" and sustainably viable throughout their life cycle. The use of blockchain as a tool for decentralized verification of any kind of transaction is already being used in urban planning. It is already being used to improve registries in cities such as Georgia, to promoting food safety in China. It is also being used in zoning where it can be used in making zoning inclusive. It may be used to manage a database that monitors the clean electricity generated by on-site solar panels, issues renewable energy certificates as certain production thresholds are achieved, then distributes them according to pre-determined contracts automatically.

- At the heart of a blockchain is a digital ledger and a decentralized database that records transactions of almost any type and enforces contracts related to them automatically, based on conditions defined by the participants. The transaction history is appended to the chain rather than a paper trail, and since the system is distributed and encrypted, it is virtually impossible to tamper with or hack.

- With respect to sustainability and sustainable design integration, the impact of blockchain will be in the utility providers and renewable energy developers seeking a more efficient way of pricing and selling clean power. For consumer products companies and retailers, blockchain provides a better way of validating claims for supply-chains. It also verifies the traceability of minerals, commodities or raw minerals for banks and insurance companies.

- Big data is also changing the way services are being delivered in cities such as Shanghai, New York, and Hong Kong. It has been used to introduce smart parking, air quality monitoring, and increasing energy efficiency.

- There is an increasing trend in the use of rapid inter-urban rail system and TaxiBots displacing cars. Lyft co-founder and president John Zimmer argued that self driving

cars will account for the majority of Lyft rides within five years. They also expect that in the near future car ownership will no longer exist in major US cities.

- Digitizing the administrative system, including the issuance of identification cards, birth certificates, payment of subsidies, the tax and collection system apart from enhancing efficiency in the system, reduces corruption and fraud. It also contributes effectively to the inclusion of a large percentage of population in the formal system, and their contribution to economic activities and to GDP. According to the world Bank about 1.1 billion people are unable to prove their identity.

- The rapid increase of drones is changing the way urban centres are being managed. They are now used for example to check the functioning of wind turbines. With fast technological progress, paired with artificial intelligence they no longer need skilled pilots who were needed to keep away the drones from trees and power lines. According to the World Development Report (WDR) 2016 digitizing the system can assist in using data effectively to target the most vulnerable giving priority to meeting the needs of the homeless and those living in informal settlements, mapping of facilities and pollution, and garbage disposal sites.

- Policies that fail to internalize the social cost of air pollution, climate change and traffic congestion in use of private cars encourage urban sprawl. This creates a number of challenges, which include increased greenhouse gas emissions, increased road congestions and air pollution, and lack of affordable housing. An OECD study for 29 OECD countries has revealed that cities have become more fragmented since 1990 with the share of land allocated to very low density areas increased. While on one hand 60% of urban space is sparsely inhabited, urban areas are becoming more crowded.[52]

- Such a pattern of development is encouraging higher car ownership and longer commuting distances, which is resulting in increased traffic congestion, increased pollution and greenhouse gas emissions. This is also resulting in increased cost per capita for services such as energy, sanitation, and public transportation.[53]

- According to the OECD study, proper pricing for private care ownership and parking should be introduced. This should be accompanied by providing mass transport systems and non-motorized transport as well as land use policies that contain and limit

[52] Rethinking Urban Sprawl: Moving Towards Sustainable Cities, Policy Highlights, OECD, June 2018
[53] Ibid

urban sprawl. Building regulations related to maximum density restrictions should be considered to maximize the use of land and reduce per capita costs.[54]

The Municipalities meeting held in New York on the 16th of July 2018 resulted in a "Municipalities Declaration of Local Governments for the Right to Housing and the Right to the City". Main elements of the Declaration included:

- The need for more legal and fiscal powers to regulate the real estate market in order to reduce speculation and ensure the social function of the city.
- Provide sufficient budgetary allocations and investments to improve public housing stocks.
- Enhance mixed residential programmes, which are provided by both the public and private sector.
- Planning for mixed use, compact and polycentric cities where housing contributes to social, economic and environmental sustainability.
- Promoting long-term strategies on a metropolitan scale through increased cooperation and solidarity within city networks that offers affordable, equitable, fair, and inclusive cities.[55]

According to the World Bank, value of lost water in developing countries is estimated at about US$ 3 billion annually.[56] It is therefore important to reduce water loss caused by leakages in the network system by installing a metering system that detects leaks and sending alerts. Other supporting measures include promoting sustainable consumption patterns through public awareness campaigns and incentive measures such as water tariff systems that increases water charges by quantity of consumed water. Other measures that promote water efficient measures include the installation of water saving equipment, the use of wastewater treatment to generate electricity, and the generation of hydroelectric power in hilly areas.[57]

In 2015 renewable energy consumption represented 23% of global energy consumption, with cities pledging to shift towards renewable sources of energy as part of the COP21

[54] Ibid
[55] Cities for Adequate Housing, Municipalist Declaration of Local Governments for the Right to Housing and the Right to the City, New York, 16th July 2008
[56] World Bank, 2016)
[57] World Economic Forum, Circular Economy in Cities, Evolving the model for a sustainable urban future, in collaboration with PwC, 2018

agreement. Cities across the world are shifting towards smart systems that enhances efficiency of energy distribution, which includes efficient communication between energy generators, utility companies, and consumers. Electric cars are also expected to contribute to smart electric grid systems in cities by introducing systems that allows cars to charge and discharge to the grid.[58]

Annex II provides eco village design criteria standards and requirements.

Urban Development and Housing in Egypt

Institutional framework

While a number of institutions are concerned with urban development in Egypt, few have a clear mandate; overlapping jurisdictions are furthermore common.

Apart from the Ministry of Housing, Utilities, and Urban Development (MHUUD), there are several other entities involved in the sector, one way or another. These include Ministry of Local Development (MoLD), Ministry Electricity and Renewable Energy, (MERE) Ministry of Water Resources and Irrigation (MWRI), Ministry of Defence (MoD), and the Ministry of Transportation (MoT).

MHUUD is responsible for housing and public utilities. Within this ministry, the General Organization for Physical Planning (GOPP) plays an important role in urban land management, and indirectly influences the scope of land management opportunities available to the governorates. Furthermore, the New Urban Communities Authority (NUCA) is in charge of planning new communities.

Moreover, ministries such as the Ministry of Planning, Monitoring, and Administrative Reform (MPMAR) and the MoLD can modify local development projects without coordination with other agencies. As a result of overlapping responsibilities and lack of effective coordination between ministries and agencies, this has resulted in incoherence in the implementation of urban development projects.

The Planning Process in Egypt

The Physical Planning Law of 1981 established the necessary planning framework for physical development by providing the mandatory preparation of master plans for cities and villages. All subdivisions and building permit approvals in cities and urban parts of villages must be consistent with the adopted master plans.

[58] Ibid

Detailed plans should be prepared by local units (city/village) following the approval of master plans. The development of the master plan should be done with the assistance of the GOPP and the governorates' departments of housing and development. The MoLD has the authority after consultation with the governor and approval of the local popular council to modify previously approved subdivisions of the plan.

Master planning is of limited effectiveness to guide urban development in Egypt. The GOPP prepared master plans for many Egyptian cities, which were not implemented. The main reason for not implementing these master plans is that they greatly exceed the limited resources needed to implement the plans. Another reason for not implementing master plans is the gap between planning and design and the reality on the ground; planning policies are designed at the central level without giving due consideration to local resources and priorities.

Centralization has often contributed to widen the gap between the planning process and the executive system at the local level with conflicting chains of command and insufficient coordination between central and local Government.[59]

Housing Policies Creating the Gap

Prior to the 1952 Revolution, the private sector dominated investments in the housing sector. In 1954 the Government took over the housing sector and created the Housing and Development Company, which was given the responsibility of providing housing for the poor segments of the population. However, housing fell short of supply due to inappropriate policies and the inability to fill the gap created by private investors. This was coupled by increased demand for housing created by population growth and increased rates of rural to urban migration, particularly to large cities such as Cairo and Alexandria.[60]

During the late 70s, the "Open Door" policy was adopted by the State attracting private investments back to the housing sector. However, the rise in construction costs along with the State restraining from developing further housing units left the sector to be monopolized by private investors focusing on upper middle and luxurious housing with no social agenda, leading to an enormous rise in units' prices and rental units scarcity[61].

[59] Christian Arandel and Manal El Batran, The Informal Housing Development Process in Egypt, July 1997
[60]Heba Allah Khalil, Affordable housing: Quantifying the Concept in the Egyptian Context, Journal of Engineering and Applied Science, Faculty of Engineering, Cairo University, Vol.59, No. 2, April 2012.
[61] Ibid

During the 1990's the Government planned to provide 750,000 units annually for the newly low-income couples and for those living in informal settlements, and as a replacement for demolished houses. Able to provide only 100,000 units, the Government had to resort once again to the private sector to support its efforts. Incentives for the private sector were provided in the form of land, and necessary infrastructure for low-income housing (Specialized National Councils 1969). The formal housing sector in Egypt continue to suffer from a big gap between supply and demand. Housing shortage is particularly acute for lower-income and poor families across Egypt. However, if we consider the period between 1996-2006, housing supply was higher than the change in the number of households. This has resulted in a high percentage of unused units.[62] It is estimated that there are about 2 million unoccupied housing units in Egypt.[63]

Aiming to provide housing, particularly for low and middle income families, the government has constructed 2,546,756 units during the period between 1997 and 2013. Private sector provided 54.7% and 45,28% consecutively, with 31.9% for middle income families and 16.3% of total units for above average income families.

During the period between 2005 and 2012 MHUUD has initiated a programme for constructing 500,000 with a total cost of 35.65 billion. The project aims at providing 80% for what is referred to as "economical housing" and 20% for middle income families. It has been reported that the national housing project has exceeded its set target reaching 604,322 housing units. Moreover, the Government has launched a social housing project for 1 million units over a six-year period with a total cost of EGY 130 billion, in addition to cost of land and infrastructure.

Implementation of the national housing project has been facilitated through the provision of land in the different governorates, the construction of cities, and the provision of soft loans. A number of decrees related to housing have been issued during the last several decades, which included the Real Estate Funding Law 2001/148 and the Unified Construction Law 2008/119 and the Social Housing Law 2014/33. Law number 144/2006 regarding the demolition of buildings has also been issued in 2006 in order to preserve the architecture heritage.

However, the gap in housing supply for low-income and poor families has further been exacerbated by increased levels of rural to urban migration, particularly to major cities such

[62] Sawsan Badr, 2015
[63] Ministry of Housing, Utilities, and Urban Development, 2018

as Cairo and Alexandria as stated earlier. It is estimated that the population living in poor settlements in Egypt is around 17% of the total population of.[64] This figure may be higher and continues to increase mainly due the lack of Government long-term strategic policy to address the problem and its rout causes. Low priority given by the Government to develop rural Egypt and lack of employment opportunities has been one of the main causes for rural to urban migration. Most rural areas in Egypt lack adequate physical infrastructure in the form of roads sanitation and water networks, social services such as education and health, and economic opportunities and consequently jobs.

One of the Government policies that have had negative impacts on the housing sector in Egypt is introducing controls on rents for housing units. This has resulted in discouraging the private sector from investing in housing units to be made available in the market for rent, resorting to providing housing units for sale. This outcome has contributed to shortages in housing supply available for rent, particularly for low-income and poor families, and increasing cost of housing units available for sale.

Realizing the negative impact this decision has had on the housing market the Government, has reversed it decision, by issuing a new renting law in 2001, which changed the trend back to renting. Rent levels are now being determined by supply and demand. Yet, the new rents exceed the affordability of low and low middle income households, in addition to the insecurity of tenure.

Moreover, some generational inequalities still exist due to coexistence of the old and new rent laws (the rents for a 200m^2 unit rented since the 60s in an elite district costs much less than a 50m2 unit in an informal area). As a continuum to focusing on luxurious housing, many neighbourhoods and gated communities were developed in cities surrounding Cairo, creating an over stock of upper middle and high level dwellings, while the shortage in units for the less fortunate remains. The policy of selling all state owned lands in auctions has added to the housing market bubble.[65]

In order to meet the housing shortage, the Government resorted to a number of measures dating back from the seventies. These included offering land at a reduced cost for investors, encouraging building cooperatives, and investing heavily in the development of new urban settlements.

[64]Hussein Abaza et.al, Arab Environment 4, Green Economy in a Changing Arab World, AFED 2011
[65]Heba Allah Khalil, Affordable housing: Quantifying the Concept in the Egyptian Context, Journal of Engineering and Applied Science, Faculty of Engineering, Cairo University, Vol.59, No.2, April 2012.

In order to support home ownership, the Government initiated housing programmes, such as Ebny Beitak programme (build your home) targeting lower middle income households. The programme included providing subsidized land parcels along with the necessary infrastructure and services in addition to 15,000 LE as a contribution towards construction costs. Additional exemption from land costs were provided in the event construction completion was within one year.

However, this programme mainly benefitted middle class households rather than low income and poor families. It should be pointed out that in 2006, there were almost 8 million closed and vacant units comprising of around 30% of the overall stock in Egypt. These are mainly houses built under existing building codes and licensed by the Government. The main reason for not achieving the objectives of public housing programmes such as "Ebny Beitak" was mainly due to the failure in providing job opportunities close to residential areas. The National Housing Programme was designed on the basis of availability with little considerations given to the potential for job opportunities.[66]

New Urban Communities Lagging Behind Targets

The concept of new urban developments started in Egypt in the late seventies with the objective of reducing pressure on large cities such as Cairo and Alexandria, and as a means to absorb population increase in the country. The New Urban Communities Organization was created according to Government Law 59 for the year 1979 to be responsible for the development of new cities in Egypt. A number of model cities were created since then, including what may be referred to as satellite cities near the City of Cairo. Twin cities on desert land were also developed, still though close to existing cities and are considered as natural extensions of these cities. Other independent cities such as the 10th of Ramadan city, Sadat city, and the new Bourg el Arab city and el Salhia were also constructed. New Mansoura City is another new city among a series of new cities is under construction

Positive impacts of the new developments constructed on about 750,000 feddans, include reducing encroachment on cultivated land, construction of industrial establishments accessible to markets and the creation of job opportunities. Investments in these projects are estimated at 60 billion EGY by the public investments and 300 billion EGY by the private sector.

Negative impacts of new communities include failure to attract the planned number of inhabitants, with more than 40% of the residential units lying vacant, 25% of commercial

[66] Ibid

assets unutilized, excessive use of fuel used in commuting between cities due to either lack of job opportunities or lack of affordable housing for the incoming labour force. Moreover, new cities did not reduce pressure on major big cities like Cairo and Alexandria with densities continuing to increase. Population of these cites failed to reach the targeted level, with residents in new cities not exceeding 19.6% of the planned target. This is mainly attributed to the lack of important factors that attract new inhabitants, these include: diversification of activities, administrative centres for ministries, educational, health and recreational services, lack of affordable public means of transport, and high cost of housing units. This is in addition to the non-compliance with the original master plans for new cities. For example, land allocated for agriculture in cities such as 6 October, Sadat, and New Menia was transformed into residential areas due to the lack of sufficient irrigation water. The Government is currently taking serious measures in the form of imposing high penalties on investors who use land originally designated for agricultural use and using it for housing.

Other factors contributing to the problems associated with the experience of new communities in Egypt, include planning for a number of large developments at the same time, flaws in the selection of sites along existing road networks, thus contributing to the gradual outward expansion of cities and failure to create independent self-sustained cities. Lack of proper management of cities and finance and absence of factors that attract private investment contribute to the problems facing new communities in Egypt.[67]

Moreover, the last several decades have experienced the development of a large number of urban settlements mainly in and around the Greater Cairo region (22 new developments). The experience of these new developments have not all been positive. This is reflected in the failure of these new settlements to attract new inhabitants, investments, support economic activities, provide housing for the different segments of the population, particularly affordable housing for middle and low income families, as well as other health, social, and cultural services. About 22% of total Government investments directed towards these new developments have drawn heavily on Government budgets, while succeeding in providing housing for only about 4.3% of the target inhabitants.[68]

[67]Nisreen El Lahham, Towards Creating New Sustainable Cities and Communities in Egypt, A critical View for Planning for New Cities, 2011

[68]Bassem Fahmy, Expert meeting, Cairo House, Egypt, 23 June 2015

Informal Settlements

One of the challenges facing large cities in Egypt such as Cairo and Alexandria is uncontrolled informal settlements in many parts of these cities. This phenomenon, which has occurred during the last several decades has been the result of increased levels of rural to urban migration, and increased population growth in major urban centres, which have exceeded national population growth rates. Increased rural to urban migration has been mainly due to the neglect by the Government of rural areas resulting in inadequate physical infrastructure (roads, public transport system, waste collection and disposal system, wastewater collection and treatment system, and clean water supply. This is in addition to inadequate social services mainly health and education system provided in rural areas.

Informal settlements in Egypt are in most of the cases built illegally on Government owned land. They are characterized by being unsafe, as they do not follow minimum acceptable building standards, either lacking proper or some of the basic amenities such as solid waste collection and disposal systems, and or illegally connected to the electricity grid. Building standards provided by the central Government and monitored al the local level by Governorates lack strong enforcement capabilities. These settlements are therefore a source of major pollution to urban centres due to the amount of solid waste generated that is either not collected or treated.

Informal settlements continue to represent a social as well as an economic and environmental challenge in Egypt. Inhabitants in these areas lack basic water and sanitary connections and other basic social services.

According to the Informal Settlement Development Facility (ISDF) (2014), unplanned areas constitute about 95% of the built up areas in Egyptian villages, and about 37.5 % of the built up area in Egyptian cities. In 2006 the informal population was about 11 million accounting for 35% of urban population.[69] It is now estimated that 40% of the population live in informal settlements.

In order to address this challenge, the Government has initiated in 1993 (1993-2007) the National Programme for Upgrading Informal Settlements to extend potable water and sanitary drainage to informal areas. Moreover, the Government in 2014 has created MURIS in order to specifically address the problem of informal settlements in Egypt, which has later on been integrated with MHUUD. The programme with total investments of LE 3.1

[69]Egypt National Report: Third United Nations Conference on housing and Sustainable Urban Development (HABITAT111), 2014.

billion (1993-2007) has contributed to improving living conditions of inhabitants of informal settlements. At present, 97% of urban residents have safe drinking water and 90% have sanitation services.[70] In order to continue to seriously address the phenomena of informal settlements, the Government has created the Fund for the Development of Informal Settlements. The Fund is entrusted with accounting for and categorizing informal settlement areas and preparing plans for their upgrading and development. It has been estimated that in 2010 there has been 404 areas categorized as being unsafe and 283 areas in 2018, including 152,694 units.

However, an integrated approach to dealing with the informal sector phenomena is still lacking. The Asmara project to accommodate inhabitants of major vulnerable informal settlements is one such example. Adopting a business as usual approach in dealing with challenges facing informal settlements in Cairo has not resulted in the desired outcome. Apart from physically uprooting the inhabitants of informal settlements from their existing environment it has not catered for the economic, social, and cultural concerns of the targeted population. The process among other matters did not consider introducing a rehabilitation programme to raise the level of literacy, awareness and education, and health of these communities.

Impacts of Urban Planning and Housing Policies in Egypt

As earlier indicated, urban development in Egypt has been lacking in an integrated and holistic approach, where the social, economic and environmental considerations are fully integrated in the planning and design of new urban settlements. The planning of new communities and housing lack giving sufficient attention to sustainability considerations. In addition to increased pressure on existing water and electricity networks due to increased number of inhabitants attributed to population growth and rural to urban migration, adequate and reliable public transport systems are also lacking. One of the main consequences of uncontrolled urbanization, is the fast and sporadic development of informal settlements in major cities such as Cairo and Alexandria as referenced earlier.

The following section identifies the main economic, social and environmental impacts of urban planning and housing policies in Egypt.

[70] Sawsan Badr, 2015

Economic impacts

Middle and low-income housing is generally provided by the public sector, as the private sector has no incentive to invest in housing to cater for these income groups compared to housing for high-income housing. Providing housing for low-income groups and poor segments of the population represent a real challenge in Egypt. This has been aggravated by increases in land and construction costs beyond the reach of most of the low-middle and low-income families.

A number of laws have been introduced which discouraged investment by private entrepreneurs in the housing sector, such as the one controlling rents that was introduced by the Government in the seventies. This is further exacerbated by increased demand on Government budget to build roads, provide transport systems, and health and education services. Although statistics show that poverty represents 50% of the population living in upper Egypt, the number of proposed housing units and Government's direct investment in this region are very low in comparison to other geographical areas. Due consideration should therefore be given when planning and designing for sustainable communities to the needs of low-income and poor families and those living in upper Egypt, Sinai, and those located in boarder areas. Realizing this, the Government has during the last several years directing attention towards providing housing and new residential communities in these areas.

A reduction in land available for construction in urban areas, which represents about 4% of the total area of the country, continue to increase the value of land for housing construction purposes.

It should also be pointed out that communal social housing projects in Egypt during the last several decades have experienced implementation problems and flaws in design and planning. This is represented in realizing 11% only of planned housing units during 2012-2014. This is also in spite of billions of Egyptian pounds spent on these projects, which were made available to a small segment of the population. On the other hand the private sector has succeeded during the last three years to build about 6.5 million units mostly for high-income families.[71]

[71] Yehia Shawkat and Ashraf Hussein, Housing Policies in Egypt, Egyptian Initiative for Human Rights, published by the Social and Economic Justice, 2014

Moreover, urban development has not always been designed in a way that drives economic activities, attracts investments, and supports the development process in the country and contribute to GDP.

Social impacts

In most cases the planning of new communities in Egypt did not fully take into account the social and cultural dimensions of local communities in different locations. Involving local communities and inhabitants has also been lacking in the planning and design process. The outcome has been in many instances, the rise of new urban areas that did not necessarily reflect the needs and priorities of local communities as well as prospective inhabitants in terms of social services, jobs, and housing. This has resulted in the failure of new communities to attract inhabitants as well as investments.

Moreover, new communities in many instances did not take into account cultural and social aspects related to the local community, as well as the geographic characteristics of the location of the new community. The result has been new settlements that do not reflect the needs as well as the cultural background and prevailing customs and living habits of the local communities.

It has also resulted in physical structures that do not rely on local building material most suited for the local environment and climatic conditions, and did not also reflect the nature and character of the surrounding environment in different locations. Housing provided in new communities do not necessarily cater for low-income and poor families, lacking the necessary social (health and education) and recreational services for low-income and poor families. Moreover, considerations were not given to maintaining cohesion between the local community and the incoming new inhabitants, which resulted in lack of social cohesion and integration of the different income groups in the same community.

Environmental impacts

Most of the Egyptian cities have suffered from lack of proper planning that integrates the three dimensions of sustainability. This was accompanied by shortages in financial flows to fund the needed physical and social infrastructure required to cope with the rapid expansion of cities. The consequence has been the deficiency of existing electricity and water and sanitation networks and services for new communities. Rapid rate of urbanization has also resulted in crowded suburbs, traffic congestion, inability to deal with wastewater and solid waste generated, and increased pollution levels of air and waterways.

Pollution, including large volumes of solid waste generated in most of the Egyptian cities has reached alarming levels threatening health and wellbeing of the inhabitants.

Negative environmental implications have had their social as well as economic consequences threatening economic activities such as tourism and agriculture, which were further exacerbated by increased incidence of encroachment on arable land.

Neglecting the environmental dimension, and failure to adopt approaches such as a full life cycle assessment (LCA) approach or green or circular economy in the planning and design of new communities resulted in inefficient allocation and use of natural resources, including land, water and energy, and other factor inputs.

Existing facilities fall short of the required capacity to deal with the generated volumes of waste, thus resulting in the dumping of waste along roads, in waterways and in open dumpsites, with negative consequences on the environment and health.

This is in addition to the falling short of the existing capacities of wastewater treatment plants to deal with the volumes of wastewater generated by existing and new communities. This is resulting in the dumping of large volumes of untreated wastewater in waterways and the use of untreated wastewater for irrigation of agricultural crops. However, the Government has been making efforts in upgrading existing wastewater treatment facilities to enable them absorb increasing volumes of wastewater.

The use of fossil fuel, as the main source of energy and the mismanagement of solid waste and wastewater generated by existing and new urban communities in addition to congested roads and poorly maintained vehicles, industrial pollution, and smog are resulting in negative environmental and health impacts for inhabitants of urban communities. This situation will be further exacerbated if new urban communities continue to be developed and built following the same old conventional way.

Towards Sustainable Urban Development in Egypt

Greening the urbanization process in Egypt and creating sustainable and green communities have the potential to offer opportunities for meeting many of the challenges the Egyptian cities are facing today. These mainly include increased energy prices, increased pressures on solid waste and wastewater networks accompanied by increased demand on housing to meet population growth estimated at 2.56% annually.[72]

[72] Central Agency for Public Mobilization and Statistics (CAPMAS) 2015

There are now compelling reasons to build houses and communities that are energy and water efficient, drive economic activities and are more resilient, economically viable and sustainable. Urban communities need to be designed with the primary objectives of driving sound and sustainable development, contributing to sustainable economic growth, social integration and environmental integrity and resilience.

Future cities need to be sustainable, resilient, resource-efficient, safe, innovative, and smart. Emphasis in the design and planning of new communities need to be laid on adopting an integrated, inclusive and participatory approach if we were to achieve sustainability and realize the objectives of SDG11.

Engagement of different stakeholders and building trust between local communities and local and central government is essential to develop a common vision that reflect the needs and priorities of the targeted communities. The support of researchers, academics, scientists is also very important in providing potential solutions to address current and future challenges cities are expected to face, particularly those related to climate change and associated water shortages.[73]

The Talanoa Dialogue, which is an outcome of Conference of the Parties (COP)23 in Bonn is an attempt to address urban resilience following a holistic and participatory approach. It is a process intended to identify approaches and measures to address climate change challenges by promoting resilient cities. It is of particular relevance to refer to the ***Talanoa Dialogue and Dinner*** held on 27 April, where delegates emphasized the importance of engaging all levels of government in addressing climate change within the framework of pursuing the SDGs and the New Urban Agenda (NUA). It was also recommended that there is an urgency in adopting an integrated approach between all levels of government as well as relevant stakeholders; ensure good governance that allows bold action to induce change on the ground; and promote direct finance to local institutions to empower and enhance their role in achieving the sustainable development goals.[74]

Adopting a nature-based approach in the development of cities and new communities promotes the efficient use of resources and makes cities more sustainable and resilient. Such an approach binds local communities more with nature, promotes health and human well being, enhances cities achieve food security, creates sustainable economic activities, creates jobs, and enhances resilience and protects biodiversity and the ecosystem.

[73] Resilient Cities 2018, Resilient Cities Report 2018, Tracking local progress on the resilience targets of SDG 11, ICLEI
[74] Ibid

Moreover, greening financial and fiscal policies provides an opportunity for financing nature-based approaches in the design and implementation of sustainable and resilient cities.[75]

It is essential to fully take into account the natural and cultural heritage when developing new communities and cities. Conserving biodiversity and the ecosystem is part of the natural heritage that needs to be preserved, not only due to their intrinsic value, but also due to the economic, social and environmental benefits derived from them. On the other hand, preserving cultural heritage maintains connections and human relations bound by common traditions and history and consequently the cultural identity of the community.[76]

Social integration and cohesion is critical in enhancing the resilience of cities and communities to sudden shocks and disasters. Integrating the different segments of the population, particularly the marginalized and underprivileged communities, women and youth through social and economic programmes and through the design and formulation of policies is key in enhancing the resilience of communities.[77]

Availability of readily accessible and accurate data is essential for informed decision making. This is particularly important for city and community planning. Dwellers living in informal settlements possess valuable data that if shared and properly analyzed can hold the solution to the ever increasing rates of informal settlements in major cities such as in Cairo and Alexandria.[78]

In addition to creating new jobs resulting from the new economic opportunities offered by greening cities, environmental and health benefits are numerous. These include improved ecosystem services in the form of energy, water, and improved environmental conditions, which are reflected in a healthy and better quality of life for inhabitants.

In order to create sustainable and green communities in Egypt there is a need for a clear long-term vision and strategy for urban settlements and housing. One that is designed to function within limited water and energy resources in the country and which does not result in increased pressure on the environment, ecosystem and biodiversity.

[75] Resilient Cities 2018, Resilient Cities Report 2018, Tracking local progress on the resilience targets of SDG 11, ICLEI
[76] Ibid
[77] Ibid
[78] Ibid

New housing units and communities should be designed to be resource efficient, drive economic activities, by creating new and innovative investment opportunities, creating employment opportunities, providing housing for the different segments of the population, and that are resilient to climate change and economic shocks.

In order to achieve this end, new communities would need to rely on nature-based energy solutions that is tilted towards a higher percentage of renewable energy, reuse of recycled water for irrigating green areas and public spaces, recycling, reuse and recovery of solid waste, and the production of compost, and biogas and biofuel from generated waste. This all contributes to the more efficient use of resources, reducing pressure on primary sources of energy, water, and factor inputs.

Moreover, sustainable and resource efficient communities and housing projects should be considered when planning for mega national projects, including the Suez corridor, Al-Alamein, New Administrative Capital, and Sinai national development project. Furthermore, the design of new communities should be considered in light of the new Governorate administrative boundaries and the proposed Egypt 2052 National Development Plan.[79]

In order to provide affordable housing for the middle and low income families in Egypt, it is proposed that the Government offers housing units through the Social Housing Project for rent and not for sale.[80]

Financing sustainable urban development through the establishment of a Green Urban Development Fund (GUDF) can also go a long way in facilitating this transition.

The following section will cover the proposed vision, approach, challenges, and strategic objectives to develop sustainable urban communities in Egypt.

Vision

Sustainable and resilient communities that sustain and drive economic development, and where current and future generations enjoy a high quality of life within the ecological limits of the area

[79]Bassem Fahmy, Expert meeting, Cairo House, Egypt, 23 June 2015

[80](Yehia Shawkat and Ashraf Hussein, Housing Policies in Egypt, Egyptian Initiative for Human Rights, published by the Social and Economic Justice, 2014)

Approach

The main approach to be adopted in satisfying the housing needs of existing and future population is to plan and design new communities that drive economic activities, create new economic opportunities, jobs, and provide housing and social, cultural and social services that meet the needs and requirements of the different segments of the community, while fully respecting the ecological limits of the ecosystem. In doing so a participatory approach should be adopted in order to ensure that the needs and priorities of local communities, as well as the incoming new inhabitants are taken into account.

Challenges

In order to clearly define the strategic directions for the urban sector it is essential to clearly identify the main challenges facing the sector, which may be summed up in the lack or absence of the following main measures:

- A comprehensive vision for sustainable development for Egypt on the long term.
- A long-term predictable and stable policies to make a transition to sustainable urban development and housing.
- A good governance system that ensures transparency, accountability and the adoption of a participatory approach in the design and planning for new communities.
- An effective awareness campaign on the economic, social, environmental and health benefits resulting from sustainable communities.
- An integrated approach to planning for new communities that takes into account economic, social and environmental considerations.
- A public participation process in the design of communities and housing units to reflect the needs and priorities of the local community and potential new inhabitants.
- A well-designed management and operational system, including sufficient budgetary allocations for maintenance of existing housing stock, road networks and electricity, water, and waste collection and recycling facilities.
- Sufficient financial resources allocated to support the development of new communities and the construction of housing units, particularly for the middle and low-income families. Though initial costs of sustainable communities and green housing are relatively higher as compared to conventional housing and construction, the long-term operational costs are lower than in the case of conventional construction.

- A regulatory framework that promotes green and sustainable communities and housing. On the contrary, the system may not be geared to support such an approach. While urban agriculture and green roofs can provide a solution to reduce energy consumption, as a means to absorb CO2 emissions, and at the same time provide families with basic foodstuff that they would have otherwise had to buy, the current coding system in Egypt don't permit growing agricultural crops in public spaces.
- Inter-ministerial coordination between relevant ministries, including MHUUD, MoE, and other relevant ministries such as MoLD, MERE, MWRI, and MoT.
- Low returns on investment in housing for low-income and poor families as compared to housing for high-income housing represents a challenge for engaging the private sector in investments in the housing sector for these income groups.
- An incentives packages for the private sector to invest in green buildings and construction, particularly for low and poor income families. This may be in the form of access to affordable mortgage finance, with the Government providing guarantees to buy down interest rates from commercial borrowers (but still require full due-diligence by the lender).
- Encroachment of housing and construction activities on agricultural land.
- The development of projects based on a political agenda without due consideration given to environmental and sustainability considerations.

Opportunities

Despite the challenges facing the transition to sustainable cities and green buildings in Egypt, the current situation presented a number of opportunities, those include the following:

- The creation of the Central Unit for Sustainable Cities and Renewable Energy (CUSCRE) (Cabinet Decision 512 for the year 2014). The Unit which was created as part of the NUCA is entrusted with the planning, design, construction and operation of green and sustainable communities that aim at achieving energy and water efficiency, integrated solid waste management, sustainable transportation, and the application of the green economy concept in general. One of the main projects the Unit has launched is the joint project with the MoE to transfer the City of Sheikh Zayed in Cairo into a

green sustainable city as a pilot city.[81] Other new communities in Egypt implementing green projects include Bourg El Arab, El Sadat, El Odour, and Toshka.

- At the Government level, there are tendencies to provide incentives for new buildings and construction to be more energy efficient.
- Building the new New Administrative Capital for Egypt provides a good opportunity to adopt the green buildings codes, Leadership in Energy and Environmental Design (LEED) Green building rating system and other sustainable development considerations.
- The handbook developed by The Green Building Council (GBC) which can be used by the public to understand and implement green building practices.
- Guidelines for sustainable urban new cities are being finalized as a joint effort between the MoE, MHUUD and sponsored by MPMAR.
- The MHUUD has revitalized and enforced since a year ago, its Environmental Units attached to the Urban Planning Authority in the new urban settlements to monitor polluting activities and provide technical support for remedial action. These units are assigned the responsibility of promoting clean energy, including the introduction of solar energy, where it finances and builds these systems, and through the Trustee Council provide solutions for problems. It also promotes the engagement of the local community in urban development.
- The emergence of the new rating system "TARSHEED" could be instrumental for injecting new approaches in the market. In addition, there are a number of local initiatives that promote efficient use of resources. One such initiative is the Eco citizen World Map project comprised of a PPP that is led by the US NGO Eco city Builders and joined by Esri, the Association of American Geographers, Eye on Earth (a partnership between UNEP + Abu Dhabi Environmental Data Initiative), Cairo University, Mundiapolis University, University of California at Berkeley and a number of local NGOs and community partners. This project, which started in 2013, provides tools and training to citizens, public officials and others aiming at ensuring a more sustainable and resilient urban environment through more informed decision-making.

[81] Hend, Farouh, 2015

Strategy

Economic, social and environmental considerations should be fully taken into account and guide the planning, design and construction of newly proposed cities and communities in Egypt. The development of such communities should ensure sustainability from the environmental, social, economic standpoint, as well as in terms of the financial viability and sustainability of the proposed economic activities in the new communities.

New housing units and communities should be designed to be resource efficient, drive economic activities, create new and innovative investment opportunities, create new employment opportunities, provide housing for the different segments of the population. They should also and be resilient to climate change and economic shocks as earlier stated. In order to achieve this end, new communities should gradually rely mainly on renewable sources of energy, reuse of recycled water for irrigating green areas and public spaces, recycling, reuse and recovery of solid waste, and the production of compost, and biogas and biofuel from generated waste. This all contributes to the more efficient use of resources, reducing pressure on primary sources of energy, water, and other factor inputs.

The proposed community should be designed and developed as an integrated self-contained self-sufficient sustainable entity to the extent possible. It should be designed to provide economic and investment opportunities for its inhabitants, employment, housing, health, educational, cultural and recreational services that are affordable and meet the needs of the different segments of the population. It should aim at driving economic activities thus contributing to GDP, social cohesion and integration, and environmental integrity.

The community or city to be developed should follow the Polycentric concept with core units developed around specific economic, social, and cultural functions and activities that may be developed at different stages, and should ensure supportiveness and complementarities to other core units, and can also function as stand-alone developments.

Strategic Objectives

Three main strategic objectives are identified to realize the vision.

Strategic objective 1

Promote the development and implementation of practices and solutions that enhance efficiency of the sector

While it is essential to have a master plan with clear land use and zoning, uniform building codes for housing units, location of economic and service activities, roads, public transport

system, social and commercial services, it is important that building codes and land use and zoning regulations are closely monitored and enforced throughout the development and functioning of a community.

One of the main guiding principles in the planning of new communities and design of houses is the efficient use of resources, natural as well as produced goods. A life cycle assessment approach should be adopted to ensure the efficient and sustainable use of resources and in the functioning of new communities and housing units. This entails ensuring that buildings and communities are designed to reduce material use, and energy and water consumption and other factor inputs. It should also ensure the reduction, recycling, and reuse of construction and demolition waste as well as solid waste and wastewater generated.

Buildings should be designed not only to be self sufficient in the use of energy, but eventually to generate electricity beyond their needs and which can be fed into the national grid. Water saving equipment should be installed in buildings to reduce water consumption. Used water should be recycled and reused for irrigating green areas and public spaces. Solid waste should be separated at source to allow for its reuse and the production of compost out of organic material.

The use of local material should be encouraged to reduce overall costs, including transport cost. Reducing energy consumption and promoting the use of renewable sources of energy will contribute to CO_2 reduction and consequently positive environmental and health impacts.

Special care should be taken in the selection of the site for the new community and its optimum size. This is critical in planning for the new community, and the extent to which it will be able to support and drive economic activities, attract investment, and inhabitants. Planning for small and medium size communities of between 100,000 and 150,000 to reach a maximum size of 250,000 in special situations may be an ideal size for new communities. This provides a size of a community, which can be easily managed and financed and is able to achieve its set target of inhabitants. This will also help achieve self-sufficiency, competitiveness and economic viability of the community. The selection of the site should be based on a feasibility study that considers the site from all aspects, including topography,

soil conditions, availability of water and sources of energy, and accessibility to main transport routes.[82]

Promoting sustainable communities and green construction, buildings and infrastructure should therefore be encouraged due to economic and financial gains, and positive social and environmental impacts.

Strategic objective 2

Enhance the contribution of urban development, housing and construction to sustainable economic development, social integration, and environmental integrity

Sustainable communities should follow the concept of urban metabolism, where the design and planning of the community should carefully consider the interactions of the natural and human systems in the designated location of the community. New communities and housing units should be designed with careful considerations given to water and energy requirements for the planned economic activities, housing units, as well as mobility and transportation requirements, and solid waste management systems.

Access to employment opportunities, social, health, and recreational services are key for a sustainable community. It should be mentioned in this context that five new urban communities were established in Upper Egypt since 1999, which have not been inhabited up till now due to flaws in the way the communities were conceptualized, designed and implemented.[83]

The conceptual development and design of communities and cities should therefore aim at developing a carbon neutral environment, with full considerations given to the use of renewable energy (solar, wind, biogas), recycled seawater using solar energy (particularly for coastal locations), irrigation using efficient and saving techniques (drip, sprinkler, hydroponic agriculture), recycled wastewater for fodder and green areas, and the use of waste for the production of biofuel and compost.

The concept of sustainable communities should be promoted along desert coastal areas, particularly along the northern coast of Egypt to absorb future population growth in the country. The development of communities along the northern coast following this concept holds the future for solving Egypt's energy, water and food problems. This is in addition

[82] Hend Farouh

[83]Bassem Fahmy, Expert meeting, Cairo House, Egypt, 23 June 2015

to reducing pressure on existing urban centres, infrastructure, services, traffic, air pollution, and pollution of waterways, as well as the encroachment on agricultural land.

Applying the concepts of green and circular economy on the coastline desert areas will mainly rely on the use of solar energy for water desalination, use of water efficient and saving techniques and technologies to support economic activities, including the use of recycled water, production of energy from renewable resources, including biogas for waste and the use of organic fertilizers from organic municipal and agricultural waste. These desert communities should be self-sustaining, based on sound and viable economic activities that attract investments, create jobs and provide livelihood for its inhabitants, within ecologically sustainable boundaries and carrying capacity of the site.

The main objective of adopting a circular economy in the construction sector is to maintain, refurbish, reuse and recycle resources and material used in all stages of the value chain. Based on a study in the Nordic construction sector, interviews were conducted with relevant stakeholders in Denmark, Finland, Norway, and Sweden. The outcome revealed that emphasis was mainly laid on rules and regulations with less emphasis on economic incentives. Main policy instruments suggested by the interviewees may be summed up as follows:

- Supplementary requirements to be prepared for the quality and content of building materials used in construction.
- New requirements for the documentation of the use of reused building material and those containing recycled material in construction.
- New requirements for the handling of building and construction demolition material.[84]

The proposed policy instruments are expected to result in positive environmental impacts, with no additional expenses on government budgets, while at the same time resulting in positive financial impacts on the private sector. Positive impacts are represented in cost savings, better environment, reduction in resource use estimated at about 20% reduction compared to conventional construction processes. Such reduced costs are expected to offset increased initial costs resulting from the transformation process. Moreover, reduced resource consumption by 20% is expected to result in a reduction of about 10 million

[84] Linda Høibye and Henrik Sand Circular Economy in the Nordic Construction Sector, Identification and assessment of potential policy instruments than can accelerate a transition towards a circular economy, Nordic Council of Ministers, 2018

tonnes of greenhouse gas emissions in the four Nordic countries throughout the entire life cycle of building material, including extraction, transportation and manufacturing.[85]

The design and layout of the city should emphasize the provision of public transport as the main transportation system as opposed to private car ownership. Space for pedestrians and cyclers along shaded areas should be included in the design of the city. Considerations should be given to providing easy access to employing opportunities, health and educational services as well as commercial, recreational, and cultural services, in order to reduce the reliance on motorized transport systems.

The Economic Dimension

The planning, design and construction of the proposed city or community should aim at maximizing its contribution to the sustainable economic development of the region in which it is located and the country as a whole.

The physical planning, design, and construction of new communities should give due consideration to the efficient use of resources and other factor inputs as earlier stated, which will result in reduced costs. Identified economic activities for the new community should be self-sustaining, generate income for its inhabitants, and contribute to GDP.

In order to ensure the economic sustainability of the core units within the community, activities have to be identified on the basis of the unique characteristics of the geographic location of the site, available resources and potential natural endowment in the area: water, energy generating potential, soil, and other resources, trends of regional and international markets for the identified products and services, and expected population growth and economic/financial payback period. The development and functioning of the community should rely primarily on the resource base available at the geographic location of the new community. [86]

The design of the new community should also be in line with and supportive of the overall socioeconomic development strategy of the country, which aims at achieving sustainable development.

The productive sector, which represents the economic base of a city should target the regional and the international markets and not simply the local market. This will widen the

[85] Ibid

[86]Nisreen El Lahham, Towards Creating New Sustainable Cities and Communities in Egypt, A critical View for Planning for New Cities, 2011

scope for the marketing of local products and the economic returns from their sale. Lack of connectivity and transport and road facilities reduce the competiveness of cities and their economic viability. This in turn renders these communities as an unattractive for investments and new residents. [87]

Priority economic activities identified for the city may be one main driving activity or a mix of complementary and interconnected activities. The main driving activity may be agriculture for example, with agriculture related industrial activities to support the sector and provide value added for agricultural activities. So if the main economic activity is agriculture, industrial activities should therefore be directly linked to that sector.

Furthermore, as the rate of urbanization increases globally with cities occupying more than 54% of the world population and is expected to increase to abut 59% by 2030, this trend is expected to be higher in Egypt. Based on these trends, agricultural development need not be concentrated only in rural areas, but it is important to emphasize the linkages between agriculture and urban areas. With the objective of achieving inclusive sustainable urbanization, efforts should be directed towards integrating urban agriculture into new and growing cities.[88]

In order to promote sustainable cities, emphasis should be laid on strengthening the social dimension, introducing innovative agricultural technologies, and promote public and private participation. Innovative agricultural approaches in urban areas include greenhouses, roof top gardens, indoor and vertical farms and green walls. Though yields from urban agriculture are not expected to meet the food needs of the urban population, it still can meet the needs for local residents in vegetables, and can produce crops that rural land may not be able to produce. However, benefits derived from urban agriculture is mainly attributed to promoting social integration and cohesion. Sharing of cultural values, knowledge and skills related to the production of food, particularly in a country like Egypt being an agriculture based country, preserves social and traditional heritage and helps bind the different segments of the society. It should be emphasized that community gardens should not infringe on the interests of existing neighbourhoods and residents.[89]

In order to promote urban agriculture, a number of policies need to be introduced. First, urban and rural development should be designed in a complementary manner adopting public-private participation as a key approach to benefit both communities. Such a multi

[87] World Bank Group, Africa's Cities, Opening Doors to the World, 2017
[88] Marc Hernandez and Rosemary Manu, George Washington University, 25 January 2018
[89] Ibid

stakeholder approach should also be adopted for the management and monitoring of urban centres, including food systems. Policies that aim at promoting green infrastructure and providing loans for SMEs should be promoted. Second, there are health and economic benefits resulting from urban agriculture, as it provides access to sustainably grown vegetables and fruits. It also promotes physical activity especially for old people improving physical and mental health. This is in addition to economic benefits resulting from the sale of excess of needs fruits and vegetables that urban farmers can generate. Third, innovative practises for urban agriculture such s greenhouses, hydroponics, and vertical agriculture should device energy efficient and energy saving techniques in order to reduce the negative impacts of greenhouse emissions on climate change. [90]

The characteristics and main features of the new community should therefore be designed to support the economic activity, which has been identified based on the potentials offered by the specific location in question and its natural resource endowment. Priority should be given to sustainable economic activities with the highest contribution to GDP and job creation. Tourism is one of the sectors that offer such an opportunity in Egypt, due to the unique geographic location, cultural and social heritage, climate, extended coastline and beaches along the Mediterranean and the Red Sea, and scenic beauty in many locations in Egypt. Investing in the agriculture sector offer another option provided water resources are used in the most prudent and efficient manner. Achieving food security is a key objective in Egypt, in order to meet increased demand for food due to population increase, changes in consumption patterns, and high world food prices.

Securing food security for urban areas is a challenge cities face, especially when cities rely on rural areas for food supply. Moreover, due to the distance from rural to urban areas, it is estimated that between 10-30% of food is lost in its way to the market place. Changes in food prices represent a challenge for poor urban households. Urban agriculture provides secure and easy access to safe and quality food that contributes to improved health of the urban population. It is estimated that between 25-30% of the urban population worldwide are involved in growing food in urban areas.[91]

The community should be built to be self-sufficient, generating income for its operations and creating economic and job opportunities for its inhabitants. Identified economic

[90] Ibid

[91] Social perception of urban agriculture in Latin-America. A case study in Mexican social housing Ana Nadal, Ileana Cerón-Palma, Carmen García-Gómez, María Pérez-Sánchez, Beatriz Rodríguez-Labajos, Eva Cuerva, Alejandro Josa, Joan Rieradevall

activities should be competitive and attractive for local and foreign investors. Serving as a major educational, research, cultural, administrative and conference service hub may also be considered as a driver for the development of the proposed new city or community.

It should be emphasized however that in order to attract new inhabitants to the new communities and encourage the purchase of new residential units, the Government should support housing finance programmes for low income and poor families.

The following are some basic principles to be considered in the design and planning of new communities and housing in Egypt:

- An integrated assessment and planning (social, economic and environmental) should be applied to ensure the viability of the new settlement from all aspects, to be accompanied by a full feasibility study.
- The new development should respect the local culture, tradition and architecture, and use local material that is most suited for the local environment and climatic conditions of the location of the project.
- Efficient use of natural resources and factor inputs using innovative building techniques to produce smart and efficient structures.
- Optimum land use planning to provide easy access to jobs, social, commercial, and cultural services, reducing heavy dependence on transportation for commuting, thus reducing energy consumption and CO_2 emissions.
- Promote a fair and transparent rental market and balanced rights for both landlords and tenants, through adequate legislation and a conflict resolution system.[92] This can only be achieved if the availability of rental properties does not exceed demand by a high margin. The Government in this instance would need to leverage construction of rental properties. This may be in the form of writing off a percentage of mortgage payments against federal tax.

The Social Dimension

Adopting an all-inclusive participatory approach is an indispensable process in the development of the proposed city or community. This process ensures that the needs, concerns, and priorities of the local community are fully taken into account in the design

[92] United Nations Economic Commission for Europe, Geneva UN Charter on Sustainable Housing, 2015

plan. It will also ensure the integration and active engagement and contribution of the local community in the development and implementation of the action plan of the city.

The design and planning for the new community should ensure the preservation of the cultural and traditional identity of the local community and the specific characteristics of the site as earlier emphasized. Housing units provided in sustainable communities should be compatible with the local identity, and cultural and traditional background for the local community and potential future inhabitants.[93] They should take into account the cultural identity of its inhabitants. This includes the protection of existing landscapes, historical and cultural heritage.[94]

Social considerations as well as the main occupational functions of the targeted community, as well as the specific geographic characteristics of the selected location should be taken into account in the development of new communities. This includes planning concepts, building material used, design of housing units, and layout and size. What suits farmers in the Delta for example would not be suitable for fishermen living along coastal areas, or Bedouins in Sinai.[95]

The approach used in the provision of new urban communities should ensure that social services such as education, health, and cultural and recreational services reflect the socioeconomic circumstances and needs of the different segments of the population. Job creation, particularly for the local community should be an important component of the new community.

New centres should aim at achieving social cohesion, including between local communities and incoming new inhabitants. This can be achieved by providing accessibility to the different segments of the population to education, cultural, and recreational services that meets the needs of different income groups, ensures fair and equitable distribution of resources and accessibility to economic opportunities, jobs, and affordable housing. Sufficient public space and green areas should be made available in communities to provide green public and recreational space for middle and low-income families. Women and youth should be well integrated in communities' activities, economic, social and cultural life, with suitable jobs made available for them.

[93]Nisreen El Lahham, Towards Creating New Sustainable Cities and Communities in Egypt, A critical View for Planning for New Cities, 2011

[94] Ibid

[95]Bassem Fahmy, Expert meeting, Cairo House, Egypt, 23 June 2015

Developing social mixed communities should therefore be promoted as opposed to gated communities as the former contribute to social cohesion and integration.[96]

The main labour force to be engaged in construction related activities, as well as economic activities generated in the new community should be mainly drawn from the location of the city and the region. This may entail the development of training and capacity building programmes for the local community to provide the required skills and calibres needed to support local activities.

Human resource development should therefore accompany physical development in order to ensure the necessary engagement and integration of local communities in the development process of their community. This should be in the form of extensive short term vocational and on site training campaigns and long term formal education, training and public awareness packages.

The Environmental Dimension

The development and design of the proposed community should fully take into account the prevailing environmental and ecosystem conditions, including the geophysical and climatological characteristics of the area. This is essential in order to ensure the integrity of the ecosystem, and that it continues to provide the resources and services needed to support and sustain the new community and its activities. Investing in the environment as well as in human resources should be considered as the basis for the sustainable development of the new community and the country as a whole.

Sustainable communities should contribute to reducing the carbon footprint throughout the life cycle of housing, constructions, and buildings.

The conceptual design of the proposed community should emphasize investing in renewable energy as the main source of energy to support all forms of activities and developments. It should also emphasize investing in water conservation, recycling, and reuse. This is in addition to investing in solid waste management in order to promote resource efficiency, produce organic compost, and biofuel. This will result in providing for a clean and healthy environment for the inhabitants of the community.

Ensuring the provision of a sustained and secure source of water is a crucial element for the long-term viability and sustainability of the proposed new community. Relying mainly

[96] Heba Allah Khalil, Affordable housing: Quantifying the Concept in the Egyptian Context, Journal of Engineering and Applied Science, Faculty of Engineering, Cairo University, Vol.59, No.2, April 2012

on depleting ground water, as the main source of water is not an option. Investing in the desalination of seawater using renewable energy should be given a priority for meeting water demand in Egypt as a more sustainable and reliable source. This should be accompanied by the adoption of water efficiency measures and techniques, including the recycling and reuse of wastewater to provide the needed water supply to support human settlements and economic activities in the proposed community.

Building, construction and design should fully take into account the introduction of innovative environmentally sound solutions for the efficient use of water and energy, as well as other factor inputs. Building and construction activities should mainly rely on local material available in the proposed site as referred to earlier.

Moreover, new communities should provide for compact housing and allow for future growth in order to avoid urban sprawl.[97]

Public transit system should represent the main means of transportation, with space provided for pedestrians and cyclers to reduce use of vehicles. Design of communities should ensure mixed use and easy access to jobs, social, commercial, cultural and recreational services to reduce commuting time and encourage the use of non-motorized means of transportation.

Emphasis should also be laid on the use of environmentally sound technologies and production processes that avoids and minimizes waste and promotes the recycling of solid waste and wastewater into usable material, biogas, and compost.

The recycling and the reuse of demolition waste should be promoted as its share in total solid waste has been increasing with increased construction and renovation activities in Egypt.

Resilience in a changing climate

Egypt is one of the countries that are expected to be severely affected by the consequences of climate change represented by sea level rise and extreme weather variations.

The projected impacts of climate change can be summed up as follows:

- Increased frequency and severity of storm events
- Reduced average rainfall

[97] Bassem Fahmy, Expert meeting, Cairo House, Egypt, 23 June 2015

- More days over 35°C and higher annual mean temperature
- Potential impact of possible sea-level rise
- Uncertainty or disrupted supply of electricity, water, food and fuel

Increased temperatures due to climate change have implications on water supply needed for human use, flora and fauna. This includes implications for food production and fodder for cattle and water availability needed to support municipal and economic activities.

It is therefore necessary that Egypt introduces measures that enhances the resilience and adaptation of new communities and cities to meet current and potential future climate change impacts.

Different alternatives and solutions for building design and the development of new communities should address the different potential scenarios for climate change implications: best-case scenario, worst case scenario, and business as usual scenario. This should be supported by an action plan with clear timeframes and responsibilities, including the role of different Government entities, as well as the role of the private sector for the different scenarios.

New cities and communities should aim at ensuring the realization of the following:

- Sustainable built environment
- Sustainable housing and construction
- Sustainable living and working environment
- Ecosystem and biodiversity conservation
- Sustainable transport system
- Sustainable business
- Integrated waste management
- Greenhouse gas emission reduction
- Water and energy efficiency

Strategic Objective 3

Promote efficient functioning and management of the building sector

A good governance structure is necessary in order to ensure the efficient management and operation of existing and new communities and housing. Transparency, accountability and public participation should govern the functioning of the sector. While there are many laws and regulations related to urban settlements, housing and construction, three main aspects

are lacking. The first is local capabilities to assess the potential economic, social and environmental implications of laws. The second is the development of laws and regulations that promote the efficient use of resources and promote sustainability. The third is an efficient law enforcement, monitoring and evaluation mechanism. It is therefore imperative that existing laws are reviewed against a set of sustainability criteria and principles and new laws introduced to achieve this end. This should be supported by community education, the strengthening of the judicial system, and the training of prosecutors and judges and enforcement agencies.

The Government should provide a secure and stable macroeconomic environment for investing in the housing sector, including regulatory procedures and mortgage rules in order to ensure appropriate mortgage availability, protect consumers, enhance their housing security, widen housing choices and reduce the risk associated with home investments. There are a number of financial instruments that the Government can use to make lending more attractive to both banks and borrowers. These include mortgage insurance and loan guarantee programmes. Moreover, national policies and programmes should be designed to allow inhabitants of informal settlements to regularize and upgrade their dwellings provided that the geographic location among other factors allow minimum safety requirements to be met.[98]

It should be emphasized that relevant stakeholders, including the local community, Government, academia, private sector, civil society, should be engaged in the planning and implementation phase of any proposed city or community. The role of Government, central and local has to be clearly identified in the implementation, management, and construction activities, as well as economic and services activities. The private sector should also be actively involved in the various community development activities, including through PPP.

Community engagement and participation from the outset in the various phases of the development of the proposed community is key to its success. A mechanism should be established to ensure that the local community and inhabitants are involved in the planning and implementation of the action plan of the community and its proposed economic activities.

[98] Bassem Fahmy, Expert meeting, Cairo House, Egypt, 23 June 2015

Land and building regulations and zoning while designed to ensure sustainability should promote economic density.[99]

Attracting private sector investment is also important in providing necessary financial resources required to fund housing and physical as well as social infrastructure related activities. A package of measures need to be introduced to encourage the engagement of businesses and the private sector in the development of new communities. These include a package of incentive and regulatory measures, and communicating a convincing message to entrepreneurs and businesses about the gains derived from internalizing the financial and environmental externalities of their operations (environmental degradation, emissions, waste, etc.). The private sector should have a better understanding of the economic and financial gains resulting from investing in sustainable communities, housing and construction.

Environmental and green building codes and standards should be introduced and enforced in the development and construction of new urban development, housing and construction and their enforcement. The Green Pyramids Rating System (GPRS) launched in 2011 by the EGBC, currently being tested and under review should provide a strong and effective tool in promoting green and sustainable building structures in Egypt. About 30% of the current version of the rating system cover water use mainly in terms of efficiency and quality. The review process, however, should ensure the engagement of a multi disciplinary team of experts in order to ensure that the rating system covers all aspects of buildings. It is also suggested that the Green Building Handbook produced by the EGBC should be reviewed to reflect experience gained on the ground and ensure that all design aspects are incorporated in the handbook. The system is currently being tested in a number of locations in Egypt, and will be applied in the development of the new building of the MoE, which is yet to be constructed.[100]

One of the necessary requirements for sound planning and projecting future housing needs for the different segments of the population is a reliable and continuously updated database for the housing and construction sector. It is therefore important to create and continuously update a database on the existing housing stock in order to support the planning decision making process.[101]

[99] World Bank Group, Africa's Cities, Opening Doors to the World, 2017
[100]Ahmed Mohamed Noureldin, Karim Mohamed Badr Ayyad, EGBC.
[101]Bassem Fahmy, Expert meeting, Cairo House, Egypt, 23 June 2015

A package of incentives should be provided by the Government to encourage private sector investment in housing for low and poor income families, and investing in green and sustainable communities and housing. This can be achieved through concessionary loans, the provision of land at reduced costs, tax rebates, and subsidies.

The Government should also encourage investments in economic activities to make new communities self-sustaining, create jobs, attract local and foreign investment, and new inhabitants. This should be accompanied by measures and policies to provide disincentives to invest and live in major cities such as Cairo and Alexandria.

Effective monitoring and enforcement of laws and regulations has been generally lacking in Egypt. It is therefore essential that strict measures be taken to ensure the enforcement of law and penalties are raised and paid for violators.

As indicate earlier, new communities and housing units should cater for the specific needs and social and cultural backgrounds of the local communities. In order to achieve this end, it is proposed that a decentralized system should be introduced in Egypt, where governorates are given the responsibility and or take the lead in the planning and designing of new communities and housing units.

Structural changes should therefore be considered to give more authority at the governorates level for land use planning and community development within a general framework to be provided by the central Government. Governorates are generally more aware of priorities and needs at the local level and are in most of the cases better positioned to provide the best solutions for local conditions.

Enhanced knowledge base and expertise of practitioners to deal with the environmental component in housing and communities, including the potential impacts of climate change on communities developed along coastal areas is essential. Consideration should be given to creating a unit within the MoE to be entrusted with the responsibility of providing technical support and guidance for practitioners and decision makers working in this field. This would also apply to other sectors as well, including agriculture, industry, tourism, and transport.

Strengthen inter-ministerial coordination between MHUUD, MoE, and other relevant ministries such as the MoLD, MERE, MWRI, and MoT is key in ensuring synergies and complementarities in the design and implementation of sustainable communities in Egypt.

Continuous assessment and evaluation of the status of implementation and functioning of new developments and housing projects should be undertaken with corrective actions introduced in order to ensure compliance with sustainable standards, guidelines, and action plans.

Human resource development and capacity building through formal education and training, as well as through vocational training is necessary in order to provide the required skills at the different levels of the planning and implementation process, including design, construction, management, and maintenance, in order to support the development of sustainable communities and housing.

A long-term research and development programme should also be developed to provide innovative technologies, techniques and measures to support the development and construction of sustainable communities and housing.

A communication package targeting different stakeholders should be developed to raise awareness about the importance of transitioning to sustainable communities and housing and for the importance of adopting sustainable production and consumption patterns.

The following table provides an example of indicators, measurement tools and targets related to social and environmental objectives.

Indicators	Measurement Tool	Target
Increased efficiency in water and energy consumption and other factor inputs and reduced pollution and waste generation	Periodic survey for the residents of the city to identify level of satisfaction and identify gaps in services	Percentage share of the housing and building sector in energy and water consumption reduced
Housing that meets the needs of the different income and social groups	A data base for the housing stock classified according to size, cost, function, etc. and periodic housing surveys to determine gap in housing needs	Increase percentage of housing provided to satisfying the needs of the different segments of the population
Social cohesion between the local community and incoming inhabitants and tourists	Incidence of disputes and crime as per police reports	Reduce incidence of reported disputes and crimes
Good quality of life and living standards of population through improved environmental conditions; and improved living standards through increased job opportunities resulting from refurbishing and construction activities	Statistics on incidence of disease, types, and causes of the most recurrent one Air and water quality measurement equipment Census on the rate of employment	Improve quality of life and standards of living Percentage share of labour force employed in housing and building sector
Increased rate of compliance by builders to building codes and standards	Monitoring of compliance by responsible entity	Full compliance by builders and contractors to the set codes and standards

Annex III provides proposed measures and indicators for supporting economic, social and environmental objectives and promoting good governance.

A strategy with three tracks

Track 1: The transition track

This track gives priority to physical conversion that can start immediately due to the cost effectiveness of available technologies. It also involves reasonable investments that can contribute to realizing short and medium-term objectives. This includes introducing necessary corrective sustainability measures for old and under construction new cities. I also includes retrofitting of the existing building stock making existing units more energy and water efficient, increase the use of biomass as a source of energy, widespread waste to

energy applications, and expansion of solar energy uses. This phase also involves community engagement to deal with municipal solid waste and regulatory reform and incentive packages that can influence change in the housing and construction sector towards a more sustainable path.

Track 2: The planning and preparation track

This track focuses on directing efforts and investments in areas that ensure the development of the necessary infrastructure to enable the achievement of the intermediate and long-term objectives. This includes the construction of necessary green infrastructure for renewable energy, including biogas and district heating systems, solid waste and wastewater recycling and treatment plants, biogas and compost production facilities, and factories for the manufacturing of environmentally friendly building materials.

Track 3: The technology development track

The design of new communities should include smart housing units that rely on technologies that provide saving in the use of resources, including natural resources such as energy and water. It should also promote the use of local material and help maintain the endogenous character of the community.[102] This track is therefore concerned with investing in knowledge generation, and research and development (R&D) to support sustainable urban development, green housing and construction that are efficient, resilient and affordable.

It includes R&D in innovative design for green buildings, the use of wind and solar power energy sources, the use of solar energy for seawater desalination and other industrial processes, urban agriculture, transport systems, and building material.

It also includes the use of blockchain to facilitate international trading and advancing e-governance, the provision of utilities, and improving the delivery of high quality services. Data gathering, analysis and synthesis as it relates to road safety and requirements and traffic congestion, waste management, state of informal settlements, and health and education and recreational services are also essential activities needed to support the transition to sustainable communities.[103]

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[102]Nisreen El Lahham, Towards Creating New Sustainable Cities and Communities in Egypt, A critical View for Planning for New Cities, 2011

[103] Wanli Fang, The World Bank, East Asia & Pacific on the rise, Deploying disruptive technologies to reshape the future of cities, July 2018

Potential Benefits

Investing in green buildings though may involve an increase in initial costs, is expected to result in savings exceeding initial costs by about 10 times, due to long term savings in energy, water, waste generation, pollution, maintenance. This is in addition to improved health, productivity and human welfare of the inhabitants of the community.

The transition to sustainable communities and green buildings and construction creates new economic activities and businesses, thus diversifying the economy and creating new economic opportunities.

Investing in sustainable communities and buildings creates new job opportunities as has been stated earlier. It is estimated that in the United States of America (USA) the refurbishing of buildings creates between 10-14 new direct jobs and 3-4 indirect jobs for every 1 million US $ spent. It is expected that this figure will be double in the Arab region due to lower labour productivity. Investing one billion US$ in Egypt should result in around 20,000 jobs. It is also expected to result in a reduction in maintenance and operating costs of refurbished commercial buildings with a payback period of less than 6 months.

It is estimated that energy saving measures and investing in renewable energy will reduce fossil fuel consumption by at least 35%. Environmental benefits include reduction in CO_2 emissions and the resulting positive impacts on health and the environment. It also results in reducing climate change impacts, where buildings.

This is in addition to the reduction of water consumption (650-1250 litre/day as compared to 350 litre/day in green cities and buildings). Separation between grey and black water, its treatment and reuse in irrigation is estimated to save about 50% of water usage.[104]

Enabling conditions

In order to facilitate the transition of the Egyptian economy to a green and sustainable path and the achievement of SDG 11, a package of policy measures need to be introduced. This section of the document is devoted to identifying a set of enabling conditions based on expert consultations, and stakeholder meetings. Main criteria used in the identification of the proposed measures are their political acceptability and relative ease of introduction and implementation.

If cities in Egypt are to become sustainable, with natural resources used efficiently, pollution levels kept to a minimum, energy consumption effectively controlled, and water

[104] Hussein Abaza et.al, Arab Environment 4, Green Economy in a Changing Arab World, AFED, 2011

resources managed in a sustainable way, considerable reconfiguration of how these cities are planned, managed, and governed will need to take place.

This will require the design and introduction of a set of enabling conditions, through a variety of administrative, regulatory, and financing tools introduced. These include devising policies for procurement, contract specifications, building performance, and building codes regulating municipal standards. Municipalities can also enact regulations and develop training and education programmes that focus attention on sustainable building design.

A strong governance system

A strong governance system that promotes transparency, accountability, and stakeholder participation is essential in making a transition to a green and sustainable urban communities. Moreover, fighting corruption is also a necessary prerequisite for a strong and efficient governance structure. This is particularly important as a good governance system is a necessary prerequisite for achieving sustainable development communities.

Officials, civil servants and decision makers should be provided with information, managerial capacity training, and the ability to analyse challenges, assess opportunities and ensure coordination to avoid redundant and inefficient policies. Robust measures should also be introduced to promote the accountability of government official, including decision makers for their actions, public policies, and decisions.

Restructuring and reforming of public institutions and the creation of new ones with clear mandates to greening polices could significantly facilitate and put in place necessary policy tools and measures to transition the economy onto a sustainable path. Decision makers should introduce a tight system of checks and balances while designing, planning, implementing and evaluating green policies. Strategic environmental assessments, project level impact assessment, devising sustainable development indicators, life cycle analysis integrated environmental and economic accounting, and public environmental expenditure reviews are tools that could be used. Moreover, integrated policymaking and sustainability assessments are tools that can be used to facilitate the transition to a green and sustainable economy.

Institutional Reform

Mandatory energy efficiency requirements through building codes have been acknowledged for their effectiveness. However, the success of implementation is subject to the institutional capacity of implementing agencies at municipal and national levels, and

technological capacity within the national building supply chain to meet the necessary requirements without considerable increase in costs.

This necessitates building the capacities of technicians and engineers to enable them review tender documents submitted by contractors and investors. Moreover, architects and engineers should be trained in implementing environmental codes and standards.

A first step towards green and sustainable urban communities is a review process for existing policies, plans and programmes in order to identify gaps and update policies and laws according to sustainability and green application measures. Ministries have to work closely together in order to ensure coherence and harmonization of their laws and legislations aimed at achieving sustainability.

A participatory process involving relevant ministries and different stakeholders should be adopted in the formulation of policies and action plans. The absence of clear roles and responsibilities of different ministries in the development of new urban communities represents a challenge for the building and construction sector in Egypt. Closer cooperation is needed between MHUUD, MoE, MERE, MoLD and Ministry of Trade and Industry (MTI). Collaboration with MTI should facilitate the promotion and introduction of cleaner and green technologies and products in the building and construction sector. There is a need for a strict approval and screening process for industrial and economic activities in urban areas in order to ensure that they do not result in negative environmental and health impacts on the community.

Capacity development and training programmes should be a key component of institutional reform. This is needed at all levels to produce the needed calibres at all levels from policy makers to skilled and manual labour. Professional staff working within the environmental units of the new Urban Communities Authority have to be well trained and qualified to be able to discharge their duties in the most competent and professional manner.

Human resource development

Investing in human capital is key in making a qualitative shift towards green and sustainable urban communities. This is a necessary prerequisite to provide the needed calibres at all levels, whether managerial, technical, or skilled labour. In order to achieve this end, the education system at all levels should be reviewed to ensure the integration of sustainability considerations in the different disciplines and at all levels, including in urban and physical planning, building and construction, infrastructure, roads and transport systems, water and

energy networks, and waste management. There is a need to cease teaching the environment as a separate discipline to an aspect that is well integrated across sectors. Moreover, social and equity considerations should also be properly integrated in the different disciplines, and the linkages between environmental, social, economic and sectoral objectives clearly identified and analysed.

Integrated policymaking

Integrating environmental and social considerations with economic sectoral and macroeconomic policies are essential in making a transition to a green and sustainable economy and building sustainable communities. This integration should be achieved in designing overall Government strategy and in formulating, plans, programmes, and projects. Designed policies should ensure sustainability from the environmental, social and economic standpoint that results in human welfare for current and future generations. Policies should ensure efficiency in the allocation and use of resources, including waste prevention, minimization, reuse, recovery, and recycling. Moreover, it should be emphasized that a key component for long-term sustainability and economic resilience is maintaining environmental and ecosystems integrity.

A strong and good governance system should facilitate the realization of this integration. It will also facilitate the implementation of the proposed strategy, plans, programmes, and projects. Integrated policy making for green and sustainable transformation should be conducted in a manner that contributes to achieving a number of key objectives, which include efficiency, equity, and resilience among others.

Social cohesion considerations should be fully taken into account in transitioning to a green and sustainable economy. Special consideration should be given to the under privileged and marginalized communities. Equity considerations should be fully taken into account, including equal access to social services and natural capital. Integrated policies should aim at achieving inter-generational equity ensuring that future generations do not bear the costs and negative implications of proposed policies. Policies should also ensure inclusiveness and equal distribution of wealth and opportunities for the different segments of urban inhabitants in terms of employment and services.

Integrated urban planning policies and greening of the economy should contribute to generating new economic activities, diversification of the economy, creating new jobs, particularly for the poorer segments of the population. It should also result in attracting and opening up new businesses and investment opportunities.

Assessment measures should be introduced to continuously monitor and assess the adequacy of policies related to potential social costs and the extent of inclusiveness that green policies are bringing about while being implemented. Moreover, coupling a green transition with investments in physical infrastructure such as roads, schools, public facilities, and sewerage and electricity networks is important to achieve equity, and put in place a minimum social protection system. Investments in much needed social infrastructural services especially in rural areas in the form of health, sanitation, and education can raise the standard of living of the population, their productivity, and sense of belonging.

Information and outputs provided through the planning process should be readily usable in decision-making and implementation. Policies should also be flexible and can easily be implemented with changing environments and circumstances.

Urban planning regulations

One of the most effective urban planning tool for city and municipality administrators is planning regulations. These determine what may be built and where, and how much may be built. This is an essential urban planning tool that can be used to (re-) configure cities in a manner that supports energy efficiency, environmental protection, and greater sustainability. It is essential to assess the economic, social, and environmental impacts of the proposed planning regulations, as they will greatly influence the intensity and distribution of economic activity taking place in various parts of the city, and will direct economic activity to certain localities and away from others. Care should be taken to ensure that zoning regulations will not negatively affect existing social structures, and protect agricultural land and green areas. Within built-up areas, the best way through which zoning may help achieve more sustainable cities is by promoting healthy densities.[105]

There is a great need to shift from functional zoning into mixed uses inside city cores to enable walkability and improve proximity to various uses and services, thus improving liveability. It is crucial to plan the urban mass of the city to improve the urban environment, reduce energy use and maximize efficiency.

Integrated planning will promote synergies and complementarities between social, economic, and environmental objectives. Industrial zones have to be subjected to a comprehensive sustainability assessment, in order to identify the industries to be allocated in each zone according to the type of industries; clean or polluting industries.

[105] Heba Khalil, 2015

There is a need to promote strategic integrated land use planning for different uses; industrial, tourism, trade, transportation and infrastructure facilities that take into account environmental as well as social considerations into account. It is important to preserve and increase urban green areas, improve the urban environment and reduce pollution.

Egypt's urban planning needs for the coming 50 years have to be included in its master plan, identifying urban policies for the new settlements. This master plan has to be updated according to new projects such as the "One Million Housing Units Project", taking into consideration the impact of such projects on urban development, water and energy consumption in Egypt.

Adequate services and employment opportunities should be provided in new urban communities to attract inhabitants and investments. There is a need to undertake a needs assessment before designing an urban plan at the national and local levels which should be a part of the national master plan of all of Egypt, and according to regional sub divisions.

Finally, it is important to ensure the provision of affordable housing to cater for the needs of the different segments of the population, particularly low income and poor families. It is also important to provide mixed housing in various districts of the city to improve efficient use of housing space and enhance social cohesion.

Inter-ministerial coordination

A mechanism should be in place in order to ensure proper coordination, supportiveness, and policy harmonization between different sectoral strategies, polices, plans, and programmes. The new law for Planning and Sustainable Development, which is in the process of being approved by the Government should provide the institutional framework that ensures alignment of polices, plans, and programmes with the SDGs and coordination between different government entities. This institutional set up is also intended to ensure continuous interaction and cooperation between the Government and civil society, the private sector and academia.

Regulatory framework

Regulations can provide a strong and effective means for supporting Government policies. They can also safeguard the competitiveness of green goods in emerging markets and provide customers with trustworthiness and confidence in locally produced green products. Certification for sustainable production, green buildings, eco labelling, environmental compliance certifications and fair trade are possible interventions that can be introduced through regulations. However, the introduction of green standards,

certifications and codes should take into consideration the need to reconcile and harmonize global and regional standards with the ones developed at the local level to avoid inefficiency, redundancy and conflict of interest. The introduction of new regulations would require accompanying information dissemination campaigns, stakeholder dialogue, training and capacity building. Lack of a long-term vision and strategy, weak compliance and monitoring mechanisms constrain the effectiveness of this tool. Costs involved in designing and managing a national regulatory framework is another impediment. A necessary prerequisite for an effective regulatory framework is a strong and good governance system in order to ensure proper monitoring and compliance.

Building Regulations

The building sector is a key target for pursuing green transformation strategies. Promoting green practices in buildings and cities involve a wide range of activities. These include developing energy-efficient, non-polluting transportation systems as well as energy-efficient building practices, water-conserving open green areas, and renewable energy resources. They also include rethinking the concept of waste management to incorporate extensive recycling and water treatment.

There is a need to enforce green building practices in Government sponsored projects. Adopting a life cycle assessment (LCA) and enforcing it will ensure that products and materials used in the construction process are manufactured through clean production processes and techniques, and that material used and disposed of do not result in negative environmental and health impacts. Environmental mitigation measures should be included in contracts designed and concluded with investors and contractors.

Green pyramids guidelines Index initiated by the Green Building Council (GBC) should be mandatory and used in buildings constructed in new urban development projects. Violators should be penalized by being high fines and denied access to services.

Building materials, and insulation techniques that reduce the heat load inside buildings should be promoted and encouraged through the introduction of relevant regulations and incentive measures. Other practices and techniques such as the use of glass in facades should be minimized, with heat reflecting window panes used. The use of recycled materials in the construction process, including the use of recycled demolition waste should

be enhanced. In addition, promoting the use of green roofs can help improve the environment in cities and provide food for household.[106]

Carbon footprint tagging for building raw materials will encourage greener building practices. Buildings should ensure the integration of environmental consideration from the outset of the planning and design phase throughout execution and operation. Building design and operation should promote the adoption of an integrated solid waste management (ISWM) system. This should be based on source separation and recycling to eventually achieve zero waste dumped in dump sites in the long-run.

Public policy

The most important factors that affect urban outcomes are outside the urban development, housing and construction sector, mainly policies that deal with energy, water, finance, and social protection. Promoting sustainable urban development in Egypt depends on other public policy interventions that are not directly connected to urban planning.

Fossil fuel subsidies discourage investments in energy efficient green buildings. Moreover, regulations and fiscal incentives determine the costs and benefits of alternative sources of renewable energy.

There is a need to promote energy efficient buildings through regulations, and through encouraging enacting and reinforcing the GPRS for new buildings and create a rating/assessment tool for existing buildings. Enforcing energy conservation policies will result in a greener and more sustainable urban environment. As earlier emphasized, energy efficiency measures and the use of renewable sources of energy in the housing and construction sector should be promoted. This will support the transformation to a more environmentally responsive urban environment. Moreover, promoting cleaner production and the greening of building material will further facilitate this transformation process.

The Government should introduce measures to enforce green applications with investors and contractors. Furthermore, concepts such as the extended producer responsibility (EPR) has to be considered and the PPP should be introduced and applied.

Collaboration between the private sector and industry and research centres and universities should be promoted. These entities should continuously provide the private sector and industry with knowledge, innovative technologies and practices that enhance resource

[106] Heba Khalil, 2015

efficiency, reduce waste and pollution. Moreover, the Government should encourage partnerships with the private sectors and other relevant stakeholders in managing natural resources, including land, water, and energy and other factor inputs.

Urban Mobility

Mobility in urban areas in Egypt rely mainly on motorized means of transportation. Little consideration is given to making adequate space for pedestrians, thus making pedestrian accessibility extremely limited, and often non-existent. This further strengthens the dominance of private car ownership over public mass transit systems in cities and between cities. Increased pedestrian access in the city has multiple advantages, including lowering air pollution levels, allowing residents to lead healthier lifestyles, lowering transportation costs, and encouraging higher levels of direct accessibility to public and service centres.

Alternative modes of transportation in the city such as cycling should also be encouraged. This will greatly depend on creating a reliable and affordable public transport systems making available dedicated bike lanes, which will reduce traffic congestion and consequently pollution, in addition to integrating the existing formal and informal bus services which can produce an enhanced network. Moreover, banning the use of pavement by shops and increasing trees on pavements would provide shaded areas to encourage pedestrian movement and cycling.

The last several years have seen large investments in the construction of a road network, including the finalization of the regional ring road that was recently inaugurated. Moreover, major investments have also been channelled to extend the underground network of the metro and to provide an electric run train that connects the Administrative Capital to other new cities and communities. Public transport systems can be promoted through PPP which will have the potential of improving the quality of the public transportation network and extend services to various locations, but in a more reliable and environmentally friendly manner. In general, PPP can provide a mechanism to promote urban development, including urban infrastructure, housing, water and energy services. Emphasis should however be given to incorporating innovative regenerative practices that continue delivering rather than relying primarily on initiating new projects.[107]

Urban Management

Various interventions are partly constrained by existing policies affecting sustainable urban management in Egypt. Each urban centre and neighbourhood has its own socioeconomic

[107] David Baxter, Regenerative PPP (R+PPP): Designing PPs that keep delivering, June 2018

and geographic characteristics. Residents in different areas within the city should have a say in the manner in which they are administered. This requires the restructuring of city councils and giving them a reasonable level of authority in running the city and introducing mechanisms that ensure that municipal institutions and their staff are responsive to the needs of their residents, and are accountable to their constituency. They should also be subjected to continuous monitoring and scrutiny.

The current planning process for new cities in Egypt lack public participation at all levels. Participation of different stakeholders in the planning and decision making process is a key element in planning for new communities and cities. There is a need to provide some space for the decentralization of activities, accompanied by the adoption of participatory urban planning processes to include local communities. Many decisions could more appropriately be made at the local, rather than the national level. Measures should be taken to decentralize the planning and decision making process at the local level.[108]

There is a need to enforce the local environmental monitoring body within the New Urban Communities Authority, to monitor, enforce the law, ensure that activities do not result in negative impacts on the environment, and propose corrective measures as and when required.

However, one cannot ignore the fact that certain aspects of urban management, such as waste management, urban transportation, or the provision of infrastructure services, depend on economies of scale and need to cover metropolitan urban areas as a whole. This requires considerable coordination between various urban districts within a given metropolitan centre. There is a need to green wastewater treatment facilities, ensuring the presence of a green solid waste management system, including efficient solid waste collection, recycling, and disposal systems.

A sustainable development unit should be created in each city or community to monitor activities in the city, including industrial and economic activities and practices and ensure that they are operating in accordance with agreed sustainability principles and environmental guidelines. This entity may be given the authority to impose sanctions and penalties on violators of environmental and sustainability rules and regulations.

[108] Heba Khalil, 2015

Build and operate

Since the late 50s the public sector has been the main provider for housing primarily to middle and low income families. Housing provided by the private sector has been confined to mainly high income families. Though PPP has not been a dominant feature for providing housing in Egypt, it should increasingly gain grounds with more emphasis in providing housing for middle and low income households. This should also be extended to include the provision of management services for a specific period of time, while the state continues to oversee the quality of services provided. Such an arrangement forces the private sector to provide quality infrastructure, and encourage efficiency and innovation.[109]

Market incentives

Regulations need to be complemented with market incentive measures in order to foster the emergence of a sustainable market for green buildings. The extent to which the green buildings market will grow is determined to a large extent by the stability and predictability of policies and regulations, and economic incentives provided to developers and property owners. Construction companies and property developers will respond to the level of demand for green buildings and the price that property owners are willing to pay.

As earlier indicated, green buildings cost more upfront, but save money in the longer term. Thus the scale of the savings should by itself create growing demand for green buildings, if property owners themselves reap the benefits of savings, and if they are aware of these savings. The extent of the savings, and thus the exact payoff period, will depend very much on the policy context. Governorates should be able to have flexibility in managing their own budgets to support the development, management and operations of urban settlements in a more efficient manner.

Currently there are no incentives for green practices in Egypt. Fiscal and economic tools, such as tax exemptions, subsidies, soft loans, incentives and grants can be used to encourage green building practices. Incentives for green buildings can also be applied through exemption from real state taxes for more than 5 years. There is a need to create incentives and partially mandating the GPRS code/system at least for the commercial and industrial sectors. Moreover, industries and economic activities that integrate environmental consideration in their operations should be rewarded.

Withdrawal of license of factories performing improper environmental practices can be a tool to ensure proper measures for environmental considerations in the industrial sector.

[109] Simile Karasavidis, Infrastructure & Public-Private Partnership World Bank Group, 2018

Besides, carbon footprint on products can encourage buying environment friendly products. They should be carefully selected to influence behaviours towards more sustainable patterns of production and consumption and achieve environmental and sustainable development objectives. An incentive system should also be designed to encourage private sector engagement and investment in green infrastructure projects. A principle such as the Polluter-Pays-Principle among other market incentive tools and mechanisms should be introduced to influence consumption and production towards more sustainable patterns.

There is a need to reform the entire fiscal and tax system to achieve this goal. It is essential for example to shift the tax system from taxing jobs and incomes to taxing environmentally damaging and unsustainable practices. It should be designed to operationalize the Polluter-Pays-Principle, attempt to reflect full cost pricing of natural resources, and internalize environmental and social externalities. Economic instruments include taxes, pollution charges, credits and rebates, R&D grants, and subsidy reform and green subsidies. Other tools include feed in tariffs to promote the business competitiveness of renewable energy sources and encourage the building of its related infrastructure, and payments for providing natural capital or ecosystem service schemes (PES) to promote ecosystem and biodiversity preservation.

More specifically the Government should reform the subsidies system to encourage the efficient allocation and use of resources and discourage environmentally harmful activities. Such a reform will reduce pressure on Government budget and release financial resources to provide the much needed social services, fund environmental activities, and investments in human resources and R&D. Subsidized water, electricity, fuel, food prices, waste collection fees are all examples of the extent of current local market failure and the Government's inability to reflect the true cost of natural capital input used for this range of services and products. Subsidy removal, polluter pays, peak pricing, tiered pricing, resource user fees are all examples of tools that can be used to limit environmental degradation. This is particularly important to support and add a competitive edge to green investments and discourage current trends of brown investments that are harmful to the environment and human wellbeing.

In order to rectify the situation, the Government has introduced in 2017 a structure adjustment programme that included the phasing out of fuel and energy subsidies. The measure has resulted in increased efficiency in the consumption of fuel and energy and directed investments to renewal sources of energy.

The Government needs to facilitate the availability of green technologies and equipment such as solar panels, smart meters, energy saving bulbs, etc., through customs exemption, loans and subsidies.

Access to finance and facilitating Investments

Regarding finance, the starting point should be gradually redirecting existing financial resources towards green investments. Innovative financial mechanisms include the introduction of soft loan programmes, credit schemes, hedge funds, social venture capital conditional grants, carbon credits, and micro finance. It is also important to emphasize that access to finance tools designed and endorsed by the Government should target small and medium size enterprises as they represent a vast majority of companies in Egypt.

Financial tools should be used to stimulate local market demand by supporting consumer-based schemes to purchase locally produced green goods such as renewable energy, organic products environment-friendly consumer goods and vehicles.

Adopting a green and sustainable development strategy has a high potential to attract technical and financial support from international and bilateral development institutions and donor countries.

Trade Policy

Trade policies should be designed to promote sustainable development. This can be achieved by integrating environmental, as well as social and equity considerations in the design of trade policies. Investing and trading in environmental technologies and environmentally produced and manufactured products creates new market niches and opportunities. In fact, greening the economy contributes to resource efficiency, waste reduction and minimization, thus rendering produced products more competitive in international markets. Trade policies can be instrumental in supporting a green transition by providing trade incentives and encouraging private sector access to markets through direct incentive measures, cutting down on red tape and long bureaucratic procedures to encourage export. It can also contribute to greening the economy by removing or reducing tariffs on environmental technologies and products.

Trade policies may be designed to facilitate the importation of innovative energy and water efficient equipment and building material. It can also be used to encourage the importation of waste recycling machinery, energy efficient and electric private and public transport vehicles. It can also be designed to encourage the exporting of green products produced in urban as well as in rural areas, thus booting green economic activities in local communities.

Public awareness and information dissemination

Public awareness and information dissemination are tools that support the Government in defining, informing and conveying the benefits and significance of a green and sustainable economy. Credibility, accessibility and transparency are important signals for citizens to build trust, facilitate the transition to a sustainable path, eliminate resistance to change and alter consumers' excessive overuse behaviour. These tools can take the form of internet, social media, advertising and printed campaigns. They can also be in the form of educational materials, reports, flyers, brochures that can be distributed in Government as well as educational and public facilities. Seminars, expert consultations and lectures are also possible venues for outreach and awareness. It should be emphasized though that these communication packages should be designed to address different target groups in simple language and in a manner that caters for their specific interests, priorities and concerns.[110]

Promoting transformation in the practices adopted in the building and construction sector in Egypt will require considerable efforts in capacity building among builders, architects, engineers, and private developers. Many decision makers lack the understanding of the concept of sustainable urban development, and the importance of integrated policy making in order to ensure the integration of the three dimensions of sustainability, including health considerations in planning and decision making.

Public awareness encompasses a broad range of measures for creating spontaneous demand through targeted communication campaigns. For example, capacity building and training programmes can be offered for urban planners and engineers to foster the development of a local, responsive supply chain. Other initiatives may include public recognition for voluntary labelling schemes and public leadership programmes and awards.

Awareness can tackle first behavioural patterns of consumption then can go beyond to implementing actual interventions that are locally appropriate and financially viable to improve the current building stock. Further awareness is needed to promote the construction of new green buildings despite the apparent increase in the initial cost. However, through promoting life cycle assessment, people could see and judge the return of their initial investment over time.[111]

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[110] Hussein Abaza and et.al, Transitioning to a Green Economy in Egypt, A Scoping Study, EEAA, UNEP, CEDARE, 2013

[111] Heba Khalil, 2015

It should be emphasized the media a very important role to play in raising public awareness to the importance of sustainable consumption and production.

Research and development

Innovative technologies and practices are essential in supporting green and sustainable development. There is a need to develop a long-term strategic vision to achieve a green transition in Egypt. It is important to shift emphasize from mainly relying on outside technologies and know-how to developing national capacities to develop local technologies that can eventually be exported and generate foreign exchange earnings. Egypt currently allocates 0.02% of GDP to R&D. It is proposed that this percentage share should be increased to between 2-4% of GDP as current rates of investment in R&D is far beyond what can really make a difference

The Republic of South Korea allocated 4.29% and 2.07% of its GDP to R& D in 2014 and 2016 respectively. South Korea aims to increase its investment to 5% of GDP by 2017, and to boost annual basic-science funding levels by 36% by 2018, to 1.5 trillion won.[112] As for Israel according to the World Bank the figure was 4.27% of GDP in 2015.

The private sector should be encouraged to invest in R&D. This can be achieved through tax cuts and rebates and other incentive measures. Research and development should give priority to research in areas such as water desalination and wastewater treatment technologies, water saving equipment, including water-saving building and construction equipment and appliances. In the energy sector, research in renewable sources of energy, solar, wind, and wave to produce cheap and more appropriate technologies suiting the Egyptian climate needs to be undertaken. For solid waste, research need to focus on waste to energy, waste to compost, as well as the recycling, reuse of waste residues as an input in the manufacturing of products and most importantly waste prevention.

Green public procurement

Government spending can be an effective tool in stimulating the economy. However, Government spending should be directed towards green products and investments. Apart from setting the example for the general public and the private sector, green public procurement will also create markets and demand for green products. Taking into consideration Egypt's current fiscal challenges and limited expenditure opportunities, the Government should focus on investing in natural resource infrastructure, and related public services to create a business environment for potential green private sector

[112] Mark Zastrow, Nature, International weekly journal of science, 2016

investments. This will limit depletion of natural resource and encourage resource efficiency. It can also influence the market for cleaner production and efficient consumption by creating sustainable public procurement programmes to purchase locally made green goods. These programmes stimulate market demand and encourage private sector involvement, a major investor in green infrastructure projects. This is especially so in green technologies, innovation and manufacturing.

Green public procurement contributes to closing the energy and material loops within supply chains, reduces waste generation across the life cycle of products. Circular procurement can be achieved at the system level through contractual arrangements, at the supplier level by ensuring that product services meet green standards, and at the product level that suppliers to public entities may use. Industrial symbiosis, where one productive activity uses by-products of another activity, including water, energy, material, and logistics, should also be promoted.[113]

Green procurement in the commissioning of public buildings should not only target high profile projects, but also low income housing projects, with conditions for cost control. These initiatives typically spur the kind of innovations that are needed to enhance the knowledge base within the local construction supply chains, including architects, engineers, material suppliers, and builders.

There are a number of barriers for transitioning to a green and sustainable economy and its applications on sustainable communities, those include the following:

Institutional – shifting from the linear business as usual way of thinking and operating to a circular integrated model will require considerable effort.

Financial – transitioning to a green/circular economy requires initial investments in research and development, digital infrastructure, planning and management.

Social – resistance to change, and lack of sense of urgency and awareness.

Technical – lack of a mechanism for information exchange regarding material streams, lack of incentives to alter production process to facilitate end of life recovery of material, which will also induce producer to produce good quality products that is easy to maintain.

[113] World Economic Forum, Circular Economy in Cities, Evolving the model for a sustainable urban future, in collaboration with PwC, 2018

Proposed Sustainable development indicators

The current system of national accounts (SNA) does not represent a genuine indicator for sustainable development, as it does not take into account social and environmental considerations, including the depletion and degradation of resources. It does not therefore provide a correct indicator for quality of life, equity considerations, and human welfare. It even provides a distorted picture regarding the performance of the economy, where for example it calculates as income damage cost, and cost of selling natural assets such as oil and natural gas. Integrated environmental and economic accounting should be promoted and used as a more realistic indicator for sustainable development and genuine welfare. This is in addition to the use of sustainability indicators.

A set of indicators have been identified in order to assess the level of performance of cities and communities and whether they have been able to meet the set environmental and sustainability standards.

These include:

- 60% of new developments to use local material and introduce measures to reduce resource consumption and promote reuse and recycling of waste.
- A 20% efficiency improvement in the use of energy and water and factor inputs in green buildings.
- By 2030, 20% of the existing housing stock refurbished, including retrofitting in order to reduce energy and water consumption.
- All public buildings to use solar energy for lighting and plug/receptacle loads
- Gap between housing demand and supply to be reduced at an annual rate of 10%.
- Increase the number of green building by 15% in the next five years with an annual increase of 3%.
- New urban development, cities and housing to be designed, planned and implanted following sustainable development principles.
- Green public procurement related to housing and construction to represent at least 60% of total purchases.
- All new cities and urban centres to follow the principles of sustainability and green buildings.

- Contribution of the sector to GDP to increase by 5% annually until 2030.
- Gap between housing demand and supply to be reduced at an annual rate of 10%.
- 25% Share of labour force involved in sustainable and green building and construction.
- CO_2 emissions from the housing sector to be reduced by 20%.
- Achieve 20% efficiency in the use of energy and water and factor inputs in green buildings.
- Convert 20% of the existing housing stock into green buildings by 2030.
- All public buildings to use solar energy for lighting.
- 25% share of labour force involved in sustainable and green building and construction
- 40% of street lighting to use solar energy.
- 30% of rural houses to use biogas for cooking.

Monitoring and evaluation

This should be part and parcel of the planning, decision making, and implementation processes. A stringent measurement and verification mechanism should be put in place to closely track the implementation of the proposed programmes and activities and should be included in the overall action plan for urban development and in the action plans for specific programmes and projects. Challenges should be identified and necessary corrective measures and actions introduced to address these challenges.

Annex IV provides the proposed roadmap for actions related to legislation, capacity building, and investments needed to achieve the strategic vision for urban communities.

Conclusion

Integrating social, environmental and economic dimensions of sustainability contributes to achieving resource efficiency particularly in scarce natural resources such as water and energy. This in turn, promotes competitiveness and resilience of cities, improves environmental and health conditions of the population, and enhances the contribution of cities to green growth and sustainable development.

The *Theses* attempted to emphasize the significance of integrated policymaking for preparing and implementing sustainable communities in Egypt and the drawbacks in failing to do that on the social, environmental and economic fronts. Evidence-based research has revealed that following an unsustainable approach to community development has not

yielded the desired outcomes on the three dimensions of sustainable development.

On the social front, urban development in Egypt has not been able to cater to the needs of the different segments of the population in terms of housing, amenities, social services, including jobs, transportation health and educational services. In many instances provided housing was not affordable for middle and low income classes, forcing these classes to live outside of the new urban developments and commute back and forth. Furthermore these classes had to resort to living in informal settlements thus contributing to urban sprawl in old metropolitan cities in Egypt such as Cairo and Alexandria as well as in new ones.

In other instances, due to lack of jobs for many inhabitants has resulted in new urban developments as being dormitories, where inhabitants had to seek jobs outside the new urban community and commute back and forth between place of work and residence. This defeats the whole purpose of developing integrated cities where inhabitants would live where they work and with all necessary services and facilities being provided within the boundaries of the city, or within close vicinity to neighboring cities

Moreover, lack of reliable, affordable and accessible mass transport systems within and between cities has further exacerbated the situation. Heavy reliance on private car ownership rather than public transport systems has reduced the attractiveness of new urban communities to inhabitants and placed financial burdens, particularly on middle and low income families. Apart from the inconvenience this causes for inhabitants of the city, it results in increased traffic, contributes to road congestion, increased use of fuel, and pollution and CO2 emissions. Moreover, building codes requiring the provision of parking space for buildings are not being enforced, thus resulting in road congestions. This has been further aggravated by the lack of sufficient parking space thus further causing road congestions and traffic bottlenecks.

Cities in Egypt have also been rather modest in achieving social cohesion and integration between the different income groups of its inhabitants. This is represented in the lack of appropriate and affordable services, including health and education, cultural and recreational as well as economic opportunities for the lower income groups. It is also represented in the lack of access to affordable housing and transportation and public space for these income groups. In many instances, cities comprised of gated compounds with swimming pools and golf courses, also have slum areas lacking main services and amenities and public green areas. This has resulted in segregating inhabitants of the same city and contributing to a widening gap between high and low income families with negative implications on inhabitants of the same community.

Urban design and planning lacked introducing mixed use and optimum land bearing capacity to enhance efficiency and reduce cost per capita of providing services and amenities. Urban communities also lack land use planning that enhanced easy access to place of work and public and social services in order to reduce commuting. It also lacks providing space for pedestrian and cyclists to discourage the use of motorized means of transportation. However, these deficiencies in urban design have been acknowledged and measures are being introduced in the design of new cities to address them.

A sound economic and sustainable base is essential for the survival of an urban community. As revealed from the research more than 80% of economic activities are generated in cities. For a city to attract inhabitants and investors, it has to have a viable economic activity that provides business and job opportunities for its inhabitants, continues to attract residence and investors and provides the necessary financial resources to support the growth and maintenance of the city and its contribution to the sustainable economic development of the city, region and country as a whole.

Urban communities should be designed to achieve economic objectives and contribute effectively in generating economic opportunities for its residence and support the economic development of the country. Full considerations of the environmental and social aspects should be taken into account to ensure synergies and complementarities between the three dimensions of sustainability and the contribution of urban communities in achieving the SDGs.

Economic activities identified on the basis of the natural endowment and location of the city should also ensure that sustainability considerations are fully taken into account. They should mainly rely on renewable sources of energy and water to operate their activities. Integrated waste management should be adopted as a means to reuse and recycle waste and enable it's conversion into energy and organic fertilizer.

Coastal cities should mainly rely on seawater desalination. Research should be directed towards technologies for using renewable sources of energy for water desalination.

Urban communities should be designed to achieve maximum efficiency of the use of natural resources such as water and energy as well as other factor inputs. They should also aim at achieving zero emissions by relying mainly on renewable sources of energy as the main source of energy for its economic activities, energy and water generation, housing and transportation.

Good governance is key in the operations and functioning of urban communities. The use

of innovative technologies digitization should be deployed to enhance the efficient monitoring and functioning of water and electricity networks, traffic and roads.

Adopting concepts such as green economy, circular economy, or closed loop economy should be promoted in order to encourage and facilitate a transition to a sustainable development path and the translation of these concepts in developing sustainable urban development communities.

Annex I

SDG 11 targets and indicators[114]

SDG Target 11.1

By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums

SDG Target 11.2

By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons.

SDG Target 11.3

By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries.

SDG Target 11.4

Strengthen efforts to protect and safeguard the world's cultural and natural heritage

SDG Target 11.5

By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations

SDG Target 11.6

By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management

SDG Target 11.7

By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities

SDG Target 11.a

Support positive economic, social and environmental links between urban, peri-urban and

[114] Tracking Progress Towards Inclusive, Safe, Resilient and Sustainable Cities and Human Settlements, SDG 11 Synthesis Report: High Level Political Forum 2018

rural areas by strengthening national and regional development planning.

SDG Target 11.b

By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels.

SDG Target 11.c

Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials.

11.1.1 Proportion of urban population living in slums, informal settlements or inadequate housing. [Tier I]

11.2.1 Proportion of population that has convenient access to public transport, by sex, age and persons with disabilities. [Tier II]

11.3.1 Ratio of land consumption rate to population growth rate [Tier II]

11.3.2 Proportion of cities with a direct participation structure of civil society in urban planning and management that operate regularly and democratically [Tier III]

11.4.1 Total expenditure (public and private) per capita spent on the preservation, protection and conservation of all cultural and natural heritage, by type of heritage (cultural, natural, mixed and World Heritage Centre designation), level of government (national, regional and local/municipal), type of expenditure (operating expenditure/investment) and type of private funding (donations in kind, private non-pro t sector and sponsorship). [Tier III]

11.5.1 Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 people [Tier II]

11.5.2 Direct disaster economic loss in relation to global GDP, damage to critical infrastructure and number of disruptions to basic services, attributed to disasters [Tier I]

11.6.1 Proportion of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated, by cities. [Tier II]

11.6.2 Annual mean levels of ne particulate matter (e.g. PM2.5 and PM10) in cities (population weighted). [Tier I]

11.7.1 Average share of the built-up area of cities that is open space for public use for all,

by sex, age and persons with disabilities. [Tier III]

11.7.2 Proportion of persons victim of physical or sexual harassment, by sex, age, disability status and place of occurrence, in the previous 12 months. [Tier III]

11.a.1 Proportion of population living in cities that implement urban and regional development plans integrating population projections and resource needs, by size of city [Tier III]

11.b.1 Number of countries that adopt and implement national disaster in line with the Sendai Framework for Disaster Risk Reduction 2015-2030a. [Tier I]

11.b.2 Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies [Tier II]

11. c.1 Proportion of financial support to the least developed countries that is allocated to the construction and retrofitting of sustainable, resilient and resource-efficient buildings utilizing local materials. [Tier III]

Tier I: Indicator is conceptually clear, has an internationally established methodology and standards are available, and data are regularly produced by countries at least for 50 per cent of countries and of the population in every region where the indicator is relevant.
Tier II: Indicator is conceptually clear, has an internationally established methodology and standards are available, but data are not regularly produced by countries.
Tier III: No internationally established methodology or standards are yet yet available for the indicator, but methodology/standards are being (or will be) developed or tested.

Annex II

Eco Village Design Criteria Standards and Requirements[115]

Integrative Project Planning and Design

Maximize opportunities for integrated, cost-effective adoption for green design and construction strategies, emphasizing human health as a fundamental evaluative criterion for building design, construction and operational strategies. Use cross-discipline design and decision making, beginning in the programming and pre-design phase.

The intent is to support high-performance, cost-effective outcomes through an early analysis of the interrelationships among systems. Systems covered include, energy, waste and water related systems.

Promote water efficiency and conservation, recycling, reuse, and recovery

- Maximum efficiency in the use of water for household and municipal purposes and for supporting of economic activities.
- Heavy water consuming activities like agriculture should be confined to crops that do not consume large quantities of water and that can be grown using recycled water.
- The selection of water resistant cash high value crops and the use of sustainable agricultural methods and irrigation systems, such as drip and pivotal irrigation systems.
- Use of drip and pivotal irrigation systems in agriculture.
- Using ground water should be used sustainably and confined to locations where it is renewable.
- Recycled wastewater to be used to irrigate green public areas and private gardens and fodder crops for animal feed and for growing human made forest areas to grow wood for local use and potentially for export.
- Water efficiency equipment to be introduced in private and public buildings, including installing low-flow faucet and showerhead aerators, and low efficient fixtures (taps, showers, flush systems).
- Recycled water to be considered for flushing toilets and watering gardens and public green areas.

[115] Mohamed Abaza, Executive Vice President, Director of Energy and Sustainability Services, Capital Brand Group, Rockville, Maryland, USA

- Reduce water consumption by recycling and reusing grey water from plumbing fixtures, building condensation and HVAC condensation.
- Provisions should be made in the plan of the city for a wastewater facility for producing recycled water for growing fodder crops and forest areas for wood production.
- Measures should be introduced to promote efficiency in the use of water in the different economic and service activities, including educational and cultural, tourism, agriculture, and industry.
- Reclaim grey water (rain water, HVAC and Building Condensation).
- Use of soil sensors to measure moisture content and provide irrigation only when needed.
- Use of solar power for seawater desalination.
- Introducing efficient water management system (capture rainwater & sustainably manage underground & reuse of water.

Promote energy efficiency and conservation

- Achieve maximum efficiency in the use of energy for household and municipal purposes and for the support of the primary economic activities.
- Main source of energy for municipal and economic activities should be based mainly on renewable sources of energy for public and residential lighting and heating (solar, wind, biogas).
- Promote the use of concentrated solar panels (CSP).
- Moreover, cities and buildings should be designed to eventually not only to satisfy its own energy needs, but eventually and subject to adequate economic analysis, supply energy to the main national electricity grid.
- Residential units should be designed to allow the fixing of solar panels for lighting and heating over roof buildings.
- Space for wind farms should also be made available to provide for energy in locations where there is enough wind to generate electricity.
- Use of solar energy for water desalination, this is particularly important due to water scarcity in Egypt, and since energy represents a large percentage of the cost of seawater desalination.
- Other sources of energy that should constitute part of the energy mix is biogas from organic solid waste and from wastewater (sludge).

- Use of solar energy to pump ground water provided locations for ground water are renewable.
- Use of solar panels on homes, parking space & waterways.
- Optimizing building envelope attributes, window to wall ratios, glazing, shading and window operability.
- Introduce earth tube ventilation distribution system, using ground temperature to provide warm or cool ventilation air to associated spaces, based on season.
- Use of solar PV micro inverters, multiple photo voltaic invertors to convert DC current to AC current improving system reliability and efficiency
- Solar ducts for pre-heating outside air, air duct on roof to pre-heat outside air before entering occupied space.
- Use ducts made from material with the ability to absorb significant amount of solar energy.
- Use of panels that provide both electrical energy and hot water heating.
- Hydrogen Fuel cells using Biogas.

Promote resource efficiency in physical planning

- Design residential areas following a mixed use concept with the mosque and church located at the centre of the residential cluster with main services located within a reasonable distance in order to allow easy access from different parts of the residential cluster.
- Locate and provide reasonable space between the mosque and church in order to allow for privacy and avoid any inconvenience for followers of the two faiths.
- Adopting a mixed-use concept reduces commuting distances, use of energy, and consequently pollution and CO2 emissions. It also reduces traffic congestion and wastage of time.
- Housing and residential areas are provided in each of the core or cell urban development to provide for the necessary accommodation needed to suite the main functional occupations of inhabitants of the cells be it agriculture, industry, etc.
- Housing should be designed to meet the different needs and economic and social status of different segments of the inhabitants of the city.

- Architectural design of cities should be derived from the surrounding environment, which is predominantly desert areas using local material, ensuring homogeneity and harmony with the surrounding environment and suiting the local climatic conditions.
- Transitioning to a green economy as an approach to the sustainability of the City entails adopting the following waste management hierarchy: prevention, reduction recycle, reuse, recover, and dispose.
- Allocate an area for the installation of main utilities to be identified appropriately located taking into account wind directions to avoid their exposure to activities and odors emanating from these facilities, and the economic viability of the facilities. This includes wastewater recycling, and solid waste treatment and disposal, power generation (mega solar station), and seawater desalination facilities.

Promote green buildings and construction

- Building structures should reflect the character and nature of the geographic location of the area as referred to above. Desert areas may adopt the housing design following Hassan Fathy concept design of arcades and dome structure type design.
- The building structure should adopt an inward concept design rather than an outward one. This concept design should allow the functioning of courts as wind catchment media attracting cool wind in summer for its inhabitants thus reducing the use of air conditions and providing space for family gathering that ensures privacy, more secure areas for children women.
- Orientation and internal design of the building units should allow for optimum ventilation and wind movement in order to reduce the feeling of heat in summer.
- The provision of balconies to be kept to the minimum, provided only in limited occasions and the use of windows are designed to minimize the impact of heat and direct sunlight through the use of "Mashrabia."
- Special windowpane that conserves energy and keeps away heat to be used in order to provide proper insulation and reduce the impact of heat and the need to air conditioning homes.
- Provide sufficient space for communal green areas in order to provide for green space areas as an outlet for residents and to function as lungs for urban areas.
- Use of local building material in order to reduce the environmental footprint of using conventional building material due to the energy use in the production process and

transportation involved. Lime bricks, which do not retain much heat in summer and keeps homes relatively warm in winter is found in many desert locations in Egypt.

- Using lime stone bricks maintains harmony with the desert environment, provides consistency and a unique character for the city, it also provides long-term durability thus minimizing maintenance cost of buildings.

Promote green and environment-friendly transport system

- A green environment-friendly public transport system should be the main transport system for urban communities. This may either be double decker busses and/or electric metro systems.
- The use of energy efficient, biogas run buses and metro should be explored. The use of private cars inside the cities will be discouraged by high parking and usage charges to be imposed on car users.
- An electric taxi network is proposed, similar to the one proposed for Masdar City, provided its economic viability. The use of solar powered vehicles in cities should be explored.
- The design of cities should make provisions for sufficient pedestrian space, as well as special space for cyclers. It should also make provisions for special lanes for a public transport system.
- Sufficient multi story parking spaces should be made available around commercial and service areas at the fringes of mixed-use commercial areas, which will be car free areas (only pedestrian).
- Solar panel shaded parking areas to be provided for the public transport system, taxis and the limited number of private car owners.
- Provisions for parking garages to be been made available in each building and residential unit, which will have to be strictly enforced.
- Adherence to building codes should be enforced with violators heavily fined and penalized if failing to abide by the building codes. Fines paid by violators to be used to fund sustainable infrastructure.

Promote waste avoidance, recycling and reuse

- Promote integrated waste management systems, including composting and multi stream recycling programmes.
- Reduce and/or eliminate mercury containing products and devices and mercury release through product substitution, capture and recycling.

- Building Life Cycle Impact reduction approach and encourage adaptive reuse and optimize performance of products and materials.
- Building product disclosure and optimization systems.
- Promote construction and demolition waste management systems; reduce construction and demolition waste disposed of in landfills and incineration facilities by recovering, reusing and recycling materials.
- Provisions for a site for processing and recycling facilities for municipal solid waste and wastewater taking into account easy access and the direction of wind.

Site Location and Transportation

Selection of appropriate sites for urban communities is of paramount importance. Site selection will depend on several considerations, which will also depend on the specific functions or main economic activity of the activity. Factors determining the location are water availability, energy sources, proximity to markets, ports, raw material, other significant centres that the newly developed community may rely on to support its functions and activities. Other determining factor is the reduction of environmental footprint resulting fro increased traffic, and physical activity, fragile ecosystem which may be negatively affected due to construction activity.

- Perform an Environmental Site Assessment
- Promote and implement a bicycle sharing programme to reduce and/or eliminate vehicle usage on the community. Bicycle storage is within 150 meters walking distance from bicycle network.
- All onsite vehicles will be electric vehicles, with electric charging stations for all village occupants. Charging stations are to be solar/PV powered.
- Construction activity should aim at avoiding/preventing pollution.
- Protect and Restore natural habitats
- Promote Open space
- Provide green vegetated roofs,
- Ensure night sky access, improve night time visibility
- Reduce consequences of development for wildlife and people
- Ensure that the sustainable site benefits achieved continue, regardless of future changes in progress or demographics
- Educate tenants/occupants in implementing sustainable design and construction features in their tenant improvement build outs.

- Educate occupants/tenants on sustainable behavioural strategies, to reduce, reuse and recycle.

Passive House Design Criteria

Passive building comprises a set of design principles used to attain quantifiable and rigorous level of energy efficiency within a specific quantifiable comfort level. A passive building is designed and built in accordance with five main principles:

1) Employs continuous insulation throughout its entire envelope without any thermal bridging.
2) The building envelope is extremely airtight, preventing infiltration of outside air and loss of conditioned air.
3) Employs high performance windows (double or triple paned windows depending on climate and building type) and doors-solar gain is managed to exploit the suns energy for heating purposes in the heating season and to minimize overheating during the cooling season.
4) Uses some form of balanced heat and moisture recovery ventilation.
5) Uses a minimal space conditioning system.

Passive building principles can be applied to all building typologies from single family homes to multifamily apartment buildings, offices, skyscrapers.

Passive design strategy carefully models and balances a comprehensive set of factors, including heat emissions from appliances and occupants to keep the building at comfortable and consistent indoor temperatures throughout the heating and cooling seasons. As a result, passive buildings offer tremendous long-term benefits in addition to energy efficiency, which includes the following:

- Superinsulation and airtight construction provide unmatched comfort even in extreme weather conditions.
- Continuous mechanical ventilation of fresh filtered air provides pleasant indoor air quality.
- A comprehensive systems approach to modelling, design, and construction produces extremely resilient buildings.
- Passive building principles offer the best path to Net Zero and Net Positive buildings by minimizing the load that renewables are required to provide.

Annex III

Proposed measures and indicators for promoting sustainable communities and green building and construction

Sustainable Communities

	OBJECTIVES
1	***Enhance the role of sustainable communities and housing in supporting sustainable economic development***
2	***Promote the role of sustainable communities in enhancing resource resource efficiency and factor inputs throughout the entire lifecycle of the construction process and in functioning and provisioning of services of the ecosystem***
3	***Enhance the role of housing in promoting social integration and cohesion and that meets the needs of the different segments of the population***
4	***Promote good governance in urban development and in the housing and building sector***

Enhance the role of sustainable communities and housing in supporting sustainable economic development

Proposed measures to be taken into account to achieve objective
• Promote housing in rural, urban, coastal, and desert areas within an environment-friendly physical structure that drives economic activities and supports sustainable economic development. • Adopt an integrated approach for the design and development of the housing and construction sector within a physical set up (rural, urban, coastal, and desert areas) that is efficient, compact, and that optimizes the use of land and space, and provides accessibility to work, commercial, social, cultural, and recreational facilities. • Introduce regulatory and incentive measures that encourages green buildings and green infrastructure thus contributing to resource efficiency, while at the same time diversifying and revitalizing the economy by opening up new economic activities and businesses, attracts investments, and creates jobs. • Promote integrated policymaking in the sector thus resulting in resource efficiency, social integration hence increased productivity and the release of resources to support economic activities.

Indicators and Measurement tools
• Increased efficiency in the use of natural resources, factor inputs, and building and construction material. • Contribution of housing and the surrounding built environment to the economic sector specific to the location (Agriculture, industry, tourism, cultural and educational, etc.) • Increased share of investments both public and private and new business in green housing and infrastructure. • Increased number of direct and direct new jobs created in the green housing. • Attraction of housing units and the surrounding built environment to new residents and visitors.

Promote the role of sustainable communities in enhancing resource resource efficiency and factor inputs throughout the entire lifecycle of the construction process and in functioning and provisioning of services of the ecosystem

Proposed measures to be taken into account to achieve objective
• Introduce and promote the concept of "Extended Builder Responsibility" (EBR), encouraging builders and contractors to adopt green and sustainable building approaches in the design and construction of housing, including the adoption of a full life cycle assessment in building design and construction, including the recycling and reuse of demolition waste. • Promote energy efficiency and sustainable practices in the reduction of energy consumption through housing design, use of building material, including the use of innovative technologies and energy saving equipment and lighting bulbs. • Promote energy efficiency and the use of renewable sources of energy for lighting and heating through regulatory measures, pricing and incentive packages. • Promote water efficiency and the sustainable water use and consumption through regulatory measures, pricing and incentive packages that encourages the introduction of water saving equipment and measures in buildings in the construction and operation of buildings. • Promote the reduction of solid waste generated by households through conscious purchasing practise, consumption and source separation of waste in order to facilitate sorting, recycling, reuse, and recovery. • Introduce standards, codes and regulations for the recycling and reuse of demolishing and construction waste. • Ensure accessibility of housing to work place, commercial, social and recreation services in order to reduce commuting, congestion, and consequently fuel consumption and CO2 emissions.

- Review the educational curricula to incorporate SCP, resource efficiency considerations, and the regenerative capacity of buildings in civil engineering, architectural, housing, and urban and physical planning disciplines.
- Support the work of the Green Building Council, including research and the promotion of green and sustainable housing and construction within.
- Introduction of building codes and standards for the use of local design and material in locations where they are available and that necessitate taking into account design elements and orientation of buildings that takes into account wind, heat, and humidity.
- Design and implement a package of regulatory and incentive measures that encourage altering practices and attitudes towards more sustainable patterns of production and consumption resulting in more efficient use of resources in the design and construction of buildings and during operation and use.
- Identify a set of incentive tools designed to support regulatory measures to encourage net positive regenerative buildings and the provision of green infrastructure within a sustainable built environment.
- Promote the concept of net positive design and regenerative design of buildings that generate energy and water beyond the use of the building unit and that sustains and enhances the vitality and viability of the location.
- Introduce the concept of Green Infrastructure (GI) that emphasizes utilizing the provision of ecosystem services to generate water management benefits (floodplains to reduce flood risks, recharge underground water, improve water quality, support wildlife and fish, and provide recreational and tourist facilities).
- Introduce integrated solid waste management approaches in order to promote waste prevention, reduction, recycling, reuse, and recovery.
- Allocate funding for research and investments aimed at introducing resource efficiency and innovation and adaptive technologies in traditional building design, knowledge and practices.
- Enhance awareness of different stakeholders, including clients/users, builders, contractors, policy and decision makers, and practitioners to the benefits of green and sustainable housing.

Indicators and Measurement Tools

- Increased percentage of green and sustainable housing units being constructed
- Increased efficiency in water and energy consumption and other factor inputs and reduced pollution and waste generation
- Increased percentage of net positive regenerative housing units
- Increased percentage of housing units using renewable sources of energy as the main source of energy

- Reduced fossil fuel generated energy and consequently CO2 emissions
- Reduction in the rate of municipal solid waste generation, with increasing rates of waste reuse, recycling, and recovery
- Increased green public procurement in the purchase and provision of services, and building construction related material and equipment
- Enhance capacity and availability of labour that can be engaged in sustainable and green building design and construction
- Increase awareness of different stakeholders to the social, economic, and environmental benefits resulting from adopting sustainable production and consumption patterns in the housing and construction sector

Enhance the role of sustainable communities and housing in promoting social integration and cohesion and that meets the needs of the different segments of the population

Proposed measures to be taken into account to achieve objective
• Promote the involvement of users in the identification of main housing requirements and features, including location, layout, design, and size.
• Enhance all-inclusive development and community participation.
• Ensure flexibility in housing design and layout in order to meet changing requirements and needs of users.
• Provide buildings that are compact and accessible to work, and main social and recreational services.
• Ensure the provision of housing that is affordable and caters for the needs of the different social and income groups particularly medium and poor income families.
• Prepare communication packages specifically targeting policy and decision makers, builders and contractors, and clients clearly identifying the benefits of green and sustainable housing, construction and buildings.
• Review the educational curricula to incorporate sustainability, resource efficiency considerations, and the regenerative capacity of buildings in civil engineering, architectural, housing, and urban and physical planning disciplines.
• Prepare a long-term training and capacity building programme for green and sustainable housing and construction for different target groups based on a needs assessment to be conducted at the national level.
• Institute in low, community as well as stakeholder participation as a mandatory requirement for the design and construction of housing as an integral part of the built environment.

- Lay emphasize on the improvement and operational efficiency of the existing housing stock (i.e. retrofitting, refurbishing and upgrading of old houses, including slum areas) as opposed to replacement.
- Develop a regulatory framework for the housing and construction sector that encourages and incentivizes the refurbishing and retrofitting of the existing housing stock, and the design and construction of new green and sustainable housing.
- Introduce regulatory reforms and incentives for builders and contractors to build sustainable and green buildings through tax rebates and cuts, reduced customs on green and environmentally friendly equipment and products, concessionary loans, particularly for small and medium size construction companies and contractors.
- Promote the concept of communal public space in physical planning in order to promote social cohesion and the integration of low income and underprivileged communities in the society.
- Institute in low the requirement for government and private developers to provide public space and green areas in urban settlements as a means to promote social integration and cohesion.
- Ensure that housing is located in easily accessible locations to work, and social and recreational services. Considerations should be given to giving priority to commuting on foot, cycling, and the use of public transit system.
- Enhance awareness of policy and decision makers, builders, and contractors to the gains resulting from green and sustainable building practices.
- Lay emphasize on the proper maintenance and operational efficiency of the existing housing stock (i.e. retrofitting, refurbishing and upgrading of old houses, including slum areas) as opposed to replacement.
- Develop a regulatory and incentive package that encourages and promotes the provision of housing that is compact, resource efficient, accessible to work, and main commercial, social and recreational services, the refurbishing and retrofitting of the existing housing stock, and the design and construction of sustainable and affordable housing that caters for the needs of the different social and income groups, particularly medium and poor income families.
- Ensure that different regulatory measures are introduced for existing housing stock as distinct from new housing units as well as different regulations, codes and standards for housing built within informal settlements than those applied in formal physical developments (rural, urban, coastal, and desert areas).
- Institute in low the requirement for government and private developers to provide public space and green areas in residential areas to provide communal public space as well as space for pedestrian, and cyclers for inhabitants, as a means to promote social integration and cohesion.

• Improve quality of life for inhabitants
Indicators and Measurement Tools
• Enhanced social integration and cohesion between the different segments and income and social groups in the built environment. • Improved quality and functioning of the existing housing stock. • Enhanced awareness of relevant stakeholders, including policy and decision makers, builders, and contractors to the gains resulting from green and sustainable building practices. • Housing that meets the needs of the different income and social groups • Enhanced social integration and cohesion • Reduced fuel consumption and consequently CO2 emissions, traffic congestion due to reduced transportation and traffic between living areas and work places • Improved health conditions and quality of life and living standards of population through improved environmental condition. • Improved living standards through increased job opportunities resulting from refurbishing and construction of new housing units.

Promote good governance in urban development and in the housing and building sector

Proposed measures to be taken into account to achieve objective
• Promote the adoption of a holistic approach in order to ensure the integration of the social, environmental and economic sustainability dimensions in housing design and construction. • Identify and enforce incentive measures as well as penalties and sanctions for buildings not in conformity with green and sustainable codes and standards. • Introduce standard data collection, ensuring comparability between Mediterranean countries, as well as a unified benchmark practice. • Harmonization of the different policy measures and market tools in order to ensure consistency and supportiveness. • Promote the involvement of the private sector, and joint collaboration between the public and private sector, including through Public-Private-Partnership in housing design and construction. • Introduce an efficient monitoring and enforcement system to ensure compliance with green and sustainable building codes and standards, this include harmonisation for the data collection.

- Provide an institutional set up that ensures public and community participation, stakeholder involvement, transparency, accountability, and proper coordination between various government entities.
- Promote the adoption of a holistic approach in order to ensure the integration of the social, environmental and economic sustainability dimensions in housing design and construction and surrounding built environment (rural, urban, coastal, and desert areas).
- Introduce standard data collection, ensuring comparability between Mediterranean countries, as well as a unified benchmark practice.
- Harmonization of the different policy measures and market tools in order to ensure consistency and supportiveness.
- Promote the involvement of the private sector, and joint collaboration between the public and private sector, including through Public-Private-Partnership (PPP) in housing design and construction.
- Prepare communication packages specifically targeting policy and decision makers, builders and contractors, and clients clearly identifying the benefits of adopting sustainable production and consumption patterns in housing design and construction and the greening of the sector.
- Support a capacity building, educational, and a research and technology development programme to support SCP in the housing and constructions sector.
- Introduce an efficient monitoring and enforcement system to ensure compliance with green and sustainable building regulations, codes and standards, this include harmonisation for the data collection.

Indicators and Measurement tools

- Increased rate of compliance by builders to building codes and standards
- Efficient functioning and operation of the housing sector
- Enhanced awareness and capacity of public and private institutions that results in creating demand and capacity to support SCP in the housing and construction.
- Positive impact on productivity, competitiveness, and GDP

Stakeholders to be involved
Local construction companies, civil society, local authorities, regulatory authorities, architecture associations, promoter building, banks local communities, local construction companies, civil society, educational institutions, local authorities, regulatory authorities, architecture associations, investment institutions, professional associations, regulators, public administration, local authorities, practitioners.

National Initiatives
• Building codes, standards, benchmarking and certificates to encourage smart, green and sustainable buildings and construction • Guidelines for the upgrading and retrofitting of existing building stock • Research and educational centre for sustainable communities, building design and building material and construction • A strong institution entrusted with monitoring and implementation of sustainable communities and green building codes and standards • Guidelines for SCP building code development around the region • Establish key data sets to facilitate regional comparability and to support policy-making processes • Creation of Green Building Councils and a network to promote collaboration, exchange of knowledge and experience • Create a Regional Forum for green and sustainable communities and green building and construction • Consider launching a carbon trading system • Framework for private sector involvement, including PPP • Public-Private consultation process in place to design green and sustainable communities, including green building codes

Annex IV

Roadmap to achieve the strategic vision

Actions/ Measures	Activity	Responsibility	Months	2019	'20-'30
Vision and Strategy	Endorsement by the Cabinet of the vision, strategy and a detailed implementation plan for sustainable communities and housing that meets the country's needs, priorities and socioeconomic circumstances of the country and aims at driving sustainable development in Egypt.	Cabinet	4-6	✔	
Integrated Policymaking	Develop and endorse a holistic and integrated approach that ensures the integration of social, environmental, and economic dimensions in the development and implementation of sustainable communities and in the design and construction of housing, while fully taking into consideration the ecosystem and the surrounding environment (coastal, rural, urban and desert areas).	HCPSD in close consultation and collaboration with relevant Ministries	Throughout	✔	✔
	Undertake an assessment of existing regulatory & incentive measures & assess their impacts on the environment & resource efficiency with the objective of identifying measures & policies, including means of implementation that promote SCP & resource efficiency.	MHUUD in collaboration with MoE with the latter taking a lead role in providing technical support to practitioners in the relevant Government departments	4-6	✔	
	Review existing regulatory framework, revisit, update and introduce a package of regulatory and incentive measures that support the development and implementation of sustainable communities and green construction and buildings.				
	Develop an Action Plan for the rehabilitation and upgrading of informal settlements that takes into account environmental, social and economic considerations.	MHUUD	4-6	✔	

	Develop and implementation of innovative planning and construction models leading to smart cities that promote sustainable urban development and land use, green infrastructure, the provision of housing that is compact and accessible to work place, commercial, social, recreation and cultural services in order to reduce commuting, congestion, and consequently fuel consumption, CO2 emissions, and air and noise pollution.	MHUUD in close consultation and collaboration with relevant ministries	4-6	✔	
			Throughout	✔	✔
	Create an institutional set up that ensures public participation, involvement of relevant stakeholders, including the private sector and civil society, transparency, accountability, collaboration and coordination between various Government entities, and between the public and private sector - through PPP - exchange of information on best available technologies and good environmental practices on sustainable physical and urban development.	MHUUD in close consultation and collaboration with relevant ministries	2-4	✔	
	Promote the use of a number of tools and measures that facilitates the design and implementation of sustainable and green buildings and communities, these include: life cycle analysis, producer responsibility, eco labelling schemes, and environmental management systems. The main aim is to ensure the integration of environmental considerations in the design and manufacturing of products. Introducing the concept of producer responsibility entails the application of the polluter pays principle, thus encouraging industry to design products that avoids and reduces waste and promotes reuse and recycling.	MHUUD in close consultation and collaboration with relevant ministries	Throughout	✔	✔
	Create and continuously update a database on the existing housing stock in order to support the planning decision making process.	CAPMAS in collaboration with MHUUD	Throughout	✔	✔

Good governance and institutions	Approve the New Law for Planning and Sustainable Development and the creation of the HCPSD	The Cabinet	1-2	✔	
	Identify action needed to reform/restructure or create an institution that will be entrusted with coordinating action related to planning, implementation, operation and maintenance of existing and planned housing and communities in an efficient, transparent and accountable manner. This may be a sub committee established under the HCPSD to assume this role.	HCPSD	1-2	✔	✔
	Ensure public participation, involvement of relevant stakeholders, including the private sector and civil society, transparency, accountability, collaboration and coordination between various Government entities, and between the public and private sector – through PPP - exchange of information on best available technologies and good environmental practices on sustainable physical and urban development.	HCPSD	Throughout	✔	✔
	Ensure functioning in a transparent, accountable, and in a participatory manner thus contributing to efficiency and optimum use of resources.	HCPSD	Throughout	✔	✔
	Create within the Ministry of Environment a Unit that will be entrusted with the responsibility of providing guidance and technical support related to green and sustainable building and construction.	MoE	1-2	✔	✔
	Initiate action to decentralize the decision making process with more powers given to governorates and local authorities in the design, planning, and management of new sustainable communities and the upgrading and retrofitting of existing housing stock.[116]	HCPSD	1-2	✔	

[116] Nisrin El Laham, Towards Creating New Sustainable Cities and Communities in Egypt, A critical View for Planning for New Cities, 2011

Regulatory framework	Develop a package of regulatory and incentive measures and policies, that support sustainable urban development, green construction and infrastructure, use of renewable energy, and sustainable practices, throughout the entire life cycle of a building, resulting in the efficiency in the use of natural resources (water, energy) and factor inputs and consequently in the conservation of the natural resource base, biodiversity, and coastal and marine ecosystems. The framework should be designed to support market incentive measures. Develop a regulatory and incentive package that promotes eco-design and the construction of sustainable and affordable housing that caters for the needs of the different social income groups, particularly medium and poor income families. Finalize and introduce green building and sustainable urban development codes, (including, the provision of space for pedestrians and cyclers, green roofs, a public space and green areas) in residential areas for communal use, as a means to promote social integration and cohesion, while at the same contributing to a clean, healthy, and productive environment. Introduce in law a requirement for all public buildings to be constructed following green and environmental friendly codes and standards, including energy efficient systems, use of renewable sources of energy, water efficient system, and recycling and reuse of treated wastewater, conversion of sewage water into biogas, source separation of municipal waste, recycling, reuse, and recover, and the production of compost from organic waste. Develop and launch a labelling and certification scheme for green and sustainable housing.	MHUUD in collaboration with the MoE,, EGBC Ministry of Finance	4-6	✔	

	Introduce regulatory and incentive measures, sustainable practices in housing and construction to promote the use of local traditional & cultural environmentally friendly housing & construction practices & knowledge & the development of a procedural guidelines document for the introduction of design adjustments & modifications to cater for the environment and socioeconomic circumstances of different geographic locations. Introduce regulatory and incentive measures that promote integrated sustainable management practices for cities, including the proper maintenance, restoration, and operational efficiency of the existing housing stock (i.e. retrofitting, refurbishing and upgrading of existing housing stock, including informal settlements) in order to maximize the use and efficiency of the housing stock. Private sector should be encouraged through incentives to contribute to this process. Institute in law the requirement for economic activities, including industry and agriculture related activities in communities to adopt cleaner production and provide incentive measures to encourage SCP. Institute in law the requirement for waste generated from the building and construction process and demolition waste to be recycled and provide facilities. Introduce and enforce a law that allocates between 10%-13% of the community to be allocated to green areas. Introduce and enforce regulatory measures that encourage compact buildings, mixed use areas to promote easy access to service and employment opportunities, district lighting and heating, and the provision of public green space.				

	Introduce laws that prohibit the use of freshwater in irrigating green areas (public and private). Institute in law a requirement for coastal communities to use desalinated water as the main source of water supply for municipal and economic activities.				
Economic instruments	Design market incentives to encourage investments in sustainable communities, green buildings and construction, including the use of renewable sources of energy, recycling of municipal solid waste, wastewater recycling and reuse, and demolition waste. These can also be designed to ensure a balanced distribution of the population attracting investments and inhabitants to new communities and discourage investment and the concentration of populations in already dense and populated centres. Provide a package of incentive measures to encourage green roofs and urban agriculture.	MHUUD in collaboration with the MoE, EGBC Ministry of Finance	3-4	✔	
Economic analysis	Undertake an economic analysis to assess the financial viability of the proposed plan to include costs and benefits (social, environmental, and economic). The latter should include the expected social and environmental benefits resulting from the proposed plan, including number of new jobs created. It should also identify budgetary requirements needed to finance the programme and sources of funding.	MHUUD in collaboration with the MoE, , EGBC Ministry of Finance	3-4	✔	
Government Procurement	Government to take the lead in promoting green and sustainable communities, infrastructure, and buildings by directing public spending towards this area, by retrofitting of public buildings (Offices, schools, hospitals, post offices, roads, etc.), with energy and water	Action to start immediately by developing an action plan by the different governorates to be	Throughout	✔	✔

	efficient equipment and the construction of new communities on a sustainable basis.	coordinated by the MHUUD			
Trade	Design trade policies to support sustainable and green building and construction through a tariff system that encourages the import of environmentally friendly building and construction technologies and encouraging the export of locally produced technologies.		2	✔	
Funding	Secure a stable and predictable source of funding for sustainable and green buildings in order to ensure the continuity of services provided and meeting the set objectives of the programme Financial institutions should be requested to support financing investments in green buildings and infrastructure, and sustainable communities. In order to encourage low-income and poor families to inhabit new communities, the Government may consider subsidizing housing for them.	MPMAR in collaboration with Ministry of Finance, and MHUUD	Throughout	✔	✔
Private sector	Develop a package of incentives and measures to encourage and promote the engagement of the private sector in green and sustainable communities and buildings directly and through PPP. In the latter case the Government could enter into partnership arrangement where it could provide easy access for land, introduce tax exemptions, provide concessionary loans in order to encourage private sector engagement.	HCPSD in collaboration with the MoE, MHUUD, EGBC Ministry of Finance	4-6	✔	
Public Awareness	Develop and implement public awareness campaigns targeting different target groups, including policy & decision makers, the general public, academia, civil society, private sector and business, builders & contractors, & clients, highlighting the economic, social, health and environmental benefits of developing and implementing sustainable	HCPSD in collaboration with the MoE, MHUUD, EGBC, Ministry of Education	4	✔	✔

	communities. The role of media is significant in promoting sustainable patterns of production and consumption in the housing and construction sector by demonstrating their economic and financial benefits to different stakeholders.				
Education	Develop and implement a curriculum for green and sustainable communities and buildings to be offered at the Egyptian Universities. This can be at the undergraduate and the post graduate level	Ministry of Education in close collaboration with public and private universities (Cairo and Ain shams University, the October 6th University, and the British University etc.)	6	✔	✔
Capacity Development	Develop a capacity building, educational, and a research and technology development programme that supports sustainable urban development and green housing and construction, including innovative green and carbon removal (carbon negative) technologies and their applications in housing and construction, as well as tools and concepts that support this transition such as integrated assessment, life cycle assessment, green economy, and circular economy/closed loop economy.	HCPSD in collaboration with the MoE, MHUUD, EGBC, Ministry of Education, Ministry of Labour	4-6	✔	✔
Monitoring and assessment	Develop, for adaptation at the national level of a framework for the efficient monitoring, enforcement & assessment system that ensures compliance & adherence to sustainability principles in physical & urban planning & development, green & sustainable building regulations, codes of practice & standards. The framework would also include the creation of a coordination mechanism to coordinate initiatives, programmes, & funding related to green & sustainable housing & construction, as well as the creation of cooperatives to	HCPSD	Throughout	✔	✔

	facilitate access to funds to financed sustainable & smart housing & construction. Provide air quality monitoring stations to monitor air pollution and main pollutants on a continuous basis, including gaseous pollutants, noise, and electro magnetic waves.				
Research & development	Design a long-term R&D programme in environmentally sound building and construction material, energy and water saving equipment for housing and infrastructure. The development of this programme to be developed by the Academy of Scientific Research in close consultation and collaboration with the MoE, MHUUD, and other relevant ministries and research bodies and think tanks.	Academy of Scientific Research in close consultation and collaboration with the MoE, MHUUD	4-6	✔	✔
Indicators	Develop a set of indicators to monitor the achievement of the set objectives and targets.	MHUUD in collaboration with the MoE, other relevant ministries and EGBC	3-4	✔	
Regional & International Cooperation	Promote regional and international cooperation in the field of sustainable and green buildings and cities by being active collaborator with the Sustainable Cities Programme, Habitat, the African Urban Metabolism Network (AUMRN), and the C40 Initiative, the Global Green Growth Institute (GGGI), etc.	MHUUD in collaboration with the MoE, , EGBC, Ministry of Foreign Affairs	Throughout	✔	✔