

EXECUTIVE BOOKLET

CityTree

FACTSHEET GREEN CITY SOLUTIONS

Green City Solutions (GCS) is a pioneer in bio-tech air refreshing. We have developed the world's first regenerative biotech filter with a measurable impact. Powered by specific mosses, our modules absorb actively polluted air and transform harmful containments into biomass and fresh air. Every unit is connected to our IoT infrastructure that enables highest performance and proof of impact.

The basis of Green City Solutions is the idea of combining nature with digital technology. It utilizes the outstanding natural ability of living moss to filter fine dust and cool the ambient air. The interaction of sensors, intelligent ventilation, irrigation and software makes the natural cleaning power of moss usable and measurable.

About the CityTree

The CityTree is a combination of street furniture and biofilter - a bench at the bottom, a moss-covered surface at the top, and complex tech- nology with an IoT interface inside. This opens up further application possibilities, e.g. in the areas of smart city, (e-mobility) infrastructure and communication.

About the CityBreeze

The CityBreeze combines natural air filtration with digital presentation technology. On one side is a green, vitalizing moss wall with active filter technology and on the other is a 75" LCD screen. This makes the CityBreeze the first out-of-home column that cools the ambient air instead of heating it up additionally. The combination, unusual at first glance, makes sense: both information and advertising as well as the microclimatic improvement of air quality is placed where as many people as possible react and benefit.

QUICK FACTS

The active moss filters can remove up to 82% of fine dust (PM6) from the air, measurably improving the air in the immediate vicinity

The performance and effect parameters were **evaluated** in extensive scientific measurements Environmental performance can be detected, evaluated and controlled through the **use of sensors** The CityTree is **never "full"**, as the fine dust is converted to natural biomass by the moss Mosses thrive under controlled conditions in the moss farm up to **16x** faster than in nature

FOUNDING DATE

March 2014

MANAGING PARTNER Peter Sänger

FOUNDER

Peter Sänger Zhengliang Wu

EMPLOYEES

35 (August 2021)

MOSSFARM

1.200 qm moss cultivation in vertical form

FUNDING

>2 Mio. Euro through public funding via EU projects (f.ex. Horizon 2020)

AWARDS >25 national and international awards

PARTNERSHIPS

> 15 partnerships from science (TROPOS; ILK) and industry (Deutsche Telekom, GLS)

MOSSFILTER LOCATIONS (F.EX.)

London Berlin Erding Lissabon Cork

greencitysolutions.de

SOCIAL WEB

Instagram YouTube Facebook Twitter LinkedIn

PRESS CONTACT

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Advantages of the CityTree

3 Key Facts



PROVEN TO BE **SUSTAINABLE**

CityTrees as a sign of sustainable building measures with significant influence on sustain- ability certificates (e.g. up to 18,75% for the German Sustainable Building Council (DGNB) certification).



CityTrees as a shade-providing green oasis that not only offers fresh and clean air, but also becomes a place of relaxation and community.



CityTrees as a sensor hub for the generation of environmental data and the integration of WiFi and e-mobility solutions.

The CityTree as a central meeting point within the city

The various application cases enable the CityTree to not only produce fresh air, but to respond to further needs of the citizen.



ILK Dresden

Climate-KIC

 \mathbb{Z}

Applications of the CityTree

greencity solutions



Bio-tech air purification with inserted moss modules for noticeably better air and CO₂ savings

Research and Development

The selection of our mosses is based on 10 years of experience according to the criteria of resistance, growth rate and fine dust assimilation capacity



Independent scientific field studies by the Leipniz Institute for Tropospheric Research show that the air quality in the immediate vicinity of the CityTree is up to 53% cleaner

data Integrated environmental sensors generate available data on the filter and cooling performance of the CityTree for everyone in

High quality

real time.



Information touchpoint for

communi- cation of messages via LED screen

or WiFi hotspot Neighborhood-

communication The CityTree for your CSR strategy: share information within the district via the media screen and info boards.

Worldwide communication Use the CityTree with

internal WiFi modules floor and small cells as world-

wide exchange point for citizens and employees.

(D) Communication 24/7

Charging stations for mobile phones and

LED lighting enable the CityTree to be used at any time.









CityTrees

Data platform & mobility hub through Smart City technology such as sensors

Expansion of CityTrees

A hub for the integration of further technologies can be built into

The integration of your technology

or e-charging stations

In principle, integration is always possible as long there is space for the respective technology.



As an example, the following technologies can be integrated into the payload area:





* POC ausstehend





Place to relax & meet through seating areas

accompanied by our

Experience Packages.

and additional greening

Experience & **Initial Situation** CityTrees can be

Add-ons

Add-ons are available and can be individually

Experience packages

Packages create an individually tailored experience



The problem of air pollution and the natural filter power of moss

greencity solutions

Air pollution

In the discussions about the global environmental problem of air pollution, the term "fine dust" if often used. Fine dust refers to solid or liquid parti- cles that float through the air for a certain amount of time. Depending on the size, a distinction is made between PM10 (10 μm), PM2.5 (2.5 μm) and ultra-fine particles (0.1 μm). These particles enter the human body through the respiratory tract and can cause disease and death.



Other emissio

House fire

(🚖) Industry

Agri-cultur

Heating

FINE DUST GENERATORS

The Federal Environment Agency of Germany estimates that the local dust pollution mainly stems from the emissions from diesel vehicles and the dust swirled up by traffic.

Emissions in

percent

15

Traffic



COMPOSITION OF FINE DUST

Fine dust consists of a complex mixture of solid and liquid tiny particles and is harmful to humans from a diameter of less than 10 micrometers.





HEALTH IMPACT

the most common are lung and

cardiovascular diseases.

Depending on the particle size, fine dust

penetrates the body to different depths,

which can trigger a wide range of diseases,

The filter power of moss

Air pollution is a complex problem and its fight requires the interaction of many players. Due to long planning and implementation phases, it is difficult for companies and cities to actually implement certain measures. That is why short-term air quality improvements play an important role.



SUPERHERO MOSS

Mosses are capable of astonishing things: They bind fine dust, some are antiseptic, antiviral and fungicidal; true allrounders for air pollution control and health. With the interplay of sensors, intelligent ventilation, irrigation and software, we can increase their natural cleaning power and make it usable and measurable.



Various moss species grow in the moss filters that can absorb and metabolise fine dust. At the same time, they produce valuable oxygen and lower the air tempe- rature.



PLEASANT COOLING

Due to their enormous surface area, mosses store and evaporate large amounts of moisture. This leads to a cooling effect by up to 4°C and noticeably fresher ambient air .





The moss surface is comparable to the human lung. It is enormously absorbent due to the fine, thin leaflets. Thus, the 2 respectively 4m² of moss used in the CityBreeze and CityTree correspond to an active moss surface of 60 respectively 120m², which can absorb fine dust from the air.

The fine dust has a negative electrical charge and is attracted and bound by the positively charged moss surface. Most of the "prey" is metabolized and biodegraded by microorganisms and rendered harmless.





of the fine dust are **stored** in the 25% sédhreent. moss

50%



3 key facts

for **7000**

of **1,300**

every day

of **1225** hot air

year



) SECRET SAUCE

The CityTree is the world's first Bio-tech fine dust filter for urban spaces. With the integrated mosses, it brings nature into the city and ensures that the air is verifiably clean.



Mosses are natural fine dust filters. Combined with smart IoT technology, an intelligently controlled irrigation system and ventilation, CityTrees clean and cool the surrounding air.



The performance and effect parameters were <u>evaluated in extensive scientific</u>

measurements. Result: up to 82 % filter effect and up to 4°C cooling.



COOLING

energy efficiency

capacity of 5,500 W. This is equivalent to

a regular air conditioning system for a room size of 50+ m² at 17.5 times better

(this is only 3.5 cents per operating hour)

ELECTRICITY



Innin

Together, we are bringing nature back into the City!

Air pollution is a global problem and affects all parts of society. In order to make life in the city healthier and greener, many people must work together.

Our client groups are therefore diverse and reflect different areas of urban life. They range from the real estate sector and neighborhood development to CSR management of companies and events to schools, cities and municipalities. Our goal is to implement CityTrees wherever air pollution is a problem and thus make clean air accessible to all.



BAYERISCHE HAUSBAU Infront of Bikini Berlin Mall

Vision: An urban Fresh Air Zone for relaxing and taking a deep breath together.

Feedback: "Green City Solutions' creative project has the poten- tial to solve urban climate problems." Michael Müller, Mayor of Berlin



OFFICEFIRST (BlackRock) Walter-Benjamin-Platz, Berlin

Vision: The CityTrees as a community meeting point and media communication platform.

Feedback: "We were surprised how fast the local community around the Walter-Benjamin-Platz accepted the CityTrees."

– Ludger Hammerschmidt, OfficeFirst



够 Vattenfall Zentrale, Berlin

 $\ensuremath{\textit{Vision:}}\xspace$ A Fresh Air Zone for employees to take a break and get together.

Feedback: "Since the CityTree is standing next to my work place I am enjoying the fresh air and I don't need my asthma spray anymore." – Nicole Schäfer, ISS Facility Services

Hampste Vision: The Ci for fresh, clear

Pampstead Hill School: London

Vision: The CityTrees as a green learning platform and for fresh, clean air on the school yard.

Feedback: "The CityTree is really cool because it cleans the air so we can breathe and play in the clean air." - student representative (age 6)



London Borough of Wandsworth

Vision: A Fresh Air Zone with integrated sensors to measure the air quality

Feedback: "We will monitor its effectiveness in absorbing air pollution [...] as part of our ongoing commitment to tackling cli- mate change." – ClIr Rory O'Broin, Cabinet Member for Finance company resources and climate



COPRO: B-Part at Gleisdreieck, Berlin

Vision: A Fresh Air Zone as a green meeting & work environment.

Feedback "As an incubator and accelerator for concepts for the city of tomorrow, B-Part is showing today what's possible tomorrow." Marc. Kimmich, founder of the B-Part & the COPRO



Deutsche Telekom: Headquarter, Bonn

Vision: Better urban quality of life with clean air and optimal network connection.

Feedback: "Environmental protection combined with the latest technologies will enable sustainable spaces for modern life."

Deutsche Telekom AG

🕤 dpd 🛛 Lissabon



Feedback: "Weintend to help one of the areas with the greatest circulation in the city of Lisbon, Avenida Ribeira das Naus, to improve air quality." Olivier Establet, Präsident von DPD Portugal



h&f London Borough of Hammersmith & Fulham

Vision: Improve the neighborhood with better air and create a space to relax.

Feedback: "Our brilliant CityTree is already drawing attention for its distinctive appearance, but its best feature is its ability to pump out clean air where we need it most." - CIIr Wesley Harcourt, H&F Cabinet Member for Environment



Your project can be the next.

Take initiative and make a contribution for clean air and a healthy future.

WE GROW FRESH AIR



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