EXPRO
هيئة كفاءة الإنفاق والمشروعات الحكومية
Expenditure Efficiency & Projects Authority

EXPRO National Manual for Projects Management

Volume 15, chapter 1

Sustainability Guideline

Document No. EPM-KU0-GL-000001 Rev 005

Document Submittal History:

Revision:	Date:	Reason For Issue
000	26/10/2017	For Use
001	08/05/2018	For Use
002	01/01/2019	For Use
003	20/02/2019	For Use
004	13/01/2020	For Use
005	19/08/2021	For Use

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1.0 PURPOSE

"A Sustainable economy is a stronger economy, building a robust future of the country and creating a better place for its future generation to live and flourish".

The Kingdom of Saudi Arabia (KSA) Vision 2030 and National Transformation Program 2020's principles are aligned to build resilient and sustainable societies and infrastructure. Each Entity's capital program, shall advance the KSA's vision to improve quality of life, create a safe environment for all people, protect the environment and build socio-economic and cultural growth. Infrastructure such as roads, railways, ports, bridges, hospitals, homes, sports centers, etc. are significant long-term investments that form the backbone of the country's economy, and should be planned from the beginning with sustainability in mind.

The purpose of this guide is to provide the Entities with an understanding of the Kingdom's commitment to sustainability and help guide the Entities on integrating sustainability into their infrastructure and construction projects. The guideline shall enable the Entities to understand the Kingdom's commitment to sustainable infrastructure development and understand how the Entities can help deliver sustainable infrastructure projects.

A country's infrastructure assets represent a significant and long lived investment that sets up impacts not only at the construction phase but throughout its operational life. Consideration of sustainability beginning in the Planning phase will enhance desired favourable outcomes - if done explicitly, early, and continuously in the process.

2.0 SCOPE

The scope of this document is a description of the KSA's commitment to sustainability, an explanation of the basis and how it fits in to the infrastructure projects. This guideline describes key aspects of a sustainability plan that should be used with all Entity's infrastructure projects.

3.0 DEFINITIONS

Definitions/Acronyms	Description
A/E	Architect & Engineer
ASHRAE	American Society of Hheating, Refrigerating and Air-Conditioning Engineers
BREEAM	Building Research Establishment Environmental Assessment Method
Building Commissioning	A quality assurance process both during and after building construction to ensure that appropriate systems and components are installed, tested and maintained according to design requirements.
Carbon Footprint	The total set of greenhouse gas emissions caused by an organization, event, product or person.
CEEQUAL	Sustainable Assessment and Awards Scheme for Civil Engineering.
EIA	Environmental Impact Assessment
Entity	A Saudi Government organization which is responsible for the delivery of government funded infrastructure construction projects.
ESIA	Environmental and Social Impact Assessment
ESR	Environmental Scoping Review
ESTIDAMA	An Arabic word for sustainability, is a sustainability program launched by Abu Dhabi's Urban Planning Council. This program provides sustainability guidelines tailored for Middle East region. It rates projects by the Pearl Rating System
Fareej System	A 'fareej' is a traditional neighborhood system. Courtyard-style homes are built with small paths (sikkak) connecting neighboring

	houses, intimate public spaces (barahaat) and even larger gathering spaces (meyadeen). The courtyard house is an ancient Arab form that works well in this region because it responds to the environmental challenges as well as the unique set of social requirements.
Greenhouse Gas	An atmospheric gas that absorbs and emits radiation within the thermal infrared range, a process that elevates the average surface temperature of the Earth. The primary greenhouse gases in the Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide and ozone.
Green Star	Developed by Green Building Council of Australia for education, multi residential, healthcare, retail, industrial type buildings. This can be used for new buildings, refurbishment, and existing buildings. Rating – 1-3 Stars, 4 Stars, 5 Stars, 6 Stars.
HSSE	Health, Safety, Security and Environment
IS	Infrastructure Sustainability (Australian rating system)
ISI	Institute for Sustainable Infrastructure
KPI	Key Performance Indicator
KSA	Kingdom of Saudi Arabia
LEED	Leadership in Energy and Environmental Design
EXPRO Projects White Book (MPWB)	The EXPRO document that describes the process for delivering projects and includes references to all required procedures, templates, and checklists.
MEP	Ministry of Economy and Planning
Mostadam	A Saudi organization that is organizing and facilitating a balance and sustainable buildings.
NTP	National Transformation Program
O&M	Operations & Maintenance
Recycled Content	The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.
RFP	Request for Proposal
SDG	Sustainability Development Goal
SKM	Sustainability Knowledge Management
SMART	Specific, Measurable, Achievable, Realistic, Time based
Sustainability	Sustainability is a systemic concept, relating to the continuity of economic, social, institutional and environmental aspects of human society. It is intended to be a means of configuring civilization and human activity so that society, its members and its economies are able to meet their needs and express their greatest potential in the present, while preserving biodiversity and natural ecosystems, and planning and acting for the ability to maintain these ideals in a very long term. Sustainability affects every level of organization, from the local neighborhood to the entire planet.
Sustainable Development	Sustainable development is development that meets the needs of the present without compromising the needs of future generations to meet their own needs.
Stakeholder	Person, group, or organization which can affect or be affected by the project's objectives, policies, and execution. Some examples of

	stakeholders include the customer, project team, sub-contractors, local communities, regulators, other government departments.
UK	United Kingdom
UN SDGs	United Nations Sustainable Development Goals
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
US	United States of America
WELL Rating System	The International WELL Building Institute (IWBI) established the WELL Building Standard to lead the world in transforming buildings and communities to enhance comfort, health and well-being. The WELL rating is a performance-based system for measuring, certifying and monitoring features of the built environment against WELL Building Standard. The WELL Building Standard® is third-party certified by the Green Business Certification Incorporation (GBCI).
WLC	Whole Life Costing

4.0 REFERENCES

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- Global Reporting Initiative, https://www.globalreporting.org/information/sustainability-reporting/Pages/reporting-benefits.aspx
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- United Nations, Indicators of Sustainable Development: Guidelines and Methodologies, http://www.un.org/esa/sustdev/natlinfo/indicators/guidelines.pdf
- WELL Certification: https://www.wellcertified.com/
- Towards Saudia Arabia's Sustainable Tomorrow, First Voluntary National Review, 2018-1439, July 9-18, 2018, New York. See the following link: https://sustainabledevelopment.un.org/content/documents/20230SDGs_English_Report972018_FINAL.pdf

5.0 RESPONSIBILITIES

5.1 EXPRO

EXPRO's responsibility is to provide an explanation of the Kingdom's sustainability principals and to help set up the tools for Entities to consider utilizing in their infrastructure projects to achieve and further the Kingdom's sustainability goals.

5.2 Entity

The Entity must determine the sustainability goals for the project, and accordingly provide direction to the Architect & Engineer (A/E) on meeting the Entity's expectations for project objectives on sustainability. The Entity needs to monitor and evaluate the sustainability progress. This should be a well-planned mechanism that is integrated with other project monitoring tools (e.g. design reviews, stage gate process) to assess the status of the program at regular intervals (see Section 10).

5.3 EPMO

The EPMO has the responsibility to assure the A/E's and contractors follow the Sustainability principals and objectives determined by the Entity.

6.0 SUSTAINABILITY IN THE KINGDOM

Since the very inception of the Sustainability Development Goals (SDGs), the Kingdom has taken part in related consultations and has pledged its commitment to meet the United Nations Sustainability Development Goals (UN SDGs) once they were endorsed in September, 2015 (reference: Sustainable Development Goals, 1st Voluntary National Review Kingdom of Saudi Arabia, July 9-18, 2018). Since then KSA has always reaffirmed its commitment during its participation in various regional and international conferences and forums. The Kingdom's commitment was set into motion through the Royal Order that mandated the Ministry of Economy and Planning (MEP) to follow this important dossier. The MEP in this regard is to create alignment of the national context with the Sustainability Development Goals. This is addressed through the pivotal role assumed by MEP in providing support to government agencies with respect to strategic planning and implementation.

MEP conducted a review to assess the alignment of Vision 2030 with the UN SDGs. In order to get a multidimensional picture a number of national strategies and programs were added and assessed for

consistency with the SDGs. Within this context, sub-strategic objectives of Vision 2030 along with national strategies and programs that are aligned with the SDGs target have been identified to reflect an accurate picture of actual alignment that can be implemented by executing Entities.

KSA embarked on a process of aligning its national strategies in various sectors with the SDGs. For example, the Ministry of Environment, Water and Agriculture (MEWA) issued the Water Strategy and the Environment Strategy, which are aligned with the SDGs with sufficient integration of social, economic, and environmental dimensions. This illustrates how national level strategy can be integrated into a Ministry, while this document provides guidance for implementing sustainability requirements for infrastructure projects and provides direction on how the SDG's can be integrated into the Entity's organization on their individual infrastructure projects.

6.1 Vision and Values

The KSA has rolled out its Vision 2030 and National Transformation Program (NTP) 2020 to diversify the oil based economy, create a vibrant society, a strong economy leading in all the sectors, preserving the rich heritage and culture, protecting vital resources, and governance to embrace transparency and accountability. Vision 2030 is a step towards making progress through creating new development in order to create a sustainable economy and transform the KSA into a Global Model of Excellence.

This document explores the link between Vision 2030, NTP 2020 and the roadmap to achieve success to be a Sustainable Nation.

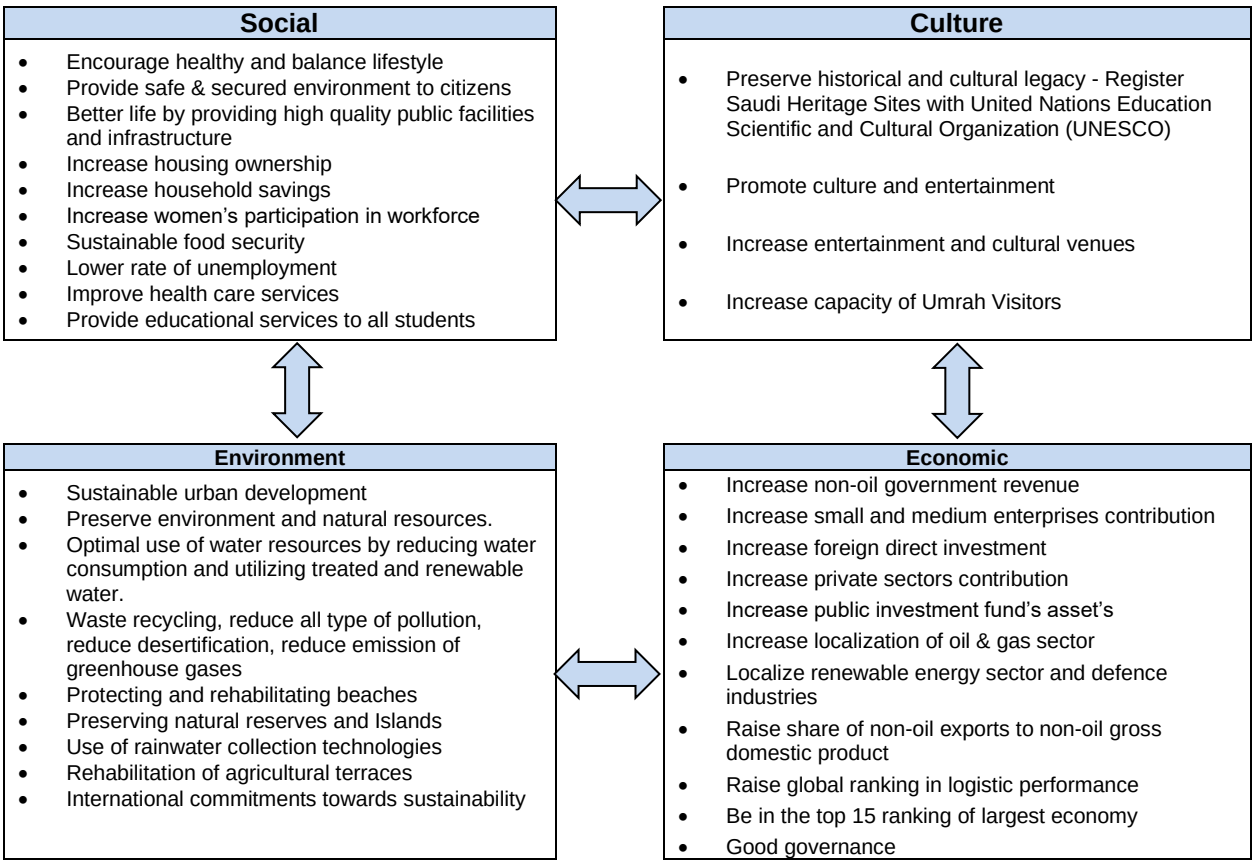
6.1.1 KSA and Global Sustainability Commitments

The KSA is committed to international conventions such as the Paris Agreement and the United Nations Sustainable Development Goals and Framework Convention on Climate Change (UNFCCC). Through its diversification and sustainable development strategy it anticipates climate impact mitigation co-benefits of some 130 million tons annually of avoided CO_2 emissions.

Global sustainability commitments are reflected in the KSA's ambitious plan to diversify the economy and establish a sustainable growth for the country. Its active engagement with International bodies shows the KSA's desire to play an important role in the drive toward global sustainability.

6.1.2 Sustainability Principles adopted by the KSA

The following sustainability principles should be incorporated into the Strategic Planning process of the Entities, particularly in Stage A.



6.1.3 Benefits and Outcomes

As entities develop their 5-Year Projects Portfolio Plan with sustainability in mind, they can expect to contribute to the KSA's vision of building a resilient economy. Some of the important benefits are:

Economic Benefits - Enhance profile regionally and globally to climate change adaption and mitigation, improve competitiveness, increase coordination between stakeholders, economic growth and investment, reduce post developmental cost (operating cost) e.g. reduced energy and water consumption and long term liabilities, boost local industry to cater to sustainable development, training and job creation, develop effective transportation systems, reduced insurance premiums, contribute to increase in tourism and leisure activities, increase property value.

Environmental Benefits - Improve air quality, reduce rise in temperature caused by heat island effect, improve and protect local water quality, reduce water demand and efficient use of water and waste water, improve material usage by adopting the "reduce, reuse and recycle" framework, reduce energy demand and efficient use, encourage use of renewable energy, reduce greenhouse gases and CO_2 emissions, protect local flora and fauna and improve biodiversity, ecofriendly procurement, carbon offsetting by creating green spaces, and overall rainwater management.

Social Benefits - Improve health and wellbeing and security, promote social interaction, build an active and cohesive community. Part of the Sustainable development approach will target increasing the employment percentage of Saudi nationals through capacity building and skills training.

Cultural Sustainability Benefits - Cultural Heritage and Customs are core elements of Bedouin culture. The Bedouin culture has always been closely associated with conserving the nature. The Bedouin culture supports cohesive society, promotes connectivity between communities and nature conservation. Inclusion of cultural sustainability is a way to retain cultural values in modern development.

6.1.4 Challenges

As described in the 1st Voluntary National Review Kingdom of Saudi Arabia, the Kingdom has many challenges with implementing sustainability across the Kingdom. The key challenges are:

1. Promoting SDGs at the sub-national level. This implies that adapting the SDGs, targets and indicators to local circumstances and integrating them into the planning and implementation of public policy at the local level. The SDG framework has the potential to help local governments improve their planning and link their performance more firmly to evidence and results through accelerating capacity building for local government structures.
2. Coordination of multiple actors and sectors. Given the comprehensiveness of the SDGs, multiple stakeholders from the public, private and non-profit sectors play a vital role in turning the SDGs into practical tools for explaining sustainable development, managing implementation, ensuring accountability, and reporting on progress. It is important that these actors are truly on board in a comprehensive approach and ensuring that sustainable development is not just a matter of specialized sustainable development designated focal points but rather a whole government affair.
3. Data availability and statistical capacity. The adaptation and monitoring of the SDGs requires data and statistics that are accurate, timely, sufficiently disaggregated, relevant, accessible, and easy to use. EXPRO is working hard to assure that various Entity projects are transparent in their progress on design, cost, schedule, and construction, along with this sustainability progress should be tracked and reported in the same way.
4. Building on existing institutional frameworks. It is important to avoid creating overlapping mechanisms through the establishment of new institutions where existing ones can play that role. This is challenging because building on existing institutional framework requires a better understanding of the SDGs by government officials and developing their capacity to deal with them. EXPRO needs to assure that each Entity is properly and accurately implementing a sustainability program and reporting the results to MEP.

6.2 Actions for Success

There are four key aspects to sustainability to be followed to assure sustainability success:

1. Take into account national realities and circumstances. The SDGs need to take into account national realities, including country aspirations and expectations. The SDGs are driven by local priorities identified in Vision 2030, this context driven approach applies also to implementation arrangements, data collection, and analysis systems. See Section 9 below for detailed discussion on how to include sustainability in projects.
2. Clear and long-term vision and policy coherence. Saudi Arabia's experience shows that effective adaptation and implementation of the SDGs requires a clear national long-term vision and policy coherence. For its SDG activities, Saudi Arabia didn't have to start from scratch but had to ensure continuity between existing development programs and framework. The early implementation of the 2030 Agenda has greatly benefitted from strong political will and support at the highest level, facilitating policy environment, streamlined institutional mechanism and building upon successful experience gained during the implementation of the Vision 2030.
3. Economic diversification is a priority aspect of sustainability.
4. Performance measurement in the public sector

6.3 EXPRO Facilitates Sustainability

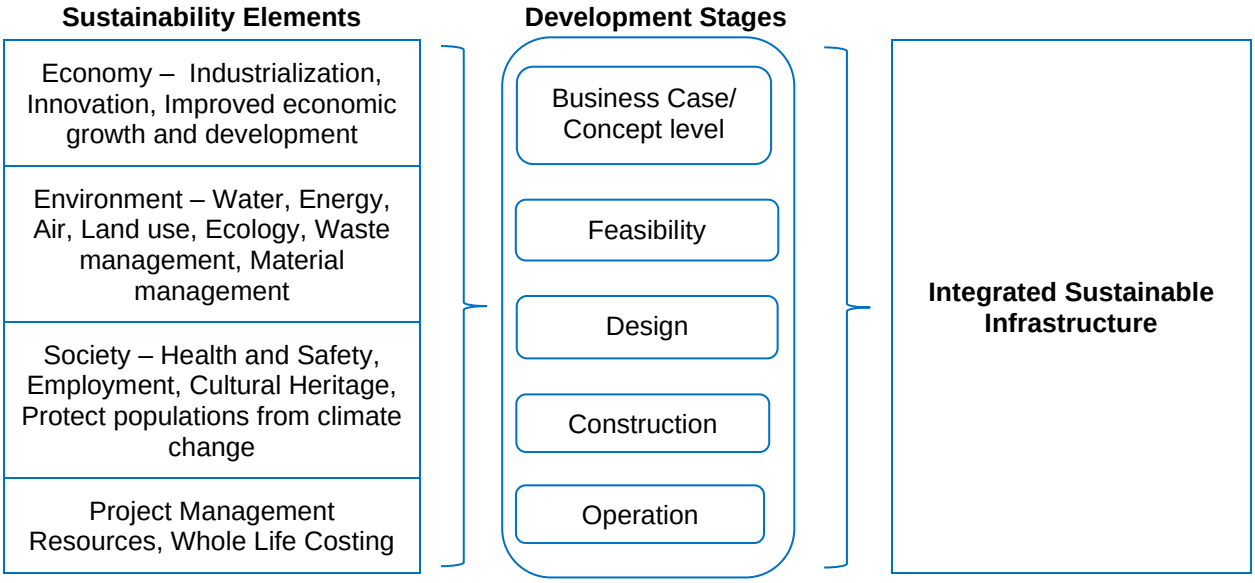
EXPRO is implementing and contributing to sustainability through the following three steps:

1. Do the right project – Through the 5-Year Projects Portfolio Planning Guide (ENT-S00-MN-000001) which provides guidance and clarifies the relationship between broader goals and objectives and the Entity's 5-Year Capital Budget Cap. This is an important tool to assist Entities to identify, plan, assess and prioritize the progressive delivery of their national infrastructure projects (investment initiatives).
2. Do the project right – By following the Project Delivery Strategy, doing the proper planning, develop the project parameters, developing the basis of design, then executing the design and construction of the project properly, as described in the EXPRO Projects White Book (MPWB), is key to doing the project right.
3. Operate and maintain the project right – a properly completed project requires that the infrastructure is operated and maintained properly to assure the equipment runs efficiently and effectively.

Improvements on these three key areas will greatly assist the Kingdom in becoming a sustainable society.

7.0 SUSTAINABILITY MANAGEMENT

Responsible Governing Entities shall adopt and recognize their roles and responsibilities to deliver a Sustainable Infrastructure Development Program. The aim shall be to develop a sustainable and resilient infrastructure to support economic growth, promote industrialization, and encourage use of environmentally friendly technology and innovations. A sustainability management framework for the strategic planning of capital projects is presented below:



Illustrated in the above framework is the notion that the essential economic, environment, societal and project management elements need to be considered from the earliest project option to concept phase and through the entire project lifecycle.

8.0 STAKEHOLDER ENGAGEMENT

Identification of stakeholders and their right level of involvement is important to ensure that a project's goals and objectives are properly defined and achieved. A stakeholder is any organization, group or individual that can affect, be affected by, or perceive itself to be affected by a program or project. Stakeholder identification and management happens throughout the project development and execution phases.

An overall stakeholder management process is depicted in **Figure 1** below:

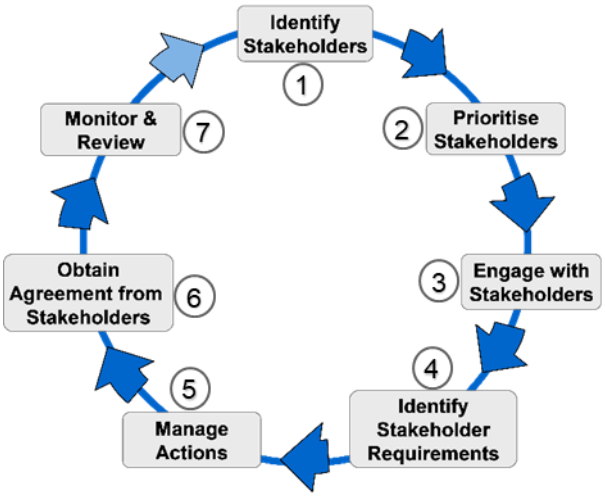


Figure 1 - Overall Stakeholder Management Process

Steps 1 through 4 in the Stakeholder Management process (see **Figure 1**) shall be repeated at each stage of the portfolio planning through project execution and closeout. It is important to consider both internal and external stakeholders for successful Stakeholder Management. Internal stakeholders may be treated initially as different departments within the Entity that contribute to or benefit from the project outcome. For successful project execution, it is important to engage the key personnel during the early project development stages as well as to address Operating and Maintenance requirements or the end user requirements.

At Phase C of the 5-Year Projects Portfolio Planning Guide and later, stakeholders broaden to include other entities. Later in the concept development and master plan process (Stage 2 - Project Initial Planning of the Stage Gate Process), external stakeholders are identified and included - such as local governments, businesses or industry, future supply chain, investors or lenders. Engagement of the future potential supply chain may help to identify new technologies or solutions.

Step 1 - Identify Primary and Secondary Stakeholders

- Identify stakeholders that could/will affect the program (through permissions, requirements, or provision of an enabling component of the project, etc.)
- Identify stakeholders that could/will be affected by the program
- Identify stakeholders that will have a financial impact on the program

Step 2 - Prioritize Stakeholders

Based on the stakeholder's relative level of interest in the project or influence over the project, determine the appropriate level of engagement. A commonly used typology is below, but it should be noted that depending on the stage of the project, a stakeholder may change from one priority group to another.

Collaborate	Stakeholders with a high level of mutual interest and impact *For these stakeholders, it may be necessary to work together closely on certain aspects of the project's design, fulfilment of requirements, or construction planning/sequencing.*
Consult	Stakeholders with a medium level of interest or impact *Their plans or requirements affect the project, and so consultation with them is important to ensure full understanding and incorporation of their interests.*
Inform	Stakeholders who may need to know for their planning, or who may affect the program *Especially if they are impacted by the project, this type of stakeholder may have to incorporate details of the project's implementation into their own plans; thus providing the right information at the right time, and keeping them updated is important.*

Step 3 - Engage with Stakeholders

Stakeholders in the first two categories should be consulted in the process of preparing the project requirements and timelines, and for understanding environmental and social impacts. Develop an engagement plan that includes how and when to communicate the concept or project plan and the objective for the engagement - what information needs to be gained from the stakeholder (and understand what they need to know about the project), and the degree of ongoing dialogue needed. It is also important to identify a primary interface point for each stakeholder to be responsible for that relationship and avoid inconsistent communications.

Step 4 - Identify Requirements and Concerns

Through engagement, track the interests, requirements and concerns that each stakeholder has in direct relationship to your project. It may also be helpful to be alert to indirect relationships or concerns they may have that act as an influence on them, as getting into further project detail. The project stakeholder manager needs to communicate the stakeholders' interests, feedback, requirements, etc. effectively to the internal project team as appropriate.

The above 4 steps repeat throughout the strategy planning process leading up to the 5-Year Projects Portfolio Plan, and then are revisited during Stage 2 of the Stage Gate Process concept and master plan, where it is more likely that based on the stakeholder requirements, specific actions are noted and agreements are obtained, relationships are monitored. At each stage, the stakeholder list should be revisited as it pertains to that stage of project development (e.g. Environmental Impact Assessment (EIA) process, design requirements, construction planning and community relations).

9.0 INCLUSION OF SUSTAINABILITY IN PROJECTS

Well-developed and well managed infrastructure improves productivity, economic growth, employment, quality of life, accessibility, education and can reduce inequality. Infrastructure can have negative impacts on environment by loss of habitat, disturbing biodiversity, increasing pollution, over-exploiting natural resources. If not planned well, infrastructure can be vulnerable to natural hazards thereby weakening the function of the whole system. To assure sustainable infrastructure projects are developed and maintained properly they need to follow a careful and well considered path as described below.

9.1 Planning

Step 1 - Form an Integrated Team

When developing projects, it is essential for the Entity to form a multidisciplinary integrated team (Sustainability Leadership Team) from different disciplines at the beginning of planning stage to enable a broad view in implementing infrastructure projects sustainably. The role of the Sustainability Leadership Team continues throughout the design, construction and operation stages of a project. Engaging a Sustainability Advisor through the life cycle of the project is advisable to educate team members, create awareness, resolve conflicts, minimize gaps in the process, and negotiate trade offs. The responsibility of

Sustainability Advisor is to be actively engaged with internal and external stakeholders to ensure the project meets desired sustainability outcomes.

Step 2 - Set Sustainability Goals for Infrastructure and Facilities Development Projects

Entities shall review the 2030 Sustainability Development Goals and determine how to best apply them within the Entity's own vision and plans for 2030. Sustainability goals for the projects should at a minimum include the following elements which derive from the existing KSA goals and strategies:

- Use locally produced material, material with recycled content, bio-based and/or produced from renewable resources
- Select materials with consideration for the ability to be disassembled, reused, recycled at end of their useful life
- Address Climate Change (potential impacts and to reduce greenhouse gas emissions), Risk and Resilience
- Improve Indoor and Outdoor Environmental Quality
- Conserve Energy and Improve Energy Efficiency
- Conserve Potable Water and Improve Water Quality
- Reuse Treated Waste Water
- Use Renewable Energy and Low Carbon Fuels
- Ensure Healthy Living and Well Being
- Foster Innovation
- Increase and Improve Biodiversity
- Reduce Waste
- Efficient Land Use and Connectivity to the Masterplan
- Provide Safe and Secure Environment
- Maintain Cultural Values

As these goals are applied, the resulting objectives and targets should be manageable, and maintain a fine balance between the KSA's aspirations and cost implications. The process needs to identify the extent and type of sustainability measures to be applied to the assigned project.

It may be useful to analyse the infrastructure and building sustainability rating systems worldwide that can be used or adapted for use and their associated risks and opportunities. Using established rating systems, or suitable adaptations, can give a clear direction and provide specific criteria to deliver a sustainable project. Attention should be given to local geographical, environmental, social, cultural conditions in the kingdom when adopting or developing a customized sustainability rating system.

Internationally established sustainability rating systems have qualification criteria for a building to be certified as a sustainable building. A thorough review of the criteria and calculations methodologies used for evaluation and certification need to be done before selecting any standard. It is important for the engineering team to identify if the proposed building would be able to meet the qualification criteria of the selected sustainability building rating system.

The team needs to identify, in consultation with the Entity, a level of rating system the proposed building or infrastructure intends to achieve. It is important to consider both the capital and operating costs of targeting a given level of rating system certification; it is not necessarily true that higher levels of achievement cost more. In some cases, higher levels of achievement cost more up front, but over the building lifecycle result in a greater return (Packard Foundation) on investment. In any case, it is advisable to update the Entity about cost implications related to the level of rating.

All the building and infrastructure sustainability rating systems require a certified professional of the chosen rating system to be part of the project development team.

The Engineering team needs to understand credit synergies when considering a credit and developing an initial credit or score assessment. Credit interactions will help to understand the design interconnection thereby contributing to more than one credit. Analysing credit interactions should identify how one credit can have both positive or negative implications, the trade-offs and the impact on the project. This process will enable the team to understand the sustainability rating system very well and provide a robust design.

Understanding the credit interactions will also reduce or eliminate the additional cost of sustainable infrastructure or buildings by optimizing the systems.

Whole Life Costing (WLC) - Also known as Lifecycle Cost. To maximize the efficiency of whole life cycle of the development, depending on the scale of project when considering certain options, it is useful to conduct life cycle analysis at the concept design stage of the project. This involves looking at not just the first cost of a technology or equipment, but also the operating costs, maintenance costs (including labor) and replacement part costs over the item's useful life. The analysis can also provide support to the design team to demonstrate to the Entity the payback benefits of adopting a specific level of rating system. WLC can be seen to be even more beneficial for mega projects.

A checklist of considerations during the Planning Stage should include a review of:

- Environmental Sustainability
- Financial Viability
- Relevance with Other Priorities set by the Entity
- Achievement of Identified Benefits for whom and how many are likely to benefit
- Project Management Arrangement, Timeframe and Support
- Operational Management Support Required
- Stakeholder Analysis

9.2 Project Feasibility: Planning Approval and Procurement

Sustainability implementation is an integrated process involving multiple disciplines. As the project is approved and selected, the following key considerations should be given while developing project scope of work, engineering and contracts documents:

- Clear definition of sustainability requirements to be captured in the project processes and procedures are listed below, but not limited to:
    - Project Design Development Plan
    - Engineering Specifications
    - Procurement Procedures
    - Risk Management Plan
    - Environmental and Social Impact Assessment (ESIA) and Subsequent Construction Environmental Plans
    - Project Training Plan
    - Contract Documents
    - Quality Plan

- Tender documents to refer to validation of the feasibility stage sustainability requirements or score assessment for optimization of design and constructability of the building or the infrastructure
- Tender documents to mention the experience requirements for the Design and Build Contractors to demonstrate their ability to deliver sustainability compliant projects
- Tender documents to provide the project sustainability guideline for the design and construction phases that will capture:
    - Details of the sustainability rating system or its principles that need to be adopted and a list of deliverables to be produced during the design development and construction phases of the project
    - Initial assessment of sustainability requirements i.e. Score cards or Sustainability components to be provided to the design consultants and construction contractors to price their bid
    - Define the criteria of the sustainability components if the Project opts for implementing sustainability principles in the design including building commissioning requirements:
        - If specific energy performance goals are adopted, define whether improved energy performance is to be demonstrated through energy modelling or other prescriptive method

        - Define the verification tools used to demonstrate improved ventilation, reduced water consumption, use of renewable energy, etc.
        - Define the Commissioning requirements - Basic or Enhanced and the standard applicable (e.g. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 90.1)
    - Requirements of key personnel, their roles and responsibilities, including the appointment of a sustainability advisor to oversee the implementation process
    - Methodologies to track and audit the performance of Designers and Contractors
    - Define the sustainability milestones for the design and construction stages
    - Handover requirements from design to construction if it is not a design and build contract

9.3 Design

Design development of projects shall be aligned with the goals set at the planning stage. Sustainable design development should consider the whole life cycle of the project.

The principles and objectives of established sustainable rating systems for sustainable design development are listed below. If used, the rating system or the guideline provides a road map to achieve a sustainable development. The Entity should do the preliminary review of which important criteria to achieve, based on the project sustainability goals and what elements may be left to the designer to select on a cost-effective basis. Whether a rating system is used or not, Design Consultants must provide cost and schedule effective solutions and consider how best to promote the following:

- Natural System and Ecology Protection [based on the findings of the Environmental Scoping Review (ESR)/EIA]
- Responsible Use and Conservation of Natural Resources
- Energy and Water Conservation
- Improved Indoor and Outdoor Environment
- Waste Management and Minimization of Waste Disposal
- Orientation and Climatic Response (for Buildings and Facilities), use of passive features
- Efficient Urban Design and Integration with the Surrounding Urban Realm
- Accessible Infrastructure and Improved Infrastructure Integration
- Promote the Use of Recycled Material, less harmful materials and material with local content
- Maximize the Use of Renewable Energy
- Minimize Noise and Light Pollution
- Maximize Greenhouse Gases and Carbon Management
- Promote Innovation

There are a number of established Sustainability Guidelines that provide and specify assessment and guidance tools such as Energy Modelling, Ventilation Modelling, Life Cycle Assessment, Lighting Simulation, Water and Energy Calculators, etc. Checklists can be customized to ensure the verification and validation of sustainability requirements implemented in the design and construction stages.

Design specifications and drawings need to reflect sustainability requirements of the adopted sustainability rating system or principles of a sustainability rating system. Refer to MPWB as follows:

- Volume 3 - Project Initial Planning / Chapter 4 - Project Concept Masterplan and Development Framework Procedure
- Volume 6 - Engineering / Chapter 5 - Codes, Standards and Reference
- Volume 6 - Engineering / Chapter 7 - Design Guideline
    - Section 1 - General Design
    - Section 2 - Civil Design
    - Section 3 - Architectural Design
    - Section 4 - Structural Design
    - Section 5 - Mechanical Design
    - Section 6 - Electrical Design
    - Section 7 - Extra Low Voltage Design
- Volume 10 - Testing and Commissioning

Given the emphasis on diversifying and further developing the Saudi economy, design elements, techniques and materials should consider whether foster (or inhibit) the ability of Saudi companies and local workforce to participate in the project delivery.

An Environmental Social Impact assessment must be conducted before/during the design phase of a project to identify and mitigate major environmental risks associated with the entire life cycle of the project. Refer to MPWB Volume 3 - Project Initial Planning / Chapter 5 - Environmental Impact Assessment.

Commission and test the complex or building in line with MPWB Volume 10 - Testing and Commissioning. Engage a Commissioning Agent, when required, in design stage throughout the completion of commissioning to oversee the commissioning process to verify the complex or building's performance. The commissioning process at the minimum should include verification of heating, ventilation, air conditioning, refrigeration, building management system, on site renewable system, and domestic hot and cold water system.

9.4 Construction

It is important that communication is set between the design consultant, construction contractor and owners to ensure that the infrastructure complex or building is built in line with the design specifications. Key consideration that must be given for Construction Phase of the project are:

- Design Development awareness about Sustainability requirements
- Procurement of Sustainability compliant materials
- Environmental and Waste management, Recycling
- Natural System Management (e.g. controlling soil erosion, waterway sedimentation, and airborne dust)
- Building Envelope verification
- Basic Commissioning
- Community relations

During Construction Phase all the construction stage standards shall be in line with design stage sustainability requirements. Refer to MPWB as follows:

- Volume 6 - Engineering
- Volume 9 - Construction Management
    - Chapter 4 - Site Engineering
    - Chapter 5 - Field Materials Management
    - Chapter 6 - Quality
- Volume 10 - Testing and Commissioning
- Volume 11 - Health, Safety, Security and Environment (HSSE)
    - Chapter 5 - Environmental Requirements

To ensure the construction is compliant with the construction rating requirements, an audit needs to be conducted at different stages of the project i.e. site set up and substructure, superstructure and envelope, internal fit out and Mechanical, Electrical and Plumbing works, Commissioning and Handover. The stage-wise verification process will assist projects in achieving construction credit compliance. Construction stage audit requirements need to be included in the construction contractor's scope of work and contract. The contract must clearly define the expected deliverables, roles and responsibilities of the construction contractor to achieve required sustainability rating.

Community relations refers to the communication with key community level stakeholders - those affected by the project - so that they can anticipate and plan for construction related nuisances, and that the construction team can understand and mitigate community level issues or concerns in their construction execution planning. Good communication to eliminate surprises facilitates project execution and overall project appreciation.

Appropriate language must be used in the Request for Proposal (RFP) documents to communicate project expectations, and contract documents to ensure delivery of sustainability objectives.

9.5 Operation

For a complex or building, ensuring the intended performance starts with obtaining Operations and Maintenance (O&M) perspectives during design of the infrastructure complex or the building and continues through Testing and Commissioning, and project handover. Building occupant handbooks and infrastructure maintenance guides must be developed for the users to ensure that the long-term aspects of the building/infrastructure management and maintenance are upheld and continue to improve upon sustainability targets and objectives already established for operation phase.

Complex management plays a critical role during the operation phase of the project to ensure that the complex or building is operated and maintained in the right manner. Training should be provided to the O&M team to familiarize them with the sustainability requirements.

10.0 EVALUATION OF SUSTAINABILITY PROGRAMS

Monitoring and evaluation of project sustainability performance should be a well-planned mechanism that needs to be integrated with other project monitoring tools (e.g. design reviews, stage gate process, EPM-EQ0-GL-000002) to assess the status of the program at regular intervals. While an Entity may decide to develop their own unique Key Performance Indicators (KPIs), it might be easier to utilize a sustainability method that has already been developed by others. Some of the internationally followed performance measurement standards and accreditation processes are discussed in this section. The Entity may decide to use one of these guidelines or other guidelines not listed, and if so desired, obtain certification based on their preferred goals. It may be noted that there are over 400 different rating systems available internationally.

To evaluate the success of the program it is advised to use simple tools that will help the Entity to gauge the performance. As stated above, it may be advisable to make the decision to use a third party standard at a project level, as a monitoring tool whether or not the decision to certify a project is taken.

10.1 Key Performance Indicators (KPIs)

Key Performance Indicators enable assessment and monitoring of progress against set parameters toward sustainable development goals. Select KPIs that are SMART, that is: specific, measurable, achievable, realistic, time based. SMART goals should directly link to sustainability goals of the program or the project.

The Entity may consider developing KPIs for the Sustainable Infrastructure Development Program at two levels of the program: (1) to track the entity's progress toward national goals and/or (2) at project level. In either case, the Entity should track performance against project goals as a reference point for future similar projects.

Selection of criteria for the KPI should be based on the four pillars - Environmental, Economic, Social and Cultural conditions of the KSA and include relevant indicators based on the topics listed below, or more specific topics selected for relevance by the individual Ministry/Entity. Example topics are included for consideration:

- Land use - project footprint (potentially established as a ratio of land to service outcome) or land use change from original state to post-project state
- Biodiversity - net effect (descriptive measures and impacts or quantitative metrics)
- Health and Safety - estimated impacts from the delivered project as well as construction phase effects on worker and bystander/community health and safety
- Employment - construction and operations/maintenance phase employment
- Economic Growth - direct and indirect economic contributions to the Saudi economy
- Education - tailor to specific current strategic goals or what the project aims to achieve
- Governance - project alignment with overall plans, transparency on performance
- Climate Change - project contribution to greenhouse gas emissions (operations).

10.2 Sustainability Standards

A sustainability standard is a tool that is used to review sustainable performance of infrastructure projects, building complexes, or a building. Envision, LEED (Leadership in Energy and Environmental Design), BREEAM (Building Research Establishment Environmental Assessment Method), ESTIDAMA, BCA Green Mark, QSAS (Qatar Sustainability Assessment System) and WELL are some of the well-recognized and established international standards used across the world. Over 900 projects in Saudi Arabia can be found in the LEED Project directory as having achieved or in pursuit of certification (this number is growing regularly). Mostadam is an assessment that is being developed in the Kingdom by the Ministry of Housing for Commercial Buildings and homes.

These third-party rating systems provide a means to benchmark performance in various sustainability aspects and recognize increasing levels of sustainability achievement.

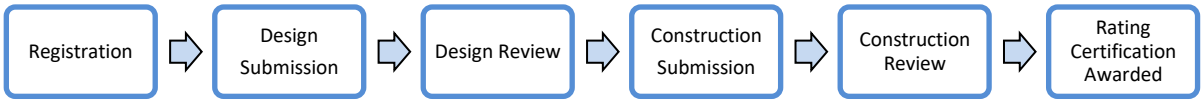
The certification system of each of these standards ensures that the targeted level of performance is achieved in areas of improved energy performance, water conservation, protection of natural resources, use of renewable energy, reduced greenhouse emission and carbon footprint, improved indoor and outdoor environment.

It is advisable to choose a rating system that is aligned with KSA's national level commitments (see Section 6.0), easy to adapt, and provides focus on resolving local and regional sustainability issues. Suggested priorities for focused achievement are:

- Encourage use of locally produced material while selecting credit criteria to support the local economy and reduce the environmental impact associated with transportation of materials.
- Encourage the use of innovation to conserve or reuse scarce water resources
- Energy conservation and appropriate levels of thermal comfort.

10.3 Certification Process

The typical process to register a project for any international sustainability building rating system is as below. These may differ slightly depending upon the chosen rating system.



The Design review and Construction review steps, is the opportunity to raise technical clarifications. Technical clarifications are a means through which project teams can clarify their strategy to achieve a credit. This process provides technical and administrative guidance to project teams.

To summarize, the following activities occur at each project phase when implementing a Sustainability Rating System:

- Concept Stage - Gather information related to the project, form a team to analyse sustainability rating system and its prequalification criteria, involve the Entity (Stakeholder)
- Preliminary Design Stage - Analyse credit options, credit interactions to establish goals for design development
- Design Development - Implement the credit design requirements, develop specific design documents, drawings, calculations for design review and certification
- Construction Stage - Demonstrate design stage compliance through drawings, material data sheets, calculations, photographs for construction stage review and certification.

It is useful to note that some systems utilize a document submittal basis for achieving the credits while others use an assessor to review project documentation, usually through a visit to the project.

10.3.1 Sustainability Rating Systems

A brief description of some sustainability rating systems and their origin is provided below. As noted before there are over 400 different rating systems so all which are described below are ones often used for complexes or buildings. While some are used for infrastructure or a complex a part of them can be specifically used for buildings alone if desired. One must choose if they are doing this for an area (infrastructure) or a specific building. Most systems can accommodate both aspects to a certain degree. Each of these systems uses an Assessor to evaluate their levels of achievement to be certified.

10.3.1.1 LEED

LEED, or Leadership in Energy and Environmental Design was developed by US Green Building council for homes, hospitals, neighbourhood development, retails, manufacturing facilities, healthcare type of buildings. LEED is the most widely used green building rating system in the world. LEED can be used for new or existing buildings and communities. Over 900 buildings in Saudi Arabia have been registered for LEED certification, with numerous buildings achieving ratings from Certified to Platinum.

Rating - Certified, Silver, Gold, Platinum

10.3.1.2 Envision

Envision, developed by the Zofnass Program for Sustainable Infrastructure based at the Harvard Graduate School of Design and American Society of Civil Engineers. Envision is now run by the Institute for Sustainable Infrastructure (ISI) and was launched in 2012. It can be used to rate infrastructure works associated with water storage and treatment, energy generation, landscaping, transportation, and information systems. Envision is typically not used for individual buildings.

Rating – Verified, Envision Silver, Envision Gold, Envision Platinum

10.3.1.3 CEEQUAL

CEEQUAL is an international evidence-based sustainability assessment, rating and awards scheme for civil engineering, infrastructure, landscaping and works in public spaces. CEEQUAL encourages and promotes the attainment of high economic, environmental and social performance in all forms of civil engineering through identifying and applying best practices. It aims to assist clients, designers and contractors to deliver improved sustainability performance and strategy in a project or contract, during specification, design and construction. The scheme rewards project and contract teams who go beyond the legal, environmental and social minima to achieve distinctive environmental and social performance in their work.

Rating - Pass, Good, Very Good, Excellent

10.3.1.4 Infrastructure Sustainability

Infrastructure Sustainability (IS), Australia and New Zealand's comprehensive rating system for evaluating sustainability across design, construction and operation of infrastructure, evaluates the sustainability (including environmental, social, economic and governance aspects) of infrastructure projects and assets. The rating is applicable to transport, energy, water, telecommunication types of infrastructure. Infrastructure Sustainability is typically used for complexes, such as airports, rail stations, roadways, etc. for buildings Green Star (see below) is typically used.

Rating – Bronze, Silver, Gold, Platinum, Diamond

10.3.1.5 BCA GREEN MARK

BCA Green Mark was launched in January 2005 as an initiative to drive Singapore's construction industry towards a more environment-friendly building. It is intended to promote sustainability in the built environment and raise environmental awareness among developers, designers, and builders when they start project conceptualisation and design, as well as during construction. BCA Green Mark also provides a comprehensive framework for assessing the overall environmental performance of new and existing buildings to promote sustainable design, construction, and operations practices in Buildings.

Rating – Certified, Gold, Gold Plus, Platinum

10.3.1.6 Green Star

Green Star is a voluntary sustainability rating system for buildings in Australia. It was launched in 2003 by Green Building Council of Australia for education, multi residential, healthcare, retail, Industrial type of buildings. The Green Star rating system assesses the sustainability of projects at all stages of the built environment life cycle. Ratings can be achieved at the planning phase for communities, during the design, construction or fit out phase of buildings, or during the ongoing operational phase. This can be used for new buildings, refurbishment and existing buildings.

Rating - 1-3 Stars, 4 Stars, 5 Stars, 6 Stars.

10.3.1.7 ESTIDAMA

The ESTIDAMA Pearl Rating System is an Abu Dhabi Urban Planning Council developed sustainability guideline tailored to local and cultural conditions. Estidama is a building design methodology for constructing and operating buildings and communities more sustainably. This rating system provides an emphasis on Outdoor Thermal comfort, e.g. Fareej System, to provide cool and comfortable shaded walkways connecting the buildings and parking spaces.

Rating – One Pearl, Two Pearls, Three Pearls

10.3.1.8 BREEAM

BREEAM (Building Research Establishment Environmental Assessment Method), first published by the Building Research Establishment in 1990, is the world's oldest established method of assessing, rating, and certifying the sustainability of buildings. BREEAM has expanded from its original focus on individual new buildings at the construction stage to encompass the whole life cycle of buildings from planning to in-use and refurbishment.

Rating – Pass, Good, Very Good, Excellent, Outstanding

10.3.1.9 Mostadam

Mostadam is the KSA sustainability rating and certification system established to address the long-term sustainability of the buildings in the Kingdom of Saudi Arabia (KSA). It includes a set of sustainability technical requirements that projects must implement and integrate to be awarded the certificate. Mostadam rating system is applicable to commercial and residential buildings.

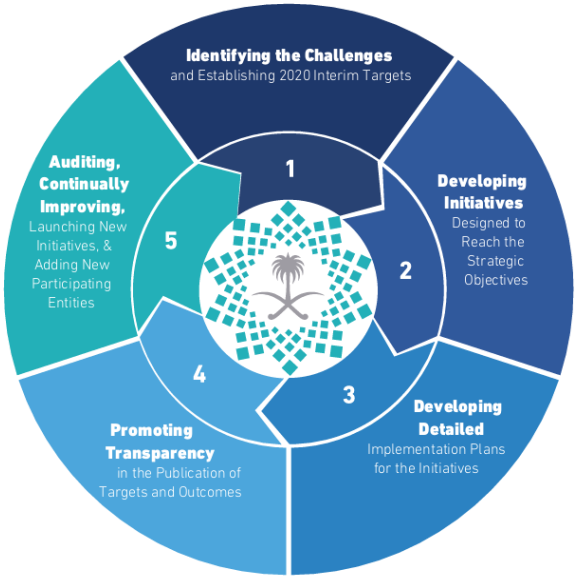
Rating – Green, Bronze, Silver, Gold, Diamond

The above sustainability ratings are well established methods of applying sustainability to infrastructure projects, complexes, and buildings. Iconic infrastructure or a representative building under each Entity are good candidates to utilize one of these Sustainability Certifications. To make it more cost effective, the Entity might consider using those experiences to implement the principles of the sustainability rating system to the infrastructure and buildings but may not elect to go through the entire certification process.

A customized guiding document for the Entity should be developed for the type of project an Entity is developing incorporating the sustainability principles in line with local conditions and the government's vision to transform KSA.

11.0 SUSTAINABILITY REPORTING

Vision 2030 promotes Transparency and Accountability reforms within the KSA to measure the performance of government authorities and hold them accountable for any short comings. The 'Operating Model of the National Transformation Program' shown below, identifies transparency as one of the enablers in achieving success of the National Transformation Program.



Operating Model of the National Transformation Program

The Entity may want to develop a sustainability management system for the program, which would provide a structured process and greater transparency to national policy for sustainable infrastructure development and encourage involvement of various parties to form a successful sustainability program. Management systems follow a Plan-Do-Check-Act process:

Plan: The entity issues a policy statement with its stated goals, and defines processes to achieve them

Do: The processes are implemented

Check: The performance of the processes and the implementation are reviewed against the desired goals to assess the effectiveness

Act: In the event the monitoring efforts show that desired outcomes are not being achieved, or the goals change, then the Plan stage begins again.

Alternatively, the Entity can issue reports on the project sustainability plans, and the achievements of goals and objectives can be issued on an annual basis. It is also advisable to report on challenges to the program as well to enable lessons learned.

Sustainability Reporting communicates progress toward commitments, prioritising the use of data, which provides assurance of performance and supports building trust. It also creates accountability to monitor, self-regulate and evaluate their intended performance thereby increasing transparency and responsiveness.

Such reporting would demonstrate leadership openness and accountability, build reputation at the regional and global level, improve the processes, and create awareness about sustainability practices within the

KSA. Coordinating reporting with MEP would be advisable since MEP is responsible for Sustainability in the KSA.

Sustainability Reporting for Program shall consider the below elements in the reporting framework (refer to MPWB Volume 7 - Project Controls and Reporting / Chapter 5 - Reporting). If a management system approach is followed, it may be useful to report on an annual basis:

- Sustainability Governance System
- Stakeholder Engagement - Internal and External
- Demonstrate the integration of the sustainability strategy with the national development strategy
- Sustainability KPIs and Targets linked to national vision
- Risk and Opportunities
- Transparent information - Positive and Negatives against Targets, Issues identified and action taken
- Sustainability Performance: Savings - energy, water consumption, use of renewable resources, recycling
- Communication - if multiple communication channels used
- Strategy for future use of resources such as improve a percentage of recycling, reduced usage of water or energy

If an entity reports only on project sustainability, it should utilize the project goals as a means of reporting. The report should include the following for future learning:

- Stakeholder engagement
- Contribution of project toward national goals
- Sustainability performance: energy, water, materials savings, recycling rates, use of renewable resources, etc.
- Lessons learned or issues encountered
- Local economic benefit - jobs created, KSA companies involved, value of work done, etc.

Entities should also consider reporting on the above externally for greater transparency and trust.

12.0 KNOWLEDGE MANAGEMENT AND SHARING

Knowledge management is a systematic approach to manage the information in such a manner that the right information is provided to the right set of people at the right time.

To implement the sustainability requirements, it is crucial to provide training to the teams to facilitate the transfer of knowledge and empower individuals to use the given sustainability tools.

A platform for knowledge sharing and management should be developed to ensure the sustainability requirements are communicated and well understood by responsible teams such as government officials, project developers, design consultants, construction contractors, facility management companies. Capacity building on sustainability is the key to success of the sustainability program.

12.1 Sustainability Knowledge Management - An Integrated Approach

A lack of understanding about sustainability principles limits the ability to choose an effective sustainable design and execution. Key Stakeholders such as government agencies, project developers, design consultants, construction contractors, sustainability advisors are to be taken in consideration while developing the Sustainability Knowledge Management (SKM) body. SKM needs to be developed for the whole life cycle of a project to ensure the desired sustainable outcomes are achieved during operations and maintenance.

To promote sustainability through knowledge application, the adopted tools need to be easy to understand, accessible and provide practical guidance. Successful implementation of SKM needs leadership commitment to develop the culture to embrace the change.

In developing the SKM framework the following steps should be taken:

- Identify and assess the current state of sustainability knowledge within the Entity
- Identify activities and opportunities to provide basic and specific training
- Identify opportunities to leverage supporting resources - consider an inter-entity collaboration to develop an appropriate taxonomy for sustainability case studies
- Link monitoring and reporting to sustainability knowledge management
- Identify systems to share and maintain sustainability knowledge (e.g. internal website, 'library') and what should remain internal to the entity and what should be shared more broadly.

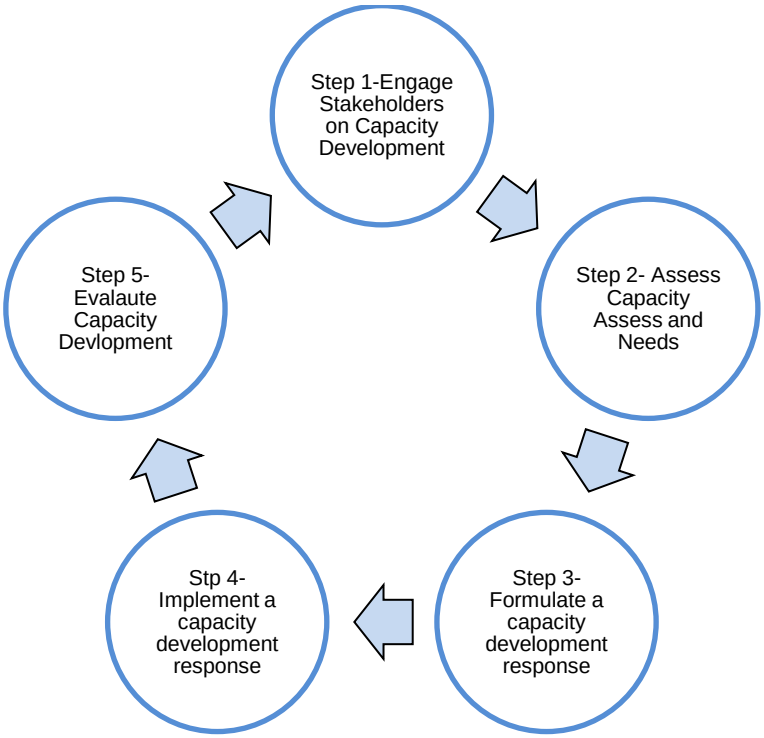
As the SKM is put into place, consider how best to refine guidance, direction and lessons learned and link SKM more specifically to the Project Development Process. Entities should plan on developing 'case studies' for their projects on how they integrated sustainable objectives, or used rating systems, and with what results – including any barriers encountered or lessons learned. In particular, each entity should identify its unique body of sustainability knowledge. For example, there is a new WELL Rating System, which focuses on building contribution to health that may be of interest to the Ministry of Health.

The SKM objectives should be clear and help to identify sustainability implementation challenges and barriers, lessons learned as well as solutions employed. See **Attachment 1** for diagram that depicts an overall sustainability knowledge management framework.

12.2 Capacity Building, Infrastructure Sustainability and Saudization

Entities implementing infrastructure sustainability through their policies and programs shall need supporting resources to deliver. Capacity building is a mechanism through which Entities and their supporting teams shall obtain and maintain capabilities to support the change in implementing sustainability requirements. It shall provide opportunity to enhance and strengthen local capacities throughout the supply chain and indirectly improve the employment rate of nationals to meet the KSA's infrastructure resource requirements. Capacity building should particularly focus on empowering Saudi Nationals (Saudization) to deliver the desired outcomes and making them self-sustainable.

The following diagram depicts the United Nations Development Programmes - Five Steps Capacity Development Process:



Rather than each entity doing this on its own, it might be advisable to do this across the entities at first, with additional support provided later if there are gaps.

13.0 ATTACHMENTS

- Attachment 1 - Sustainable Knowledge Management Framework

Attachment 1 - Sustainable Knowledge Management Framework

The following diagram depicts an overall sustainability knowledge management framework:

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