Part L Review Consultation Event

cSBEMw Demonstration and Discussion

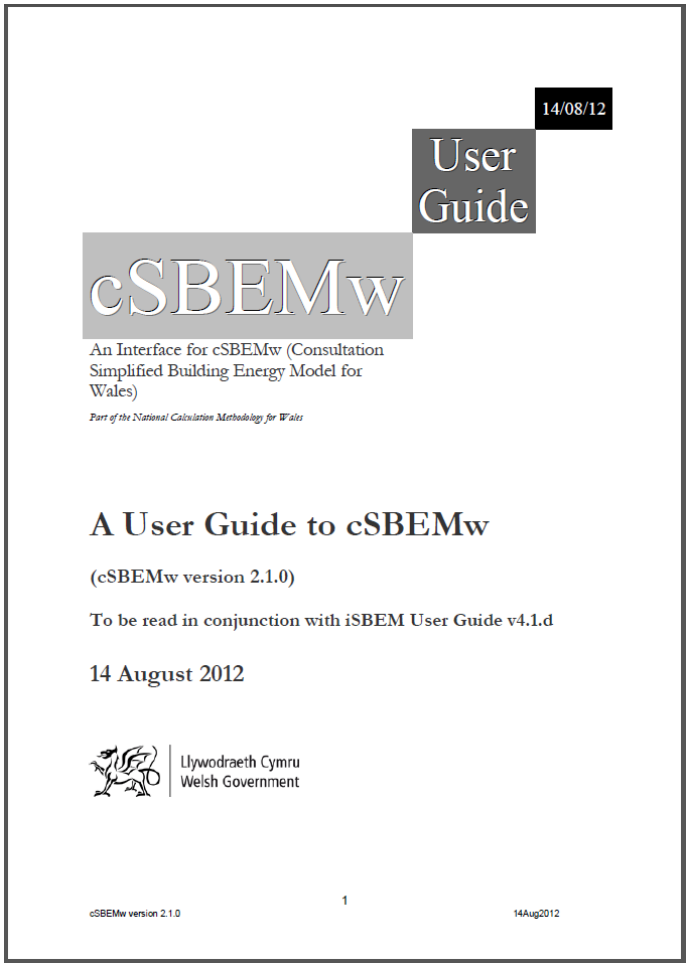
Overview

- *Introduction to cSBEMw*
  - *Software improvements*
  - *Changes resulting from updated NCM*
- *Outputs from cSBEMw*
  - *Delegate feedback and discussion*
- *Closing remarks*

Introduction to cSBEMw

Introduction to cSBEMw

- *www.2013walesncm.bre.co.uk/*
- *Further information on software improvements available in the User Guide*



14/08/12

User Guide

cSBEMw

An Interface for cSBEMw (Consultation Simplified Building Energy Model for Wales)

Part of the National Calculation Methodology for Wales

A User Guide to cSBEMw

(cSBEMw version 2.1.0)

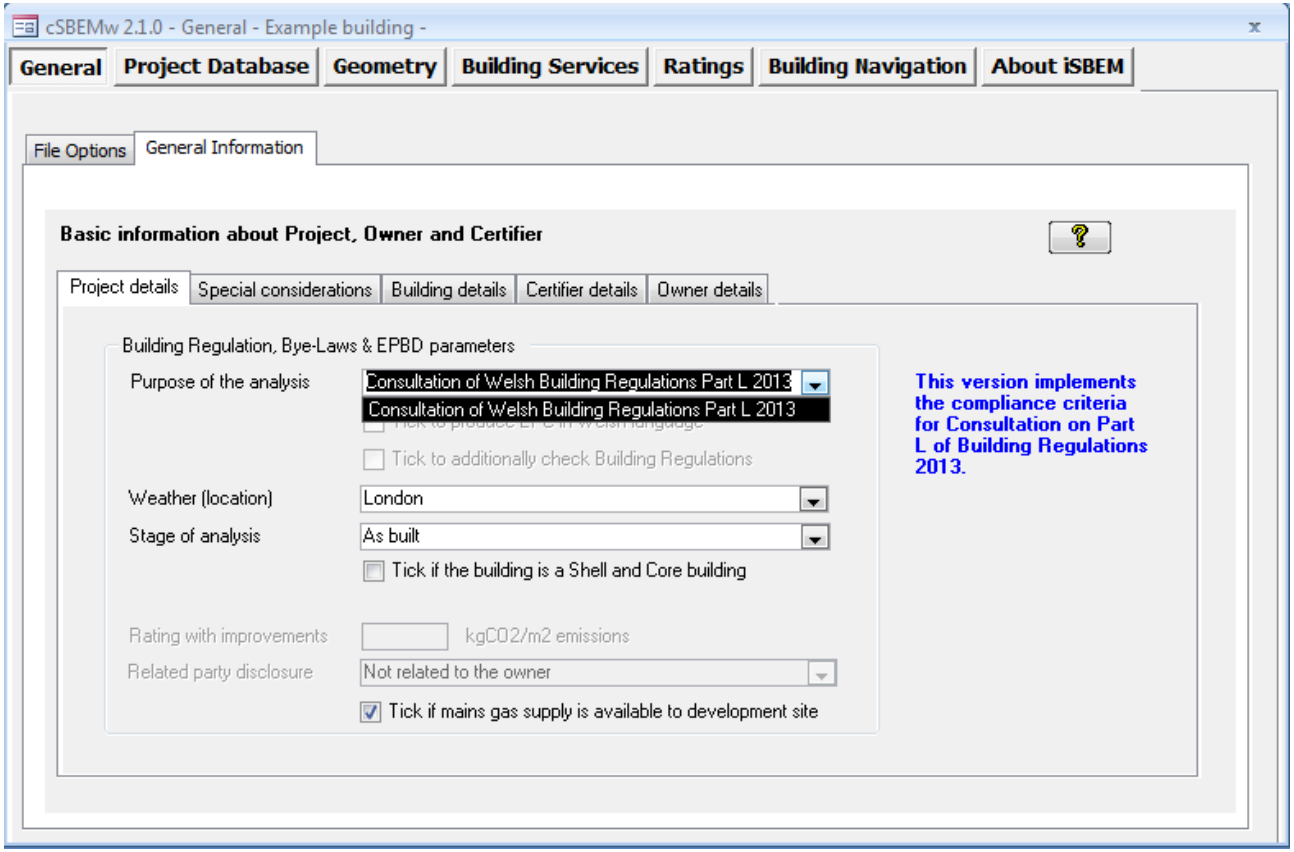
To be read in conjunction with iSBEM User Guide v4.1.d

14 August 2012

Llywodraeth Cymru
Welsh Government

Introduction to cSBEMw – NCM Change

- *Purpose of analysis, availability of gas supply*



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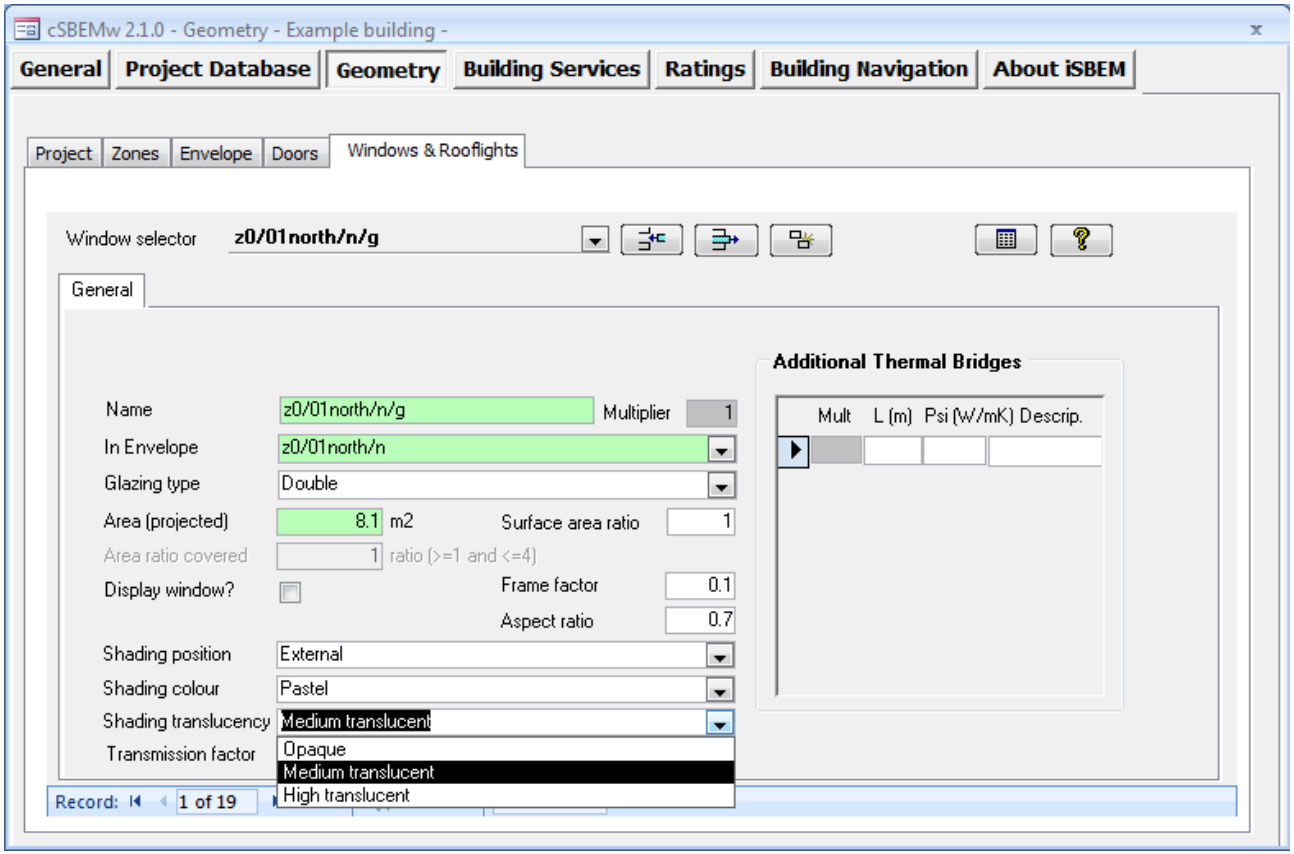
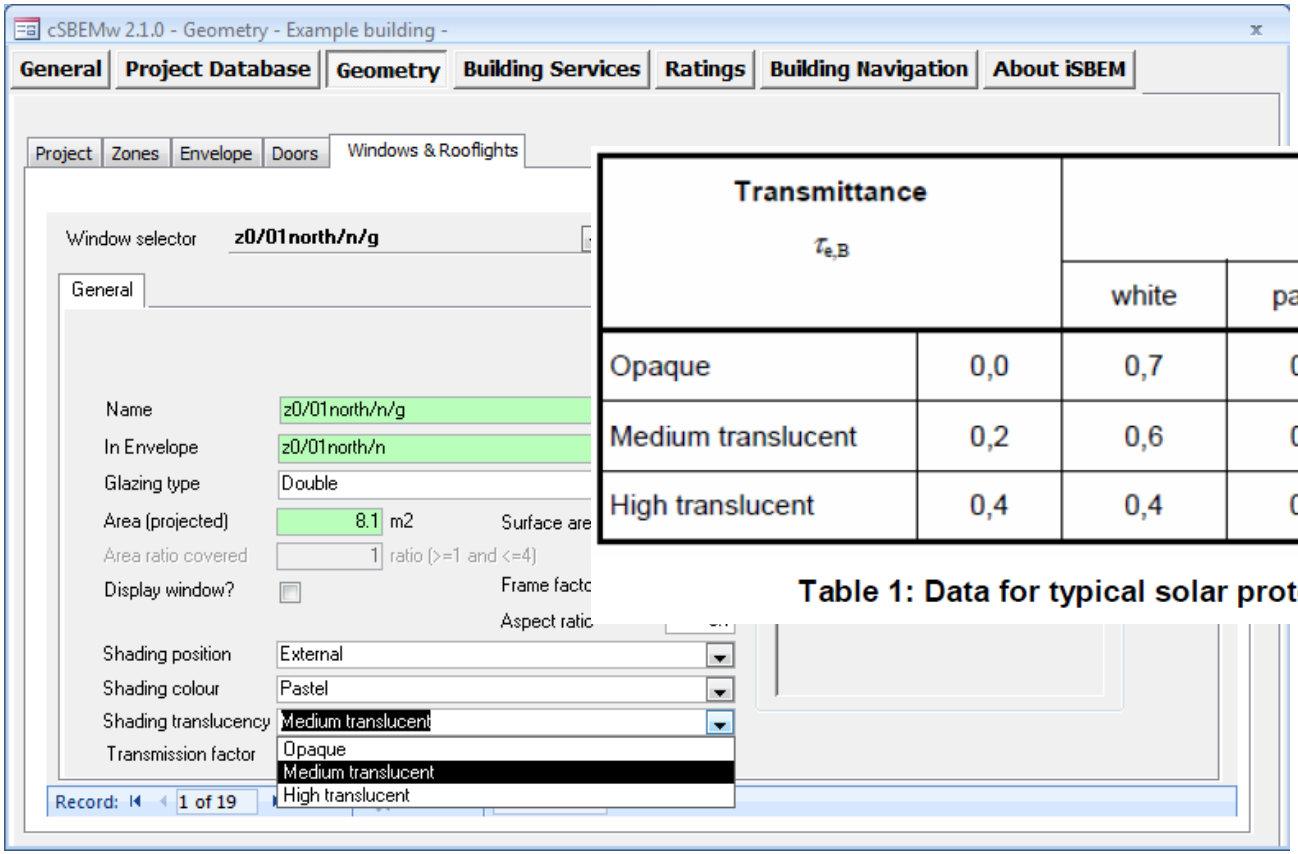
Introduction to cSBEMw

- *Improved treatment of shading*



Introduction to cSBEMw

- *Improved treatment of shading*

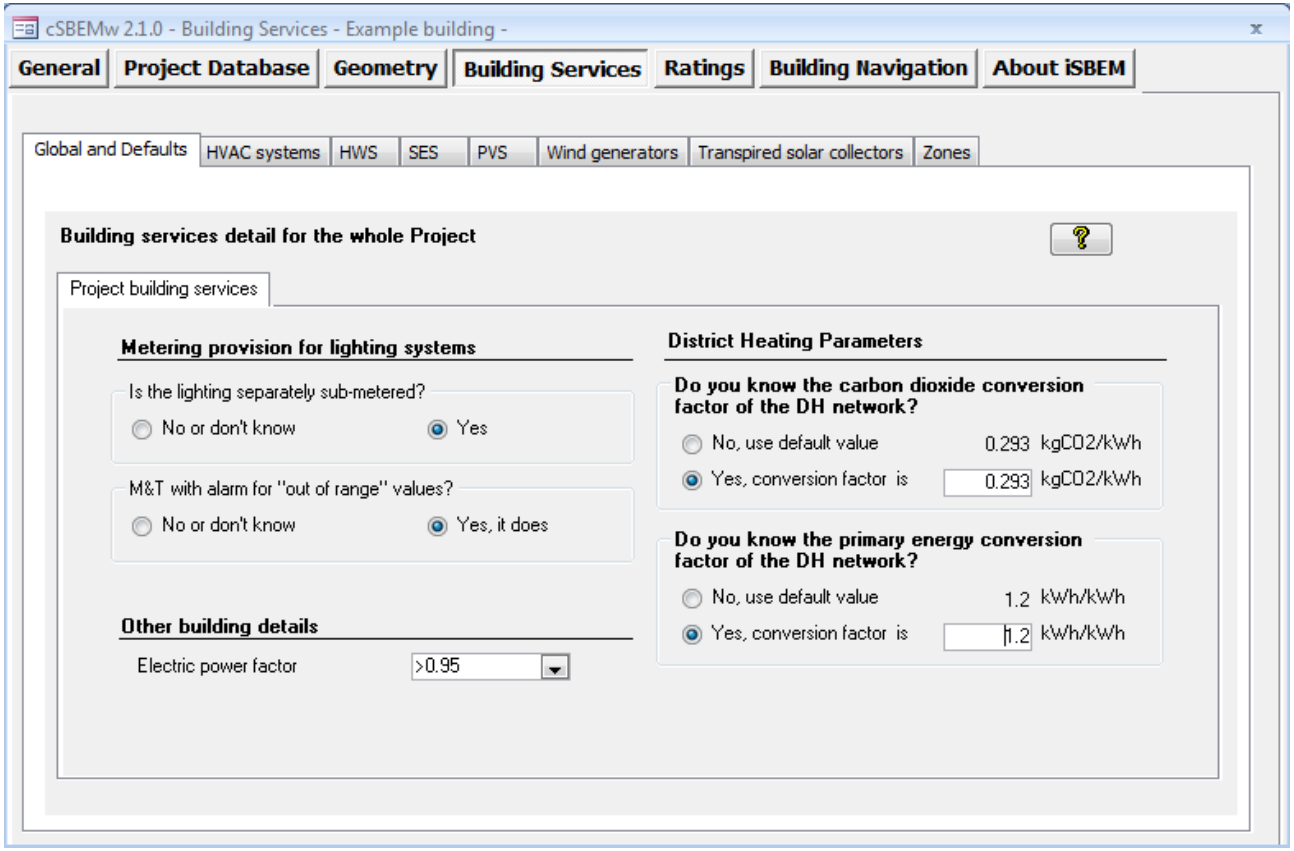


Transmittance $\tau_{e,B}$		Reflectance $\rho_{e,B}$			
		white	pastel	dark	black
Opaque	0,0	0,7	0,5	0,3	0,1
Medium translucent	0,2	0,6	0,4	0,2	0,1
High translucent	0,4	0,4	0,3	0,2	0,1

Table 1: Data for typical solar protection devices[i]

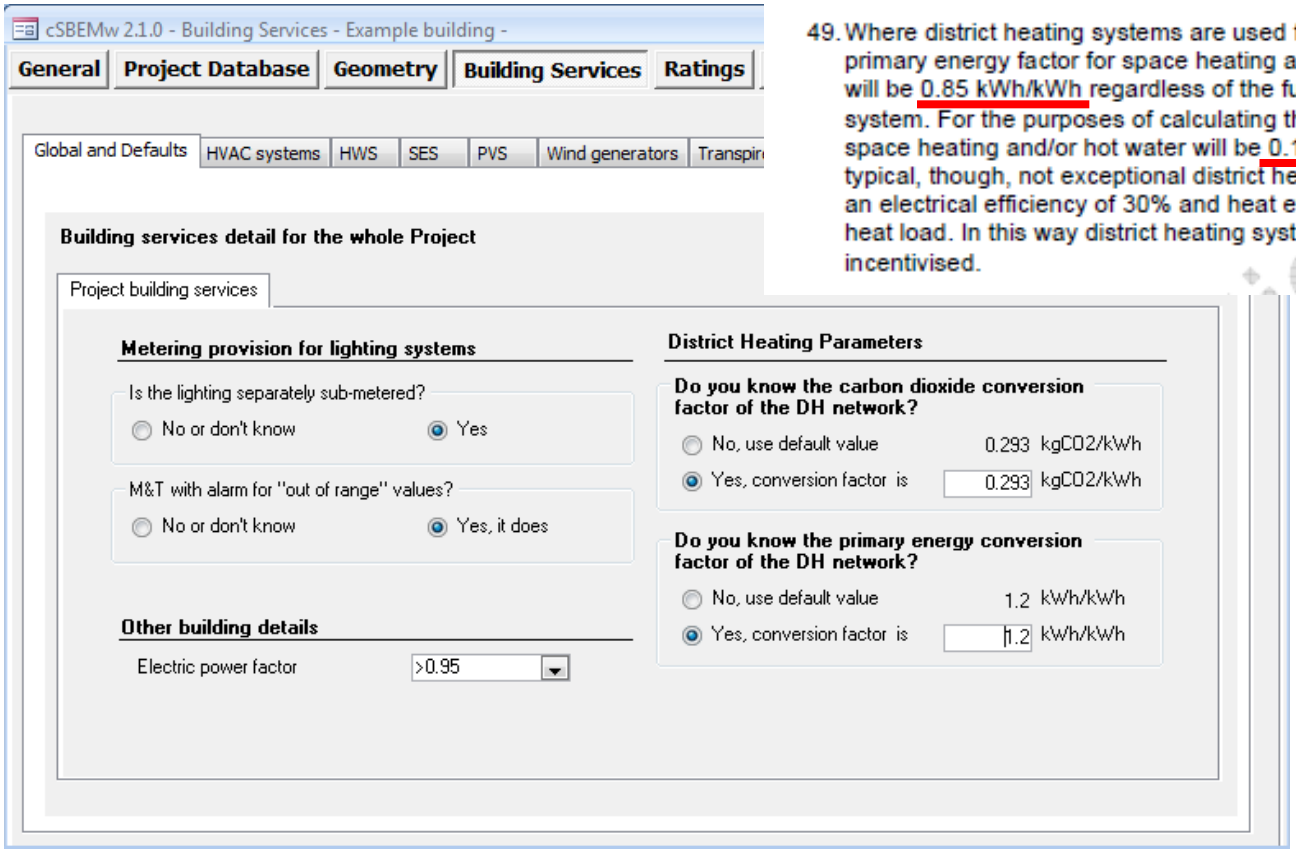
Introduction to cSBEMw – NCM Change

- *District heating parameters*



Introduction to cSBEMw – NCM Change

- *District heating parameters*

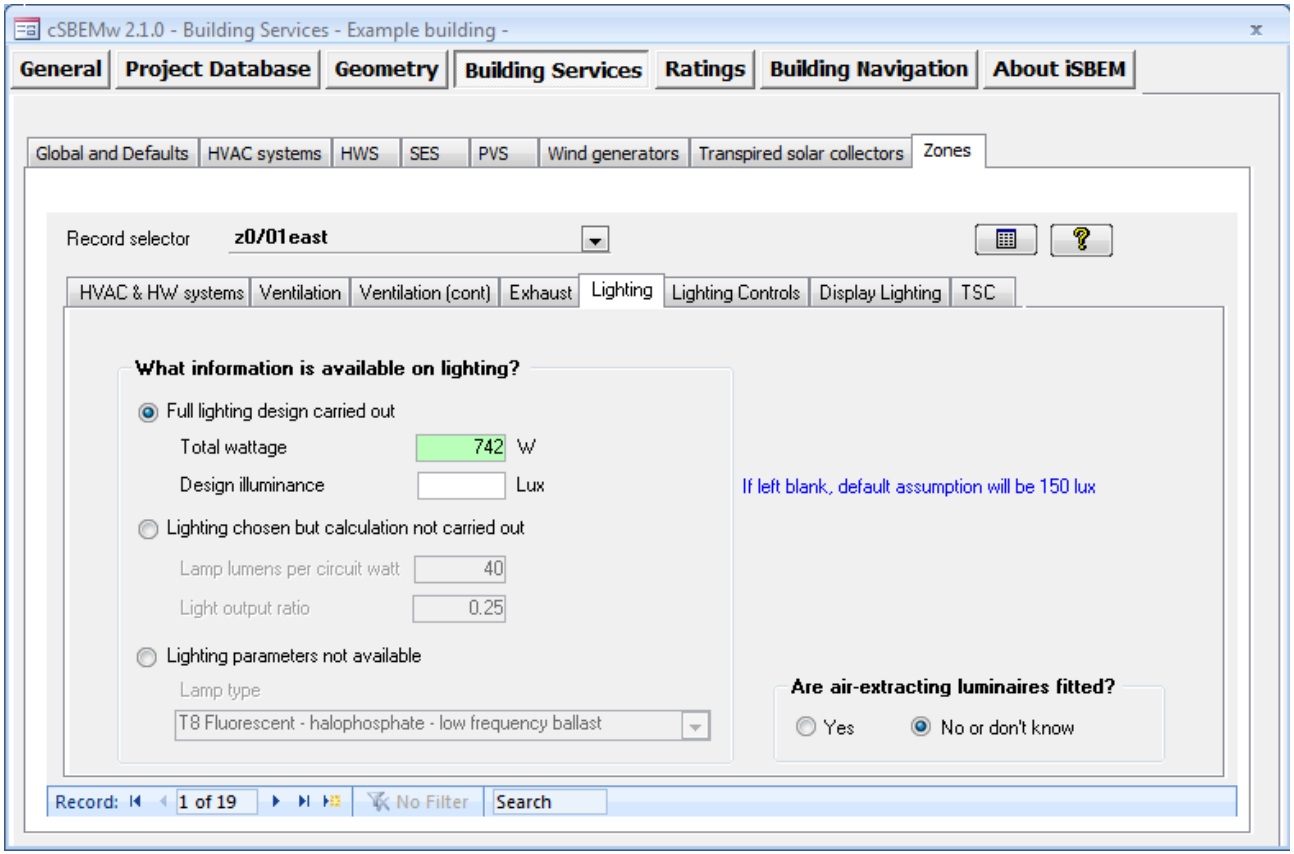


District Heating

49. Where district heating systems are used for space heating and/or hot water, the primary energy factor for space heating and/or hot water in the notional building will be 0.85 kWh/kWh regardless of the fuel(s) used in the actual district heating system. For the purposes of calculating the TER the fuel emission factor for space heating and/or hot water will be 0.15 kgCO_2/kWh. This represents a typical, though, not exceptional district heating system supplied by gas-CHP with an electrical efficiency of 30% and heat efficiency of 50% supplying 70% of the heat load. In this way district heating systems offering improved performance are incentivised.

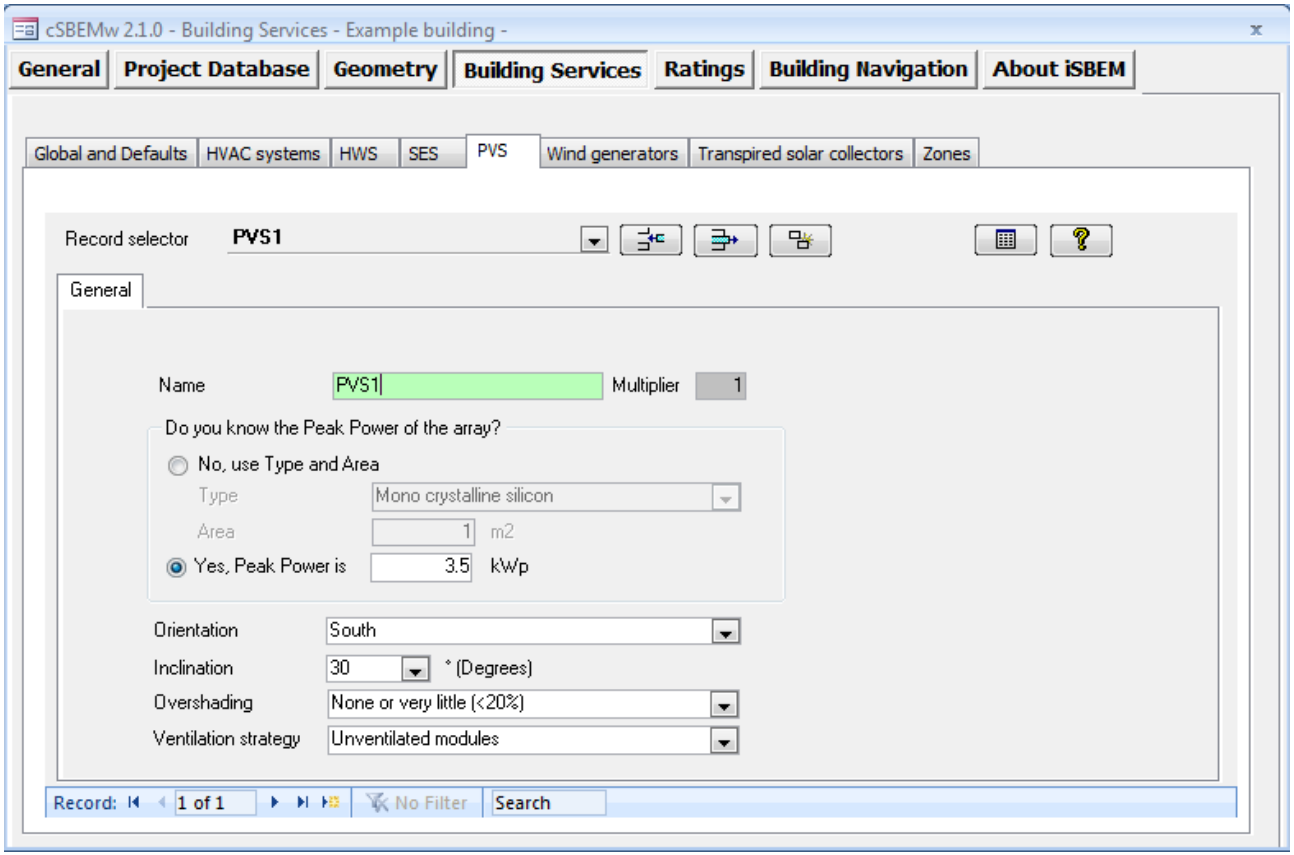
Introduction to cSBEMw – NCM Change

- *Lighting design illuminance*



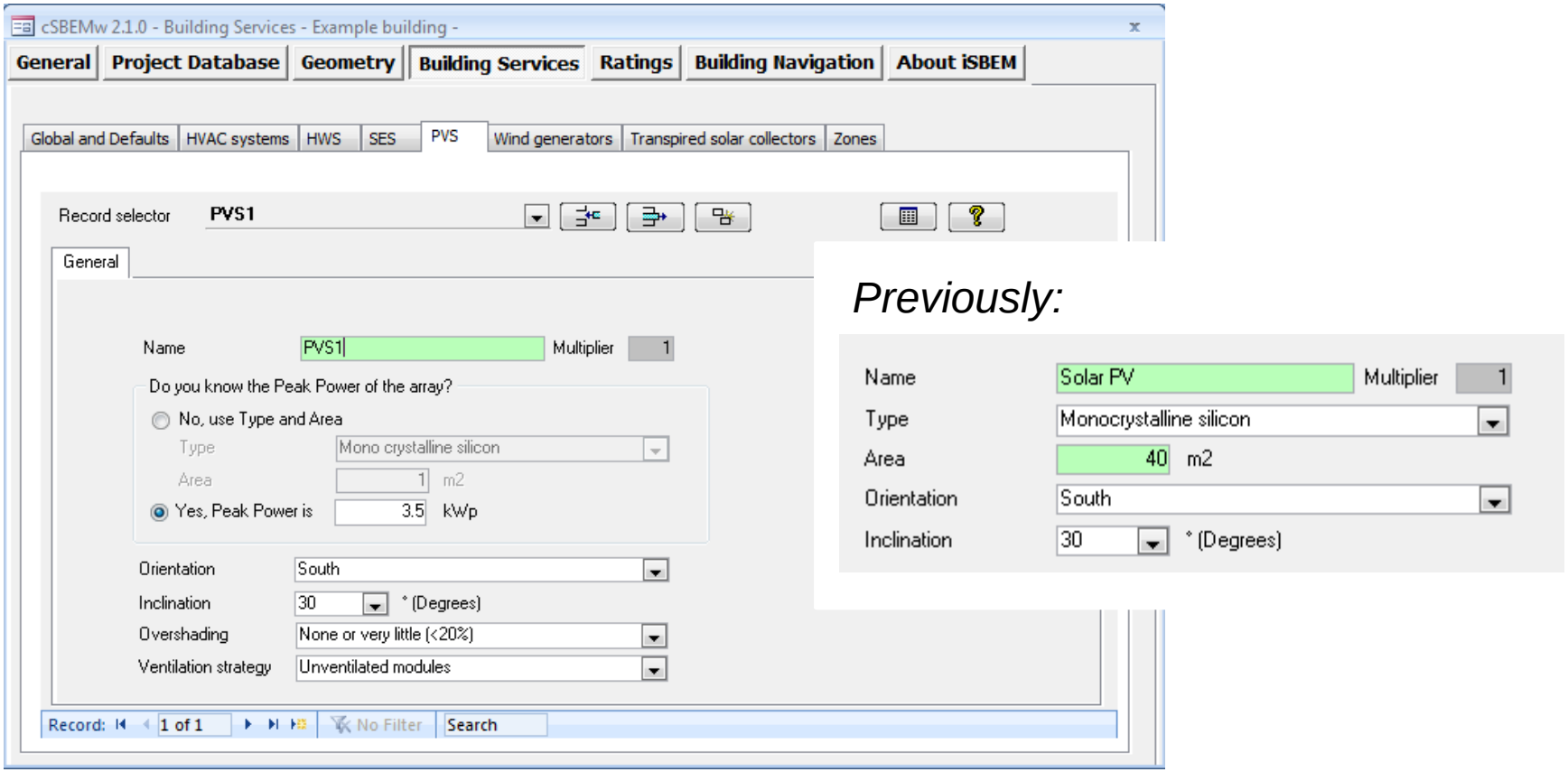
Introduction to cSBEMw

- *Improved treatment of PV systems*



Introduction to cSBEMw

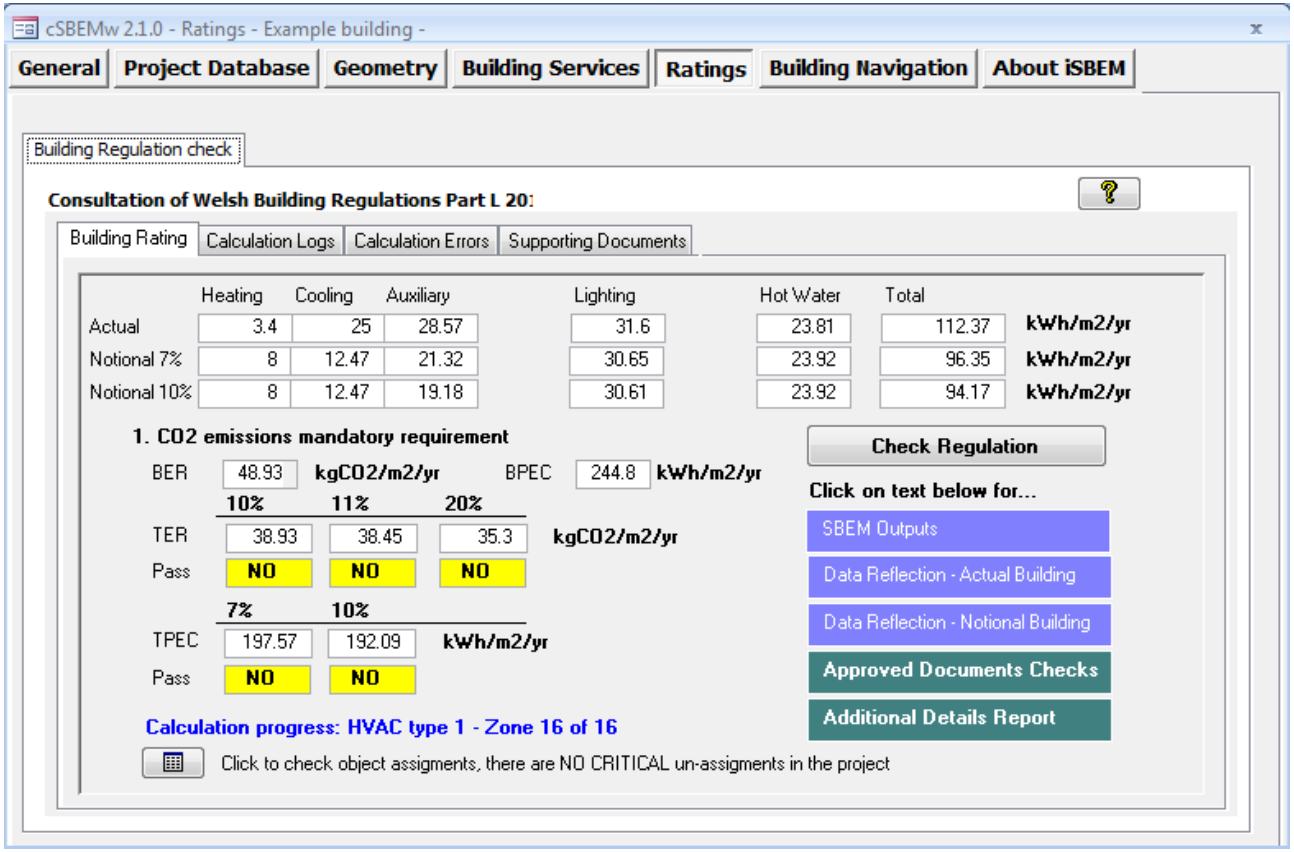
- *Improved treatment of PV systems*



Outputs from cSBEMw

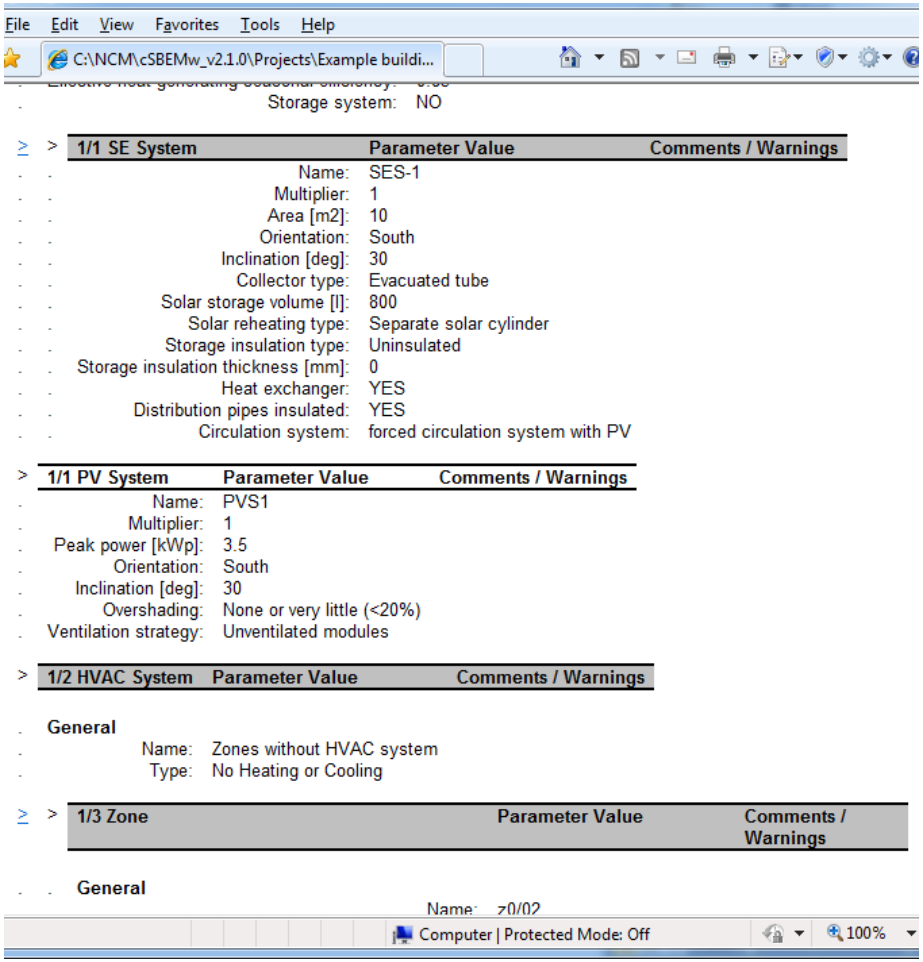
Outputs from cSBEMw

- *Actual/Notional values*



Outputs from cSBEMw

- *Data Reflection Report (Inputs)*



File Edit View Favorites Tools Help

C:\NCM\cSBEMw_v2.1.0\Projects\Example buildi...

Storage system: NO

1/1 SE System	Parameter Value	Comments / Warnings
Name:	SES-1	
Multiplier:	1	
Area [m2]:	10	
Orientation:	South	
Inclination [deg]:	30	
Collector type:	Evacuated tube	
Solar storage volume [l]:	800	
Solar reheating type:	Separate solar cylinder	
Storage insulation type:	Uninsulated	
Storage insulation thickness [mm]:	0	
Heat exchanger:	YES	
Distribution pipes insulated:	YES	
Circulation system:	forced circulation system with PV	

1/1 PV System	Parameter Value	Comments / Warnings
Name:	PVS1	
Multiplier:	1	
Peak power [kWp]:	3.5	
Orientation:	South	
Inclination [deg]:	30	
Overshading:	None or very little (<20%)	
Ventilation strategy:	Unventilated modules	

1/2 HVAC System	Parameter Value	Comments / Warnings

General

Name: Zones without HVAC system

Type: No Heating or Cooling

1/3 Zone	Parameter Value	Comments / Warnings

General

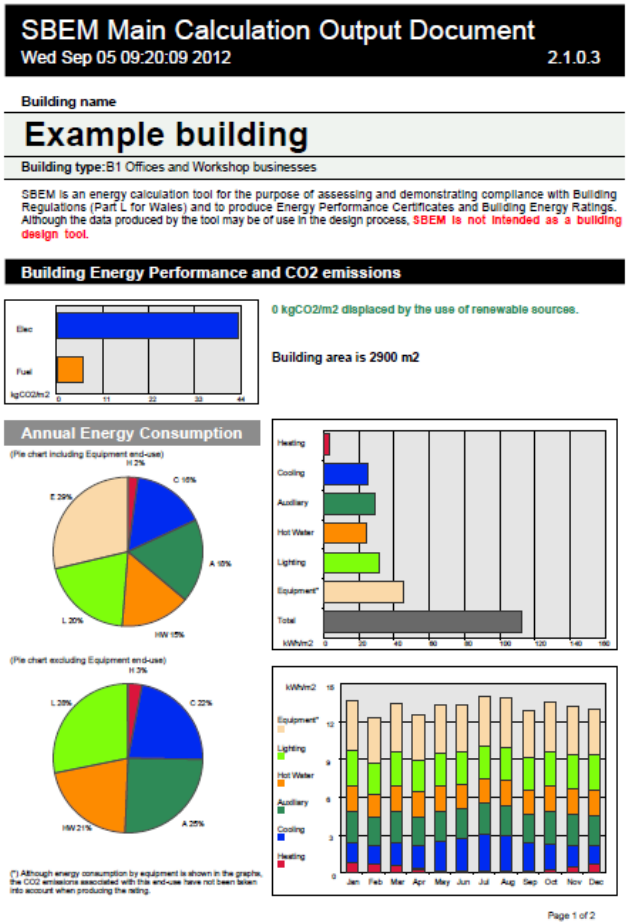
Name: z0/02

Computer | Protected Mode: Off

100%

Outputs from cSBEMw

- *SBEM Main Calculation Output (Outputs)*



SBEM Main Calculation Output Document
Wed Sep 05 09:20:09 2012 2.1.0.3

Building name

Example building

Building type: B1 Offices and Workshop businesses

SBEM is an energy calculation tool for the purpose of assessing and demonstrating compliance with Building Regulations (Part L for Wales) and to produce Energy Performance Certificates and Building Energy Ratings. Although the data produced by the tool may be of use in the design process, SBEM is not intended as a building design tool.

Building Energy Performance and CO2 emissions

0 kgCO2/m2 displaced by the use of renewable sources.

Building area is 2900 m2

Annual Energy Consumption

(Pie chart including Equipment end-use)

(Pie chart excluding Equipment end-use)

(*) Although energy consumption by equipment is shown in the graphs, the CO2 emissions associated with this end-use have not been taken into account when producing the rating.

Page 1 of 2

Outputs from cSBEMw

- *BRUKL (Outputs)*

BRUKL2 Output Document

HM Government

Compliance with Welsh Building Regulations Part L 2013

Project name

Example building — As built

Date: Wed Sep 05 09:20:09 2012

Administrative information

Building Details

Address: 56 London Road, LONDON, SW23 1HA

Certification tool

Calculation engine: SBEM

Calculation engine version: 2.1.0.3

Interface to calculation engine: iSBEM

Interface to calculation engine version: 2.1.0

BRUKL2 compliance check version: v2.1.0.2

Owner Details

Name: John Jones

Telephone number: 987654321

Address: 53 London Road, LONDON, SW23 1HA

Certifier details

Name: <ea name>

Telephone number: <ea phone>

Address: <ea address>, <ea city>, XXXX XX

Criterion 1: The calculated CO_2 emission rate for the building should not exceed the target

Consultation Options for TER Saving	10%	11%	20%
Target Emission Rate (TER), kgCO2/m2.annum	38.9	38.5	35.3
Building Emission Rate (BER), kgCO2/m2.annum	48.9		
Consultation Options for TPEC Saving	**7%**	**10%**	
Target Primary Energy Consumption (TPEC), kWh/m2.annum	197.6	192.1	
Building Primary Energy Consumption (BPEC), kWh/m2.annum	244.8		

Outputs from cSBEMw

- *BRUKL (Outputs)*

Criterion 2: The performance of the building fabric and the building services should achieve reasonable overall standards of energy efficiency

2.a Building fabric

Element	$U_{i\text{-Limit}}$	$U_{i\text{-Calc}}$	$U_{i\text{-Calc}}$	Surface where the maximum value occurs*
Wall**	0.35	0.16	0.16	z0/01east/e
Floor	0.25	0.1	0.25	z1/01centre/fe
Roof	0.25	0.15	0.15	z1/01centre/c
Windows***, roof windows, and rooflights	2.2	1.5	1.5	z0/01north/n/g
Personnel doors	2.2	2	2	z0/03/w/d
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{i\text{-Limit}}$ = Limiting area-weighted average U-values [W/(m²K)]
$U_{i\text{-Calc}}$ = Calculated area-weighted average U-values [W/(m²K)]
$U_{i\text{-Calc}}$ = Calculated maximum individual element U-values [W/(m²K)]

* There might be more than one surface where the maximum U-value occurs.
** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.
*** Display windows and similar glazing are excluded from the U-value check.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
m³/(h.m²) at 50 Pa	10	3

Page 1 of 5

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Outputs from cSBEMw

- *BRUKL (Outputs)*

2.b Building services

The building services parameters listed below are expected to be checked by the BCO against guidance. No automatic checking is performed by the tool.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- HVAC for the example building

Heating seasonal efficiency	Cooling nominal efficiency	SFP [W/(l/s)]	HR seasonal efficiency
1	4.2	1.2	0.75
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			YES

1- HWS for the example building

Heating seasonal efficiency	Hot water storage loss factor [kWh/litre per day]
0.85	-

Local mechanical ventilation and exhaust

Zone	Supply/extract SFP [W/(l/s)]	HR seasonal efficiency	Exhaust SFP [W/(l/s)]
z1/03	-	-	1.5

General lighting and display lighting

Zone	General lighting [W]	Display lamps efficacy [lm/W]
z0/02	230	-
z1/02	240	-
z1/03	120	-
z0/01east	740	15
z0/03	4400	15
z1/01centre	2790	-
z0/01north	250	15

Outputs from cSBEMw

- *BRUKL (Outputs)*

Criterion 3: The spaces in the building should have propriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
z0/01east	N/A	N/A
z0/03	N/A	N/A
z1/01centre	N/A	N/A
z0/01north	NO (-67.1%)	NO
z0/01west	NO (-18.5%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

Outputs from cSBEMw

- *BRUKL (Outputs)*

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m²]	2900	2900
External area [m²]	4307.5	4307.5
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	3	5
Average conductance [W/K]	993.58	1618.42
Average U-value [W/m²K]	0.23	0.38
Alpha value* [%]	13.59	11.58

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
31	**A1/A2 Retail/Financial and Professional services**
16	**A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways**
53	**B1 Offices and Workshop businesses**
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Inst.: Hospitals and Care Homes
	C2 Residential Inst.: Residential schools
	C2 Residential Inst.: Universities and colleges
	C2A Secure Residential Inst.
	Residential spaces
	D1 Non-residential Inst.: Community/Day Centre
	D1 Non-residential Inst.: Libraries, Museums, and Galleries
	D1 Non-residential Inst.: Education
	D1 Non-residential Inst.: Primary Health Care Building
	D1 Non-residential Inst.: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others - Stand alone utility block

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Outputs from cSBEMw

- *BRUKL (Outputs)*

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	3.4	8
Cooling	25	12.47
Auxiliary	28.57	19.18
Lighting	31.6	30.61
Hot water	23.81	23.92
Equipment*	45.24	45.24
TOTAL	112.37	94.17

* Energy used by equipment does not count towards the total for calculating emissions.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0.88	6.03
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0.44	0

Energy & CO_2 Emissions Summary

	Actual	Indicative Target
Heating + cooling demand [MJ/m²]	276.91	193.42
Total consumption [kWh/m²]	112.37	94.17
Total emissions [kg/m²]	48.9	35.3

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Outputs from cSBEMw

- *BRUKL (Outputs)*

HVAC Systems Performance

System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] No Heating or Cooling										
	Actual	266.1	5.7	0	0	5.3	0	0	0	0
	Notional	154.5	37.2	0	0	1.4	0	0	---	---
[ST] Single-duct VAV, [HS] District heating, [HFT] District Heating, [CFT] Electricity										
	Actual	11.3	265.8	3.6	26.1	29.6	0.88	2.83	1	3.7
	Notional	24.6	168.9	8.4	13	20	0.82	3.6	---	---

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

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Outputs from cSBEMw

- *Delegate Feedback*
  - *Are the input/output reports sufficient?*
  - *What do you use the reports for?*
  - *Any other comments?*

Closing Remarks

Closing Remarks

- *Non-Domestic Part L Update this afternoon*
- *Any questions?*

Proposed Notional Building Specifications

- *7% TPEC Specification*

Element	Side lit or unlit (where HVAC specification is heating only)	Sidelit or unlit (where HVAC specification includes cooling)	Toplit
Roof U-value (W/m^2.K)	0.18	0.18	0.18
Wall U-value (W/m^2.K)	0.26	0.26	0.26
Floor U-value (W/m^2.K)	0.22	0.22	0.22
Window U-value (W/m^2.K)	1.8 (10% FF)	1.8 (10% FF)	N/A
G-Value (%)	40%	40%	N/A
Light Transmittance (%)	71%	71%	N/A
Roof light U-value (W/m^2.K)	N/A	N/A	1.8 (15% FF)
G-Value (%)	N/A	N/A	55%
Light Transmittance (%)	N/A	N/A	60%
Air-permeability (m^3/m^2/hour) Gross Internal Area greater than 250m^2	3	5	5
Air-permeability (m^3/m^2/hour) Gross Internal Area less than or equal to 250m^2	5	5	5
Lighting Luminaire (lm / circuit watt)	55	65	65

Element	Side lit or unlit (where HVAC specification is heating only)	Sidelit or unlit (where HVAC specification includes cooling)	Toplit
Occupancy control (Yes/No)	Yes	Yes	Yes
Daylight control (Yes/No)	Yes	Yes	Yes
Heating efficiency (Heating and hot water)	88%	91%	91%
Central Ventilation SFP (W/l/s)	1.8	1.8	1.8
Terminal Unit SFP (W/l/s)	0.5	0.4	0.4
Cooling (SEER / SSEER)	4.5 / 3.6	4.5 / 3.6	4.5 / 3.6
Cooling (SSEER)[67]	2.7	2.7	2.7
Heat recovery efficiency (%)	70%	70%	70%
Variable speed control of fans and pumps, controlled via multiple sensors (Yes/No)	Yes	Yes	Yes
Demand control (mechanical ventilation only). Variable speed control of fans via CO_2 sensors (Yes/No)	No	Yes	Yes
Renewable Energy Contribution Monocrystalline PV with an efficiency of 15%. Active area of south facing panels (120kWh/m^2/year output) equivalent to stated % of gross floor area but limited to 50% of roof area.	For 10% aggregate reduction in ***TER***: 1% of gross internal area		

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Proposed Notional Building Specifications

- *10% TPEC Specification*

Element	Side lit or unlit (where HVAC specification is heating only)	Sidelit or unlit (where HVAC specification includes cooling)	Toplit
Roof U-value ($W/m^2.K$)	0.18	0.18	0.18
Wall U-value ($W/m^2.K$)	0.26	0.26	0.26
Floor U-value ($W/m^2.K$)	0.22	0.22	0.22
Window U-value ($W/m^2.K$)	1.8 (10% FF)	1.8 (10% FF)	N/A
G-Value (%)	40%	40%	N/A
Light Transmittance (%)	71%	71%	N/A
Roof light U-value ($W/m^2.K$)	N/A	N/A	1.8 (15% FF)
G-Value (%)	N/A	N/A	55%
Light Transmittance (%)	N/A	N/A	60%
Air-permeability (m^3/m^2/hour) Gross Internal Area greater than $250m^2$	3	5	5
Air-permeability (m^3/m^2/hour) Gross Internal Area less than or equal to $250m^2$	5	5	5
Lighting Luminaire (lm / circuit watt)	65	65	65

Element	Side lit or unlit (where HVAC specification is heating only)	Sidelit or unlit (where HVAC specification includes cooling)	Toplit
Occupancy control (Yes/No)	Yes	Yes	Yes
Daylight control (Yes/No)	Yes	Yes	Yes
Heating efficiency (Heating and hot water)	91%	91%	91%
Central Ventilation SFP (W/l/s)	1.8	1.8	1.8
Terminal Unit SFP (W/l/s)	0.4	0.3	0.4
Cooling (air-conditioned) (SEER / SSEER)	4.5 / 3.6	4.5 / 3.6	4.5 / 3.6
Cooling (mixed mode) (SSEER)[68]	2.7	2.7	2.7
Heat recovery efficiency (%)	70%	70%	70%
Variable speed control of fans and pumps, controlled via multiple sensors	Yes	Yes	Yes
Demand control (mechanical ventilation only). Variable speed control of fans via CO_2 sensors	Yes	Yes	Yes
Renewable Energy Contribution	For 11% aggregate reduction in ***TER***: None		
Monocrystalline PV with an efficiency of 15%. Active area of south facing panels (120kWh/m^2/year output) equivalent to stated % of gross floor area but limited to 50% of roof area.	For 20% aggregate reduction in ***TER***: 5% of gross internal area Welsh Government's preferred option		

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