How SolarWall® Works

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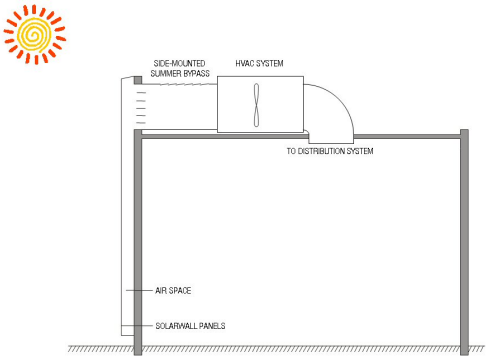
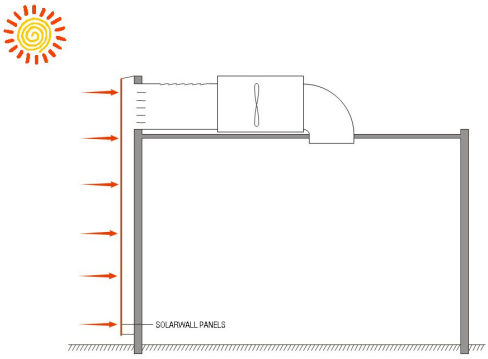
How SolarWall® Works

1. The SolarWall® perforated Transpired Solar Collector (pTSC) heats external air via a southerly facing solar collector. The system consists of a coated, profiled sheet that is installed as an additional skin to a buildings elevation.



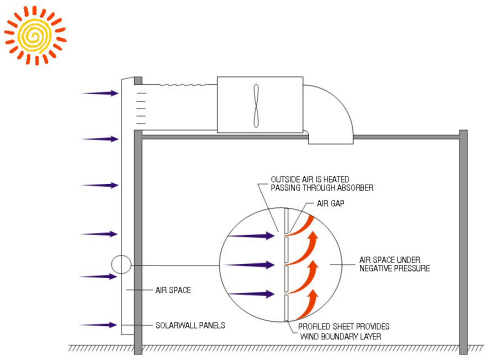
Main components of the Solarwall system

2. The principle of the SolarWall® is simple. Thousands of tiny perforations are uniformly spaced across the full face of the collector. As sunlight strikes the surface of the SolarWall® and is absorbed, solar heat conducts to the thermal boundary layer of air which lines the outer surface of the panel.



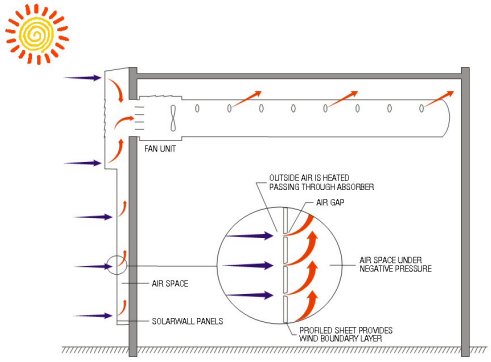
The Solarwall panels absorb the sun's energy

3. This heated boundary layer of air is then drawn through the perforations (by means of a ventilation fan) into the cavity space.



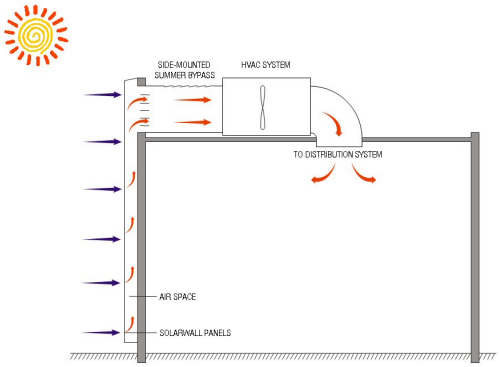
The boundary layer air is heated and drawn through tiny perforations into the air space

4. From the cavity, the fresh, heated air is then fed either directly into the building as ventilation air (industrial applications), or ducted into an HVAC unit (commercial & residential applications), where it is used as a pre-heater for the main heating system.



Indoor fans and perforated ducting destratify ceiling heat and balance air flow.

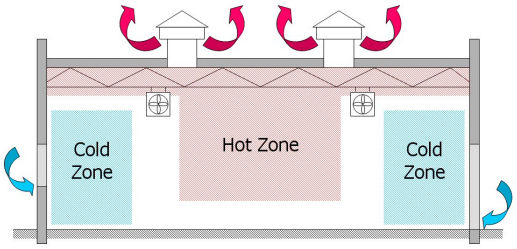
Industrial Application



The heated air is then evenly distributed in the building via conventional distribution system

Commercial & Residential Application

5. The SolarWall® effectively eliminates internal negative pressure and heat stratification problems that are associated with modern air tight buildings, as well as providing CO_2 free heating.



Fans exhaust the hottest air causing cold air to infiltrate at floor level

Building Heat Stratification

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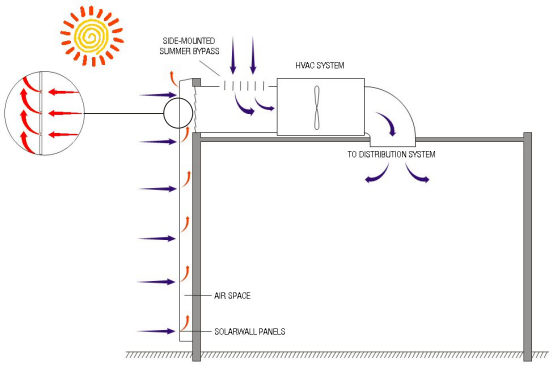
6. As well as supplying free heat during winter periods, the SolarWall® system can also provide significant benefits during the warmer, summer months. As the SolarWall® collector is installed as an additional skin to a buildings envelope, it effectively acts as a 'sun screen', shading the original elevation from direct solar gain and significantly reducing convective heat gains through the building fabric.

During such periods, automated dampers on the SolarWall® close to stop any unwanted heat from entering the building. This heated air is then captured within the cavity and allowed to rise to the top of the wall, where it then naturally perspires back through the perforated collector into atmosphere. Ambient external air can then be introduced into the system through a summer by-pass damper.

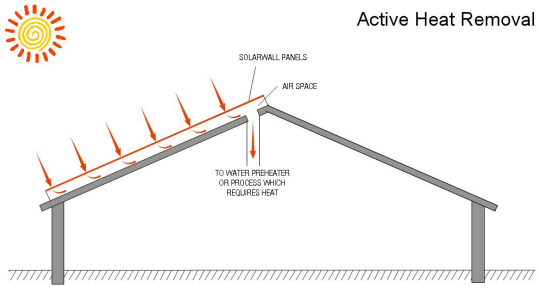


In the summer, the hot air is vented out the top. Panels act as a sunscreen preventing the sunshine from hitting the wall.

SolarWall® Summer Cooling

SolarWall® Process Air

As well as providing heated ventilation air, the SolarWall® system has also been used to provide heated process air for drying products such as tea leaves and coffee beans in equatorial regions. In such locations the SolarWall® panels can be roof mounted* for increased levels of solar gain.



If heat is required for preheating water or other processes, it can be removed actively.

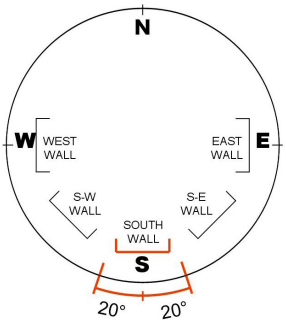
SolarWall® Heated Process Air

*For a project where a roof mounted SolarWall® installations being considered, contact CABP Technical Department for project specific recommendations and advice.

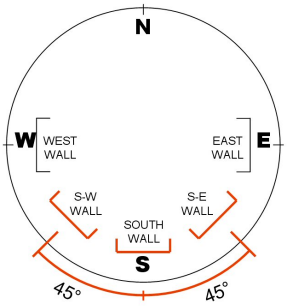
This type of roof mounted system can also have the added benefit of providing a "cool roof" all year round, as in the case of summer cooling outlined previously.

SolarWall® Orientation

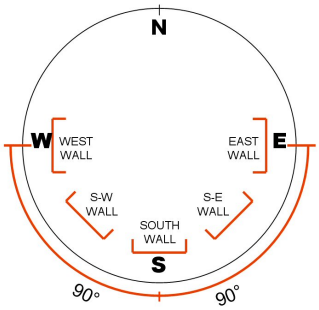
The ideal orientation for the SolarWall® perforated Transpired Solar Collector (pTSC) is due south, as this provides the maximum amount of exposure and hence solar gain to be absorbed by the collector. If a southerly elevation is not available, the collector can be installed onto different elevations, however the amount of solar gain will be subsequently reduced.



Ideal Orientation
(96 – 100% Solar Gain)



Favourable Orientation
(80 – 100% Solar Gain)



Acceptable Orientation
(60% Solar Gain)

If an elevation other than due south is utilised for the SolarWall® system e.g. the west wall, this elevation would then only generate heat during the afternoon period. It would prove more beneficial therefore, to utilise both the west and east elevations in SolarWall® as the east wall could provide heat during the morning periods and vice versa.

System Benefits

- Solar air heating significantly reduces CO_2 emissions.
- The collector when incorporated into the design can enhance the aesthetics of the building.
- Can be used on most buildings including, commercial, schools, universities, retail, industrial, distribution, warehousing, etc. If there is a heated / ventilation air requirement, SolarWall® can be utilised.

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- Can be incorporated with a wide variety of ventilation fans / HVAC equipment / inline heating units.
- Any heated air lost through the southerly facing elevation(s) is collected in the cavity and can be returned back into the building.
- The solar air cavity on the southerly facing elevation(s) enhances the U-value at no extra cost.
- The solar pre-heated air distributed through perforated ducts at ceiling level de-stratifies wasted ceiling heat, further increasing energy savings and promoting a more even temperature profile within the building.
- Virtually maintenance free as there are no liquids and minimal moving parts.
- Photovoltaic panels could be incorporated to create a PV/T system.
- The employment of the system enhances the image of not only the designer but also the developer and building occupier as they demonstrate their contribution to reduce the impact of CO_2 on the environment.
- This same theme can be employed on older buildings, reducing heating costs as well as increasing the life of the building at minimal cost.
- Short payback on capital due to the low system cost.
- Made from coated steel the system is 100% recyclable at the end of its useful life.

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