Construction
Leadership
Council

Innovation In Buildings Workstream

Housing Industry Metrics

October 2018

Acknowledgement

This research was commissioned by the Construction Leadership Council and prepared by BRE. The dashboard is based upon data from the BRE's April 2018 report, which was the best available data at that time. We expect that it will continually evolve and have already begun work on an improved version.

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Table of Contents

Introduction

The Construction Leadership Council (CLC) would like to have a system which enables the collection and management of key metrics to track progress for the Innovation in Buildings workstream. The workstream is focussed on "embedding innovative construction techniques to improve productivity and capacity in the construction industry, and the quality and whole-life performance of buildings".

The CLC require the collection of data and the maintenance of a Housing Industry Metrics Management Dashboard with key measures that need to be tracked. The aim of this work is to design and specify a system to support this Dashboard and identify sources of information to set benchmarks.

Description of the project

A set of Key Performance Indicators (KPIs) for the housing industry has been described. This includes the details of what information is required to calculate the KPI and how the calculations are performed. In addition, for each KPI a review of information currently available has been carried out to determine whether existing data is available to produce benchmark data for the KPI. Where there are multiple sources of information, the preferred source is highlighted in green. Where existing data is not currently available, potential sources of information have been identified.

The method for updating the information to populate a Housing Industry Metrics Dashboard has been described. This involves updating publicly available data, agreeing a means of updating third party information and data collection from the CLC membership.

A dashboard has been completed based on the available information and information required to populate a static webpage has also been produced (Appendix A).

In addition, a template spreadsheet (Appendix B) has been produced showing what information should be reported by housebuilders on an annual basis or a project/site basis. This spreadsheet includes the calculations for the KPI and a summary report comparing a housebuilders KPIs with the benchmark KPIs (where these are available). This spreadsheet forms the basis of a possible future online collection mechanism.

Descriptions of Housing Industry Metrics

Capital cost/m^2				
Unit	Definition	Information required	Benchmark figure	Source
£/m^2	Cost associated with construction of building per metre square of gross internal floor space	Capital cost - cost in £ associated with construction of the building excluding non-construction costs such as marketing etc.	£1,800/m^2 to £1,900/m^2	Indicative figure from Buildoffsite[1]
		Gross internal floor space – space of a building measured to the internal face of the perimeter walls at each floor level according to RCIS NRM1 Appendix A definition[2]	£1340/m^2 to £2540/m^2	Costmodelling.com[3]
			£1201/m^2 to £1,691/m^2	*2012-3 data from DCLG/HCA[4]*
			?	*Building Cost Information Service data from RICS[5]*

[1] Internal communication

[2] http://www.rics.org/Global/NRM_1_Order_of_cost_estimating_and_cost_planning_2nd_edition_PGguidance_2012.pdf NB a new International Property Measurement Standard for Residential buildings was published in September 2016. However benchmark data will be based on the NRM1 method.

[3] https://www.costmodelling.com/building-costs (8/1/18)

[4] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/211105/GCS_Publication_2_July_2013_Departmental_Cost_Benchmarks_Cost_Reduction_Trajectories_and_Indicative_Cost_Reductions_v0_2.pdf (8/1/18)

[5] Building Cost Information Service (BCIS) from RICS http://www.rics.org/uk/knowledge/bcis/online-products/bcis-online/ (8/1/18). The mid-point of the data range is to be used.

Embodied carbon				
Unit	Definition	Information required	Benchmark figure	Source
$KgCO_2e/m^2$	Amount of embodied carbon associated with the production and transport of materials used in the construction of homes per metre square of gross internal floor space	Embodied carbon – embodied carbon covers greenhouse gas (GHG) emissions that arise from the energy and industrial processes used in the processing, manufacture and delivery of the materials, products and components required to construct a building[6] Gross internal floor space – space of a building measured to the internal face of the perimeter walls at each floor level according to RCIS NRM1 Appendix A definition[7]	450-1300 $kgCO_2e/m^2$ (embodied carbon of products only)	RICS, Methodology to calculate embodied carbon[8]
			?	IMPACT Environmental Benchmarking for whole building assessment[9]
			?	WRAP embodied carbon database[10]

[6] Cutting embodied carbon in construction projects, WRAP, http://www.wrap.org.uk/sites/files/wrap/FINAL%20PRO095-009%20Embodied%20Carbon%20Annex.pdf (8/1/18)

[7] http://www.rics.org/Global/NRM_1_Order_of_cost_estimating_and_cost_planning_2nd_edition_PGguidance_2012.pdf NB a new International Property Measurement Standard for Residential buildings was published in September 2016. However benchmark data will be based on the NRM1 method.

[8] (http://www.rics.org/Global/Methodology_to_calculate_embodied_carbon_1st_edition_PGguidance_2014.pdf) (8/1/18)

[9] http://www.impactwba.com/page.jsp?id=21

[10] http://ecdb.wrap.org.uk/Default.aspx

Days on site/m²				
Unit	Definition	Information required	Benchmark figure	Source
Days/m²	Elapsed time spent on site per metre square of gross internal floor space	Days – From the first day the first man hour on site was registered with HSE to the last man hour being the last day. This excludes on site surveying, pre-inspecting before construction takes place and demolition. Gross internal floor space – space of a building measured to the internal face of the perimeter walls at each floor level according to RCIS NRM1 Appendix A definition[11]	No publicly available data found	*BCIS Construction Duration Calculator*[12]
			0.17	SmartWaste Based on start and end date of completed new build residential projects and gross internal floor space of these projects[13]

[11] http://www.rics.org/Global/NRM_1_Order_of_cost_estimating_and_cost_planning_2nd_edition_PGguidance_2012.pdf NB a new International Property Measurement Standard for Residential buildings was published in September 2016. However benchmark data will be based on the NRM1 method.

[12] http://www.rics.org/uk/knowledge/bcis/online-products/bcis-construction-duration-calculator/ (8/1/18)

[13] SmartWaste data. Median of days/m2 from124 new build residential projects completed during 2017. Calculated from period between start date and end date and internal floor area.

Homes completed				
Unit	Definition	Information required	Benchmark figure	Source
Number of homes	Number of homes completed per year	Number of homes completed – Number of permanent dwellings completed	178,360 (2016-17, UK)	DCLG, House building: new build dwellings statistics[14]
			146,909 (2016-7, UK)	NHBC Annual Review, 2017[15]
			138,570 (2016, GB)	CPA Housing data – Annual (NHBC)[16]

[14] DCLG, House building: new build dwellings statistics Table 209: permanent dwellings completed, by tenure and country, https://www.gov.uk/government/statistical-data-sets/live-tables-on-house-building (9/1/18)

[15] NHBC Annual Report & Accounts 2016/7, http://www.nhbc.co.uk/NHBCpublications/LiteratureLibrary/AnnualReviews/filedownload,73877,en.pdf (9/1/18)

[16] Construction Products Association, Housing data – Annual, https://www.constructionproducts.org.uk/publications/economics/construction-information-database/construction-information-database/ (9/1/18)

Productivity				
Unit	Definition	Information required	Benchmark figure	Source
£/man hour	Productivity is the efficiency at which a building is being constructed looking at the ratio of capital cost to man hours recorded on site. It is reflected as £ / man hour.	Capital cost - cost in £ associated with construction of the building excluding non-construction costs such as marketing etc. Man hours – Number of hours worked	26 (£/hour) for 2016	Based on ONS data for output and hours worked[17]

[17] Labour productivity: July to September 2017. Breakdown of contributions, whole economy and sectors, https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/labourproductivity/datasets/annualbreakdownofcontributionswholeeconomyandsectors

Pre-manufactured value (PMV)				
Unit	Definition	Information required	Benchmark figure	Source
%	Pre-manufactured value captures the value that is created as a result of completing work away from the site. It is calculated by taking the gross capital cost of the project and deducting the prelims - sometimes referred to as site overhead costs - and the site labour costs. The result of this is then divided by the capital cost and is reflected as a %	Capital cost - cost in £ associated with construction of the building excluding non-construction costs such as marketing etc. Preliminary cost (Site overhead cost) – Main contractor's preliminaries – are items which cannot be allocated to a specific element, sub-element or component. Main contractor's preliminaries include the main contractor's costs associated with management and staff, site establishment, temporary services, security, safety and environmental protection, control and protection, common user mechanical plant, common user temporary works, the maintenance of site records, completion and post-completion requirements, cleaning, fees and charges, sites services and insurances, bonds, guarantees and warranties. Site labour costs – Total cost of labour	40%	Information from Mark Farmer, Cast

EPC rating				
Unit	Definition	Information required	Benchmark figure	Source
Integer	Energy Performance Certificates record how energy efficient a property is and what its environmental impact is, using A-G ratings (A – being the most efficient/environmentally friendly and G – the least).	Average EPC rating for houses built	B (SAP rating 81-91)	Using Government data on EPCs lodged, Table NB1 – Number of New Dwelling Energy Performance Certificates lodged on the Register in England & Wales by Energy Efficiency Rating[18]. Average value calculated by giving a value 1-7 to A-G ratings respectively, calculating an average score from these and rounding to the nearest whole figure

[18] Table NB1 - Number of New Dwelling Energy Performance Certificates lodged on the Register in England & Wales by Energy Efficiency Rating https://www.gov.uk/government/statistical-data-sets/live-tables-on-energy-performance-of-buildings-certificates

Quality rating				
Unit	Definition	Information required	Benchmark figure	Source
%	Quality of homes is captured by looking at the cost of post-completion defects of a building as set out by the NHBC over the total capital cost. In short it is calculated as 1 minus the cost of post-completion defects over the total build cost, reflected as a %	Capital cost - cost in £ associated with construction of the building excluding non-construction costs such as marketing etc. Cost of post-completion defects -	99.4	NHBC survey data

BIM Level 2				
Unit	Definition	Information required	Benchmark figure	Source
%	Companies using BIM level 2 as % of total number of companies. This measure refers to Building information modelling at level 2 which involves developing building information in a collaborative 3D environment, with data attached but created in separate discipline models	BIM Level 2 certification evidence	No data currently available	

No publicly available information was available for this indicator. It is proposed that NHBC carry out a survey of members to collect this information.

Waste generated				
Unit	Definition	Information required	Benchmark figure	Source
Volume (m^3) construction waste/£100K project value	This measure looks at the ratio of volume of construction phase waste that has been generated in the construction of the home represented for every £100k of the capital cost	Total volume of construction phase waste produced in m^3 - This includes waste from construction phase only Capital cost – - cost in £ associated with construction of the building excluding non-construction costs such as marketing etc	10.2	BRE SmartWaste data based on median value for residential projects completed during 2016 [19].

[19] Based on 170 new build residential projects completed during 2016. These projects cover a total of 948888 m2 which is estimated to be 10,095 dwellings (assuming floor area of dwelling of 94 m2 as per average for all dwellings according to housing stock tables from English Housing Survey 2016-7 (https://www.gov.uk/government/statistics/english-housing-survey-2016-to-2017-headline-report). This is equivalent to approximately 6% of total new dwellings.

ISO 9001 Accreditation				
Unit	Definition	Information required	Benchmark figure	Source
%	ISO 9001 is the quality management system standard that sets out quality requirements for facilities, people, training, services and equipment of an organisation. As a measure it would be calculated as the total number of companies certified against ISO9001 over the total number of companies in the industry/sector, expressed as a %	Evidence of company ISO 9001 accreditation	No data currently available	

No publicly available information was available for this indicator. It is proposed that NHBC carry out a survey of members to collect this information.

RIDDOR				
Unit	Definition	Information required	Benchmark figure	Source
Injuries per million hours worked	The frequency rate is the number of people injured over a year for each million hours worked by a group of employees or workers	Number of injuries per year (as reported as per RIDDOR) Total hours worked per year OR Average weekly hours worked	2.24	Calculated as per Injury Frequency Rates guidance from HSE[20] using injury rates from RIDIND: Reported injuries by detailed industry[21] for 2016/17 and mean paid hours worked for Construction of Buildings from ASHE Table 4.9a[22] for 2017

[20] http://www.hse.gov.uk/statistics/adhoc-analysis/injury-frequency-rates.pdf

[21] http://www.hse.gov.uk/statistics/tables/ridind.xlsx

[22] https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/datasets/industry2digitsicashetable4

Prelims cost per home built				
Unit	Definition	Information required	Benchmark figure	Source
%	This looks at the costs attached to prelims in construction which can be sometimes referred to as 'site overhead' divided by the total cost per home built reflected as a percentage	Preliminaries costs (£) - As defined in NRM1[23] for main contractors Capital cost – - cost in £ associated with construction of the building excluding non-construction costs such as marketing etc	No data publicly available	

No publicly available data was available to produce a benchmark figure for this indicator. It is proposed that a survey of CLC members is carried out to collect information for this indicator.

[23] RICS, NRM1, http://www.rics.org/Global/NRM_1_Order_of_cost_estimating_and_cost_planning_2nd_edition_PGguidance_2012.pdf).

Data collection and maintenance of a Housing Industry Metrics Management Dashboard

In order to maintain the Housing Industry Metrics dashboard it is recommended that data is updated on an annual basis. Some of the data is publicly available but further information directly from housebuilders would be beneficial. The following steps could be taken to create an annual update of the dashboard:

1. Annual collection of data from the public sources identified in this project. Many of the data sources identified here are updated regularly. The frequency of updates varies from monthly to annually so an annual update would cover all of these.

2. Agree a method of data collection from third parties such as NHBC or RICS to include agreement on timescales for data collection and how data will be shared.

3. Carry out an annual, paper based CLC membership survey, and collate this data. This survey would ask the CLC membership for the data as described in the spreadsheet in Appendix B. This would then be collated and compared with publicly available data to update the measures. Where publicly available data is also available the performance of CLC members could be compared with overall performance.

	Data collection method		
Metric	**Publicly available data**	**Third party data**	**CLC membership survey data**
Capital cost/m^2	X	RICS	√
Embodied carbon	X	RICS	√
Time on site	X	BRE SmartWaste data	√
Homes completed/year	X	NHBC	X
Productivity	Government data	X	X
Pre-manufactured value	X	X	√
EPC rating	Government data	X	√
Quality rating	X	NHBC	X
BIM level 2 accreditation	X	NHBC	√
Construction phase waste generated	X	BRE SmartWaste data	√
ISO 9001 accreditation	X	NHBC	√
Safety	Government data	X	X
Preliminaries per home built	X	X	√

4. Update the static web page with new figures for the measures where available and show progress towards the targets.

5. Future improvements to the data collection mechanism could include a web portal for easier collection of data and possible links with existing data sources.

Housing Industry Metrics Management Dashboard Web Page

The information currently available for each of the metrics has been reviewed and where possible a benchmark figure has been produced together with a target for 2020. This information has been summarised in the dashboard below. The web page will have a brief introduction to the dashboard, the table of Key Measures and information about each Key Measure will be displayed by clicking on the title of the measure. This is shown in Appendix A.

CLC Metrics (for housing)						
Key Measures	Unit	Benchmark	Benchmark Source	Target 2020	Progress	Date
Capital cost/m²	£/m^2	1850	BuildOffsite	1480	% achieved	19/01/2018
Embodied carbon	$kgCO_2e/m^2$	875 $kgCO_2e/m^2$ (embodied carbon of products only)	RICS, Methodology to calculated embodied carbon	700	% achieved	19/01/2018
Time on site	days/m^2	0.17	BRE SmartWaste data		% achieved	19/01/2018
Homes completed/year	Number of homes	146,909 (excludes refurb numbers) (2016-17, UK)	NHBC Annual Review 2017	300,000	% achieved	19/01/2018
Productivity	£/man hour	26 (£/hour) for 2016	ONS data for output and hours worked	£31	% achieved	19/01/2018

Smart Construction Metrics						
Key Measures	Unit	Benchmark	Benchmark Source	Target 2020	Progress	Date
Pre-manufactured value	%	40%	CLC Measures Group agreed figure from information from Mark Farmer	50%	% achieved	28/03/2018
EPC rating	Integer	B (SAP rating 81-91)	Government data on Energy performance of buildings certificates Table NB1	A (SAP rating 92 plus)	% achieved	19/01/2018
Quality rating	%	99.4	NHBC Data	99.5	% achieved	19/01/2018
BIM level 2	%	*TBC*	*NHBC Survey to be carried out*		% achieved	19/01/2018
Waste generated	m^3 construction phase waste/£100k project value	10.2	BRE SmartWaste data	8.2	% achieved	19/01/2018
Firms ISO 9001 accredited	%	*TBC*	*NHBC Survey to be carried out*		% achieved	19/01/2018
Safety	Injuries per million hours worked	2.24	HSE RIDIND data and ASHE data for hours worked	1.79	% achieved	19/01/2018
Prelims cost per home built	%	TBC		TBC	% achieved	19/01/2018

Data collection spreadsheet for CLC membership

A spreadsheet has been developed that can be distributed to the CLC membership for completion. This requires data to be entered to provide the information needed to produce the Key Measures as well as the calculations required. Screenshots of the excel spreadsheet are shown in Appendix B.

Conclusion and recommendations

Completion of the Initial Project

BRE have gathered data from the sources described above, for each benchmark where available. This has been used to produce a Housing Industry Metrics Dashboard (Appendix A). To complete this initial exercise additional information is needed and potential sources of information were identified during the CLC Metrics group meeting (25th January 2018).

- Capital cost/m^2 data from the BCIS is the preferred data and RCIS have been contacted to investigate further.
- Quality – NHBC data is preferred data.
- Companies BIM level 2 accredited – Proposed that this information could be sought by NHBC by survey covering companies building the greatest proportion of new homes.
- Companies ISO9001 accredited – Proposed that this information could be sought by NHBC by survey covering companies building the greatest proportion of new homes.
- Safety – additional measure to record safety in homes in use to be investigated.
- Preliminaries – a survey of CLC members could be carried out to obtain this information.

Further information could possibly be obtained from the CLC Membership. BRE is therefore recommending that the CLC request their members complete the 'CLC Membership Survey'.

Possible Next Step

To maintain the relevance of the Housing Industry Metrics Management Dashboard, BRE could manage updates on behalf of the CLC. A suggestion would be to refresh the Dashboard each year. Possible deliverables for this update service could include the following:

1. Annual collection of data from the sources identified in the initial project. Where data is to be sourced from third parties such as NHBC surveys or RICS data, further discussions would be needed to agree data collection timescales and sharing of data.
2. Management of an annual, paper based CLC membership survey, and collation of the data.
3. Refreshing the static web page with new figures for the measures where available and update on progress towards the targets.

Future Possibilities

Beyond the manual data collection process described above, the CLC could participate in BRE's commercial Data Services. We are building a knowledge and data engine that will hold metrics captured over time, providing the raw data for trend analysis. Individual metrics may have to be manually entered, but potentially the knowledge and data could be fed through automatic data integration with open and commercial data sources.

Likewise, a web portal could be developed to simplify the data capture process from CLC members' data returns.

Further investigation and discussion would be needed to determine the scope and viability of these possibilities. This discussion would also need to understand the potential commercial arrangements for data from commercial sources, usage and intellectual property rights, and possible usage charges.

Appendix A Housing Industry Metrics Web Page

Housing Industry Metrics Management Dashboard

The Construction Leadership Council (CLC) have developed a dashboard of metrics to track progress for the Innovation in Buildings workstream. The workstream is focussed on "embedding innovative construction techniques to improve productivity and capacity in the construction industry, and the quality and whole-life performance of buildings".

The dashboard contains a set of Key Performance Indicators (KPIs) for the housing industry. For each KPI a review of information currently available has been carried out to produce a current benchmark figure. These are shown together with a target for 2020. Clicking on the KPI name will show more details about the indicator and the data sources used to produce the benchmark figure.

CLC Metrics (for housing)						
Key Measures	Unit	Benchmark	Benchmark Source	Target 2020	Progress	Date
Capital cost/m²	£/m²	1850	BuildOffsite	1480	% achieved	19/01/2018
Embodied carbon	$kgCO_2e/m^2$	875 $kgCO_2e/m^2$ (embodied carbon of products only)	RICS, Methodology to calculated embodied carbon	700	% achieved	19/01/2018
Time on site	days/m²	0.17	BRE SmartWaste data		% achieved	19/01/2018
Homes completed/year	Number of homes	146,909 (excludes refurb numbers) (2016-17, UK)	NHBC Annual Review 2017	300,000	% achieved	19/01/2018
Productivity	£/man hour	26 (£/hour) for 2016	ONS data for output and hours worked	£31	% achieved	19/01/2018

Smart Construction Metrics						
Key Measures	Unit	Benchmark	Benchmark Source	Target 2020	Progress	Date
Pre-manufactured value	%	40%	CLC Measures Group agreed figure	50%	% achieved	28/03/2018
EPC rating	Integer	B (SAP rating 81-91)	Government data on Energy performance of buildings certificates Table NB1	A (SAP rating 92 plus)	% achieved	19/01/2018
Quality rating	%	99.4	NHBC Data	99.5	% achieved	19/01/2018
BIM level 2	%	*TBC*	*NHBC Survey to be carried out*		% achieved	19/01/2018
Waste generated	m^3 construction phase waste/£100k project value	10.2	BRE SmartWaste data	8.2	% achieved	19/01/2018
Firms ISO 9001 accredited	%	*TBC*	*NHBC Survey to be carried out*		% achieved	19/01/2018
Safety	Injuries per million hours worked	2.24	HSE RIDIND data and ASHE data for hours worked	1.79	% achieved	19/01/2018
Prelims cost per home built	%	TBC		TBC	% achieved	19/01/2018

Information for website links

Capital cost/m² :

Definition:

Cost associated with construction of building per metre square of gross internal floor space

Data required:

Capital cost –
cost in £ associated with construction of the building excluding non-construction costs such as marketing etc.
Gross internal floor space –
space of a building measured to the internal face of the perimeter walls at each floor level according to RCIS NRM1 Appendix A definition

Source of data used for 2018 benchmark:

Indicative figure from BuildOffsite

Embodied Carbon

Definition:

Amount of embodied carbon associated with the production and transport of materials used in the construction of homes per metre square of gross internal floor space

Data required:

Embodied carbon –
embodied carbon covers greenhouse gas (GHG) emissions that arise from the energy and industrial processes used in the processing, manufacture and delivery of the materials, products and components required to construct a building[24]
Gross internal floor space –
space of a building measured to the internal face of the perimeter walls at each floor level according to RCIS NRM1 Appendix A definition[25]

Source of data used for 2018 benchmark:

RICS, Methodology to calculate embodied carbon[26]

Days on site/m2

Definition:

Elapsed time spent on site per metre square of gross internal floor space

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[24] Cutting embodied carbon in construction projects, WRAP, http://www.wrap.org.uk/sites/files/wrap/FINAL%20PRO095-009%20Embodied%20Carbon%20Annex.pdf (8/1/18)

[25] http://www.rics.org/Global/NRM_1_Order_of_cost_estimating_and_cost_planning_2nd_edition_PGguidance_2012.pdf NB a new International Property Measurement Standard for Residential buildings was published in September 2016. However benchmark data will be based on the NRM1 method.

[26] (http://www.rics.org/Global/Methodology_to_calculate_embodied_carbon_1st_edition_PGguidance_2014.pdf) (8/1/18)

Data required:

Days –

From the first day the first man hour on site was registered with HSE to the last man hour being the last day. This excludes on site surveying and pre-inspecting before construction takes place.

Gross internal floor space –

space of a building measured to the internal face of the perimeter walls at each floor level according to RCIS NRM1 Appendix A definition[27]

Source of data used for 2018 benchmark:

BRE SmartWaste data

Homes completed

Definition:

Number of homes completed per year

Data required:

Number of permanent dwellings completed

Source of data used for 2018 benchmark:

NHBC Annual Review, 2017[28]

[27] http://www.rics.org/Global/NRM_1_Order_of_cost_estimating_and_cost_planning_2nd_edition_PGguidance_2012.pdf NB a new International Property Measurement Standard for Residential buildings was published in September 2016. However benchmark data will be based on the NRM1 method.

[28] NHBC Annual Report & Accounts 2016/7, http://www.nhbc.co.uk/NHBCpublications/LiteratureLibrary/AnnualReviews/filedownload,73877,en.pdf (9/1/18)

Productivity

Definition:

Productivity is the efficiency at which a building is being constructed looking at the ratio of capital cost to man hours recorded on site. It is reflected as £ / man hour.

Data required:

Capital cost -
cost in £ associated with construction of the building excluding non-construction costs such as marketing etc.
Man hours –
Number of hours worked

Source of data used for 2018 benchmark:

ONS data for output and hours worked[29]

Pre-manufactured value

Definition:

Pre-manufactured value captures the value that is created as a result of completing work away from the site. It is calculated by taking the gross capital cost of the project and deducting the prelims - sometimes referred to as site overhead costs - and the site labour costs. The result of this is then divided by the capital cost and is reflected as a %

Data required:

Capital cost -
cost in £ associated with construction of the building excluding non-construction costs such as marketing etc.
Preliminary cost (Site overhead cost) –
Main contractor's preliminaries – are items which cannot be allocated to a specific element, sub-element or component. Main contractor's preliminaries include the main contractor's costs associated with management and staff, site establishment, temporary services, security, safety and environmental protection, control and protection, common user mechanical plant, common user temporary works, the maintenance of site records, completion and post-completion requirements, cleaning, fees and charges, sites services and insurances, bonds, guarantees and warranties.
Site labour costs –
Total cost of labour

Source of data used for 2018 benchmark:

Mark Farmer, Cast

[29] Labour productivity: July to September 2017. Breakdown of contributions, whole economy and sectors, https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/labourproductivity/datasets/annualbreakdownofcontributionswholeeconomyandsectors

EPC Rating

Definition:

Energy Performance Certificates record how energy efficient a property is and what its environmental impact is, using A-G ratings (A – being the most efficient/environmentally friendly and G – the least)

Data required:

Average EPC rating for houses built

Source of data used for 2018 benchmark:

Government data on EPCs lodged, Table NB1 – Number of New Dwelling Energy Performance Certificates lodged on the Register in England & Wales by Energy Efficiency Rating[30]

Quality rating

Definition:

Quality of homes is captured by looking at the cost of post-completion defects of a building as set out by the NHBC over the total capital cost. In short it is calculated as 1 minus the cost of post-completion defects over the total build cost, reflected as a %

Data required:

Capital cost -
cost in £ associated with construction of the building excluding non-construction costs such as marketing etc.
Cost of post-completion defects -

Source of data used for 2018 benchmark:

NHBC survey data

[30] Table NB1 - Number of New Dwelling Energy Performance Certificates lodged on the Register in England & Wales by Energy Efficiency Rating https://www.gov.uk/government/statistical-data-sets/live-tables-on-energy-performance-of-buildings-certificates

BIM Level 2

Definition:

Companies using BIM level 2 as % of total number of companies.

This measure refers to Building information modelling at level 2 which involves developing building information in a collaborative 3D environment, with data attached but created in separate discipline models

Data required:

BIM Level 2 certification evidence

Source of data used for 2018 benchmark:

No data currently available

Waste generated

Definition:

This measure looks at the ratio of volume of construction phase waste that has been generated in the construction of the home represented for every £100k of the capital cost

Data required:

Total volume of construction phase waste produced in m^3
- This includes waste from construction phase only

Capital cost –
cost in £ associated with construction of the building excluding non-construction costs such as marketing etc

Source of data used for 2018 benchmark:

BRE SmartWaste data

ISO 9001 Accreditation

Definition:

ISO 9001 is the quality management system standard that sets out quality requirements for facilities, people, training, services and equipment of an organisation. As a measure it would be calculated as the total number of companies certified against ISO9001 over the total number of companies in the industry/sector, expressed as a %

Data required:

Evidence of ISO9001 accreditation

Source of data used for 2018 benchmark:

No data currently available

RIDDOR

Definition:

Injuries per million hours worked. The frequency rate is the number of people injured over a year for each million hours worked by a group of employees or workers

Data required:

Number of injuries per year (as reported as per RIDDOR)

Total hours worked per year OR Average weekly hours worked

Source of data used for 2018 benchmark:

Calculated as per Injury Frequency Rates guidance from HSE[31] using injury rates from RIDIND: Reported injuries by detailed industry[32] for 2016/17 and mean paid hours worked for Construction of Buildings from ASHE Table 4.9a[33] for 2017

Prelims cost per home built

Definition:

This looks at the costs attached to prelims in construction which can be sometimes referred to as 'site overhead' divided by the total cost per home built reflected as a percentage

Data required:

Preliminaries costs (£)

- As defined in NRM1[34] for main contractors

Capital cost –

cost in £ associated with construction of the building excluding non-construction costs such as marketing etc

Source of data used for 2018 benchmark:

No data currently available

[31] http://www.hse.gov.uk/statistics/adhoc-analysis/injury-frequency-rates.pdf

[32] http://www.hse.gov.uk/statistics/tables/ridind.xlsx

[33] https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/datasets/industry2digitsicashetable4

[34] RICS, NRM1, http://www.rics.org/Global/NRM_1_Order_of_cost_estimating_and_cost_planning_2nd_edition_PGguidance_2012.pdf).

Appendix B Screenshots of Excel data collection spreadsheet

CLC Housing Industry Metrics – Data Collection Form	
Information required	**Data**
Year	
General information	
Company name	
Contact name	
Contact email	
Contact telephone number	
Accreditation information	
Is your company ISO 9001 accredited?	
If ISO 9001 accredited, please provide details	
Does your company have BIM level 2 accreditation?	
If BIM level 2 accredited, please provide details	
Cost data	
Number of homes completed	
Gross internal floor space of completed homes (m^2)	
Capital cost of completed homes (£)	
Days elapsed on site	
Man hours on site	
Preliminaries (£)	
Site Labour Cost (£)	
Cost of post construction defects (£)	
Health & Safety	
Number of RIDDOR reported	
Sustainability data	
Total waste generated (m^3)	
Total waste generated (tonnes)	
Construction waste generated (m^3)	
Construction waste generated (tonnes)	
Number of homes with EPC rating A	
Number of homes with EPC rating B	
Number of homes with EPC rating C	
Number of homes with EPC rating D	
Number of homes with EPC rating E	
Number of homes with EPC rating F	
Number of homes with EPC rating G	
Embodied carbon of materials used in completed homes (kg CO_2e)	

CLC Housing Industry Metrics – Data Collection Form

Metric	Unit	Calculation	Company score
Capital cost/m2	£/m^2	Capital cost associated with construction of buildings/gross internal floor space in m2	
Embodied carbon	kg CO2e/m2	Amount of embodied carbon associated with production and transport of materials used in construction/gross internal floor space in m2	
Time on site	Days/m2	Elapsed time spent on site/gross internal floor space in m2	
Homes completed/year	Integer	Number of homes completed per year	
Productivity	£/man hour	Capital cost associated with construction of buildings/total man hours	
Pre-manufactured value	%	((Gross capital cost-preliminaries-site labour cost))/capital cost)*100	
EPC rating	Integer	Average value calculated by giving a value 1-7 to A-G ratings respectively, calculating an average score from these and rounding to the nearest whole figure	
Quality rating	%	(1-(cost of post-completion defects/total build cost))*100	
BIM level 2	%	BIM level 2 accreditation	
Total volume of waste generated	m3/£100K project value	Volume of all waste generated during building of homes/£100K capital cost	
Volume of construction waste generated	m3/£100K project value	Volume of all construction phase waste generated during building of homes/£100K capital cost	
Total tonnes of waste generated	Tonnes/£100K project value	Tonnes of all waste generated during building of homes/£100K capital cost	
Tonnes of construction waste generated	Tonnes/£100K project value	Tonnes of construction phase waste generated during building of homes/£100K capital cost	
ISO 9001 accreditation	%	ISO 9001 accreditation	
Safety (RIDDOR frequency rate)	Frequency rate/million hours worked	(Injuries (per year)/(hours worked per year))*100	
Prelims cost per home built	%	(Cost of preliminaries/total cost)*100	

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