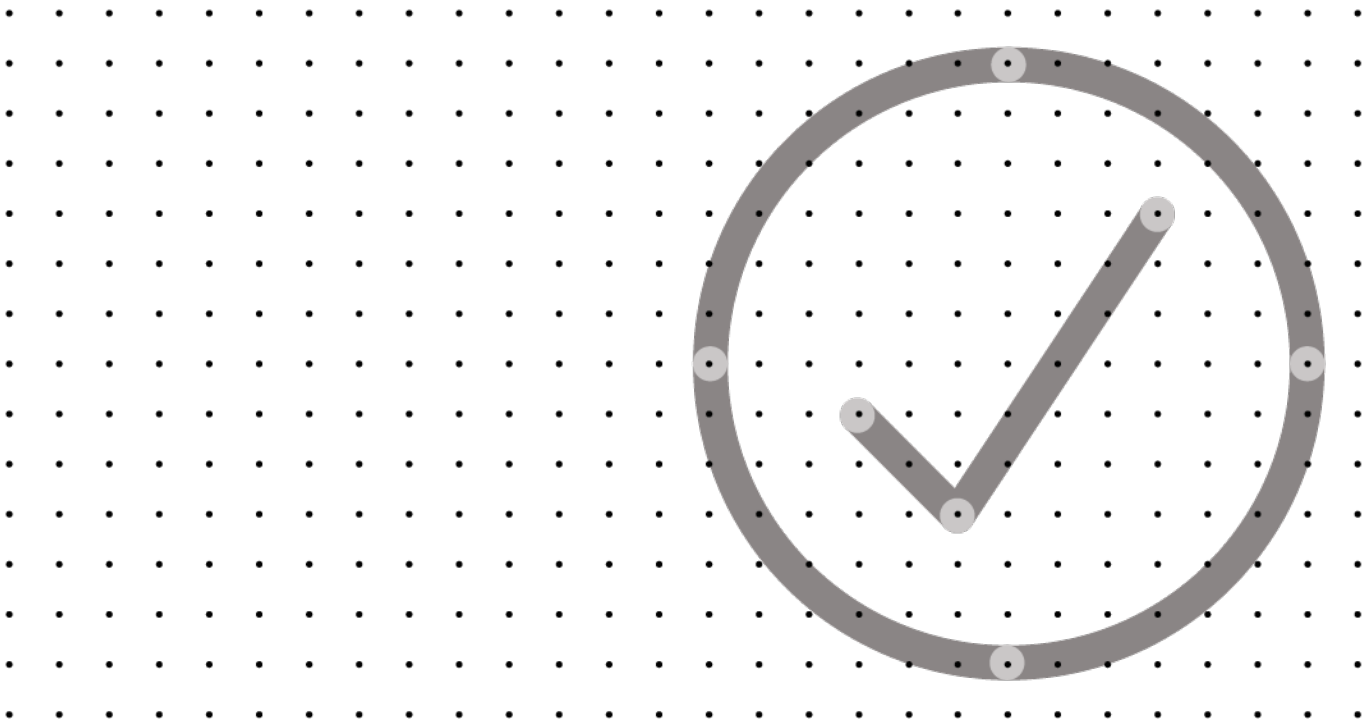
STANDARDS DOCUMENT

MCS 037: 2025 ISSUE 1.0

MCS 2025

Micro CHP: Pre-Sale Information and System Performance Estimate Standard

To be used in conjunction with the MCS Customer Commitment



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The MCS Service Company Ltd
Violet 3,
Sci-Tech Daresbury,
Keckwick Lane,
Cheshire WA4 4AB

www.mcscertified.com
hello@mcscertified.com
0333 103 8130

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ABOUT MCS

MCS: Giving everyone confidence in home-grown energy

With energy costs constantly rising and climate change affecting us all – low-carbon technology has a bigger and bigger role to play in the future of UK energy. MCS is here to ensure it's a positive one.

MCS is the UK's quality mark for small-scale renewable energy technologies like solar PV, solar heating, heat pumps, biomass, and battery storage. We have two main roles – setting and maintaining standards, and providing consumer protection.

Our Standards define how certified renewable energy installations should be designed and installed using MCS certified products. They are a benchmark for quality developed in close consultation with industry through independent technical working groups.

The Standards are owned by The MCS Foundation (a charitable trust), but maintained and developed by MCS.

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CHANGES TO STANDARDS

When MCS Standards are revised, the issue number is also revised to indicate the nature of the changes. This can either be a whole new issue or an amendment to the current issue. Details will be posted online, www.mcscertified.com

Technical or other significant changes which affect the requirements for the approval or certification of the product or service will result in a new issue. Minor or administrative changes (e.g. corrections of spelling and typographical errors, changes to address and copyright details, the addition of notes for clarification etc.) may be made as amendments.

The issue number is given on the left of the decimal point, and the amendment number on the right. For example, issue 3.2 indicates that it is the third significant version of the document which has had two sets of minor amendments.

Users of this Standard should ensure that they are using the latest issue.

Amendments issued since publication

Issue No.	Amendment details	Date
1.0	First Publication for MCS: 2025 1.0	01/01/2025

FOREWORD

Compliance with this Standard is mandatory for MCS Contractors certified to MCS: 2025.

The purpose of this Standard is to specify best practice in achieving high-quality low carbon technology installations. Whilst it is not possible to ensure safety, this Standard provides requirements which should help mitigate potential safety risks associated with the design and installation of this technology.

This document contains references to other documents which may be either normative or informative. At the time of publication any editions of those documents, where indicated, were valid. However, as all documents are subject to revision, any users of this document should apply the most recent editions of those referenced documents (unless a dated version is specified).

NOTE:
This MCS Standard makes use of the terms 'must', 'shall' and 'should' when prescribing certain requirements and procedures. In the context of this document:

- the term 'must' identifies a requirement by law at the time of publication;
- the term 'shall' prescribes a requirement or procedure that is intended to be complied with in full and without deviation;
- the term 'should' prescribes a requirement or procedure that is intended to be complied with unless reasonable justification can be given.

Compliance with this MCS Standard does not in itself confer immunity from legal obligations.

1 SCOPE

This Standard describes the method for calculating the estimated annual performance of a Micro-CHP system. This document is to be used in conjunction with the MCS Customer Duty. The format in which this performance estimate shall be presented to the customer is also given along with the technical information to accompany the estimate.

Performance estimates enable customers to compare different systems. The use of this MCS Standard for performance estimates brings a comparable and consistent methodology for different Micro-CHP configurations.

The estimates are based on the best knowledge of MCS of Micro-CHP applications.

This Standard and its associated requirements shall be complied with before a contract is awarded to the customer.

Note: Where site characteristics are unknown (e.g. where the contract may be signed when the property is pre-built), best assumptions shall be made.

2 METHOD

2.1 Site evaluation

2.1.1 For domestic installations, a valid Energy Performance Certificate (EPC) should be used to produce an estimate of the annual energy requirements of the system using the methodology detailed in Section 2.2.

Note: A valid EPC is one which has not expired and where the given annual heat demand is not expected to change such as by, for example, an extension or refurbishment of the building, and where the micro-CHP is intended to supply that changed heat demand. Where no valid EPC exists on the public register, but it is possible to obtain one through a Domestic Energy Assessment, then an EPC should be obtained and lodged. Examples of where it would not be possible to obtain a valid EPC for use would be non-domestic buildings, a planned refurbishment changing the heat demand, or the building is new and not yet complete.

2.1.2 Where it is not possible to obtain a valid EPC, assess the annual energy heat load for the building (space heating and hot water) using any suitable method. Such calculation method shall be clearly described and justified. That annual energy load shall then be used to produce an estimate of the annual energy performance of the system using the methodology detailed in Section 2.2.

2.2 Calculation

This is a template for calculation of the annual energy performance of a micro-CHP appliance as mentioned in clause 2.1.2. The actual output from micro-CHP will depend greatly on the appliance design and the user's energy usage pattern. As such, it is difficult to predict with accuracy from a simple calculation the actual running-time and output of a micro-CHP.

This template is given here as an indication to the owner/user of what factors are important and what they might expect in output from their micro-CHP appliance under their own unique use cases.

Three worked examples are given; Worked Examples A and B are for calculating micro-CHP fuel input and energy output during the heating season for micro-CHP without and with a supplemental heater respectively. For appliances that also produce domestic hot water during the summer, a further Worked Example C is given to calculate output during the Summer (non-heating season).

Explanation of template:

A. Micro-CHP installation data			Units
(1)	Installed electrical capacity of micro-CHP system - P_{el}[1]		KWel
(2)	Installed heat capacity of micro-CHP system – P_{th}[2]		KWth
(3)	Overall Efficiency[3]		%
(4)	Fuel use under nominal operation (KW) [(①+②) / ③][4]		KW
B. Performance calculations			
(5)	House heat load (annual)[5,6]		KWh
(6)	Micro-CHP Contribution to that heat load		%
(7)	Micro-CHP Contribution to that heat load as a fraction [⑥/100]		
(8)	Estimated annual run-time [⑤*⑦ / ②]		hours
(9)	Estimated annual electric output [⑧*①][7]		KWh
(10)	Estimated annual heat output [⑧*②]		KWh
(11)	Estimated annual fuel use [④*⑧]		KWh

[1] P_{el} in the BS EN50465.

[2] P_{ch} in the BS EN50465.

[3] *nCHP_100+Supp_0* or *nCHP_100+Supp_100* (for appliances with and without supplemental heaters respectively) in the BS EN50465.

[4] Efficiency figures are in net calorific value (e.g., not including potential condensation heat) while fuels are typically supplied gross calorific value. This equation therefore underestimates fuel use by at a minimum of net over gross calorific value of the fuel.

[5] Heat load taken from a valid EPC.

[6] Or domestic hot water load (in Summer months – see Worked Example C).

[7] May underestimate electricity production especially for micro-CHP with supplemental heaters where both the micro-CHP and supplemental heater can operate independently.

C. Estimated micro-CHP electricity self-consumption			
(12)	Assumed occupancy archetype		Home all day/ Home half day/ Out all day
(13)	Assumed annual property domestic electricity consumption[8]		KWh
(14)	Expected micro-CHP generation self-consumption[9]		Nearest 5%
(15)	Grid electricity independence / Self-sufficiency [⑨*⑭ / ⑬]		%
D. Estimated micro-CHP self-consumption – with EESS[10] (if installed)			
(16)	Assumed usable capacity of electrical energy storage device which is used for self-consumption		KWh
(17)	Expected micro-CHP generation self-consumption (with EESS)[11]		Nearest 5%
(18)	Grid electricity independence / Self-sufficiency (with EESS) [⑨*⑰ / ⑬]		%
F. Waste heat avoidance			
(19)	If heat-load falls below this value micro-CHP may turn down/OFF		KWh/day
G. Notes			

[8] Actual consumption values from bills etc are preferred if available

[9] There is no designated method for this calculation. Calculations should take at least occupancy archetype and current household electricity consumption levels into account. Please give method details in Section G - notes or in an attached piece of paper. To reflect the large number of variables and therefore the difficulty in making an accurate calculation, please give the result to the nearest 5%.

[10] EESS – Electrical Energy Storage System (e.g., house battery).

[11] There is no designated method for this calculation but it should take at least occupancy archetype, electrical demand, battery capacity and battery power output into account. To reflect the large number of variables and therefore the difficulty in making an accurate calculation, please give the result to the nearest 5%.

2.2.1 Additional estimates may be provided using an alternative methodology, including proprietary software, but:

a) such estimates shall clearly describe and justify the approach taken and factors used

b) they shall not be given greater prominence than the standard MCS estimate

c) they shall be accompanied by warning text stating that it should be treated with caution if it is significantly better than the result given by the standard method.

2.3 Worked examples

Worked Example A: Micro-CHP without supplemental heater for space heating

A. Micro-CHP installation data			Units
(1)	Installed electrical capacity of micro-CHP system - P_{el}	1.5	KWel
(2)	Installed heat capacity of micro-CHP system – P_{th}	1	KWth
(3)	Overall Efficiency	90	%
(4)	Fuel use under nominal operation (KW) [(①+②) / ③]	2.8	KW
B. Performance calculations			
(5)	House heat load (annual)	10,000	KWh
(6)	Micro-CHP Contribution to that heat load	25.5	%
(7)	Micro-CHP Contribution to that heat load as a fraction [⑥/100]	0.255	
(8)	Estimated annual run-time [⑤*⑦ / ②]	2,550	hours
(9)	Estimated annual electric output [⑧*①]	3,825	KWh
(10)	Estimated annual heat output [⑧*②]	2,550	KWh
(11)	Estimated annual fuel use [④*⑧]	7,395	KWh
C. Estimated micro-CHP electricity self-consumption			
(12)	Assumed occupancy archetype	All day	Home all day/ Home half day/ Out all day
(13)	Assumed annual property domestic electricity consumption	5,000	KWh
(14)	Expected micro-CHP generation self-consumption	40	Nearest 5%
(15)	Grid electricity independence / Self-sufficiency [⑨*⑭ / ⑬]	31	%
D. Estimated micro-CHP self-consumption – with EESS (if installed)			
(16)	Assumed usable capacity of electrical energy storage device which is used for self-consumption	n/a	KWh

(17)	Expected micro-CHP generation self-consumption (with EESS)	n/a	%
(18)	Grid electricity independence / Self-sufficiency (with EESS)	n/a	%
F. Waste heat avoidance			
(19)	If heat-load falls below this value micro-CHP may turn down/OFF	24	KWh/day
G. Notes			
EXAMPLE	Calculation of self-consumption of micro-CHP electric (own method – average demand over output – 0.57KW/1.5KW). No EESS installed.		

Worked Example B: Micro-CHP with supplemental heater for space heating

A. Micro-CHP installation data			Units
(1)	Installed electrical capacity of micro-CHP system - P_{el}	0.75	KWel
(2)	Installed heat capacity of micro-CHP system – P_{th}	7.76	KWth
(3)	Overall Efficiency	81	%
(4)	Fuel use under nominal operation (KW) [(①+②) / ③]	9.6	KW
B. Performance calculations			
(5)	House heat load (annual)	10,000	KWh
(6)	Micro-CHP Contribution to that heat load	100	%
(7)	Micro-CHP Contribution to that heat load as a fraction [⑥/100]	1	
(8)	Estimated annual run-time [⑤*⑦ / ②]	1276	hours
(9)	Estimated annual electric output [⑧*①]	956	KWh
(10)	Estimated annual heat output [⑧*②]	9,902	KWh
(11)	Estimated annual fuel use [④*⑧]	12,250	KWh
C. Estimated micro-CHP electricity self-consumption			
(12)	Assumed occupancy archetype	Half day	Home all day/ Home half day/ Out all day
(13)	Assumed annual property domestic electricity consumption	2500	KWh
(14)	Expected micro-CHP generation self-consumption	50	%
(15)	Grid electricity independence / Self-sufficiency [⑨*⑭ / ⑬]	19	Nearest %
D. Estimated micro-CHP self-consumption – with EESS (if installed)			
(16)	Assumed usable capacity of electrical energy storage device, which is used for self-consumption	n/a	KWh
(17)	Expected micro-CHP generation self-consumption (with EESS)	n/a	%
(18)	Grid electricity independence / Self-sufficiency (with EESS)	n/a	%
F. Waste heat avoidance			
(19)	If heat-load falls below this value micro-CHP may turn down/OFF	24	KWh/day
G. Notes			
	Consumption taken from electric bills. Self-consumption of micro-CHP electric (default value of 50%)		

Worked Example C: Micro-CHP – Summer domestic hot water production only

A. Micro-CHP installation data			Units
(1)	Installed electrical capacity of micro-CHP system - P_{el}	0.3	KWel
(2)	Installed heat capacity of micro-CHP system – P_{th}	0.7	KWth
(3)	Overall Efficiency	90	%
(4)	Fuel use under nominal operation (KW) [(①+②) / ③]	1.11	KW
B. Performance calculations			
(5)	House DHW load (Summer)	2,750	KWh
(6)	Micro-CHP Contribution to that DHW load	100	%
(7)	Micro-CHP Contribution to that DHW load as a fraction [⑥/100]	1	
(8)	Estimated run-time [⑤*⑦ / ②]	3,929	hours
(9)	Estimated electric output [⑧*①]	1,179	KWh
(10)	Estimated heat output [⑧*②]	2,750	KWh
(11)	Estimated fuel use [④*⑧]	4,361	KWh
C. Estimated micro-CHP electricity self-consumption			
(12)	Assumed occupancy archetype	-	Home all day/ Home half day/ Out all day
(13)	Assumed annual property domestic electricity consumption	-	KWh
(14)	Expected micro-CHP generation self-consumption	-	Nearest 5%
(15)	Grid electricity independence / Self-sufficiency [⑨*⑭ / ⑬]	-	Nearest %
D. Estimated micro-CHP self-consumption – with EESS (if installed)			
(16)	Assumed usable capacity of electrical energy storage device, which is used for self-consumption	8	KWh
(17)	Expected micro-CHP generation self-consumption (with EESS)	100	Nearest 5%
(18)	Grid electricity independence / Self-sufficiency (with EESS)	47	%
F. Waste heat avoidance			
(19)	If heat-load falls below this value micro-CHP may turn down/OFF	17	KWh/day
G. Notes			
	Consumption from electric bills. Calculations for self-consumption of micro-CHP electric (EESS installed – so assumed 100%).		

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A. Micro-CHP installation data			Units
(1)	Installed electrical capacity of micro-CHP system - P_{el}		KWel
(2)	Installed heat capacity of micro-CHP system – P_{th}		KWth
(3)	Overall Efficiency		%
(4)	Fuel use under nominal operation (KW) [(①+②) / ③]		KW
B. Performance calculations			
(5)	House heat load (annual)		KWh
(6)	Micro-CHP Contribution to that heat load		%
(7)	Micro-CHP Contribution to that heat load as a fraction [⑥/100]		
(8)	Estimated annual run-time [⑤*⑦ / ②]		hours
(9)	Estimated annual electric output [⑧*①]		KWh
(10)	Estimated annual heat output [⑧*②]		KWh
(11)	Estimated annual fuel use [④*⑧]		KWh
C. Estimated micro-CHP electricity self-consumption			
(12)	Assumed occupancy archetype		Home all day/ Home half day/ Out all day
(13)	Assumed annual property domestic electricity consumption		KWh
(14)	Expected micro-CHP generation self-consumption		Nearest 5%
(15)	Grid electricity independence / Self-sufficiency [⑨*⑭ / ⑬]		%
D. Estimated micro-CHP self-consumption – with EESS (if installed)			
(16)	Assumed usable capacity of electrical energy storage device which is used for self-consumption		KWh
(17)	Expected micro-CHP generation self-consumption (with EESS)		Nearest 5%
(18)	Grid electricity independence / Self-sufficiency (with EESS) [⑨*⑰ / ⑬]		%
F. Waste heat avoidance			
(19)	If heat-load falls below this value micro-CHP may turn down/OFF		KWh/day
G. Notes			

3 PRE-SALE INFORMATION

3.1.1 This estimate shall be communicated in the prescribed format to the client before the point that the contract is awarded and shall be accompanied by the following text:

"Important Note: The performance of micro-CHP systems is impossible to predict with certainty due to the variability in the heat load. This estimate is based upon the standard MCS procedure and given as guidance only. It should not be considered as a guarantee of performance."

3.1.2 As a minimum, the following technical information shall be communicated in writing to the client before the point that the contract is awarded:

a) The result of the performance estimate calculated in accordance with Section 2
b) The physical characteristics of the system (size and weight)
c) The proposed location of the system
d) Maximum power output in kilowatts (KW)
e) Maximum heat output (KW)
f) Performance warranties applying to the system and its output capacity