

Table 1: Benchmarks for solar thermal systems in single and multi-family homes

Solar thermal system category	DHW-SFH Solar domestic hot water systems in single family homes	CS-SFH Solar-combi systems in single family homes	CS-MFH Solar-combi systems in multi-family homes
All systems of this category are roof mounted All systems of this category are equipped with short-term (diurnal) storages			
Energy/technical data			
Kind of solar thermal collector used <i>optional</i>	FPC <i>ETC</i>	FPC <i>ETC</i>	FPC <i>ETC</i>
Kind of solar energy storage used	DHW-tank	TTES (pressurized)	TTES (pressurized)
Typical size per unit [m^2_{gross}] <i>- range (from - to)</i>	7 <i>5 – 10</i>	18 <i>12 – 24</i>	100 <i>30 – 300</i>
Typical thermal peak capacity per unit [kW] <i>- range (from - to)</i>	5 <i>4 – 7</i>	13 <i>8 – 17</i>	70 <i>21 – 210</i>
Typical storage volume per unit [ltr.]	400	1,500	9,000
Typical annual production per unit [kWh/a]	2,625	5,940	39,500
Specific storage volume per unit [ltr./ m^2_{gross}] <i>- range (from - to)</i>	65 <i>50 - 80</i>	85 <i>60 - 110</i>	95 <i>70 - 120</i>
Typical solar energy yield SE [kWh/ m^2_{gross}/a] <i>- range (from - to)</i>	380 <i>330 - 430</i>	330 <i>310 - 350</i>	400 <i>350 - 450</i>
Typical solar fraction sf [-] <i>- range (from - to)</i>	68% <i>60 – 75%</i> (domestic hot water only)	20% <i>15 – 40%</i> (DHW + space heating)	15% <i>10 – 25%</i> (DHW + space heating)
Technical life time [years]	25	25	25
Financial data			
Specific cost ready installed [1,000€/ m^2_{gross}] (excl. VAT, excl. subsidies)	0.93 (+/- 13%) <i>(0.81 – 1.05)</i>	0.76 (+/- 13%) <i>(0.67 – 0.86)</i>	0.66 (+/- 21%) <i>(0.52 – 0.80)</i>
Specific cost (material only) [1,000€/ m^2_{gross}] (excl. VAT, excl. subsidies)	0.70 (+/- 6%) <i>(0.66 – 0.74)</i>	0.61 (+/- 8%) <i>(0.57 – 0.66)</i>	0.55 (+/- 20%) <i>(0.44 – 0.66)</i>
Labor required [hrs.] Labor cost [€/hr.] (excl. VAT)	18 (+/- 6hrs) 90 (reference: AT)	30 (+/- 10hrs) 90 (reference: AT)	120 (+/- 30hrs) 90 (reference: AT)
Investment per unit ready installed [1,000€/unit] (excl. VAT, excl. subsidies)	6.5 (+/-13%) <i>(5.7 – 7.3)</i>	13.8 (+/-13%) <i>(12.0 – 15.5)</i>	65.8 (+/-21%) <i>(52.1 – 79.5)</i>
Fixed O&M per unit [€/ m^2_{gross}/a]*	7.0	6.1	5.5
Variable O&M per unit [€/ m^2_{gross}/a]**	1.4	1.2	1.4
Levelized cost of heat LCOH [€-ct/kWh] <i>- range (from - to)</i>	16.2 (+/- 12%) <i>(14.3 – 18.1)</i>	15.5 (+/- 12%) <i>(13.7 – 17.4)</i>	11.2 (+/- 20%) <i>(8.9 – 13.4)</i>

* 1% of net investment cost (excl. labor)

** Electricity for solar pump and control (around 1.5 kWh electrical / 100 kWh heat produced). Electricity: 24€/MWh