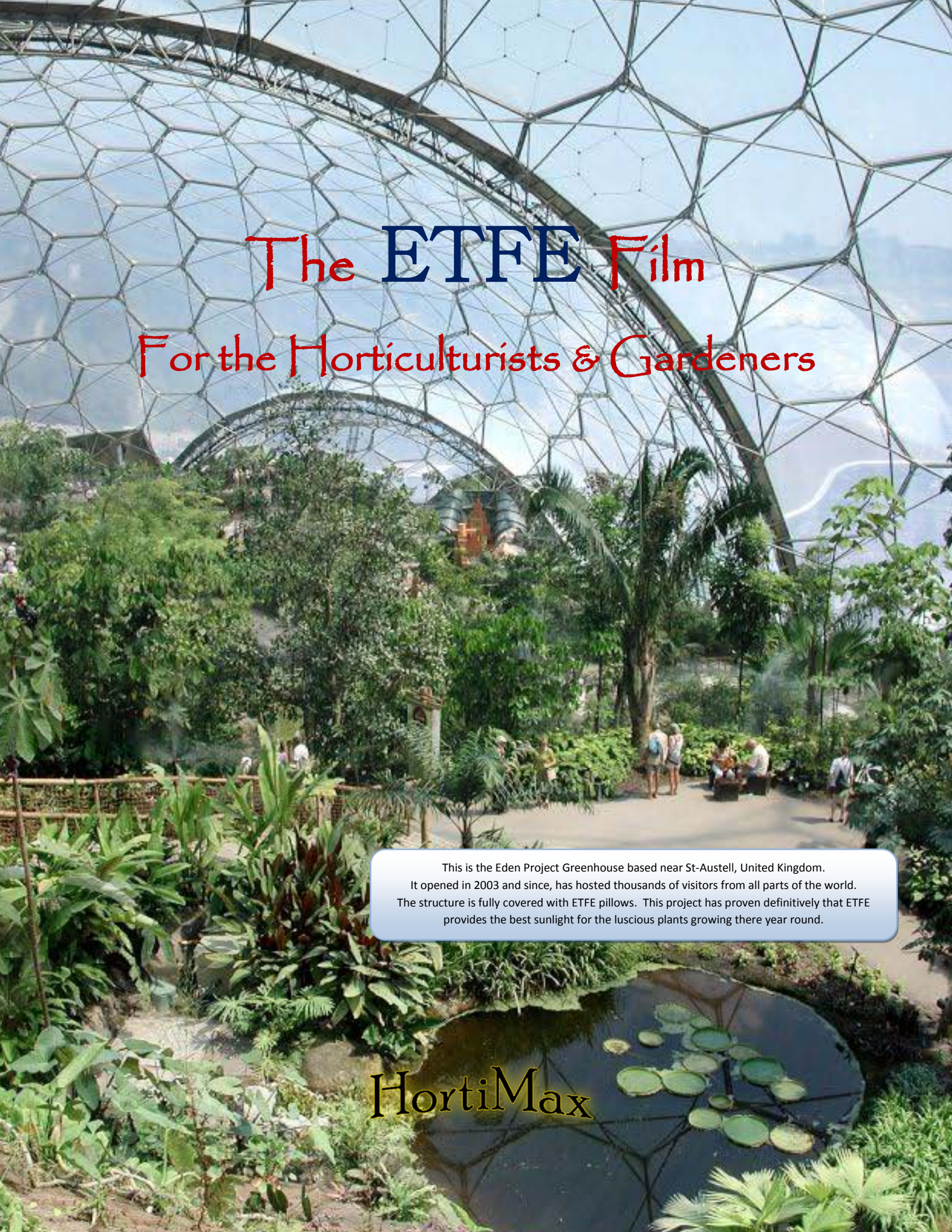

The ETFE Film

For the Horticulturists & Gardeners

This is the Eden Project Greenhouse based near St-Austell, United Kingdom.
It opened in 2003 and since, has hosted thousands of visitors from all parts of the world.
The structure is fully covered with ETFE pillows. This project has proven definitively that ETFE provides the best sunlight for the luscious plants growing there year round.

HortiMax

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The Lightweight Structure Concept

What sprung the idea of designing greenhouses using ETFE was my fascination of large areas, natural lighting and the well-being felt while standing in a glass house, like the ones at the Botanical Garden in Montreal.

It just made sense to me to spend time enjoying gardening in such a natural environment, surrounded by plants.

However, glass houses are expensive. Since glass is a heavy material it requires a sturdy supporting frame, usually of aluminum, with strong foundations to support all that weight. Also, for security reasons, the overhanging glass has to be tempered so that if it breaks, it will shatter in small pieces instead of large knife edged pieces. This glass tempering process significantly drives up the price of a glass roof.

It's been 30 years now that an amazing material called ETFE has been available on the open markets.

A lightweight structure concept is now feasible because the proven ETFE film is 300 times lighter than glass. This concept maximizes the free solar energy benefits by having a minimalist structure made of slim members and wide open spaces in between, for a better light from the outside.

Comparing ETFE to Glass

ETFE film is much lighter, more resilient and energy efficient than glass. It transmits more natural light and ETFE greenhouses may costs up to 10 times less to own. Let's investigate these advantages.

Lightweight

An ETFE pillow is simply 2 layers of ETFE joined together in an airtight fashion and inflated into a pillow using minimal air pressure.

At first it is the lightness of the ETFE pillow which makes it so attractive. In a comparison between the two materials, double glazed glass weighs at least 30 kg/m^2 where the same roof, made from ETFE film, is less than 0.1 kg/m^2.

This is 300 times less dead weight. It thus requires less material and is easier to install while achieving a better result. This also means that ETFE roofs need far less structural support than glass and the consequential requirements on the foundations are minimized.

Only with the use of the ETFE pillow can one have access to such a wide span of open spaces between supports.

Photo : China – Beijing National Aquatics Center

Energy Efficient

To keep their shape, the ETFE cushions need to be maintained with a low air pressure. This consumes an occasional 50 W of inflation power per 1,000 m^2 of film cushion.

ETFE film becomes an insulator when formed into cushions. Its heat transmission is only 2.6 W/ m^2°C, which is more than 30 % better than that of standard double-glazing at 3.8 W/m^2°C.

The energy lost through air gaps is greatly reduced using ETFE. Heat transfer principally happens in and out of a building through air leaks. Our ETFE greenhouse is air tight and the indoor climate may be controlled.

The larger panel sizes covered by the film cushions result in far more sunlight entering than with glass. There is a much larger area-to-frame ratio per window and a slimmer lightweight structure.

Sturdy

ETFE is mechanically much more resilient than glass. It is able to bear 400 times its own weight and to stretch to three times its length without loss of elasticity. ETFE has a tensile strength of 42 N/mm² ; you literally can push on it with a pressure up to 6,000 Pounds Per Square Inch and it will hold !

Under a minute fraction of this stress, glass simply shatters and is very costly to replace.

ETFE is mineral based just like glass. As opposed to plastics, which are mostly petroleum based and degrade rapidly in the sun, ETFE has a comfortable working temperature range exceeding -150 °C to +150 °C .

Inflating the cushion pre-stresses its outer skin, enabling it to easily withstand the weight of snow while being flexible enough to withstand the pressure of wind gusts.

When the ETFE pillow is clamped onto its frame and inflated, the strength of the structure plus the inflated ETFE pillows' rigidity adds-up to deliver an outstanding shell.

The ETFE film is tear proof. If accidentally punctured it can be easily patched or replaced.

Volkswagen fully supported by a ETFE film

Man standing on ETFE

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ETFE is Mineral based

The source mineral for making ETFE is Fluorite stones, and not a petrochemical derivate. Its manufacturing process is water-based, requiring no solvents or additives.

Plastic materials such as Polycarbonates have been available as alternatives to glass, but these has have limited success due to their poor performance.

Safe

Being mineral, ETFE has an inherent low flammability and is self-extinguishing. It meets the UL-94 flammability test. In an intense fire, the film simply opens-up and retracts away from the flame, without dripping.

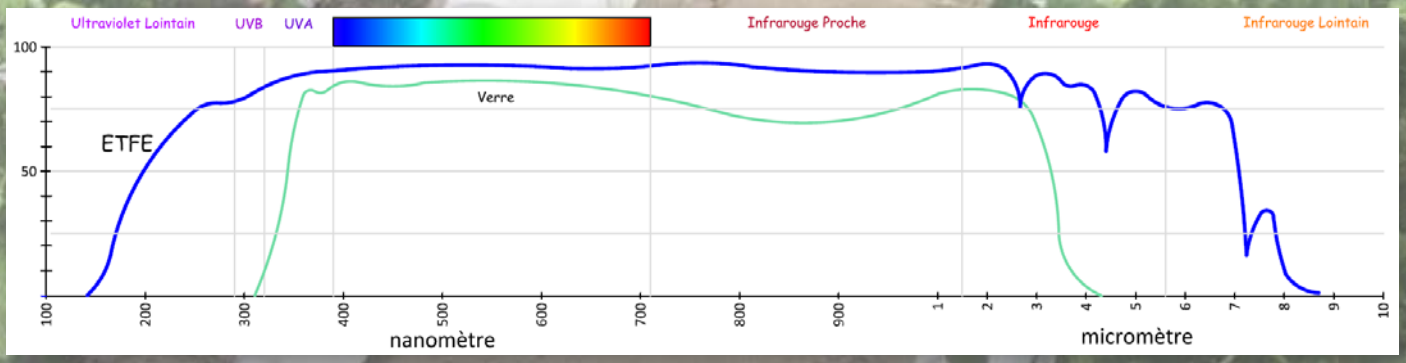
Full Spectrum Natural Sunlight

Glass is 90 % transparent and blocks most of the sun's UV. On the other hand, the ETFE film is 95 % transparent and allows in more Ultraviolet rays, which are extremely important for plant growth, as well as Infrareds.

UV limits fungus, bacteria and virus spreading. Only 75 % of the UVB rays pass through, providing a light tan.

Being crystalline, ETFE lets more radiant energy from the sun go through than glass and plastics.

The full spectrum provided by the ETFE film prevents the abnormally elongated seedlings that result from insufficient light and an unbalanced light spectrum. Seedlings are compact and robust while being ready earlier for outdoor transplanting, with minimum trauma due to the similarity of the indoor/outdoor light spectrum.



In the above graph the micrometer scale has been shrunk 10 times for better viewing.

Increased Illumination

ETFE has a better refractive index than glass. For low angle of incidence light, such at dust or dawn, most of the light will be transmitted through the films into the greenhouse and not be reflected out.

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In a Greenhouse ... Fewer Bugs

You now have control over the bug infestation !

By limiting their way in at the openings, you can now thrive free of bugs inside. You have better control on the environment, shielded from outside airborne fungus, bacteria & virus spreading as well as cross pollination.

Clean & Environment Friendly

ETFE is closely related to the non-stick material Teflon, so dust and dirt are washed away in the rain.

This non-stick property of ETFE also helps keep it snow-free, a chore with all plastic film greenhouses.

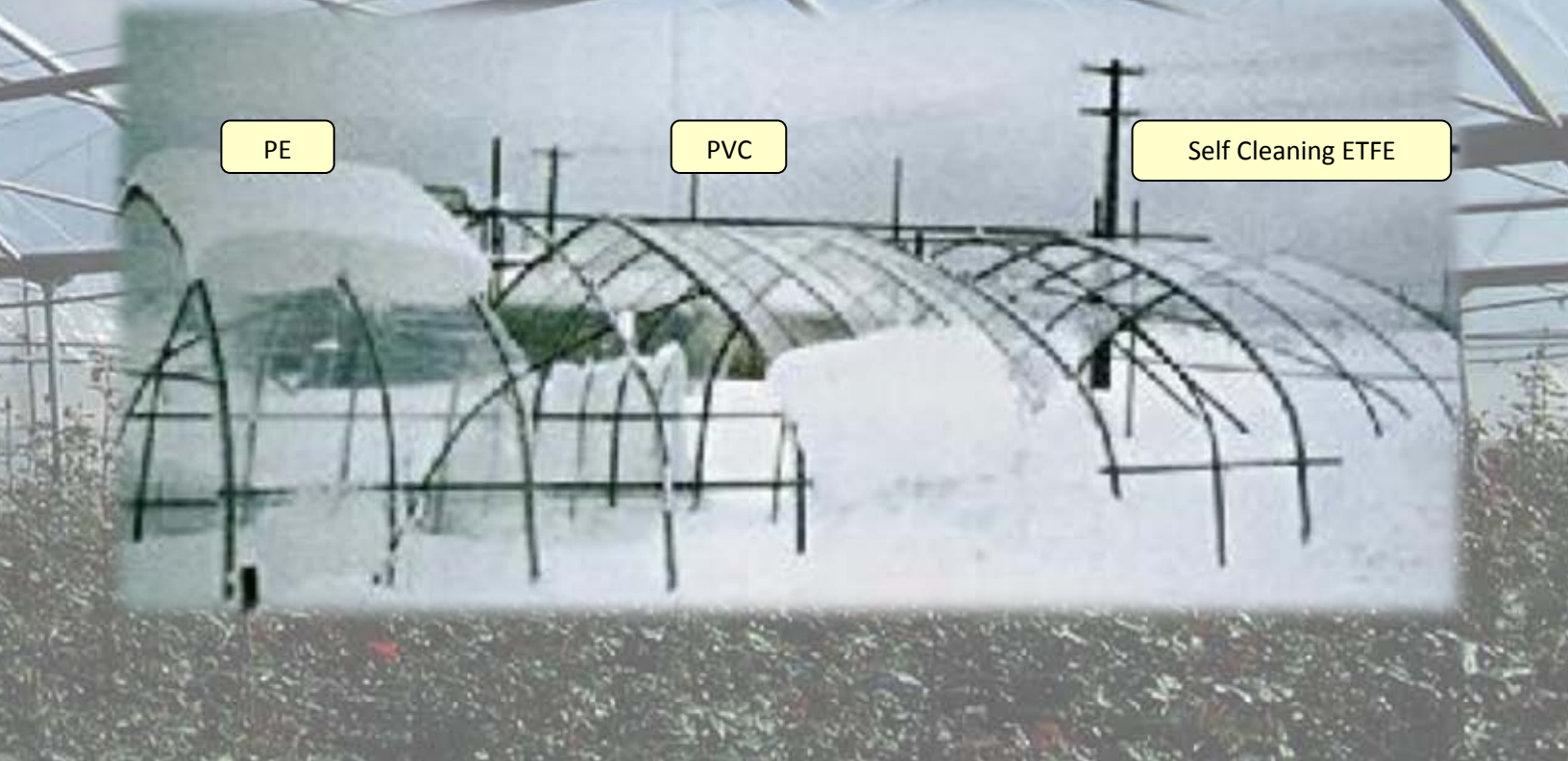
Recycling takes place only at the end of a material's life. For glass double-glazed units, the lifespan is likely to be 10 -20 years, limited by the life of the edge seals. ETFE is a relatively new material, with the early installations now approaching 20 years. The leadings film manufacturers say that the expected lifespan of ETFE is to the order of 30 - 50 years, without significant degradation.

At the end of its use, it can simply be recycled into new material by the manufacturer.

Embedded energy is the energy required to manufacture a product. It is more than 25 times more economical energy-wise to fabricate a wooden framed ETFE pillow compared to an aluminum framed double glazed window.

This economy potentially may double in a horizontal application.

A great push for our planet.



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Long Lasting

All the materials chosen to constitute our ETFE solutions have been selected for their outstanding durability and long life expectancy.

Typical frames are built using Eastern Cedar, rot resistant and light. Our unique Hub system is made out of rust-resistant Stainless Steel which last decades.

Large structures are also dismountable and can be moved so that the investment is conserved for many generations.

Aerodynamic

The ETFE pillow shape has evading curves in all directions on which the wind has no grip, unlike traditional buildings with their overhangs or square corners, which are prone to wind noise and heat loss.

It is then much quieter and safer to be in an ETFE greenhouse during high wind gusts, both for the gardener and his precious plants.

ETFE in the World (... and there are many more creations)

Eden Project – United Kingdom

Villa de LaGuardia Hotel – Spain

Beijing National Aquatic Center - China

Dresden Castle – Germany

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Our Offering

Custom Frames

We are able to custom manufacture ETFE pneumatic pillows which may be installed directly on the structure or framed in the cedar or pine variety of your choice, adapted to be efficient in our Nordic climate. These frames may be used at any angle and may be nearly 78 inches wide.

As an example, the Horticulturist may now have a cold-frame at his disposal to start his plants directly in soil earlier in spring, and the gardener may close his balcony to have a place in the sun to start his plantation. Framed ETFE pillows can also be used as wide area windows and as skylights.

The frames may be insulated and capped for a better insulation performance and extended life in the sun.

Let us know of your project and we will help you find the better solution.

When needed, we use advanced technology for a precision cut.

Our ETFE Covered Domes

We also offer affordable Dome shaped greenhouses.

They are available in 30’ and 40’ diameters.

Close your Veranda

Are you dreaming of closing your veranda to make the best of winter ?

Our pneumatic pillows let the free radiant energy from the sun get inside so that you may save on your heating bill while taking a sun’s bath.

Also a closed veranda acts as a buffer zone which helps increasing the insulation of that portion of your home.

We are located in the Laurentides, north of Montreal, and able to ship nation wide.

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Contact-us, we will be happy to assist you !