



## Sunmark – Sustainable Solar Solutions

To ensure Sunmark quality solutions, we produce, control and cover the parts of an installation that make a difference in reaching the highest efficiency and reliability in energy production:

### Sunmark in headlines

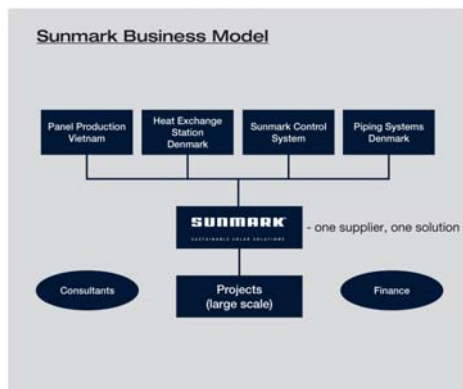
- Established in 2008, Danish-owned and based on more than 22 years of experience and knowhow.
- Experience from installations totaling, more than 200,000 m<sup>2</sup>.
- Collector production certified according ISO 9001, Solar Keymark and EN 12975.
- Highest efficiency flat plate collector in the market.
- Production of heat exchange stations in Denmark.
- Product development in Denmark.
- Sunmark Control System.
- Sunmark Service Solution.



## Sunmark core competences

### Sunmark core competences

- Design of optimized and tailor-made thermal solar solutions.
- Turn-key system installation.
- Development and production of high quality and cost effective solar collectors.
- Development and production of customized heat exchange terminals.
- Pre-fab. of piping systems
- Advanced control system for solar thermal installations.



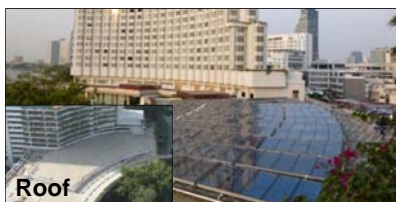
3 | August 20, 2013  
Sunmark PowerPoint Presentation

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## From passive space to active energy production

### Time schedule of a turn-key installation:

- |  |             |
|--|-------------|
| 1. Analysis                              | 2-4 weeks   |
| 2. Feasibility study                     | 2-4 weeks   |
| 3. Design & dimensioning of installation | 2 weeks     |
| 4. Construction of installation          | 10-24 weeks |
| 5. Commissioning                         | 2-4 weeks   |
| 6. Full scale operation, adjustment      | 1-2 weeks   |
| 7. Service of installation               | ongoing     |



Pipe work

Foundation

Fittings

Solar collectors

Tank capacity

Exchange station

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## Marstal District Heating, Denmark

2012 Marstal District Heating will be independent of fossil fuels and thus independent of rising energy prices. Solar and biomass will constitute 99% of the future energy.

Energy source:	Annual production:	Distribution of annual prod.
Solar thermal	14.542 MWh	55%
Biomass boiler	11.700 MWh	40%
Heat pumps	2.500 MWh	4%
Oil	287 MWh	1%
Total	29.029 MWh	100%



### Key figures thermal solar

Collector area:	33.000m <sup>2</sup>
Heat storage:	87.100 m <sup>3</sup>
Heat pumps:	2.500 MWh
Biomass boiler	4 MW
ORC unit:	750 kW
Max. load:	24MW
CO2 reduction:	5.636 tons
Oil savings:	1.745 tons/year

## Sun Island Almere, Netherlands by NV Nuon, Vattenfall

### Installation & performance data:

- Collector area: 7,134 m<sup>2</sup>
- Annual production: 2,708 MWh
- Max Load: 5.38 MW
- Share in annual heat demand: 10 %
- Energy storage: 12,100 m<sup>3</sup>

### Key figures:

- Equivalent oil savings: 500 tons/year
- Households connected: 2,700
- CO2 reduction: 1,050 tons/year



### Heineken Group

Sunmark is chosen to develop conceptual installations adapted to Heineken production processes. Once the installations are in operation the concept will be rolled out to the rest of the Heineken group consisting of 154 breweries.

#### Total Installation & performance data:

- Collector area: 7,270 m<sup>2</sup>
- Annual production: 4,558 MWh
- Max Load: 5,1MW
- Share in annual heat demand: ~ 21 %
- Energy storage: 850 m<sup>3</sup>

#### Key figures:

- CO2 reduction: 1,245 tons/year

### Food



## Norways largest Solar Thermal Installation - Akershus Energi Varme AS

#### Installation & performance data:

- Collector area: 12,810 m<sup>2</sup>
- Annual production: 4,223 MWh
- Max. load: 7 MW
- Share in annual heat demand: ~5 %



## The world's largest solar plant

Chilean state-owned Codelco has signed an agreement with the consortium consisting of Energy Llaima SpA and Sunmark A/S for the construction and operationalization of the world's largest solar thermal installation. Codelco is the world's largest copper mining company, and the installation will be built in connection with the Gaby mine in northern Chile. The installation will cover a total of 39,300 m<sup>2</sup> with an annual output of 50,000 MWh (50 GWh). The plant will be completed in June 2013 and is a turn-key solution from Sunmark A/S.



Today the mine uses 8,000 m<sup>3</sup> of oil per year to produce 120,000 tonnes of copper.

The solar thermal plant will:

- be the largest plant of its kind in the world
- cover 80% of the annual heating requirements
- reduce CO<sub>2</sub> emissions by 15,000 tonnes per year
- reduce energy costs by approx. \$ 7 million US
- ensure a reliable supply of energy
- reduce transportation of fuel to the mine by 250 trucks per year





## Selection of References

Country	Project	Type of delivery	Area	MWh/year1	Max load2
Denmark	Rise District Heating	Turn-key	3,600 m <sup>2</sup>	1,692	2.66 MW
	Marstal District Heating I+II	Turn-key	16,295 m <sup>2</sup>	7,659	12.06 MW
	Sønderborg District Heating I+II+III	Panels	7,779 m <sup>2</sup>	3,656	5.76 MW
	Tørring CHP	Turn-key	7,500 m <sup>2</sup>	3,525	5.55 MW
	Ærøskøbing District Heating	Panels	2,195 m <sup>2</sup>	1,032	1.62 MW
	Oksbøl District Heating	Turn-key	10,000 m <sup>2</sup>	4,700	7.40 MW
	Jægerspris CHP I+II	Turn-key	13,300 m <sup>2</sup>	6,251	9.84 MW
	Højnsvig District Heating I+II	Turn-key	5,766 m <sup>2</sup>	2,710	4.27 MW
	Vojens District Heating	Turn-key	17,500 m <sup>2</sup>	8,225	12.95 MW
	Sæby District Heating	Turn-key	11,921 m <sup>2</sup>	5,603	8.82 MW
	Ejstrupholm District Heating	Panels	6,243 m <sup>2</sup>	2,934	4.62 MW
	Skovlund District Heating	Panels	2,970 m <sup>2</sup>	1,396	2.20 MW
	Toftlund District Heating	Turn-key	11,000 m <sup>2</sup>	5,170	8.14 MW
	Sydlangeland District Heating	Turn-key	12,500 m <sup>2</sup>	5,875	9.25 MW
	Tim District Heating	Turn-key	4,235 m <sup>2</sup>	1,990	3.13 MW
Norway	Akershus Energi	Panels	12,810 m <sup>2</sup>	4,223	9.61 MW
Netherlands	Almere	Panels	7,134 m <sup>2</sup>	3,353	5.28 MW
Chile	Minera Gaby SpA	Turn-key	39,300 m <sup>2</sup>	51,800	32 MW
Vietnam	Sheraton Hotel	Panels	112 m <sup>2</sup>	123	88 kW
	Perrin Tannery	Panels	238 m <sup>2</sup>	262	188 kW
Thailand	Thai Union Manufacturing Co. Ltd.	Panels	462 m <sup>2</sup>	508	365 kW
	Shangri-La Hotel, Bangkok	Panels	921 m <sup>2</sup>	1,013	728 kW

1 Calculation based on average of 470 kWh/year in Northern Europe and 1100 kWh/year in Asia.  
 2 Calculation based on average of 740 w/m<sup>2</sup> in Northern Europe and 790 w/m<sup>2</sup> in Asia.

## Turn-key solution from Sunmark

### Sunmark Turn-key Solutions

- Analysis
- Feasibility study
- Design & dimensioning of installation
- Own production of collectors
- Own production of heat exchange stations
- Sunmark Control System
- Project management
- Installation
- Commissioning
- Sunmark Service Solution

### Benefits:

- One supplier
- Specialized in turn-key solutions
- Leading technology
- High efficiency
- Lifetime more than 25 years
- Fixed low energy price
- Attractive investment

**Sunmark**  
 - one supplier, one solution