RapidRate™ Whole of Home Calculator User Guide

Introduction

RapidRate™ Whole of Home Calculator is an online tool that quickly assesses the energy efficiency of a dwelling's thermal shell (star rating), and also estimates energy consumption, energy generation, and carbon emissions using a relatively small number of inputs.

Whilst RapidRate™ Whole of Home attempts to align with the Nationwide House Energy Rating Scheme (NatHERS), RapidRate™ Whole of Home is not an official NatHERS accredited tool. Outputs cannot be directly compared as underlying assumptions and calculations are not identical.

This document gives guidance on how to use the RapidRate™ Whole of Home Calculator.

Accessing RapidRate Whole of Home Calculator

RapidRate™ Whole of Home Calculator is accessible using this link: RapidRate™ Whole of Home Calculator.

Entering input data

The inputs required by RapidRate™ Whole of Home Calculator are described in Tables 1 to 5.

Figures 1 and 2 show what the RapidRate™ Whole of Home Calculator input screen looks like.

Getting results

Once all input values have been entered, click on 'Analyse' and the RapidRate™ Whole of Home outputs will be displayed. RapidRate™ Whole of Home Calculator outputs are described in Table 6.

If a mistake has been made with any of the inputs or you want to experiment with different input values, close the results window, change any of the input values as required, then click 'Analyse' again.

Figure 3 shows what the RapidRate™ Whole of Home Calculator output screen looks like.

More information

Further details about RapidRate™ (including RapidRate™ Whole of Home) are available at https://ahd.csiro.au/rapidrate/.

Disclaimer

The RapidRate™ software used to calculate the star rating and other outputs is not accredited software under the Nationwide House Energy Rating Scheme (NatHERS) and any star rating or other outputs generated represents an estimated NatHERS star rating and is not a replacement for a NatHERS Certificate.

While the software has been created with due care, the information used to train the software will continue to develop over time, and there is no warranty or representation that the star rating or other outputs are free from errors or omissions or generated with appropriate or accurate assumptions.

The star rating and other outputs are estimated based on certain inputs and assumptions, and no claim is made as to the accuracy, completeness, reliability, currency, suitability or otherwise of the star rating or other outputs, especially where input data is based on assumptions.

The star rating and other outputs are provided on the basis that the end user receiving the star rating and other outputs are responsible for assessing whether it will meet their requirements and be fit or suitable for that person's or organisation's purpose or intended use.

Input data

Table 1: RapidRate™ Whole of Home Calculator user inputs – thermal shell

RapidRate Input	Valid values	Definitions	Notes
Post code	Valid Australian postcode		
NCC class	House/Townhouse Apartment	NCC Class 1a NCC Class 2	
Project type	New Existing Renovation	Built since 2010 Built before 2010 without major renovation Built before 2010 and has undergone a major renovation since 2010	
Site exposure type	Suburban Open Exposed Protected	Numerous closely spaced obstructions below 10 m. Examples: Suburban housing, heavily vegetated bushland areas, townhouses. Grasslands with few well scattered obstructions below 10 m. Examples: Farmland with scattered sheds, lightly vegetated bush blocks, elevated units with a few obstructions of similar height to the dwelling Few or no obstructions. Examples: Flat grazing land, lake-side, ocean-frontage, desert, exposed high-rise unit without obstructions at a similar height to the dwelling Numerous closely spaced obstructions over 10 m. Examples: City and industrial areas	Reference: NatHERS Technical Note
Main floor construction type	AAC (Autoclaved aerated concrete) Concrete ConcreteSlab ConcreteSuspended ConcreteWafflePod ConcreteSlabOnGround Plasterboard TimberSuspended Unclassified UnitBelow	Use 'UnitBelow' for apartments where there is a neighbour directly below the apartment being assessed	Up to 3 floor construction types can be passed to RapidRate, along with a percentage of each construction type
Floor insulation R-value	0-12	R-value is a measure of how well a layer of insulation resists the flow of heat. The higher the R-value the better the performance. For RapidRate, R-Value can range from 0 (no insulation) to 12	If available, use documentation (such as dwelling building plans) to determine insulation level.
Floor area - conditioned	Area in square metres	For RapidRate, most spaces within the home are categorised as 'conditioned', except for most bathrooms, WCs, laundries, and garages. (However, bathrooms, WCs, laundries, and garages which do not have an external wall; or which cannot be closed off from other conditioned spaces; or which are artificially heated/cooled are categorised as 'conditioned').	For RapidRate, floor area is the area *inside* the building envelope.

RapidRate Input	Valid values	Definitions	Notes
Floor area - unconditioned	Area in square metres	Every dwelling must have at least one unconditioned space. Unconditioned spaces include bathrooms, WCs, laundries and garages which have an external wall; can be closed off from other conditioned spaces; and are not artificially heated/cooled.	For RapidRate, floor area is the area *inside* the building envelope.
Floor area - garage	Area in square metres	Only include attached enclosed garages	For RapidRate, floor area is the area *inside* the building envelope.
Main external wall construction type	BrickVeneer CladFibreCement CladWeatherboard CladTimber CladMetal CladInsulatedPanel CladAAC CladOther ConcretePanel ConcreteOther ConcreteBlock Earth InsulatedConcreteFormwork MasonrySingleBrick MasonryCavity MasonryOther Other PartyWall Plasterboard ReverseBrickVeneer RetainingWall StructuralInsulatedPanel Strawbale	Use 'PartyWall' for apartments or townhouses where there is a neighbour directly on the other side of a wall	Up to 3 external wall construction types can be passed to RapidRate, with a percentage of each
External wall insulation R-value	0-12	R-value is a measure of how well a layer of insulation resists the flow of heat. The higher the R-value the better the performance. For RapidRate, R-Value can range from 0 (no insulation) to 12	If available, use documentation (such as dwelling building plans) to determine insulation level.
External wall area by orientation	Area in square metres broken down by orientation	1. External wall area includes any windows or doors that may be set in the external wall. 2. Orientation must be based on the rotation of the dwelling relative to true north, not magnetic north. 3. Orientation (*direction*) must be one of 16 values: N, NE, NNE, NNW, NW, E, ENE, ESE, S, SE, SSE, SW, SSW, W, WSW, WNW.	Tick the 'Show all cardinal directions' to get all 16 orientation options

RapidRate Input	Valid values	Definitions	Notes
		4. Wall height is the measurement between the finished floor level and the finished ceiling level. If the wall height varies, use the average wall height.	
Window area by orientation	Area in square metres broken down by orientation	1. Window area includes all windows at a particular orientation, whether single or double glazed 2. Orientation must be based on the rotation of the dwelling relative to true north, not magnetic north. 3. Orientation (*direction*) must be one of 16 values: N, NE, NNE, NNW, NW, E, ENE, ESE, S, SE, SSE, SW, SSW, W, WSW, WNW.	Tick the 'Show all cardinal directions' to get all 16 orientation options
Window area double glazed by orientation	Area in square metres broken down by orientation	1. Window area double glazed includes all windows at a particular orientation that are double glazed 2. Orientation must be based on the rotation of the dwelling relative to true north, not magnetic north. 3. Orientation (*direction*) must be one of 16 values: N, NE, NNE, NNW, NW, E, ENE, ESE, S, SE, SSE, SW, SSW, W, WSW, WNW.	Tick the 'Show all cardinal directions' to get all 16 orientation options
Main roof construction type	Metal Tiles Concrete Mixed None Ceiling Unclassified	Use 'None' for apartments where there is a neighbour directly above the apartment being assessed	
Ceiling insulation R-value	0-12	R-value is a measure of how well a layer of insulation resists the flow of heat. The higher the R-value the better the performance. For RapidRate, R-Value can range from 0 (no insulation) to 12	If available, use documentation (such as dwelling building plans) to determine insulation level.
Roof insulation R-value	0-12	R-value is a measure of how well a layer of insulation resists the flow of heat. The higher the R-value the better the performance. For RapidRate, R-Value can range from 0 (no insulation) to 12	If available, use documentation (such as dwelling building plans) to determine insulation level.
Roof colour mean solar absorptance	0-1	Solar absorptance value	The **roof colour** drop down menu offers options for roof colour which will translate to a roof colour solar absorptance value. The value can be adjusted if desired.

Table 2: RapidRate™ Whole of Home Calculator user inputs - appliances

Input name	Valid values	Definition	Notes
Space heater type	See Table 3	Describes heating system	Up to two space heaters may be defined
Space heater performance rating	See Table 3	A number which defines the efficiency of the heating system in some way. The type of number to use depends on the type of heating system specified.	Up to two space heaters may be defined
Space heater duct installation year	A valid year	If the heater type selected is ducted, then the duct installation year is required	Up to two space heaters may be defined
Space heater conditioned floor area percentage	0-100	Specifies the percentage of the total conditioned floor area that this heating system applies to.	Space heater conditioned floor area percentages must total 100%
Space cooler type	See Table 4	Describes cooling system	Up to two space coolers may be defined
Space cooler performance rating	See Table 4	A number which defines the efficiency of the cooling system in some way. The type of number to use depends on the type of cooling system specified.	Up to two space coolers may be defined
Space cooler duct installation year	A valid year	If the cooler type selected is ducted, then the duct installation year is required	Up to two space coolers may be defined
Space cooler conditioned floor area percentage	0-100	Specifies the percentage of the total conditioned floor area that this cooling system applies to.	Space cooler conditioned floor area percentages must total 100%
Water heater type	See Table 5	Describes the hot water system	
Water heater performance rating	See Table 5	A number which defines the efficiency of the hot water system in some way. The type of number to use depends on the type of hot water system specified.	
Number of halogen lights	>=0 integer		
Cooktop type	Gas cooktop (natural gas) Gas cooktop (LPG) Electric cooktop Induction cooktop		
Oven type	Gas oven (natural gas) Gas oven (LPG) Electric oven		
Solar PV system size (kW)	>=0		
Pool surface area (m2)	>=0		
Pool average depth (m)	>=0		
Pool pump speed	Single-speed Two-speed Multi- or variable-speed		

Table 3: RapidRate™ Whole of Home Calculator user inputs – space heater types

Space heater type valid values	Space heater performance rating valid values	Notes
Reverse Cycle Air Conditioner - 2019 Ducted GEMS ZERL	GEMS 2019 Star (valid range 1-10)	Use star rating for heating in the relevant climate zone
Reverse Cycle Air Conditioner - 2019 Non-ducted GEMS ZERL	GEMS 2019 Star (valid range 1-10)	Use star rating for heating in the relevant climate zone
Reverse Cycle Air Conditioner - 2010 Rating Non-ducted single speed	GEMS 2010 Star (valid range 1-10)	Use star rating for heating; single speed = fixed speed compressor
Reverse Cycle Air Conditioner - 2013 Rating Non-ducted single speed	GEMS 2013 Star (valid range 1-10)	Use star rating for heating; single speed = fixed speed compressor
Reverse Cycle Air Conditioner - 2010 Rating Non-ducted inverter	GEMS 2010 Star (valid range 1-10)	Use star rating for heating; inverter = variable speed compressor
Reverse Cycle Air Conditioner - 2013 Rating Non-ducted inverter	GEMS 2013 Star (valid range 1-10)	Use star rating for heating; inverter = variable speed compressor
Reverse Cycle Air Conditioner - 2010 Rating Ducted single speed	GEMS 2010 Star (valid range 1-10)	Use star rating for heating; single speed = fixed speed compressor
Reverse Cycle Air Conditioner - 2013 Rating Ducted single speed	GEMS 2013 Star (valid range 1-10)	Use star rating for heating; single speed = fixed speed compressor
Reverse Cycle Air Conditioner - 2010 Rating Ducted inverter	GEMS 2010 Star (valid range 1-10)	Use star rating for heating; inverter = variable speed compressor
Reverse Cycle Air Conditioner - 2013 Rating Ducted inverter	GEMS 2013 Star (valid range 1-10)	Use star rating for heating; inverter = variable speed compressor
Electric Resistance Heater	COP must be 1	
Ducted Natural Gas Heater	GER Star (valid range 1-6)	
Non-ducted Natural Gas Heater	GER Star (valid range 1-6)	
Wood heater – slow combustion	COP (0-1); default 0.65	
Wood heater - slow combustion fan assisted	COP (0-1); default 0.60 post 2019, 0.50 pre 2019	
Wood heater - ducted	COP (0-1); default 0.65	
Wood heater - open fireplace	COP (0-1); default 0.1	
Wood heater - open fireplace twin skin flue	COP (0-1); default 0.18	
Electric panel heater	COP must be 1	
Electric floor slab heater	COP must be 1	
Electric ducted heater	COP must be 1	
Electric heat bank	COP must be 1	
Natural gas hydronic - panel	COP must be 0.7	
Heat pump hydronic - panel	COP must be 3	
Natural gas hydronic - floor slab	COP must be 0.7	
Heat pump hydronic - floor slab	COP must be 3	
LPG gas heater	GER Star (valid range 1-6)	
LPG gas hydronic - panel	COP must be 0.7	
LPG gas hydronic - floor slab	COP must be 0.7	

Table 4: RapidRate™ Whole of Home Calculator user inputs – space cooler types

Space cooler type valid values	Space cooler performance rating valid values	Notes
Reverse Cycle Air Conditioner - 2019 Ducted GEMS ZERL	GEMS 2019 Star (valid range 1-10)	Use star rating for cooling in the relevant climate zone
Reverse Cycle Air Conditioner - 2019 Non-ducted GEMS ZERL	GEMS 2019 Star (valid range 1-10)	Use star rating for cooling in the relevant climate zone
Reverse Cycle Air Conditioner - 2010 Rating Non-ducted single speed	GEMS 2010 Star (valid range 1-10)	Use star rating for cooling; single speed = fixed speed compressor
Reverse Cycle Air Conditioner - 2013 Rating Non-ducted single speed	GEMS 2013 Star (valid range 1-10)	Use star rating for cooling; single speed = fixed speed compressor
Reverse Cycle Air Conditioner - 2010 Rating Non-ducted inverter	GEMS 2010 Star (valid range 1-10)	Use star rating for cooling; inverter = variable speed compressor
Reverse Cycle Air Conditioner - 2013 Rating Non-ducted inverter	GEMS 2013 Star (valid range 1-10)	Use star rating for cooling; inverter = variable speed compressor
Reverse Cycle Air Conditioner - 2010 Rating Ducted single speed	GEMS 2010 Star (valid range 1-10)	Use star rating for cooling; single speed = fixed speed compressor
Reverse Cycle Air Conditioner - 2013 Rating Ducted single speed	GEMS 2013 Star (valid range 1-10)	Use star rating for cooling; single speed = fixed speed compressor
Reverse Cycle Air Conditioner - 2010 Rating Ducted inverter	GEMS 2010 Star (valid range 1-10)	Use star rating for cooling; inverter = variable speed compressor
Reverse Cycle Air Conditioner - 2013 Rating Ducted inverter	GEMS 2013 Star (valid range 1-10)	Use star rating for cooling; inverter = variable speed compressor
Evaporative Cooler - Ducted	Must be 15	This is a default COP value used for evaporative cooler systems
Evaporative Cooler – Non-ducted	Must be 15	This is a default COP value used for evaporative cooler systems

Table 5: RapidRate™ Whole of Home Calculator user inputs – hot water system types

Water heater type valid values	Water heater performance rating valid values	Notes
Solid fuel - wood	Must be blank	
Natural gas storage	Star rating, 2-5 stars in 0.5 increments	
Natural gas instantaneous	Star rating, 3-7 stars in 0.5 increments	
LPG storage	Star rating, 2-5 stars in 0.5 increments	
LPG instantaneous	Star rating, 3-7 stars in 0.5 increments	
Solar thermal - electric boost	Number of STCs earned, 12-45, valid range varies by climate	STC = small-scale technology certificates
Solar thermal – natural gas boost	Number of STCs earned, 9-45, valid range varies by climate	STC = small-scale technology certificates
Solar thermal – LPG boost	Number of STCs earned, 9-45, valid range varies by climate	STC = small-scale technology certificates
Heat pump	Number of STCs earned, 12-35, valid range varies by climate	STC = small-scale technology certificates
Electric storage - small MEPS 2005	must be blank	
Electric storage - small pre MEPS 1999	must be blank	
Electric storage - very small MEPS 2005	must be blank	

Electric storage - very small pre MEPS 2005	must be blank	
Electric storage - large MEPS 2005	must be blank	
Electric storage - large pre MEPS 1999	must be blank	
Electric storage - low pressure MEPS 2005 NO feed tank	must be blank	
Electric storage - low pressure pre MEPS 2005 NO feed tank	must be blank	
Electric storage - low pressure MEPS 2005 WITH feed tank	must be blank	
Electric storage - low pressure pre MEPS 2005 WITH feed tank	must be blank	
Electric storage - heat exchange MEPS 2005 NO feed tank	must be blank	
Electric storage - heat exchange pre MEPS 2005 NO feed tank	must be blank	
Electric storage - heat exchange MEPS 2005 WITH feed tank	must be blank	
Electric storage - heat exchange pre MEPS 2005 WITH feed tank	must be blank	
Electric instantaneous	must be blank	

Output data

Table 6: RapidRate™ Thermal Calculator outputs

Column name	Notes
Star rating	Estimated NatHERS star rating
Star rating lower bound estimate	Star rating prediction interval lower bound
Star rating upper bound estimate	Star rating prediction interval upper bound
Star rating prediction interval description	
Star rating model version	Version of RapidRate star rating model used
Heating (MJ/m2/yr)	Energy load for heating
Heating lower bound estimate	Heating prediction interval lower bound
Heating upper bound estimate	Heating prediction interval upper bound
Heating prediction interval description	
Heating model version	Version of RapidRate heating energy model used
Cooling (MJ/m2/yr)	Energy load for cooling
Cooling lower bound estimate	Cooling prediction interval lower bound
Cooling upper bound estimate	Cooling prediction interval upper bound
Cooling prediction interval description	
Cooling model version	Version of RapidRate cooling energy model used
Space heater - electricity (kWh/yr)	Space heater electricity will be the electricity consumed from use of Space_Heater_Type_1 if it is electric, and Space_Heater_Type_2 if it is electric

Space heater – natural gas (MJ/yr)	Space heater natural gas will be the natural gas consumed from use of Space_Heater_Type_1 if it is natural gas, and Space_Heater_Type_2 if it is natural gas
Space heater – LPG (MJ/yr)	Space heater LPG will be the LPG consumed from use of Space_Heater_Type_1 if it is LPG, and Space_Heater_Type_2 if it is LPG
Space heater - wood (MJ/yr)	Space heater wood will be the wood consumed from use of Space_Heater_Type_1 if it is wood, and Space_Heater_Type_2 if it is wood
Space heater CO2-e emissions (kg/yr)	Space heater CO2-e emissions will be the emissions resulting from use of Space_Heater_Type_1 (if specified), and Space_Heater_Type_2 (if specified)
Space cooler - electricity (kWh/yr)	Space cooler electricity will be the electricity consumed from use of Space_Cooler_Type_1 (if specified), and Space_Cooler_Type_2 (if specified)
Space cooler CO2-e emissions (kg/yr)	Space cooler CO2-e emissions will be the emissions resulting from use of Space_Cooler_Type_1 (if specified), and Space_Cooler_Type_2 (if specified)
Water heater - electricity (kWh/yr)	
Water heater – natural gas (MJ/yr)	
Water heater – LPG (MJ/yr)	
Water heater CO2-e emissions (kg/yr)	
Lighting (kWh/yr)	
Lighting CO2-e emissions (kg/yr)	
Pool pump (kWh/yr)	
Pool pump CO2-e emissions (kg/yr)	
Plug load (kWh/yr)	Plug load is an estimate of electricity consumption for plug-in appliances
Plug load CO2-e emissions (kg/yr)	
Cooktop - electricity (kWh/yr)	
Cooktop – natural gas (MJ/yr)	
Cooktop - LPG (MJ/yr)	
Cooktop CO2-e emissions (kg/yr)	
Oven - electricity (kWh/yr)	
Oven – natural gas (MJ/yr)	
Oven - LPG (MJ/yr)	
Oven CO2-e emissions (kg/yr)	
Solar PV (kWh/yr)	
Solar PV CO2-e emissions (kg/yr)	
CO2-e emissions - electricity (kg/yr)	
CO2-e emissions – natural gas (kg/yr)	
CO2-e emissions - LPG (kg/yr)	
CO2-e emissions - wood (kg/yr)	
CO2-e emissions - net (kg/yr)	

Input screen

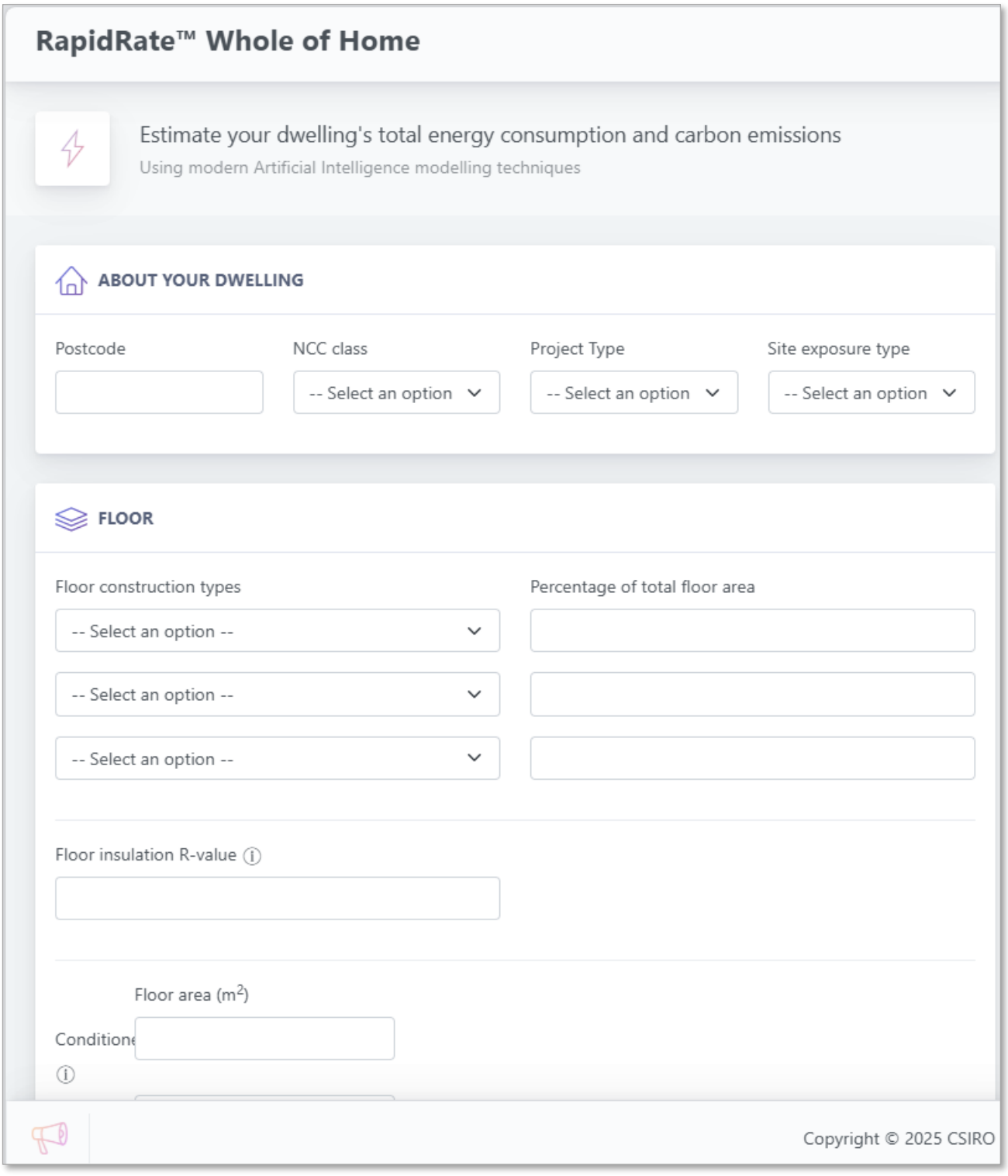


Figure 1. RapidRate™ Whole of Home Calculator data input page (part of top section)

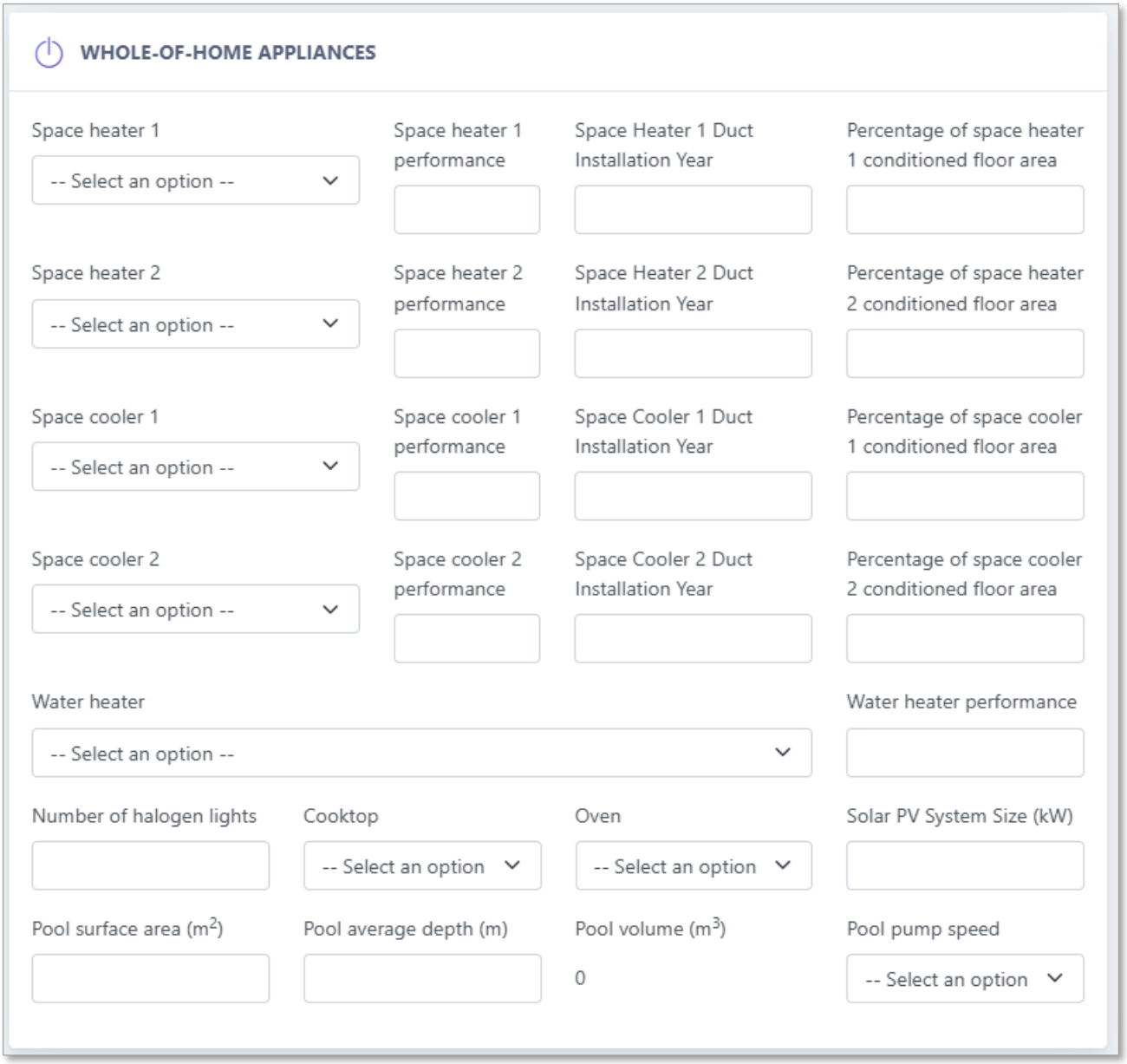
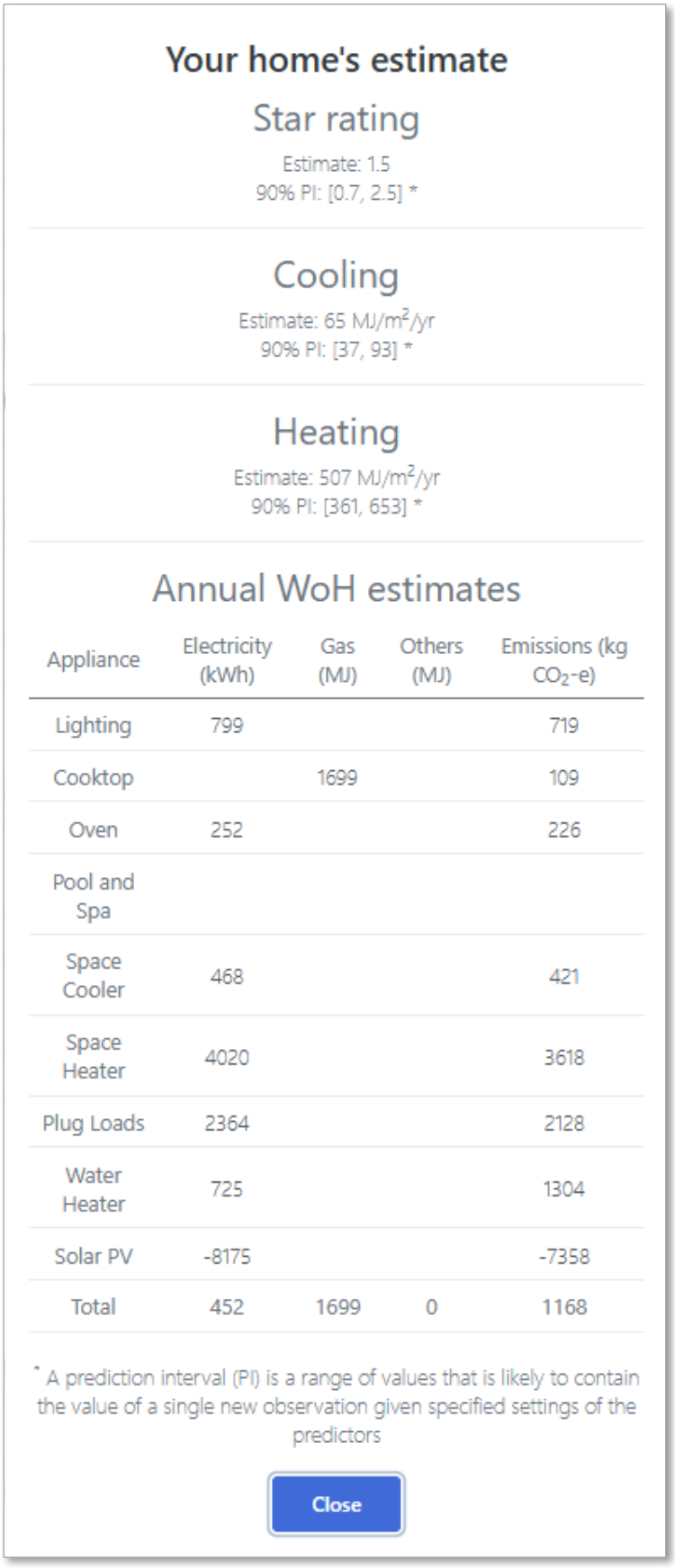


Figure 2. RapidRate™ Whole of Home Calculator data input page (bottom section)

Output screen



Your home's estimate

Star rating

Estimate: 1.5
90% PI: [0.7, 2.5] *

Cooling

Estimate: 65 MJ/m^2/yr
90% PI: [37, 93] *

Heating

Estimate: 507 MJ/m^2/yr
90% PI: [361, 653] *

Annual WoH estimates

Appliance	Electricity (kWh)	Gas (MJ)	Others (MJ)	Emissions (kg CO_2-e)
Lighting	799			719
Cooktop		1699		109
Oven	252			226
Pool and Spa				
Space Cooler	468			421
Space Heater	4020			3618
Plug Loads	2364			2128
Water Heater	725			1304
Solar PV	-8175			-7358
Total	452	1699	0	1168

* A prediction interval (PI) is a range of values that is likely to contain the value of a single new observation given specified settings of the predictors

Close

Figure 3. RapidRate™ Whole of Home Calculator output page

Abbreviations

Table 7: Abbreviations

Abbreviation	Full name
CO2-e	Carbon dioxide equivalent
COP	Coefficient of Performance
GEMS	Greenhouse and Energy Minimum Standards
GER	Gas Energy Rating
kW	Kilowatt
kWh	Kilowatt-hour
LPG	Liquid Petroleum Gas
MEPS	Minimum Energy Performance Standards
MJ	Megajoule
NatHERS	Nationwide House Energy Rating Scheme
NCC	National Construction Code
PV	Photovoltaic
STC	Small-scale Technology Certificate
ZERL	Zoned Energy Rating Label