



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

Responses to consultation and basis for conclusions

December 2021

Summary

In September 2020, the Standards Setting Committee (SCC) started the preparation of a third edition of ICMS (ICMS 3). There were three principal objectives:

1. to include carbon emissions
2. to add several more Project Types and
3. to incorporate feedback from the market on the second edition of ICMS (ICMS 2).

A public consultation of the draft took place from July to September 2021. In summary there were:

- 1,138 downloads of the draft PDF from the iConsult consultation website and
- 153 comments received from 30 named and other, unnamed participants

In addition to broadcasting the consultation widely, Coalition member organisations disseminated the draft to their members and other contacts.

The SCC considered and reviewed all the comments and formulated agreed responses. A comprehensive list of comments and the SCC's responses is provided in Appendix A, but a summary of the most important is provided below.

Not surprisingly, the majority of comments concerned carbon emissions, with the remainder falling into the following categories:

- clarifications relating to the new Project Types
- additions to Project Types, Attributes and Sub-Groups and
- detailed comments on definitions and wording.

Carbon emissions

Many respondents commented on the absence of guidance on the method of calculation of carbon emissions. Notwithstanding its topicality and social importance, the SCC was very conscious that the measurement of carbon emissions is an embryonic, and emerging discipline. As a result, there is as yet no internationally-accepted method of calculation. The aim of ICMS 3 is, therefore, to provide a single and consistent reporting framework for both costs and carbon emissions. This will for the first time allow exploration of the relationship between costs and carbon emissions. The requirement for users to state their method of calculation should allow proper comparisons of costs between projects to be made.

Several respondents expressed concern about the lack of consistency between ICMS 3 and other standards especially EN 15978 and PAS 2080. While a figure has been provided to map the relationship between ICMS and the stages defined in EN 15978 and PAS 2080, it is recognised that the map is imperfect, not least because the ICMS framework is constrained by the decision to maintain consistency between cost and carbon emissions reporting. As a result, users are required to report any deviations from the figure.

There was significant commentary on the scope of the ICMS. In order to maintain consistency between the cost and carbon emissions frameworks, ICMS is restricted to life cycle costs and carbon emissions. This means that externalities lie outside its scope. Thus issues such as sequestration, carbon credits and change

of land use are not reported within the ICMS framework, though they may be the subject of a separate report. Finally, to maintain consistency with the cost framework, ICMS classifies carbon emissions resulting from occupancy as externalities, although this view does not align with several relevant standards.

Clarifications relating to the new Project Types

ICMS 3 identifies five new project types that are not included in ICMS 2. Four of these are concerned with water and marine works where there is a specialised vocabulary. As a result of comments received, the SCC took extensive advice on the vocabulary that was most likely to be recognised internationally and where English is not the first language.

Additions to project types, attributes and sub-groups

Concerns were expressed that ICMS 3 makes no specific reference to Manufacturing or Process Plant Projects (except for Chemical Plants, Refineries, and Mines and Quarries). While Manufacturing and Process Plant Projects can be reported as a particular functional type of Building Project, the SCC will give further consideration to this omission in the preparation of the next edition.

Several respondents suggested additional attributes that should be included for some Project Types. There was reluctance on the part of the SCC to extend the amount of data collection demanded by the implementation of ICMS, noting that there were other opportunities for describing the defining project characteristics e.g. in the brief project description or where the attribute descriptor allowed the use of 'other stated'.

There were also numerous suggestions for the addition of further Sub-Groups. Again, the SSC was reluctant to extend the Sub-Groups because

- those identified in the Standard are designed to serve only as prompts and
- their use is discretionary.

One of the guiding principles adopted from the first edition was to err on the side of simplicity, and the SSC has attempted throughout to optimise the level of detail in relation to its added value.

Detailed comments on definitions and wording

A number of helpful comments were received relating to definitions and wording, particularly those associated with carbon emissions. As far as possible these were incorporated in the published edition, although the SSC remained conscious of the need to ensure the Standard was accessible to an international audience. As in previous editions, the overriding aim of the SSC was to use simple, plain, professionally-recognised language that can be easily translated and understood.

The SSC is extremely grateful for the many helpful comments it received on the draft Standard, and would like to thank all the professionals who spent time and effort downloading, reviewing and providing comments on the consultation document. There is no doubt that the final document has benefited from their advice.

Appendix A: Comments received during the consultation period

Comments have been arranged to reflect the structure of ICMS. Comments that were duplicated or similar to other comments have been omitted. In this way, the list of comments has been reduced from 153 to 111. The full text of the comments can be reviewed on request.

Comment number	Reference to consultation draft	Summary of comment received	Response from the ICMS Standard Setting Committee (SCC)
001	Section 1.1	The Standard has achieved what it set out to do in a thorough and user-friendly format. Although it is a lengthy Standard to read and absorb, it covers all points well. The integration of this Standard into use with BIM and other electronic forms of take-off software is the key to its universal use and user familiarity developing quickly. A repository of data from other worldwide projects is needed urgently. NZIQS confidently support version 3 of this Standard.	The SCC is grateful for the support of NZIQS.
002	Section 1.1	There are many cases of megaprojects and programs of works around the world that the Standard needs to allow for. I suggest adding two more levels above the project, i.e. L1 Portfolio, L2 Program, L3 Project then the remaining levels.	ICMS can sit and is intended to sit under any other more complex local or client classification system.
003	Section 1.1	It needs to be clear that post-construction operational performance and decommissioning and disposal costs and environmental performance is included within the scope.	Text added to clarify the scope.
004	Section 1.1	Initial thought only: the differences between currencies might lead to significant distortions, perhaps some kind of standard pricing model could be considered.	Agreed, but the SCC is not aware of any such model.
005	Section 1.1	Excellent introduction, giving good overview. Clear link to IPMS by reference to 'GEFA (IPMS1 (External))' – IPMS phraseology could usefully adopt this reference.	The SCC is grateful for this endorsement.

Comment number	Reference to consultation draft	Summary of comment received	Response from the ICMS Standard Setting Committee (SCC)
006	Section 1.1	<p>LETI and Carbon Leadership Forum and our work in Australia has identified that EN 15987:2011 has not contributed to the advancement of 'comparability' and should not be continued.</p> <p>Your proposal here for the organisation and measurement closely with ICMS is to be congratulated and supported in particular with the use of 15686-5 to establish credible estimates for 'use' phase (B1-5 EN 15987).</p> <p>The normalisation to a functional unit of both net and gross floor area is essential.</p>	The SCC is grateful for the endorsement. No action required.
007	Section 1.1	<p>It would be better to provide undated references to the standards for Building LCA and Construction Product EPD, as they are regularly revised and amended.</p> <p>Please also add the following standards:</p> <p>BS EN 15643:2021. <i>Sustainability of construction works – Framework for assessment of buildings and civil engineering works.</i></p> <p>EN 17472:2021. <i>Sustainability of construction works. Sustainability assessment civil engineering works. Calculation methods.</i></p> <p>ISO 21931-1:2010. <i>Sustainability in building construction – Framework for methods of assessment of the environmental performance of construction works – Part 1: Buildings</i></p> <p>ISO 21931-2:2019. <i>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.</i></p>	Text revised to reflect this comment.
008	Section 1.1	In relation to the standards for assessment of sustainability and environmental impacts, it may be better to provide undated references, as several of the standards quoted are currently being revised.	Text revised to reflect this comment.

Comment number	Reference to consultation draft	Summary of comment received	Response from the ICMS Standard Setting Committee (SCC)
009	Section 1.1	<p>Carbon Leadership Forum, Australian GBCA, RICS have all recognised that EN 15978:2011 has not served the industry at all. This is because the full LCA requirement and use of EPDs means that most calculators have been developed to measure the building in kilograms of materials. This is very problematic.</p> <p>I would urge you to consider reference to 15978 ONLY for the life stage characterisation.</p> <p>ISO 14067 carbon footprint of products and GHG protocol are clear and focused on carbon. I urge reconsideration to refer to these ISO standards and marry these with your outstanding measurement classification system noted here to provide a very robust and focused system to accelerate comparability.</p>	Text revised to reflect this comment. The Standard now makes it clear that it does not purport to suggest how carbon emissions should be measured.
010	Section 1.1	BIM and all of this paper trail will not make buildings more energy efficient. What will make the buildings energy efficient is better workmanship – particularly when it comes to installing insulation.	Regarded as a comment so no action required.
011	Section 1.1	Elaborate further on the link between BIM and ICMS (ISO 19650 Part 1 and 2).	ICMS coding, cost and CO ₂ values, can be used as additional fields in the Common Data Environment to support requested information of Asset Information Model and Project Information Model as described in ISO 19650 parts 1 and 2.
012	Section 1.2	I think we need to add a section about the 'why', It is important to sell the value to enhance utilisation. What are the benefits of adopting this Standard for different types of stakeholders like government bodies, financials, contractors, designers, clients, etc.	Covered in the 'Welcome to ICMS' section so no action required.

Comment number	Reference to consultation draft	Summary of comment received	Response from the ICMS Standard Setting Committee (SCC)
013	Section 1.2	<p>Although ICMS will provide the framework for reporting of carbon emissions, it does not provide guidance on the calculation of those emissions. To ensure that carbon emissions can be consistently and transparently benchmarked, it is necessary that a consistent methodology is used. EN 15978 does not provide consistency because it is for users to make assumptions for their building. The RICS professional statement (PS) <i>Whole life carbon assessment for the built environment</i> methodology does provide consistency to a greater extent but this really is most relevant only for the UK, as the defaults provided for the UK will not be relevant in many countries. In those countries, if assessments use different assumptions for their country (as suggested by the RICS PS) which are not consistently provided nationally, then the carbon emissions will not be consistent and benchmarking will not be possible.</p> <p>The ICMS should not overpromise consistency of carbon emissions calculation. It only provides the framework to ensure consistency is possible.</p>	<p>The SCC agrees with this comment, but recognises that no internationally-accepted standard method of calculation is available. By requiring users of ICMS to state their method of calculation, comparisons are possible though potentially laborious.</p> <p>Since the measurement of carbon emissions is an embryonic field, it is anticipated that ICMS 3 will need revising as the field develops. If at that time an internationally-accepted method of calculation is available we anticipate that reference will be made to it.</p>
014	Section 1.2	<p>While universally (incorrectly) used, the term 'carbon emissions' is not scientifically accurate. The correct term should be 'greenhouse gas emissions'. The emissions being referred to are more than just those related to carbon (i.e. methane, nitrous oxide) and the form is as a gas not the element carbon.</p>	Text changed to reflect this comment.
015	Section 1.2	<p>Again, the post-handover/operational performance and decommissioning needs to be in the scope of the framework.</p>	Text amended to reflect this comment.
016	Section 1.2	<p>Add that ICMS can be used for benchmarking as well.</p>	Already stated in the Standard so no action required.
017	Section 1.2	<p>This is a paper exercise assuming that the design can actually be built – they never learnt from the impossible H2 joint on the Taylor Woodrow Anglian large panel system (Ronan Point) – and that it is built correctly and maintained correctly.</p> <p>The first stage must be to ensure that the installations are checked for compliance, that insulation is installed correctly.</p>	Regarded as a comment so no action required.

Comment number	Reference to consultation draft	Summary of comment received	Response from the ICMS Standard Setting Committee (SCC)
018	Section 1.3	The existing standards for carbon assessment set out the requirements for reporting what has been included or excluded, and what data sources should be used. Perhaps ICMS should refer to the standards rather than set requirements here?	Since no internationally-recognised Standard exists, ICMS seeks to fill the gap.
019	Section 1.3	Once you have all of your theoretical documents make sure that they are on the cloud and remain fully accessible for the life of the building.	Regarded as a comment so no action required.
020	Section 1.3	Good to illustrate examples of applications.	Not considered to be appropriate for inclusion in the Standard.
021	Section 1.3	At funding stage, the operational costs and decommissioning costs and environmental cost must be considered. A cheaper plant to build may be more costly to operate and decommission in financial and environmental context.	Regarded as a comment so no action required.
022	Section 2.1	Sounds like a good idea, and may cover my comment on Process Plants, etc.	No response required.
023	Section 2.1	The life cycle stage needs to be defined to reflect the funding stages of the more complex projects and those stages need to be bypassed for the simple projects/ repeat projects, where the front-end considerations are far less.	The life cycle stages are defined in the standards referenced in ICMS 3, but users can map them on to their own project stages.
024	Section 2.1, Figure 1	Confused by the statement the: 'Occupancy Costs' are considered part of the 'Non-Construction Costs'. Surely 'occupancy costs' are part of the operational costs. Overall like the diagram makes sense.	Occupancy and Operation Costs are defined in Part 4. They are aligned with the standards referenced in ICMS 3 and with comments received during the consultation on ICMS 2.
025	Section 2.1, Figure 2	Like the alignment with the cost reporting, need to make sure Occupancy Emissions are in Operational category.	See response to comment 024.
026	Section 2.1, Figure 2	In my opinion, ACE sounds better than AE for Acquisition Carbon Emissions; CCE instead of CE for Construction Carbon Emissions; RCE instead of RE for Renewal Carbon Emissions; OCE instead of OE for Operation Carbon Emissions; MCE instead of ME for Maintenance Carbon Emissions; and ECE instead of EE for End of Life Carbon Emissions.	After careful consideration of all opinions expressed, the SCC decided to use the shorter abbreviations.

Comment number	Reference to consultation draft	Summary of comment received	Response from the ICMS Standard Setting Committee (SCC)
027	Section 2.1, Figure 2	<p>Concur but not that your reporting templates on p129 are inconsistent with this structure and must be changed to adopt exactly the life cycle cost reporting template. This adoption so that cost and carbon reported on the SAME table is the only practical way of progressing benchmarking and alignment to core cost planning process.</p> <p>A CRITICAL point to appreciate is that to be complete, a carbon assessment needs to marry unmeasured items (in \$) with measured items particularly at 'early/concept' stages. This is called 'hybrid' method. GHG protocol and ISO14067 allows – whereas ISO 14025 EN 15987 does not.</p>	<p>Templates amended to reflect this comment.</p> <p>There is no internationally-accepted method of measuring carbon emissions. For this reason, ICMS 3 does not suggest how carbon emissions should be measured, but requires the user to state the method used.</p>
028	Section 2.1, Figure 3	Need a category for, e.g. landscaping/ planting?	'Land formation and reclamation' project type includes the functional type of 'park' which may be used to deal with this. Otherwise, it can be reported under 'Other stated'.
029	Section 2.1, Figure 3	Is 'Project' singular or plural?	Text amended where necessary for consistency.
030	Section 2.1, Figure 3	Should there be a manufacturing plant category, i.e. cars, trucks/lorries, equipment, household items like fridges, etc.	Manufacturing and industrial project types can be reported as separate Projects or Sub-Projects with different functions within the project type 'Buildings'.
031	Section 2.1, Figure 3	Another good structural diagram at beginning of document.	Thank you for this comment.
032	Section 2.2	Should this wording not be included with the next item?	Addressed by the inclusion of a new Figure 1 in the Introduction Section 1.1.
033	Section 2.2	Ok as a starter, may need to go lower later.	No action required.
034	Section 2.2, Figure 4	Level 1 is singular and levels 2-4 are plural. Is there a reason? NB level 1 title implies there could be more than one Sub-Project in a Project?	Text amended where necessary for consistency. One Project may comprise several Sub-Projects.
035	Section 2.2, Table 1	See comment against Figure 3 re additional project type for manufacturing plant and also warehousing, offices and residential will be different project categories.	Manufacturing, industrial and other project types can be reported as separate Projects or Sub-Projects with different functions within the project type 'Buildings'. Future editions of ICMS may incorporate additional Project Types.

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036	Section 2.2, Table 1	Table 1: We (BCIS) remain concerned about the workability in practice of a list of Project Types which are mixed forms and functions. Our view is that Projects should be classified by Function while structures should be classified by Form. We have commented on this in detail in previous consultations.	The SCC responded to this comment in ICMS 2 <i>Responses to consultations and basis for conclusions</i> .
037	Section 2.2, Table 1	'Motorways' is British centric, prefer 'Highways' and 'Expressways', which is more international.	Text changed to reflect this comment.
038	Section 2.2, Table 1	While this approach to the structure is logical and is required for flexibility of Project Types, it contradicts the fact that the structure is around Project as L1 and then Category as L2, so where will the Sub-Project fit?	The current structure is retained for simplicity and consistency with earlier versions of ICMS.
039	Section 2.2, Table 2	Presentation very confusing. I think the coding should be indented like a WBS. 'Demolition, site preparation and formation' looks to be C5 01 I don't see it as part of C5 (Maintenance) but part of C2 (Construction/Pre construction). In addition, testing/commissioning/handover is a major part of any project and should have a sub-code.	Since this view does not seem to be shared by others, the SCC decided that no action is required. Cost Categories CC, RC and MC use the same Cost Groups. If a particular Cost Group is not applicable under a particular Cost Category, it can be left blank. Testing and commissioning is already included in several Groups and Sub-Groups, but can be added as a (discretionary) Sub-Group wherever the user considers necessary.
040	Section 2.2, Table 3	As for comment on Table 2, coding needs to be like WBS, enabling should be sub-code on construction not maintenance and there needs to be a sub-code for testing/commissioning/handover within construction.	See response to comment 039.
041	Section 2.2, Table 2	In 02 Substructures the impact of a varying water level, in some countries 15m and on some rivers 10m is important in the costing of the works whether it be a bridge or a wharf. The phrase 'nearest water level' needs fine tuning. In 08 there is no mention of mob or demob costs which for many marine projects is huge as are the carbon costs in shipping of gear to/from the site. The words 'temporary facilities' does not address this aspect.	Text amended to reflect this comment. Text amended to reflect this comment.
042	Section 2.2, Table 2	No mention of manufacture of components, insulation elements. For example, natural wool insulation versus rockwool.	Considered to represent too much detail.

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043	Section 2.2, Table 3	<p>Under E5 you have 01 demolition listed. Should this be somewhere else?</p> <p>It would be good if ICMS supported the separate reporting of embodied and operational carbon.</p> <p>For embodied, this is, for infrastructure, A0-A5, B1-B5, C1-C4. Currently A0 assumed to be zero for buildings and not currently included in EN 15978:2011 or RICS PS, so A1-A5, B1-B5, C1-C4.</p> <p>For operational, this is B6-B8 for infrastructure and B6-B7 for buildings, as B8 is not currently included in EN 15978 or RICS PS.</p> <p>We also commonly use upfront carbon which is A1-A5, but does not include sequestered carbon. In the RICS Professional Statement, sequestered carbon needs to be reported separately. Does the ICMS have a way in which both all emissions and removals, and the sequestered carbon can be reported separately?</p>	<p>Demolition is placed under E5 for consistency between the cost and carbon emissions breakdowns.</p> <p>Table H-1 has been amended to address as far as possible this and other comments.</p> <p>In ICMS 3, reporting is specifically limited to Life Cycle as distinct from Whole Life costs and carbon emissions. However, externalities such as sequestration can be reported separately if considered necessary.</p>
044	Section 2.2, Table 3	<p>* In most cases, carbon emissions associated with site acquisition will be negligible, and there is no need to report them unless they are significant. In that case, they should be reported only at Category Level 2 (Code E1) with a note explaining why they are significant.</p> <p>Has consideration been given to emissions of CO₂ from the change of use of the land?</p>	<p>Table H-1 notes that carbon emissions associated with site acquisition should be reported only if significant.</p> <p>Changes in carbon emissions arising from change in use of land would be regarded as externalities and therefore outside the scope of ICMS 3. They could, however, be reported additionally if considered necessary.</p>
045	Section 2.2, Sub-Groups (Level 4)	It would be useful to have Sub-Group appendix for chemical/process plant, and another one for manufacturing plant.	All production/process machinery and equipment should be reported under 'Production and loose furniture, fittings and equipment', whose scope has been re-defined.
046	Section 2.2, Sub-Groups (Level 4)	Reporting carbon emissions at Level 4 is not mandatory. However, where feasible, reporting carbon emissions at Sub-Group level could facilitate more detailed analysis.	Reporting at Level 4, though discretionary, may facilitate the calculations necessary for the mandatory reporting required at Level 3.
047	Section 2.2, Codes	Not sure what sub-code .100 to .700 are allocated to. Is this covered later?	For marine works, sub-codes jump-start from 700 on purpose to leave some placeholders for the non-marine works.
048	Section 2.3	Must consider the throughput of a plant as an attribute, as for a production plant that is a key attribute, and the associated energy and discharge requirements.	Agreed and already recognised in the Standard.

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049	Section 2.4	Life cycle means from inception via commissioning and operation to decommissioning and disposal/demolition.	Text revised to reflect this comment.
050	Section 2.4, Setting the scope of the Life Cycle Costs	Not to forget decommissioning post operation care and maintenance, demolition and disposal of resultant waste.	Already included in the End of Life Category.
051	Section 2.4, Expected asset life	This is a simplistic view. Individual buildings may have a single design life but complex infrastructure may have a number of design lives and service lives within each. It is not clear whether projects with multiple design lives should be broken into sub-projects aligning to individual design lives.	ICMS 3 requires a Project to be split into Sub-Projects if the Project is too large or complex to be described by a single set of attributes.
052	Section 2.4, Time value of money	This is an overly simplistic model. For investment appraisals and decisions (including valuations) to be properly informed, there should be multiple cash flows reacting to different risk profiles, different discount rates and expected design lives incorporating different service lives. These models will differ from time to time and place to place. Ultimately, the only one that counts is the one selected by the client, and this should be the basis of reporting.	ICMS 3 refers the user to ISO 15686-5:2017 for more information on the calculation of NPV, and requires the user to state the method used for economic appraisal.
053	Section 2.4, Net Present Value Calculations	Would be more clear with subscript and superscript.	Superscripts and subscripts already used.
054	Section 2.5, Measuring greenhouse gas emissions in terms of carbon dioxide (CO ₂) equivalent	This section should perhaps be clear that projects give rise to carbon emissions throughout the life of an asset, from the extraction, manufacture and transport of the construction products and materials used, through to the disposal and recovery of materials after demolition.	Text amended to reflect this comment.
055	Section 2.5, Measuring greenhouse gas emissions in terms of carbon dioxide (CO ₂) equivalent	We have to be careful the carbon emissions is absolute and is not adjusted by carbon offset.	No action required.

Comment number	Reference to consultation draft	Summary of comment received	Response from the ICMS Standard Setting Committee (SCC)
056	Section 2.5, Measuring greenhouse gas emissions in terms of carbon dioxide (CO ₂) equivalent	In the first paragraph of the carbon section (following) ICMS fails to mention that construction also emits a lot of particulate matter (namely PM10 & PM2.5.	The scope of ICMS 3 is limited to greenhouse gas emissions.
057	Section 2.5, Measuring greenhouse gas emissions in terms of carbon dioxide (CO ₂) equivalent	2 in CO ₂ and N ₂ O should be subscript throughout. 4 in CH ₄ should be subscript throughout.	Text amended accordingly.
058	Section 2.5, Whole Life Carbon assessment and management approach	The EU LifeLevel(s) framework offers a scope for measuring whole life carbon of buildings in its indicator 1.2 Lifecycle GWP (http://susproc.jrc.ec.europa.eu/product-bureau/sites/default/files/2021-01/UM3_Indicator_1.2_v1.1_37pp.pdf). This scope outlines the building elements to include when calculating the WLC of a building, and default replacement cycle periods (p. 29, Table 4). If this framework is to be adopted and promoted across the EU it would be useful to see it in alignment with ICMS.	Agreed, but the scope of ICMS 3 is limited to life cycle costs and carbon emissions, no action is required and its reporting framework is constrained by the decision to retain the framework adopted in the 1st and 2nd editions.
059	Section 2.5, Reporting carbon emissions alongside life cycle costs	The term 'operational carbon' is sometimes used to refer to the total carbon emissions associated with the operation, renewal and maintenance of an asset and includes whole life carbon stages B1-B5. Should this read '... stages B1-B7.' to include operational carbon and water use for a full analysis? B6 is usually the largest contributor to a building's WLC, particularly older buildings.	Text and Fig H-1 amended to reflect this comment.

Comment number	Reference to consultation draft	Summary of comment received	Response from the ICMS Standard Setting Committee (SCC)
060	Section 2.5, Reporting carbon emissions alongside life cycle costs	<p>'Embodied carbon' is more correctly referred to as embodied greenhouse gas emissions.</p> <p>'The total carbon emissions associated with the materials and products used, their transportation and the construction processes to create an asset are sometimes known as 'embodied carbon', corresponding to whole life carbon stages A1-A5. Embodied 'carbon' also includes stages B3-5, C1-4. This sentence should be revised to cover not just 'creation' but also repair, replacement, refurbishment, and end-of-life stages. The next sentence is also incorrect as operational 'carbon' does not include renewal. Distinguish between the terms 'use' and 'operational'.</p>	Text and Fig H-1 amended to reflect this comment.
061	Part 3, Table 4	<p>Other Sub-Projects might be storage facilities, or manufacturing facilities.</p> <p>The access problems are a bit too generic. If the Project is in a very remote region access is obviously difficult but you can also have difficult access in a built up area, with confined routes and laydown areas exist, with agreement with local authorities required. Perhaps there needs to be a generic statement like: 'City, Countryside, Desert, Jungle' and then use the difficult, average and easy criteria.</p>	<p>Storage or manufacturing facilities can be reported as a Building with a specific functional type. Future editions of ICMS may incorporate additional project types.</p> <p>The attribute 'Location and country' should address this comment. Other alternatives are considered to require an unwarranted level of detail.</p>
062	Part 3, Table 4	<p>Cradle to grave including benefits and loads beyond the system boundary (EN 15978 stages A1-C4)' – Change C4 to D.</p> <p>'Percentage of carbon emissions based on actual quantities (as opposed to forecasts)' – Not clear what this is.</p>	<p>Text amended to reflect this comment.</p> <p>Since this view does not seem to be shared by others, the SCC decided that no action is required.</p>
063	Part 3, Table 4	<p>The row for 'boundary of whole life carbon assessment' includes a typo where 'Module D' is mentioned but not included.</p> <p>Amend to (EN 15978 stages, A1-C4 and D)?</p>	Text amended to reflect this comment.

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064	Part 3, Table 5	<p>Methods of working: Confined working is unlikely to be the whole project but specific areas like basements. Suggest you add 1 shift, 2 shift or 3 shift (24-hour working), as this will influence the timescale and efficiencies on site.</p> <p>Functional Units: Suggest there are additional categories for production plants.</p>	<p>The SCC considered that any expansion of methods of working would introduce an unwarranted level of detail.</p> <p>ICMS 3 allows 'Other stated' to be included in Functional Units.</p>
065	Part 3, Table 5	<p>Environmental grade: Suggest the ISO 14001 be used as a basis for prompt levels.</p> <p>Project Complexity: Suggest the prompts should be: Novel Technology, Repeat technology scaled up or down/ Repeat technology/design adapted to new location, Repeat technology/design same location/jurisdiction.</p>	<p>Text amended to reflect this comment.</p> <p>The SCC considered that introducing the degree of novelty into project complexity would require an unwarranted level of detail.</p>
066	Part 3, Table 5	Possible omissions for railway stations, e.g. level of platforms, number of platforms etc.	The SCC considered that this expansion of attributes would introduce an unwarranted level of detail.
067	Part 3, Table 6	Environment: Suggest use ISO 14001 grade prompts.	Text amended to reflect this comment.
068	Part 3, Table 8	Tensioning: pre-tensioned, post-tensioned.	The SCC considered that this expansion of attributes would introduce an unwarranted level of detail.
069	Part 3, Table 12	<p>Principle Material Suggest Stainless Steel is an important addition for corrosive materials.</p> <p>Question: Not sure how shielded pipe ducts are handled as seen in nuclear works, often these are lined with SS cladding or coax pipe is used.</p>	Can be included under 'Other stated'.
070	Part 3, Table 14	Question: It could be useful to capture M3 of concrete M of pipe, no of cables/M of cable, etc. The amount of control IO is often a good measure.	These attributes can be captured under 'Brief project description'.

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071	Part 3, Table 15	<p>The following from Mines and Quarries is equally relevant:</p> <ul style="list-style-type: none"> * infrastructure <p>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</p> <ul style="list-style-type: none"> * waste handling and storage <p>waste handling waste storage tailings management facility</p> <ul style="list-style-type: none"> * reinstatement and closure <p>salvage rehabilitation of land pollution monitoring other stated</p>	Text amended to reflect this comment.
072	Part 3, Table 15	Contaminated Soil could be an issue on refinery modifications, when digging out the ground or demolishing plants some of the structure could have significant contamination particularly Metal processing or Nuclear.	Comment so no action required.
073	Part 3, Table 18	<p>Table 18 P56 Mines, Functional types</p> <p>This seems confused. Should diamonds be precious stones more generally? Suggest the following enumeration:</p> <ul style="list-style-type: none"> * Precious and semi-precious stones * Precious metals and their ores * Ferrous metals and their ores * Non-ferrous metals and their ores * Rock, stone and aggregates * Organic materials, coal, oil-shale, peat, guano and coprolites * Other non-metallic, inorganic materials. <p>There may need to be another category for 'rare earths' but we are not sure if the arrangements are significantly different to other non-ferrous metals. Advice is required from a mining expert.</p>	The Mining and Metals (M&M) industry already has terminology to address different types of mining. 'Other stated' can be used to expand the functional type if necessary.
074	Part 3, Table 19	<p>Table 19 P58 Offshore structures.</p> <p>Bathymetry: What is intended to be recorded against this? Should it be a reference to separate information about a bathymetry survey?</p>	Text refers to bathymetric survey. No further action is required.

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075	Part 3, Table 22	There must be environmental impacts with water ways.	Considered to be outside the scope of life cycle carbon emissions so no action required,
076	Part 3, Table 23	There must be environmental impacts on land reclamation and formation. There should be something to capture this.	Considered to be outside the scope of life cycle carbon emissions so no action required,
077	Section 4.1	Reference to chemical elements should have subscript numerals. Some titles need spaces added.	Text amended to reflect this comment.
078	Section 4.1	Definition of 'Client' and 'Constructor' includes reference to payment. Leaving aside the possibility that there may be no actual payment involved (because this document is primarily concerned with costs), it implies a direct contractual relationship between the Client and Constructor. This is not always the case. The (ultimate) Client is not always the Employer in a contractual sense, and the person who commissions the work may not be the same one that pays for it. Separately, 'Architect' is a title and not a role, consider 'Designer' instead?	The 'Client' has been defined as one who pays for the works and services provided, which is logical since ICMS relates to costs (and carbon emissions). It means the 'Employer' in the UK contractual terms, and may differ from the owner or the ultimate client. The terms 'architects' and 'engineers' have been used and are considered broad enough to cover the usual types of projects. 'Designer' on the other hand is more restrictive in the sense that a designer may not be a contract administrator or supervising officer, which is also a role sometimes assumed by architects and engineers.
079	Section 4.1	IPMS Floor areas We remain concerned about the use of Gross IPMS Floor Areas (both IPMS1 and 2) for benchmarking. We have commented on this in detail in previous consultations. In particular, IPMS states that all its components must be stated. On this basis, we do not think that ICMS complies with IPMS.	The SCC responded to this comment in ICMS 2 'Responses to consultations and basis for conclusions'.
080	Section 4.2, Figure 7	Manufacturing plants need adding to the box adjacent to the Wells and Bore holes.	Manufacturing plants may be covered as a functional type of building.
081	Section 4.2, Figure 11	Figure 11. It is not clear where the boundary between the structure and substructure lies. Is it intended to be the water surface, the seabed or some other datum? In the case of a structure standing on piles, the boundary should be at the top of the piles. This obviously needs further clarification to provide a workable solution to solid structures not standing on piles.	Text amended to reflect this comment.
082	Section 4.2, Figure 11	The acronymic annotations are not explained and seem very cryptic to someone unfamiliar with marine structures.	Text amended to reflect this comment.

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083	Appendices, General Notes	Are they 'codes' or 'cost codes'? Consistency needed.	Text amended to reflect this comment.
084	Appendix B	It sounds certain that legislation and regulations with set benchmarks for the percentage of building materials which are to be recycled materials. Doesn't the coding system need to be capable of easily identifying this, so the quantities and costs can be isolated for benchmarking and reporting purposes.	The scope of ICMS 3 is limited to a consistent breakdown structure for life cycle costs and carbon emissions, so no action is required.
085	Appendix B	<p>A few minor points;</p> <p>1) Shouldn't C3 and C5 be more aligned to the EN 15978 headings B1 to B5 for 'Building in Use'.</p> <p>2) Likewise, for the future, wouldn't it be helpful to align 'End of Life' with EN 15978's items C1-C4.</p> <p>3) Apologies if I missed it, but I also did not see a section for 'Off-setting' of carbon emissions (in the Client's overall budget) – carbon credits, garbology initiatives, etc.</p> <p>4) With the move to 'manufacture-and-reuse'/leasing materials (like Phillips is doing with lighting fixtures), which is part of circular economy, I don't see how the current structure allows us to separate the 'leased material' elements, which technically will become OPEX costs instead of CAPEX – something that would also need to be addressed in the reporting level structure.</p>	<p>The text has been amended to reflect comments 1 and 2.</p> <p>Since the scope of ICMS 3 is limited to a consistent breakdown structure for life cycle costs and carbon emissions, offsetting would not be reported within ICMS, but could be reported separately if necessary.</p> <p>This is an interesting point for future consideration, but would introduce an unwarranted level of detail into ICMS 3.</p>
086	Appendix B	In general, Client expenses are having very little detail and are very subjective.	The Client's project-specific administrative expenses are to be reported as Acquisition Costs. Some sub-items at Level 5 have been suggested, but they are not mandatory and can be adjusted to suit.
087	Appendix B	Where are costs allocated in case the Client has deliverables for the project?	The note to Table 2 states that 'costs reported should be those paid or payable by the Client and include the payees' overheads and profits, where applicable'. This applies no matter who incurs the original cost. Client deliverables would be reported under ICMS 3 provided they were within the defined scope of life cycle costs.

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088	Appendix B	We miss a specific section relating to Winter conditions/Weather additional cost during execution. In the Nordics, it is around 2% of total construction costs.	Text amended to reflect this comment.
089	Appendix B	2.02.020.050 Lowest floor slabs and beams (excluding basement bottom slabs). Doesn't it refer to tie beams under bottom slabs? If it refers to line/strip/beam foundations, aren't they already covered under. 2.02.020.030 Raft footings, pile caps, column bases, wall footings, strap beams, tie beams.	Typically, the lowest floor slabs and beams would be outside the footprint of the basement, i.e. the normal 'ground floor slabs and beams', so no action required.
090	Appendix B	There is a typo in the text and 2.02.020.060 Lift pits appears at the wrong line level.	Text amended to reflect this comment.
091	Appendix B	Where are the Curtain walls meant to be included? Under 2.04.020.030 Facade cladding?	Text amended to reflect this comment.
092	Appendix B	Is screeding considered under this section? 2.04.060.010 Floor finishes (internal and external) Non-structural screed	'Group costs of ancillary items, such as ... screeding ... with their principal items unless otherwise shown as a Sub-Group.' (General note 'g' to the Appendices).
093	Appendix B	Generally missing, no provision for (mostly focused on people-based buildings not Process Plants only touched on): * Process/manufacturing equipment and the infrastructure * Process control * Process storage systems C05. 050 – No provision for: * Process water feed systems C05. 070 – we should make it clear for Laboratory and Industrial waste disposal it covers: liquid, solid and gaseous discharges C05. 090 – No provision for: * Related instrument and control systems	The inclusion of Process Plants will be considered in a future edition of ICMS. The SCC considers that trying to include every possible Cost Sub-Group would be both impractical and lead to an unwarranted level of detail. Since Level 4 sub-groups are discretionary, the user can add any Sub-Groups that may be considered necessary.

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		<p>C05. 100 – No provision for:</p> <ul style="list-style-type: none"> * Process related transfer and storage systems (e.g. AGV's, in process storage, pipe/duct transfer for fluid or granules, crane as part of transfers or production as in the shipbuilding industry/nuclear industry, etc.) * Product related transfer and storage systems (i.e. transfer pipes to other plants or sites for fluid, granules or gases) <p>C05. 110 to 260 – No provision for:</p> <ul style="list-style-type: none"> * Process/manufacturing equipment and the infrastructure equipment * Process and safety and environmental control equipment * Process and Product storage systems * Process waste treatment facilities, which can be for gaseous, solid or liquid arisings, which often have to be treated on site before discharge/disposal <p>C11. 010 – No provision for:</p> <ul style="list-style-type: none"> * Process/manufacturing waste discharges (liquid, gaseous, etc.) * Process product transfer system liquid or gaseous (i.e. transfer from aviation fuel tank farm to airport) <p>C13. 010 – No provision for:</p> <p>Licence to operate fees:</p> <ul style="list-style-type: none"> * Fire certification * Environmental certification * Safety certification. * Nuclear plant Notice of No Objection to operate * etc. 	
094	Appendix B	<p>This section should only include for:</p> <p>Under building and just surrounding building</p> <p>Is this right?</p> <p>2.06 Surface and underground drainage</p>	This is correct so no action is required.
095	Appendix B	<p>Will this section:</p> <p>2.07.070.010 Water supply</p> <p>Also cover for: drainage, sewage, etc.</p>	Drainage and sewage should be reported under Group 06: 'Surface and underground drainage'.

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096	Appendix C	In the printable versions, consider having the table header row on all pages of table C1.	Text amended to reflect this comment.
097	Appendix D	<p>Need to cover:</p> <ul style="list-style-type: none"> * CO3 Waste management – need to cover process waste treatment facilities, which can be for gaseous, solid or liquid arisings, which often have to be treated on site before discharge/disposal * C05 Information technology – need to cover process and safety and environmental control equipment * CO8 Taxes and Levies – need to cover Re certification of operating licences * Fire certification * Environmental certification * Safety certification. * Nuclear plant Notice of No Objection to operate (Part of this will be the COSR – the Continuous Operation Safety Report process) * etc. 	<p>The inclusion of Process Plants will be considered in a future edition of ICMS.</p> <p>The SCC considers that trying to include every possible Cost Sub-Group would both be impractical and lead to an unwarranted level of detail. Level 4 Sub-Groups are discretionary and serve only as prompts. The user can add any additional Sub-Groups that may be considered necessary.</p>
098	Appendix E	There will be a period of care and maintenance of the building and structures and equipment during the decommissioning phase pending making ready for demolition, particularly on a nuclear plant, where active plant has to be decontaminated before removal.	Agreed, but covered under End of Life, so no action required.
099	Appendix F, Figure F-2	<p>Level 1 Project</p> <p>+E77+D78:E83+D78:E85+D78:E86+D78:E87+D78:E86+E77+D78:E83+D78:E85+D78:E86+D78:E87+D78:E88+D78:E87+D78:E88 +E77+D78:E83+D78:E89+D78:E90+D78:E91+E77+D78:E83+D78:E90+D78:E91+D78:E90+D78:E91+D78:E90</p>	Spreadsheet not included in ICMS 3.
100	Appendix F, Figure F-2	Level 2 – C – should include 'Construction'?	Text amended to reflect this comment.
101	Appendix G, Table G-8	Not enough granulation to compare a Process Plant floor area not applicable measure.	Unit costs can be normalised by functional units instead of floor areas, as appropriate.

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102	Appendix H, Figure H-1	<p>The TC350 framework now includes A0 – Preconstruction Stage – non-physical processes before construction, preliminary studies, tests, acquisition of land/site and design. This would be equivalent to E1.</p> <p>The diagram should be updated to reference EN 15643:2021 and needs to include A0 and also B8 (Users Activities). A0 is used in infrastructure studies according to PAS 2080 and EN 17472. It is currently assumed to be negligible for buildings.</p> <p>For B8, it is not clear whether these emissions are assessed by ICMS – but this would include the use of energy for equipment such as computers, desk lamps, etc. not 'connected' to the building, and for infrastructure, the emissions of the cars using a road.</p> <p>All emissions should be split between A0 and A5, and reported as such in E1 for A0 and E2 for A5.</p> <p>Emissions reported in B1 include the uptake of carbon dioxide by concrete, the emission of blowing agents from insulation foam and fugitive emissions of refrigerant. These are very much 'embodied impacts' rather than 'operational impacts' and should not be included in an overall 'operational' carbon grouping. This is because benchmarks and targets are set for embodied carbon (B1-B5) and these will always include B1 emissions. If ICMS groups emissions differently then it will not be possible to make use of existing benchmarks.</p>	Text, Figures and Tables have been amended to reflect these comments as far as possible. However, changes are constrained by the decision to maintain the same reporting framework for costs and carbon emissions.
103	Appendix H, Table H-1	CO ₂ should have subscript 2.	Text amended to reflect this comment.
104	Appendix H, Table H-1	B8 (Users' Activities) should be added as part of E4. This is included in the TC350 framework and PAS 2080.	The SCC carefully considered this and similar comments, and has decided, for the sake of consistency between this 3rd and earlier editions of ICMS, and between costs and carbon emissions, that occupancy (users' activities) should be regarded as an externality, and therefore lie outside the scope of ICMS 3, which is limited to life cycle costs and carbon emissions.

Comment number	Reference to consultation draft	Summary of comment received	Response from the ICMS Standard Setting Committee (SCC)
105	Appendix H, Table H-1	<p>E2 Construction Carbon Emissions – needs either to extend sub-category A5 to include 'testing and commissioning and operational licensing' or create a new sub-category.</p> <p>E4 Operational Carbon Emissions – needs a sub-category for 'Process waste arising treatment and disposal'.</p> <p>E5 Maintenance Carbon Emissions – needs a sub-category for 'Plant upgrade/ refurbishment'.</p> <p>E4 End of Life Carbon Emissions – C1 Deconstruction, Decommissioning should be extended to include 'Care and Maintenance'.</p>	<p>Testing and commissioning and licensing are included in Sub-Group 12.020.</p> <p>Level 4 Sub-Groups are discretionary and serve only as prompts. The user can add any additional sub-groups that may be considered necessary.</p>
106	Appendix H, Table H-1	<p>Stage B1 is associated with direct emissions and removals from the construction products and components during their use. These emissions and removals are not usually classified as 'Operational' and would usually count as part of the 'embodied carbon' of buildings and structures.</p> <p>Should B1 emissions/removals be classified separately?</p>	<p>Text, Figures and Tables have been amended to reflect these comments as far as possible. However, changes are constrained by the decision to maintain the same reporting framework for costs and carbon emissions.</p>
107	Appendix H, Figure H-1	<p>There is usually an additional B8 stage considered in civil engineering and infrastructure assessments known as 'Users Utilization'. It is mainly associated with the impacts of users of a service (e.g. emissions of cars using a road, trains in a station, etc.). There may be a need to think about the worth of adding such stage to the Standard. It can be made optional!</p>	<p>Text, Figures and Tables have been amended to reflect these comments as far as possible. However, changes are constrained by the decision to maintain the same reporting framework for costs and carbon emissions.</p>

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108	Appendix H, Table H-2	<p>A0 needs to be added instead of A5 for E1. A5 includes the manufacture, transport and disposal/recovery of waste produced on site, and as such needs to be included in each building element, not just A1-A4.</p> <p>E4 should only include the emissions from the use of energy and water (B6 and B7). The energy used for cleaning processes should be in B2 if significant – but it is likely in reality that they will be included in the energy usage in B6), but the emissions associated with cleaning chemicals used would be in B2 (maintenance) if significant.</p> <p>B8 in TC350 covers users activities, i.e. the use of energy which is not building related – this would cover users’ computers. If the ICT and security is ‘fixed’ to the building, then its operation would be included in B6.</p> <p>B1 emissions are not operational carbon. They are embodied impacts and should be assigned with B2-B3 or B4-B5, or have their own category to enable this.</p> <p>E6.02 – if decontamination results in material coming off site for treatment or disposal, then C3 and C4 need to be included too.</p>	Text, Figures and Tables have been amended to reflect these comments as far as possible. However, changes are constrained by the decision to maintain the same reporting framework for costs and carbon emissions.
109	Appendix H, Table H-2	NB the cost tables did not pick up on this split between E6.02 and E6.03 this split needs to be reflected in the cost tables.	Text amended to reflect this comment.
110	Appendix H, Table H-2	Where does the actual assembly/ construction process come in (A5)?	It does, so no action required.
111	Appendix L	Add ISBN.	The identifiers provided for references in Appendix L are considered to be sufficient.