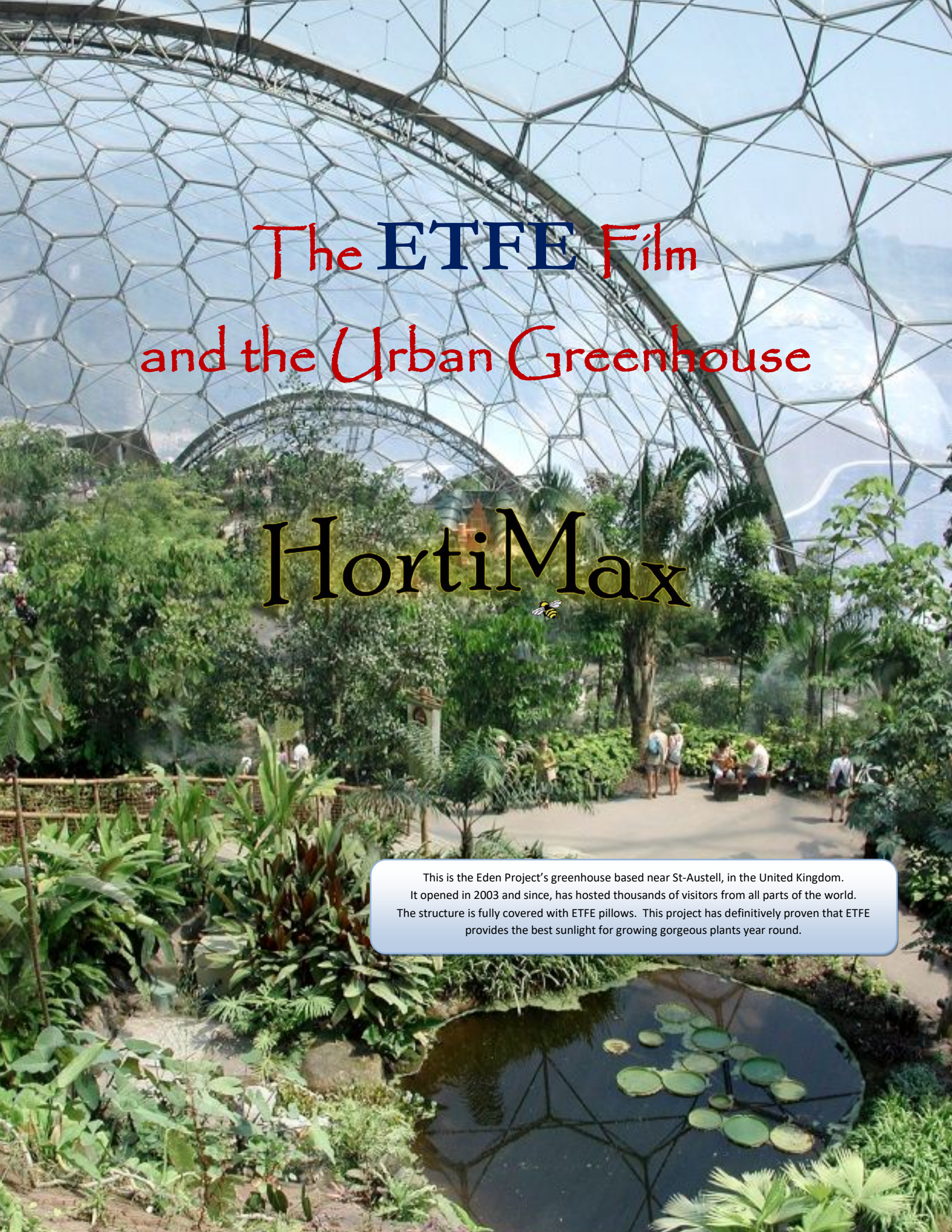
The ETFE Film and the Urban Greenhouse

HortiMax



This is the Eden Project's greenhouse based near St-Austell, in the 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 definitively proven that ETFE provides the best sunlight for growing gorgeous plants year round.

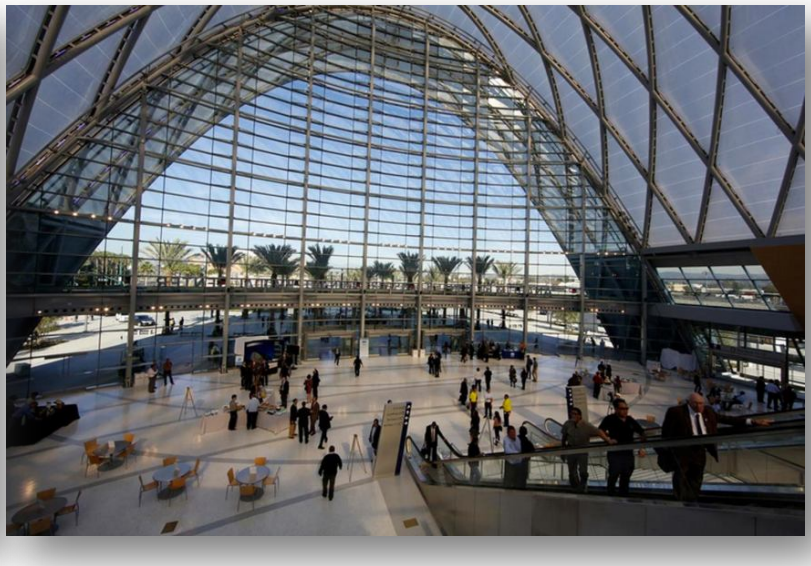
The Concept of an Arial Structure

The ETFE film has made its marks all around the world in many major projects, commercial and public ones.

It is for its outstanding fire rating that we have adopted-it for our Urban Greenhouse concept. An Urban Greenhouse is defined by the Canadian Building Code as being a building used for agriculture applications and having a minimum and occasional human occupation.

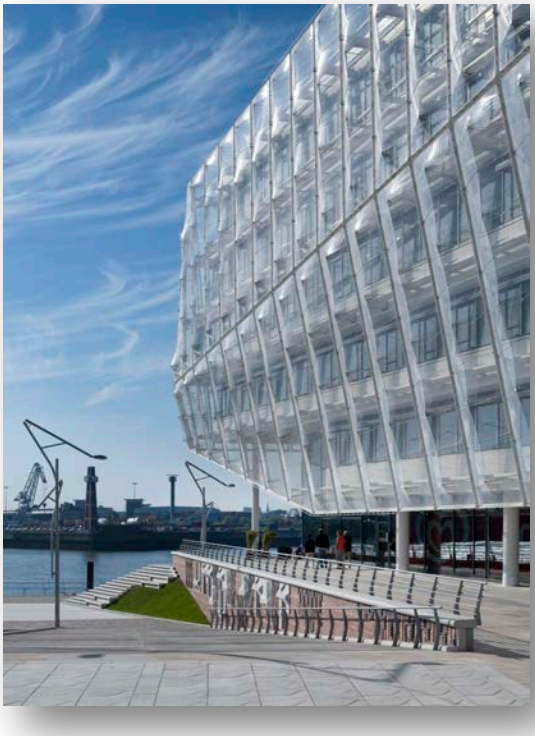
It has been now 30 years since the extraordinary ETFE film has been available on the market. Building employing ETFE may well soon become the corner stone's of many sustainable and LEED projects.

An arial structure is now easily accessible because the ETFE film, which has proven itself, is 300 times lighter than glass. This concept maximises the potential for free solar energy, by having a fine and minimalist structure, covering a vast space, with more natural sunlight inside.



High speed train station - Anaheim, California

ETFE is Very Light



An ETFE pneumatic pillow is simply made from 2 films joined together in an aluminum frame in an airtight fashion and kept inflated, like a car tire for instance, but at a much lower pressure.

To directly compare two type of equivalent materials in durability, a double glazed window weigh's at least 30 Kg/m^2 while an ETFE pillow of the same area weigh's a mere 0.1 kg/m^2.

This represents 300 times less dead weight to be supported by the structure. Less material is then globally needed, which facilitates the installation and procures better results in general.

Our ETFE Urban Greenhouse uses a lightweight Aluminum baring structure and is ideal to be used on flat roofs.

Only the ETFE pneumatic pillow approach can offer that much open spaces to let in light for the optimum production in a greenhouse.

Unilever's head office – United Kingdom

Energy Efficiency

Only a slight pressure is needed to keep the tension on the ETFE pillow. The air pump only needs 50 Watts to operate, per 1,000 m^2 of pillow area, and is very seldom used.

Two films become more insulating when they are inflated in the form of a pillow. The heat transmission is then only of 2.6 W/ m^2°K, 30 % more efficient than a double glazed window which is at 3.8 W/m^2°K.

Of course, in every building, air leaks are the most important sources of energy loss. Our ETFE pillows are airtight, allowing a better control on the interior's climate.

Since ETFE can be used on wider opening surfaces, there is less obstruction to sunlight, and the ETFE pillow lets in more light, which makes it a very wide window with a fine supporting structure barely noticeable.

Notthingham High School – United Kingdom

ETFE comes from a Mineral

The source stone used to make ETFE is Fluorite, not a petrochemical derivative. The fabrication process is water based, requiring no additional solvents or additives who may be harmful to the environment.

We distribute only a pure ETFE film that includes no additives or modifiers whatsoever.

ETFE is Highly Secure

Since its mineral based, ETFE has little susceptibility to fire and it is self extinguishing.

It meet's the UL94 V-0 norm, because ETFE is a plastic material that does not catch on fire. In an intense fire, it simply opens up and lets freely the smoke get out.

ETFE is Resistant and Durable

The ETFE film can support 400 times its own weight and can stretch up to 3 times without losing elasticity. Tension wise, ETFE has more than 6,000 psi of force.

ETFE is a mineral, just like glass. Contrary to plastics which are petrol based, and who degrades rapidly in the sun, ETFE supports comfortably very long and constant exposures to the ultraviolet's of sunlight and keeps its performances in a temperature range from -50 °C to +50 °C .

The inflated ETFE pillow has tension, which allows it to support snow loads while being flexible enough to support and damp random wind pressures.

Forsyth Barr Stadium - New Zealand

When the ETFE pillow is fixed to the Aluminum frame and inflated, the strength of the structure adds to the rigidity of the pillows, this makes it an outstanding Urban Greenhouse. ETFE also does not tare. If it is accidently punctured, it can be easily be patched or replaced.

ETFE is in the same family as Teflon. Thus it is self cleaning and any accumulated dust washes out with the first rain. This anti-adhesive property also helps reducing any snow accumulation, which on the part of a glass greenhouse for example, constitute many snow removal additional work load every winter.

Although ETFE is a fairly new material, with installations reaching now more than 20 years, all manufacturers now acknowledge that its life expectancy may meet and exceed 30 to 50 years. At the end of its useful life, the old ETFE film can be fully recycles into a new material by its makers, since it is so pure.

ETFE also helps reducing urban heat islands. Since ETFE is so transparent, this material lets through the greater portion of the sun's radiant energy, which is used by the plants, and the ETFE film heats-up much less than glass, when comparing. The excessive heat coming from a glassed greenhouse roof is well known and represents an important additional air conditioning burden to compensate for by the growers.

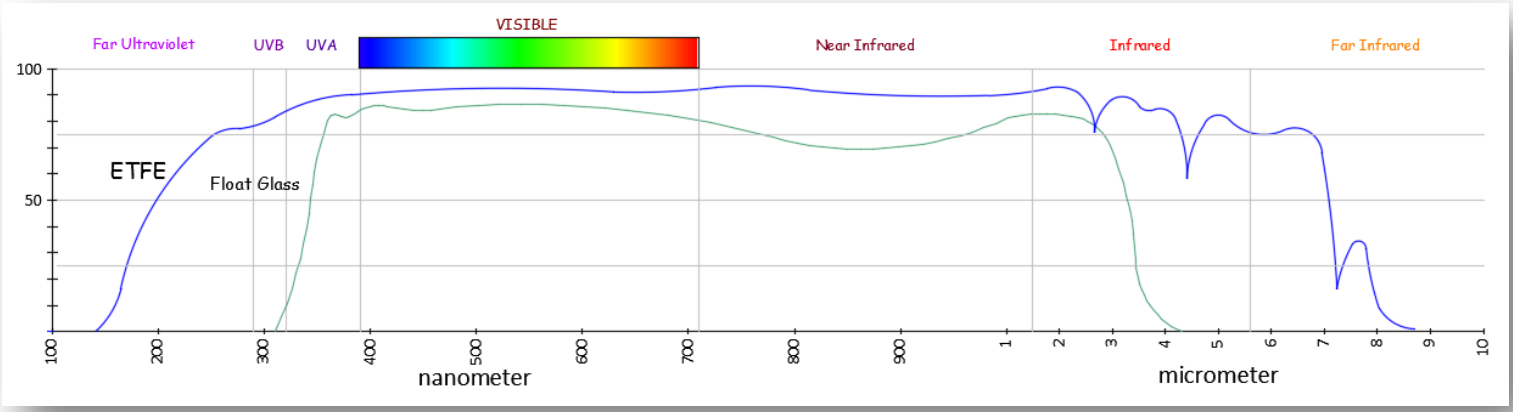
Full Spectrum Natural Sunlight

A double glazed window is only 80 % transparent and blocks most of the sun's UV. On the other hand, the ETFE pillow 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. About 75 % of the UVB rays pass through, providing a light tan.

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

The Sun's full spectrum provided by the ETFE film prevents the abnormally elongated seedlings that result from insufficient light and an unbalanced light spectrum. Plants grow 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.

Imagine yourself being bathed by the sun's heat all winter !

Parc des Trois Forest - France

Our ETFE Urban Greenhouse

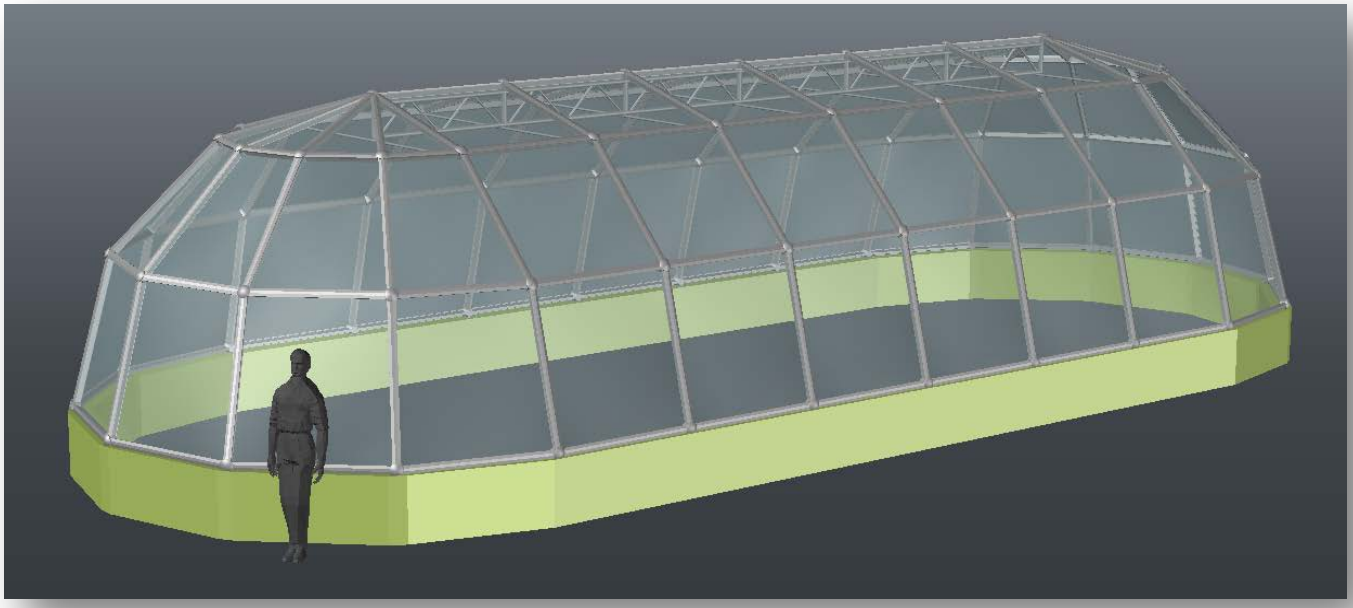
Our ETFE Urban Greenhouse concept, which is unique on the market, revolves around the idea of using as needed and in tandem many standard prefabricated modular elements.

The structure can be adequately be assembled and raised easily and fast, because all the elements are fixed solidly together using bolts. If needed, the structure can also be dismantled for reuse.

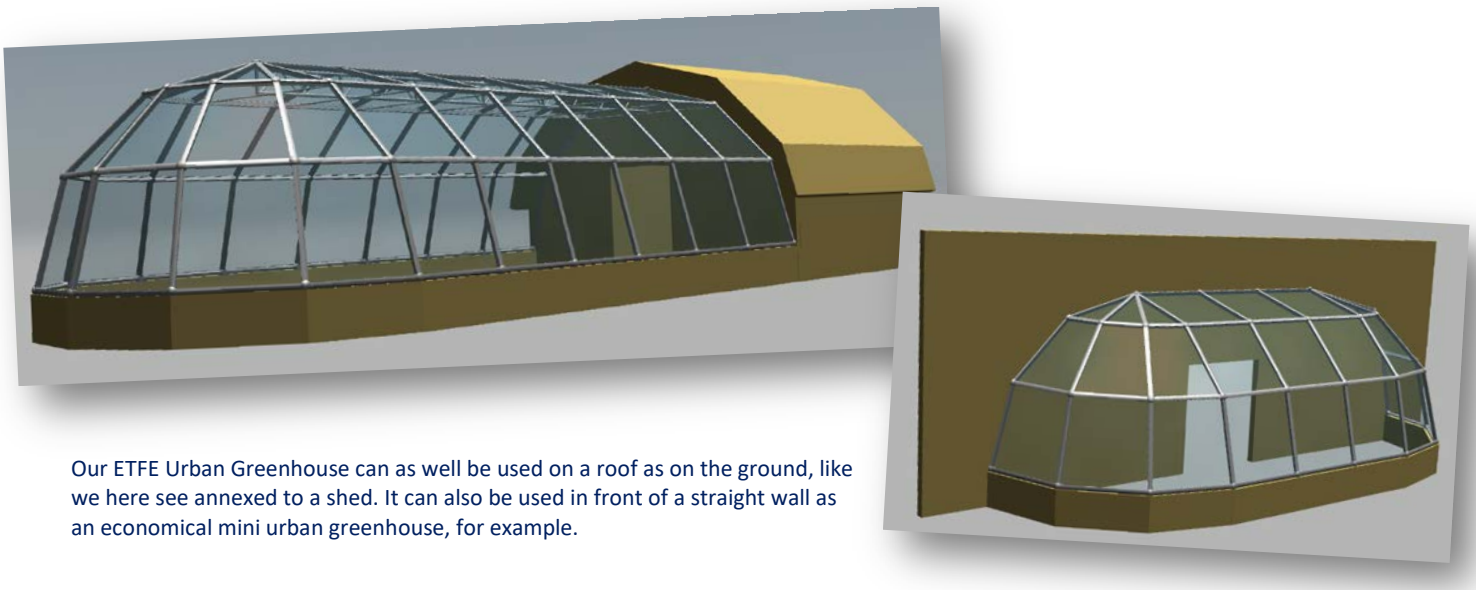
The ETFE pneumatic pillows are fabricated pre-framed and airtight, and they are to be fixed to the structure. All joints are covered by durable anodised aluminum profiled caps, which can handle our weather's up and downs for decades.

Our design strategy and material selection lowers the chances of thermal bridge occurrences, for a better global insulation of the greenhouse. Our ETFE Urban Greenhouse's design goal is to have the most performing greenhouse on the market and everything has been adequately thought-out and adapted to handle the harsh Nordic climate we all know, year round.

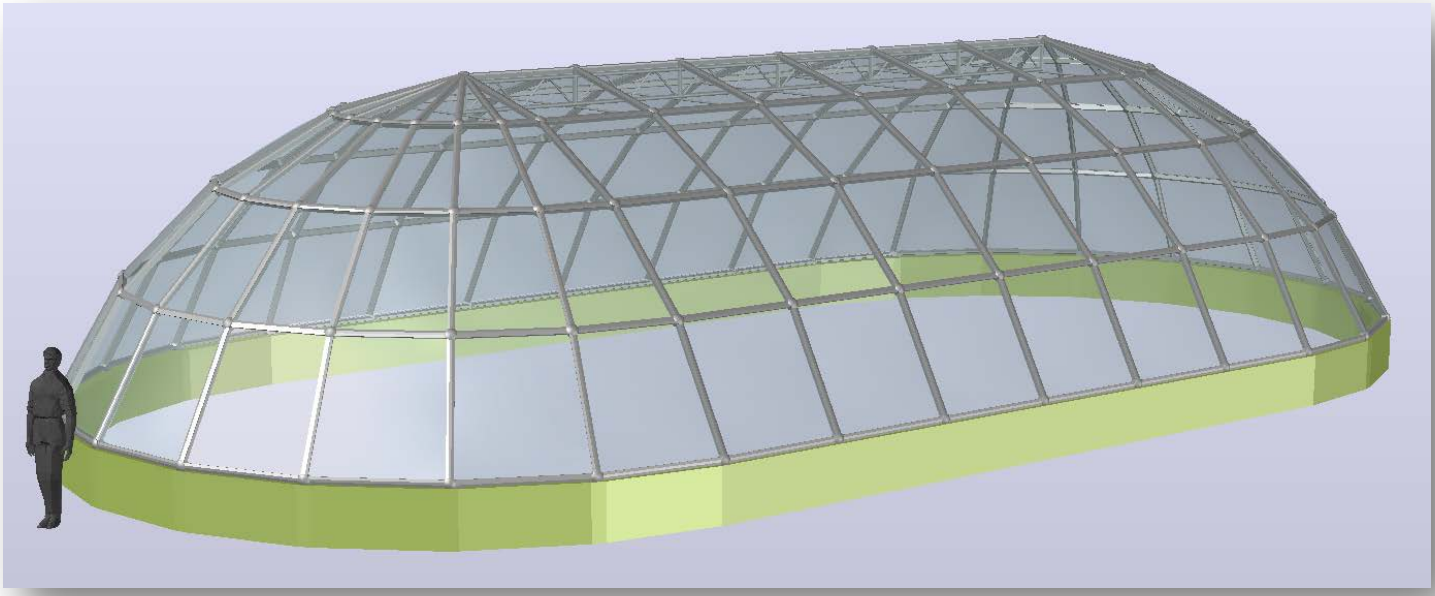
Our approach's modularity allows for a vast range of greenhouse configuration. Here are some examples :



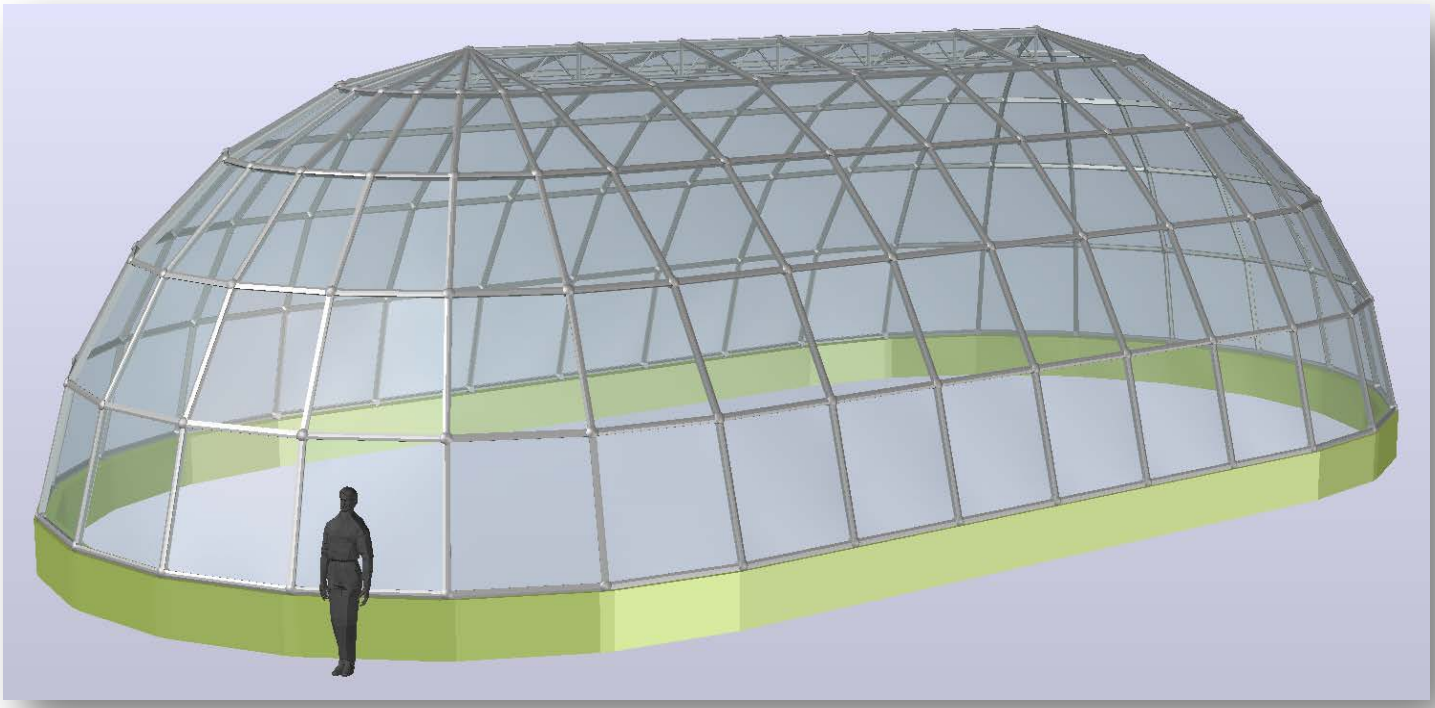
Our 3 panels high ETFE Urban Greenhouse, lightweight enough to be installed on a roof, with access stairs inside.



Our ETFE Urban Greenhouse can as well be used on a roof as on the ground, like we here see annexed to a shed. It can also be used in front of a straight wall as an economical mini urban greenhouse, for example.



An example of our 4 panels high greenhouse, for more width.
Its length can vary in sections of 5 feet as needed.
A useful width of 28 feet and a height of up to 12 feet, when built over a 24 inch wall.



An example of our 5 panels high greenhouse, for more height.
Its length can vary in sections of 5 feet as needed.
A useful width of 31 feet and a height of up to 16 feet, when built over a 24 inch wall.

Specifications

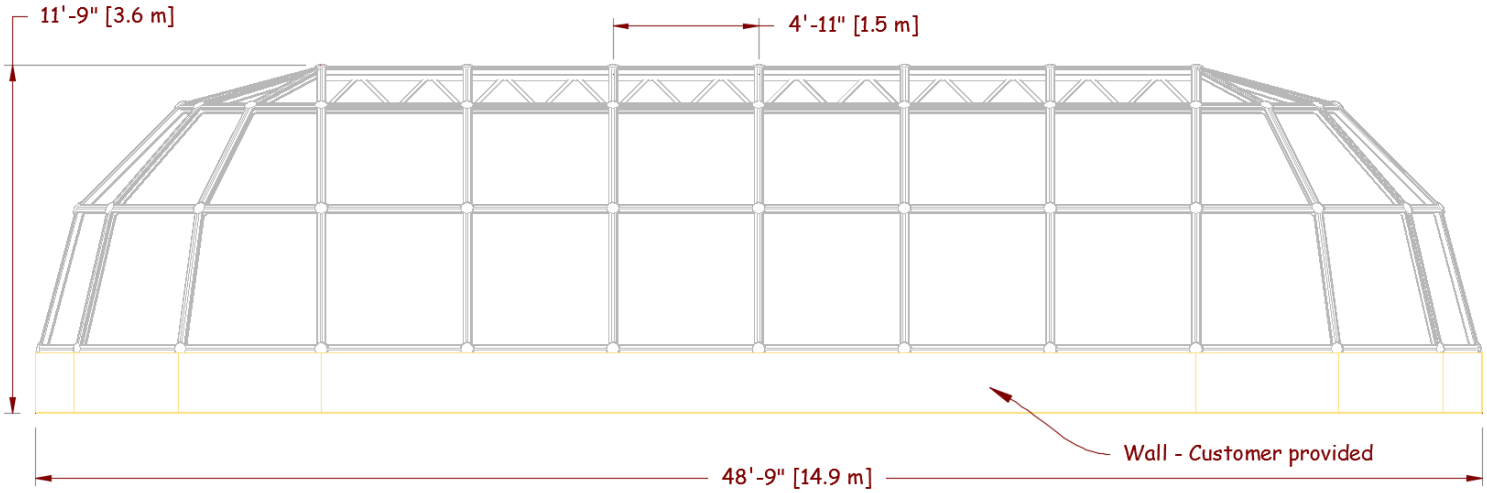
Our offer meets all of the requirements for an agricultural greenhouse as indentified by the Canadian National Farm Building Code (NFBC), because the land (the space) included in the greenhouse will be dedicated to agriculture and there only will be little human occupancy.

We have paid special attentions to small details, in order to adequately meet all the needs of a performing and productive ETFE Urban Greenhouse, year round.

The highlights are :

- An Aluminum profiled structure, lighter and strong, ideal to be installed on a flat roof.
- A greenhouse made-out of anodised Aluminum to be used for an increased amount of years.
- Our advanced design inherent to our structure minimises the occurrence of thermal bridges, for globally a better insulated greenhouse.
- Our aerodynamic design provides minimum wind turbulences and less opposition to wind gusts.
- A Stainless Steel fixing system, durable, and assuring the high stability and rigidity of the greenhouse.
- Individually framed pillows, allowing an easy and economical replacement in the advent of an accident. A pillow is made from 2 ETFE films, absent of welding for more strength and style, built with care, framed and airtight. When inflated, they procure optimum insulation to the exterior.
- A modular concept allowing a multiple of building configurations.
- A greenhouse of adjustable length of 1.5 meter sections, almost 5 feet.
- The greenhouse can be rapidly raised and is dismountable for ulterior utilisation.

Dimensions, as an example, of a 3 panels high ETFE Urban Greenhouse :

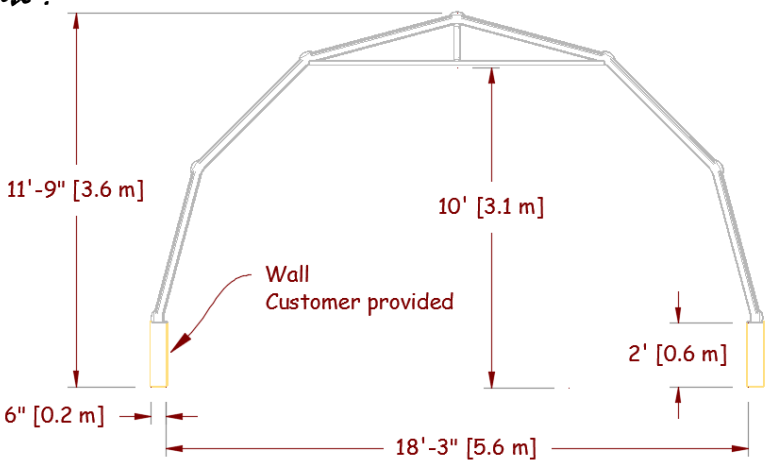


Contact-us now for your own ETFE Urban Greenhouse !

Also, take the time to inquire about :

- ✓ *Our advances hydroponic system, for growing organically, with high quality and high yield,*
- ✓ *our advanced lighting technology,*
- ✓ *our radiant heating system,*

… and many other innovations !



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