



Building up a green revolution

KLYMAATM  **SWISS
INSO**
solar thermal control



Global climate change influences our daily lives

Finding new solutions to minimize the impact of these changes is of paramount importance, society's approach to energy consumption as a whole must be adapted accordingly by developing alternative strategies and innovative solutions to reduce the use of fossil fuels and CO₂ emissions into the atmosphere.

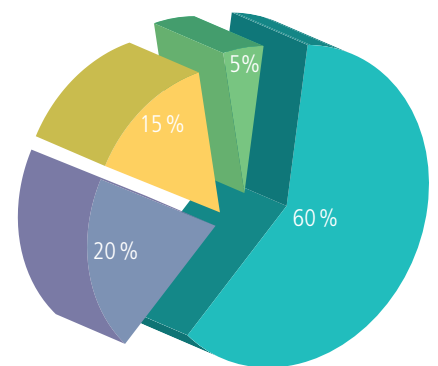
Shifting climatic patterns and extremes in weather conditions have an immediate impact on our lives and on society's basic needs—the need to stay cool in scorching hot summers and warm in very cold winters. Adequate temperature control is far more than a comfort factor; it is a requirement for efficient working conditions across all sectors of activity.

It is of supreme importance to reduce our reliance on traditional fossil fuels and to actively develop and implement the use of alternative renewable sources of energy. More than half of a commercial building's power consumption is for air conditioning alone. This electrical power and the associated costs can now be saved!

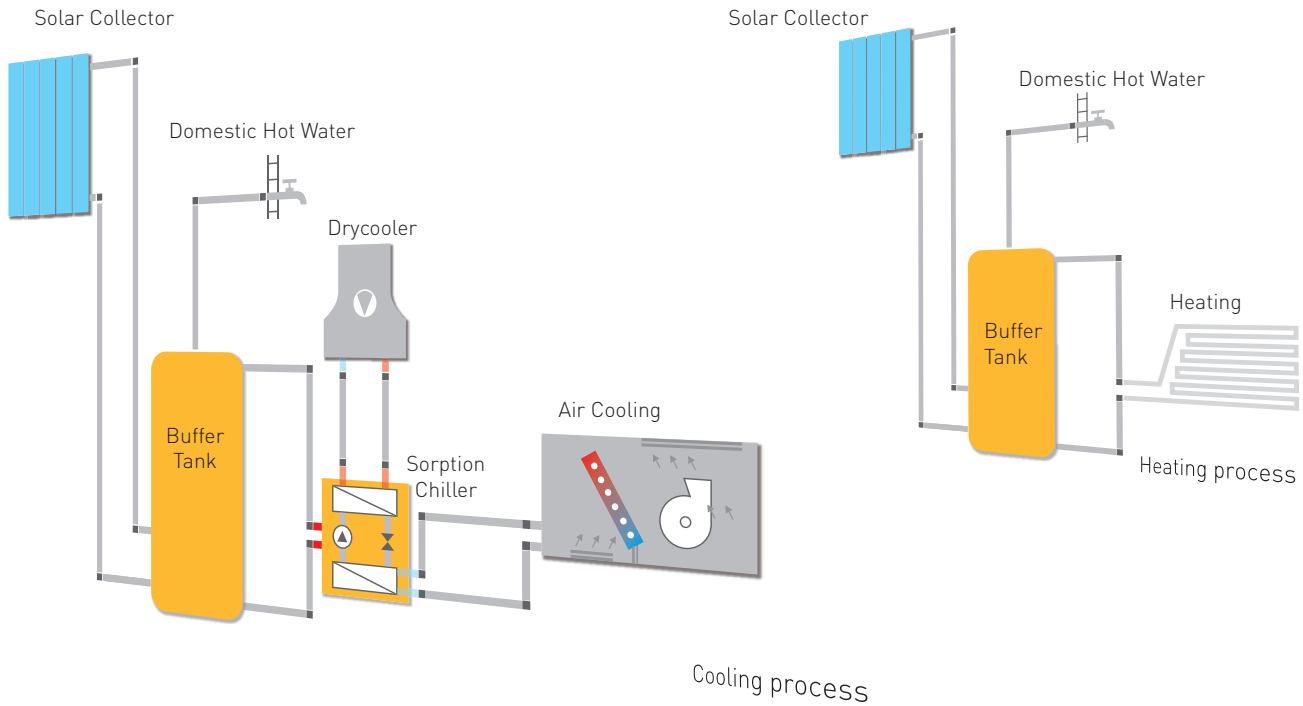
New Klymaa™ solar thermal panels provide a unique, environment friendly air cooling/heating solution using revolutionary coloured glazed cladding thermal panels – a proprietary nanotechnology surface treatment developed with the École Polytechnique Fédérale de Lausanne (EPFL). The panels are designed to be a creative feature of the building, offering new environment friendly perspectives for architectural design.

The Klymaa™ system is aimed at the construction industry's continued efforts to find cost effective alternative sources of energy and architecturally innovative design solutions for air heating or cooling.

Energy consumption & costs for buildings



- Air-conditioning
- Equipment
- Lighting
- Ventilation



Solar cooling and heating

SwissINSO provides a sustainable turnkey solution for air cooling and heating that combines solar thermal panels with colourful glass panels.

The Klymaa™ solar thermal collectors offer both a high level of solar transmission as well as a coloured reflection. Thanks to the coloured cladding glass, solar thermal panels can now be aesthetically integrated onto a building's façade and offer the same level of solar energy transmission. Combined with absorption or adsorption chillers, a new environmental solution for the air cooling of glazed buildings is now available.

Sorption chillers

Absorption and adsorption chillers transform heat into cool air to refresh buildings. The principle of a thermally driven cooling process is the same for adsorption and absorption chillers. They are both based on a thermal cycle, requiring a heat source (hot water) to provide the energy to drive the chilling process. In the chilling process heat/energy is removed from the cooling liquid used for air-conditioning. To complete the thermal cycle extra heat at a medium temperature has to be removed from the system.

SwissINSO solar thermal system

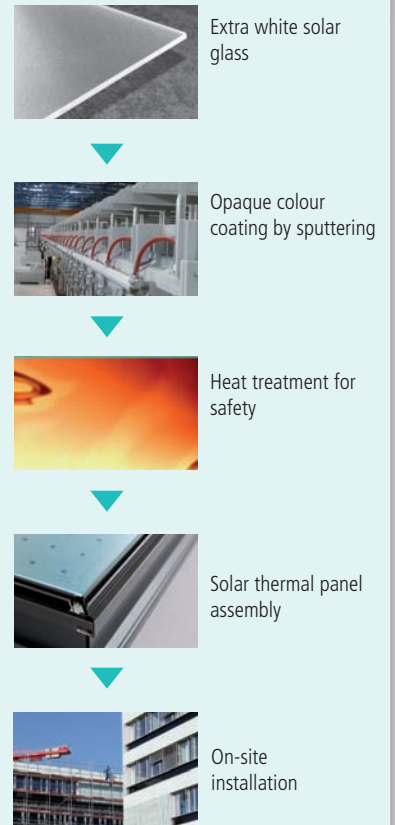
The SwissINSO solar system combines the unique technology of a coloured solar panel with sorption chillers to provide a sustainable solution for cooling buildings during the hot months of the year. The circuit diagrams above show the general settings for a solar air-cooling system and heating system.

Solar air-cooling in practice

Today, over 500 buildings obtain part of their thermal energy from solar thermal panels mounted on the rooftop of buildings.

As an industrial example, FESTO AG in Esslingen, Germany, is using three adsorption chillers and 1200m² of thermal collectors to cool 27 000m² of office area plus 2 800m² of three atria. However, it only provides for 21% of the cooling energy during summer, because the area for the solar collectors is limited to the available space on the roof where it can be hidden from sight.

KLYMAA™ project process



Project management by SwissINSO



Example of Klymaa™ solution versus conventional curtain wall

Office building with 10 floors, 200 m long (north and south façades) by 100 m (east and west).

- Temperature reduction of 8°C inside the building from outside temperature.
- Cost of installation of Klymaa™ curtain wall similar to that of non solar enameled glass pane spandrel panels.
- Cost of installation of sorption chillers (solar solution) equal to that of conventional grid power compressors.

Glass façades traditional (non solar):

- The four façades are equipped with framed enameled glass panels 1.2 m high by 2.0 m wide, including thermal insulation.

Solar capturing Klymaa™ façades:

- North side equipped with non solar SwissINSO coloured panels 1.2 m high by 2.0 m wide, including thermal insulation (same type of construction as enameled glass above).
- The three other sides are equipped with SwissINSO Klymaa™ solar panels 1.2 m high by 2.0 m wide.

Taking into account a price of \$0.14/kWh, the following ROI calculation applies:

Non solar solution

Total investment in glass curtain wall	\$ 1.98m
Air cooling equivalent for temperature reduction of 8°C for 46 000 m ³ (tons AC)	270
Grid power consumption (4 kW/h for 2 tons AC)	540 kW/h
Yearly power cost at \$0.14/kWh (m\$/year of 8760 h)	\$0.7m

Air cooling powered by Klymaa™

Total cost of non solar side	\$ 0.66m
Total cost of solar sides	\$ 3.25m
Total cost of 4 façades	\$ 3.9m
Extra initial investment for solar solution	\$ 1.9m
ROI period of solar solution	3 years
Yearly savings after third year	\$ 0.7m/year

Klymaa™ by SwissINSO

Key benefits

- Turnkey solar energy thermal control solution for buildings
- Maximum use of the building envelope to collect and generate energy
- Unique solution that can combine solar air cooling, heating and hot water production
- Cooling and heating solutions are independent of fossil fuel prices
- Offers significant energy savings and reduced CO₂ emissions
- Unique architectural solution that opens up new design options and creative flexibility for glazed buildings and façade integration
- Attractive coloured panels opaque to the human eye, but transparent to solar energy
- Good return on investment and short payback period

Coloured opaque solar thermal panels

SwissINSO's innovative solar thermal panels combine the capture of thermal energy with the aesthetics of a colourful opaque cover glass. Thermal water circulation solar collectors are the preferred choice for producing thermal energy used for generating domestic hot water, heating of buildings or air conditioning. However, conventional black thermal panels have significant limitations – the water circulation panel and tubings are covered with a transparent glass pane for protection, as well as to reduce heat losses, and thus, their aesthetics are very poor as the inner workings of the panel are visible, thus restricting their use to places where they cannot be seen.

SwissINSO has exclusive rights on the revolutionary nano-technology coating process to produce a unique and innovative coloured solar glass that is opaque to the human eye, but transparent to solar energy transmission.

The selective coatings are obtained by precise magnetron sputtering deposition of different metal oxide nano-composite layers on extra white solar glass.

Klymaa™ coloured panels generate the same amount of energy as conventional panels, but can now be mounted on the façade of buildings, allowing all non see through surfaces to capture the sun's energy in an aesthetic manner and adapted to today's architectural needs. This breakthrough technology opens a whole new field of opportunities in driving energy efficiency and architectural design.



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