ICMS INTERNATIONAL COST MANAGEMENT STANDARD

ICMS: Global Consistency in Presenting Construction Life Cycle Costs and Carbon Emissions

3rd edition, November 2021

ICMS Coalition

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Welcome to ICMS, third edition

The second edition of ICMS extended the scope of the first edition to encompass life cycle costs, reflecting the pivotal role they play in the financial management of construction projects around the world. This third edition recognises the criticality of reducing greenhouse gas emissions if a disaster caused by global climate change is to be averted. In ICMS, greenhouse gas emissions are measured in terms of carbon dioxide (CO_2) equivalent, and for simplicity, referred to throughout as 'carbon emissions'. By providing a common reporting framework for life cycle costs and carbon emissions, ICMS allows their interrelationship to be explored, and provides the opportunity to make decisions about the design, construction, operation and maintenance of the built environment to improve environmental sustainability.

In addition to extending the use of ICMS to carbon emissions, the Standard Setting Committee (SSC) has taken this opportunity to add five new project types: 'Offshore structures', 'Near shore works', 'Ports', 'Waterway works' and 'Land formation and reclamation' as well as making minor modifications in response to feedback received from practitioners.

Considering these changes, the ICMS Coalition has decided to change the title of ICMS to 'International Cost Management Standard', which, while retaining the same acronym, reflects the broader scope of its contents. Nevertheless, the structural framework of ICMS remains unchanged, allowing comparisons with reports of capital and other life cycle costs that have been produced in accordance with the first and second editions. As a result, those familiar with the second edition will find little difference in this third edition other than the inclusion of carbon emissions and the extension of project types.

Since its inception, the driving principle behind ICMS has been that consistent practice in presenting the performance of construction projects globally will bring significant benefits to managing the performance of construction projects. As such, ICMS aims to provide global consistency in classifying, defining, measuring, recording, analysing, presenting and comparing entire life cycle costs and carbon emissions of construction projects and constructed assets at regional, state, national or international level. ICMS is a high-level classification system. The globalisation of the construction business has only increased the need to make this meaningful comparative analysis between countries, not least by international organisations such as the World Bank Group, the International Monetary Fund, various regional development banks, non-governmental organisations and the United Nations.

Since its introduction to the market in 2017, ICMS has already been adopted by several high-profile bodies seeking to benchmark project performance internationally. To date this includes large public sector project sponsors, global cost consultancies, constructors, and other construction-sector stakeholders (for a list of business support partners visit the ICMS Coalition website).

ICMS has been created through a transparent, detailed and inclusive standard-setting process. The third edition has followed the same development method as the first and second. A third independent Standard Setting Committee (SSC) was formed, including experts in marine works, carbon emissions as well as some of the experts who developed the first and second editions. As a result of the COVID-19 pandemic, no face-to-face meetings were held and the SSC worked virtually throughout the development of the third edition.

It is accepted that standard-setting is a continuous and dynamic process. The SSC will continue to listen carefully to the global construction performance management community to ensure necessary updates are captured for continued improvement.

Many key stakeholders are being engaged in the process of implementation. A list of ICMS-supporting partners is shown on the ICMS Coalition website – these organisations are committed to the adoption of ICMS.

For further information on ICMS, please visit the ICMS Coalition website.

On behalf of the ICMS Coalition Trustees:

Justin Sullivan (The European Council of Construction Economists) – Chair

Ken Creighton (Royal Institution of Chartered Surveyors) – Vice Chair

Karl Trusler (Association of South African Quantity Surveyors) – General Secretary

ICMS Coalition

The Coalition is a non-governmental, not-for-profit professional coalition. A wide range of professional organisations are represented in the Coalition and the SSC. They were generous in providing their national standards, which again provided the basis for the early deliberations of the SSC. The Coalition originally formed on 17 June 2015 at the International Monetary Fund in Washington DC, USA. The Coalition aims to bring about consistency in construction project reporting standards internationally through the development and adoption of ICMS.

The Coalition members for the third edition are:

1. Africa Association of Quantity Surveyors (AAQS)
2. Association for the Advancement of Cost Engineering International (AACE)
3. Association of Cost Engineers (ACostE)
4. Association of South African Quantity Surveyors (ASAQS)
5. Australian Institute of Quantity Surveyors (AIQS)
6. Brazilian Institute of Cost Engineers (IBEC)
7. Building Surveyors Institute of Japan (BSIJ)
8. Canadian Association of Consulting Quantity Surveyors (CACQS)
9. Canadian Institute of Quantity Surveyors (CIQS)
10. Chartered Institute of Building (CIOB)
11. Chartered Institution of Civil Engineering Surveyors (CICES)
12. China Electricity Council (CEC)
13. China Cost Engineering Association (CCEA)
14. Commonwealth Association of Surveying and Land Economy (CASLE)
15. Conseil Européen des Economistes de la Construction (CEEC)
16. Consejo General de la Arquitectura Técnica de España (CGATE)
17. Dutch Association of Quantity Surveyors (NVBK)
18. European Federation of Engineering Consultancy Associations (EFCA)
19. Fédération Internationale des Géomètres (FIG)
20. Fiji Institute of Quantity Surveyors (FIQS)
21. Ghana Institution of Surveyors (GhIS)
22. Hong Kong Institute of Surveyors (HKIS)

23. Ikatan Quantity Surveyor Indonesia (IQSI)
24. Indian Institute of Quantity Surveyors (IIQS)
25. Institute of Engineering and Technology (IET)
26. Institute of Quantity Surveyors of Kenya (IQSK)
27. Institute of Quantity Surveyors Sri Lanka (IQSSL)
28. Institution of Civil Engineers (ICE)
29. Institution of Surveyors of Kenya (ISK)
30. Institution of Surveyors of Uganda (ISU)
31. International Cost Engineering Council (ICEC)
32. Italian Association for Total Cost Management (AICE)
33. Korean Institution of Quantity Surveyors (KIQS)
34. Fachverein für Management und Ökonomie im Bauwesen (MANECO)
35. New Zealand Institute of Quantity Surveyors (NZIQS)
36. Nigerian Institute of Quantity Surveyors (NIQS)
37. Pacific Association of Quantity Surveyors (PAQS)
38. Philippine Institute of Certified Quantity Surveyors (PICQS)
39. Property Institute of New Zealand (PINZ)
40. Quantity Surveyors International (QSi)
41. Real Estate Institute of Botswana (REIB)
42. Royal Institute of British Architects (RIBA)
43. Royal Institution of Chartered Surveyors (RICS)
44. Royal Institution of Surveyors Malaysia (RISM)
45. Singapore Institute of Building Limited (SIBL)
46. Singapore Institute of Surveyors and Valuers (SISV)
47. Sociedad Mexicana de Ingeniería Económica, Financiera y de Costos (SMIEFC)
48. Society of Chartered Surveyors Ireland (SCSI)
49. Union Nationale des Economistes de la Construction (UNTEC)

ICMS Standard Setting Committee

The Standard Setting Committee (SSC) comprises experts selected by the Coalition and represents a wide range of professional construction organisations in the built environment. The SSC acts independently from the Coalition and its members.

The SSC members and co-authors of ICMS, first edition were:

Ong See-Lian (Malaysia)	Chairman
Alan Muse (UK)	Vice-Chairman
Gerard O'Sullivan (Republic of Ireland)	Executive Secretary

Alexander Aronsohn (UK)
Dainna Baharuddin (Malaysia)
Tolis Chatzisymeon (Greece)
William Damot (Philippines)
Ruya Fadason (Nigeria)
Roger Flanagan (UK)
Mark Gardin (Canada)
Guo Jing Juan (China)
Malcolm Horner (UK)
Roy Howes (Canada)
Philip Larson (USA)
Patrick Manu (Ghana)
Charles Mitchell (Republic of Ireland)
Sinimol Noushad (UAE)
Antonio Paparella (Belgium)
David Picken (Australia)
Anil Sawhney (India)
Peter Schwanethal (UK)
Koji Tanaka (Japan)
Tang Ki-Cheung (Hong Kong)

In January 2018, the SSC started drafting the second edition to incorporate other life cycle costs. Experts in life cycle costing, therefore, joined the SSC.

The SSC members and co-authors of ICMS, second edition were:

Ong See-Lian (Malaysia)	Chairman
Alan Muse (UK)	Vice-Chairman
Gerard O'Sullivan (Republic of Ireland)	Executive Secretary

Alexander Aronsohn (UK)
Dainna Baharuddin (Malaysia)
Tolis Chatzisymeon (Greece)
Ruya Fadason (Nigeria)
Andrew Green (UK)
Malcolm Horner (UK)
Roy Howes (Canada)
Francis Leung (Hong Kong)
Patrick Manu (Ghana)
Brian McBurney (Canada)
Charles Mitchell (Republic of Ireland)
Sinimol Noushad (UAE)
Antonio Paparella (Belgium)
David Picken (Australia)
Anil Sawhney (USA)
Koji Tanaka (Japan)
Tang Ki-Cheung (Hong Kong)
Luizviminda Villacan (Philippines)

In March 2020, the SSC started drafting the third edition to incorporate carbon emissions and increase the range of project types. Additional experts, therefore, joined the SSC.

The SSC members and co-authors of ICMS, third edition are:

Alan Muse (UK)	Chairman
Malcolm Horner (UK)	Vice-Chairman and Technical Author
Gerard O'Sullivan (Republic of Ireland)	Executive Secretary
Chris Fry (UK)	Technical Author

Alexander Aronsohn (UK)
Dainna Baharuddin (Malaysia)
Peter Bredehoeft (USA)
Tolis Chatzisymeon (Greece)
Ruya Fadason (Nigeria)
Roger Flanagan (UK)
Andrew Green (UK)
Simon Hall (UK)
Roy Howes (Canada)
Tim de Jonge (Netherlands)
Nathan Kibwami (Uganda)
Gregory Kight (USA)
Patrick Manu (Ghana)
Brian McBurney (Canada)
Charles Mitchell (Republic of Ireland)
Philippe Moseley (Belgium)
Sinimol Noushad (UAE)
David Picken (Australia)
Anil Sawhney (USA)
Stacy Smedley (USA)
Koji Tanaka (Japan)
Tang Ki-Cheung (Hong Kong)

Part 1 Context

1.1 Introduction

Research from the World Economic Forum has shown that improvements in the design and construction process can be achieved by using international standards like ICMS to gain comparable and consistent data. ICMS provides a high-level structure and format for classifying, defining, measuring, recording, analysing and presenting life cycle costs and carbon emissions associated with construction projects and constructed assets. This will promote consistency and transparency across international boundaries. ICMS has focused only on issues directly related to the costs and carbon emissions associated with construction projects and constructed assets so that cross-boundary performance can be benchmarked and the causes of differences identified.

Figure 1 shows the hierarchical framework adopted in ICMS and illustrates its scope.

The ICMS project followed work on the development of International Property Measurement Standards (IPMS). IPMS established standards for measuring the floor areas of buildings. For ICMS, a key element was that ICMS would be compatible and in accordance with IPMS.

ICMS offers a high-level framework against which life cycle costs and carbon emissions can be classified, defined, measured, recorded, analysed, presented and compared. Part 2 sets out the hierarchical framework. It has four levels:

- Level 1: Projects or Sub-Projects
- Level 2: Categories
- Level 3: Groups
- Level 4: Sub-Groups.

Each Category, Group and Sub-Group is used to report costs and/or carbon emissions. The composition of Levels 2 and 3 is mandated for all Projects and Sub-Projects, although discretion is allowed at Level 4. Examples of the contents of Level 4 are given in Appendices A to E.

In comparing the performance of construction projects and constructed assets within and across national boundaries, it is essential that like is compared with like. ICMS achieves this by requiring the expression of attributes for each project and sub-project. The attributes are used to capture those characteristics of a construction project and the context in which it is built that might influence its performance. They are set out in Part 3. Thus, when comparing one project with another, their attributes should be checked for similarity, and necessary adjustments made to account for any differences.

Figure 1: Hierarchical framework of ICMS

ICMS Framework

See Section 2.2 for further detail on Level 1

Level 1 – Projects or Sub-Projects (two-digit codes)

01.	Buildings	11.	Chemical plants
02.	Roads and runways	12.	Refineries
03.	Railways	13.	Dams and reservoirs
04.	Bridges	14.	Mines and quarries
05.	Tunnels	15.	Offshore structures
06.	Wastewater treatment works	16.	Near shore works
07.	Water treatment works	17.	Ports
08.	Pipelines	18.	Waterway works
09.	Wells and boreholes	19.	Land formation and reclamation
10.	Power-generating plants		

See Section 2.2 for further detail on Levels 2 and 3
See Appendix F for further detail on Levels 2, 3 and 4
See Appendices A to E for further detail on Level 4

Level 2 – Categories (one-digit code)

- A: 1. Acquisition Costs (AC) and/or Carbon Emissions (AE)
- C: 2. Construction Costs (CC) and/or Carbon Emissions (CE)
- R: 3. Renewal Costs (RC) and/or Carbon Emissions (RE)
- O: 4. Operation Costs (OC) and/or Carbon Emissions (OE)
- M: 5. Maintenance Costs (MC) and/or Carbon Emissions (ME)
- E: 6. End of Life Costs (EC) and/or Carbon Emissions (EE)

Level 3 – Groups (two-digit codes)

- 01. Site acquisition
- 02. Administration, finance, legal and marketing expenses

- 01. Demolition, site preparation and formation
- 02. Substructure
- 03. Structure
- 04. Architectural works | non-structural works
- 05. Services and equipment
- 06. Surface and underground drainage
- 07. External and ancillary works
- 08. Preliminaries | Constructors' site overheads | general requirements
- 09. Risk Allowances
- 10. Taxes and Levies
- 11. Works and utilities off-site
- 12. Production and loose furniture, fittings and equipment
- 13. Construction-related consultants and supervision

- 01. Cleaning
- 02. Utilities
- 03. Waste management
- 04. Security
- 05. Information and Communication Technology
- 06. Operators' site overheads | general requirements
- 07. Risk Allowances
- 08. Taxes and Levies

- 01. Disposal inspection
- 02. Decommissioning and decontamination
- 03. Demolition and reclamation
- 04. Reinstatement
- 05. Constructors' site overheads | general requirements
- 06. Risk Allowances
- 07. Taxes and Levies

Note: Carbon Emissions are reported only for the green cells

Level 4 – Sub-Groups (discretionary) (three-digit codes)

Level 4 – Sub-Groups (discretionary for Costs; required for Carbon Emissions by exception)

It is important to understand the scope of ICMS: what it covers and what it does not cover. It covers buildings and civil engineering works, but not, presently, the process industries (although factories and their production equipment can be reported as buildings). It also covers the life cycle costs and carbon emissions arising throughout the life of a construction project, from inception to end of life, but not Whole Life Costs and Whole Life Carbon Emissions.

Thus it does not cover:

- the costs or carbon emissions associated with change of use prior to acquisition
- what is referred to in BS 15686-5 as 'externalities' such as sequestration or
- carbon credits such as energy exported during operation

which are considered to sit outside the boundaries of the project.

Finally, ICMS is a reporting system: it does not purport to describe how costs or carbon emissions should be calculated, since methods of calculation vary from country to country, although reference is made to other publications where this information may be obtained. It does, however, require the method of calculation to be stated, so that at least local comparisons should be possible.

Part 4 provides definitions of terms commonly used throughout ICMS. Definitions specific to types of Projects are provided in Appendices A to E.

Guidance is given on:

- how ICMS is to be used
- the level of detail to include when presenting costs and carbon emissions
- the method of dealing with Projects comprising different Sub-Projects and
- the approach for ensuring that like is compared with like, especially considering different currencies, sources of carbon emissions and timeframes.

For buildings, the existing cost analysis standards worldwide require the measurement of either the Gross External Floor Area (GEFA) or Gross Internal Floor Area (GIFA). This permits the representation of overall costs in terms of currency per GEFA or GIFA. Research shows that floor area measurement standards vary considerably between countries. The linking of ICMS with IPMS provides a valuable tool for overcoming these inconsistencies. ICMS requires a cost and/or carbon emissions report to include both GEFA (IPMS 1 (EXTERNAL)) and GIFA (IPMS 2 (INTERNAL)) measured in accordance with the rules set out in IPMS. These are summarised in Appendix J.

For selected types of civil engineering projects, ICMS also provides units of measurement describing their physical sizes and functional capacities for comparison. The third edition extends the number of civil engineering Projects or Sub-Projects to include 'Offshore structures', 'Near shore works', 'Ports', 'Waterway works', and 'Land formation and reclamation'.

ICMS contains high-level standards. The transparent and inclusive standard-setting process described has resulted in full analysis and appreciation of standards and practices in many more countries than those directly represented by SSC members. ICMS is not a hybrid of those standards but introduces some concepts that may be new to some markets. Markets that do not have established standards are encouraged to adopt ICMS. Markets that do have established local standards should adopt ICMS to compare cost and carbon emissions data prepared using different standards from different markets on a consistent, like-for-like basis. The aim is not to replace existing local standards, but to provide an

internationally-accepted reporting framework into which data generated locally can be mapped and analysed for comparison. In time, it is expected that ICMS will become the primary basis for both global and local construction cost and carbon emissions reporting.

In drafting ICMS, the SSC has been conscious of the need for compatibility with other established or emerging standards. It has aimed to strike a balance between the need to be compatible with different standards and the need for flexibility to accommodate detailed performance classification systems that exist across the world.

Thus, the types of Projects are generally compatible with the United Nations *International Standard Industrial Classification of all Economic Activities*. The Sub-Groups are generally compatible with the elements in ISO 12006-2:2015, *Building construction – Organization of information about construction works – Part 2: Framework for classification* and can be adapted for compatibility with most other cost classification systems. The Groups and Sub-Groups for Life Cycle Costs are generally compatible with ISO 15686-5:2017 *Buildings and constructed assets – Service life planning – Part 5: Life-cycle costing*.

In addition, it has been recognised that a work breakdown structure (WBS) approach to performance reporting is widely used around the world, particularly in civil engineering projects. Therefore, examples of mapping to and from various national standards and WBS coding structures are included on the ICMS Coalition website.

In relation to carbon emissions, ICMS provides the reporting framework and it is intended that appropriate existing and emerging standards are used for the actual measurement and management of carbon emissions of construction projects and products, such as:

- ISO 21931-1:2010 *Sustainability in building construction – Framework for methods of assessment of the environmental performance of construction works – Part 1: Buildings*
- ISO 21931-2:2019 *Sustainability in buildings and civil engineering works – Framework for methods of assessment of the environmental, social and economic performance of construction works as a basis for sustainability assessment – Part 2: Civil engineering works*
- ISO 21930:2017 *Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services*
- EN 15978:2011 *Sustainability of construction works – Assessment of environmental performance of buildings – Calculation method*
- EN 15804: 2012 + A2:2019 *Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products*
- EN 15643:2021 *Sustainability of construction works – Framework for assessment of buildings and civil engineering works*
- EN 17472 (draft) *Sustainability of construction works – Sustainability assessment civil engineering works – calculation methods* and
- PAS 2080:2016 *Carbon Management in Infrastructure*.

However, standards are dynamic, especially in the field of carbon emissions. While it is intended that this edition of ICMS will be revised and updated in due course, in the meantime, reference should be made to the latest editions of the relevant standards.

As the use of building information modelling (BIM) becomes more widespread, the link between BIM and ICMS takes greater importance. ICMS may be used as the performance breakdown structure in BIM-based performance management practice.

1.2 Aims

ICMS aims to provide global consistency in classifying, defining, measuring, recording, analysing and presenting entire construction life cycle costs and carbon emissions at a project, regional, state, national or international level. ICMS allows costs and carbon emissions to be managed and potentially reduced. It allows:

- construction life cycle costs **and carbon emissions** to be consistently and transparently benchmarked (**comparative benchmarking**)
- the causes of differences in life cycle costs **and carbon emissions** between projects to be identified (**option appraisal**)
- properly informed decisions on the design and location of construction projects to be made at the best value for money (**investment decision-making**) and
- data to be used with confidence for construction project financing and investment, decision-making, and related purposes (**certainty**).

1.3 Use of the Standard

The third edition of ICMS can be used to present the Acquisition, Construction, Renewal, Operation, Maintenance, and End of Life costs using the templates provided in Appendix G and carbon emissions using the templates provided in Appendix H. Wherever a report has been prepared in compliance with ICMS, this should be stated in the report.

ICMS can be used to classify, define, measure, record, analyse, present, and compare historical, current and future construction life cycle costs and carbon emissions of new build and major adaptation programmes and projects. This can be applied throughout the various stages of construction and/or after completion of construction through to the end of life or a shorter period of analysis.

Applications include, but are not limited to:

- global investment decisions
- international, national, regional or state cost and carbon emission comparisons
- feasibility studies and development appraisals
- project work including cost and carbon emission planning and control, setting carbon budgets or reduction targets, cost and carbon emission analysis, cost and carbon emission modelling, and the procurement and analysis of tenders
- dispute resolution work
- reinstatement costs for insurance and
- valuation of assets and liabilities.

Process flow charts set out the comprehensive steps for the use of ICMS and are provided in Appendix F.

The cost and/or carbon emission report should clarify precisely what costs and carbon emissions have been included or excluded, to avoid confusion or omissions in comparing alternative project options and to inform decision making. The most appropriate available data sources should be used. These may be in the public domain or not, but the origin should be recorded.

Part 2 ICMS Framework

2.1 Overview

Figures 2 and 3 set out the broader context and scope for the second and third editions of ICMS, including what is covered beyond the scope of the first edition.

Figure 2: The relationship between ICMS, Life Cycle Costs (LCC) and Whole Life Costs (WLC)

'Occupancy Costs' are considered part of the 'Non-Construction Costs'.

ICMS treats the difference between Life Cycle Carbon Emissions (LCCE) and Whole Life Carbon Emissions (WLCE) in an analogous way to the difference between Life Cycle Costs and Whole Life Costs as illustrated in Figure 2.

Figure 3: Cost and Carbon Emission (CCE) reporting framework

Thus the reporting structures for costs and carbon emissions are identical.

Figure 4 presents the overall taxonomy used in the third edition of ICMS. The taxonomy consists of four levels with Level 1 through Level 3 being mandatory while Level 4 is discretionary.

Figure 4: ICMS Framework including Level 1 Projects and Sub-Projects

The framework is identical for Costs (C) and Carbon Emissions (E).

2.2 Hierarchical Levels

Figure 5 shows the hierarchical links between the four levels of the ICMS taxonomy, from the highest to the lowest level of detail.

Figure 5: ICMS Hierarchy

The description of each level in Figure 5 is as follows.

Projects and Sub-Projects (Level 1)

ICMS classifies Projects according to their essence and principal purpose. The Projects shown in the framework are not exhaustive and will be further developed in future editions of ICMS. Projects have been assigned the following codes:

Table 1: ICMS Projects with their corresponding codes

01.	Buildings	11.	Chemical plants
02.	Roads and runways	12.	Refineries
03.	Railways	13.	Dams and reservoirs
04.	Bridges	14.	Mines and quarries
05.	Tunnels	15.	Offshore structures
06.	Wastewater treatment works	16.	Near shore works
07.	Water treatment works	17.	Ports
08.	Pipelines	18.	Waterway works
09.	Wells and boreholes	19.	Land formation and reclamation
10.	Power-generating plants		

Codes need be used only when considered desirable, for example, in databases.

When a Project is too large or complex to be described by a single set of Project Attributes and Values, it is to be subdivided for cost and/or carbon emission reporting into Sub-Projects, each described by a single set of Project Attributes and Values. A Project can have multiple Sub-Projects. It is also possible to use a combination of Sub-Projects within a Project to report a collection of Projects under the names of 'programme' or 'portfolio'.

Categories and Groups (Levels 2 and 3)

The Categories at Level 2 and Groups at Level 3 are defined in Table 2 for costs and Table 3 for carbon emissions. They are mandatory and standardised for all Projects to enable high-level comparison between different Projects and Sub-Projects.

Accepted alternative terms are separated with a vertical slash (|).

Different levels of Codes are to be linked together with a full point (.) in between.

'Load bearing work' refers to work bearing the load of the whole building or construction, not just one satisfying its own structural integrity. If a piece of work can be removed without the need for temporary structural support or strengthening to the remaining construction, then it should be treated as a piece of 'non-load bearing work'.

Table 2: Definitions of Categories (Level 2) and Groups (Level 3) for costs

- All individual costs reported should be those paid or payable by the Client and include the payees' overheads and profits, where applicable.

Code		Description			
		Categories (Level 2)	**AC**	**CC**	**RC, OC, MC and EC**
		Groups (Level 3)			
		Life Cycle Cost (CC plus NPV of RC, OC, MC, and EC)			
1.		Acquisition Costs (AC) [Part of Non-Construction Costs]			
2.		Construction Costs (CC)			
3.		Renewal Costs (RC)			
4.		Operation Costs (OC)			
5.		Maintenance Costs (MC)			
6.		End of Life Costs (EC)			
1.		Acquisition Costs (AC)			
	01.	Site acquisition Scope: All payments required to acquire the site, excluding physical construction.			
	02.	Administrative, financial, legal and marketing expenses Scope: All other expenses associated with Project realisation, from inception to putting the Project into use, excluding physical construction.			
2.		Construction Costs (CC)		Categories CC, RC and MC use the same Groups	
3.		Renewal Costs (RC)			
5.		Maintenance Costs (MC)			
	01.	Demolition, site preparation and formation Scope: All necessary advance or facilitating work to prepare, secure and form the site to enable substructure [construction | renewal | maintenance]			

Code		Description			
		Categories (Level 2)	AC	CC	RC, OC, MC and EC
		Groups (Level 3)			
	02.	Substructure Scope: All the load bearing work underground or underwater up to and including the following (including related earthwork, lateral support beyond site formation, and non-load bearing components and services and equipment forming an integral part of composite or prefabricated load bearing work) and as illustrated in Part 4.2: • for buildings: lowest floor slabs, and basement sides and bottom including related waterproofing and insulation • for roads and runways: sub-base to pavements • for railways: sub-base to rail track structures • for bridges: pile caps, footings, bases nearest ground level or water level if constructed in water • for tunnels: external faces of structural tunnel linings • for tanks and the like underground: external faces of tanks • for tanks and the like above ground: bases supporting tanks • for pipelines underground: beds and surrounds to underground pipes • for pipelines above ground: bases to structures supporting pipes • for wells and boreholes: bases to structures supporting well heads • for dams and reservoirs: seepage ditch, drainage layer/blanket, drain channels, foundation, base, footings, cut-off wall, heel and toe • for mines and quarries: underground mines: bases to structures supporting shaft headgear; open pits: bases to structures; processes: bases to structures, tanks, and bases to major process equipment • for offshore structures, near shore works, ports, waterway works: bases to structures supporting material handling equipment; bases to retaining structures; bases to permanent structures			
	03.	Structure Scope: All the load bearing work, including non-load bearing components and services and equipment forming an integral part of composite or prefabricated load bearing work, excluding those included in Substructure and Architectural works | Non-structural works.			
	04.	Architectural works | Non-structural works Scope: All architectural and non-load bearing work excluding services, equipment, and surface and underground drainage.			
	05.	Services and equipment Scope: All fixed services and equipment required [to put the completed project into use for Construction Costs | to sustain the use after completion of construction for Renewal and Maintenance Costs], whether they are mechanical, hydraulic, plumbing, fire-fighting, transport, communication, security, electrical or electronic, control systems, or signalling excluding external surface and underground drainage. Including testing, commissioning and operational licensing and plant upgrades/refurbishment.			
	06.	Surface and underground drainage Scope: All underground or external surface drainage systems excluding those inside basement or underground construction.			
	07.	External and ancillary works Scope: All work outside the external face of buildings or beyond the construction entity required to fulfil the primary function of the Project and not included in other Groups.			
	08.	Preliminaries | Constructors' site overheads | general requirements Scope: Constructors' site management, temporary site facilities, site services, mobilisation, demobilisation and other expenses, not directly related to a particular Group, but commonly required to be shared by all Groups.			

Code		Description			
		Categories (Level 2)	**AC**	**CC**	**RC, OC, MC and EC**
		Groups (Level 3)			
	09.	Risk Allowances Scope: As defined in section 4.1 but related to [Construction | Renewal | Maintenance] Costs and not included in other Groups.			
	10.	Taxes and Levies Scope: As defined in section 4.1 and not included in other Groups.			
	11.	Work and utilities off-site Scope: All payments to government authorities or public utility companies to connect | keep connected public work and utilities to the site, or services diversions, to enable the Project, including related risk allowances, taxes and levies.			
	12.	Production and loose furniture, fittings and equipment Scope: Those provided for the Project to perform its business function close to or after completion of construction, including related risk allowances, taxes and levies.			
	13.	Construction | Renewal | Maintenance-related consultancies and supervision Scope: Fees and charges payable to Service Providers not engaged by the Constructors, including related risk allowances, taxes and levies.			
4.		Operation Costs (OC)			
	01.	Cleaning Scope: Periodic, routine and specialist cleaning of internal and external works.			
	02.	Utilities Scope: Fuel, including gas, electricity, fuel oil solid and other fuel; water and drainage including water rates, effluents sewerage drainage and other charges.			
	03.	Waste management Scope: Collection, compaction, removal and disposal and/or recycling general and toxic waste from the constructed asset.			
	04.	Security Scope: Physical security (such as access control, CCTV camera) including staff or contractors involved in providing security controls via remote support centres, to the constructed asset.			
	05.	Information and communications technology Scope: Information communications systems (such as public address and communications cabling and IT support services built as a constructed asset, as well as technology used for monitoring assets (i.e. building management systems) and physical sensors.			
	06.	Operators' site overheads | general requirements Scope: Operators' site management, temporary site facilities, site services, and expenses, not directly related to a particular Group, but commonly required to be shared by all Groups.			
	07.	Risk Allowances Scope: As defined in Part 4.1 but related to Operation Costs and not included in other Groups.			
	08.	Taxes and Levies Scope: As defined in Part 4.1 but related to Operation Costs.			
6.		End of Life Costs (EC)			
	01.	Disposal inspection Scope: Inspections carried out in connection with demolition, dilapidations or other contractual requirements.			

Code		Description			
		Categories (Level 2)	AC	CC	RC, OC, MC and EC
		Groups (Level 3)			
	02.	Decommissioning and decontamination Scope: All post-occupation activities required to render the constructed asset ready for demolition.			
	03.	Demolition, reclamation and salvage Scope: Demolition of the constructed asset at end of life or period of interest, and landfill and recycling or disposal.			
	04.	Reinstatement Scope: Dealing with dilapidations, measures to comply with other contractual obligations to return the constructed asset to a required standard of repair.			
	05.	Constructors' site overheads | general requirements Scope: Constructors' site management, temporary site facilities, site services, and expenses, not directly related to a particular Group, but commonly required to be shared by all Groups.			
	06.	Risk Allowances Scope: As defined in Part 4.1 but related to End of Life Costs and not included in other Groups.			
	07.	Taxes and Levies Scope: As defined in Part 4.1 but related to End of Life Costs.			

Table 3: Definitions of Categories (Level 2) and Groups (Level 3) for carbon emissions

- In most cases, carbon emissions associated with site acquisition will be negligible, and there is no need to report them unless they are significant e.g. for some infrastructure projects. In that case, they should be reported only at Level 2 Category (Code 1) with a note explaining why they are significant.
- There is no requirement to report carbon emissions associated with construction | renewal | maintenance Taxes and Levies, Work and Utilities off site or Consultancies and supervision, since these are considered to be negligible and/or not attributable to the subject of this reporting system. As a result, codes 2.10, 2.11, 2.13, 3.10, 3.11, 3.13, 5.10, 5.11, and 5.13 are not used.
- There is no requirement to report operation carbon emissions associated with Operator's site overheads or Taxes and Levies since these are negligible and/or not attributable to the subject of this reporting system. As a result, codes 4.06 and 4.08 are not used.
- Reporting carbon emissions in 4.01 Cleaning, 4.04 Security and 4.05 Information and communications technology is optional and is required only if the associated carbon emissions are considered significant.
- There is no requirement to report End of Life carbon emissions associated with Disposal inspection and Taxes and Levies since these are negligible. As a result, codes 6.01 and 6.07 are not used.

Code		Description			
		Categories (Level 2)	AE (where significant)	CE	RE, OE, ME and EE
		Groups (Level 3)			
		Life Cycle Emissions (CE+RE+OE+ME+EE)			
1.		Acquisition Carbon Emissions (AE) (where significant)			
2.		Construction Carbon Emissions (CE)			
3.		Renewal Carbon Emissions (RE)			
4.		Operation Carbon Emissions (OE)			
5.		Maintenance Carbon Emissions (ME)			
6.		End of Life Carbon Emissions (EE)			
2.		Construction Carbon Emissions (CE)		Categories CE, RE and ME use the same Groups	
3.		Renewal Carbon Emissions (RE)			
5.		Maintenance Carbon Emissions (ME)			
	01.	Demolition, site preparation and formation Scope: All necessary advance or facilitating work to prepare, secure and form the site to enable substructure [construction | renewal | maintenance]			
	02.	Substructure Scope: All the load bearing work underground or underwater up to and including the following (including related earthwork, lateral support beyond site formation, and non-load bearing components and services and equipment forming an integral part of composite or prefabricated load bearing work) and as illustrated in Part 4.2: • for buildings: lowest floor slabs, and basement sides and bottom including related waterproofing and insulation • for roads and runways: sub-base to pavements • for railways: sub-base to rail track structures • for bridges: pile caps, footings, bases nearest ground level or water level if constructed in water • for tunnels: external faces of structural tunnel linings • for tanks and the like underground: external faces of tanks • for tanks and the like above ground: bases supporting tanks • for pipelines underground: beds and surrounds to underground pipes • for pipelines above ground: bases to structures supporting pipes • for wells and boreholes: bases to structures supporting well heads • for dams and reservoirs: seepage ditch, drainage layer/blanket, drain channels, foundation, base, footings, cut-off wall, heel and toe • for mines and quarries: underground mines: bases to structures supporting shaft headgear; open pits: bases to structures; processes: bases to structures, tanks, and bases to major process equipment. • for offshore structures, near shore works, ports, waterway works: bases to structures supporting material handling equipment; bases to retaining structures; bases to permanent structures.			
	03.	Structure Scope: All the load bearing work, including non-load bearing components and services and equipment forming an integral part of composite or prefabricated load bearing work, excluding those included in Substructure and Architectural works | Non-structural works.			

Code		Description			
		Categories (Level 2)	AE (where significant)	CE	RE, OE, ME and EE
		Groups (Level 3)			
	04.	Architectural works | Non-structural works Scope: All architectural and non-load bearing work excluding services, equipment, and surface and underground drainage.			
	05.	Services and equipment Scope: All fixed services and equipment required [to put the completed project into use for Construction Carbon Emissions| to sustain the use after completion of construction for Renewal and Maintenance Carbon Emissions], whether they are mechanical, hydraulic, plumbing, fire-fighting, transport, communication, security, electrical or electronic, excluding external surface and underground drainage. Including testing, commissioning and operational licensing and plant upgrades/refurbishment.			
	06.	Surface and underground drainage Scope: All underground or external surface drainage systems excluding those inside basement or underground construction.			
	07.	External and ancillary works Scope: All work outside the external face of buildings or beyond the construction entity required to fulfil the primary function of the Project and not included in other Groups.			
	08.	Preliminaries | Constructors' site overheads | general requirements Scope: Constructors' site management, temporary site facilities, site services, mobilisation, demobilisation and other carbon emissions, not directly related to a particular Group, but commonly required to be shared by all Groups.			
	09.	Risk Allowances Scope: As defined in section 4.1 but related to [Construction | Renewal | Maintenance] Carbon Emissions and not included in other Groups.			
	10.	Not used			
	11.	Not used			
	12.	Production and loose furniture, fittings and equipment Scope: Those provided for the Project to perform its business function close to or after completion of construction, including related risk allowances.			
	13.	Not used			
4.		Operation Carbon Emissions (OE)			
	01.	Cleaning (optional – to be included only if carbon emissions associated with Cleaning are considered significant) Scope: Periodic, routine and specialist cleaning of internal and external works.			
	02.	Utilities Scope: Fuel, including gas, electricity, fuel oil solid and other fuel; water and drainage including water rates, effluents sewerage drainage and other charges.			
	03.	Waste management Scope: Collection, compaction, removal and disposal and/or recycling general and toxic waste from the constructed asset.			
	04.	Security (optional – to be included only if carbon emissions associated with Security are considered significant) Scope: Physical security (such as access control, CCTV camera) including staff or contractors involved in providing security controls via remote support centres, to the constructed asset.			

Code		Description			
		Categories (Level 2)	AE (where significant)	CE	RE, OE, ME and EE
		Groups (Level 3)			
	05.	Information and communications technology (optional – to be included only if carbon emissions associated with Information and communications technology are considered significant) Scope: Information communications systems (such as public address and communications cabling and IT support services built as a constructed asset, as well as technology used for monitoring assets (i.e. building management systems) and physical sensors.			
	06.	Not used			
	07.	Risk Allowances Scope: As defined in Part 4.1 but related to Operation Carbon Emissions and not included in other Groups.			
	08.	Not used			
6.		End of Life Carbon Emissions (EE)			
	01.	Not used			
	02.	Decommissioning and decontamination Scope: All post-occupation activities required to render the constructed asset ready for demolition.			
	03.	Demolition, reclamation and salvage Scope: Demolition of the constructed asset at end of life or period of interest, and landfill and recycling or disposal. Including any ongoing care and maintenance (e.g. of decontamination).			
	04.	Reinstatement Scope: Dealing with dilapidations, measures to comply with other contractual obligations to return the constructed asset to a required standard of repair.			
	05.	Constructors' site overheads | general requirements Scope: Constructors' site management, temporary site facilities, site services, and expenses, not directly related to a particular Group, but commonly required to be shared by all Groups.			
	06.	Risk Allowances Scope: As defined in Part 4.1 but related to End of Life Carbon Emissions and not included in other Groups.			
	07.	Not used			

Sub-Groups (Level 4)

The costs and/or carbon emissions of components of a Project or Sub-Project under each Group serving a specific function or common purpose are grouped into one Sub-Group, such that the costs and/or carbon emissions of alternatives serving the same function can be compared, evaluated and selected. Sub-Groups are chosen irrespective of their design, specification, materials or construction.

ICMS does not mandate the classification of the Sub-Groups (Level 4), but the following appendices provide examples of what might be included for costs:

- Appendix A – Acquisition Sub-Groups
- Appendix B – Construction | Renewal | Maintenance Sub-Groups: Buildings
- Appendix C – Construction | Renewal | Maintenance Sub-Groups: Civil Engineering Works
- Appendix D – Operation Sub-Groups
- Appendix E – End of Life Sub-Groups.

Users of ICMS may adopt a Sub-Group classification based on trades, work breakdown structure or work results according to their local practice.

Reporting carbon emissions at Level 4 is not mandatory. However, where feasible, reporting carbon emissions at Sub-Group level could facilitate more detailed analysis.

Codes

Codes are a unique identifier for digital purposes. They have been assigned to the ICMS hierarchy down to Level 4. However, the classification of the Sub-Groups at Level 4 is discretionary rather than mandatory.

Codes from .600 have been used for marine related Sub-Groups leaving room for expansion before them for other non-marine Sub-Groups. Codes from .800 to .998 are reserved for use as user-defined codes for Sub-Groups that have not yet been included in ICMS. Code .999 is to catch 'all others'.

Payment currencies

Costs should, as far as practicable, be stated in their payment currencies. When it is necessary to carry out a currency conversion, the exchange rates or conversion factors used and the applicable dates should be stated.

2.3 Project Attributes and Values

To enable consistent and concise evaluation and comparison between different Projects or different design schemes, ICMS provides a set of Project Attributes and Values in Part 3 describing the principal characteristics of each Project or Sub-Project.

2.4 Life Cycle Cost Considerations

Setting the scope of the Life Cycle Costs

Life Cycle Costing (LCC) is an economic evaluation method that takes account of all relevant costs over a time horizon (Period of Analysis). Presentation of life cycle costs should make clear the scope of those costs included or excluded (as defined in the Categories and Group tables) and the relevant level of costs for the LCC purpose, as well as dealing with the time value of money.

LCC may be reported at a lesser level of detail than the underlying analysis. For example, the detailed cost analysis may be at Level 4 Sub-Groups, whereas reporting may be at Level 1 Project or Sub-Project or Level 2 Categories or Level 3 Groups.

LCC may be part of a wider economic project evaluation that considers the Whole Life Costs (including non-construction costs such as finance, business income from sales and disposals, occupancy costs and externalities).

Expected asset life

The design life of the Constructed Asset is a key performance requirement and should be defined in the project brief. The estimated expected service life of the Constructed Asset should be at least as long as the design life.

Renewals of Constructed Assets during the expected service life should be included in the life cycle cost's Period of Analysis, as well as any associated end of life or hand-back obligations.

Time value of money

The initial Construction Costs reported should be the forecast or actual final costs to complete the construction of the Project. Forecast costs should include an adjustment for price level fluctuations until the completion of the Project using published market indices and an agreed Base Date.

The rest of the LCC should be the forecast costs after the completion of construction until the end of life or a shorter Period of Analysis (e.g. one to ten years). This should be defined in the project scope, discounted to a Common Date not earlier than the completion of construction, using Discount Rates mandated by government authorities for public projects or published Discount Rates for the market, where the Project is located for private projects or other rates such as those designated by the Client.

These interrelated terms of LCC are illustrated in Figure 6.

Figure 6: LCC Calculations and Period of Analysis

ICMS can be used to report and compare actual costs that have been collected, recorded and analysed. Actual costs should be recorded in the amounts paid. When historic actual costs are used for forecasting future costs, Price Level Adjustments should be made to bring the historic costs to the desired date of payment. LCC has certain cost variables. It is therefore important to record the purpose, scope, form and method of the economic appraisal, as well as the Common Date and the underlying assumptions, risks and uncertainty, information and data sources.

Net Present Value Calculations

For option appraisal based on LCC, the Net Present Values (NPV) of different options should be compared. The NPV of an option should be a single figure that sums up the present values of all relevant future LCC occurring during the Period of Analysis. NPV is the normal measure for discounted LCC.

To convert a future cost to the present value (cost) at the Common Date, the following formulae, using $ as an example currency, can be used:

Present value = future cost × discounting factor

R% = Discount Rate per annum

Discounting factor for the same cost spent at the end of year N after the Common Date

= PV of $1 after N years

$= 1 / (1 + R\%)^{N}$

Discounting factor for a cost spent annually for N years after the Common Date

= PV of $1 per annum after N years

$= [1 - 1 / (1 + R\%)^{N}] / R\%$

Where a particular commodity or group of commodities or resources are subject to a different rate of escalation from that generally applied, a suitably revised discount rate should be applied separately to each commodity or group of commodities or resources affected.

Where constructed assets or major components have different lives, the NPV of each must be calculated separately.

More information on the calculation of NPV and the relationship between real and nominal costs and discount rates can be found in ISO 15686-5:2017.

2.5 Carbon Emission Considerations

Measuring greenhouse gas emissions in terms of carbon dioxide (CO_2) equivalent

Construction projects give rise to global climate change impacts through the emission of greenhouse gases (GHGs), which include carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). Climate change impacts are considered in terms of Global Warming Potential (GWP), which is the heat absorbed by the emission of different greenhouse gases. GWP can be expressed on a comparable basis (i.e. in units of carbon dioxide equivalent (CO_2e) per 1 tonne of the gas over 100 years). This carbon dioxide equivalent metric is commonly referred to as 'carbon emissions' and all relevant greenhouse gases are typically included in the carbon assessments using conversion factors.

Life Cycle Carbon Emissions from construction should be reported in kilograms carbon dioxide equivalent ($kgCO_2e$), or any clearly stated metric multiples thereof as appropriate, such as tonnes of carbon dioxide equivalent (tCO_2e).

Carbon emissions can be subject to monetary valuation, including through carbon markets and emissions trading schemes. These have increasingly been adopted by countries for certain industrial sectors and activities, with carbon prices varying over time. However, even where such trading schemes exist, Life Cycle Carbon Emissions associated with construction projects and constructed assets typically comprise a mixture of traded and non-traded carbon. Furthermore, to assess and manage the reduction of carbon from construction it is important to measure absolute carbon emissions. For these reasons, it is not necessary to convert and report carbon in monetary terms although some organisations in some jurisdictions may wish to do so in addition to reporting in terms of the $kgCO_2e$ metric, for example, to directly feed into business cases and project investment decisions. If the carbon emissions subject to monetary valuation arise at different times, the time value of money must be considered as set out in Part 2.4.

Carbon assessment and management approach

Alongside other forms of carbon accounting, carbon assessment for construction is rapidly evolving as governments and the private sectors adopt significant carbon emission reduction targets to curb global climate change and put in place plans and prioritise the actions required to achieve them. ICMS provides a reporting framework for carbon emissions to be used in conjunction with existing standards, guidance and tools, and emerging developments that are coming on stream to support decarbonisation.

International standards for carbon assessment include:

- ISO 21931-1:2010 *Sustainability in building construction – Framework for methods of assessment of the environmental performance of construction works – Part 1: Buildings*
- ISO 21931-2:2019 *Sustainability in buildings and civil engineering works – Framework for methods of assessment of the environmental, social and economic performance of construction works as a basis for sustainability assessment – Part 2: Civil Engineering Works*
- ISO 21930:2017 *Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services*
- EN 15978:2011 *Sustainability of construction works –Assessment of environmental performance of buildings – Calculation method*
- EN 15804: 2012 + A2:2019 *Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products*
- EN 15643:2021 *Sustainability of construction works – Framework for assessment of buildings and civil engineering works*
- EN 17472 (draft) *Sustainability of construction works. Sustainability assessment civil engineering works – calculation methods* and
- PAS 2080:2016 *Carbon Management in Infrastructure*.

These and related standards and their linkages have been recognised in the harmonisation activities of The European Committee for Standardization (CEN) Technical Committee 350 'Sustainability of construction works'. Companies and other organisations also commonly utilise the *Greenhouse Gas Protocol* (GHGP) which provides an international standard for corporate accounting and reporting emissions, categorising greenhouse gases into Scopes 1, 2 and 3 based on the source. The GHGP is a joint initiative of World Resources Institute and World Business Council on Sustainable Development.

As described more fully below, under ICMS carbon emissions are to be reported on a specific life cycle basis in line with costs. This reporting can typically draw on a more broadly-based whole life approach to the assessment and management of carbon emissions. The whole life approach is normally advocated

for that purpose as it helps to identify the optimum approach for reducing lifetime emissions and avoids any unintended consequences of focusing on emissions from one part of the life cycle alone. A whole life approach also enables circular economy principles to be addressed, for example, by encouraging future repurposing of a building or infrastructure asset and its components, which can further reduce the carbon emissions and improve the sustainability of the asset.

Guidance on conducting whole life carbon assessment is provided in a growing body of publications covering different jurisdictions and different project types. One example that addresses both buildings and infrastructure projects is the RICS professional statement Whole life carbon assessment for the built environment (2017). The guidance recognises that carbon assessments typically combine carbon data that is specific to the project with other carbon information from equivalent or similar construction products and activities. Those involved in assessing whole life carbon can utilise various databases and inventories, including international, regional or national databases of emission factors, which may be updated on a regular basis to take account of changes over time, such as in the carbon intensity of electricity supplied by a national grid. There are also databases that compile comparable carbon emissions data from construction products and/or construction projects and constructed assets.

Reporting carbon emissions alongside life cycle costs

Carbon assessments for major construction projects and constructed assets can be complex and data-intensive and it is acknowledged that there may be challenges and constraints in reporting Life Cycle Carbon Emissions pending the further development of practical assessment tools and specific data sources. Transparency is therefore of utmost importance so that when presenting carbon emissions, the scope of emissions that have been included or excluded should be made clear. As for life cycle costs, Life Cycle Carbon Emissions may be reported at a lesser level of detail than the underlying analysis. For example, detailed analysis may be at Level 4 Sub-Groups, whereas reporting may be at Level 1 Projects or Sub-Projects or Level 2 Categories or Level 3 Groups.

Carbon assessment standards (i.e. EN 15978:2011) identify a series of carbon stages (A0-C4 plus D) that can map to the ICMS/CROME Categories as shown in Appendix H. There are various groupings of these stages that tie into different parts of the life cycle (e.g. carbon emissions associated with products or construction processes, all up front carbon, all embodied carbon) reflecting the limitations in the scope of carbon assessment undertaken at a particular point in the development of a particular project.

Depending on the project, varying proportions of the overall carbon emissions may be associated with different stages. For example, the use of energy during the operational life of a new building might give rise to a large proportion of that project's carbon emissions. This gives rise to a wide variety of different opportunities to manage and reduce carbon emissions alongside project costs. The total carbon emissions associated with the materials and products used, their transportation and the construction processes to create an asset as well as the emissions associated with the asset's maintenance, repair and refurbishment/replacement are sometimes known as 'embodied carbon', corresponding to carbon stages A1-A5, B1-B5 and C1-C4.

Whatever scope has been undertaken in the underlying carbon assessment, it should be clearly reported alongside the carbon emissions results and other associated attributes. As with costs, ICMS distinguishes between Whole Life Carbon Emissions and Life Cycle Carbon Emissions. Thus Life Cycle Carbon Emissions may be part of a wider project evaluation that considers Whole Life Carbon Emissions including carbon savings arising from energy generation or recycling, carbon sequestration as well as those associated with benefits and loads beyond the project's system boundary (carbon stage D). This stage D results, for example, the potential carbon emissions benefits associated with products designed for future reuse in line with circular economy thinking, should be reported separately for clarity and comparability rather

than being netted off.

In terms of the timing and frequency of assessing carbon emissions, in order to maximise the opportunity to manage and reduce climate change impact, guidance such as the RICS professional statement recommends that carbon assessments should start early (i.e. at the conceptual planning and design stage) and be undertaken in a sequential fashion during design, procurement, construction and post-construction. The assessment of carbon will therefore initially be based on forecasts of carbon emissions, progressively updated with data based on actual quantities and activities.

Part 3 Project Attributes and Values

This part of ICMS sets out the Project Attributes and Values to be used when presenting costs and/or carbon emissions. These attributes have been carefully selected and are limited to those that have a direct bearing on the costs and/or carbon emissions. Comparisons are made possible within project types by these Project Attributes and Values.

Note 1: All Values should be given so long as the attributes are relevant.

Note 2: Alternative Values are separated with a vertical slash (|). More than one alternative Value may be chosen. Some Attributes are multi-valued requiring the entry of sets of sub-Attributes and Values, e.g. more than one set of dimensions or quantities are to be stated when more than one size is involved.

Note 3: All quantities should be rounded to the nearest whole number unless considered inappropriate in special circumstances.

Note 4: These Project Attributes and Values capture the minimum principal characteristics of a Project or Sub-Project that might have a significant influence on cost and/or carbon emissions. Users may add more Project Attributes and Values to suit their needs.

Note 5: The values of functional units refer to the designed values.

Table 4: Common Project Attributes

Project Attributes	Values
Common for all Projects and Sub-Project Types (Project level only)	
Report	
Project title	
Status of cost and/or carbon emissions report	pre-construction forecast | at tender | during construction | actual costs and/or carbon emissions of construction post-completion | renewal forecast during use | end of life forecast
Date of cost and/or carbon emissions report	(month and year)
Revision number of cost and/or carbon emissions report	
Brief description of the Project	
• client's name	
• main Project type (principal Sub-Project)	
• brief scope	
Location and country	International Organization for Standardization (ISO) country code (e.g. CN) | address of building site(s) | start and end locations for linear civil engineering works

Project Attributes	Values
Common for all Projects and Sub-Project Types (Project level only)	
Sub-Projects included	buildings | roads and runways | railways | bridges | tunnels | wastewater treatment works | water treatment works | pipelines | wells and boreholes | power-generating plants | chemical plants | refineries | dams and reservoirs | mines and quarries | offshore structures | near shore works | ports | waterway works | land formation and reclamation | common | other stated
Construction Cost Price Level	
ISO currency code (e.g. USD)	
Base date of costs (if individual cost is exclusive of Price Level Adjustments after that date)	(month and year)
Price basis	fixed unit rates | unit rates subject to fluctuating adjustment
Construction Cost Currency Conversion	
Conversion date	
Exchange rates or other conversion factors (used to convert a cost report of multi- currencies into a single currency)	(numeric conversion and currency codes)
Construction Programme	
Project status	initiation and concept phase | design phase | construction and commissioning phase | complete
Construction period	
• number of months	
• start date (planned or actual)	(month and year)
• end date (planned or actual)	(month and year)
Site	
Existing site status	
• state of use	greenfield | brownfield
• type of use	urban | rural | agricultural
Legal status of site	freehold | leasehold | joint venture | not owned | other stated
Site topography	principally flat | principally hilly | mountainous | offshore | other stated
Ground conditions (predominant)	soft | rocky | reclaimed | submerged | swampy
Seismic zones (state more than one if applicable based on location)	
Site conditions and constraints	
• access problems	difficult | average | easy
• extreme climatic conditions	difficult | average | easy
• environmental constraints	difficult | average | easy
• statutory planning constraints	difficult | average | easy
Construction Procurement	
Funding	private | public | public and private in partnership

Project Attributes	Values
Common for all Projects and Sub-Project Types (Project level only)	
Project delivery	
• pricing method	lump sum | stipulated price | re-measurement | cost reimbursement | other stated
• mode of procurement	design bid build | design and build (turnkey) | build operate and transfer | public private partnership | management contracting | construction management | engineer procure construct | target | other stated
• joint venture foreign Constructor	yes | no
• predominant source of Constructors	local | foreign
Life Cycle Cost Related	
Life cycle costing	
• purpose	for a business case | for option appraisals | for producing a sinking fund | for cost analysis | other stated
• method of presentation of costs	net present value
• common date (to which all costs are discounted or compounded)	(month and year)
• project status at common date	initiation and concept phase | design phase | construction and commissioning phase | in use | close to end of life
• discount rate	real discount rate | nominal discount rate (% per annum)
Expected constructed asset life span after completion of construction	design life | alternative life span (years)
Period of analysis for life cycle costing	
• until	end of life | end of interest
• from	(month and year)
• to	(month and year)
• number of months | years	(months | years)
Primary usage type constraints affecting expected life and life cycle costs (if applicable)	
• hours of operation (e.g. office hours 9:00 to 17.30 Monday to Friday)	
• access restrictions	
• environmental	
• statutory	
• contractual	
• others	
Renewals planned (during period of analysis)	
• scope of renewal (stating key Groups/Sub-Groups included)	• (a) = • (b) = • (c) = • etc.

Project Attributes	Values
Common for all Projects and Sub-Project Types (Project level only)	
• respective cycle (e.g. every five years)	• (a) = • (b) = • (c) = • etc.
• number of renewal cycles included (during the period of analysis)	• (a) = • (b) = • (c) = • etc.
End of Life Costs and/or Carbon Emissions	
• hand-back obligations at end of life/period of analysis (if applicable)	
Carbon Emissions Related	
Carbon emissions measurement	
• boundary of carbon reporting	Products (EN 15978 stages A1-A3) | Construction (EN 15978 stages A4-A5) | Up front carbon (EN 15978 stages A1-A5) | Embodied carbon (EN 15978 stages A0-A5, B1-B5, C1-C4) | other stated
• percentage of carbon emissions based on actual quantities (as opposed to forecasts)	(%)
• name of carbon assessment tool(s) used (where applicable, by Sub-Project)	
• name of certified carbon assessment process if used	
• main source(s) of material quantities for carbon emissions assessment	materials delivery records | BIM models | bills of quantities (BoQ) | cost plans | estimations from consultants' drawings
• main source(s) of carbon emission factors	
Energy sources	
• source(s) (and associated percentages) of operational energy	grid electricity (%) | on site gas (%) | on site oil (%) | on site renewable electricity (%) | on site renewable heat (%) | other stated
• list of energy generation and storage facilities on site	

Table 5: Buildings

Project Attributes	Values
Buildings **(A construction with a cover and enclosure to house people, equipment or goods.)**	
Code	
Local functional classification standard	
• name of standard	
• code number of construction	
Works	
Functional type	residential | office | commercial | shopping centre | industrial | hotel | car park | warehouse | educational | hospital | airport terminal | railway station | ferry terminal | plant facility | other stated
Nature	new build | major adaptation | temporary
Grade (qualitative description to be read in conjunction with the location)	ordinary quality | medium quality | high quality
Hotel grade	international below 4-star | international 4-star | international 5-star | international over 5-star | local below 4-star | local 4-star | local 5-star | local over 5-star
Environmental grade	
• grade and name of environmental certification	ISO 14001 | other stated
• status	targeted | achieved | none
Principal design features	
• structural (predominant)	timber | concrete | steel | load bearing masonry | other stated
• external walls (predominant)	stone | brick/block | render/block | curtain walling | other stated
• environmental control	non-air conditioned | air conditioning
• degree of prefabrication	less than 25% | up to 50% | up to 75% | up to 100%, of Construction Costs
• major prefabricated work	suites (inclusive of toilets, kitchens and the like) | standalone toilets, bathrooms, shower rooms and the like | standalone kitchens | classrooms | healthcare rooms | operating theatres | plant rooms, pipe ducts and the like | soundproof rooms | computer rooms | cold rooms | kiosks | balconies | corridors | staircases | other stated
Project Complexity	
• shape (on plan)	circular, elliptical or similar | square, rectangular, or similar | complex
• shape (vertical section)	circular, elliptical or similar | square, rectangular, or similar | complex
• design	simple | bespoke | complex
• method of working	sectional completion | out-of-hours working | confined working | other stated
Design life	(years)

Project Attributes	Values
Buildings **(A construction with a cover and enclosure to house people, equipment or goods.)**	
Average height of site above or below sea level	above | below (m | ft)
Dimensions (overall length × width × height of each building to highest point of the building)	(m | ft)
Typical storey height (floor level to floor level)	(m | ft)
Other storey heights and applicable floors	(m | ft)
Number of storeys above ground (qualitative description to be read in conjunction with the location)	house | low rise | medium rise | high rise
Number of storeys above ground (quantitative)	specific number 0–3 | 4–7 | 8–20 | 21–30 | 31–50 | over 50
Number of storeys below ground	specific number
Area of external elevations (total area of external wall finishes, facade cladding and curtain walls, windows, doors, shop fronts, roller shutters, fire shutters, etc. on the external elevations including all surfaces of external railings, parapets and features, but ignoring the presence of canopies)	(m^2 | ft^2)
Project Quantities	
Site area (within legal boundary of building site, excluding temporary working areas outside the site)	(m^2 | ft^2)
Covered area on plan	(m^2 | ft^2)
Gross external floor area as IPMS 1 (EXTERNAL)	(m^2 | ft^2)
Gross internal floor area as IPMS 2 (INTERNAL)	(m^2 | ft^2)
Functional units	number of occupants | number of bedrooms | number of hospital beds | number of hotel rooms | number of car parking spaces | number of classrooms | number of students | number of passengers | number of boarding gates | production capacity (specifics to be stated) | other stated

Table 6: Roads and Runways

Project Attributes	Values
Roads and Runways **(A pavement providing a thoroughfare, route, or way for vehicular traffic on land between two or more places including but not limited to alley, street, collector and rural roads, motorways, expressways, county and interstate highways, hard standings. Elevated roads that are an integral part of bridges shall be included in bridges. Roads in tunnels shall be included in tunnels.)**	
Code	
Local functional classification standard	
• name of standard	
• code number of construction	
Works	
Functional type	motorway | highway | freeway | expressway | road | lane | runway | hard standing
Nature	new build | major adaptation | temporary
Environmental grade	
• grade and name of environmental certification	ISO 14001 | other stated
• status	targeted | achieved | none
Principal design features	
• position	at grade | in cutting | on embankment | elevated
• design speed	(km | miles per hour)
• number of carriageways	
• number of lanes per carriageway	
• lane width	(m | ft)
• hard shoulders	yes | no
• footways	yes | no
• footway width	(m | ft)
• surfacing	flexible construction | concrete pavement
• vertical profile	switchbacks | undulating | flat
• plan profile	straight | winding
• ruling gradient	%
Project Complexity	
• number of grade-separated intersections	
• number of at-grade intersections	
• number of crossings over other roads, railways, waterways, valleys and the like	
• number of access ramps	
Design life	(years)
Altitude	
• minimum height of passageway above or below sea level	above | below (m | ft)
• maximum height of passageway above or below sea level	above | below (m | ft)
Dimensions	

Project Attributes	Values
Roads and Runways **(A pavement providing a thoroughfare, route, or way for vehicular traffic on land between two or more places including but not limited to alley, street, collector and rural roads, motorways, expressways, county and interstate highways, hard standings. Elevated roads that are an integral part of bridges shall be included in bridges. Roads in tunnels shall be included in tunnels.)**	
• total width of metaled surface of each road, runway or motorway (including hard shoulders but excluding footways)	(m | ft)
Project Quantities	
Total length (between two places, irrespective of number of lanes)	(km | miles)
Equated lane length (being the length of all lanes along the route, including those in passing loops, sidings and depots reduced toa single length)	(km | miles)
Total paved area	(m^2 | ft^2)
Functional units	
• capacity	(vehicles per hour)

Table 7: Railways

Project Attributes	Values
Railways **(A permanent way comprising a rail track composed of two parallel rails fixed to sleepers, or single monorail that includes spurs, sidings and turnouts for train traffic or the like, including tramways, metro rails, light rails and other rapid mass transit systems. Figure 7 provides guidance on what should be considered within the scope of any rail project.)**	
Code	
Local functional classification standard	
• name of standard	
• code number of construction	
Works	
Functional type	high speed | express | light rail | tram | freight | mixed traffic | other stated
Nature	new build | major adaptation | capacity enhancement
Environmental grade	
• grade and name of environmental certification	ISO 14001 | other stated
• status	targeted | achieved | none
Principal design features	
• position	at grade | in cutting | on embankment | in tunnel | elevated | other stated
• design speed	(km | miles per hour)
• maximum axle loading of traffic	(tonnes | ton)
• train power systems	overhead AC | overhead DC | third or contact rail(s) DC | diesel electric | bi-mode | other stated
• number of tracks	
• track gauge	(m | ft)
• track rigidity	flexible | rigid | other stated | not applicable
• rail joints	fish-plated | welded
• control system	European Train Control System | in cab | block signalling | centralised traffic control | other stated
• signalling system	European Railway Traffic Management System | semaphore | coloured light | inductive loop
• operational telecommunications system	fixed telephone network | other stated
• ruling gradient	%
Project Complexity	
• number of point ends	
• number of intersections with roads and other railways	
• number of crossings over roads, other railways, waterways, valleys and the like	
Design life	(years)
Altitude	
• minimum height of track bed above or below sea level	above | below (m | ft)

Project Attributes	Values
Railways **(A permanent way comprising a rail track composed of two parallel rails fixed to sleepers, or single monorail that includes spurs, sidings and turnouts for train traffic or the like, including tramways, metro rails, light rails and other rapid mass transit systems. Figure 7 provides guidance on what should be considered within the scope of any rail project.)**	
• maximum height of track bed above or below sea level	above | below (m | ft)
Dimensions	
• average width of rail corridor between legal boundaries	(m | ft)
Project Quantities	
Route length (between start and finish points of longest route plus start and finish points of ancillary routes irrespective of number of tracks)	(km | miles)
Equated track length (being the length of all tracks along the route, including those in passing loops, sidings and depots reduced to a single length)	(km | miles)
Functional units	
• weight of traffic expressed as estimated gross million tonnes or tons per annum	(M tonnes | M tons/year)
• passenger journeys	(million journeys per year)

Figure 7: Railways (diagram showing the cross section of a four-track railway corridor alignment including overhead traction power supply for two tracks)

(a) Cess walkway: Safe walking area beside the track

(b) Four foot: Standard interval between running rails of standard gauge track

(c) Six foot: Standard interval between a pair of tracks

(d) Ten foot: Standard interval between groups of tracks

Table 8: Bridges

Project Attributes	Values
Bridges **(A structure designed to span across a physical obstacle.)**	
Code	
Local functional classification standard	
• name of standard	
• code number of construction	
Works	
Functional type (serving)	road | railway | pipeline | conveyor | canal | pedestrian | other stated
Nature	new build | major adaptation | temporary
Environmental grade	
• grade and name of environmental certification	ISO 14001 | other stated
• status	targeted | achieved | none
Principal design features	
• support	arch | post and beam | cantilever | suspension | cable-stayed | other stated
• mobility	fixed | movable | temporary
• materials	natural materials | wood | concrete | steel | advanced materials | other stated
Types of obstacles crossed	river and canal | roads | railways | other stated
Project Complexity	
• curvature (predominant)	straight | curved
• number of access ramps	
• number each of abutments/piers/towers with foundations in water	
• number each of abutments/piers/towers with foundations not in water	
Design life	(years)
Altitude	
• average height of deck above or below sea level	above | below (m | ft)
Dimensions	
• width (including walkways, hard shoulders and the like)	(m | ft)
• maximum height above the lowest point land/water	(m | ft)
• minimum clearance height	(m | ft)
Project Quantities	
Deck length measured from face to face of abutments	(km | miles)
Surface area of deck	(m^2 | ft^2)
Functional units	
• capacity	(vehicles | litres | gallons | tonnes | tons per hour)

Table 9: Tunnels

Project Attributes	Values
Tunnels **(An artificial underground or underwater passageway, completely enclosed except for openings for entrance and exit, commonly at each end, and for ventilation.)**	
Code	
Local functional classification standard	
• name of standard	
• code number of construction	
Works	
Functional type	road | railway | pipeline | conveyor | other stated
Nature	new build | major adaptation | temporary
Environmental grade	
• grade and name of environmental certification	ISO 14001 | other stated
• status	targeted | achieved | none
Principal design features	
• tunnelling method	cut and fill | tunnel-boring machine | drill and blast | immersed | other stated
• in compressed air	yes | no
• lining	iron | steel | concrete | not lined
• curvature (predominant)	straight | curved | other stated
• underwater	yes | no
• ventilated	yes | no
• number and size of portal structures	
• number of cross passages separated by a dividing wall	
• number of shafts	
• average depth below water or ground level	above | below (m | ft)
Project Complexity	
• number of intersections	
• horizontal profile (predominant)	flat | undulating
• cross sectional shape	circular | oval | rectangular | other stated
Design life	(years)
Altitude	
• minimum height of passageway above or below sea level	above | below (m | ft)
• maximum height of passageway above or below sea level	above | below (m | ft)
Dimensions	
• overall cross section area of the tunnel (range stated in case of varying cross sections)	(m^2 | ft^2)
• overall dimensions (width x height | diameter) (range stated in case of varying cross sections)	(m | ft)

Project Attributes	Values
Tunnels **(An artificial underground or underwater passageway, completely enclosed except for openings for entrance and exit, commonly at each end, and for ventilation.)**	
Project Quantities	
End to end length	(km | miles)
Equated track length (being the length of all tracks inside the tunnel)	(km | miles)
Equated lane length (being the length of all tracks inside the tunnel)	(km | miles)
Volume of excavation	(m^3 | yd^3)
Functional units	
• capacity	(vehicles | litres | gallons | tonnes | tons per hour)

Table 10: Wastewater Treatment Works

Project Attributes	Values
Wastewater Treatment Works **(A facility for the cleaning and improvement of water that contains waste products, contaminants or pollutants to make it safe for discharge to land or water.)**	
Code	
Local functional classification standard	
• name of standard	
• code number of construction	
Works	
Functional type (descriptions of primary, secondary and tertiary treatment processes)	
Nature	new build | major adaptation
Environmental grade	
• grade and name of environmental certification	ISO 14001 | other stated
• status	targeted | achieved | none
Principal design features	
• plant technology	
• number of processes	
• tank materials for each process	steel | concrete | other stated
• term of use	fixed | temporary
Project Complexity	
• standard of cleanliness of treated water (expressed in terms of significant parameters, e.g. Biological Oxygen Demand, Suspended Solids, etc.)	
Design life	
Altitude	
• average height of site above or below sea level	above | below (m | ft)
Dimensions	
• overall external diameter or length × width × height of each major structure	(m | ft)
Project Quantities	
Site area (area of land covered by permanent work, excluding temporary working areas outside the site)	(hectares | acres)
Functional units	
• capacity	(mega litres | litres | million gallons | gallons per day)

Table 11: Water Treatment Works

Project Attributes	Values
Water Treatment Works **(A facility for the cleaning and improvement of water to make it potable.)**	
Code	
Local functional classification standard	
• name of standard	
• code number of construction	
Works	
Functional type (descriptions of processes involved)	screening | pre-ozonation | coagulation | flocculation | clarification | filtration | pH correction | chemical dosing | chlorination | desalination | other stated
Nature	new build | major adaptation
Environmental grade	
• grade and name of environmental certification	ISO 14001 | other stated
• status	targeted | achieved | none
Principal design features	
• plant technology	
• number of processes	
• tank materials for each process	steel | concrete | other stated
• term of use	fixed | temporary
Project Complexity	
• standard of cleanliness of treated water (expressed in terms of significant parameters e.g. microbial, chemical, radiological, appearance, etc.)	
Design life	(years)
Altitude	
• average height of site above or below sea level	above | below (m | ft)
Dimensions	
• overall external diameter or length × width × height of each major structure	(m | ft)
Project Quantities	
Site area (area of land covered by permanent work, excluding temporary working areas outside the site)	(hectares | acres)
Functional units	
• capacity	(mega litres | litres | million gallons | gallons per day)

Table 12: Pipelines

Project Attributes	Values
Pipelines **(A series of pipes and tubing for the transfer of liquid, gas or powder.)**	
Code	
Local functional classification standard	
• name of standard	
• code number of construction	
Works	
Functional type (for transporting)	liquid | gas | powder
Nature	new build | major adaptation | temporary
Environmental grade	
• grade and name of environmental certification	ISO 14001 | other stated
• status	targeted | achieved | none
Principal design features	
• principal materials	steel | cast iron | precast concrete | uPVC | other stated
• minimum and maximum depths below ground	(m | ft)
• minimum and maximum heights above ground	(m | ft)
• drilling/boring method	cut and cover | directional drilling/boring | none
• insulation type, if insulated	
• corrosion protection measures	
Project Complexity	
• position	on land | underwater
• number of intersections	
• number of piping specials (e.g. tie-ins, hot tap and other interface requirements before commissioning)	
• number of crossings over roads, railways, waterways, valleys and the like	
• number of pumping stations, inspection points, pressure relief points	
Design life	(years)
Altitude	
• minimum height above or below sea level	above | below (m | ft)
• maximum height above or below sea level	above | below (m | ft)
Dimensions	
• length of each diameter of pipes	(m diameter x km long | ft diameter x miles long)
Project Quantities	
Total length of pipes	(km | miles)
Length from servicing inlets to outlets	(km | miles)
Functional units	
• capacity	(litres | gallons | m^3 | ft^3 per hour)

Table 13: Wells and Boreholes

Project Attributes	Values
Wells and Boreholes **(Process of drilling or boring in the ground for extraction of a natural resource or the injection of a fluid, or for the evaluation/monitoring of subsurface formations.)**	
Code	
Local functional classification standard	
• name of standard	
• code number of construction	
Works	
Functional type (for extracting)	water | gas | oil | other stated
Nature	new build | major adaptation
Environmental grade	
• grade and name of environmental certification	ISO 14001 | other stated
• status	targeted | achieved | none
Principal design features	
• lining material	steel | concrete | other stated
Project Complexity	
• position	onshore | offshore
• direction	vertical | directional
Design life	(years)
Altitude	
• commencing height above sea level	above | below (m | ft)
• commencing height below sea level	above | below (m | ft)
Dimensions	
• number of wells/boreholes	
• length of each diameter of vertical drilled/ bored wells/boreholes	(m diameter x m long | ft diameter x ft long)
• length of each diameter of inclined or horizontal drilled/bored wells/boreholes	(m diameter x m long | ft diameter x ft long)
Project Quantities	
Total length drilled/bored	(m | ft)
Functional units	
• capacity	(m^3 | ft^3 | litres | gallons per hour)

Table 14: Power-Generating Plants

Project Attributes	Values
Power-Generating Plants **(A facility for the generation of electrical power. Major buildings and civil engineering works shall be reported under separate Sub-Projects under a power-generating plant Project.)**	
Code	
Local functional classification standard	
• name of standard	
• code number of construction	
Works	
Functional type	nuclear | wind | solar | hydroelectric | geothermal | biomass | gas | coal | oil | other stated
Nature	new build | major adaptation
Environmental grade	
• grade and name of environmental certification	ISO 14001 | other stated
• status	targeted | achieved | none
Principal design features	
• generator containment material	concrete | steel | other stated
• coolant	water | gas | other stated
• cycle	open | closed
• number and size of turbines	(MW)
Project Complexity	
• cooling system	wind | water | other stated
Design life	(years)
Altitude	
• average height of site above or below sea level	above | below (m | ft)
Dimensions	
• overall external diameter or length × width × height of each major structure	(m | ft)
Project Quantities	
Site area (area of land covered by permanent work, excluding temporary working areas outside the site)	(hectares | acres)
Functional units	
• capacity	(MW)

Table 15: Chemical Plants

Project Attributes	Values
Chemical Plants **(A facility for the creation of chemical products excluding petro-chemicals. Major buildings and civil engineering works shall be reported under separate Sub-Projects under a chemical plant Project.)**	
Code	
Local functional classification standard	
• name of standard	
• code number of construction	
Works	
Functional type (product description: specify the products produced and the principal source of energy (oil, gas, electricity, etc.) and number of types or varieties of products)	
Nature	new build | major adaptation
Environmental grade	
• grade and name of environmental certification	ISO 14001 | other stated
• status	targeted | achieved | none
Principal design features	
• principal processes (more than one if applicable)	oxidation | reduction | hydrogenation | dehydrogenation | hydrolysis | hydration | dehydration | halogenation | nitrification | sulphonation | ammoniation | alkaline fusion | alkylation | dealkylation | esterification | polymerisation | polycondensation | catalysis | waste treatment | storage facility | other stated
• principal reactor materials	mild steel | stainless steel | concrete | other stated
• infrastructure	access roads | airstrips | port facilities | site works | power station | power line | water supply | desalination plant | fuel storage | solid waste disposal | communications | railroad | slurry pipeline | river | camp facilities | workshop facilities | administration | township
• waste handling and storage	waste handling | waste storage | tailings | management facility
• reinstatement and closure	salvage | rehabilitation of land | pollution monitoring | other stated
Project Complexity	
• number of processes	
Design life	
Altitude	
• average height of site above or below sea level	above | below (m | ft)
Dimensions	
• overall external diameter or length × width × height of each major structure	(m | ft)
Project Quantities	
Site area (area of land covered by permanent work, excluding temporary working areas outside the site)	(hectares | acres)

Project Attributes	Values
Chemical Plants **(A facility for the creation of chemical products excluding petro-chemicals. Major buildings and civil engineering works shall be reported under separate Sub-Projects under a chemical plant Project.)**	
Functional units	
• output of products	(m^3 | ft^3 | tonnes | tons | litres | gallons per day)

Table 16: Refineries

Project Attributes	Values
Refineries **(A downstream facility for the creation of petro-chemical products. Major buildings and civil engineering works shall be reported under separate Sub-Projects under a refinery Project. Wells and boreholes are upstream and Pipelines are midstream.)**	
Code	
Local functional classification standard	
• name of standard	
• code number of construction	
Works	
Functional type	oil | petrol | other stated
Nature	new build | major adaptation
Environmental grade	
• grade and name of environmental certification	ISO 14001 | other stated
• status	targeted | achieved | none
Principal design features	
• principal processes	upstream | downstream
• principal reactor materials	mild steel | stainless steel | concrete | other stated
• infrastructure	access roads | airstrips | port facilities | site works | power station | power line | water supply | desalination plant | fuel storage | solid waste disposal | communications | railroad | slurry pipeline | river | camp facilities | workshop facilities | administration | township
• waste handling and storage	waste handling | waste storage | tailings | management facility
• reinstatement and closure	salvage | rehabilitation of land | pollution monitoring | other stated
Project Complexity	
• number of processes	
• number of products	
Design life	(years)
Altitude	
• average height of site above or below sea level	above | below (m | ft)
Dimensions	
• overall external diameter or width x height of each major structure	(m | ft)
Project Quantities	
Site area (area of land covered by permanent work, excluding temporary working areas outside the site)	(hectares | acres)
Functional units	
• input of crude oil	(tonnes | tons | litres | gallons | barrels per day)
• output of products	(tonnes | tons | litres | gallons | barrels per day)

Table 17: Dams and Reservoirs

Project Attributes	Values
Dams and Reservoirs **(A barrier that stops or restricts the flow of water (i.e. fresh water, sea water, coral reef water) or underground streams. A reservoir created by dams may provide water for irrigation, human consumption, industrial use, recreation, aquaculture and navigation. Dams generally serve the primary purpose of retaining water.)**	
Code	
Local functional classification standard	
• name of standard	
• code number of construction	
Works	
Functional type	fresh water | wastewater | sea water
Functional purpose	power generation | water supply | stabilisation of water flow | flood prevention | land reclamation | irrigation | water diversion | navigation | other stated
Nature	new build | expansion of existing
Environmental grade	
• grade and name of environmental certification	ISO 14001 | other stated
• status	targeted | achieved | none
Principal design features	
• structure	arch | gravity | embankment | barrage | other stated
• core	compaction | earth fill | clay | asphaltic | other stated (m^3 | yd^3)
• facing	concrete | clay | other stated (m^2 | ft^2)
• location	above ground | underground | other stated
• infrastructure	access roads | hydro-electric plant | site works | power supply | water supply | pipelines
• principal materials	rock fill | earth fill | concrete | timber | steel | clay | rock | other stated
Project Complexity	
• water balance	positive | negative | clean water | dirty water | spillway
Number of layers	
• geotechnical	natural depression | flat ground | slope design | thickness of dam wall | saddle dam (fill void between peaks)
• flow rate	(m^3 per second | ft^3 per second)
Design life	(years)
Altitude	
• average height of site above or below sea level	above | below (m | ft)
Dimensions	

Project Attributes	Values
Dams and Reservoirs **(A barrier that stops or restricts the flow of water (i.e. fresh water, sea water, coral reef water) or underground streams. A reservoir created by dams may provide water for irrigation, human consumption, industrial use, recreation, aquaculture and navigation. Dams generally serve the primary purpose of retaining water.)**	
• number of dam structures	main walls | saddle dam walls Each
• principal dam wall height	(m | ft)
• principal dam crest length	(m | ft)
• principal dam min thickness	(m | ft)
• principal dam max thickness	(m | ft)
Project Quantities	
Site area (surface area of stored liquid at maximum capacity)	(square km | square miles)
Functional units	
• reservoir capacity	(million m^3 | million yd^3)
• power generation capacity	(MW)

Table 18: Mines and Quarries

Project Attributes	Values
Mines and Quarries **(The identification of potential sites, the extraction by mining, quarrying or pumping of minerals and/or other geological materials from the earth, usually from an orebody, lode, vein, seam, reef or placer deposit, and the processing operation that uses heat and/or chemicals to separate the metal or other substance of interest. A quarry is similar to an open-pit mine from which minerals are extracted.)**	
Code	
Local functional classification standard	
• name of standard	
• code number of construction	
Works	
Functional type	diamond | precious metal | base metal | natural solid inorganic material (i.e. alumina, bauxite, rock, etc.) | organic material (coal, etc.) | hydrocarbon (solid and liquid) | other stated
Nature	new build (greenfield) | major adaptation (brownfield)
Terrain	forest | desert | urban | rural
Region	
Depth to ore body	(m | ft)
Environmental grade	
• grade and name of environmental certification	ISO 14001 | other stated
• status	targeted | achieved | none
Principal design features	
• excavation type	surface | underground (hard rock) | underground (coal and soft rock) | mineral sands | underwater
• metallurgical processes	beneficiation (comminution, concentration, material handling) | leaching and calcining | solvent extraction (ion exchange, carbon-in-pulp, carbon-in-leach, electrolytic) | smelter | waste handling and storage | other stated
• infrastructure	access roads | airstrips | port facilities | site works | power stations | power lines | water supply | desalination plants | fuel storage | solid waste disposal | communications | railroads | slurry pipelines | rivers | camp facilities | workshop facilities | administration | township
• waste handling and storage	waste handling | waste storage | tailings | management facility
• reinstatement and closure	salvage | rehabilitation of land | pollution monitoring | other stated
Project Complexity	
• number of processes	
• number of products	
Design life	(years)
Altitude	

Project Attributes	Values
Mines and Quarries **(The identification of potential sites, the extraction by mining, quarrying or pumping of minerals and/or other geological materials from the earth, usually from an orebody, lode, vein, seam, reef or placer deposit, and the processing operation that uses heat and/or chemicals to separate the metal or other substance of interest. A quarry is similar to an open-pit mine from which minerals are extracted.)**	
• average height of site above or below sea level	above | below (m | ft)
Dimensions	
number of shafts	
• average shaft diameter	(m | ft)
• average shaft depth	(m | ft)
• average drift and adit cross-section area	(m^2 | ft^2)
• total drift and adit length	(m | ft)
Project Quantities	
Site area (area of land covered by permanent work, excluding temporary working areas outside the site)	(hectares | acres)
Functional units	
• ore extraction	(tonnes | tons per annum)
• throughput of product	(tonnes | tons per day)

Table 19: Offshore structures

Project Attributes	Values
Offshore structures **(Offshore structures comprise engineering designed structures and facilities mainly constructed and pre-commissioned onshore, installed offshore in either fresh or sea water, for the purpose of extraction, production or transmission of electricity, oil, gas or other natural resources including offshore mining.)**	
Code	
Local functional classification standard	
• name of standard	
• code number of construction	
Works	
Functional type	quay | wharf | pier | jetty | rubble mound breakwater | floating breakwater | dredging | revetment | aids to navigation | offshore upstream (oil & gas drilling) | offshore midstream (offshore pipelines and marine shipping) | wind farm | other stated
Nature	new build | major adaptation | temporary | decommissioning
Environmental grade	
• grade and name of environmental certification	ISO 14001 | other stated
• status	targeted | achieved | none
Principal design features	
• bathymetry (seabed survey)	
• construction	tubular piles | sheet piles | rockfill | granular fill | armour | anchors & chains | floating pontoons | flexible anchors | box caissons | fixed platforms (conventional fixed platforms | compliant towers | tension leg platforms | seastar platforms | gravity-based structures) | mobile offshore drilling units | floating production storage and offloading | mobile offshore production units | other stated
• foundations	shallow | deep | gravity based
• materials	steel | reinforced concrete | stone or granular fill | rock | concrete armour |GRP | granite | limestone | other stated
Project Complexity	
• positions	shallow water (< 300 m | 1000 ft), deep-water (300 – 1500 m | 1000 – 5000 ft) or ultra-deep water (> 1500 m | 5000 ft)
• water nature	salt | fresh | brackish
• significant wave height at site	(m | ft)
• contaminated sediment dredging	reuse | soil disposal | dump at sea
• number of berths	
• gross tonnage or bollard pull capacity	(tonnes | tons)
• total net dredging volume	(m^3 | yd^3)
• soft dredging volume	(m^3 | yd^3)

Project Attributes	Values
Offshore structures **(Offshore structures comprise engineering designed structures and facilities mainly constructed and pre-commissioned onshore, installed offshore in either fresh or sea water, for the purpose of extraction, production or transmission of electricity, oil, gas or other natural resources including offshore mining.)**	
• hard dredging volume	(m^3 | yd^3)
• spoil disposal volume	(m^3 | yd^3)
Oil and gas	
• exploratory drilling (diameter + depth)	(ø mm + m |ø " + ft)
• developments drilling (diameter + depth)	(ø mm + m |ø " + ft)
• decommissioning	
Design life	(years)
Altitude	
• average height of deck above or below sea level or deck level relative to Chart Datum (CD)	above | below (m | ft)
Dimensions	
• berthing length or length of structure	(m | ft)
• width of structure	(m | ft)
• berthing draft at low water (CD)	(m | ft)
• height from seabed to deck	(m | ft)
Project Quantities	
Surface area of platform	(m^2 | ft^2)
Mass prefabricated offshore structure	(tonnes | ton)
Functional units	
• crude oil production	(tonnes | tons/day | barrels/day)
• natural gas production (measured at 100 kPa (0.987 atmosphere) and 15oC or 14.696 psi (1 atmosphere) and 60°F	(m^3 | ft^3)
• electricity production	MWh | BTU

Table 20: Nearshore Works

Project Attributes	Values
Nearshore Works **(Engineered | designed structures and facilities located nearshore for the purposes of land reclamation and coastal protection (excluding dams).)**	
Code	
Local functional classification standard	
• name of standard	
• code number of construction	
Works	
Functional type	quay | wharf | pier | jetty | storm barrier | rubble mound breakwater | floating breakwater | marina | slipway | dry dock | dolphin | dredging | revetment | aids to navigation | dyke | turning basin | access channels | other stated
Nature	new build | major adaptation | temporary
Environmental grade	
• grade and name of environmental certification	ISO 14001 | other stated
• status	targeted | achieved | none
Principal design features	
• bathymetry (seabed survey)	
• construction	sheet pile walls | gravity quay wall | receiving platform | pile supported | special type (type to be stated)
• foundations	shallow | deep | gravity based
• materials	steel | reinforced concrete | natural stone | other stated
• surface	concrete | steel | asphalt | block paving | cement treated base | other stated
• infrastructure and port equipment	access roads | port facilities | site works | power lines | water supply | fuel storage| railroads | pipelines | container cranes | mobile harbour cranes | rail mounted gantry cranes | rubber tire gantry cranes | reachstackers | dockyard cranes | reefer racks | other stated
Project Complexity	
• positions	near shore | harbour | estuary | other stated
• water nature	sea | fresh | brackish
• tidal variation	(m | ft)
• crane loads	
• quay front load	(kN/m² | lb/ft²)
• quay rear load	(kN/m² | lb/ft²)
• significant wave height at site	(m | ft)
• contaminated sediment dredging	reuse | land disposal | dump at sea
• number of berths	
• total dredging volume	(m³ | yd³)
• soft dredging volume	(m³ | yd³)
• hard dredging volume	(m³ | yd³)
• spoil disposal volume	(m³ | yd³)

Project Attributes	Values
Nearshore Works **(Engineered | designed structures and facilities located nearshore for the purposes of land reclamation and coastal protection (excluding dams).)**	
Design life	(years)
Dimensions	
• berthing length or length of structure	(m | ft)
• width of structure	(m | ft)
• berthing draft at low water (CD)	(m | ft CD)
• height from seabed to deck	(m | ft)
Project Quantities	
Quay length + retaining height	(m + m | ft + ft)
Number of fenders	
Fender surface load	(kN/m² | lb/ft²)
Surface area of quayside	(m² | ft²)
Site area (area of land covered by permanent work including land reclaimed from the sea, excluding temporary working areas outside the site)	(hectares | acres)
Functional units	
• description and units to be provided where possible	

Table 21: Ports

Project Attributes	Values
Ports **(Engineered | designed structures and facilities to provide mooring for water transport.)**	
Code	
Local functional classification standard	
• name of standard	
• code number of construction	
Works	
Functional type	quay | wharf | pier | jetty | rubble mound breakwater | floating breakwater | marina | slipway | dry dock | dolphin | dredging & disposal | revetment | aids to navigation | stacking & storage yard | warehouse | passenger gangway | ferry pontoon | ferry terminal | ro-ro ramp | land removal | turning circle | other stated
Nature	new build | major adaptation | temporary
Environmental grade	
• grade and name of environmental certification	ISO 14001 | other stated
• status	targeted | achieved | none
Principal design features	
• bathymetry (seabed survey)	
• construction	sheet pile walls | gravity quay walls | receiving platforms | pile supported | special type (type to be stated)
• foundations	shallow | deep
• materials	steel | reinforced concrete | timber | stone or granular fill |rock | concrete armour | asphalt | GRP | rubber | granite | limestone | others stated
• surface	concrete | asphalt | green landscaping | granular fill | armour rock | pontoons | other stated
• surface load	ro-ro | container | dry-bulk | liquid bulk | breakbulk | offshore | fisheries | leisure | other stated
• support infrastructure	access roads | marine furniture | power lines | quayside power supply | water supply | fuel storage | waste compounds | wastewater treatment system | rail tracks | gantry cranes | straddle carriers | stacked reefer storage areas | portainers | storage silos | cargo pipelines | customs depots | port security facilities | conveyors | other stated
Project Complexity	
• positions	open sea | harbour | inland waterway | estuary | other stated
• water nature	sea | lake | river
• significant wave height at site	(m | ft)
• contaminated sediment dredging	reuse | land disposal | dump at sea
• total dredging volume	(m^3 | yd^3)
• soft dredging volume	(m^3 | yd^3)
• hard dredging volume	(m^3 | yd^3)

Project Attributes	Values
Ports **(Engineered | designed structures and facilities to provide mooring for water transport.)**	
• spoil disposal volume	(m^3 | yd^3)
• siting, permit and water licences	water quality monitoring | dump at sea licence | waste licence | planning permission | foreshore licence
• number of berths	
• characteristic bollard load	(tonnes | tons)
• characteristic imposed quay load	(kN/m^2 | lb/ft^2)
• characteristic berthing load through fenders	(tonnes | tons)
Design life	(years)
Altitude	
• average height of deck above or below sea level or deck level relative to CD	above | below (m | ft)
Dimensions	
• berthing length or length of structure	(m | ft)
• width of structure	(m | ft)
• berthing draft at low water (CD)	(m | ft)
Project Quantities	
Quay Length + height (from seabed to top of retaining structure)	(m + m | ft + ft)
Surface area of structure	(m^2 | ft^2)
Volume of breakwaters/dredging/ other stated	(m^3 | ft^3)
Site area (area of land covered by permanent work including land reclaimed from the sea, excluding temporary working areas outside the site)	(hectares | acres)
Functional units	(ships | passengers | tonnes | tons per year)

Table 22: Waterway works

Project Attributes	Values
Waterway works **(Engineered | designed Structures and facilities to alter/protect natural waterways and provide artificial water ways for water transport.)**	
Code	
Local functional classification standard	
• name of standard	
• code number of construction	
Works	
Functional type	canal | lock | lock gate | aqueduct | weir | diversion canal | dredging & disposal | artificial open channel | box culvert | piped culvert | inlet grille screen | gabion | bund | levee | dyke | embankment | groyne | rip-rap | sheet piled wall | reinforced concrete retaining wall | diaphragm wall | glass wall | cofferdam | flood barrier | demountable flood barrier | inflatable flood barrier | other stated
Nature	new build | major adaptation | temporary
Environmental grade	
• grade and name of environmental certification	ISO 14001 | other stated
• status	targeted | achieved | none
Principal design features	
• bathymetry (seabed survey)	
• construction	reinforced concrete | steel | timber | block | masonry | PVC | stone | soil or earth | armour | glass | pre-cast concrete sections | sheet piles | cofferdam | diaphragm wall | other stated
• foundations	shallow | deep
• materials	steel | reinforced concrete | timber | stone or granular fill | rock | concrete armour | asphalt | GRP | rubber | granite | limestone | bentonite slurry | polymer mud | other stated
• surface	concrete | asphalt | green landscaping | granular fill | armour rock | pontoons | other stated
• infrastructure	access roads | marine furniture | accommodation | power line | water supply | communications lock water basins | waste compound | wastewater treatment systems for major developments | other stated
Project Complexity	
• positions	river | inland waterway | estuary | other stated
• water nature	lake | river | other stated
• discharge, Q	(m^3/sec | ft^3/sec)
• flow velocity	(m/sec | ft/sec)
• depth of water, D	(m | ft)
• flood design level relative to local vertical datum	(m | ft)
• siting, permit and water licences	waste licence | planning permission | dump at sea permit | water quality monitoring

Project Attributes	Values
Waterway works **(Engineered | designed Structures and facilities to alter/protect natural waterways and provide artificial water ways for water transport.)**	
• contaminated sediment dredging	reuse | land disposal | dump at sea
• total dredging volume	(m^3 | yd^3)
• soft dredging volume	(m^3 | yd^3)
• hard dredging volume	(m^3 | yd^3)
• spoil disposal volume	(m^3 | yd^3)
Design life	(years)
Altitude	
• average height above | below local vertical datum	above | below (m | ft)
Dimensions	
• length of structure	(m | ft)
• width of structure	(m | ft)
• crest level relative to local vertical datum	(m | ft)
Project Quantities	
Length of structure	(m | ft)
Site area (area of land covered by permanent work including land reclaimed from the sea, excluding temporary working areas outside the site)	(hectares | acres)
Functional units	
• description and units to be provided where possible	

Table 23: Land formation and reclamation

Project Attributes	Values
Land formation and reclamation **(Pieces of land formed or reclaimed to provide land for future development or self-completed as parks, open plazas, parking lots, air-fields, etc. (roads, runways, railways, bridges, tunnels, treatment works, utilities within the boundaries of the land to be reported as Sub-Projects).)**	
Code	
Local functional classification standard	
• name of standard	
• code number of construction	
Works	
Functional type	district land bank | country park | rural park | open plaza | parking lot | air-field | other stated
Nature	new build | major adaptation | temporary
Environmental grade	
• grade and name of environmental certification	ISO 14001 | other stated
• status	targeted | achieved | none
Principal design features	
• surfacing	mainly soil | mainly paved | mainly planted
Project Complexity	
• position	all on existing land | all reclaimed | mainly on land | mainly reclaimed | elevated above water
• volume of concrete used (excluding wastage)	(m^3 | yd^3)
• volume of earthwork (excavated, dredged and filled)	(m^3 | yd^3)
Design life	(years)
Altitude	
• average height of land above sea level	(m | ft)
Project Quantities	
Total land area	(hectares | acres)

Part 4 Definitions

4.1 Defined terms

Acquisition Costs: All payments or considerations required to acquire/lease/purchase the land, property or existing Constructed Asset, and all other expenses associated with the acquisition, excluding physical construction.

Base Date: The date at which the individual Construction Costs in ICMS cost reports apply exclusive of Price Level Adjustments after that date. However, there can be a separate allowance for Price Level Adjustments under the Risk Allowances Group. A different date (the Common Date) applies to Life Cycle Costs.

Brownfield: A site that has been previously developed and that may contain contaminants.

Carbon dioxide equivalent (CO_2e): A metric expressing the impact of all greenhouse gases on a carbon dioxide basis.

Client: The person(s) or entity that pays for the works and services provided. This may include external clients as well as internal.

Climate change: A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods. (United Nations Framework Convention on Climate Change, 1992)

Coalition: The International Cost Management Standard Coalition, comprising not-for-profit organisations, each with a public interest mandate.

Common Date: The date to be used in conjunction with Life Cycle Costing, being a date not earlier than the completion of construction. All future cash flows occurring at different times are discounted or compounded as if the costs are incurred at that date.

Constructed Asset (or Asset): The output from any building or civil engineering project.

Construction Costs: Expenditures incurred as a direct result of construction including labour, materials, plant, equipment, site and head office overheads and profits as well as taxes and levies. They are the total price payable for all permanent and temporary works normally included in construction contracts, including goods or materials supplied by the Client for the Constructor to install.

Constructor: A collective term for the organisations (contractors, sub-contractors, service providers, suppliers) paid by a Client to implement the construction of a Project or part thereof, in some cases including providing funding, design, management, maintenance and operation services as applicable. In the context of other Life Cycle Costs after construction, it means the organisations undertaking the renewal or maintenance works.

Conversion Date: The date or dates at which any currency conversion was made.

Category: A division of Project or Sub-Project costs and/or carbon emissions into Acquisition, Construction, Renewal, Maintenance, Operation, and End of Life.

Code: The recommended numeric coding structure that may be used to uniquely identify Projects, Sub-Projects, Categories, Groups, and Sub-Groups within a submitted ICMS report.

Group: A division of a Category into broad groups to enable easy estimation or extraction of cost and/or carbon emissions data for quick, high-level comparison by design discipline or common purpose.

Cost Management Professional: A Service Provider competent to calculate, interpret, analyse, apportion and report using ICMS.

Demolition: The physical removal and disposal of a constructed asset.

Discount Rate: Factor or rate reflecting the time value of money that is used to convert cash flows occurring at different times (ISO 15686-5).

Discounted Cost: The resulting cost when the real cost is discounted by the real discount rate or when the nominal cost is discounted by the nominal discount rate (ISO 15686-5).

End of Life Costs: The net costs or fees for disposing of an asset at the end of its service life after deducting the salvage value and other income due to disposal, including costs resulting from disposal inspection, decommissioning and decontamination, demolition and reclamation, reinstatement, asset transfer obligations, recycling, recovery, disposal of components and materials, and transport and regulatory costs.

Escalation: A positive or negative factor or rate reflecting an estimate of differential increase/decrease in the general price level for a particular commodity, or group of commodities, or resources (ISO 15686-5).

External Costs: Costs associated with an asset that are not reflected in the transaction costs between provider and consumer, collectively referred to as Externalities. These costs may include business staffing, productivity, social impact costs and user costs and can be considered in a Life Cycle Cost analysis when explicitly identified (ISO 15686-5).

Externalities: Quantifiable cost or benefit that occurs when the actions of organisations and individuals have an effect on people other than themselves, e.g. non-construction costs, income and wider social and business costs (ISO 15686-5). In the context of carbon emissions, these are benefits or loads beyond the system boundary including reuse, recovery and recycling potential.

GEFA: Gross External Floor Area measured according to IPMS 1 (EXTERNAL) as set out in IPMS and provided in Appendix J.

GIFA: Gross Internal Floor Area measured according to IPMS 2 (INTERNAL) as set out in IPMS and provided in Appendix J.

Greenfield: A previously undeveloped site that contains no structures or contaminants.

Greenhouse gases: Any gases that contribute to the greenhouse effect that causes global warming. The primary greenhouse gases in the Earth's atmosphere are: carbon dioxide (CO^2), methane (CH_4), nitrous oxide (N_2O), ozone (O_3), chlorofluorocarbons (CFCs) and water vapour (H_2O).

ICMS: International Cost Management Standard.

Income: Money received from sales and other activities during the life of an Asset.

Inflation/Deflation: Sustained increase/decrease in the general price level of resources (ISO 15686-5).

IPMS (International Property Measurement Standards): The global standards that aim to enhance the transparency and consistency in the way property is measured across markets. It was developed by the IPMS Coalition, an independent group of professional bodies from around the world.

IPMS 1 (EXTERNAL): The Floor Area measured to the external extent of the External Walls and to any Notional Boundaries, External Floor Areas or Sheltered Areas (see Appendix J).

IPMS 2 (INTERNAL): The Floor Area measured to the internal extent of the Internal Dominant Face (IDF) and to any Notional Boundaries and External Floor Areas (see Appendix J).

Life Cycle Carbon Emissions (LCCE): Carbon emissions of a Constructed Asset or its parts throughout its life cycle from construction through use, operation, maintenance and renewal till the end of life or a shorter Period of Analysis, while fulfilling the performance requirements (see Figure 3).

Life Cycle Cost (LCC): Cost of a Constructed Asset or its parts throughout its life cycle from construction through use, operation, maintenance and renewal till the end of life or a shorter Period of Analysis, while fulfilling the performance requirements (see Figure 2).

Maintenance Cost: The total cost of labour, material and other related costs to retain a Constructed Asset or its parts so that it can perform its required functions (ISO 15686-5). Maintenance includes conducting corrective, responsive and preventative maintenance on a Constructed Asset or its parts and all associated management, cleaning, services, repainting, repairing or replacing of parts as needed for the Constructed Asset to be used for its intended purpose. It does not include Renewal Costs.

Major Adaptation: A one-off substantial modification/adaptation/extension of, or improvement to, the main parts of an existing Constructed Asset that is not classified as a Renewal.

Net Present Value or Cost: The sum of the discounted future cash flows (ISO 15686-5).

Nominal Cost: The expected price that will be paid when a cost is due to be paid, including estimated changes in price due to, for example, forecast change in efficiency, inflation or deflation and technology (ISO 15686-5).

Nominal Discount Rate: The factor or rate used to relate present and future money values in comparable terms, taking into account the general inflation/deflation rate.

Non-Construction Costs: Includes finance costs, service charges, parking charges and charges for associated facilities.

Occupancy Costs: Costs that arise exclusively as a result of the occupation of a Constructed Asset, including reception, library services and porterage. Occupancy Costs are part of the Non-Construction Costs.

Operation Costs: Costs incurred in running and managing a Constructed Asset during occupation , including administrative support services, rent, insurances, energy and other environmental/regulatory

inspection costs, taxes and charges.

Operator: The entity responsible for the running and operation of a Constructed Asset, whose costs should be included under the Operation Costs.

Optimism Bias: The demonstrated systematic tendency, whether consciously or unconsciously, for project business cases to overstate forecast benefits and understate the timescales and costs.

Period of Analysis: Period of time over which Life Cycle Costs are analysed as determined by the Client. It may cover the entire life (physical, technical, economic, functional, social, or legal life) or a selected stage or stages or periods of interest as required by the Client.

Present Day Value: Monies accruing in the future which have been discounted to account for the fact that they are worth less at the time of calculation (ISO 15686-5).

Price Level Adjustment: An allowance for the increases or decreases in the price levels, due to inflation or deflation, over a defined period.

Project Attributes and Values: Attributes being the principal characteristics of a Project or Sub-Project relating to time, cost, the scope of works, design, quality, quantity, procurement, location and other contextual features that might impact its life cycle cost. Values being standard set of descriptions and/or measurements for each of the Project Attributes.

Project Complexity: The relative intricacy of a Project or Sub-Project by reference to its form, design, site constraints, method or timing of construction, renewal, operation, maintenance or end of life activities.

Project Quantities: The physical quantities (numbers, lengths, areas, volumes and weights), functional quantities (capacities, inputs, outputs) and degree of repetition required to be captured in the Project Attributes and Values so the costs or carbon emissions of different projects or design schemes can be converted to a unit cost or carbon emission per the desired Project Quantity for evaluation and comparison. Both physical and functional quantities are required for each Project or Sub-Project.

Project: A single or series of construction intervention(s) with a single purpose or common purposes to create a series of or single Constructed Asset commissioned by a Client, or group of Clients, with a defined start and end date. A Project may comprise a number of Sub-Projects.

Real Cost: The cost expressed as a value at the Common Date, including estimated changes in price due to forecast changes in efficiency and technology, but excluding general price inflation or deflation (ISO 15686-5).

Real Discount Rate: The factor or rate used to relate present and future money values in comparable terms, not taking account of general or specific inflation in the cost of a particular asset (ISO 15686-5).

Reclamation: The process of changing waste land or land formerly under water into land that can be used.

Reinstatement: The process of returning a constructed asset to its original or intended state of use.

Renewal Costs: The costs of replacing a Constructed Asset and/or major components once they reach the end of their life, and which the Client decides are to be included in the capital rather than the revenue budget.

Reporting Date: The date at which the report describing construction or Life Cycle Costs or Carbon Emissions is compiled.

Risk Allowance: A quantitative allowance set aside as a precaution against risks and future needs to allow for the uncertainty of outcome. This may include an allowance for optimism bias and a contingency sum.

Risk: Probability of an event occurring multiplied by its consequences. Risks may have a positive or negative influence on a Project's outcome (ISO 15686-5).

Service Provider: Any organisation or individual providing advice or a service to a Client at any point in a Project's life including, but not limited to, project managers, architects, engineers, technical architects or engineers, surveyors, cost management and environmental professionals, constructors, facilities managers, planners, valuers, property managers, asset managers, agents and brokers.

Sub-Group: A division of a Group solely according to its functions, services, or common purposes to enable alternatives serving the same function to be compared, evaluated and selected.

Sub-Project: A subdivision of a Project that can be described by a single set of attributes and values.

Taxes and Levies: Mandatory costs taxed or levied in connection with any phase of the Project by national governments, states, municipalities or governmental organisations, whether paid by the Client, the Constructor or the Operator.

Whole Life Carbon Emissions: All significant and relevant initial and future carbon emissions and benefits of an asset, throughout its life cycle, while fulfilling the performance requirements.

Whole Life Costs: All significant and relevant initial and future costs and benefits of an asset, throughout its life cycle, while fulfilling the performance requirements.

4.2 Substructure and Structure Delineation

Figure 8: Substructure and Structure Delineation

Tunnels and tanks underground

Tanks above ground

Pipelines underground

Pipelines above ground

Wells and boreholes

Waste water treatment works, water treatment works, power-generation plants, chemical plants and refineries

Use the same principles as illustrated above

Figure 9: Dams and Reservoirs

Figure 10: Mining

Figure 11: Process Plant

Figure 12: Jetties and Breakwaters (cross sections)

Typical open piled pier/jetty

H.A.T. – Highest Astronomical Tide

M.H.W.S – Mean High Water Springs

M.H.W.N – Mean High Water Neaps

M.L.W.N – Mean Low Water Neaps

M.L.W.S – Mean Low Water Springs

L.A.T – Lowest Astronomical Tide

Typical rubble mound breakwater

PVD – Prefabricated Vertical Drains

Appendices

General Notes

a. Accepted alternative terms are separated with a vertical slash (|). Bullet points under Sub-Groups serve to illustrate the scope but without limitation.

b. In the case of projects where there are sub-projects, allocate costs and/or carbon emissions to their most relevant Sub-Project, Group and Sub-Group as far as possible without omissions or duplications. Add a separate Sub-Project called 'Common' to capture costs and/or carbon emissions that are common to all or most Sub-Projects and which should better be shown separately to permit reallocation in the appropriate way when the specific need arises.

c. Add a Sub-Group 'All Other Costs' or 'All Other Carbon Emissions' within the relevant Group to take account of the costs or carbon emissions of those Sub-Groups whose value is insufficient to warrant a separate Sub-Group (typically whose value is less than 5% of the relevant Group). The Code should end with '.999'.

d. All costs should represent those payable by the Client and include the payees' overheads and profits where applicable.

e. Include design fees payable by the Constructor under Construction | Renewal | Maintenance Costs in the Group and Sub-Group for which the design is provided, as much as possible, otherwise include in the 'Preliminaries | Constructors' site overheads | general requirements'.

f. Group costs and/or carbon emissions associated with preparatory or enabling work with the principal items they are serving.

g. (1) Group costs of ancillary items, such as temporary lateral supports/temporary drainage/dewatering/slope treatment and protection for earthwork, falsework/formwork/reinforcement for concrete work, ironmongery/hardware, fixing accessories, inline fittings for pipes/drains/conduits/cables, backing/screeding, painting/coating, spares, etc. with their principal items unless otherwise shown as a Sub-Group.
(2) Group costs of testing and commissioning with the relevant services. Include first-fill consumables
(3) Split costs and/or carbon emissions of composite or prefabricated work into the relevant Groups and Sub-Groups as much as possible to facilitate analysis and comparison.
(4) Include in the 'composite or prefabricated work' only if the composite or prefabricated work integrates different construction components across different Groups and Sub-Groups serving the functions of more than one Sub-Group and is priced without further breakdown in the contract.

h. Group costs and/or carbon emissions of pre-treatment, pre-finishes and built-in components (including services and equipment) with their relevant composite or prefabricated work.

i. Round off costs and/or carbon emissions suitably and commensurate with the accuracy of the amounts.

j. State 'Excluded' if the cost and/or carbon emission exists but is not reported. State 'N/A' (not applicable) if the cost and/or carbon emission does not exist.

k. Apportion the costs and/or carbon emissions of code [2 | 3 | 5].08–[2 | 3 | 5].10 into code [2 | 3 | 5].01–[2 | 3 | 5].07 in case of simplified presentation.

l. As the Project develops, the Risk Allowances under code [2 | 3 | 5].09 may be gradually expended and the expended allowances would be reflected in the costs and/or carbon emissions of other items. The allowances may be explicitly shown in the Constructor's contract build-up or reserved in the Client's own budget not known to the Constructor. For cost and/or carbon emission reports on actual costs and/or carbon emissions after construction, any surplus allowances should not be included.

m. The 'Design development allowance' under code [2 | 3 | 5].09 is an allowance in a pre-construction forecast estimate or plan for unforeseen extra costs and/or carbon emissions due to the development

of the design as it evolves. Once the design is complete, this allowance should become zero.

n. The 'Construction contingencies' under code [2 | 3 | 5].09 is an allowance for unforeseen extra costs and/or carbon emissions during construction. Typically, it is to cover unforeseen events after awarding a construction contract. After the completion of the final account for the construction contract, this allowance should become zero.

o. Typically, a pre-construction cost estimate may be prepared based on the price level at a certain date, which may be current at the time of preparing the estimate or at an earlier base date, with or without allowance for the possible increases or decreases due to inflation or deflation during construction. A construction contract may be priced based on the price levels at a certain Base Date around the time of tendering and permit adjustments for rises or falls in the costs during construction. A provisional allowance should be made inside or outside the contract for the possible increase or decrease and should gradually be replaced with the actual outcome. The 'Price Level Adjustments' under code [2 | 3 | 5].09 are to allow for the aforesaid possible change until the time of tendering, and further change during construction.

Appendix A – Acquisition Sub-Groups

- Carbon emissions are reported for Acquisition only if they are significant.

Table A-1: Acquisition Sub-Groups

Code		Description		Note
		Category (Level 2)	**AC | AE**	
		Group (Level 3)		
		Sub-Group (Level 4)		
1.		**Acquisition Costs (AC) | Acquisition Carbon Emissions (AE) (each Sub-Group includes Risk Allowances)**		
	01.	Site acquisition		
	01.010	Costs and premium required to procure site		
	01.020	Compensation to existing occupiers		
	01.030	Demolition, removal and modification of existing properties by way of payment to existing owners instead of carrying out physical work		
	01.040	Contributions for the preservation of heritage, culture and environment		
	01.050	Related fees to agents, lawyers, and the like		
	01.060	Related taxes and statutory charges		
	02.	Administrative, finance, legal and marketing expenses		
	02.010	Client's general office overheads		
	02.020	Client's project-specific administrative expenses: • in-house project management and design team • supporting project staff • project office venue, furniture and equipment if not included in Constructor's preliminaries | site overheads • stores and workshops • safety and insurances • staff training • accommodation and travelling expenses for in-house team and external parties		
	02.030	Interest and finance costs		
	02.040	Legal expenses		
	02.050	Accounting expenses		
	02.060	Sales, leasing, marketing, advertising and promotional expenses		
	02.070	Taxes and statutory charges related to sales and lease		
	02.080	License and permit charges for operation and use		

Appendix B – Construction | Renewal | Maintenance Sub-Groups: Buildings

- Carbon emissions are reported at the Sub-Group level by exception.

Table B-1: Construction | Renewal | Maintenance Sub-Groups: Buildings

Code		Description			Note
		Category (Level 2)	**CC | CE**	**RC | RE or MC | ME**	
		Group (Level 3)			
		Sub-Group (Level 4)			
2.		Construction Costs (CC) | Construction Carbon Emissions (CE)			
3.		Renewal Costs (RC) | Renewal Carbon Emissions (RE)			
5.		Maintenance Costs (MC) | Maintenance Carbon Emissions (ME			
		(CC | CE, RC | RE, and MC | ME share the same Groups below, so far as applicable. Those separated by ' | ' in [ ] are respective alternative terms.)			
	01.	Demolition, site preparation and formation			
	01.010	Site survey and ground investigation			
	01.020	Environmental treatment			
	01.030	Sampling of hazardous or useful materials or conditions			
	01.040	Temporary fencing			
	01.050	Demolition of existing buildings and support to adjacent structures			
	01.060	Site surface clearance (clearing, grubbing, topsoil stripping, tree felling, minor earthwork, removal)			
	01.070	Tree transplant			
	01.080	Site formation and slope treatment			
	01.090	Temporary surface drainage and dewatering			
	01.100	Temporary protection, diversion and relocation of public utilities			
	01.110	Erosion control			
	02.	Substructure			
	02.010	Foundation piling and underpinning: • mobilisation and demobilisation • trial piles and caisson • permanent piles and caisson • pile and caisson testing • underpinning			

Code		Description			Note
		Category (Level 2)	**CC | CE**	**RC | RE or MC | ME**	
		Group (Level 3)			
		Sub-Group (Level 4)			
	02.020	Foundations up to top of lowest floor slabs: • excavation and disposal • lateral supports • raft footings, pile caps, column bases, wall footings, strap beams, tie beams • substructure walls and columns • lowest floor slabs and beams (excluding and beyond basement bottom slabs) • lift pits • composite or prefabricated work			
	02.030	Basement sides and bottom: • excavation and disposal • lateral supports • bottom slabs and blinding • sides • vertical waterproof tanking, drainage blanket, drains and skin wall • horizontal waterproof tanking, drainage blanket, drains and topping slab • insulation • lift pits, sump pits, sleeves • composite or prefabricated work			
	03.	Structure			
	03.010	Structural removal and alterations			
	03.020	Basement suspended floors (up to top of ground floor slabs): • structural walls and columns • beams and slabs • staircases			
	03.030	Frames and slabs (above top of ground floor slabs): • structural walls and columns • upper floor beams and slabs • roof beams and slabs • staircases • fireproofing to steel structure			
	03.040	Tanks, pools, sundries			
	03.050	Composite or prefabricated work			
	04.	Architectural works | Non-structural works			
	04.010	Non-structural removal and alterations			

Code		Description			Note
		Category (Level 2)	**CC | CE**	**RC | RE or MC | ME**	
		Group (Level 3)			
		Sub-Group (Level 4)			
	04.020	External elevations: • non-structural external walls and features • external wall finishes except cladding • facade cladding and curtain walls • external windows • external doors • external shop fronts • roller shutters and fire shutters			
	04.030	Roof finishes, skylights and landscaping (including waterproofing and insulation): • roof finishes • skylights • other roof features • roof landscaping (hard and soft)			
	04.040	Internal divisions: • non-structural internal walls and partitions • shop fronts • toilet cubicles • moveable partitions • cold rooms • internal doors • internal windows • roller shutters and fire shutters • sundry concrete work			
	04.050	Fittings and sundries: • balustrades, railings and handrails • staircases and catwalk not forming part of the structure, cat ladders • cabinets, cupboards, shelves, counters, benches, notice boards, blackboards • exit signs, directory signs • window and door dressings • decorative features • interior landscaping • access panels, fire service cabinets • sundries			
	04.060	Finishes under cover: • floor finishes (internal and external) • internal wall finishes and cladding • ceiling finishes and false ceilings (internal or external)			

Code		Description			Note
		Category (Level 2)	**CC | CE**	**RC | RE or MC | ME**	
		Group (Level 3)			
		Sub-Group (Level 4)			
	04.070	Builder's work in connection with services: • plinth, bases • fire-proofing enclosure • hoisting beams, lift pit separation screens, lift shaft separator beams • suspended manholes • cable trenches, trench covers • sleeves, openings and the like not allowed for in 'Fittings and sundries'			
	04.080	Composite or prefabricated work			
	05.	Services and equipment			
	05.010	Heating, ventilating and air-conditioning systems/air conditioners: • seawater system • cooling water system • chilled water system • heating water system • steam and condensate system • fuel oil system • water treatment • air handling and distribution system • condensate drain system • unitary air-conditioning system • mechanical ventilation system • kitchen ventilation system • fume and smoke extraction system • anaesthetic gas-extraction system • window and split-type air conditioners • air-curtains • fans • related electrical and control systems • submissions, testing and commissioning			
	05.020	Electrical services: • high-voltage transformers and switchboards • incoming mains, low-voltage transformers and switchboards • mains and submains • standby system • lighting and power • uninterruptible power supply • electric underfloor heating • local electrical heating units • earthing/lightning protection and bonding • submissions, testing and commissioning			
	05.030	Fitting out lighting fittings			

Code		Description			Note
		Category (Level 2)	**CC | CE**	**RC | RE or MC | ME**	
		Group (Level 3)			
		Sub-Group (Level 4)			
	05.040	Extra low voltage electrical services: • information and communications technology system • staff paging/location • public address system • building automation • security and alarm • close circuit television • communal aerial broadcast distribution and the like • submissions, testing and commissioning			
	05.050	Water supply and drainage above ground or inside basement: • cold water supply • hot water supply • flushing water supply • grey water supply • cleansing water supply • irrigation water supply • rainwater disposal • soil and waste disposal • planter drainage disposal • kitchen drainage disposal • related electrical and control systems • submissions, testing and commissioning			
	05.060	Supply of sanitary fittings and fixtures (installation included in 'Water supply and above ground drainage' unless not separable from costs of 'Fittings and sundries')			
	05.070	Disposal systems: • refuse • laboratory waste • industrial waste • incinerator • submissions, testing and commissioning			
	05.080	Fire services: • fire hydrant and hose reel system • wet risers • sprinkler system • deluge system • gaseous extinguishing system • foam extinguishing system • audio/visual advisory system • automatic fire alarm and detection system • portable hand-operated appliances and sundries • related electrical and control systems • submissions, testing and commissioning			

Code		Description			Note
		Category (Level 2)	**CC | CE**	**RC | RE or MC | ME**	
		Group (Level 3)			
		Sub-Group (Level 4)			
	05.090	Gas services: • coal gas • natural gas • liquid petroleum gas • medical gas/laboratory gas • industrial gas/compressed air/instrument air • vacuum • steam • submissions, testing and commissioning			
	05.100	Movement systems: • lifts | elevators • platform lifts • escalators • travellators | moving walkways • conveyors • submissions, testing and commissioning			
	05.110	Gondolas			
	05.120	Turntables			
	05.130	Generators			
	05.140	Energy-saving features			
	05.150	Water and wastewater treatment equipment			
	05.160	Fountains, pools and filtration plant			
	05.170	Powered building signage			
	05.175	Audio/visual entertainment system			
	05.180	Kitchen equipment			
	05.190	Cold room equipment			
	05.200	Laboratory equipment			
	05.210	Medical equipment			
	05.220	Hotel equipment			
	05.230	Car park or entrances access control			
	05.240	Domestic appliances			
	05.250	Other specialist services			
	05.260	Builder's profit and attendance on services			
	06.	Surface and underground drainage			
	06.010	Surface water drainage			
	06.020	Storm water drainage			
	06.030	Foul and wastewater drainage			
	06.040	Drainage disconnections and connections			
	06.050	CCTV inspection of existing or new drains			
	06.060	Buried Process Pipe			

Code		Description			Note
		Category (Level 2)	**CC | CE**	**RC | RE or MC | ME**	
		Group (Level 3)			
		Sub-Group (Level 4)			
	07.	External and ancillary works			
	07.010	Permanent retaining structures			
	07.020	Site enclosures and divisions			
	07.030	Ancillary structures			
	07.040	Roads and paving			
	07.050	Landscaping (hard and soft)			
	07.060	Fittings and equipment			
	07.070	External services: • water supply • gas supply • power supply • communications supply • external lighting • utility disconnections and connections			
	08.	Preliminaries | Constructors' site overheads | general requirements			(j)
	08.010	Construction management including site management staff and support labour			
	08.020	Temporary access roads and storage areas, traffic management and diversion (at the Constructors' discretion)			
	08.030	Temporary site fencing and securities			
	08.040	Commonly shared construction plant			
	08.050	Commonly shared scaffolding			
	08.060	Other temporary facilities and services			
	08.070	Technology and communications: telephone, broadband, hardware, software			
	08.080	Constructor's submissions, reports and as-built documentation			
	08.090	Quality monitoring, recording and inspections			
	08.100	Safety, health and environmental management			
	08.110	Insurances, bonds, guarantees and warranties			
	08.120	Constructor's statutory fees and charges			
	08.130	Testing and commissioning			
	08.140	Extras for extreme climatic or working conditions (if priced separately according to local pricing practice)			
	09.	Risk Allowances			(j), (k)
	09.010	Design development allowance			(l)
	09.020	Construction contingencies			(m)
	09.030	Price Level Adjustments: • until tendering • during construction			(n)
	09.040	Exchange rate fluctuation adjustments			
	10.	Taxes and Levies			(j)
	10.010	Paid by the Constructor			
	10.020	Paid by the Client in relation to the construction contract payments			

Code		Description			Note
		Category (Level 2)	**CC | CE**	**RC | RE or MC | ME**	
		Group (Level 3)			
		Sub-Group (Level 4)			
	11.	Work and utilities off-site (including related risk allowances, taxes and levies)			
	11.010	Connections to, diversion of and capacity enhancement of public utility mains or sources off-site up to mains connections on-site: • electricity • transformers • water • sewer • gas • telecommunications			
	11.020	Public access roads and footpaths			
	12.	Production and loose furniture, fittings and equipment (including related risk allowances, taxes and levies)			
	12.010	Loose production, process and operating furniture, fittings and equipment not normally provided before completion of construction			
	12.020	Fixed production, process and operating furniture, fittings and equipment installed before completion of construction • production (including process and operating) equipment (including furniture and fittings) • related instrument and control systems • related safety and environmental control systems • related storage and transfer systems • services and equipment as described in Group 05 but dedicated to serve production equipment • surface and underground drainage as described in Group 06 but dedicated to serve production equipment • testing and commissioning • licences and certifications to start production • risks allowances • taxes and levies			
	13.	Construction-related consultants and supervision (including related risk allowances, taxes and levies)			
	13.010	Consultants' fees and reimbursable: • architects (architectural, landscape, interior design, technical, etc.) • engineers (geotechnical, civil, structural, mechanical, electrical and plumbing, technical, etc.) • project managers • surveyors (quantity surveying, land surveying, building surveying, cost engineering, etc.) • specialist consultants (environmental, traffic, acoustic, facade, BIM, etc.) • value management studies			
	13.020	Charges and levies payable to statutory bodies or their appointed agencies (in connection with planning, design, tender and contract approvals, supervision and acceptance inspections)			
	13.030	Site supervision charges (including their accommodation and travels)			
	13.040	Payments to testing authorities or laboratories			

Appendix C – Construction | Renewal | Maintenance Sub-Groups: Civil Engineering Works

- Carbon emissions are reported by exception at the Sub-Group level.
- A bullet indicates that the Sub-Group is likely to apply. Sub-Groups without a bullet can also be included if applicable.

Table C-1: Construction | Renewal | Maintenance Sub-Groups: Civil Engineering Works

Code		Description	Roads and runways	Railways	Bridges	Tunnels	Wastewater treatment works	Water treatment works	Pipelines	Wells and boreholes	Power generating plants	Chemical plants	Refineries	Dams and reservoirs	Mines and quarries	Offshore Structures	Near Shore Works	Ports	Waterway Works	Land formation and reclamation	Note
		Category (Level 2)																			
		Group (Level 3)																			
		Sub-Group (Level 4)																			
2.		Construction (CC | CE)																			
3.		Renewal (RC | RE)																			
5.		Maintenance (MC | ME)																			
		(CC | CE, RC | RE, and MC | ME share the same Groups below, so far as applicable. Those separated by '|' in [ ] are alternative terms for respective Groups)																			
	01.	Demolition, site preparation and formation																			
	01.010	Site survey and ground investigation	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	01.020	Environmental treatment	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	01.030	Sampling of hazardous or useful materials or conditions	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	

Code		Description	Roads and runways	Railways	Bridges	Tunnels	Wastewater treatment works	Water treatment works	Pipelines	Wells and boreholes	Power generating plants	Chemical plants	Refineries	Dams and reservoirs	Mines and quarries	Offshore Structures	Near Shore Works	Ports	Waterway Works	Land formation and reclamation	Note
		Category (Level 2)																			
		Group (Level 3)																			
		Sub-Group (Level 4)																			
	01.040	Temporary fencing	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	
	01.050	Demolition of existing structures and support to adjacent structures	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	
	01.060	Site surface clearance (clearing, grubbing, topsoil stripping, tree felling, minor earthwork, removal)	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	
	01.070	Tree transplant	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	
	01.080	General site formation and slope treatment (including embankments / cuttings required by more than one Sub-Project)	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	
	01.090	Temporary surface drainage and dewatering	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	
	01.100	Temporary access roads and storage areas (provided under an advance contract)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	01.110	Temporary protection, diversion and relocation of public utilities	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	01.120	Erosion control	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	

Code		Description	Roads and runways	Railways	Bridges	Tunnels	Wastewater treatment works	Water treatment works	Pipelines	Wells and boreholes	Power generating plants	Chemical plants	Refineries	Dams and reservoirs	Mines and quarries	Offshore Structures	Near Shore Works	Ports	Waterway Works	Land formation and reclamation	Note
		Category (Level 2)																			
		Group (Level 3)																			
		Sub-Group (Level 4)																			
	01.600	Water surface development (including common facilities and services, and dredge spoil recovery area)														•	•	•	•	•	
	01.601	Dredge spoil recovery area														•	•	•	•	•	
	01.620	Hydrographic / bathymetry surveys														•	•	•	•	•	
	01.630	Water quality monitoring														•	•	•	•	•	
	01.640	Excavation (of soft silt, peat, sands, gravels, clay, rock, etc., including mobilisation and demobilisation of excavators, blasting, transportation, disposal, reclamation, compaction and monitoring)														•	•	•	•	•	
	01.650	Dredging (of soft silt, peat, sands, gravels, clay, rock, etc., including mobilisation and demobilisation of dredgers and barges, blasting, transportation, disposal, reclamation, compaction and monitoring)														•	•	•	•	•	
	01.660	Special disposal and treatment of contaminated sediment														•	•	•	•	•	
	01.670	Reclamation or filling (with imported rock, concrete, or other hard materials)														•	•	•	•	•	

Code		Description	Roads and runways	Railways	Bridges	Tunnels	Wastewater treatment works	Water treatment works	Pipelines	Wells and boreholes	Power generating plants	Chemical plants	Refineries	Dams and reservoirs	Mines and quarries	Offshore Structures	Near Shore Works	Ports	Waterway Works	Land formation and reclamation	Note
		Category (Level 2)																			
		Group (Level 3)																			
		Sub-Group (Level 4)																			
	01.680	Reclamation or filling (with dredged materials)														•	•	•	•	•	
	01.690	Surcharging or consolidation of lands and monitoring of settlement														•	•	•	•	•	
	01.700	Habitat protection systems														•	•	•	•	•	
	02.	Substructure																			
	02.010	Embankments / cuttings (specifically required for the Project or Sub-Project)	•	•	•	•								•	•		•	•	•	•	
	02.020	Excavation, disposal and lateral supports (specifically to receive any substructure construction but excluding general site formation and slope treatment)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	02.025	Geotextile or other geomembranes															•	•	•	•	
	02.030	Trenching / common trenches	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	
	02.040	Drilling / boring				•			•	•				•	•	•	•	•	•	•	
	02.050	Piling / anchoring	•	•	•		•	•			•	•	•	•	•	•	•	•	•	•	
	02.060	Structural backfill / ground remediation	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	02.070	Earth-retaining structures	•	•	•	•								•	•		•	•	•	•	

Code		Description	Roads and runways	Railways	Bridges	Tunnels	Wastewater treatment works	Water treatment works	Pipelines	Wells and boreholes	Power generating plants	Chemical plants	Refineries	Dams and reservoirs	Mines and quarries	Offshore Structures	Near Shore Works	Ports	Waterway Works	Land formation and reclamation	Note
		Category (Level 2)																			
		Group (Level 3)																			
		Sub-Group (Level 4)																			
	02.080	Abutments / wing walls	•	•	•									•	•		•	•	•	•	
	02.090	Pile caps / footings / bases (nearest to the ground level or water level if constructed in water)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	02.100	Sub-base to pavements and rail track structures	•	•											•		•	•	•		
	02.110	Bases to supports for tanks, pipes, well heads and the like					•	•	•	•	•	•	•		•	•	•	•	•		
	02.120	Beds and surrounds to underground pipes					•	•	•	•	•	•	•			•	•	•	•	•	
	02.600	Pile retaining walls (combi walls / H-pile walls / secant piled walls • sheet piled walls • gravity quay walls • relieving platforms • pile supported structures • special types																•	•		
	02.610	Diaphragm walls																•	•		
	02.620	Quays / docks / wharfs / moorings / piers /dry dock structure foundations																•	•		

Code		Description	Roads and runways	Railways	Bridges	Tunnels	Wastewater treatment works	Water treatment works	Pipelines	Wells and boreholes	Power generating plants	Chemical plants	Refineries	Dams and reservoirs	Mines and quarries	Offshore Structures	Near Shore Works	Ports	Waterway Works	Land formation and reclamation	Note
		Category (Level 2)																			
		Group (Level 3)																			
		Sub-Group (Level 4)																			
	02.630	Marine anchor systems														•	•	•	•		
	02.640	Mooring dolphins															•	•	•		
	02.650	Breakwaters • cores • primary armour (interlocking units) • secondary armour															•	•	•	•	
	02.660	Rock revetments / gabions															•	•	•		
	02.670	Cofferdams															•	•	•		
	02.680	Bank protection																	•	•	
	03.	Structure																			
	03.010	Piers and towers			•										•						
	03.020	Suspension system			•										•						
	03.030	Decks			•																
	03.040	Bearings			•																
	03.050	Tunnel lining				•									•			•	•		
	03.060	Roads / track bases	•	•	•	•									•			•	•		
	03.070	Pavements	•	•	•	•												•	•		
	03.080	Service roads and approaches	•	•	•	•										•	•	•	•		

Code		Description	Roads and runways	Railways	Bridges	Tunnels	Wastewater treatment works	Water treatment works	Pipelines	Wells and boreholes	Power generating plants	Chemical plants	Refineries	Dams and reservoirs	Mines and quarries	Offshore Structures	Near Shore Works	Ports	Waterway Works	Land formation and reclamation	Note
		Category (Level 2)																			
		Group (Level 3)																			
		Sub-Group (Level 4)																			
	03.090	Parapets / edge treatment	•	•	•	•															
	03.100	Main structures (in case of land formation and reclamation, referring to those of project types not separately reported as Sub-Projects)					•	•	•	•	•	•	•	•	•	•	•	•	•		
	03.105	Service stations and houses for district utility services																•	•		
	03.110	Tanks, rigs, storage containers and the like					•	•	•	•	•	•	•		•	•	•	•	•	•	
	03.120	Supports for tanks, pipes and the like					•	•	•	•	•	•	•		•	•	•	•	•	•	
	03.130	Civil pipework					•	•	•	•		•	•	•	•	•	•	•	•	•	
	03.140	Valves and fittings					•	•	•	•		•	•	•	•	•	•	•	•	•	
	03.600	Seawalls															•	•		•	
	03.610	Lake and river lining																•	•		
	03.620	Prefabricated marine structures – off-site fabrication														•	•	•			
	03.630	Prefabricated marine structures – transport to site location														•	•	•			
	03.640	Prefabricated marine structures – installation on site location														•	•	•			

Code		Description	Roads and runways	Railways	Bridges	Tunnels	Wastewater treatment works	Water treatment works	Pipelines	Wells and boreholes	Power generating plants	Chemical plants	Refineries	Dams and reservoirs	Mines and quarries	Offshore Structures	Near Shore Works	Ports	Waterway Works	Land formation and reclamation	Note
		Category (Level 2)																			
		Group (Level 3)																			
		Sub-Group (Level 4)																			
	03.650	Slipways / gangways / linkways															•	•	•		
	03.660	Dock and lock gates																•	•		
	03.670	Pontoons															•	•	•		
	03.680	Coastal protection systems															•	•			
	03.690	Deck / surface structures (ground bearing or suspended concrete slabs)															•	•	•		
	03.700	Locks and guidance structures																•	•		
	03.710	Revetments															•				
	03.720	Flood defences															•	•	•		
	03.730	Navigational aids														•	•	•	•		
	03.740	Dry docks structures																•	•		
	03.750	Weirs																	•		
	03.760	Aqueducts																	•		
	04.	Non-structural works																			
	04.010	Non-structural removal and alterations	•	•	•	•	•	•	•	•	•	•	•	•	•						
	04.020	Non-structural construction					•	•	•	•	•	•	•	•	•						
	04.030	Running surface	•	•	•	•								•							

Code		Description	Roads and runways	Railways	Bridges	Tunnels	Wastewater treatment works	Water treatment works	Pipelines	Wells and boreholes	Power generating plants	Chemical plants	Refineries	Dams and reservoirs	Mines and quarries	Offshore Structures	Near Shore Works	Ports	Waterway Works	Land formation and reclamation	Note
		Category (Level 2)																			
		Group (Level 3)																			
		Sub-Group (Level 4)																			
	04.040	Signage, markings and the like	•	•	•	•								•	•						
	04.050	Gantries and the like	•	•	•	•									•						
	04.060	Safety facilities	•	•	•	•	•	•	•	•	•	•	•	•	•						
	04.070	Barriers / rails and means of access	•	•	•	•	•	•	•	•	•	•	•	•	•						
	04.080	Special equipment and fittings	•	•	•	•	•	•	•	•	•	•	•	•	•						
	04.090	Interior landscaping	•	•	•	•	•	•	•	•	•	•	•	•	•						
	04.100	Builders' work in connection with services	•	•	•	•	•	•	•	•	•	•	•	•	•						
	05.	Services and equipment																			
	05.005	District heating, ventilating and cooling systems																		•	
	05.010	Mechanical systems	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	05.020	Lighting systems	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		
	05.030	Illuminations	•	•	•	•									•		•	•	•		
	05.040	Low-voltage power supply	•	•	•	•	•	•	•	•	•	•	•		•			•	•		
	05.050	Cables/cable trays	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		
	05.060	Other electrical services	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		

Code		Description	Roads and runways	Railways	Bridges	Tunnels	Wastewater treatment works	Water treatment works	Pipelines	Wells and boreholes	Power generating plants	Chemical plants	Refineries	Dams and reservoirs	Mines and quarries	Offshore Structures	Near Shore Works	Ports	Waterway Works	Land formation and reclamation	Note
		Category (Level 2)																			
		Group (Level 3)																			
		Sub-Group (Level 4)																			
	05.070	Control systems and instrumentation • signalling systems • telecommunications systems	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		
	05.080	Pipe racks / supports (localised)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		
	05.090	Water supply and drainage above ground or inside underground construction (localised)	•	•	•	•	•	•			•	•	•	•	•		•	•	•		
	05.100	Refuse and waste disposal systems														•	•	•	•		
	05.110	Fire services	•	•	•	•	•	•			•	•	•	•	•	•	•	•	•		
	05.115	Gas services														•	•	•	•		
	05.120	Movement systems: lifts / elevators / conveyors	•	•	•	•	•	•			•	•	•	•	•	•	•	•	•		
	05.600	Boat lifts																•	•		
	05.610	Cranes / rigs/ rails															•	•	•		
	05.620	Under water / sea service pipe installation														•	•	•	•		
	05.630	Under water / sea electrical / data cabling														•	•	•	•		

Code		Description	Roads and runways	Railways	Bridges	Tunnels	Wastewater treatment works	Water treatment works	Pipelines	Wells and boreholes	Power generating plants	Chemical plants	Refineries	Dams and reservoirs	Mines and quarries	Offshore Structures	Near Shore Works	Ports	Waterway Works	Land formation and reclamation	Note
		Category (Level 2)																			
		Group (Level 3)																			
		Sub-Group (Level 4)																			
	06.	Surface and underground drainage																			
	06.010	Surface water drainage	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	
	06.020	Storm water drainage	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	
	06.030	Foul and waste water drainage	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	
	06.040	Pumping systems	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	
	06.050	Drainage connections	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	
	07.	External and ancillary works																			
	07.010	Site enclosures and divisions	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	
	07.020	Ancillary structures	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	
	07.030	Roads and paving (not amounting to a Sub-Project)	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•		
	07.040	Landscaping (hard and soft)	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	
	07.050	Fittings and equipment	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	
	08.	Preliminaries | Constructors' site overheads | general requirements																			(j)
	08.010	Construction management including site management staff and support labour	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	

Code		Description	Roads and runways	Railways	Bridges	Tunnels	Wastewater treatment works	Water treatment works	Pipelines	Wells and boreholes	Power generating plants	Chemical plants	Refineries	Dams and reservoirs	Mines and quarries	Offshore Structures	Near Shore Works	Ports	Waterway Works	Land formation and reclamation	Note
		Category (Level 2)																			
		Group (Level 3)																			
		Sub-Group (Level 4)																			
	08.020	Temporary access roads and storage areas, traffic management and diversion (at the Constructors' discretion)	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	
	08.025	Temporary concrete batching yard, precast concrete casting yard	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	
	08.030	Temporary site fencing and securities	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	
	08.040	Commonly shared construction plant	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	
	08.045	Marine plant and equipment (e.g. ships / barges / vessels, floating cranes, dredgers, floating drill rigs, cofferdams, caissons, etc.)														•	•	•	•		
	08.050	Commonly shared scaffolding	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	
	08.055	Workpeople living accommodation	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	08.060	Other temporary facilities and services	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	08.065	Mobilisation and demobilisation where significant and not elsewhere reported														•	•	•	•	•	
	08.070	Technology and communications: telephone, broadband, hardware, software	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	

Code		Description	Roads and runways	Railways	Bridges	Tunnels	Wastewater treatment works	Water treatment works	Pipelines	Wells and boreholes	Power generating plants	Chemical plants	Refineries	Dams and reservoirs	Mines and quarries	Offshore Structures	Near Shore Works	Ports	Waterway Works	Land formation and reclamation	Note
		Category (Level 2)																			
		Group (Level 3)																			
		Sub-Group (Level 4)																			
	08.080	Constructor's submissions, reports and as-built documentation	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	08.090	Quality monitoring, recording and inspections	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	08.100	Safety, health and environmental management	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	08.110	Insurances, bonds, guarantees and warranties	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	08.120	Constructor's statutory fees and charges	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	08.130	Testing and commissioning	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	08.140	Extras for extreme climatic or working conditions (if priced separately according to local pricing practice)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	09.	Risk Allowances																			(j), (k)
	09.010	Design development allowance	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	(l)
	09.020	Construction contingencies	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	(m)
	09.030	Price level adjustments • until tendering • during construction	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	(n)

Code		Description	Roads and runways	Railways	Bridges	Tunnels	Wastewater treatment works	Water treatment works	Pipelines	Wells and boreholes	Power generating plants	Chemical plants	Refineries	Dams and reservoirs	Mines and quarries	Offshore Structures	Near Shore Works	Ports	Waterway Works	Land formation and reclamation	Note
		Category (Level 2)																			
		Group (Level 3)																			
		Sub-Group (Level 4)																			
	09.040	Exchange rate fluctuation adjustments	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	10.	Taxes and Levies																			(j)
	10.010	Paid by the Constructors	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	10.020	Paid by the Client in relation to the construction contract payments	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	11.	Work and utilities off-site (including related risk allowances, taxes and levies)																			
	11.010	Connections to, diversion of and capacity enhancement of public utility mains or sources off-site up to mains connections on-site: • electricity • transformers • water • sewer • gas • telecommunications	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	11.020	Public access roads and footpaths	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	

Code		Description	Roads and runways	Railways	Bridges	Tunnels	Wastewater treatment works	Water treatment works	Pipelines	Wells and boreholes	Power generating plants	Chemical plants	Refineries	Dams and reservoirs	Mines and quarries	Offshore Structures	Near Shore Works	Ports	Waterway Works	Land formation and reclamation	Note
		Category (Level 2)																			
		Group (Level 3)																			
		Sub-Group (Level 4)																			
	12.	Production and loose furniture, fittings and equipment (including related risk allowances, taxes and levies)																			
	12.010	Loose production, process and operating furniture, fittings and equipment not normally provided before completion of construction	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	12.020	Fixed production, process and operating furniture, fittings and equipment installed before completion of construction	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	13.	Construction-related consultants and supervision (including related risk allowances, taxes and levies)																			

Code		Description	Roads and runways	Railways	Bridges	Tunnels	Wastewater treatment works	Water treatment works	Pipelines	Wells and boreholes	Power generating plants	Chemical plants	Refineries	Dams and reservoirs	Mines and quarries	Offshore Structures	Near Shore Works	Ports	Waterway Works	Land formation and reclamation	Note
		Category (Level 2)																			
		Group (Level 3)																			
		Sub-Group (Level 4)																			
	13.010	Consultants' fees and reimbursable: • architects (architectural, landscape, interior design, technical, etc.) • engineers (geotechnical, civil, structural, mechanical, electrical and plumbing, technical, etc.) • project managers • surveyors (quantity surveying, land surveying, building surveying, cost engineering, etc.) • specialist consultants (environmental, traffic, acoustic, facade, BIM, etc.) • value management studies	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	13.020	Charges and levies payable to statutory bodies or their appointed agencies (in connection with planning, design, tender and contract approvals, supervision and acceptance inspections)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	13.030	Site supervision charges (including their accommodation and travels)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	

Code		Description	Roads and runways	Railways	Bridges	Tunnels	Wastewater treatment works	Water treatment works	Pipelines	Wells and boreholes	Power generating plants	Chemical plants	Refineries	Dams and reservoirs	Mines and quarries	Offshore Structures	Near Shore Works	Ports	Waterway Works	Land formation and reclamation	Note
		Category (Level 2)																			
		Group (Level 3)																			
		Sub-Group (Level 4)																			
	13.040	Payments to testing authorities or laboratories	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	

Appendix D – Operation Sub-Groups

- Carbon emissions are reported at the Sub-Group level by exception.

Table D-1: Operation Sub-Groups

	Code	Description	
		Category (Level 2)	**OC | OE**
		Group (Level 3)	
		Sub-Group (Level 4)	
4.		Operation Costs (OC) | Operation Carbon Emissions (OE)	
	01.	Cleaning	
	01.010	External cleaning (routine and periodic)	
	01.020	Internal cleaning (routine and periodic)	
	01.030	Specialist cleaning (define type)	
	02.	Utilities	
	02.010	Fuel (state type: gas / electricity / oil and other fuel sources)	
	02.020	Water, drainage and sewerage	
	03.	Waste management	
	03.010	Waste collection and disposal	
	03.020	Recycling and savage	
	04.	Security	
	04.010	Physical security	
	04.020	Remote monitoring	
	05.	Information and communications technology	
	05.010	Communication systems	
	05.020	Specialist technology / sensors	
	06.	Operators' site overheads | general requirements	
	06.010	Administration	
	06.020	Property insurance	
	07.	Risk Allowances	
	07.010	Operation related (user definable)	
	07.020	Contractual obligations	
	08.	Taxes and Levies	
	08.010	Taxes	
	08.020	Levies	

Appendix E – End of Life Sub-Groups

- Carbon emissions are reported at the Sub-Group level by exception.

Table E-1: End of Life Sub-Groups

	Code	Description	
		Category (Level 2)	**EC | EE**
		Group (Level 3)	
		Sub-Group (Level 4)	
6.		End of Life Costs (EC) | End of Life Carbon Emissions (EE)	
	01.	Disposal inspection	
	01.010	Dilapidations report	
	01.020	Contractual hand-back obligations	
	02.	Decommissioning and decontamination	
	02.010	Shutdowns and decommissioning	
	02.020	Decontamination	
	03.	Demolition, reclamation and salvage	
	03.010	Demolition	
	03.020	Reclamation	
	03.030	Salvage	
	04.	Reinstatement	
	04.010	Agreed reinstatement works	
	04.020	Contractual obligations	
	05.	Constructors' site overheads | general requirements	
	05.010	Administration	
	05.020	Overheads (project specific)	
	06.	Risk Allowances	
	06.010	End of life specific (user definable)	
	06.020	Abnormal risks (user definable)	
	07.	Taxes and Levies	
	07.010	Taxes	
	07.020	Levies	
	07.030	Credit for grants	

Appendix F – Process Flow Charts

The process flow charts in this appendix provide the steps needed to present Life Cycle Costs and/or Carbon Emissions for a Project, programme or portfolio.

Figure F-1: Step 1

Figure F-2: Step 2

Level 3: Groups
Acqusition Costs and/or Carbon Emissions
Construction Costs and/or Carbon Emissions
Renewal Costs and/or Carbon Emissions Maintenance Costs and/or Carbon Emissions
Operation Costs and/or Carbon Emissions
End of Life Costs and/or Carbon Emissions
Note: Costs are reported for all cells at level 3; Carbon Emissions are reported at level 3 only for the cells coloured green.
01. Site acquisition
02. Administration, finance, legal and marketing expenses
01. Demolition, site preparation and formation
02. Substructure
03. Structure
04. Architectural works | non-structural works
05. Services and equipment
06. Surface and underground drainage
07. External and ancillary works
08. Preliminaries | Constructors' site overheads | general requirements
09. Risk Allowances
10. Taxes and Levies
11. Works and utilities off-site
12. Production and loose furniture, fittings and equipment
13. Construction-related consultants and supervision
01. Cleaning
02. Utilities
03. Waste management
04. Security
05. Information and Communication Technology
06. Operators' site overheads | general requirements
07. Risk Allowances
08. Taxes and Levies
01. Disposal inspection
02. Decommissioning and decontamination
03. Demolition and reclamation
04. Reinstatement
05. Constructors' site overheads | general requirements
06. Risk Allowances
07. Taxes and Levies
Classify each Cost into detailed reporting Sub-Group (required for Carbon Emissions only by exception)
Level 4 Sub-Groups (discretionary for Costs; required for Carbon Emissions by exception)

Appendix G – Cost Reporting Templates

- See Appendix H for carbon emission reporting template.

Specific notes for Appendix G

- Project Attributes and Values are not shown in this template but should be provided in the actual cost report.
- '$M' = $ million.

Table G-1: Template for Grand Summary for a Mixed Project

- Bring all costs to the Common Date, which is assumed to be not earlier than the completion of construction.
- State whether the payments at the time of payment are based on Real Costs or Nominal Costs. Take this into account when determining the Discount Rates and discounting factors. Different Discount Rates should be used for specific commodities subject to escalation beyond general price inflation or deflation.
- <P>, <Q>, <R>, <S> are different numbers of years lapsed.
- <T> is number of years of annual payments.

Item	Description	AC	CC	RC	RC	RC	OC	MC	EC	Total Cost
	Years lapsed after construction to incur one-time payment			**<P>**	**<Q>**	**<R>**			**<S>**	
	Number of years of annual payments after construction						**<T>**	**<T>**		
A	Project Qty and Discount Rate									
1	Buildings	IPMS 1 (EXTERNAL) Floor Area (m^2)								
		IPMS 2 (INTERNAL) Floor Area (m^2)								
2	Roads and runways	Paved Area (m^2)								
3	Railways	Route Length (km)								
4	Bridges	Surface Area of Deck (m^2)								
5	Tunnels	Volume of Excavation (m^3)								
6	Dams and reservoirs	Reservoir capacity (million m^3)								
7	Common (insert Qty's Attribute of main Project Type (Principal Sub-Project))									
8	Others	Discount rate used (% per annum)								
B	Total Cost $M brought to the Common Date (= D x E)									
1	Buildings									
2	Roads and runways									
3	Railways									
4	Bridges									
5	Tunnels									
6	Dams and reservoirs									
7	Common									

Item	Description		AC	CC	RC	RC	RC	OC	MC	EC	Total Cost
	Years lapsed after construction to incur one-time payment				<P>	<Q>	<R>			<S>	
	Number of years of annual payments after construction							<T>	<T>		
8	Total										
C	Unit cost $ / Project Qty (= B/A)										
1	Buildings	IPMS 1 (EXTERNAL)									
		IPMS 2 (INTERNAL)									
2	Roads and runways										
3	Railways										
4	Bridges										
5	Tunnels										
6	Dams and reservoirs										
7	Common										
D	One time or one annual payment $M at the time of payment										
1	Buildings										
2	Roads and runways										
3	Railways										
4	Bridges										
5	Tunnels										
6	Dams and reservoirs										
7	Common										
E	Discounting factor to bring one time or one annual payment from year of payment to the Common Date (using present value factor for RC and EC and present value in annuity factor for OC or MC)										
1	Buildings										
2	Roads and runways										
3	Railways										
4	Bridges										
5	Tunnels										
6	Dams and reservoirs										
7	Common										

Table G-2: Template for Construction Costs only for a Project

- Add columns for unit costs calculated using additional Project Quantities, if required.
- Replace 'Qty' in '$/Qty' with the unit of the Project Quantity.
- The Project Quantity to be IPMS 1 (EXTERNAL) and IPMS 2 (INTERNAL) floor areas, paved area, route length, surface area of deck, volume of excavation, reservoir capacity, etc.
- Give totals in the heading row.

Code	Description	<Insert Project Type>		
		$M	$/Qty	%
	Project Quantity		(insert Qty)	
			(insert Qty's Attribute)	
2.	Construction Costs (CC)			100%
2.01.	Demolition, site preparation and formation			
2.02.	Substructure			
2.03.	Structure			
2.04.	Architectural works | non-structural works			
2.05.	Services and equipment			
2.06.	Surface and underground drainage			
2.07.	External and ancillary works			
2.08.	Preliminaries | Constructor's site overheads | general requirements			
2.09.	Risk Allowances			
2.10.	Taxes and Levies			
2.11.	Work and utilities off-site			
2.12.	Production and loose furniture, fittings and equipment			
2.13.	Construction-related consultants and supervision			

Table G-3: Template for Construction Costs only for a Building Project

- Show unit costs per two Project Quantities, IPMS 1 (EXTERNAL) and IPMS 2 (INTERNAL) floor areas.

Code	Description	<insert Building Type>			
		$M	$/m²	$/m²	%
	Project Quantity		(insert area)	(insert area)	
			IPMS 1 (EXTERNAL) Floor Area (m²)	IPMS 2 (INTERNAL) Floor Area (m²)	
2.	Construction Costs (CC)				100%
2.01.	Demolition, site preparation and formation				
2.02.	Substructure				
2.03.	Structure				
2.04.	Architectural works | non-structural works				
2.05.	Services and equipment				
2.06.	Surface and underground drainage				
2.07.	External and ancillary works				
2.08.	Preliminaries | Constructor's site overheads | general requirements				
2.09.	Risk Allowances				
2.10.	Taxes and Levies				
2.11.	Work and utilities off-site				
2.12.	Production and loose furniture, fittings and equipment				
2.13.	Construction-related consultants and supervision				

Table G-4: Template for Total Capital Cost for a Project

- Give subtotals and totals in the heading rows

Code	Description	<Insert Project Type>				
		$M	$/Qty	% by	% by Category	% of Total
	Project Quantity		(insert Qty)			
			(insert Qty's Attribute)			
	Total Capital Cost (AC+CC)					100%
1.	Acquisition Costs (AC)					
2.	Construction Costs (CC)					
1.	Acquisition Costs (AC)				100%	
1.01.	Site acquisition					
1.02.	Administrative, finance, legal and marketing expenses					
2.	Construction Costs (CC)				100%	
2.01.	Demolition, site preparation and formation					
2.02.	Substructure					
2.03.	Structure					
2.04.	Architectural works | non-structural works					
2.05.	Services and equipment					
2.06.	Surface and underground drainage					
2.07.	External and ancillary works					
2.08.	Preliminaries | Constructor's site overheads | general requirements					
2.09.	Risk Allowances					
2.10.	Taxes and Levies					
2.11.	Work and utilities off-site					
2.12.	Production and loose furniture, fittings and equipment					
2.13.	Construction-related consultants and supervision					

Table G-5: Template for Total Capital Cost for a Building Project

Code	Description	<Insert Building Type>				
		$M	$/m²	$/m²	% by Category	% of Total
	Project Quantity		(insert area)	(insert area)		
			IPMS 1 (EXTERNAL) Floor Area (m²)	IPMS 2 (INTERNAL) Floor Area (m²)		
	Total Capital Cost (AC+CC)					100%
1.	Acquisition Costs (AC)					
2.	Construction Costs (CC)					
1.	Acquisition Costs (AC)				100%	
1.01.	Site acquisition					
1.02.	Administrative, finance, legal and marketing expenses					
2.	Construction Costs (CC)				100%	
2.01.	Demolition, site preparation and formation					
2.02.	Substructure					
2.03.	Structure					
2.04.	Architectural works | non-structural works					
2.05.	Services and equipment					
2.06.	Surface and underground drainage					
2.07.	External and ancillary works					
2.08.	Preliminaries | Constructor's site overheads | general requirements					
2.09.	Risk Allowances					
2.10.	Taxes and Levies					
2.11.	Work and utilities off-site					
2.12.	Production and loose furniture, fittings and equipment					
2.13.	Construction-related consultants and supervision					

Table G-6: Template for Life Cycle Costs for a Project

- $M as paid = amount at the time of payment. (The dark green cells represent the totals of $M as paid, which should be equal to the sums of (amount paid each time x number of payments), not just sums of (amounts paid each time).)
- $M NPV = $M as paid each time × Discounting Factor.
- Discounting Factors should take into account the effect of different times of payments made more than once. The $M NPV calculated in this way should therefore represent the totals.
- Different Discount Rates should be used for specific commodities subject to escalation beyond general price inflation or deflation.
- No entries are required for dark grey cells.

Code	Description	<Insert Project Type>					
		$M as paid	Discounting Factor	$M NPV	$/Qty	% by Category	% of Total
	Project Quantity				(insert Qty)		
					(insert Qty's Attribute)		
	Life Cycle Cost (CC plus NPV of RC, OC, MC, and EC)						100%
1.	Acquisition Costs (AC) [Part of Non-Construction Costs]						
2.	Construction Costs (CC)						
3.	Renewal Costs (RC)						
4.	Operation Costs (OC)						
5.	Maintenance Costs (MC)						
6.	End of Life Costs (EC)						
1.	Acquisition Costs (AC)					100%	
1.01.	Site acquisition						
1.02.	Administrative, finance, legal and marketing expenses						
2.	Construction Costs (CC)					100%	
2.01.	Demolition, site preparation and formation						
2.02.	Substructure						
2.03.	Structure						

Code	Description	<Insert Project Type>					
		$M as paid	Discounting Factor	$M NPV	$/Qty	% by Category	% of Total
	Project Quantity				(insert Qty)		
					(insert Qty's Attribute)		
2.04.	Architectural works | non-structural works						
2.05.	Services and equipment						
2.06.	Surface and underground drainage						
2.07.	External and ancillary works						
2.08.	Preliminaries | Constructors' site overheads | general requirements						
2.09.	Risk Allowances						
2.10.	Taxes and Levies						
2.11.	Work and utilities off-site						
2.12.	Production and loose furniture, fittings and equipment						
2.13.	Construction-related consultants and supervision						
3.	Renewal Costs (RC)					100%	
3.01.	Demolition, site preparation and formation						
3.02.	Substructure						
3.03.	Structure						
3.04.	Architectural works | non-structural works						
3.05.	Services and equipment						
3.06.	Surface and underground drainage						
3.07.	External and ancillary works						
3.08.	Preliminaries | Constructors' site overheads | general requirements						
3.09.	Risk Allowances						
3.10.	Taxes and Levies						
3.11.	Work and utilities off-site						

Code	Description	<Insert Project Type>					
		$M as paid	Discounting Factor	$M NPV	$/Qty	% by Category	% of Total
	Project Quantity				(insert Qty)		
					(insert Qty's Attribute)		
3.12.	Production and loose furniture, fittings and equipment						
3.13.	Construction-related consultants and supervision						
4.	Operation Costs (OC)					100%	
4.01.	Cleaning						
4.02.	Utilities						
4.03.	Waste management						
4.04.	Security						
4.05.	Information and Communication Technology						
4.06.	Operators' site overheads | general requirements						
4.07.	Risks Allowances						
4.08.	Taxes and Levies						
5.	Maintenance Costs (MC)					100%	
5.01.	Demolition, site preparation and formation						
5.02.	Substructure						
5.03.	Structure						
5.04.	Architectural works | non- structural works						
5.05.	Services and equipment						
5.06.	Surface and underground drainage						
5.07.	External and ancillary works						
5.08.	Preliminaries | Constructors' site overheads | general requirements						
5.09.	Risk Allowances						
5.10.	Taxes and Levies						
5.11.	Work and utilities off-site						

Code	Description	<Insert Project Type>					
		$M as paid	Discounting Factor	$M NPV	$/Qty	% by Category	% of Total
	Project Quantity				(insert Qty)		
					(insert Qty's Attribute)		
5.12.	Production and loose furniture, fittings and equipment						
5.13.	Construction-related consultants and supervision						
6.	End of Life Costs (EC)					100%	
6.01.	Disposal inspection						
6.02.	Decommissioning and decontamination						
6.03.	Demolition and reclamation						
6.04.	Reinstatement						
6.05.	Constructors' site overheads | general requirements						
6.06.	Risks Allowances						
6.07.	Taxes and Levies						

Table G-7: Template for Comparison Between Two Design Schemes for a Project

- Add columns for other schemes as appropriate.
- Only Construction Costs used for illustration.

Code	Description	Scheme A			Scheme B			B–A	
		$M	$/Qty	% of Total	$M	$/Qty	% of Total	$M	$/Qty
	Project Quantity		(insert Qty)			(insert Qty)			(insert Qty)
			(insert Qty's Attribute)			(insert Qty's Attribute)			(insert Qty's Attribute)
2.	Construction Costs (CC)			100%			100%		
2.01.	Demolition, site preparation and formation								
2.02.	Substructure								
2.03.	Structure								
2.04.	Architectural works | non-structural works								
2.05.	Services and equipment								
2.06.	Surface and underground drainage								
2.07.	External and ancillary works								
2.08.	Preliminaries | Constructors' site overheads | general requirements								
2.09.	Risk Allowances								
2.10.	Taxes and Levies								
2.11.	Work and utilities off-site								
2.12.	Production and loose furniture, fittings and equipment								
2.13.	Construction-related consultants and supervision								

Table G-8: Template for Comparison Between Two Design Schemes for a Building Project

Code	Description	Scheme A				Scheme B				B–A		
		$M	$/m²	$/m²	% of Total	$M	$/m²	$/m²	% of Total	$M	$/m²	$/m²
	Project Quantity		IPMS 1 (EXTERNAL) Floor Area (m²)	IPMS 2 (INTERNAL) Floor Area (m²)			IPMS 1 (EXTERNAL) Floor Area (m²)	IPMS 2 (INTERNAL) Floor Area (m²)			IPMS 1 (EXTERNAL) Floor Area (m²)	IPMS 2 (INTERNAL) Floor Area (m²)

Table G-9: Template for a Project Consisting of Various Parts

- A 'part' may be:
  - a Project within a collection, a programme, a portfolio, etc. of Projects
  - a Sub-Project of a Project
  - apartment blocks, hotel blocks, and external works of a mixed development
  - basement, podium, and tower of a building
  - a phase or contract package of a Project
  - in-situ construction and prefabricated construction of a Project or
  - any other sub-division to suit the need of the Project.
- Add a set of columns for 'Common' before the 'Total' to show the costs that may be commonly shared by all or most parts, and worthwhile to be shown separately for the time being to permit reallocation in the appropriate way when the need arises.
- Use landscape paper as appropriate.
- Only Construction Costs used for illustration.

Code	Description	Part A			Part B			Common			Total	
		$M	$/Qty	% of Total	$M	$/Qty	% of Total	$M	$/Qty	% of Total	$M	$/Qty
	Project Quantity		**(insert Qty)**			**(insert Qty)**			**(insert Qty)**			**(insert Qty)**
			(insert Qty's Attribute)			**(insert Qty's Attribute)**			**(insert Qty's Attribute)**			**(insert Qty's Attribute)**
2.	Construction Costs (CC)			100%			100%			100%		
2.01.	Demolition, site preparation and formation											
2.02.	Substructure											
2.03.	Structure											
2.04.	Architectural works | non-structural works											
2.05.	Services and equipment											

Code	Description	Part A			Part B			Common			Total	
		$M	$/Qty	% of Total	$M	$/Qty	% of Total	$M	$/Qty	% of Total	$M	$/Qty
	Project Quantity		(insert Qty)			(insert Qty)			(insert Qty)			(insert Qty)
			(insert Qty's Attribute)			(insert Qty's Attribute)			(insert Qty's Attribute)			(insert Qty's Attribute)
2.06.	Surface and underground drainage											
2.07.	External and ancillary works											
2.08.	Preliminaries | Constructors' site overheads | general requirements											
2.09.	Risk Allowances											
2.10.	Taxes and Levies											
2.11.	Work and utilities off-site											
2.12.	Production and loose furniture, fittings and equipment											
2.13.	Construction-related consultants and supervision											

Table G-10: Template for Handling Two Currencies

- Additional column may be added to show the conversion date.

Code	Description	<Insert Project Type>					
		Payment Currency A	Payment Currency B	Conversion Factor from A to B	Equivalent Currency A	Equivalent Currency A/Qty	%
	Project Quantity					(insert Qty)	
		A	B	C	A x C + B	(insert Qty's Attribute)	
2.	Construction Costs (CC)						100%
2.01.	Demolition, site preparation and formation						
2.02.	Substructure						
2.03.	Structure						
2.04.	Architectural works | non-structural works						
2.05.	Services and equipment						
2.06.	Surface and underground drainage						
2.07.	External and ancillary works						
2.08.	Preliminaries | Constructor's site overheads | general requirements						
2.09.	Risk Allowances						
2.10.	Taxes and Levies						
2.11.	Work and utilities off-site						
2.12.	Production and loose furniture, fittings and equipment						
2.13.	Construction-related consultants and supervision						

Table G-11: Template for Handling Many Currencies

- Additional column may be added to show the conversion date.
- The 'check sum' rows are to be used to verify calculations.

Code	Description	<Insert Project Type>				
		Payment Currency	Conversion Factor to A	Equivalent Currency A	Equivalent Currency A/ Qty	%
	Project Quantity				(insert Qty)	
		M	N	M x N	(insert Qty's Attribute)	
2.	Construction Costs (CC)					100%
2.01.	Demolition, site preparation and formation					
	Currency B					
2.02.	Substructure					
	Currency B					
2.03.	Structure					
	Currency B					
2.04.	Architectural works | non-structural works					
	Currency A					
	Currency B					
	Currency C					
2.05.	Services and equipment					
	Currency A					
	Currency B					
	Currency C					
2.06.	Surface and underground drainage					
	Currency B					
2.07.	External and ancillary works					
	Currency B					
2.08.	Preliminaries | Constructor's site overheads | general requirements					
	Currency A					
	Currency B					
2.09.	Risk Allowances					
	Currency A					
2.10.	Taxes and Levies					
	Currency B					
2.11.	Work and utilities off-site					
	Currency B					

Code	Description	<Insert Project Type>				
		Payment Currency	Conversion Factor to A	Equivalent Currency A	Equivalent Currency A/ Qty	%
	Project Quantity				(insert Qty)	
		M	N	M x N	(insert Qty's Attribute)	
2.12.	Production and loose furniture, fittings and equipment					
	Currency A					
	Currency B					
	Currency C					
2.13.	Construction-related consultants and supervision					
	Currency A					
	Currency B					
	Currency C					
	Check sum					
	Currency A					
	Currency B					
	Currency C					

Appendix H – Carbon Emission Reporting Templates

Table H-1: Carbon Emissions by Category

- This table enables carbon emissions to be reported against ICMS categories and is supported by Figure H-1 which maps stages of whole life carbon assessment against the categories. In principle each category should capture all the carbon emissions embodied or generated during the life of that category.
- Period of Analysis and Renewal Cycles are given in Project Attributes and Values.
- State 'Excluded', if excluded.

Names of carbon assessment standard(s) adopted for the project	
Names of carbon assessment tool(s) adopted for the project	
Source(s) of conversion factors (emission factors)	

Code	Category	<Insert Project or Sub-Project Type>	
		Emissions (tCO_2e)	tCO_2e/Qty
	Project Quantity		(insert Qty)
			(insert Qty's Attribute)
	Total Carbon Emissions		
1.	Acquisition Carbon Emissions (AE) (where significant)		
2.	Construction Carbon Emissions (CE)		
3.	Renewal Carbon Emissions (RE)		
4.	Operation Carbon Emissions (OE)		
5.	Maintenance Carbon Emissions (ME)		
6.	End of Life Carbon Emissions (EE)		
7.	Benefits and loads beyond the system boundary		

Figure H-1: How ICMS reporting maps to the stages associated with whole life carbon assessment (adapted from EN 15978: 2011 & PAS 2080:2016)

Table H-2: Carbon Emissions by Groups

- This table provides the means of reporting carbon emissions by Groups (ICMS Level 3). In any case, the carbon emissions by Categories (codes 1, 2, etc.) must match Table H-1.
- An indicative approach for allocating carbon emissions based on carbon assessment stages is provided in Figure H-1, using the carbon assessment stages presented in EN 15978 and its associated standards. The mapping between ICMS and EN 15978 or other frameworks used for carbon assessment is necessarily imperfect and may be changed at the user's discretion. However, any departures from Figure H-1 should be reported.
- In principle each Category or Group should capture all of the carbon emissions embodied or generated in each Group during the life of that Category.
- The quantities of materials or items of work or sources of emissions should be stated where possible to enable re-assessment based on other assessment standards and conversion factors if required.
- Emissions due to wastes and temporary work should be included.
- There is not yet a globally adopted set of emission factors. However, when making comparisons between more than one design option, benchmarking based on the same set of emission factors should be good enough. When it is necessary to make comparisons using another set of emission factors, the quantities can serve as the common base for applying the different sets of emission factors.

Code	Category and Group with Description of Material or Work Item with Source	<Insert Project Type>			
		Qty	Unit	tCO_2e / Unit	tCO_2e
	Total Carbon Emissions				
1.	Acquisition Carbon Emissions				
1.01.	Site acquisition (if significant)				
2.	Construction Carbon Emissions				
2.01.	Demolition, site preparation and formation				
2.02.	Substructure				
	e.g. by material or item of work inclusive of component materials (e.g. formwork instead of steel and timber)				
2.03.	Structure				
2.04.	Architectural works | non-structural works				
	e.g. by material or item of work inclusive of component materials (e.g. floor finishes instead of cement, lime and sand)				
2.05.	Services and equipment				
2.06.	Surface and underground drainage				
2.07.	External and ancillary works				
2.08.	Preliminaries | Constructors' site overheads | general requirements				
2.09.	Risk Allowances				
2.12.	Production and loose furniture, fittings and equipment				

Code	Category and Group with Description of Material or Work Item with Source	<Insert Project Type>			
		Qty	Unit	tCO_2e / Unit	tCO_2e
3.	Renewal Carbon Emissions				
3.01.	Demolition, site preparation and formation				
3.02.	Substructure				
3.03.	Structure				
3.04.	Architectural works | non-structural works				
3.05.	Services and equipment				
3.06.	Surface and underground drainage				
3.07.	External and ancillary works				
3.08.	Preliminaries | Constructors' site overheads | general requirements				
3.09.	Risk Allowances				
3.12.	Production and loose furniture, fittings and equipment				
4.	Operation Carbon Emissions				
4.01.	Cleaning (if significant)				
4.02.	Utilities				
4.03.	Waste management				
4.04.	Security (if significant)				
4.05.	Information and Communication Technology (if significant)				
4.07.	Risks Allowances				
5.	Maintenance Carbon Emissions				
5.01.	Demolition, site preparation and formation				
5.02.	Substructure				
5.03.	Structure				
5.04.	Architectural works | non-structural works				
5.05.	Services and equipment				
5.06.	Surface and underground drainage				
5.07.	External and ancillary works				
5.08.	Preliminaries				
5.09.	Risk Allowances				
5.12.	Production and loose furniture, fittings and equipment				
6.	End of Life Carbon Emissions				
6.02.	Decommissioning and decontamination				
6.03.	Demolition and reclamation				
6.04.	Reinstatement				

Code	Category and Group with Description of Material or Work Item with Source	<Insert Project Type>			
		Qty	Unit	tCO_2e / Unit	tCO_2e
6.05.	Constructors' site overheads | general requirements				
6.06.	Risks Allowances				
7.	Benefits and Loads beyond the system boundary (if reporting Whole Life Carbon Emissions)				

Appendix I – ICMS Coding Structure

- The codes are identical for costs and carbon emissions.
- Example Code: 01.2.03.030 = Costs or carbon emissions associated with Buildings: Construction: Structure: Frames and slabs (above top of ground floor slabs).
- Codes need be used only when considered desirable.

Table I-1: Level 1 Codes for Projects and Sub-Projects

01.	Buildings	11.	Chemical plants
02.	Roads and runways	12.	Refineries
03.	Railways	13.	Dams and reservoirs
04.	Bridges	14.	Mines and quarries
05.	Tunnels	15.	Offshore works
06.	Waste water treatment works	16.	Near shore works
07.	Water treatment works	17.	Ports
08.	Pipelines	18.	Waterway works
09.	Wells and boreholes	19.	Land formation and reclamation
10.	Power-generating plants		

Table I-2: Level 2 Codes for Categories

1.	Acquisition Costs (AC) [Part of Non-Construction Costs] | Construction Carbon Emissions (CE) [Part of Non-Construction Carbon Emissions]
2.	Construction Costs (CC) | Construction Carbon Emissions (CE)
3.	Renewal Costs (RC) | Renewal Carbon Emissions (RE)
4.	Operation Costs (OC) | Operation Carbon Emissions (OE)
5.	Maintenance Costs (MC) | Maintenance Carbon Emissions (ME)
6.	End of Life Costs (EC) | End of Life Carbon Emissions (EE)

Table I-3: Level 3 Codes for Acquisition Group

01.	Site acquisition
02.	Administrative, finance, legal and marketing expenses

Table I-4: Level 3 Codes for Construction | Renewal | Maintenance Groups

01.	Demolition, site preparation and formation
02.	Substructure
03.	Structure
04.	Architectural works | Non-structural works
05.	Services and equipment
06.	Surface and underground drainage
07.	External and ancillary works
08.	Preliminaries | Constructors' site overheads | general requirements
09.	Risk Allowances
10.	Taxes and Levies
11.	Work and utilities off-site

12.	Production and loose furniture, fittings and equipment
13.	Construction | Renewal | Maintenance-related consultancies and supervision

Table I-5: Level 3 Codes for Operation Groups

01.	Cleaning
02.	Utilities
03.	Waste management
04.	Security
05.	Information and Communications Technology
06.	Operators' site overheads | general requirements
07.	Risk Allowances
08.	Taxes and Levies

Table I-6: Level 3 Codes for End of Life Groups

01.	Disposal inspection
02.	Decommissioning and decontamination
03.	Demolition and reclamation
04.	Reinstatement
05.	Constructors' site overheads | general requirements
06.	Risk Allowances
07.	Taxes and Levies

Codes have been suggested in Appendices A to E for Level 4 Sub-Groups but these are discretionary.

Appendix J – Interface with International Property Measurement Standards (IPMS)

Please note: This appendix reflects the changes due to be made in *IPMS: All Building Asset Classes*. However, at the time of publication (November 2021) *IPMS: All Building Asset Classes* is at exposure draft stage and due to publish in 2022. Please refer to the International Property Measurement Standards Coalition (IPMSC) website for the latest changes. This appendix will be updated again when *IPMS: All Building Asset Classes* is published. Any advice provided to clients in the interim should be suitably caveated and highlighted.

Measurement of Floor Areas for Buildings for ICMS Cost Reports

The various cost analysis standards worldwide require the measurement of a Gross Floor Area (either External (GEFA) or Internal (GIFA)) or similar variations thereof to permit the representation of overall costs in terms of currency per floor area. However, even though the use of these terms is commonly understood, the definitions and interpretations of these terms are also subject to considerable regional variations. Measurement guidelines and definitions vary considerably between countries.

Linking ICMS with IPMS provides a valuable tool for overcoming these inconsistencies. ICMS require a cost report to include both GEFA (IPMS 1 (EXTERNAL)) and GIFA (IPMS 2 (INTERNAL)) measured in accordance with the rules set out in IPMS. IPMS are evolving on a Building-sector basis (offices, residential, retail, etc.). These rules are summarised below, but reference to the specific Standards for the Building type is recommended.

IPMS 1 (EXTERNAL): Gross external floor area	IPMS 2 (INTERNAL): Gross internal floor area
Use	
IPMS 1 (EXTERNAL) is used for measuring the area of a Building including External Walls. IPMS 1 (EXTERNAL) is a whole Building measurement and is consistent for all Building types.	IPMS 2 (INTERNAL) is a whole Building measurement that is used for measuring the interior boundary area of a Building. IPMS 2 (INTERNAL) is a whole Building measurement and is consistent for all Building types.
IPMS 1 (EXTERNAL): The Floor Area measured to the external extent of the External Walls and to any Notional Boundaries, External Floor Areas or Sheltered Areas.	**IPMS 2 (INTERNAL):** The Floor Area measured to the internal extent of the Internal Dominant Face (IDF) and to any Notional Boundaries and External Floor Areas.
Balustrade: A protective barrier such as a Wall, parapet, railings, or other construction feature that enables Floor Area with one or more open sides to be used safely.	
Boundary: A physical or non-physical line denoting the perimeter of an area to be measured.	
Building: A construction providing shelter from the environment for occupants or contents, partially or totally enclosed by a roof, designed to stand in one place and comprising all levels within the construction.	
Column: A Building member may also be known as a pillar, generally cylindrical or rectangular in shape, whose primary purpose is to provide structural support and having a maximum ratio of 4:1 comparing the longest and shortest horizontal dimensions.	
Covered Area: The extent of the area of a Building covered by one or more roof(s) and the perimeter of which is sometimes referred to as the drip line, being the outermost permanent structural extension, exclusive of ornamental overhangs.	
External Floor Area: An external horizontal structure at any floor level of a Building with a Balustrade to the open sides and including in this definition generally accessible balconies, colonnades (with balustrade), rooftop terraces, external galleries and loggias but excluding structures such as patios and Level 0 terraces when not integral to the structural construction of the Building.	
External Wall: The enclosing element of a Building, excluding appendages and ornamental features, which separates the interior area from the exterior.	

IPMS 1 (EXTERNAL): Gross external floor area	IPMS 2 (INTERNAL): Gross internal floor area
Finished Surface: The Wall surface directly above the horizontal wall-floor junction, ignoring any part-height walls, fittings, skirting boards, cable-trunking, pipework and heating or cooling units.	
Floor Area: The area of a normally horizontal, permanent, load-bearing structure, inclusive of areas occupied by Walls, Columns, stairs, staircase openings, lift shafts and other vertical penetrations, for all or part of each level of a Building.	
Internal Dominant Face (IDF): The inside surface area comprising more than 50 per cent of the lowest 2.75 metres measured vertically from the structural floor surface, or to the ceiling if lower, for each Wall Section. If such does not occur or, if the IDF is not vertical, the Finished Surface is deemed to be the IDF.	
Limited Use Areas: Areas in Buildings that are incapable of legal or effective occupation due to local or national legislation or practical circumstances.	
Mezzanine: An intermediate or partial floor that is usually fully or partially open on one or more sides.	
Notional Boundary: A non-physical line, that forms part or all of a Boundary.	
Sheltered Area: Any part of the Covered Area that is not fully enclosed where the permanent structural extension above provides effective shelter.	
Temporary Structure: A physical element within or attached to a Building installed on an interim basis, the removal of which would not damage the physical integrity of the Building.	
Wall: A normally vertical element, whether or not load-bearing, that separates one area from another.	
Wall Section: The lateral extent of each section of an External Wall or other external construction feature where the inside finished surface area of each part of a window, Wall or other external construction feature varies from the inside surface area of the adjoining window, Wall or external construction feature, ignoring the existence of any Columns.	
Measure and Calculate the Areas included	
Once the IPMS 1 boundary for each level of the Building has been determined, the boundary lines should be measured and the area within the boundary calculated on a level-by-level basis and/or may be apportioned into different sections of the area being measured. The resulting calculations determine the IPMS 1 for each level or section and these are added together to calculate IPMS 1 for the Building. Any reporting of IPMS 1 must state whether it is for the entire Building or only for one or more levels of the Building.	Once the IPMS 2 boundary for each level of the Building has been determined, the boundary lines should be measured and the Floor Area within the boundary calculated on a level-by-level basis and/or may be apportioned into different sections of the area being measured. The area of any atrium void above the lowest level is deducted at each level. The resulting calculations determine the IPMS 2 for each level or section and these are added together to calculate the IPMS 2 for the Building. Any reporting of IPMS 2 must state whether it is for the entire Building or only for one or more levels or sections of the Building.
Areas included but reported separately	
• Any area between a Notional Boundary and the external perimeter of External Walls • Sheltered Areas • External Floor Areas • Enclosed walkways or passages connecting separate Buildings • Enclosed roof-top plant such as mechanical, electrical and lift motor rooms • External stairs that lead to upper levels, excluding open framework fire escapes, which are excluded • Limited Use Area(s) not otherwise identified.	• Any area between a Notional Boundary and the Internal Dominant Face • External Floor Areas • Mezzanines • Enclosed walkways or passages connecting separate Buildings • Enclosed roof-top plant rooms such as mechanical, electrical and lift equipment rooms/elevator machine rooms • Limited Use Area(s) not otherwise identified.

Appendix K – Revision Notes for ICMS, third edition

- Expanded to incorporate the full scope of carbon emissions.
- Extended to include 'Offshore structures', 'Near shore structures', 'Ports', 'Waterway works', 'Land formation and reclamation' as Project Types.
- New section 2.5 added.
- 'Cost Categories', 'Cost Groups' and 'Cost Sub-Groups' replaced by 'Categories', 'Groups' and 'Sub-Groups'.
- New Table 3 added.
- New codes assigned and Categories renumbered.
- Sub-groups extended.
- Attributes extended.
- Definitions added.
- New Appendix H added.
- Subsequent appendices re-numbered.
- Bibliography updated.
- Colouring of tables revised.
- Colouring of Figures 8 to 12 changed.
- New Figure 7 added.
- New Figure 1 framework added.

Appendix L – Bibliography

International Standards

- Greenhouse Gas Protocol (GHGP)
- International Ethics Standards (IES)
- International Land Measurement Standards (ILMS)
- International Property Measurement Standards (IPMS)
- International Valuation Standards (IVS)

References

- EN 15804: 2012 *Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products*
- EN 15978:2011 *Sustainability of construction works – Assessment of environmental performance of buildings – Calculation method*
- Eurostat
- International Standard Industrial Classification of all Economic Activities (ISIC), Rev.4
- ISO 3166-2:2013 *Codes for the representation of names of countries and their subdivisions – Part 2: Country subdivision code*
- ISO 4217:2015 *Codes for the representation of currencies*
- ISO 6707-1:2014 *Buildings and civil engineering works – Vocabulary – Part 1: General terms*
- ISO 12006-2:2015 *Building construction – Organization of information about construction works – Part 2: Framework for classification*
- ISO 21930:2017 *Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services*
- ISO 15686-5:2017 *Buildings and constructed assets – Service life planning – Part 5: Life-cycle costing*
- PAS 2080: 2016 *Carbon Management in Infrastructure*
- Prices and purchasing power parities (PPP)
- Whole life carbon assessment for the built environment, RICS professional statement (2017)

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