



Opportunities for solar heat in Europe

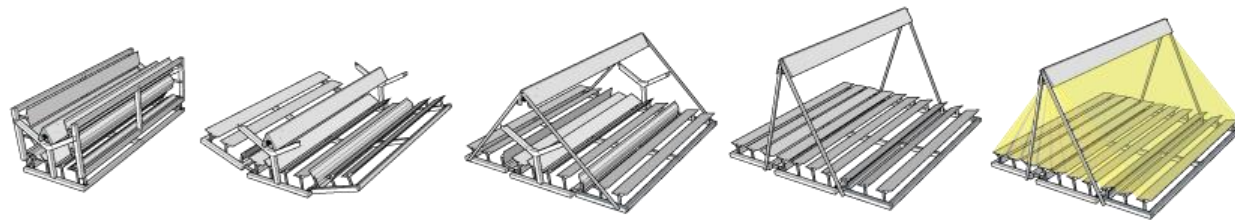
Miguel Frasquet

Prepared for:

SOLATOM in 1 minute

Pre-assembled solar solution for steam and high temperature generation

1 out of 4 concentrating SHIP
references in **Spain** use our collectors





The **scope** of the presentation

Reference case

Payback time
Solar share

Demand profile

Integration scheme

Fuel cost

Disclaimer

Focus on SMEs users

Concentrating collectors (Fresnel)

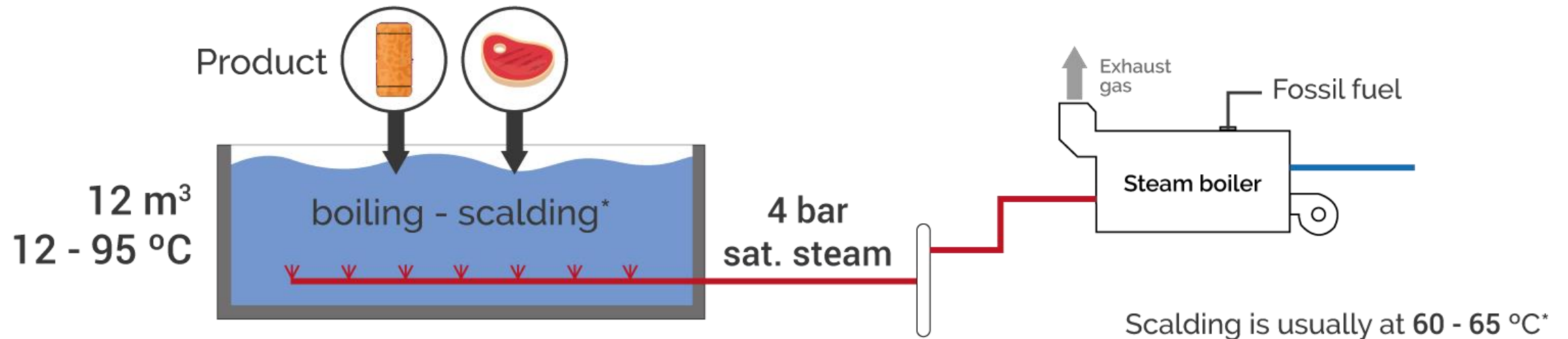
Numbers apply to SOLATOM's case

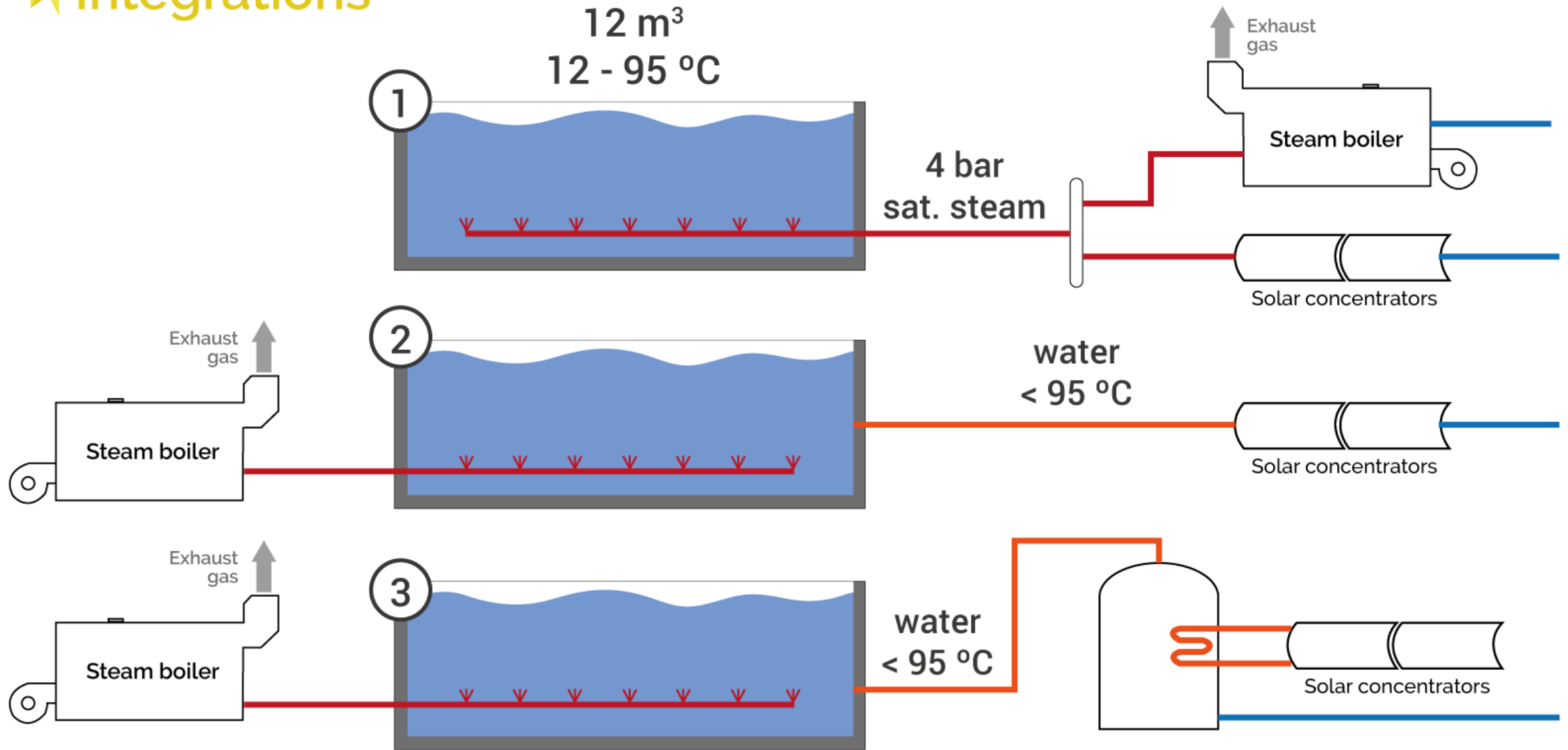
ReSSSPI as simulation tool (www.ressspi.com)

Focus on pattern rather than absolute number

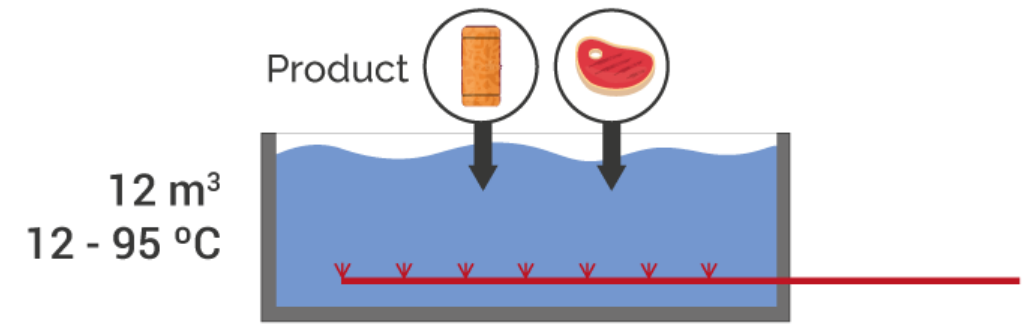
		>20 GWh/year	5-20 GWh/year	<2 GWh/year
Integration		continuous	continuous - batch	continuous - batch
Demand profile	1 Shift:	0 %	13 %	71 %
	2 Shift:	7 %	61 %	20 %
	3 Shift:	93 %	26 %	9 %
	No weekend:	0 %	65 %	90 %
	Saturday:	63 %	31 %	8 %
	Weekend:	37 %	4 %	2 %
Fuel cost	Natural Gas:	82 %	47 %	36 %
	LNG:	18 %	42 %	20 %
	Diesel:	0 %	7 %	34 %
	Other:	0 %	4 %	10 %
	Regulated price:	0 %	23 %	67 %
	Contract:	100 %	77 %	33 %

The thermal process



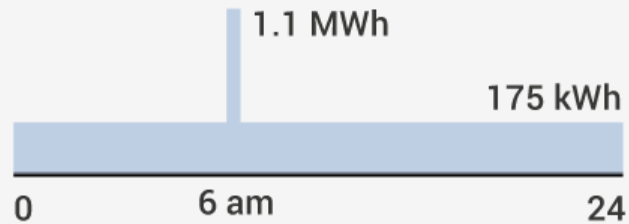


The demand profile

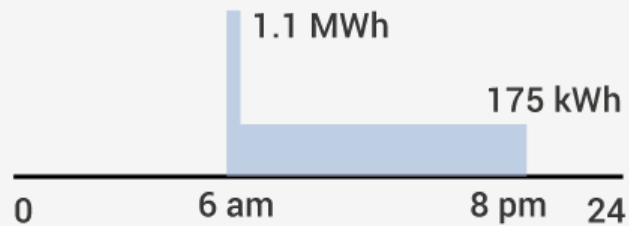


Daily profile

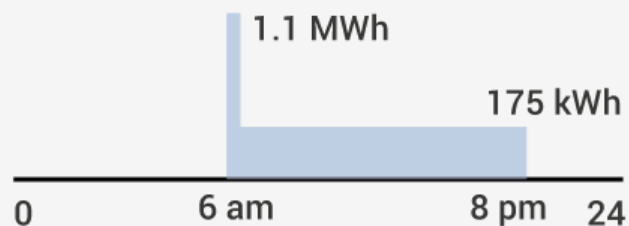
A



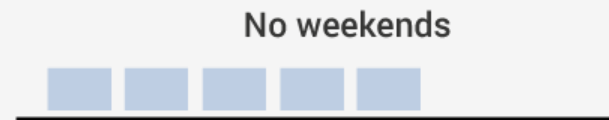
B



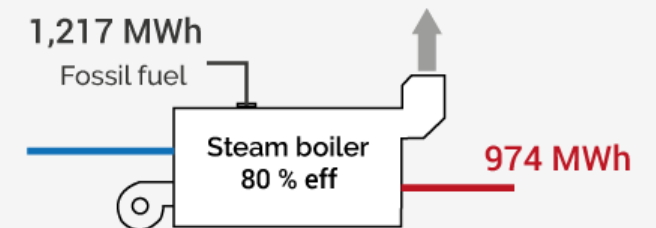
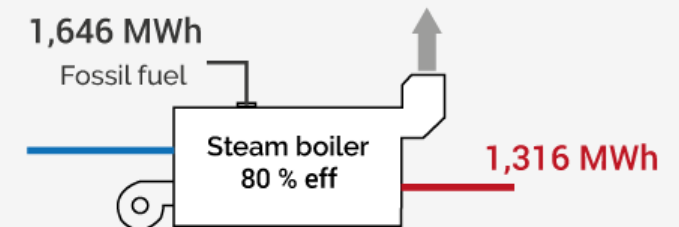
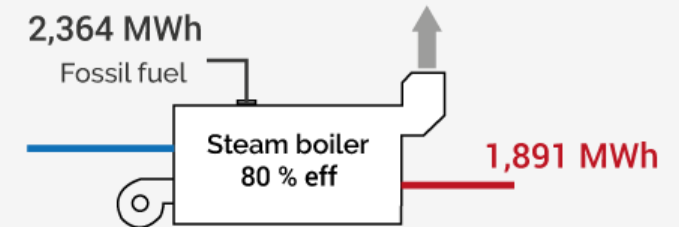
C



Weekly profile



Annual demand



1 Steam generation

Demand profile

A

Solar share: 14.9 %
Payback: 10 years

Aperture: 317 m²
Annual energy: 281861 kWh
Utilization: 100 %

B

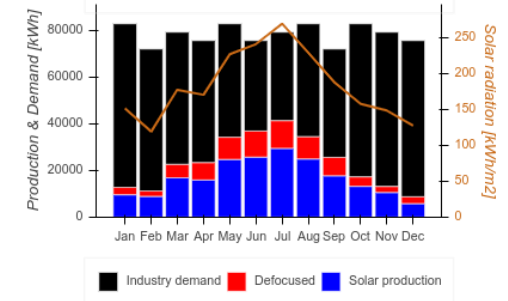
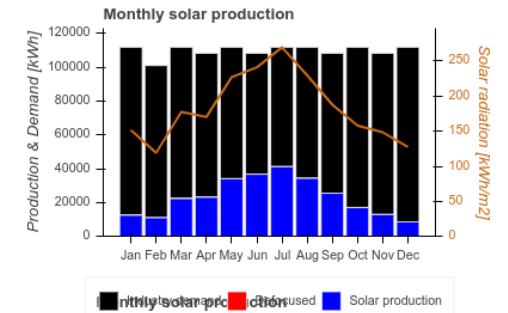
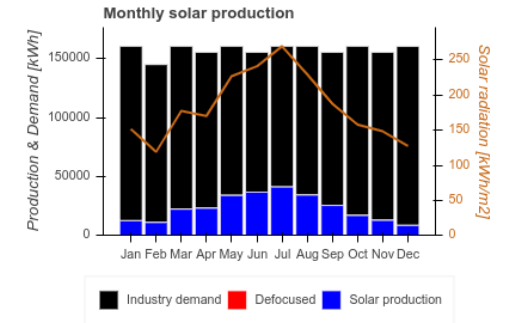
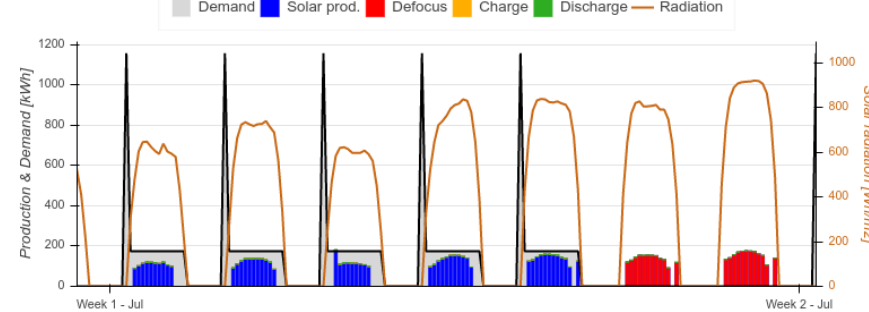
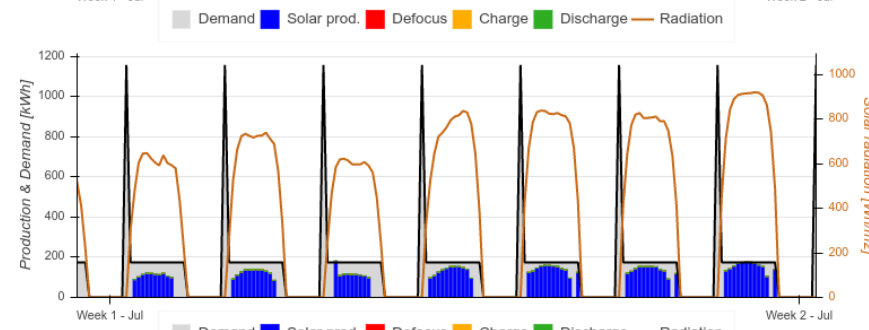
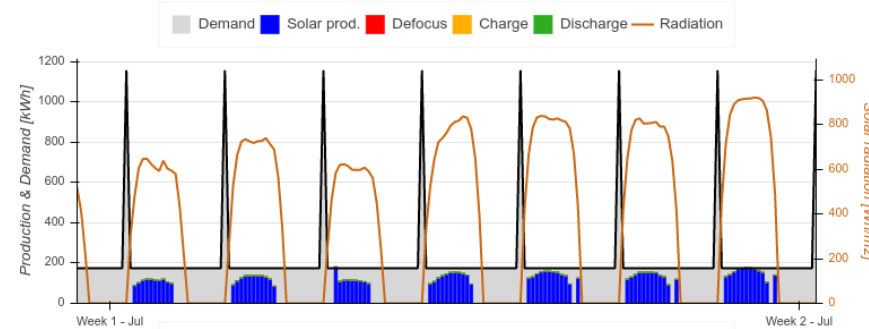
Solar share: 21.3 %
Payback: 10 years

Aperture: 317 m²
Annual energy: 281861 kWh
Utilization: 100 %

C

Solar share: 21.6 %
Payback: 13 years

Aperture: 317 m²
Annual energy: 203183 kWh
Utilization: 72 %



② Hot water without storage

Fuel cost: 0.04 €/kWh
Collector life: 20 years

Demand profile

A

Solar share: 16.6 %
Payback: 8 years

Aperture: 317 m²
Annual energy: 313794 kWh
Utilization: 100 %

B

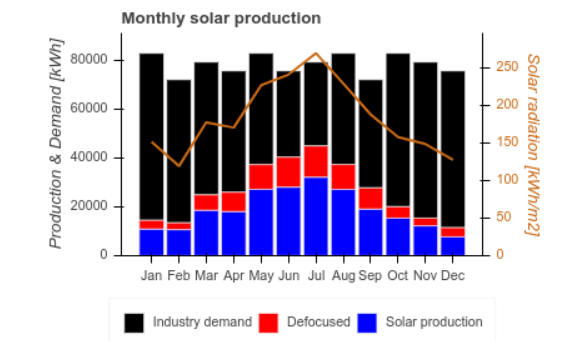
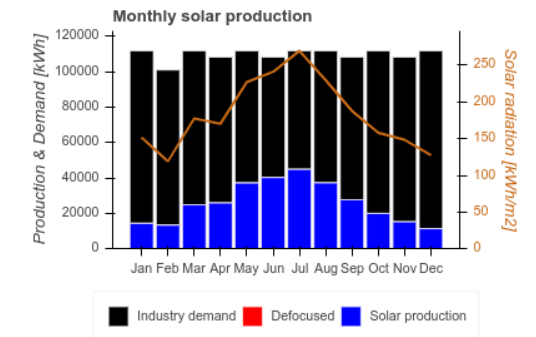
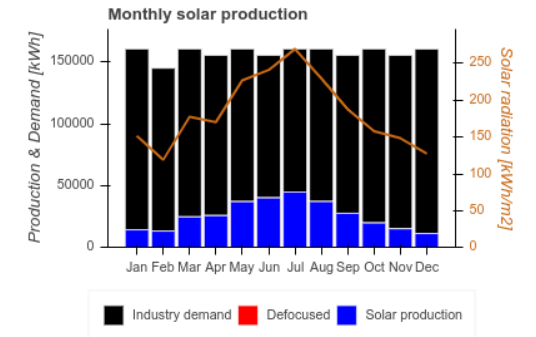
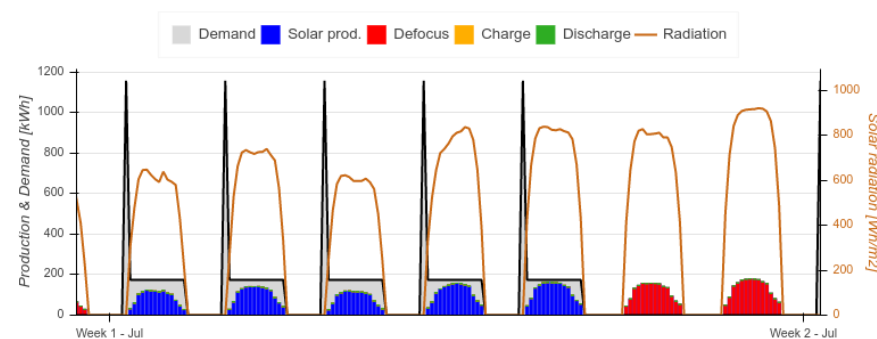
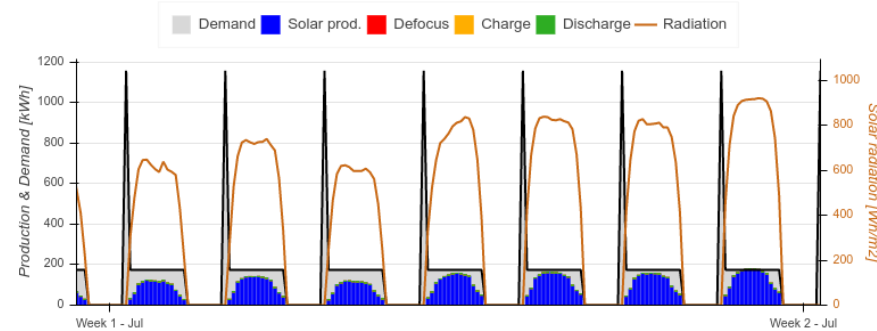
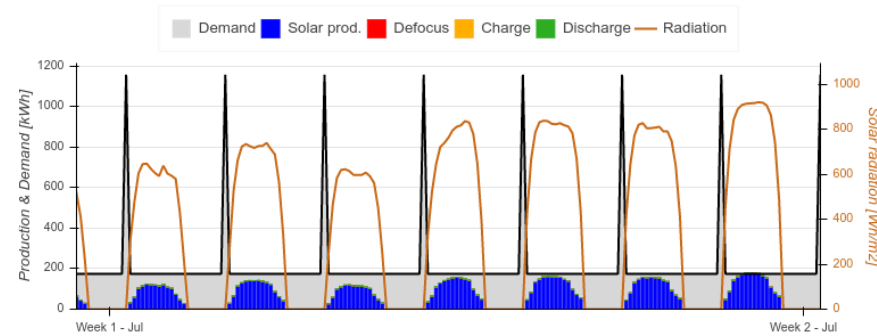
Solar share: 23.82 %
Payback: 8 years

Aperture: 317 m²
Annual energy: 313794 kWh
Utilization: 100 %

C

Solar share: 24 %
Payback: 10 years

Aperture: 317 m²
Annual energy: 226806 kWh
Utilization: 72 %



① Steam generation

② Hot water without storage

Demand profile

Ⓐ

Solar share: **14.9 %**
Payback: **10 years**

Aperture: 317 m²
Annual energy: **281861 kWh**
Utilization: 100 %

Ⓑ

Solar share: **21.3 %**
Payback: **10 years**

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Ⓒ

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Payback: **13 years**

Aperture: 317 m²
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Solar share: **16.6 %**
Payback: **8 years**

Aperture: 317 m²
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Utilization: 100 %

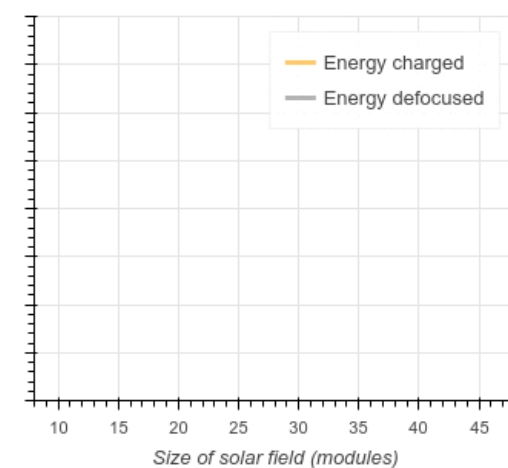
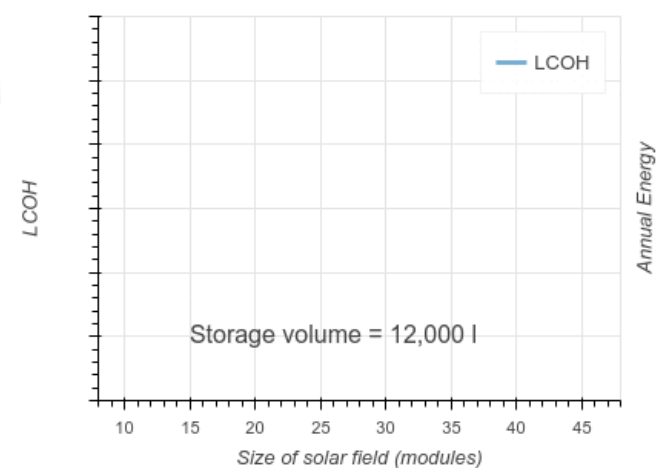
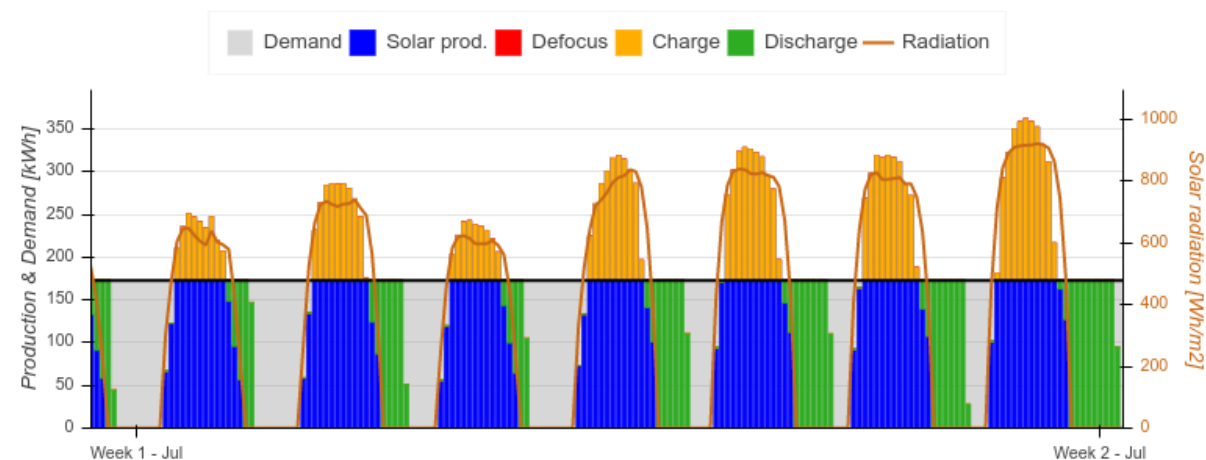
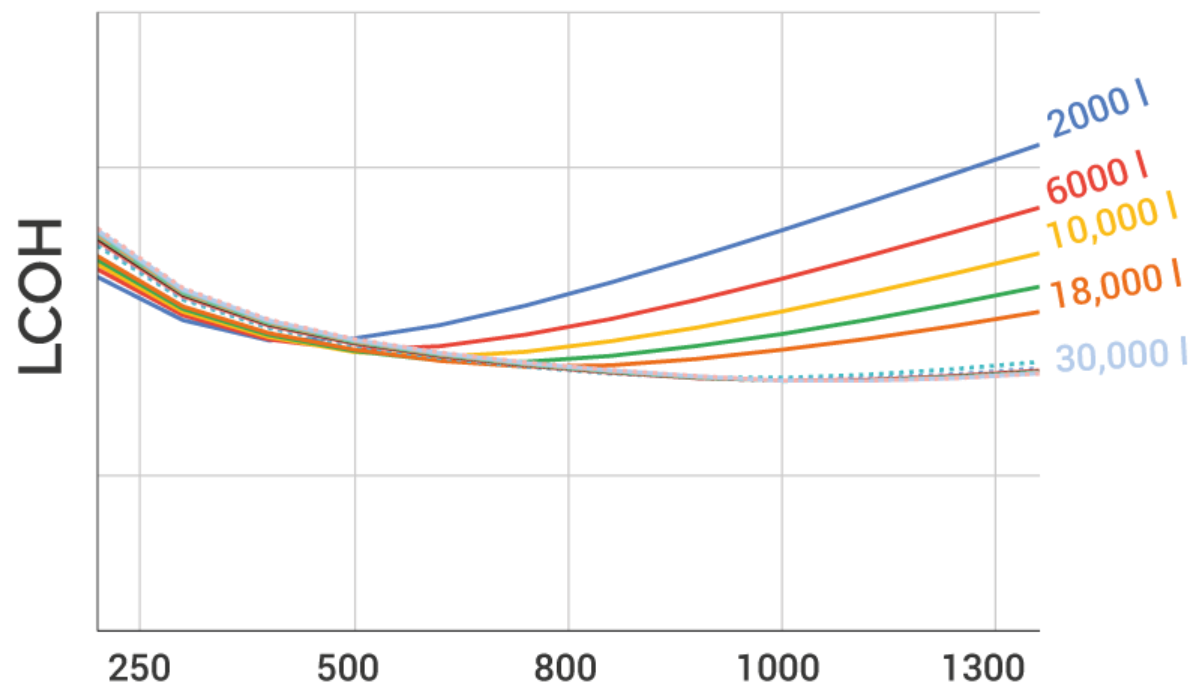
Solar share: **23.82 %**
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Solar share: **24 %**
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Aperture: 317 m²
Annual energy: **226806 kWh**
Utilization: 72 %

③ Hot water with storage



Integration scheme

Demand
profileFuel cost
variation

A

0.04 c€/kWh
0.05 c€/kWh
0.06 c€/kWh

①

Payback: 10 years
Payback: 8 years
Payback: 7 years

②

Payback: 8 years
Payback: 7 years
Payback: 6 years

③

Payback: 7 years
Payback: 6 years
Payback: 4 years



Thanks!



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www.resspi.com



[mfrasquet](https://github.com/mfrasquet)



<https://es.linkedin.com/in/miguel-frasquet-energy>

