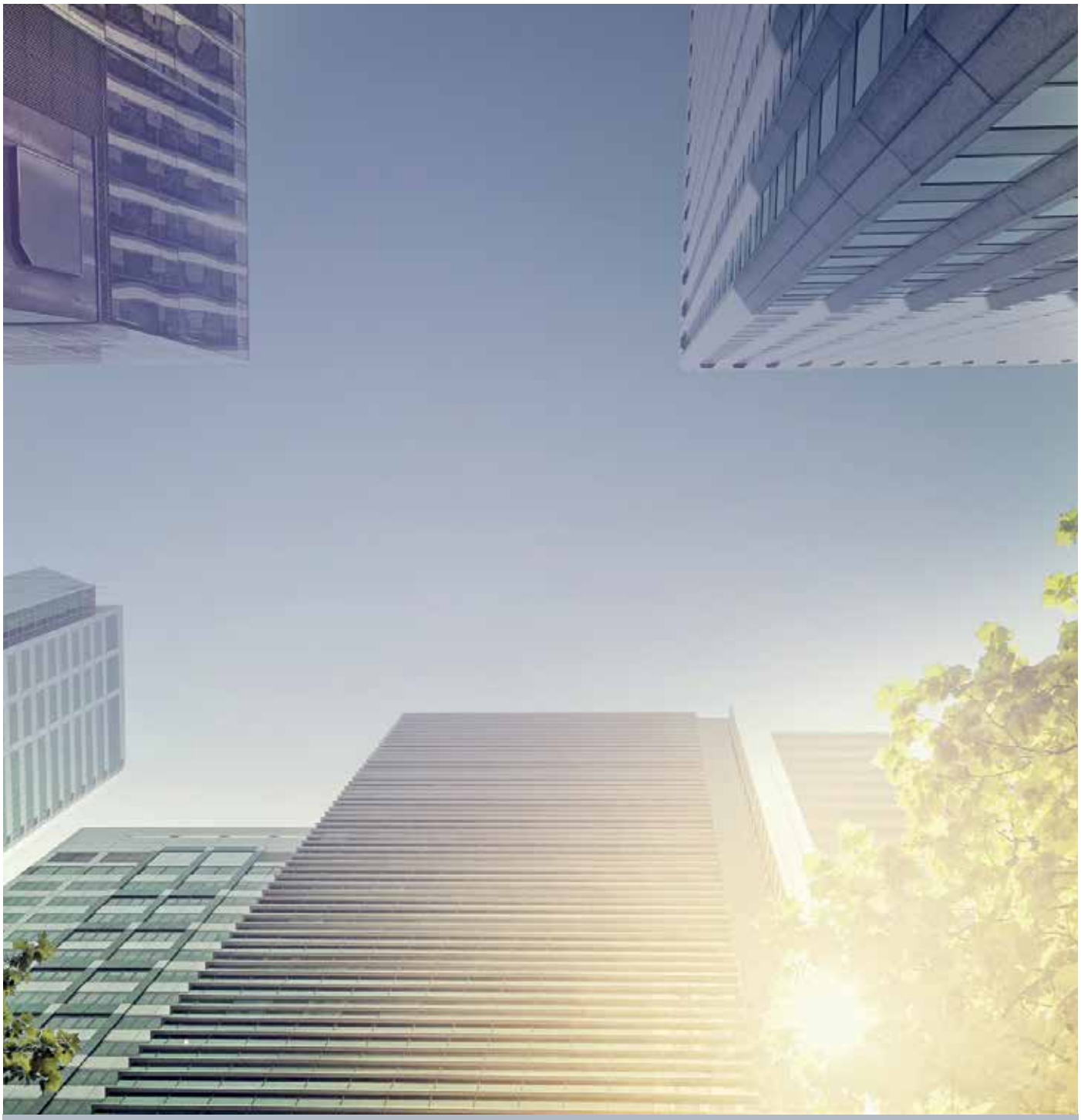


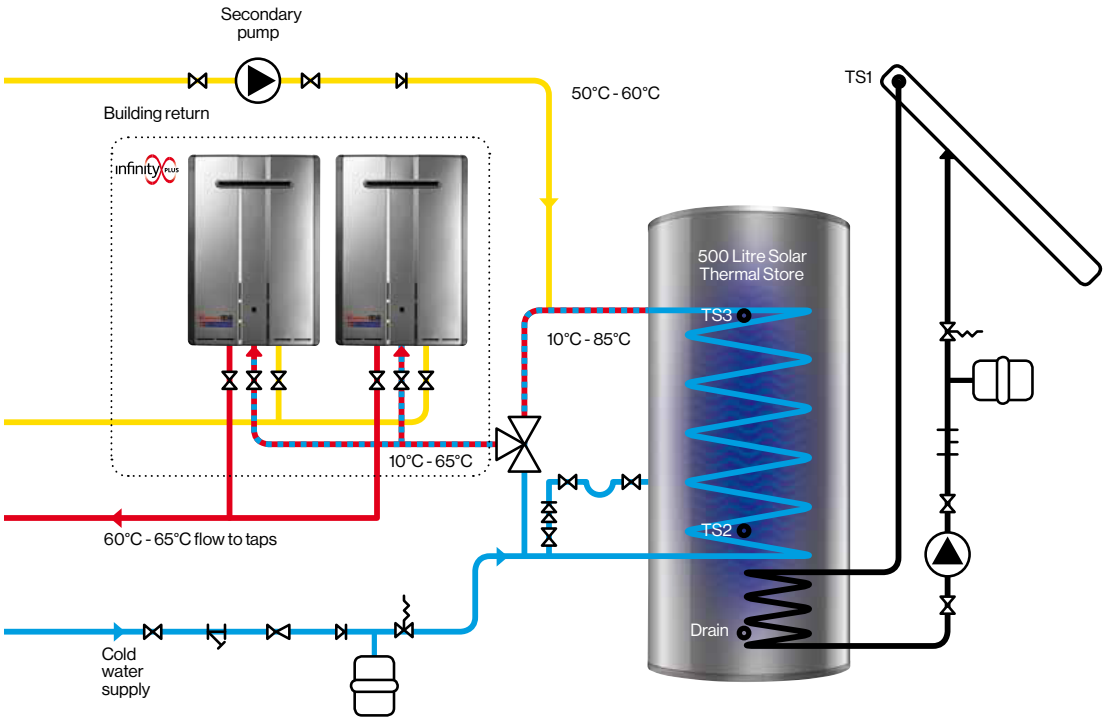
Rinnai Commercial - Solar Thermal

Rinnai

virtu HOT

The Easy Choice for Commercial Hot Water Solutions

Rinnai offers both Virtu^{HOT} evacuated tube and flat plate collectors, each with specific benefits to suit your application. Providing you with years of high energy performance, low maintenance and reduced energy costs.



All Rinnai solar thermal products are perfectly aligned with our Hydrogen blend ready 20% and renewable liquid fuel ready combustion technologies.

Put simply, the Virtu^{HOT} solar thermal design will gain more solar energy from less space whilst the Rinnai continuous flow water heater will modulate to use less energy whilst creating more plant room space.

Virtu^{HOT} - more energy, less space
Rinnai - Less energy required, more space gained
The perfect DHW solution to lower carbon footprint.

Renewable hot water solutions

Solar technology is designed with efficiency and effectiveness in mind.

The core design of Virtu[HOT] has benefited from multiple workshops with experienced installers, whose valuable insights have been integrated into design and innovation for transportation, installation, and maintenance. From Virtu's low-profile design to the modular assembly, our innovation keeps life simple for installers and maintenance teams.

What is unique about virtu HOT and Rinnai products?

Saves more carbon

Virtu saves up to 3.5x more carbon per m^2 compared to conventional solar technology. This combined with the Rinnai water heating system will save carbon created through traditional storage-based systems, mainly due to heat losses and over-sizing. Rinnai water heaters will modulate to 4.4kW therefore only using gas to boost the temperature - harnessing renewable gains and not compromising on performance.

Greater returns

Virtu delivers up to 50% greater financial returns per m^2 in comparison to conventional solar technology. Rinnai intelligent hot water systems can save more than 30% in operational running costs when compared to storage systems.

Reduces risk

Virtu protects customers from energy prices and exposure to ever-increasing energy and climate change legislation. Rinnai only uses the gas needed to boost the water temperature and all water heaters are hydrogen blend ready 20% and Bio LPG ready.

Lower installation and maintenance costs

A design-led architecture and turnkey solution makes Virtu easy to install and keeps maintenance to a minimum; backed by a warranty of up to 10 years. Rinnai water heaters come with a warranty of upto 10 years, are lightweight (one-man lift), can be cited internally or externally, and have a compact design (670x470x276mm). We have created a low maintenance, high performance system that lowers carbon footprint without compromising performance.

Rinnai and VirtuHot - Unrivalled performance

Unrivalled performance in any environment

- Reduce scope 1 emissions using 100% renewable solar heat
- Higher energy-density compared to market-leading solar thermal panels

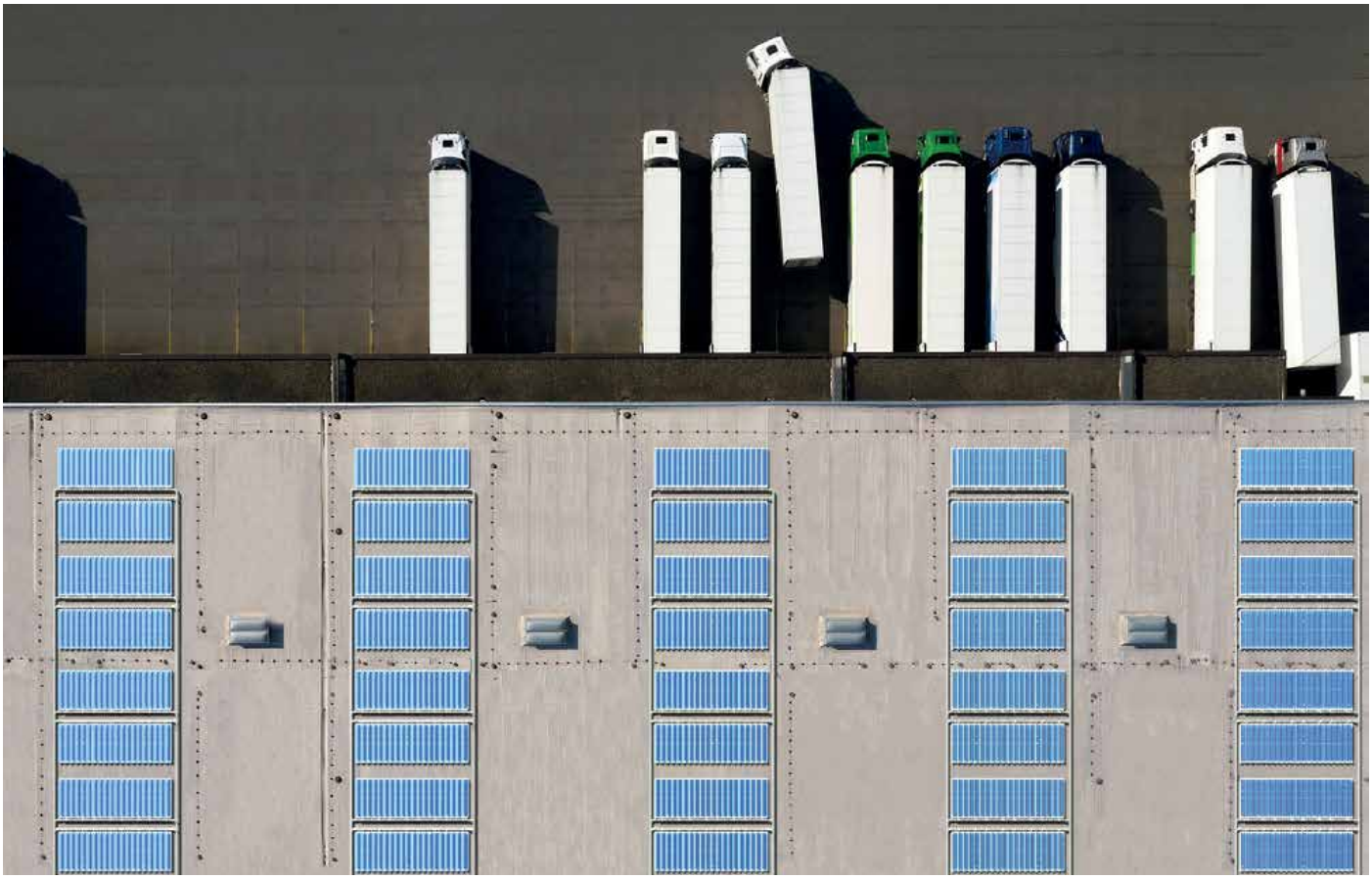
Versatile and easy to install

- Simple modular assembly
- Integrated mounting with self ballasting: no need for roof penetration
- Compatible with any roof type
- Low profile: 26.5 cm installed height

Designed for Commercial Scale

Ideal for:

- Multi-dwelling residential
- Manufacturing
- Food & beverage
- Hospitality & leisure



Rinnai and Virtu^{Hot} - Unrivalled performance

Low install cost
- Simple modular assembly
- Lifted to roof pre or post assembly
- Fits in service elevators
- Use of a crane not necessary
- Mounting included
- Pipe manifolds included

Low Profile
- 26.5 cm height from roof/façade
- Simplifies planning permission
- Low wind shear

Compatible with any roof type
6 X M8 mounting slots provide compatibility with, for example, clamp and rail systems

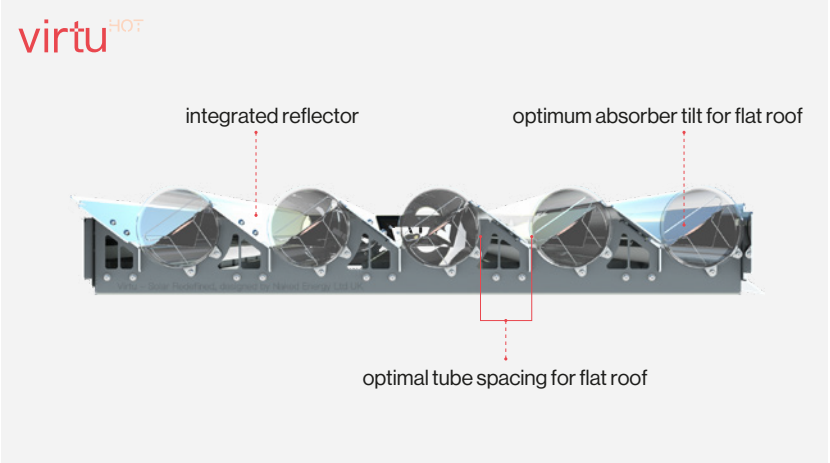
Suitable for:
- Raised seamed roofs
- Trapezoidal roofs
- Sarnafil roofs
- Nicholson fittings
- Pitched roofs
- Façade mounting

Self ballasting
In-built ballast trays can be loaded with concrete blocks.
- No need for roof penetration
- No need for additional mounting

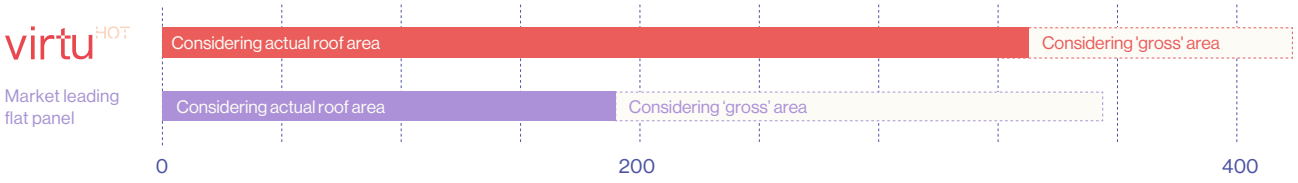
- Suitable for:
- Felt roofs
- EPDM roofs
- Rubber roofs
- Sarnafil roofs

Flat roof performance

Virtu^{HOT} maximises energy density on a flat roof.

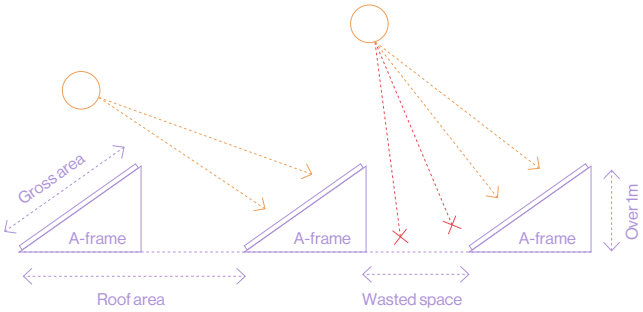


Annual kWh per m ^{2} roof area (Würzburg @50°C)*



Standard panels waste space

- Panels/collectors tilted towards the sun on A-frames
- Spaced to avoid self shading in winter
- Roof area required is larger than panel gross area



No wasted space with VirtuHOT

- Absorber plates are tilted to optimum angle within tubes
- Integrated reflector captures sunlight in space between tubes
- More energy, less space

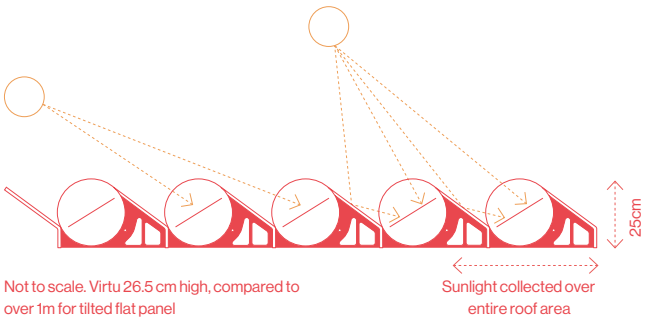


*Chart notes

> All annual kWh values are calculated using industry-standard Scenocalc tool, taking Würzburg as location, 50°C fluid temperature and 0° azimuth.

> Virtu ^{HOT} kWh calculation takes parameters from the Virtu ^{HOT} Solar Keymark certificate. Calculation is made at 0° inclination. Service corridor allowance is considered in roof area calculation (see layout on page 6).

> Flat panel kWh calculation takes parameters from Viessmann Vitosol 200 FM Solar Keymark certificate. Similar results are achieved by other best-in-class panels. Calculation is made at 15° inclination, by interpolating between 0° and 25° inclination. Space between panels is calculated using Viessman Technical Guide - Solar Thermal Systems. The 15° inclination has been chosen to produce best trade off between gross area and roof area performance.

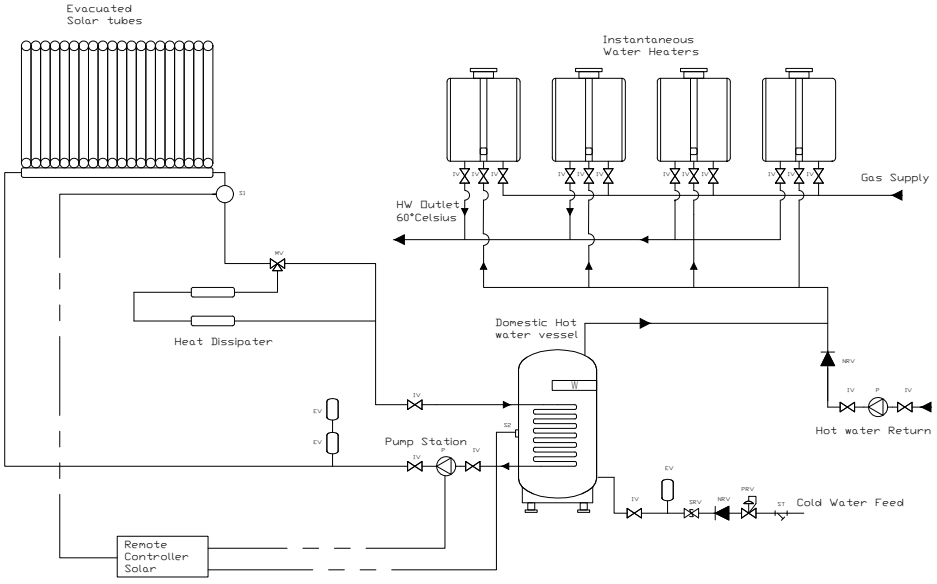
Rinnai + Virtu^{HOT} - How does it work?

virtu^{HOT}

- Virtu^{HOT} generates **5% more** energy per m^2 than the alternative ETC
- Reducing more carbon + operating cost over a given space
- Virtu^{HOT} costs **14% less** per m^2 than the alternative ETC

Rinnai

- Rinnai modulates gas burner 58kW - 4.4kW in relation to pre-heat solar gains.
- Rinnai water heaters are also ready for low carbon fuels like blended Natural gas and BioLPG.
- Reduces carbon footprint when displacing traditional storage based systems **by up to 30%**
- Rinnai systems are proven to reduce operational expenditure versus traditional storage



Typical holiday park, ablution block - projected savings

	Rinnai + VirtuHot
Total Storage Capacity (L)	500
Solar Cylinder Capacity (L)	500
Number of Water Heaters	4
Number of Storage Vessels	1
Peak Water Usage (L)	2000
Peak Usage Period (Hrs)	1
Number of Peak Usage Periods	2
Gas Type	LPG

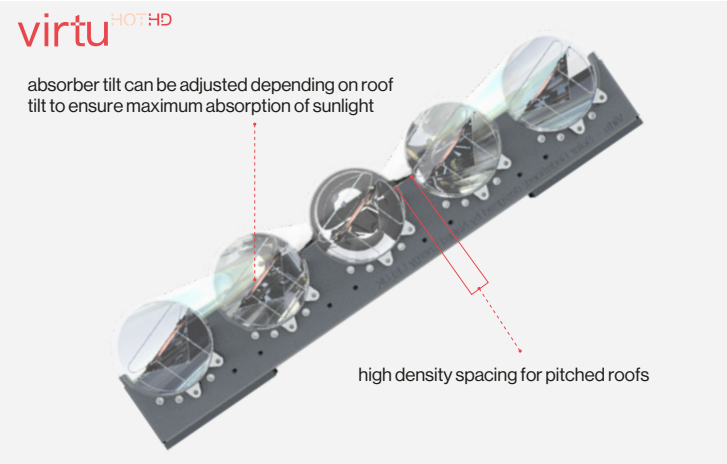
Year 1 - Estimated Carbon Footprint - Down 10%

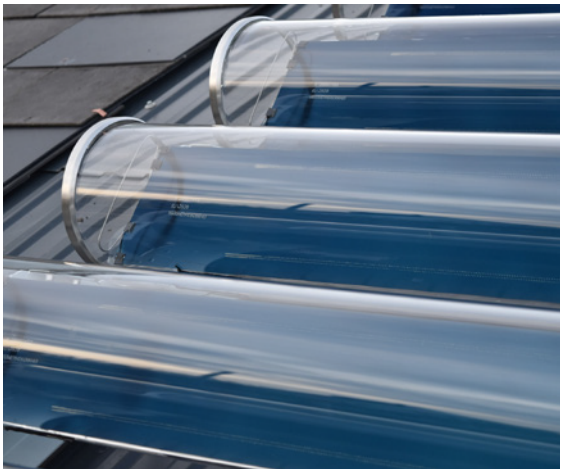
	Direct Fired Approach Only
Total Storage Capacity (L)	0
Solar Cylinder Capacity (L)	0
Number of Water Heaters	4
Number of Storage Vessels	0
Peak Water Usage (L)	2000
Peak Usage Period (Hrs)	1
Number of Peak Usage Periods	2
Gas Type	LPG

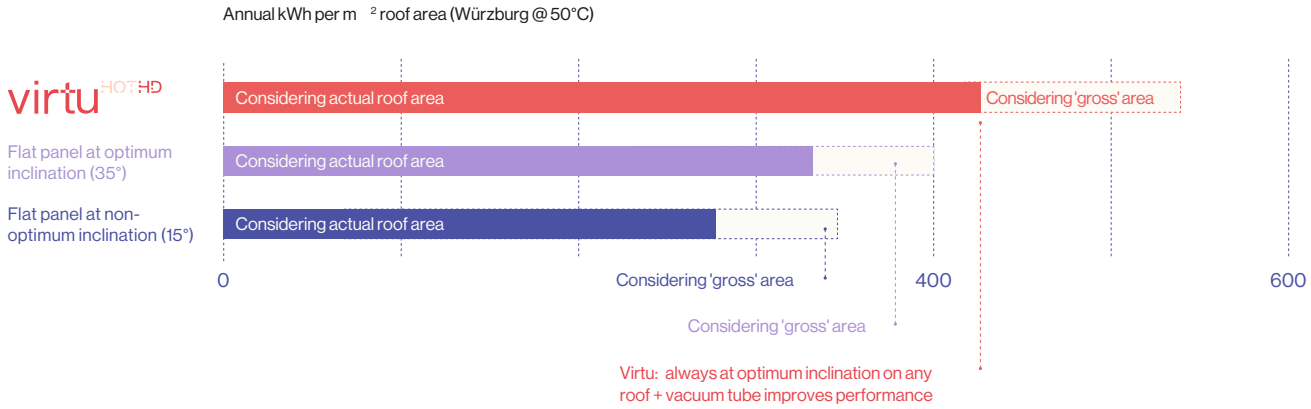
Year 1 - Estimated Operational Expenditure - Down 7%

Pitched roof performance

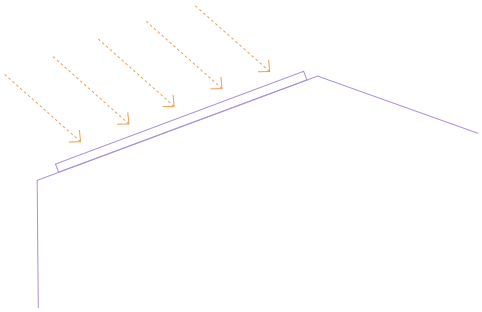
Sister product Virtu^{HOT} HD is designed for pitched roofs. Very few roofs are optimally angled for solar collectors. Virtu^{HOT} HD has the flexibility to tilt absorbers towards the sun, giving optimum performance on any roof inclination.







Flat panel: non-optimum inclination



Virtu: always optimum

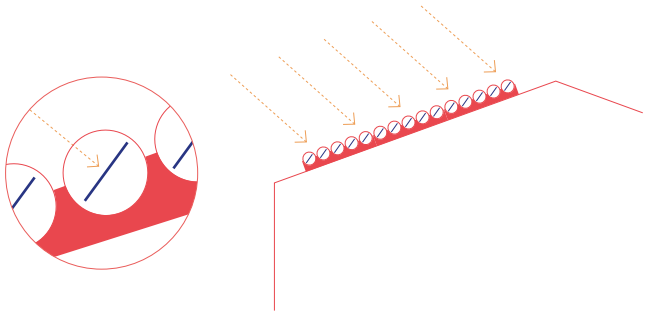


*Chart notes

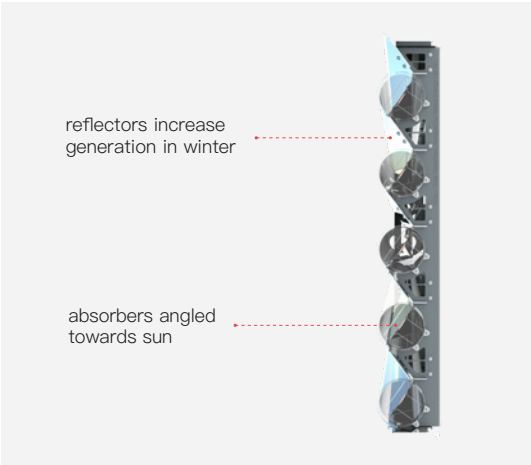
> All annual kWh values are either taken directly from Solar Keymark datasheets, or calculated using the industry-standard Scenocalc tool, taking Würzburg as location, 50°C fluid temperature and 0° azimuth.

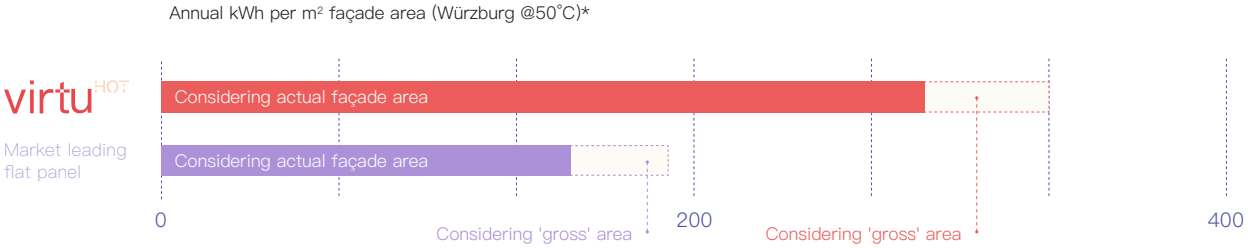
> Virtu HOT HD kWh numbers are taken directly from Virtu HOT HD Solar Keymark certificate, since absorbers can be adjusted to produce optimal result on any roof inclination between 15° and 45°. Service corridor allowance is considered in roof area calculation (see layout on page 6).

> Flat panel kWh calculation takes parameters from Viessmann Vitosol 200 FM Solar Keymark certificate. Similar results are achieved by other best-in-class panels. Values for 35° inclination are taken directly from Solar Keymark certificate. Values at 15° inclination are calculated using Scenocalc, interpolating between 0° and 25° inclination. For roof area calculation, similar clearance to Virtu HOT HD is assumed.

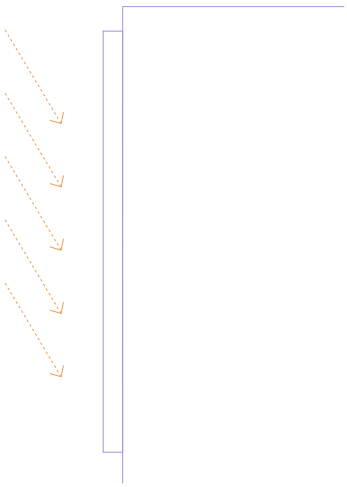
Vertical façade performance

Ever think of using your façade to produce solar energy whilst introducing a unique architectural feature and broadcasting your green credentials? Virtu^{HOT} unique design means it generates nearly as much energy on a south-facing façade as it does on a rooftop.





Flat panels are non–optimum
in both summer and winter



Virtu: Absorbers tilted upwards for
optimal summer performance

Virtu: Reflectors provide boost
to winter output

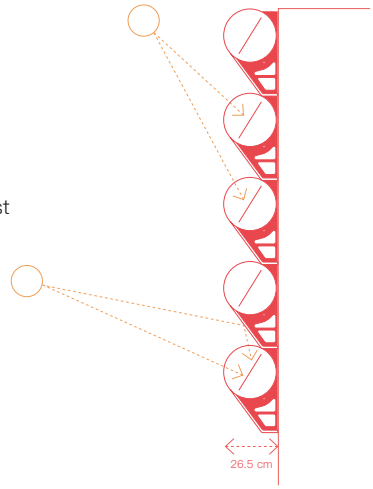


*Chart notes

> All annual kWh values are calculated using industry–standard Scenocalc tool, taking Würzburg as location, 50°C fluid temperature and 0° azimuth.

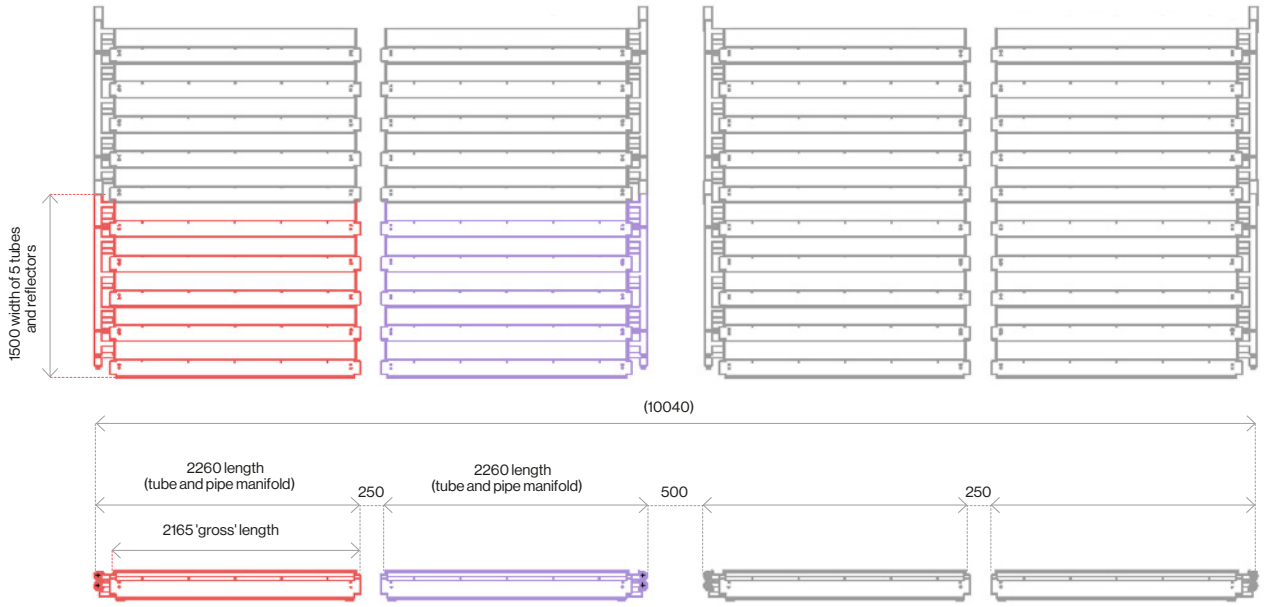
> Virtu^{HOT} kWh calculation takes parameters from the Virtu^{HOT} Solar Keymark certificate. Calculation is made at 90° tilt. The IAMs have been inverted to account for the orientation of the collector on the façade. Service corridor allowance is considered in façade area calculation (see layout on page 6).

> Flat panel kWh calculation takes parameters from Viessmann Vitosol 200 FM Solar Keymark certificate. Similar results are achieved by other best–in–class panels. Calculation is made at 90° tilt. For roof area calculation, similar clearance to Virtu^{HOT} is assumed.

virtu HOT

Includes integrated reflector. Suitable for :

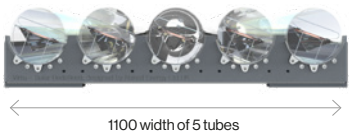
- Flat roofs
- Vertical façades
- Low pitch roofs (< 15° tilt)
- Installed in sets of 5 tubes
- Sets connected together to form an array of any size
- Can be configured with manifolds on left or right side

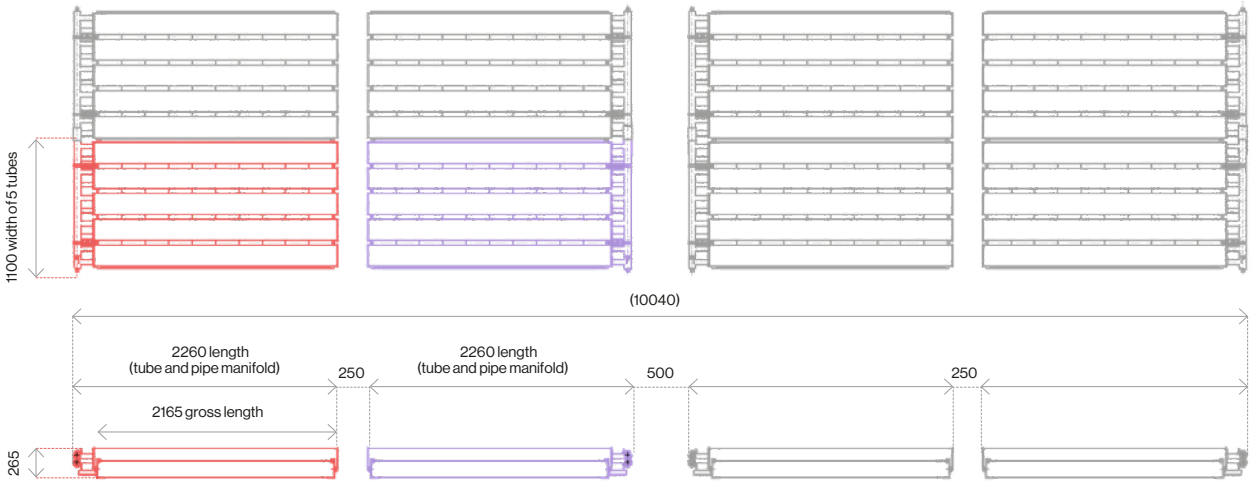


virtu HOT HD

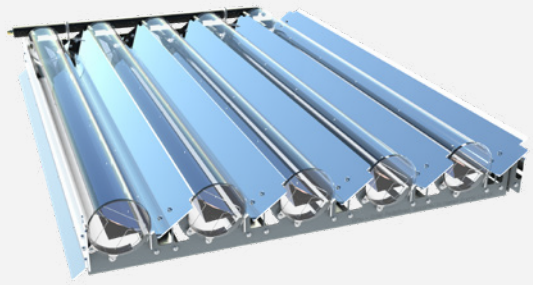
Higher density tubes without reflector. Suitable for :

- Pitched roofs
- Flat roofs in very low latitudes (< 30 ° from equator)
- Installed in sets of 5 tubes
- Sets connected together to form an array of any size
- Can be configured with manifolds on left or right side

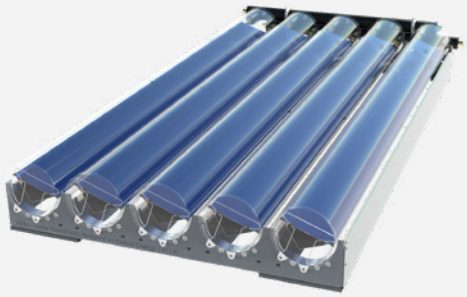




virtu HOT



virtu HOT HD



Model	Virtu HOT	Virtu HOT HD

SINGLE TUBE DIMENSIONS (refer to drawing on previous page)		
Gross length	2165 mm	2165 mm
Gross width (single tube)	300 mm	220 mm
Gross height	265 mm	265 mm
Absorber area	0.324 m^2	0.324 m^2
Gross area	0.65 m^2	0.47 m^2
Roof area occupied (incl. pipe manifold and service corridor)	0.78 m^2	0.57 m^2
Total weight (wet)	19.1 kg	14.8 kg
Roof loading	22.9 kg/m^2	23.7 kg/m^2
Additional ballast	Up to 21.7 kg (7 x 3.1 kg) of ballast blocks can be added per tube. Choose additional ballast based on wind loading calculations.	
Absorber plate angle	35°	Adjustable: 20°, 0° or –20°
SET OF 5 CONNECTED TUBES DIMENSIONS (refer to drawing on previous page)		
Gross width	1500 mm	1100 mm

MATERIALS	
Absorber plate	Aluminium/copper
Glass	Borosilicate 3.3

SINGLE TUBE HEAT OUTPUT		
Peak thermal output	400 W	290 W

OPERATING CONDITIONS	
Flow rate range	0.1–1 l/min
Maximum pressure	6 bar
Fluid output temperature range	10 – 90 (°C)
Manifold diameter (external)	22 mm
Manifold connections	DN16 male (3/4" flat face threaded)
Heat transfer fluid	Water–Glycol Solution
Mounting slots	6 x M8 slots per set of 5 tubes

Annual performance in Solar Keymark standard locations

Fluid temperature	ATHENS			DAVOS			STOCKHOLM			WÜRZBURG		
	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
Flat roof (0° inclination) – Virtu^{HOT}[1]												
kWh per tube	567	474	381	439	355	277	314	244	183	353	277	208
kWh per m² gross area	857	717	575	675	547	426	484	375	281	544	426	320
Annual efficiency (%)	54%	45%	36%	50%	41%	32%	49%	38%	29%	50%	39%	29%
Pitched roof (15° – 45° degree inclination, south facing) – Virtu$^{HOT\ HD}$[2]												
kWh per tube	492	391	295	417	326	245	300	224	159	325	243	171
kWh per m² gross area	1047	832	628	887	694	521	639	476	338	691	516	365
Annual efficiency (%)	59%	47%	36%	55%	43%	32%	56%	42%	30%	56%	42%	30%
Vertical Façade (90° degree inclination, south facing) – Virtu^{HOT}[3]												
kWh per tube	389	304	226	405	328	260	287	223	170	283	216	160
kWh per m² gross area	598	467	348	623	505	400	441	344	261	436	332	246
Annual efficiency (%)	55%	43%	32%	51%	41%	33%	51%	40%	30%	50%	38%	28%

Table notes

1. Calculated using industry–standard Scenocalc tool, taking input parameters from **Virtu^{HOT} Solar Keymark datasheet**
2. Values taken directly from **Virtu^{HOT} HD Solar Keymark datasheet**
3. Calculated using industry–standard Scenocalc tool, taking input parameters from **Virtu^{HOT} Solar Keymark certificate.** IAMs are inverted to account for collector orientation.

Guide to calculations for building regulations / compliance, for example SBEM, FSAP, LEED

SBEM calculations should take the Solar Keymark values according to EN 12975–2 (table below). Tilt should be set to the roof inclination.

	virtu^{HOT}	virtu$^{HOT\ HD}$
Area	0.65 m² per tube	0.47 m² per tube
Zero–loss efficiency (η0)	0.39	0.56
First–order coefficient (a1)	1.3 W/(m²K)	2.06 W/(m²K)
Second–order coefficient (a2)	0.006 W/(m²K²)	0.007 W/(m²K²)
Incidence angle modifier (IAM)	1.8	1.46

FSAP calculations should take a corrected zero–loss efficiency to account for the fact that Virtu^{HOT} has been tested at a solar incidence angle that is not perpendicular to the absorber (table below). Corrected zero–loss efficiency has been calculated as η0 x IAM (35) x cos(35) for Virtu^{HOT}, and η0 x IAM (20) x cos(20) for Virtu$^{HOT\ HD}$. Tilt should be set to 35° for flat roofs, the roof inclination for pitched roofs, and 55° for vertical façades

	virtu^{HOT}	virtu$^{HOT\ HD}$
Area	0.65 m² per tube	0.47 m² per tube
Zero–loss efficiency (η0)	0.582	0.605
First–order coefficient (a1)	1.3 W/(m²K)	2.06 W/(m²K)

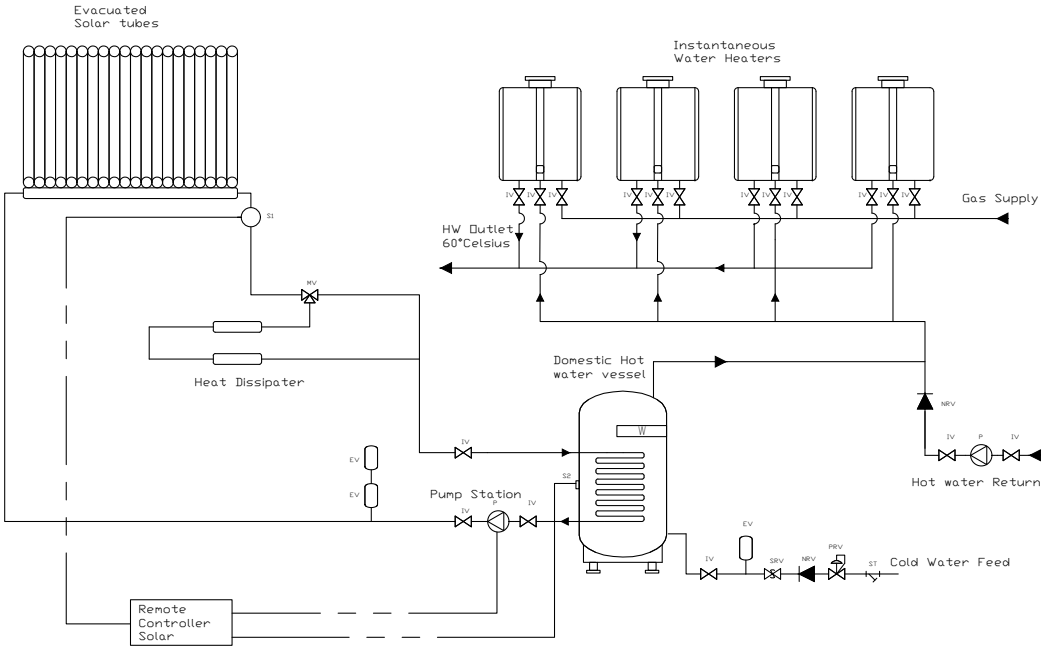
Guide to inputting Virtu^{HOT} into simulation software, e.g. Polysun, Tsol, EnergyPro, Scencalc

When using more sophisticated simulation software, be sure to use the full parameter set from the Solar Keymark datasheets Virtu^{HOT} or Virtu$^{HOT\ HD}$, and take the full IAM into account. **The collector tilt should be set to the roof inclination.** For vertical façades, the collector is rotated through 180 degrees.

Rinnai + Virtu^{HOT} Hybrid

Rinnai offers the market leading Virtu^{HOT} evacuated tube collectors combined with energy saving and carbon reducing Bio LPG ready and hydrogen blend ready 20% water heaters.

These market leading technologies will ensure that solar gains are maximised and fuels for combustion are minimised - without compromising system performance.



System Performance Virtu^{HOT} + Rinnai

Assume Max, and continuous flow from solar

Start Temperature	Preheat Solar System	Gas System top up	Energy from Gas in kW	Final Temperature	Savings in Gas
10.0	Rise 0 @	Rise 50 @	55.7	60.0	0.00%
10.0	Rise 10 @	Rise 40 @	44.6	60.0	20.00%
10.0	Rise 20 @	Rise 30 @	33.4	60.0	40.00%
10.0	Rise 30 @	Rise 20 @	22.3	60.0	60.00%
10.0	Rise 40 @	Rise 10 @	11.1	60.0	80.00%

Assume solar cylinder size 300, peak flow l/h @ 900, total energy per peak in kwh 52.25

Start Temperature	Solar cylinder 300 Litre	Gas Energy in Solar cylinder top up	Total Energy top up from gas kwh	Final Temperature	Savings in Gas per peak
10.0	Rise 20 @	7.0	45.3	60.0	13.3%
10.0	Rise 30 @	10.5	41.8	60.0	20.00%
10.0	Rise 40 @	13.9	38.3	60.0	26.67%
10.0	Rise 50 @	17.4	34.8	60.0	33.33%

Hydrogen I Hybrids I Heat Pumps

To see how these combinations can impact your projects carbon footprint contact us today on **0300 373 0660** or scan the QR code.

Rinnai can offer the complete package, designed with capital expenditure, operational expenditure and carbon reductions in mind. We can supply the complete solution.

Simply scan the QR code and ask us a question!

Notes

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