Sustainable design for noise reduction, air purification and economical construction.
Wall4life® is a unique patented green tech sound barrier screen, equipped with the latest innovation of plant technology and architecture, that highly effectively reduces noise and fine dust particles from the air. The best of ecology and technology mixed in a feasible low-tech design.

Our cities and landscapes are full of it, long metal & concrete sound barriers. The barriers have been placed alongside roads to protect people against traffic noise. A lot of traditional noise barriers didn’t do what they were intended to do, or they did it much less. The wind plays a crucial part in the disruption of the traveling of noise and pollution. The hard surfaced screens bended the air waves with noise and fine dust particles and transferred them over the barrier into the neighbourhood taking with them (toxic) pollution. Even the traditional barriers that had vegetation were not equipped to reduce the noise and fine dust particles (pm-concentrations). Screen2clean® and Wall4life® offer an innovative system, green wall, an effective and economical solution for this environmental problem. An approach that respects nature & forward going humanity and that at the same time can be realistically feasibly constructed.

A new innovative sound barrier that purifies the air, reduces noise and supports ecological systems, for humanity.
Screen2clean® the green purifying barrier providing a healthy urban environment and Wall4life®: the noise barrier that purifies the air, reduces negative traffic influences on the environment, enables sustainable infrastructure and can be constructed with recycled materials.
The need for cleaner air

Scientific research reveals that in populated areas nearby dense traffic a significant higher part of the population suffers from lung and heart diseases than the population in relative green lush area. The cause of this are high concentrations of fine dust particles in the air, in science referred as PM (Particulate Matter). The source of these particles are from the exhaust of our car motors, the erosion of brakes, roads and tires. Natural fine dust particles come from the desert sand and sea salt. The smaller the particles the further they penetrate into our bodies. The higher the amount of noxious particles in our body the more we suffer from health problems caused by this concentration of particles. Our traffic is the major contributor to the production of these dangerous fine dust particles and we can find the highest concentrations along our traffic infrastructure. Fine dust particles produced by traffic are a serious problem that deserves a purifying solution.

<table>
<thead>
<tr>
<th>EU regulation for noise pollution</th>
<th>lower</th>
<th>upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban traffic</td>
<td>48dB</td>
<td>63dB</td>
</tr>
<tr>
<td>Outside urban traffic</td>
<td>48dB</td>
<td>53dB</td>
</tr>
<tr>
<td>Rail</td>
<td>55dB</td>
<td>68dB</td>
</tr>
<tr>
<td>Industrial noise</td>
<td>50dB</td>
<td>55dB</td>
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According to 2005 EU-regulation fine dust particles are not allowed to exceed over the level of 40 microgram per cubic meter measured of the whole year. Only 35 days a year the daily average level is allowed to go to 50 microgram per cubic meter. With the new 2010 EU-regulation these norms have been altered.

| EU regulation for fine dust (PM$_{10}$) 2005 - 2010 |
|-----------------------------------------------|--------|--------|
| Phase 1 01-01-2005 | Phase 2 01-01-2010 |
| Yearly average       | 40 µg/m$^3$ | 20 µg/m$^3$ |
| Daily average (24 hour) | 50 µg/m$^3$ | 50 µg/m$^3$ |
| Maximum exceeding days per year | 35 | 7 |
High concentrations of background PM caused by the burning of coal in power stations can be filtered from the air as well.
The massive prefab core, the green screens and the essential voids in between combined together allow air to flow in a controlled manner through the vegetation screens to be purified and to reduce the traveling of noise pollution. Screen2clean® and Wall4life® both needs a relatively small strip area, it is not bigger than a traditional screen. However it doesn’t impact its surroundings in a negative way, because it blends in with the landscape, and softens the cities hard surfaces.

The double layered green screens of Screen2clean® and Wall4life® are designed in such a way that they absorbs in high effect noise and traffic related fine dust particles, but also background PM, concentrations. The fine dust particles are caught in the Wall4life® due the suspension of air flow caused by the dense structure of the Hedera. This dense structure of Hedera captures the fine dust particles so they cannot be released. If the wind comes to a full stop fine dust particles drop down onto the plants and soil. The microscopic fine hairs on the leaves of the Hedera capture the fine dust particles and eventually they’ll wash down with the rain.

Innovative green tech design:
Complexity made simple, that’s the trick
Hedera, also know as Ivy, stays green the whole year around and it produces continuously more new leaves than old ones that fall off. The growing amount of leave surface is an important advantage considering the absorption of fine dust particles. Hedera cleans the air in the following ways: The larger dust particles lay on the leaves until the rain washes them down. The ultra small particles are so small that as part of the gas they are eaten by the skin of the leaves. The result of this is that concentrations of fine dust particles are dropped upto 40% alongside a road flanked with Hedera.

Hedera is ideal to use alongside roads because of its durability to withstand the impact of salting in times of frost. The leaves of the Hedera are rough because of the microscopic fine hair structure on the surface. These small rough hair capture fine dust particles floating in the air flow. One square meter of Hedera equals three square meter of leave surface, this enlarges the contact of air over the leaves.

The Hedera is a very easy plant because it grows quickly, it survives well on low-nutrition soil and it can be planted the whole year around. The plant is easy in maintenance, it takes less work than grass after it has grown a bit.

Graffiti will not last on the plant giving it a durable natural look, what we cannot say about traditional noise barriers. This will save costs for cleaning and will prevent complaints from the neighbourhood about determination.

The Hedera is an ideal plant and with all of its divers variations it fits everywhere. The Hedera is even party resistant to the salt spread on icy roads. Plant species may differ due to local weather conditions and climate, alternative local planting can be a good replacement possibility.
One kilometer of three meter high Wall4life® absorbs the CO$_2$ equal to one hectare of forest!
Purifying the air

With the purification power of Hedera the Screen2clean® and Wall4life® needed to be designed in a way that air flows can be controlled to move optimally through the cleaning screens. With a hard surface wall like a massive wall of steel or concrete turbulence and under pressure cause air flow to drop and circulate, taking fine dust particles deposite. Wall4life® offers the solution by using permeable screens and slowing down air flows inside the wall. With a wide range of Hedera variations optimal purification can take place inside the Wall4life®. The voids inside the Wall4life® cause air flows to slow down and drop fine dust particles.

Wind tunnel research proves that a screen of Hedera, if properly constructed, can adsorb high amounts of fine dust particles. The remarkable fact is that in highly polluted situations the amount of absorption goes up as well.
Sound can travel with the flow of air. Therefore noise pollution can travel over greater distance if supported by wind. Hard surface sound barrier enhance turbulences in the air allow the noise to travel further instead of being absorbed. By neutralising this negative wind effect sound barrier with vegetation work more effectively. According to Belgium research the absorption can be improved with 4 (and locally even 10) dB(A). This requires that the vegetation has to meet a certain amount of design conditions.

With the thickness of the solid core of the Wall4life® more sound can be absorbed than with traditional thin walls. The high mass of a 400 kilo/m² absorbs noise vibrations and with the double screen air flow control less reflected sound bounces back into the direct environment. The continuous wall without sound leaks for the emergency exits can offer continuous noise reduction. The large prefab elements can be easily transported, put in place and more important been unbuild and relocated. This flexibility is crucial in dynamic infrastructural world. It also serves the planet with the saving on consumption of energy used for building and demolition. The prefab elements of Wall4life® make even temporary use possible.
The noxious fine dust particles and its effects on health norms threaten construction alongside infrastructure. The increased amount of traffic movements is a result of the growing economy, denser cities and increasing mobility. It is the progress of humanity and should therefore not be ignored. We have developed an advanced highly effective and scientifically proven solution linking environmental purification and growth of economy and city development in one linear solution: Screen2clean® and Wall4life®. Scientific research has revealed that vegetation can absorb large amounts of fine dust particles up to 40% of the concentrations but only when properly/ clever designed (Lancaster University). Research by VITO (Belgium) and ENVICO (The Netherlands) support this statement.

**Screen2clean® concept**

The integral design of the Wall4life® can be adjusted for architectural usage as well. By using an existing wall structure, like a building, the separate screens of Wall4life® can function as purifying vegetation elements for building facades. This concept, Screen2clean®, purifies the air from fine dust particles and besides has the economically interesting benefit that it regulates cooling and urban heat situations in the city. Planting has the positive effect to absorb sunlight preventing the building from warming up under the hot sun in summer. In winter the reduction of wind child prevents the building from cooling down saving massive energy on heating, as well as on the costs of cooling in summer. Offering a place for urban ecology, saving energy and purifying the environment, Screen2clean® offers only benefits.
With the exhaust of a modern car of a 100 gr CO₂ per km Wall4life® compensates placed on one side of the road on a year base the exhaust of 60,000 passing cars.
Ecological embedment

Not only does vegetation purifies the air, it also contributes to a positive psychological effect on people. The vegetation offers a natural habitat for a wide range of flora and fauna essential for our ecosystem. In cities these places are rare, with Screen2clean® and Wall4life® long lines of ecological screens add high amounts of surfaces for ecology. It is the best of technology combined with the best of nature. Wall4life® with its natural looks will be a pleasure to see for people and a useful habitat for animals. The green waste caused by maintenance can be transformed into biofuel to further reduce CO₂ impact.
With the addition of solar panels or small wind turbines Wall4life® can be a generator for renewable energy. Long lines of solar panels, or wind turbines encouraged by air flow of the passing cars and trucks can transform the purifying linear element into a renewable landscape element.
Wall4life® offers cost reduction from the start. The savings start with the fact that in general the wall doesn’t need a foundation. Because all construction pieces can be prefabricated, which allows quick assembly, reducing traffic round works obstructions. Due to its simplicity of construction, building time is brought back to a minimum, saving energy consumption and saving time related to road obstructions. The prefabricated elements make it possible to assemble and dissemble the Wall4life® and to move if needed. This generates a continuous high value. The quick assembly has the economical effect of relatively short transport activities. Wall4life® is suited for the use and imbedding of recycled materials. The massive core can be constructed of local available material.
Screen2clean® and Wall4life® provides what a modern city needs:

- Clean air when applied as the Wall4life® road barrier or even as Wall4life® building facade.
- Noise pollution reduction & clean air when applied as the Wall4life® noise reduction screen.
- Renewable energy, clean air and noise reduction when applied with advanced highly cost effective windmills; the Wall4life® energy wall.

With Wall4life® roads and city centers change from pollution sources into cleaning energy producing connections and surroundings
By facing the facts, researching them and offering solutions for fine dust particles, noise and sight pollution, Wall4life\textsuperscript{®} encounters a growing problem and offers one binding purifying solution for all of them.

\textbf{Screen2clean\textsuperscript{®} and Wall4life\textsuperscript{®}:
}

- purification of environment
- using recycled material
- sustainable construction
- low production costs
- quick and flexible prefab construction
- high CO\textsubscript{2} reduction
- noise absorption
- graffiti free
- building with nature
- latest green tech

\textbf{Multi CO\textsubscript{2} reduction}

One kilometer of Wall4life\textsuperscript{®} absorbs the CO\textsubscript{2} equal to one hectare of forest!