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Informa-TECH

Volume 32, number 2, June 2018

Cascades chooses solar energy for its sustainable development projects

Everyone knows that the sun is a limitless source of free energy. Each spring, we witness the beneficial effects of the sun's rays on nature after a long, hard winter. So why not harness part of this energy to meet some of our needs? We have a number of different technologies for converting sunlight into either electricity or heat. Cascades, a local company that is committed to being a leader in sustainable development, installed solar thermal panels at three of its plants in 2016. Let's look at how solar energy has become an integral part of the company's sustainable development efforts.

Cascades, a specialist in converting recycled fibres

For over 50 years, Cascades has been in the business of manufacturing, converting and marketing tissue and packaging products comprised mainly of recycled fibres. Nearly 11,000 people work for the company at its more than 90 units located in North America and Europe. The Canadian leader in paper recovery, Cascades conducts ongoing R&D to create innovative products for its clients.

At three plants (Vaudreuil, Candiac and Drummondville), Cascades decided to install solar walls to preheat the ventilation air and thereby generate significant energy savings. To optimize their performance, the walls were oriented toward the south-southeast and southwest, and there is nothing in front of them to block the sunlight.

Three Cascades solar projects generating major savings

Installing the solar walls has generated the following savings at Cascades' three plants.

Reduction of over 100,000 m^3 at the Vaudreuil plant

Cascades's solar wall in Vaudreuil's plant.

The Vaudreuil plant produces corrugated boxes from recycled paper; it was constructed in 1976.

The aeraulics in one section of the plant were inadequate, and new ventilation units needed to be installed to produce a total airflow of 60,000 ft^3/min. To preheat the fresh air, an 870 m² (9,364 ft²) solar wall was installed. This wall comprises perforated aluminum collectors that are coloured green to preserve the building's architectural features. Also, to maintain a comfortable environment for the workers, destratification ducts were installed to keep the warm air from accumulating at the plant's ceiling.

The solar wall reduced the plant's energy consumption for heating the ventilation air by more than 100,000 m³.

Reduction of over 98,000 m^3 at the Candiac plant

Cascades's solar wall in Candiac's plant.

The building at Candiac was constructed in 1963 but purchased by Cascades in 1995. This plant produces tissue products: toilet paper, table napkins and paper towel.

Similar to the situation at the Vaudreuil plant, two production systems were not adequately ventilated. To keep operating costs low, two solar walls were installed to preheat the air feeding the ventilation units, which produce airflow of 60,000 ft^3/min. Destratification ducts were also added.

The energy consumption for heating the two systems' ventilation will be reduced by a little over 98,000 m³/year as a result.

Reduction of 44,815 m^3 at the Drummondville plant

Cascades's solar wall in Drummondville's plant.

The Drummondville plant was built in 1985 and was purchased by Cascades in 1992. It is used to design and manufacture corrugated packaging products.

Slightly over 371 m^2 (3,993 ft^2) of solar collectors installed on a wall serve to preheat 40,000 ft^3/min. of fresh air feeding an existing ventilation system. As with the Candiac and Vaudreuil projects, destratification ducts were also integrated into the air distribution system.

A total reduction of 44,815 m^3 in natural gas consumption was achieved by installing the solar wall.

Financial assistance from Énergir for these projects

For each of these projects, financial assistance of $2 for every cubic metre of natural gas saved was provided under Énergir's Solar Air Preheating program.

Solar air preheating projects	Énergir financial assistance
Vaudreuil	$209,232
Candiac	$196,214
Drummondville	$89,630

These grants shortened the return on investment (ROI) period, making the projects very attractive for Cascades, which demonstrate once again Cascades' leadership in sustainable development and energy saving.

Close-up on producing electricity or heat with the sun

There are two types of solar panels like explained in an Énergir's video:

- **Photovoltaic (PV) panels, which produce electricity.** The photons from the sunlight strike the panel composed mainly of silicon, a semiconductor material. The energy is transmitted to the electrons, creating electrical current. PV panels have a potential efficiency for converting sunlight into electricity of over 40%, but the efficiency of the panels currently available on the market is closer to 15% on average.
- **Solar thermal panels, which convert light to heat.** For example, it is possible to heat a liquid (such as a water-glycol mixture) circulating through pipes on a building's roof. The choice of materials and the orientation of the panels greatly impact the performance of the thermal transfer.
- Solar thermal technology also includes **solar walls**, which comprise a series of collectors that preheat a building's ventilation air. This is the option Cascades chose for its projects.

Solar wall for preheating ventilation air: design principle and guidelines

Figure 1 illustrates the main components of a solar-wall system for preheating ventilation air.

1. In a conventional system, the outside air is drawn directly into the exterior ventilation unit and heated by a natural gas burner to the necessary temperature for the building's occupants.
2. Solar air preheating systems include the following components:
   - Solar wall
   - Air supply duct
   - Bypass duct
   - Motorized damper
   - Exterior ventilation unit
   - Air distribution ducts.
3. Operation:
   a. The solar wall absorbs the sun's thermal energy and heats up.
   b. The air drawn in by the ventilation unit is preheated as it passes through the perforated solar wall heated by the sun
   c. During the summer, air is circulated between the solar wall and the bypass duct to cool the solar panel.
4. To optimize the energy transfer, the solar-wall panels are best installed on a south-facing wall. As well, a dark coating is used to limit reflection. Some models of panel are effective with airflow as low as 1 ft^3/min. per square foot of solar wall.

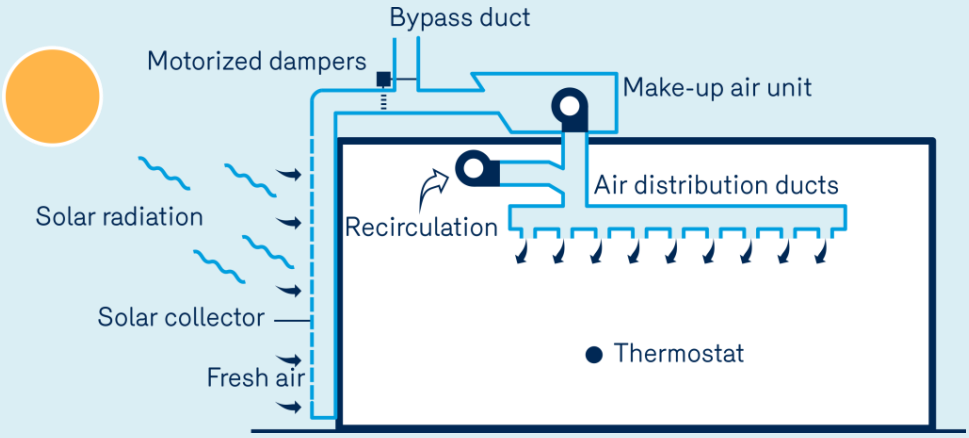

Figure 1: Operation of a solar wall (source: technology sheet, Énergir).

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