Sustainability in Design Guide

PMF Library Document

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DOCUMENT HISTORY

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For any suggestions or feedback on this document, kindly reach out to the Project Standards Team via iPMS@shell.com

CONTENTS

1. Introduction

The purpose of this document is to provide guidance on the inclusion of sustainability opportunities in the early development phases of a project.

The identification and implementation of sustainability opportunities supports the project goals of being carbon competitive, whilst respecting nature and having a positive impact on society.

This document further supports the Project Management Framework (PMF) and provides detailed guidance to Front End Development Managers (FEDM), Project Managers (PM) and Business Opportunity Managers (BOM) and Discipline Engineers developing projects designs.

1.1 Why focus on Sustainability in Design

The sustainability of our project designs is closely linked to and helps support Shell's Powering Progress strategy.

As shown in the Figure 1 below, a focus on sustainability can unlock opportunities to transition to more sustainable facilities which minimise or eliminate emissions, respect nature, and help power lives.

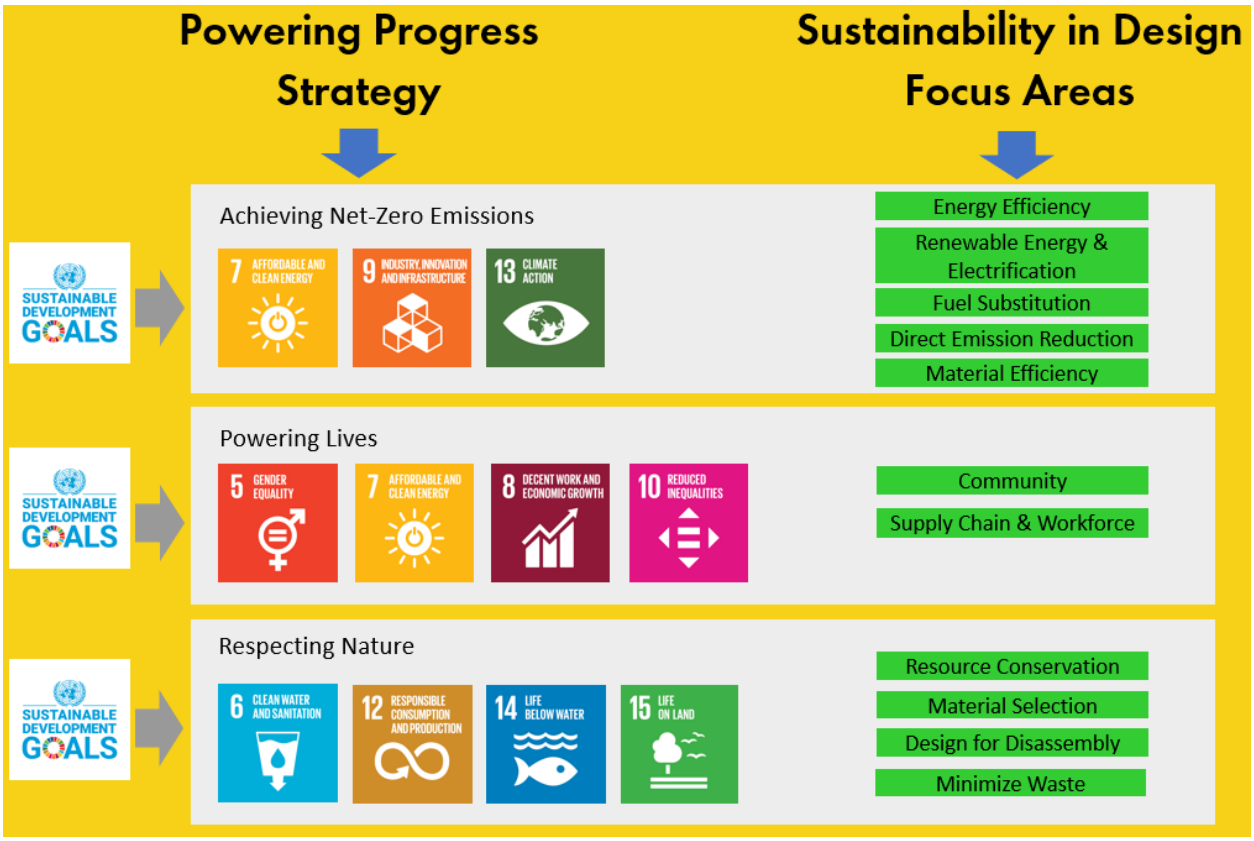

Figure 1 Powering Progress and Sustainability in Design

1.2 Sustainability in Design Concepts and Definitions

1.2.1 Concepts

The Sustainability in Design (SuID) methodology aims to deliver more sustainable projects by promoting the identification and implementation of sustainability opportunities during the early project development stages.

Sustainable designs typically have one or more of the characteristics below:

- Promote the wellbeing of people.
- Are in harmony with the environment (having a positive impact or minimising negative impacts).
- Minimize non-renewable energy consumption.
- Reduce waste and or emissions.
- Use low-impact materials (non-toxic, sustainably produced, or recycled materials that require little energy to process).
- Protect and conserve water.
- Consider the entire lifecycle of the installation (initial manufacture to disposal and useful life).
- Optimised for reuse, repair, and recycling.

This guide provides a structure and catalogue of opportunities to support projects in the transition to more sustainable facilities.

The SuID focus areas are shown in Figure 1 above.

Descriptions of each focus area are provided in section 1.2.2 below.

1.2.2 Definitions

Term	Definition
Energy efficiency	Designs that minimize energy consumption and promote energy efficiency.
Renewable energy & Electrification	Incorporate renewable energy sources + electrification of designs.
Fuel substitution	Decarbonised, Bio and integration of waste products into feed or fuel streams. Hydrogen production and use.
Direct Emission reduction	Reduce Methane emissions, flaring and venting. Incorporate CCUS or Nature-based solutions.
Material efficiency (Competitive scoping)	Designs that drive material efficiencies to minimize their environmental impact.
Community	Design to enhance and develop sustainable communities and minimise impact on local climate and environment.
Supply Chain & Workforce	Support the development of local supply chains and workforce through procurement and education and training.
Natural resource conservation	Prioritise the conservation of natural resources, such as water and land, through efficient use and recycling.
Material selection	Use of more sustainable materials in the design including recycled, bio-based or easily recycled or repurposed materials.
Design for disassembly	Designs that can be easily disassembled and recycled at the end of their useful life.
Minimise waste	Designs to minimise waste either during construction and/or operation.

1.3 Requirements on projects

The identification and implementation of sustainability opportunities supports the project goals of being carbon competitive whilst respecting nature and having a positive impact on society. Both the Carbon Competitive Projects and Respecting Nature Guides reference this guide as a means to identify and implement carbon reduction and respecting nature improvements.

For more detail on how the Project Management Framework expected practice steps and control points tie to Sustainability in Design, please see section **2.2 Where does it fit into existing standards and processes?**.

The Discipline Delivery Plans for the COP, ICE and ME disciplines include a critical activity to consider sustainability in the early project phase designs (Assess & Select).

1.4 Control of this document

This document is INTERNAL and must not be shared outside Shell.

2. Sustainability in Design (SuID) Methodology

2.1 Scope

This guide is intended to be applicable to all projects, irrespective of size or line of business. For small brownfield projects the identification of SuID opportunities should be a relatively simple exercise based on the project scope.

2.2 Where does it fit into existing standards and processes?

Figure 2 below shows how the PMF expected practice steps and related control points require projects to consider sustainability in the early design phases (Identify, Assess and Select).
The SuID methodology is intended to help projects meet these requirements, with an Opportunity Catalogue which can be filtered by the categories in this chart and promote focussed identification and tracking of opportunities.

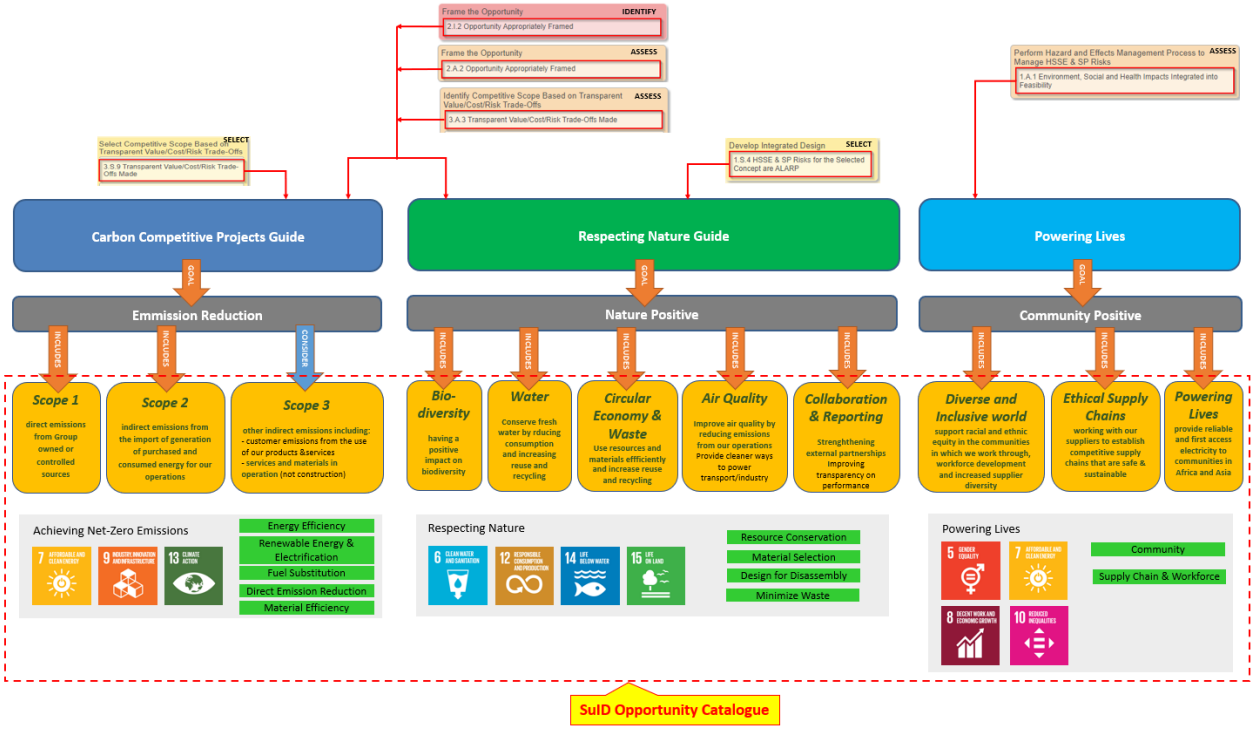

Figure 2 PMF requirements related to sustainability in design

The output from these control activities is recorded in the DCAF control points as shown in the Figure 3 below.

No.	DCAF Control Point	Phase	Controls
1	Project Premises Document (Identity)	Identify	2.1.1, **2.1.2**, 2.1 3
2	Project Premises Document (Assess)	Assess	2.A.1, **2.A.2**, 2.A.3, 3.A.1
6	Feasibility Report	Assess	**1.A.1**, 1.A.I.N, 2.A.4, 2.A.5, 2.A.6, 3.A.2, **3.A.3**, 3.A.4, 4.A.1, 4.A.2, 4.A.3, 5.A.1
7	Concept Select Report	Select	1.S.3, 2.S.7, 2.S.8, 3.S.6, 3.S.7, **3.S.9**, 3.S.10, 3.S.11
9	Basis for Design	Select	**1.S.4**

Figure 3 PMF controls evidenced in DCAF control points

Although there are control points in the Identify phase, this methodology and Opportunity Catalogue are expected to be used primarily in the Assess and Select phases when there is sufficient project definition to start to identify opportunities.

Beyond the above early design phases the Sustainability in Execution (SuIE) methodology and guidance covers aspects related to execution (construction and startup) of the project scope.

The SuID methodology is not intended to duplicate existing processes and tools. Where existing processes, guidance and tools are available these are simply signposted from the SuID Opportunity Catalogue.

2.3 Using the SuID methodology

The Sustainability in Design (SuID) methodology aims to deliver more sustainable projects by promoting the identification and implementation of sustainability opportunities during the early project development stages.

The SuID Opportunity Catalogue is an excel spreadsheet (see Appendix 1) that has been developed to assist projects in the identification, selection and tracking of sustainability opportunities.

It contains a catalogue of opportunities which can be viewed based on several criteria.

Opportunities are listed with:

- a design aspect description.
- links to related Global Technology Catalogue (GTC) items.
- links to tools & resources.
- DCAF control point IDs (where applicable).
- a description of the sustainability opportunity (what benefits can be realised).

An example is shown in Figure 4 below.

Design Aspect	Global Technology Catalogue #	Tools / Resources	DCAF ID	OPPORTUNITY
Replace turbine driven equipment with electric motors.	GTC # 4758	E-Motor Toolkit	DCAF#1526 Critical Rotating Equipment and Driver Type Selection Study, Accountable Disc: Mechanical	Utilize high MW, high speed electric motor drivers and VFD combination over turbine driven equipment. Electric motors operate more efficiently than gas or steam driven turbines and require less maintenance. GHG emission reductions is the primary benefit

Figure 4 Example of opportunity (pre-populated)

Opportunities can be filtered/viewed in many ways as shown in Figure 5 below.

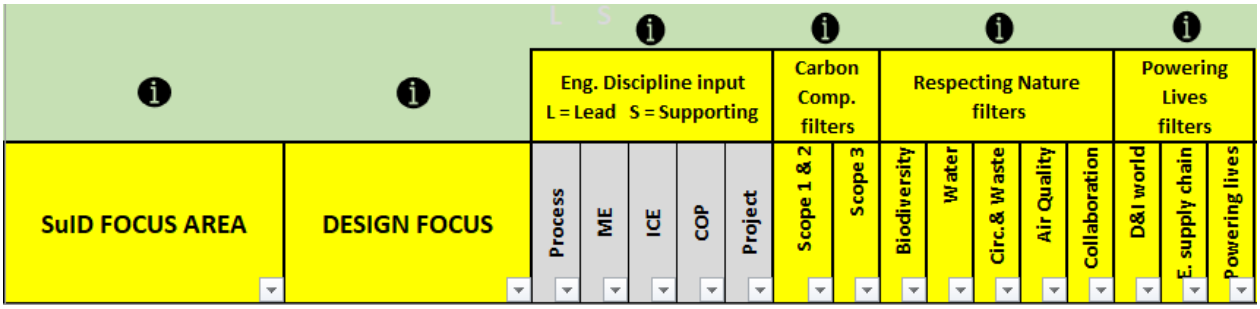

Figure 5 Opportunity viewing filters

In the above figure:

- Focus areas are as shown in Figure 1.
- Design Focus allows filtering on a specific design focus area or subdiscipline (e.g. Civil).
- Engineering Discipline Input indicates which discipline is taking the lead role and which other disciplines have a supporting role.
- The Carbon Competitive, Respecting Nature and Powering Lives columns allow filtering on specific themes - refer to Figure 2.

The columns with blue shading in the header shown in Figure 6 are intended for the project to record and track project decisions.

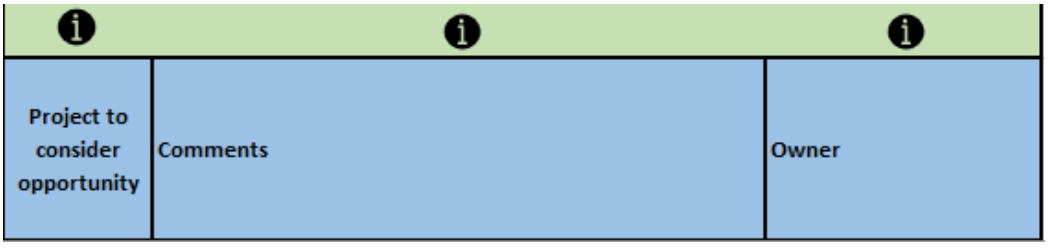

Figure 6 Columns to record and track project decisions

The methodology and Opportunity Catalogue can be used in many ways. The flow chart in Figure 7 below provides a suggested approach. A copy of the catalogue can be obtained from Appendix 1.

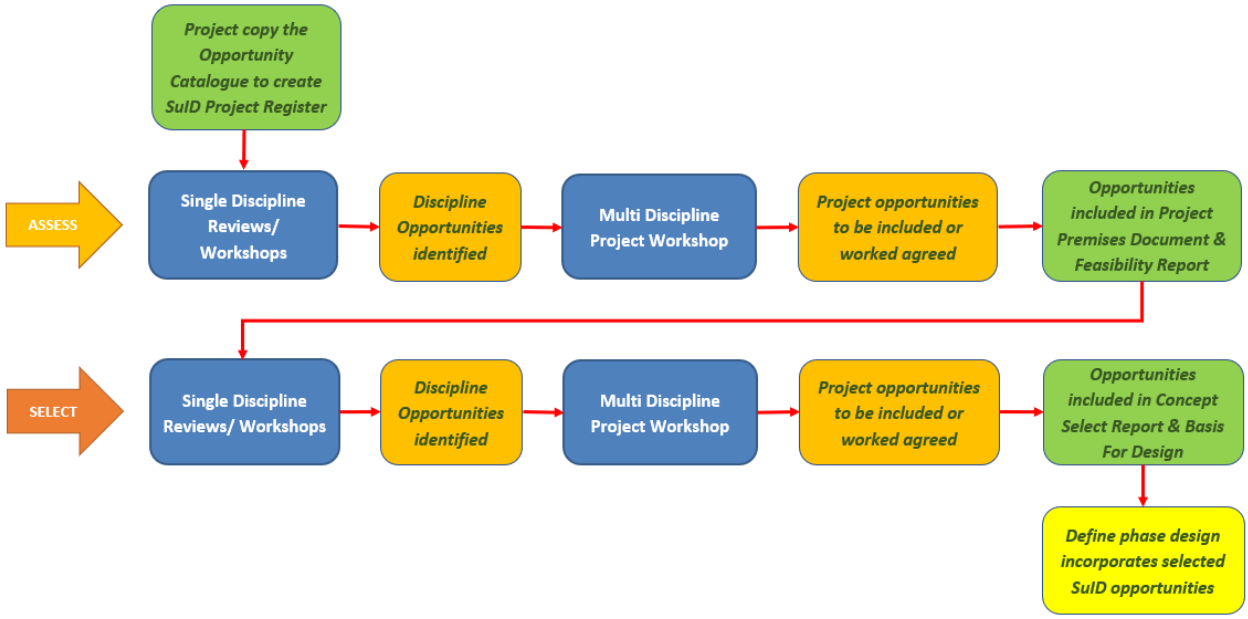

Figure 7 SuID process flow

3. Implementing SuID in projects by phase

3.1 Identify & Assess

The key expected practice and PMF control points that relate to sustainability are shown in Figure 8 below.

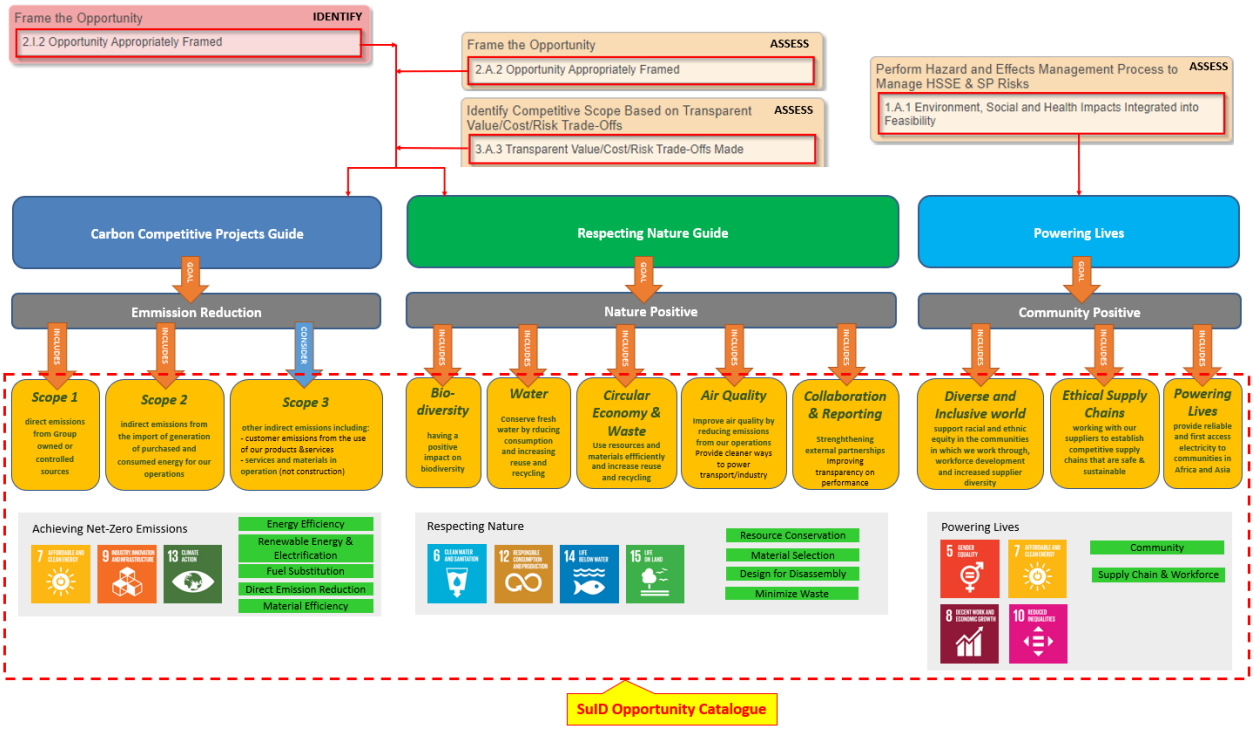

Figure 8 Identify & Assess PMF control points mapping

Sustainability in Design opportunities that the project is adopting or considering should be captured in the DCAF control point documents as shown in the Figure 9 below.

No.	DCAF Control Point	Phase	Controls
1	Project Premises Document (Identity)	Identify	2.1.1, **2.1.2**, 2.1 3
2	Project Premises Document (Assess)	Assess	2.A.1, **2.A.2**, 2.A.3, 3.A.1
6	Feasibility Report	Assess	**1.A.1**, 1.A.I.N, 2.A.4, 2.A.5, 2.A.6, 3.A.2, **3.A.3**, 3.A.4, 4.A.1, 4.A.2, 4.A.3, 5.A.1

Figure 9 Identify & Assess PMF control points table

Although there are control points in the Identify phase, this methodology and Opportunity Catalogue are expected to be used primarily in the Assess phase when there is sufficient project definition to start to identify opportunities.

3.2 Select

The key expected practice and PMF control points that relate to sustainability are shown in Figure 10 below.

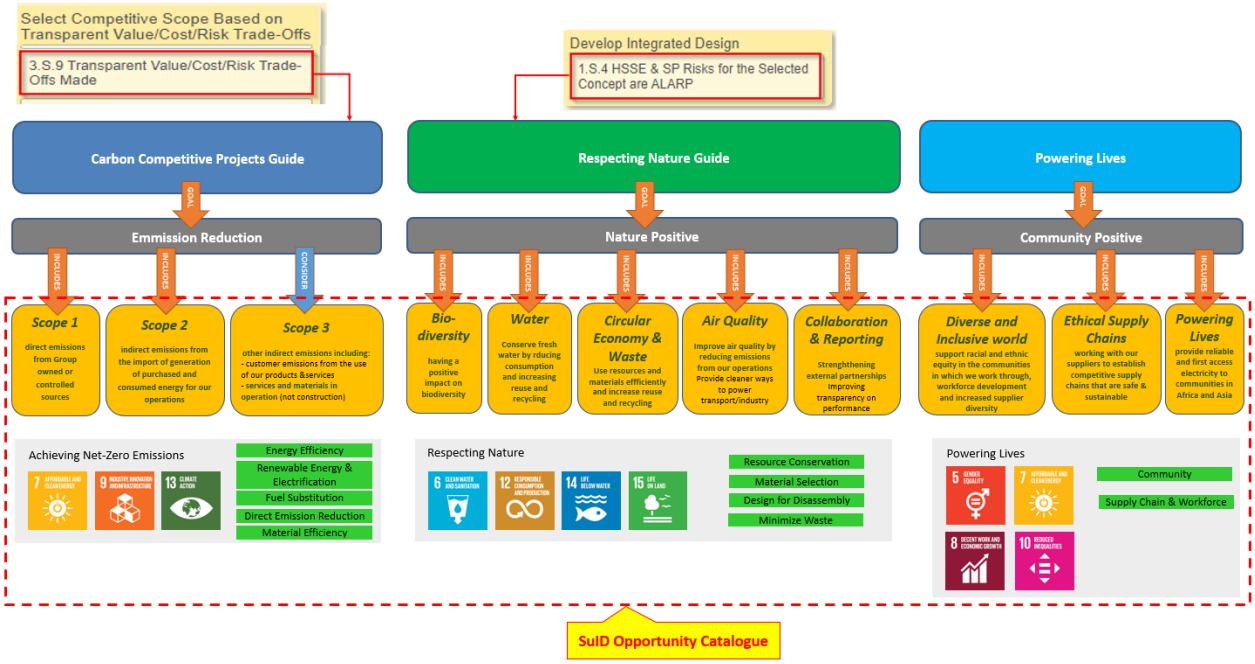

Figure 10 Select PMF control points mapping

Sustainability in Design opportunities that the project is adopting or considering should be captured in the DCAF control point documents as shown in Figure 11 below.

No.	DCAF Control Point	Phase	Controls
7	Concept Select Report	Select	1.S.3, 2.S.7, 2.S.8, 3.S.6, 3.S.7, **3.S.9**, 3.S.10, 3.S.11
9	Basis for Design	Select	**1.S.4**

Figure 11 Select PMF control points table

4. List of Abbreviations

Abbreviation	Meaning
BOM	Business Opportunity Managers
CCUS	Carbon Capture Utilisation & Storage
COP	Civil, Offshore, Pipelines & Subsea
DCAF	Discipline Controls and Assurance Framework
DCAF ID	Discipline Controls and Assurance Framework – Control Point Identification (number)
FEDM	Front End Development Managers
GHG	Green House Gas
GTC	Global Technology Catalogue
HSSE & SP	Health Safety Security Environment & Social Performance
ICE	Instrumentation, Control & Electrical
ME	Mechanical Engineering
PM	Project Manager
PMF	Project Management Framework
SuID	Sustainability in Design
SuIE	Sustainability in Execution

Appendix 1 – SuID Opportunity Catalogue

SuID Opportunity Catalogue is embedded below.

Sustainability in Design_Opportunity C

To view the above template, please download the file (the pdf you are viewing) to your computer and open it in Adobe Acrobat reader (and not a web browser). The embedded file will appear on the top left (under Attachments). Click open the file from there.

Guidance on its use is contained on the 'READ ME' sheet of the Catalogue.