

LIVING DESIGN:

BRINGING PEOPLE, CITIES & ORGANIZATIONS TO LIFE WITH PLANTS

The concepts of sustainability and biophilic design might still be fairly new to the general public, but for urban planners and real estate developers, the subject has been top of mind for quite some time.

As a society, we want our cities to be more environmentally friendly while also making them more inclusive of nature – we want them to be “greener” in more ways than one. Often coupled with these initiatives however, is the sense that companies and developers must incur a major financial burden.

A solution that balances the necessity of greater environmental consciousness with the reality of budgetary constraints exists in the installation of indoor and outdoor living walls. These vertical gardens can be leveraged for sustainability policy alignment, nature integration plans and cost-cutting initiatives all at once.

The positive outcomes associated with the incorporation of nature – and specifically living walls – into the built environment are many, but can be viewed through two overarching benefit perspectives: economic and environmental.

ECONOMIC BENEFITS OF LIVING WALLS

Though many organizations and cities aim to do what’s best for people and for the environment, many times, decisions must come down to budgeting and “the bottom line.”

So, how can living walls drive cost savings and reap environmental and human-centric benefits at the same time? The answers are clear: greenery saves energy, improves health and wellness, and drives human performance.



ENERGY SAVINGS

The Urban Heat Island Effect makes an impact across our cities, contributing to unprecedented energy demands. Among the primary mitigation strategies listed by the Environmental Protection Agency (EPA) is greenery, specifically green roofs and living walls.

Outdoor living walls act as a barrier for the buildings they adorn, effectively regulating the temperature so that HVAC systems experience less strain throughout the seasons.

Studies conducted at the University of Oxford found that ivy growing on a building’s walls protected it by acting as a thermal shield from extreme temperatures, increasing the wall temperature by about of **15%** in cold weather and reducing the surface temperature in hot weather by an average of **36%**.

Similarly, indoor walls act as insulation from temperature swings, helping to regulate the environment inside a building. A study published in the Indoor and Built Environment journal found that living walls cooled the space by **four to six degrees Celsius**, a shift that significantly reduces the impact on air conditioning systems – especially during periods of extreme heat.



HEALTH & WELLNESS

It's no surprise that city living can be stressful. While symptoms of urban living stress may initiate with symptoms like fatigue, it can quickly turn toward more serious outcomes, like depression, drug or alcohol abuse, high blood pressure and other severe health problems, based on data collected by Mayo Clinic. What's more, according to a study by the Arkin Mental Health Institute in Amsterdam, city dwellers are **21%** more likely to experience an anxiety disorder and carry a **39%** increased risk of mood disorders.

Mental well-being is not the only aspect of a person's health that can be affected by a less-than-healthy urban environment; their physical well-being can suffer, as well. The EPA asserts that poor air quality associated with city pollution and a lack of green space can lead to a plethora of health issues ranging from headaches to dizziness and eye irritation.

But what do these mental and physical ailments mean from a financial standpoint?

First, it puts an increased strain on our healthcare systems. More time at the doctor, in emergency rooms and visiting mental health professionals results in increased costs for citizens and employers alike.

In addition to the personal finance-related impact of experiencing pollution, crowds and noises around a city, poor indoor air quality also makes a direct financial impact on businesses. According to OSHA, the issue costs companies **\$15 billion** in sick leave and poor work performance each year.

Even more directly, employers are pouring additional funds into employee healthcare as physical symptoms of stress require treatment. In fact, The American Institute of Stress approximates the annual toll of stress on U.S. businesses at **\$300 billion**.

However, these concerns can be markedly improved with the introduction of plants into both indoor and outdoor environments.

How do we know that plants are making a difference in a person's overall health, and therefore, can contribute to lower healthcare costs? The answers come straight from the hospitals themselves.

A study published by HortTechnology divided 80 female thyroidectomy patients into two groups: One was given a recovery room containing houseplants and the other a room without. Their recuperative experiences were tracked.

The group that was able to view plants had significantly shorter hospitalizations, a reduced need for analgesics and substantially lower anxiety. They also reported that their rooms had "a pleasant smell and were more satisfying, relaxing, comfortable, colorful, happy, calming and attractive."

Plants not only are positive agents in the healing process, they can also shift a person's sense of well-being as a whole. Renowned organizational psychologist Carry Cooper found that those with access to natural elements in their workspaces experience increased perceptions of well-being by up to **15%**.



HUMAN PERFORMANCE

Providing workers across our cities with renewed feelings of positivity and stress reduction using plants benefits local organizations in a myriad of ways, but most directly, companies enjoy increases in productivity and creative thinking from their employees.

In a study conducted by **Texas A&M University**, participants were placed in office environments both with and without plant life and asked to perform a variety of creative problem-solving tasks. In the plant-adorned spaces, both men and women experienced positive effects on innovation and ideation. On average people in offices with plants generated **30%** more ideas overall than those in the control spaces and offered noticeably more creative solutions than their counterparts with no plants.

Depending on company goals, innovative thinking may be just what an employer needs; however, plants bring more than just out-of-the-box thinking – they also increase productivity among workers. In fact, participants in a **Washington State University** study experienced a **12%** increase in productivity on a simple computer task when situated in a room with plants.

Living walls ultimately shift a number of “levers” for companies and communities, acting as a solution that results in fewer sick days, less hospital time and reduced energy costs while also increasing productivity and feelings of well-being.

ENVIRONMENTAL BENEFITS OF LIVING WALLS

Enduring everything from construction noise to car exhaust outside and loud conversations to cleaning chemicals inside, urban dwellers face a number of polluting factors every day. While addressing these issues requires an overarching pollution reduction plan that incorporates a variety of solutions, living walls can act as a key driver of results within a set of environmentally beneficial initiatives.



AIR PURIFICATION

Plant life acts as a natural air purifier. Yes, harmful toxins can cause physical symptoms like headaches, irritation and coughing, but the right greenery can help to remove these pollutants, including ammonia, xylene, benzene, formaldehyde and trichloroethylene.

Studies from **NASA** state that, “Plants absorb and break down the most harmful of indoor chemicals through their leaves to create a healthy indoor ecosystem. Just three plants in a room can vastly improve the air in the space.”

The organization also asserts that airborne mold spores and bacteria can be reduced by up to **60%** using plants.



NOISE REDUCTION

In addition to reducing air pollution – both indoors and outdoors – living walls also contribute to the reduction of noise in urban environments. Guided by an array of academic research that supports the claim that living walls reduce noise pollution, a Mexican government-backed coalition launched Via Verde in 2012.

Thus far, the project has resulted in over 1,000 green wall column installations along the Mexico City Beltway. Researchers are estimating that vehicular noise pollution in the area has been reduced by ten decibels – a decrease significantly more impactful than the typical sound walls in the United States.

However, these benefits extend into indoor environments, as well, reducing noise pollution within the spaces we work, live and play. According to research published in *Applied Acoustics*, living walls – depending on size, density and environmental factors – can reduce sound indoors by an average of **15 decibels**; this is the difference in volume between a vacuum cleaner (75 dBA) and a lawn mower (90 dBA).

In 2018, commercial furniture giant Steelcase conducted independent research on sound abatement using Sagegreenlife's Verdanta collection of indoor living walls, ultimately determining the Noise Reduction Coefficient (NRC) of the product line.

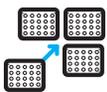
NRC is a scalar representation of the amount of sound energy absorbed upon striking a particular surface. An NRC of 0 indicates perfect reflection; an NRC of 1 indicates perfect absorption; an acoustic product with a .95 NRC rating means that **95%** of sound in the space is absorbed, while the other **5%** is reflected.

The study found that the Verdanta™ Collection walls deliver near-perfect Noise Reduction Coefficient Scores (NRCs) – all above .90, which indicates that **90+ percent** of sound in the space is being absorbed.

Reduced sound and air pollution – both indoors and outdoors – makes for a much healthier, more pleasant environment for our employees, clients, and citizens while also addressing the need to adapt our cities so we can provide a livable planet for future generations.

We the leading company in the design and manufacturing of interior and exterior living walls. If your city or organization is considering leveraging vertical gardens to benefit humans and the environment while also positively impacting the bottom line, we'd like to connect with you to share our knowledge and expertise.

WHY SAGEGREENLIFE?



UNRIVALED AESTHETICS AND SCALABILITY

Modular, scalable and flexible, you can install our systems to fit any area, accommodate unique spaces or feature signage and other elements – your options are endless.



10X MORE WATER EFFICIENT THAN SOIL-BASED SYSTEMS

Self-irrigation technology distributes the perfect amount of water to circulate evenly throughout your living wall.



ADAPTABLE TO ANY ENVIRONMENT

Designed to endure challenging exterior environments – including heat, cold, wind and snow – our Biotile™ system is unique in its ability to insulate dormant plants in winter, maintaining life-protecting moisture for the longevity of plants.