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ENERGY SHOW

Upcoming changes to DEAP methodology

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Changes to DEAP Water Heating

Changes to DEAP Lighting Demand

Changes to DEAP Ventilation

Renewable Energy Ratio (Part L new dwelling compliance)

Changes to DEAP Methodology – Provisional Timelines

Date		Update to include:
April 2019	Part L (Dwellings) 2019 published	*Nzeb standard for dwellings*
	DEAP workbook version 4.2.0	*Updates to DEAP methodology, TGD L 2019 compliance check, integrated heat pump calculator*
	DEAP manual version 4.2.0	*Methodology changes & TGD L 2019 compliance*
	Survey Guide version 3.0	*Survey & publication guidance on methodology changes*
	Survey Form	*New lighting, MVHR, water heating inputs included*
July 2019	DEAP 4.2.0 software	*UI updates, methodology updates, TGD L 2019 compliance checks & integrated heat pump calculation tool*
	DEAP manual version 4.2.1	*Incorporating changes to DEAP 4 software, methodology updates*

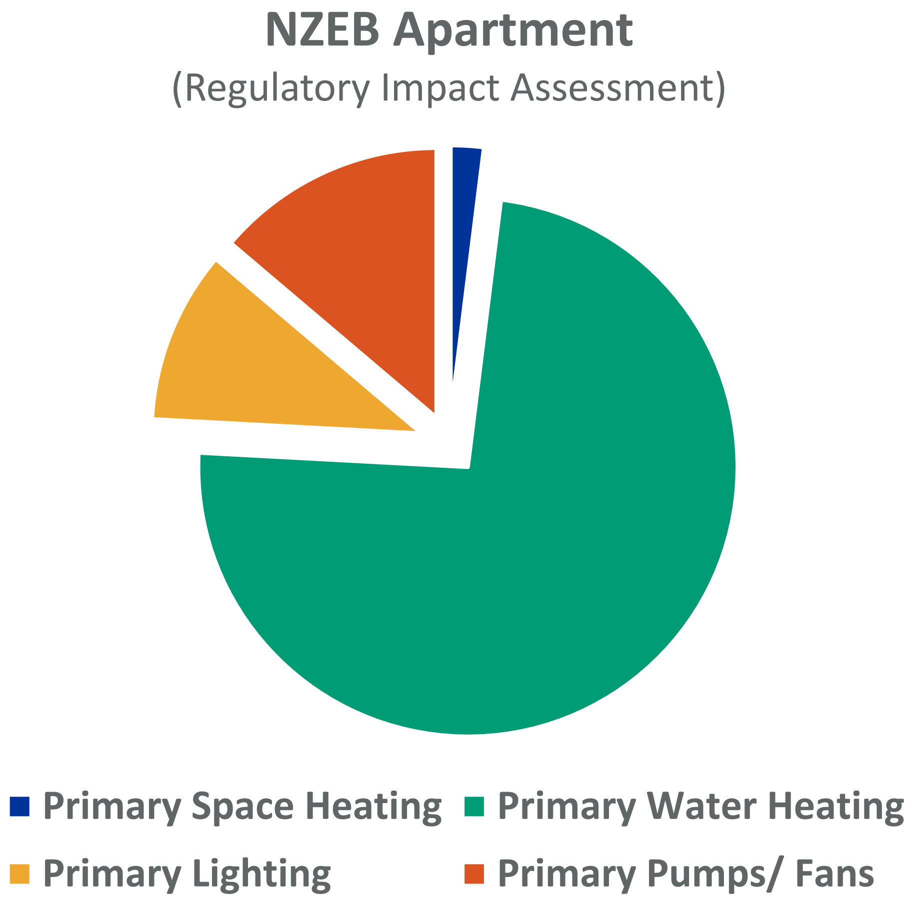
Water Heating

Water Heating – Changes to energy demand calculation

- In NZEB – hot water energy demand can be significantly larger than the space heating energy demand.
- Demand has been based on number of occupants (floor area) - too simple compared to space heating calculation.

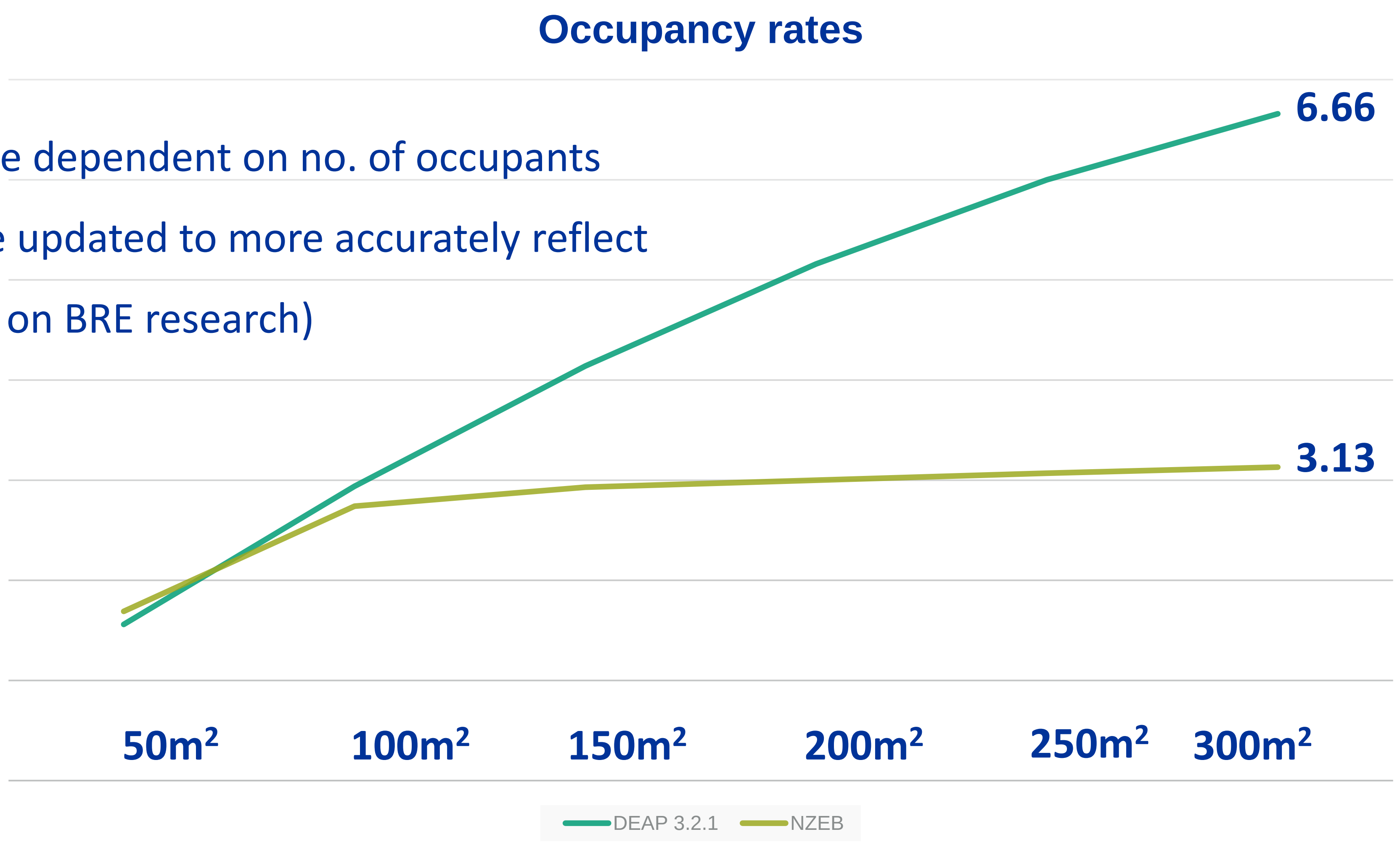
New methodology will take account of

- Updated occupancy rates
- Shower types and presence of baths
- Electricity used by electric showers
- Low water use fittings



Water Heating – Updated occupancy rates

- In DEAP, hot water usage dependent on no. of occupants
- No. of occupants will be updated to more accurately reflect occupancy rates (based on BRE research)



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Water Heating – Updated hot water requirement

- A daily hot water requirement in litres/day is calculated separately for three categories of use:
- Hot water required for showers ($V_{d,shower}$)
- Hot water required for baths ($V_{d,bath}$)
- Hot water required for other uses ($V_{d,other}$)

- Combination provides a total daily hot water demand for each month

$$V_{d,average} \text{ (litres/day)} = V_{d,shower} + V_{d,bath} + V_{d,other}$$

Water heating – Hot water required for showers

- Daily hot water requirement is calculated individually for each shower in the dwelling & then summed
- For each shower, hot water requirement depends on
    - *No. of occupants (floor area) & adjusted to account for a bath if present*
    - Shower flow rate - (*Hot water pressure) depends on plumbing arrangement, pumps, flow restrictors*

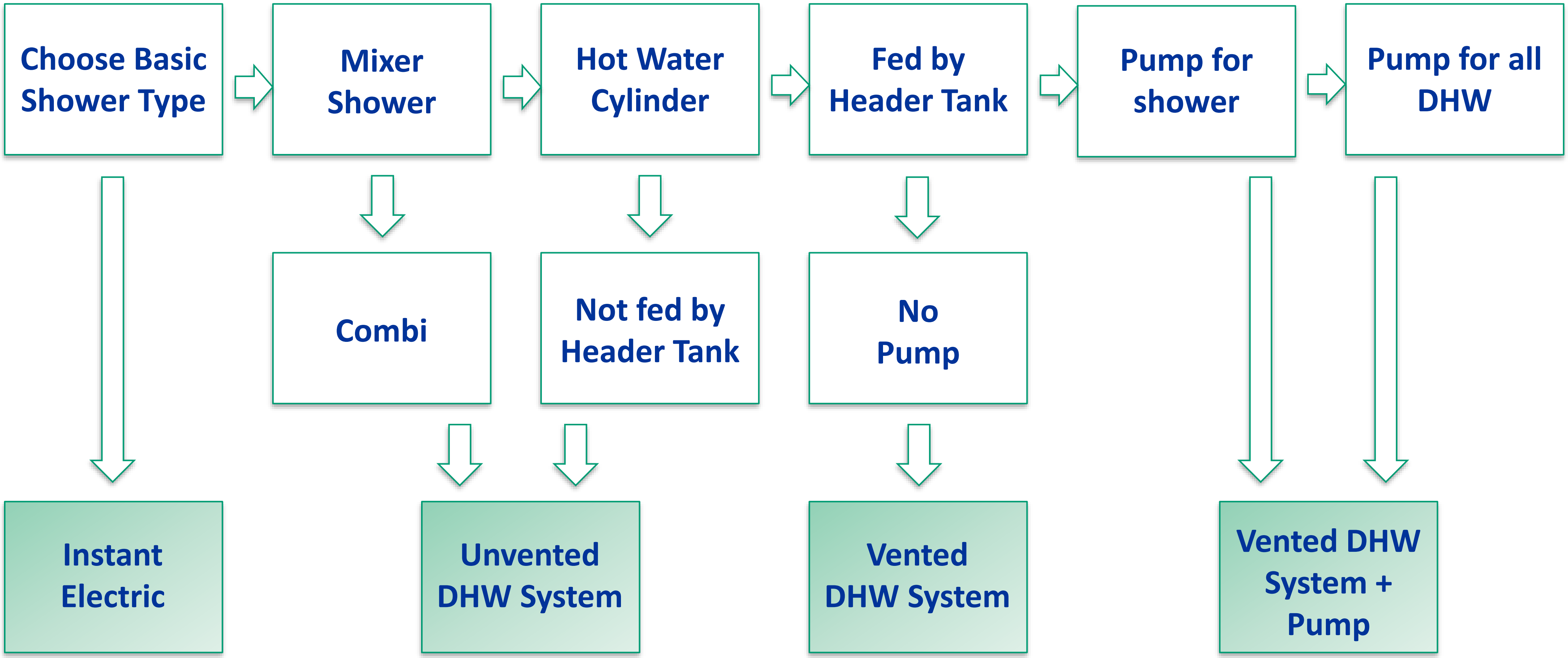
Water heating – Entering showers in DEAP

1. Enter type of shower – choice of 4

Hot Water Usage from Showers					
	No of Showers Taken			1.72	
		Is flow rate known	Type of System	Flow Restrictor	Known Flow Rate l/min
	Shower 1	No	Vented hot water system	No	
	Shower 2	No	Vented hot water system + pump	No	
	Shower 3	No	Unvented hot water system	No	
	Shower 4	No	Instantaneous electric shower (vent	No	

Depends on no. of occupants (floor area) & if bath present

Water Heating – Identifying type of shower



Water Heating – Identifying type of shower

Choose Basic Shower Type → Mixer Shower → Hot Water Cylinder → Fed by Header Tank → Pump for shower → Pump for all DHW

Pump for shower / Pump for all DHW → Vented DHW System + Pump

Pump?	Notes
Yes	Includes in-built shower pumps and whole dwelling pump used to increase water pressure generally
	Identification of pump = often beside HW cylinder or could be built into shower unit (look-up make & model of shower)
	Default (higher flow rate)
No	Evidence = note on survey form

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Water heating – Entering showers in DEAP

2. Is flow rate known? – yes or no

Hot Water Usage from Showers						
	No of Showers Taken				2.21	
		Is flow rate known	Type of System		Flow Restrictor	Known Flow Rate l/min
	Shower 1	Yes	Vented hot water system + pump		No	10
	Shower 2	No	Vented hot water system + pump		No	
	Shower 3	No	Vented hot water system		No	

Flow rate known?	Notes
Yes	Enter flow rate in DEAP
	Evidence = technical data sheet for shower
No	**A default flow rate is applied based on shower type**

Water Heating – Entering showers in DEAP

2. Is flow rate known? If not, default flow rates are applied

Shower Type	Default Flow Rate (l/min)
Vented Hot Water System	7
Vented Hot Water System + Pump	12
Unvented Hot Water System	11
Instantaneous Electric Shower	0[1]
Notes 1. Instantaneous electric showers have only a cold water feed, so use no hot water	

Water heating – Entering showers in DEAP

3. Is there a flow restrictor present? – yes or no

	Is flow rate known	Type of System	Flow Restrictor	Known Flow Rate l/min	Flow Rate l/min
Shower 1	Yes	Vented hot water system + pump	Yes	6	6
Shower 2	No	Vented hot water system + pump	Yes		6
Shower 3	No	Vented hot water system	No		7
Shower 4	No	Unvented hot water system	No		11
Shower 5	No	Vented hot water system + pump	No		12

Water Heating – Entering showers in DEAP

3. Is there a flow restrictor present?

Flow Restrictor?	Notes
Yes	Permanent flow restrictor installed (requiring use of tools to remove)
	Where flow rate is known - enter flow rate with restrictor (min flow rate in DEAP = 6 l/min)
	Where flow rate is unknown – default flow rate reduced to 6 l/min for all shower types
	Evidence = technical data sheet for shower or photo if visible
No	**Default**

Water Heating – Entering showers in DEAP

Instantaneous Electric Shower

- Don't use any hot water - they only have a cold water feed
- The significant amount of electricity they use is accounted for in DEAP

Electricity for pumps and fans and electric keep-hot facility	
	[kWh/y]
Heating system	175
Keep-hot facility of a combi boiler	0
Ventilation system	0
Solar water heating pump	0
Electric Shower	117
Total	292

- Also affects the heat gain calculation in DEAP

Water Heating – Bath in dwelling

- The amount of hot water used in baths depends on
    - no. of occupants (floor area) & adjusted to account for a shower if present

$V_{d,bath}$ = DHW used per bath * the number of baths per day

Is a Bath present within Dwelling	Yes	No
Hot Water Usage from Showers		
No of Showers Taken	1.72	2.21

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Water Heating – Volume of hot water required for other uses

- The remaining hot water use is calculated as a simple function of the number of occupants, N.

$$V_{d,other}\ (\text{litres/day}) = 9.8\ N + 14$$

$$V_{d,average}\ (\text{litres/day}) = V_{d,shower} + V_{d,bath} + V_{d,other}$$

Hot water energy requirement at taps (kWh/y)

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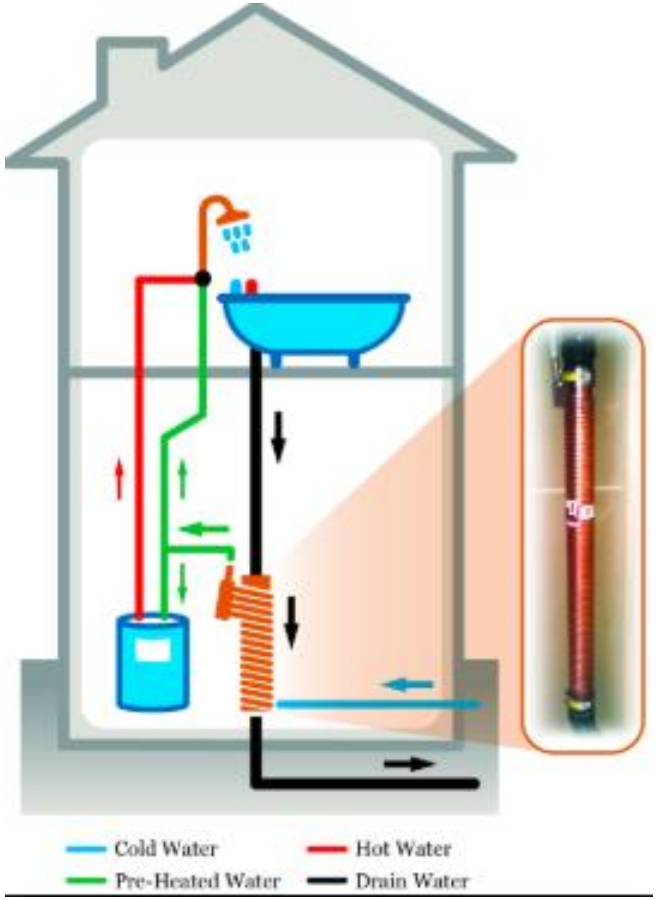
Water Heating – instantaneous waste water heat recovery

- Use a heat exchanger to recover heat from waste warm water to pre-heat the cold water feed of a shower

- The energy recovered depends on
  - the number and type of systems that are installed.



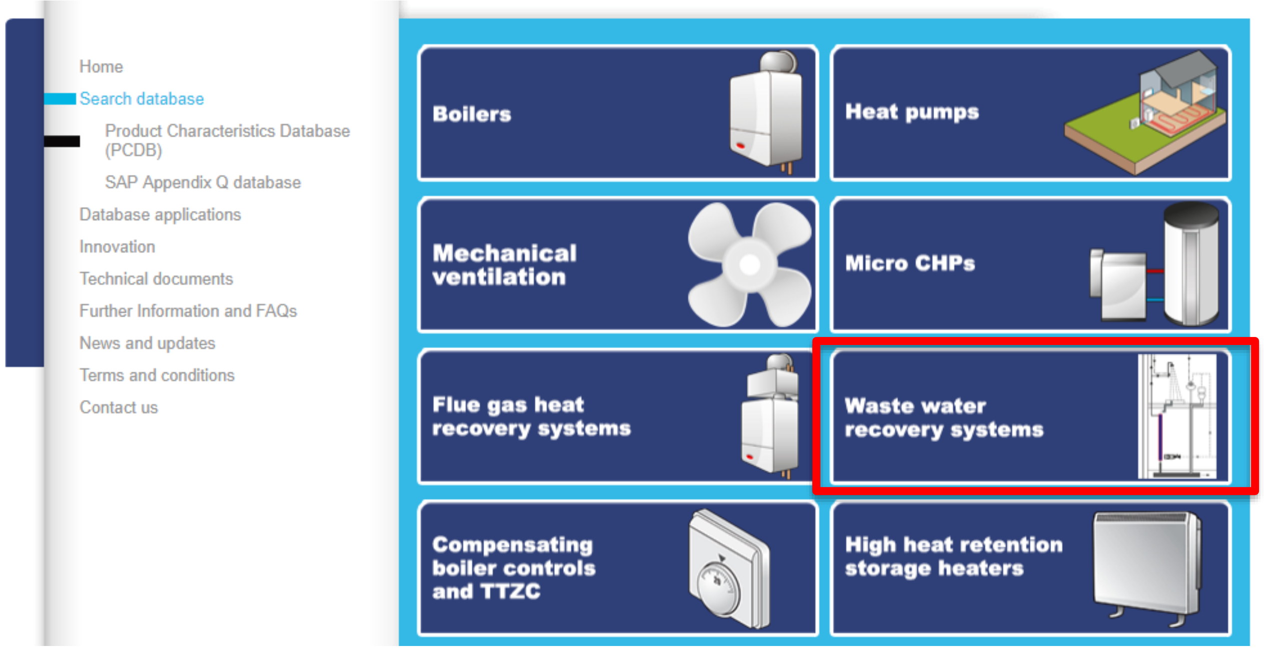
Water Heating – instantaneous waste water heat recovery

			PCDB characteristics	
	Associated with	Waste Water Heat Recovery Present	Efficiency, n	Utilisation factor, UF
WWHR1	Shower 1	Yes	0.376	0.979
WWHR2	Shower 2	No		

- 2 product specific parameters taken from the Product Characteristics Database (PCDB):
- The unit’s heat recovery efficiency
- A utilisation factor taking account of unrecoverable heat at the beginning and end of shower events.

Water Heating – instantaneous waste water heat recovery

- Input efficiency (%) & utilisation factor from Product Characteristics Database



Search for 'Waste Water Heat Recovery Systems' listed within the Product Characteristics Database (PCDB)

Category	Instantaneous
Brand name	Select
Model name	Select
Model qualifier	Select

Efficiency (%) [2012]	Utilisation factor	
37.6	0.979	Details
51.8	0.979	Details
61.2	0.973	Details
48.2	0.961	Details

Water Heating – instantaneous waste water heat recovery

WWHRS installed?	Notes
Yes	Evidence = technical data sheet, design/ as-built specification and drawings
	Efficiency & UF from PCDB
No	Default

Water Heating – reduced water consumption (target ≤ 125 l/p/d

- Where the design of the system reduces overall water consumption within the dwelling, the methodology will allow the benefits to be accounted for in the Hot Water Energy Demand.

Is water use target (hot and cold) 125 l/p/d	No

Water consumption ≤ 125 l/p/day	Notes
Yes	The overall water consumption to be calculated in line with the "The water efficiency calculation methodology" to be developed by SEAI
	Evidence = Specification of water usage devices, calculations, manufacturer's product information
No	**Default**

Water Heating – collecting the data

- Survey form updated to include record of shower & bath details

Cylinder volume/dimensions does not include insulation thickness | storage is outdoors] | contained within separate cylinder

Supplementary Summer Hot Water

☐ not applicable ☐ electric heater present for supplementary hot water heating*
*only if space heating and water heating cannot be separated and main water heating isn't electric. See DEAP manual

orientation ☐ tilt ° ☐

Solar panel make and model:

Comments on water heating system

Showers and baths

☐ Bath in dwelling (y/n)? ☐ Is water use target (hot and cold) 125 l/p/d (y/n)?

Shower #	Is flow rate known? (y/n)	Type of system (vented? Pumped? Electric? Mixer?)	Flow restrictor? (y/n)	Flow rate (if known)?	WWHR efficiency and utilisation factor
1					
2					
3					
4					
5					

Heating system (Controls)

Heating Controls (tick all that
☐ no controls
☐ programmer / timeclock
☐ room thermostat number ☐
☐ TRV's % rads with TRVs ☐

Underfloor heating (UFH)
☐ in insulated timber floor ☐ whole house UFH
☐ in screed ☐ Partial UFH including living area
☐ in concrete ☐ Partial UFH not including living area

Pumps
☐ How many central heating pumps for space heating?
Central heating pump(s) outdoors ☐
☐ How many oil boiler fuel pumps?
Oil fuel pump(s) outdoors ☐

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Water Heating – impact of changes

- **Part L compliance – Water heating demand impacts EPC / CPC**

	Reference Dwelling
No. of showers	Same as actual dwelling
Bath in dwelling	Same as actual dwelling
Shower type	Vented hot water system + pump (12 l/min)
Flow restrictor	None
WWHR	None
Water consumption	Greater than 125 l/p/d

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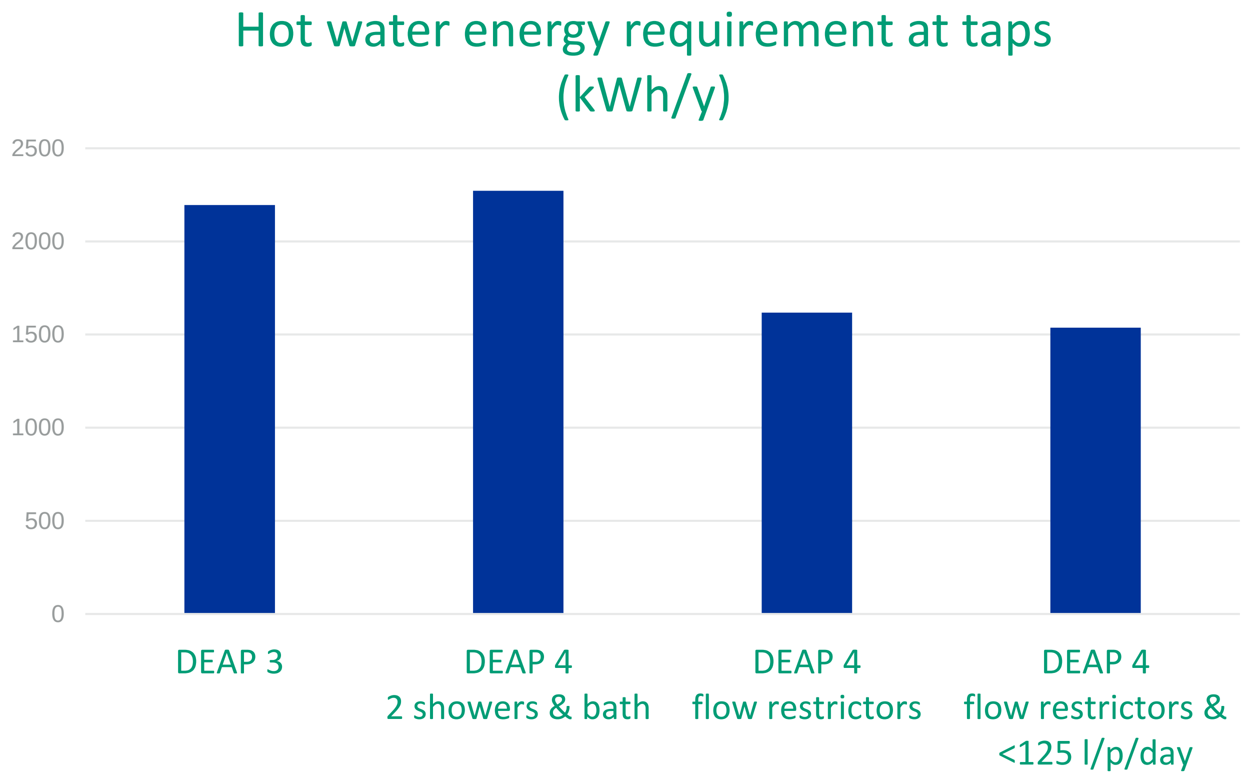
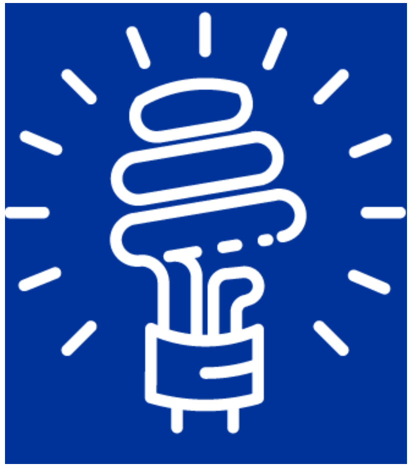
Water Heating – Impact of changes

- Two homes which currently have the same BER but have different shower types, will have different ratings in future



Lighting

Lighting – Changes to lighting demand calculation



Portable Lighting:

- Efficiency improved based on UK Household Electricity Survey

Fixed lighting:

- **Lighting Design Known:** input wattage and efficacy based on design of the installed lighting
- **Lighting Design Unknown:** the assessor enters no. of each lamp type

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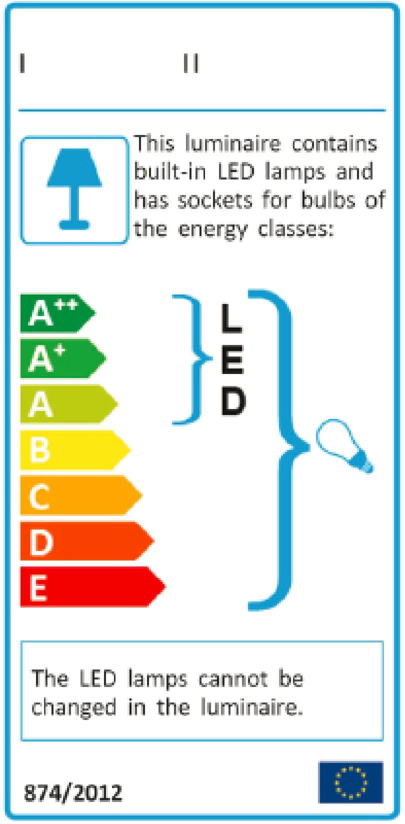
Lighting – Changes to lighting demand calculation

Benefits:

- Takes account of different lighting designs
- Takes account of new high performance light fittings, such as LEDs
- Where lighting is overdesigned, the additional energy use is accounted for
- Where lighting is under-designed, the lighting is supplemented with portable lighting, therefore encouraging adequate lighting to be designed.



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Lighting – Changes to lighting demand calculation

Lighting Design

Is Lighting Design Known	Yes	or	No

If Yes,

Lamp	Lamp Power (Watts)	Is lamp efficacy known	Type of Lamp	Lumen /Watt	Lumen /Watt	Lumen
1		No	Linear flourescent		80.5	0
2		No	LEDs/ CFL		66.9	0
3		No	Halogen LV		26.1	0
4		No	Halogen lamps		15.7	0
5		No	Incandescent		11.2	0
	0				CLfixed	0 lm

yes

If No,

Lamp	No of Lamps	Type of Lamp	Lumen /Watt
1		Linear flourescent	80.5
2		LEDs/ CFL	66.9
3		Halogen LV	26.1
4		Halogen lamps	15.7
5		Incandescent	11.2

no

... Proj Dim Vent Win Fab WH **Light** HtUse SH ER1 ER2 Result RER Fuel SWH Summer Rpt Sheet1

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Lighting – Lighting Design Known

Input

- Enter Lamp Power in Watts
- Enter lamp efficacy in lumen/watt **if available** or default lumen/watt is applied

If Yes,							
Lamp	Lamp Power (Watts)	Is lamp efficacy known	Type of Lamp	Lumen /Watt	Lumen /Watt	Lumen	
1	10	Yes	Linear flourescent	75	75	750	
2	10	No	LEDs/ CFL		66.9	669	
3		No	Halogen LV		26.1	0	
4		No	Halogen lamps		15.7	0	
5		No	Incandescent		11.2	0	
	20				CLfixed		lm

Lighting – Lighting Design Unknown (default)

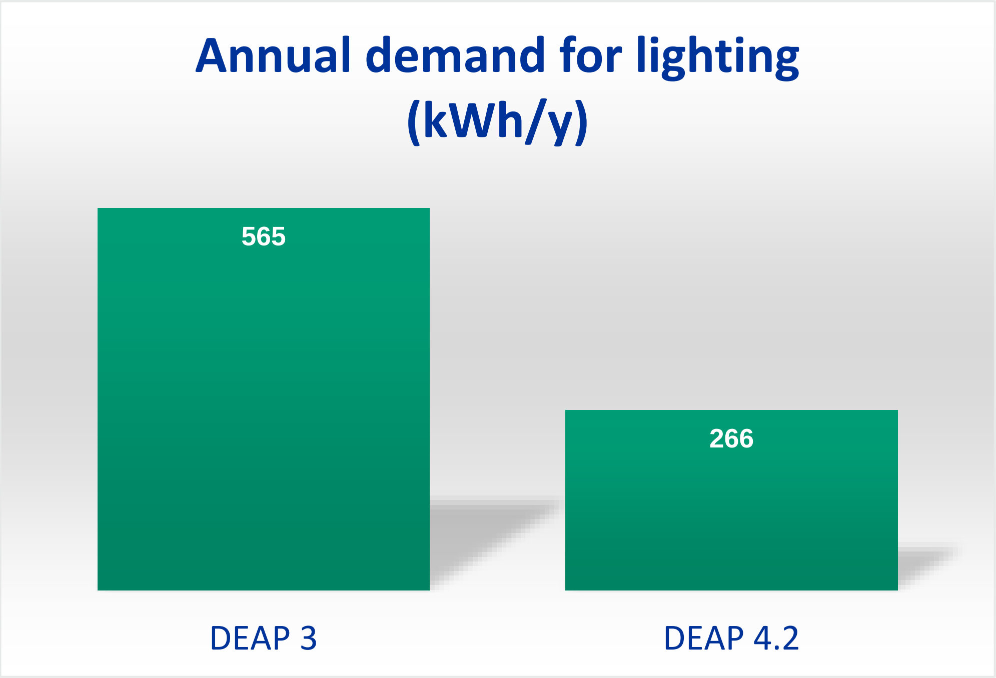
Input

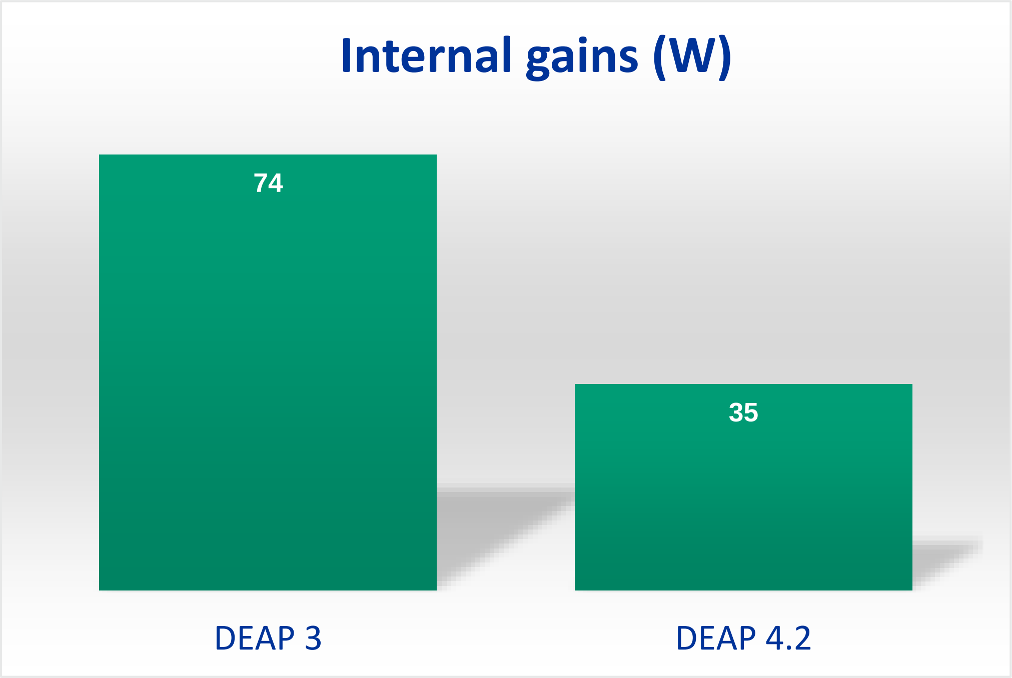
- Number of each bulb type
- Applies **default** lumen/watt based on lamp type

If No,				
	Lamp	No of Lamps	Type of Lamp	Lumen /Watt
	1	1	Linear flourescent	80.5
	2	10	LEDs/ CFL	66.9
	3		Halogen LV	26.1
	4		Halogen lamps	15.7
	5	4	Incandescent	11.2
		15	Average Efficacy	52.9533

Lamp Type	Linear Fluorescent	LEDs/CFLs	Halogen LV	Halogen Lamps	Incandescent
		 			
Lumen/watt	80.5	66.9	26.1	15.7	11.2

Lighting – Impacts of changes





- 100% CFLs/LEDs in 120 sqm dwelling

Ventilation

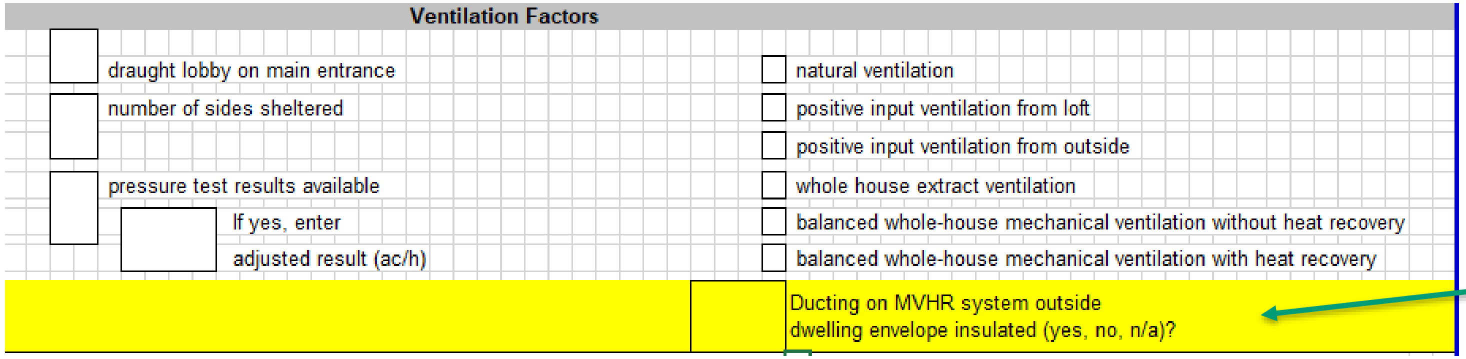
Ventilation – Changes to MVHR input

- Efficiency adjustment factor for MVHR systems where ductwork outside the insulated dwelling envelope is **uninsulated**.
- Reduces heat exchanger efficiency by 15% → Increases ventilation heat loss

If mechanical ventilation, other than positive input ventilation from loft, has been selected above:				
Is measured "Appendix Q" data available?		Yes	1	
If yes				
Manufacturer and model				
How many wetrooms (including kitchen)? Is the ventilation ducting flexible/rigid/both?			Default	Value to be used
Specific fan power [W/(l/s)]		0.8	0.00	0.80
If balanced whole-house mechanical ventilation with heat recovery:				
Heat exchanger efficiency [%]		85	0	72
End if				
End if			Efficiency Adjustment Factor	
Is ducting insulated where outside of insulated dwelling envelope	No	0	0.85	
Electricity for ventilation fans [kWh/y]	0			
Heat gains from ventilation fans [W]	0			

End if			Efficiency Adjustment Factor
Is ducting insulated where outside of insulated dwelling envelope	Yes	1	1

Ventilation – Changes to MVHR input


Ventilation Factors

draught lobby on main entrance
number of sides sheltered
pressure test results available
If yes, enter
adjusted result (ac/h)

natural ventilation
positive input ventilation from loft
positive input ventilation from outside
whole house extract ventilation
balanced whole-house mechanical ventilation without heat recovery
balanced whole-house mechanical ventilation with heat recovery

Ducting on MVHR system outside
dwelling envelope insulated (yes, no, n/a)?

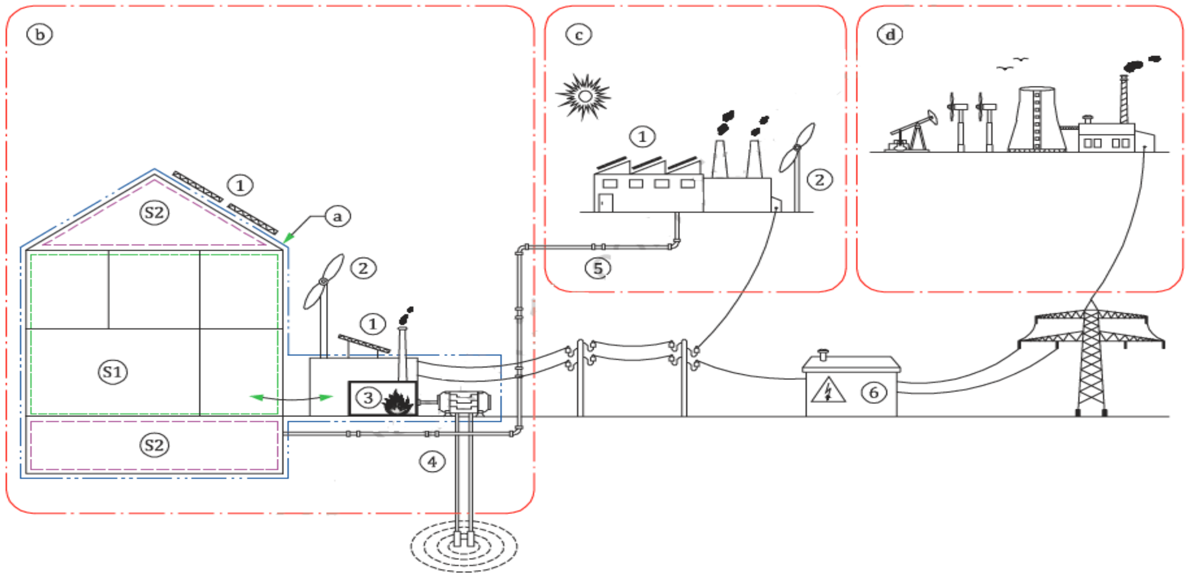
Record on survey form

Insulated ducting outside of thermal envelope	Notes
Yes	All of the duct system outside the dwelling envelope should be continuously insulated to a minimum depth of 25mm with thermal conductivity of 0.04 W/mK or less as required by the UK domestic ventilation compliance guide.
	Evidence = Confirm on site and/or confirmation from installer
No	**Default**
N/A	No ducting outside of thermal envelope

Renewable Energy Ratio

Renewable Energy Ratio (new dwelling compliance)

- Calculated in line with ISO 52000
- Included:
  - PV
  - Solar
  - Wind
  - Heat Pump
  - Biomass/ Biogas
  - District heating
  - CHP

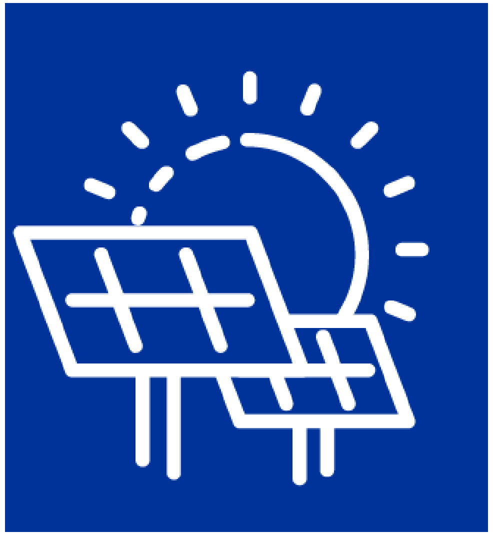


Key

a	assessment boundary (use energy balance)	1	PV, solar
b	perimeter: on-site	2	wind
c	perimeter: nearby	3	boiler room
d	perimeter: distant	4	heat pump
S1	thermally conditioned space	5	district heating/cooling
S2	space outside thermal envelope	6	substation (low/medium voltage and possible storage)

Renewable Energy Ratio (new dwelling compliance)

- RER requirement of 0.20 or 20% will replace the existing requirement of 10 kWh/m^2/yr contributing to the thermal load or 4 kWh/m^2/y electrical



$$\textbf{RER} = \frac{\textbf{Primary Energy of the Renewables (Epren)}}{\textbf{Total Primary Energy (Eptot)}}$$

- **Epren** = sum of the delivered renewable energy multiplied by the renewable primary energy factor
- **Eptot** = sum of the total delivered energy multiplied by the renewable and non renewable primary energy factors.

Renewable Energy Ratio (new dwelling compliance)

PV Example	Delivered Energy	PEF	Primary Energy	
Main space	3521	1.1	3873	
Secondary space	770	1.1	847	
Main water	2423	1.1	2665	
Supplementary water	0	0	0	
Pumps, fans & electric showers	130	2.08	270	
Lighting	272	2.08	566	
PV	- 1224	2.08	**-2546**	**(Epren)**
Total			**5675**	**(Epnren)**

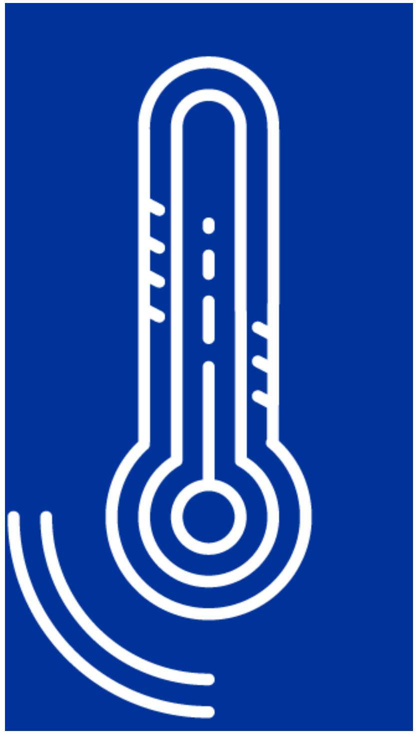
- Calculate electricity generated by the on-site PV, in kWh.
- Generated electricity is multiplied by the PEF of the PV to determine the total and renewable primary energy.

$$\textbf{RER} = \frac{\text{Epren}}{\text{Eptot}} = \frac{2546\ \text{kWh/y}}{= 5675 + 2546 = 8221\ \text{kWh/y}} = 0.31$$

Renewable Energy Ratio (new dwelling compliance)

Heat Pumps

- The environmental renewable contribution is calculated based on the
- Space Heating Demand and
- Hot Water Demand
- Demand provided by the heat pump minus the energy consumed by the heat pump



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Renewable Energy Ratio (new dwelling compliance)

HP Example	Delivered Energy	PEF	Primary Energy	
Main space	538	2.08	1119	
Secondary space	447	1.1	492	
Main water	949	2.08	1974	
Pumps, fans & electric showers	175	2.08	364	
Lighting	272	2.08	566	
Total			**4,515**	**(Epnren)**

HP Example	Heat Use	HP %	Elec. Use (Del. Energy)	Environmental Energy	
Main space	2365	4.4	538	1827	
Main water	2088	2.2	949	1139	
Total				**2966**	**(Epren)**

$$\text{RER} = \frac{\text{Epren}}{\text{Eptot}} = \frac{2966\ \text{kWh/y}}{= 4515 + 2966 = 7481\ \text{kWh/y}} = 0.40$$

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Questions?

If in doubt, check with the BER helpdesk
Call: 1890 252 738
Email: registered@ber.seai.ie