



The Bio-Module 2 is unique from other green roofs as it combines the lessons learned from other green roof systems and their most effective materials to create an extensive system which balances cost, weight, and performance to truly change the industry. The following is a list of challenges which the Bio-Module 2 - Wool was designed to address:

Water Retention: One of the challenges in creating a green roof system is optimizing water retention performance. Despite its small size, the Bio-Module 2 - Wool is aggressively effective. It utilizes the Bio-Wool retention product which retains many times its own weight in water and combines this with the built-in retention panel of the Bio-Module and the premium Bio-Mat's sedum to create for its size, one of the most retentive systems out there. The system can hold up to 1.23 gal/ft², with 0.64 gal/ft² coming from the Bio-Wool, .29 gal/ft² from the Bio-Module and upwards of .3 gal/ft² from the sedum. The same module with a depth of conventional media matching that of the retention wool would only hold 1.17 gal/ft². While those two values may sound like they're in the same ball-park, that .06 gal/ft² difference adds up over the entire area of a roof. On top of this the Wool has the product come in at 3 pounds less than the media version. The Bio-Module 2 - Wool pushes the envelope of extensive green roofs to create an innovative new product.

Wind Uplift: For a green roof, all other costs and capabilities mean nothing if it can't stay on the roof. Typically, a product's driest weight is compared to the uplift of a roof to ensure that it can't be blown off. This is problematic for most extensive green roofs since their lightweight design hinders them. At their driest, they tend to be at their lightest. Given the cutting-edge materials and light weight of the Bio-Module 2 - Wool, one could assume that it would perform significantly under this. Biroof Systems Inc. has one secret to resist more wind uplift than the competition. The modular nature of the product allows for it to not be treated on a pound per square foot basis, but instead as an entire system! As wind flows across a roof and applies pressure to one part of the green roof, the other parts help-out by allowing their ballasted weight to resist the pressure. The CNRC has tested the Bio-Module to be able to withstand up to 6.36 KpA!

Product Waste: A challenge for any green roof is reducing waste wherever possible for financial and environmental reasons. The more diverse products are added into a system, the more opportunity there is for the differing sizes of products to result in excess waste. This equates to increased cost and material in landfill. It is typical for an extensive built-up system to use ~1000 SF rolls of root barrier, ~282 SF rolls of moisture retention, ~25 SF rolls of sedum. In the event of any project under that 1000 SF, you have excess root barrier, and any project that does not easily divide by the other two measurements will have excess in those materials respectively. The modular nature of the Bio-Module 2 - Wool stops that trend as it is a self-contained green roof unit. Every two square foot unit contains everything a green roof needs, drastically reducing site waste. This product innovates the industry by drastically reducing the waste produced on site.

Ease of Installation: Having a product which requires less time or effort to install directly impacts the bottom line. A typical green roof installation requires the contractor to lay out layer after layer of heavy and awkward product, taking excess time and effort to cut and seal the seams of products. Given the fact that Bio-Module 2 - Wool is a much smaller unit, and combines these multiple layers into one easy-to-install package, this problem is solved immediately. An installer can simply lay the modules onto the roof and lock them together, taking a fraction of the time and effort of other green roof installations. Even when compared with other modular systems, the lack of media within the Bio-Module 2 - Wool makes it even lighter than conventional modules.

Ease of Transportation: A difficulty with any green roof system is ensuring that the products involved with it are easy to move. When the various layers of a classic green roof come from different sites, the logistics of delivering a project on time can become a nightmare. On top of this, large products may require multiple people to move or even specialized equipment to install. The modular nature of the Bio-Module 2 - Wool addresses these concerns perfectly. First off, the module is produced in the field and shipped ready-to-install, meaning aside from accessories, no other products are required to be shipped from other sites. A single module's weight and size is easy for a single person to be able to move by hand, removing the need for any excess equipment like soil-blowing trucks. When compared to the same sized module, the use of Bio-Wool instead of growth media reduces the weight of a unit while dry from 10.8 lb/ft² to 7.15 lb/ft².

Vegetation Establishment: The challenge of reducing the vegetated layer's establishment-time to maximize performance and minimize additional maintenance costs is imperative. While classic green roofs need multiple months for vegetation to reach their full potential, the sedum layer in the Bio-Module 2 - Wool is ready to install immediately. It is already acclimatized to the system as the whole product was established in a field. This means direct savings for the client and the design's aesthetic being produced immediately.

Cost: Using materials that are produced nearby and affordably can be one of the most difficult challenges to making a viable green roof. The installation of this system takes significantly less effort than its predecessors, thus reducing labour costs. Installation is not the only way in which the Bio-Module 2 - Wool reduces costs, however. In terms of freight, being significantly lighter and thinner than standard modules allows more units to be packed into each shipment. Typically, a single load on a truck can accommodate up to 720 six-inch tall modules, while with this new product, up to 864 units can be fit in a single load. That is an increase of 144 units or an additional 288 SF of system that can be shipped for the same cost! Finally, in terms of simple material price, the thinner module costs approximately two dollars less per unit than the six-inch version, which can add up to considerable savings over the course of an entire project.

Material Erosion and Longevity: Given the diverse climate that Canada is subject to, it is no wonder that the life-span of a green roof cannot be overlooked. Luckily, the Bio-Module 2 - Wool uses a combination of tried-and-true products to allow for the system to survive the harshest climates Ontario has to offer. The Bio-Mat sedum used for the vegetated layer of the module is a premium blend of hardy succulents which acts as the first line of defence between damaging solar radiation and the polypropylene module or retention wool. So long that the vegetation is kept healthy, the rest of the system remains strong to the elements. In the highly unlikely event where the vegetation is temporarily in decline, the rest of the system has its own ways of resisting the constant pressures of the environment. The module itself is made of recycled high-density polypropylene which can withstand significant pressures and impacts without failing. Finally, one of the main weaknesses of a green roof with a compromised vegetation layer is the effect of wind and precipitation on growth media, which can erode away. This concern is virtually nonexistent to the Bio-Module 2 - Wool because it contains no soil at all, instead using the moisture retention wool contained within the module itself to support the vegetation. Taking the premium sedum from our standard product line and marrying it with the other high-quality components Bioroof Systems Inc. is known for takes this system's survivability to new heights.

Irrigation Implementation: Creating a green roof system which allows for the easy implementation of irrigation infrastructure without a loss in performance is a challenge for any company. Drip irrigation systems are simple enough in most applications as they are installed directly on top of the green roof, but for the most cost savings and effective irrigation, rotary is often preferred. While with built-up systems, the irrigation supply lines can be placed mid-way through installation, most modular systems have difficulty in implementing this life-maintaining necessity. Competition often cuts holes in their product to allow the pipe to flow through the design. The clever way that Bio-Modules implement this without cutting into the module is by having the supply pipe fit within the cavity between the units. This, along with easy punch-out rotary heads, makes the Bio-Module 2 - Wool a cutting-edge improvement to the industry.