The Net Zero Future50 report – CEE Edition

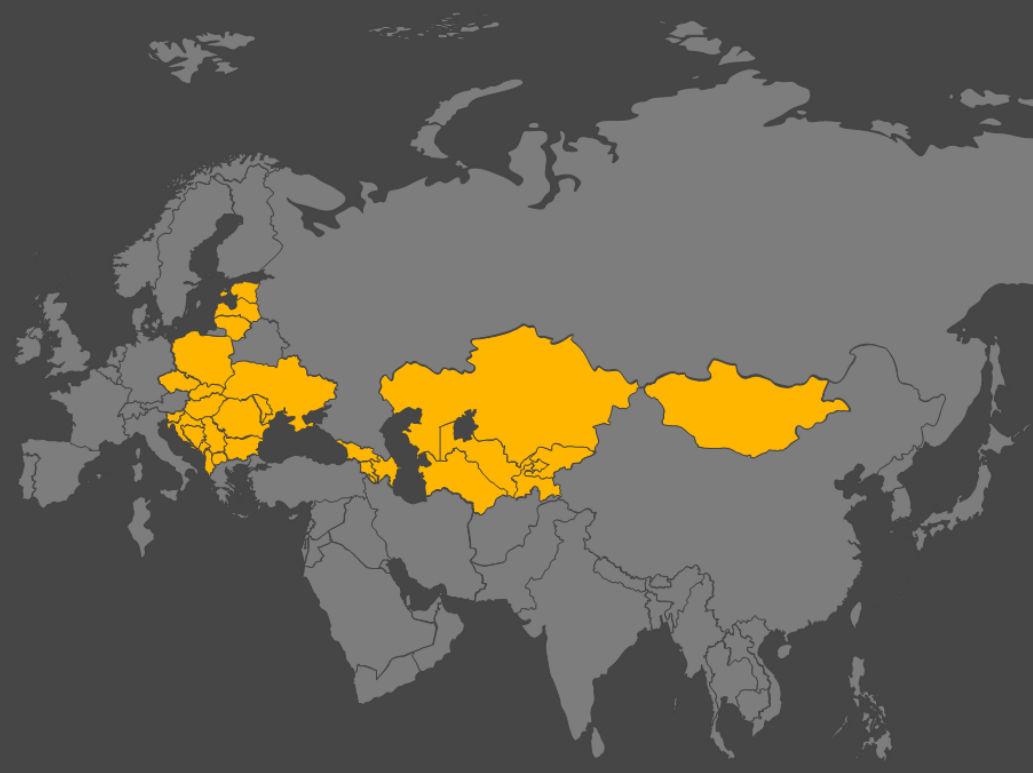
The state of climate tech in Central and Eastern Europe, 2022

pwc

Wolves Summit

About us

This insight is brought to you by the PwC Central and Eastern Europe (CEE) ESG Hub, PwC's regional centre of excellence on ESG topics, alongside our PwC Sustainability & Innovation global professionals and our project partner Wolves Summit.



About PwC's CEE ESG Hub

Our team is the main coordination body within the PwC CEE ESG Platform, bringing together 395 ESG practitioners across 27 countries in the region, as well as all lines of service (LoS) and industries. We create value for private and public sector clients in: climate risk & resilience, ESG benchmarking, environmental due diligence, ESG and net-zero strategy & transformation.

We also support the PwC CEE ESG Platform by coordinating strategic opportunities, communication, upskilling and knowledge exchange, and helping identify professionals across the PwC network. Find out more at: https://www.pwc.com/c1/esg

About PwC Central & Eastern Europe (CEE)

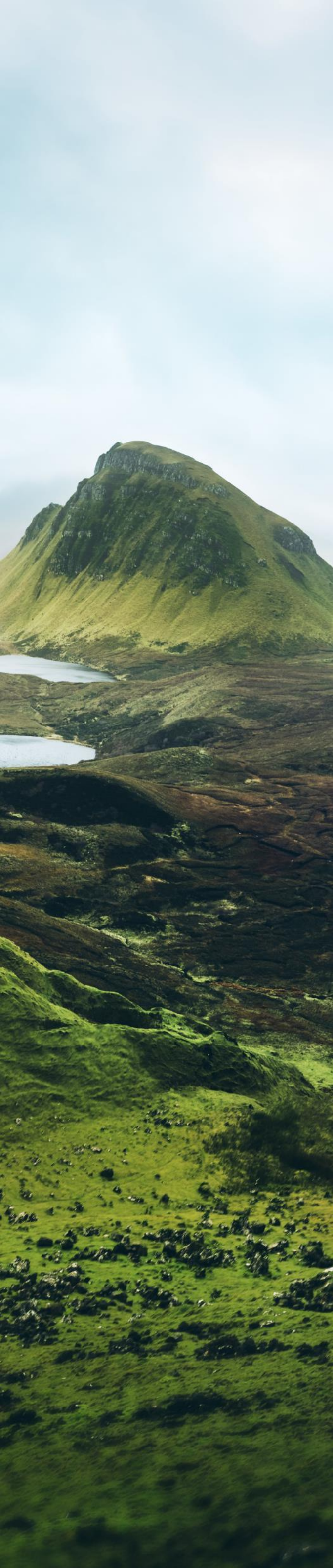
PwC CEE operates as a single partnership within the PwC global network. PwC CEE consists of separate legal entities in accordance with applicable local laws and regulations. We work to help our clients in local markets become more successful and globally competitive.

Our network of firms include representation in 27 territories: Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kosovo, Kyrgyzstan, Latvia, Lithuania, North Macedonia, Mongolia, Montenegro, Moldova, Poland, Romania, Serbia, Slovakia, Slovenia, Turkmenistan, Ukraine, Uzbekistan. We have 11,000 people, including more than 260 Partners, working in 49 offices across the region. Find out more at: https://www.pwc.com/cee

About Wolves Summit

Wolves Summit is an integrated dealflow and digital marketing platform for investors and tech companies, offering year-round engagement through digital events, corporate innovation challenges and start-up scaling activities. The group hosts three major events every year - Alpha Wolves, Wolves Summit (main), and Emerging Wolves.

Since 2020, their digital events arm – Wolves Digital – has organised +100 virtual events for some of the world's largest brands, including Panasonic, United Nations, Department of International Trade, among others. In 2021, the company spun-out a new start-up division called WolvesX supporting large organisations such as LG Electronics, PwC, Garage+, Economic Development Board in Singapore, among others, to address a wide range of corporate and government innovation challenges. For more information please visit www.wolvessummit.com



Foreword by PwC

Agnieszka Gajewska

Partner, Global Leader Government & Public Services
CEE ESG Platform Leader, PwC Central and Eastern Europe | CEE ESG Markets & Clients Leader

At PwC, we are always looking for ways to build trust and achieve sustained outcomes.

The climate crisis is the major challenge of our time. Globally and in Central and Eastern Europe, there is a huge momentum of net zero pledges. For instance, through the Glasgow Financial Alliance for Net Zero (GFANZ), over $130 trillion of private capital is committed to transforming the economy for net zero, but the challenge now is to turn pledges into meaningful action.

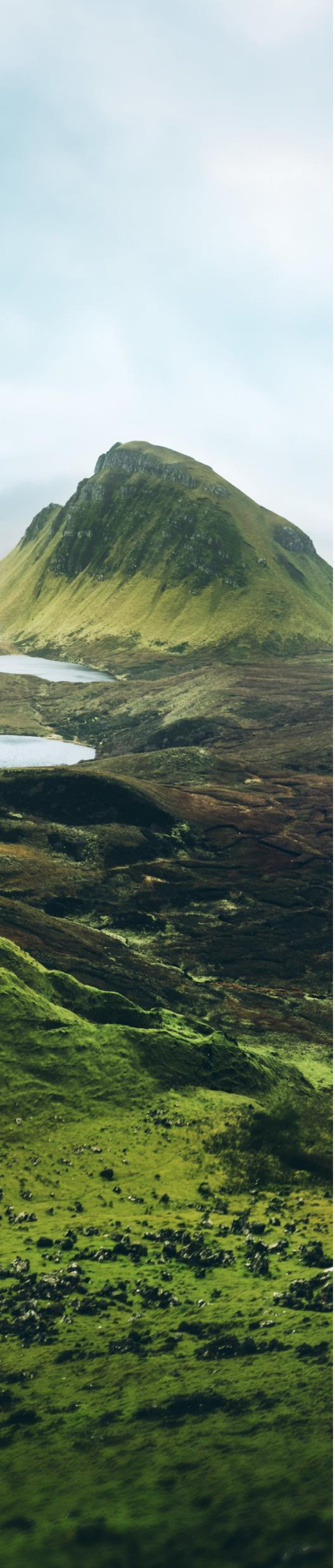
This is all the more urgent in light of Russia's invasion of Ukraine and its use of energy security to influence European politics. In CEE, sustainability goals have also become security goals. We have even more motivation to work toward the goals set out by the European Green Deal: reducing CO2 emissions by at least 55% by 2030, and achieving climate neutrality by 2050.

The urgency of achieving net zero commitments and the need for energy independence and security will not be met by business as usual. One of the most exciting ways of making progress is to scale up the impact of climate tech solutions – and to match investor funding with climate tech entrepreneurs.

What is the state of the climate tech ecosystem in CEE? Which technological solutions illustrate the opportunity to decarbonise in our region? What do investors need to know and is it the right moment for them to be interested?

These are the questions we have set out to answer, in partnership with Wolves Summit, within the pages of this publication. We are seeing a steady growth in climate tech investment in CEE, but the funding is concentrated in specific sectors and territories.

Congratulations to the 50 companies featured in the following pages. I trust our report will help shed light on an important area, and be of interest to both VC investors and to the wider society.



Foreword by PwC

Leo Johnson

Head of Disruption & Innovation,
PwC United Kingdom

The choice confronting us is a stark one. Business as usual or a radical step change in decarbonisation. As PwC's latest Net Zero Economy Index shows, in order to limit temperature rises to the global target of 1.5°, we now need to decarbonise at 15.2% per year, eleven times faster than we have done in the past two decades. To do this, there is one clear conclusion: we must make full use of climate tech as a lever for emissions reduction.

Technology is not the panacea, it is the amplifier of intent, but climate tech is now emerging as an asset class that offers the potential to drive both climate impact and commercial returns. In our global report on The State of Climate Tech Investment 2021, we found that 14 cents of every investment dollar are now going into this sector.

At PwC we are strongly focused on supporting the net zero transition, and our PwC UK edition of The Net Zero Future50 report profiled a selection of 50 climate tech start-ups from a range of industry sectors across the UK.

I am delighted with the collaboration between the Wolves Summit and PwC to explore the climate tech sector in Central and Eastern Europe.

As the report shows, across the region there is a wealth of talent and innovation, with CEE founders building start-ups and exponential technologies that have the potential to bend the decarbonisation arc and define a new global best practice.

This is a moment where we need to re-imagine the possible and I hope that this report, showcasing CEE's pioneers, will help to catalyse the market, policy and financing response that is needed to get these game-changing innovations into the mainstream and get us back on track to 1.5°.

Foreword by Wolves Summit

Michael Chaffe,

CEO at Wolves Summit

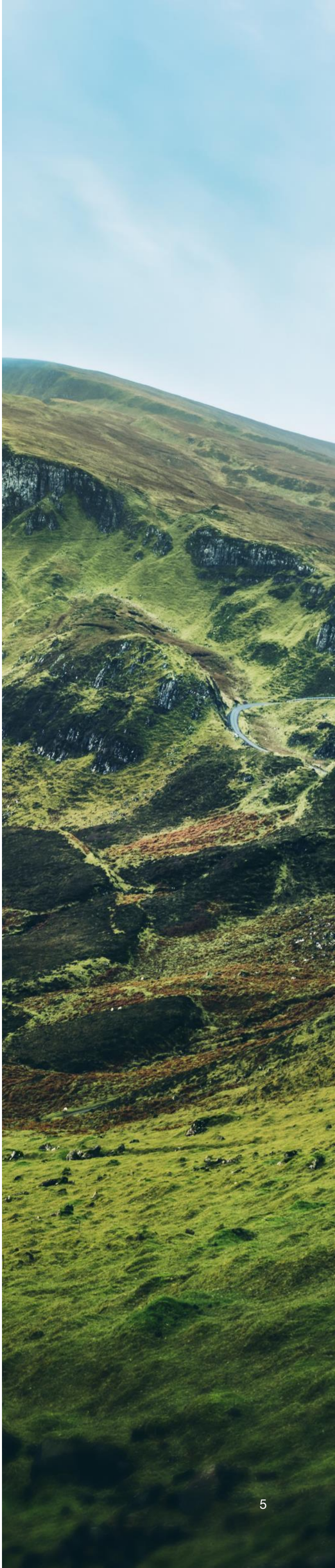
Climate tech has shown strong growth as an emerging asset class globally, and in portfolio diversification, while also facilitating progress towards climate change mitigation and adaptation.

Despite the quickening pace of climate tech investment, some of the most promising technologies and founders are underfunded in their earliest stages of development. Start-ups in Central and Eastern Europe have been less likely to benefit from the trend towards increasing investment in climate tech. This is in part because founders in CEE lack the networks and connections that founders in Western Europe and the US take for granted.

The Wolves Summit and PwC partnership was formed to help support the climate tech sector in CEE and deepen the collaboration between start-ups and key stakeholders. Leveraging our fast-growing community of 8,000+ start-ups, 3,700+ investors, and over 150 community partners across Europe, our goal is to connect high-impact start-ups with the capital, know-how, and market they need to deliver on their full potential.

While it will take effort to address some of these challenges, it’s clear that the best days for CEE remain ahead of us. The introduction of specialised accelerator programs into CEE such as EIT Climate-KIC and funds such as SpeedInvest will dramatically speed up the maturation of the climate tech ecosystem.

We are actively working to build these connections, and VCs, corporations and others can play an important role in connecting founders, too. As such, we are more inspired than ever by our mission – to grow the region into a world leading tech powerhouse.



Contents

Executive summary

Our State of Climate Tech Report 2021 analysis showed that this asset class is rapidly maturing. Investments last year accounted for 14 cents of every VC dollar globally, but they are heavily concentrated in just a handful of sectors and countries. For instance, 60% of investment went to mobility & transport start-ups, and nearly 65% of VC investment went to targets in the US. That's leading to a carbon funding gap, where the technologies that could accelerate decarbonisation in specific industries lack the funding to be deployed at the scale needed to deliver impact.

Addressing this imbalance in climate tech investment requires a coordinated effort by all stakeholders. To do so, we need first of all to understand the state of the climate tech start-up ecosystem in Central and Eastern Europe, a historically understudied area, and then to identify what barriers are hindering progress, and which drivers could further accelerate progress.

That is why PwC, in collaboration with Wolves Summit, has formed a partnership to support and promote the development of the climate tech ecosystem in the CEE region. As part of this collaboration, we began a six-month investigation into the state of climate tech in CEE in 2022.

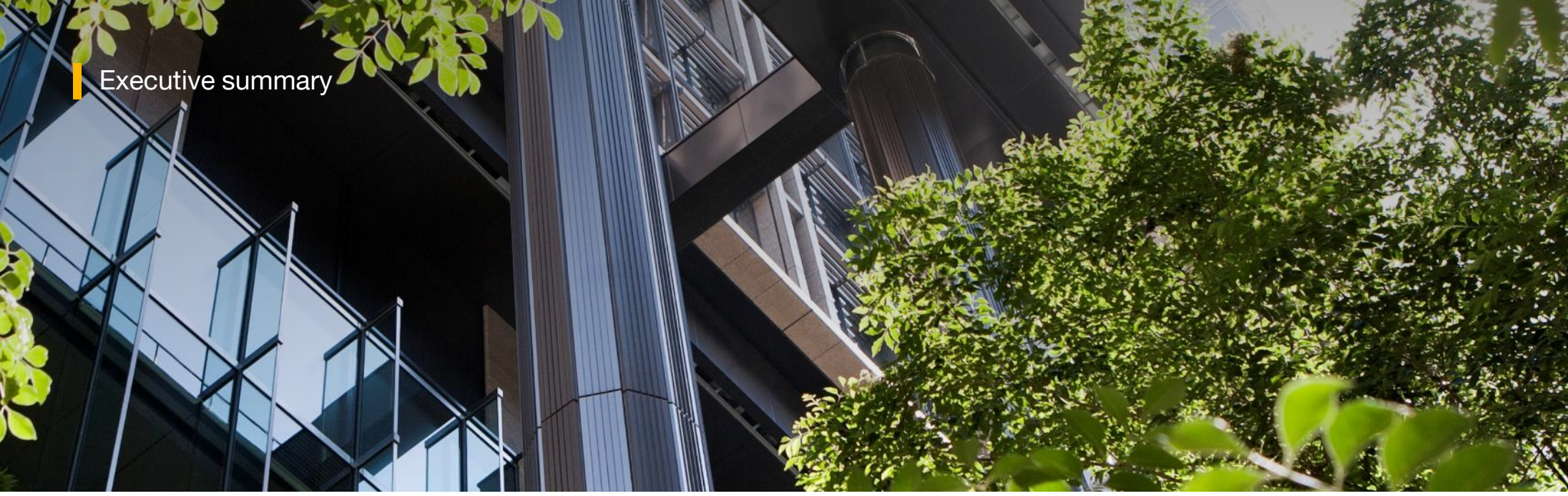
What did we find? The CEE climate tech ecosystem is clearly in its early days and less mature than in other global start-up hubs. The region has no shortage of technically minded founders aiming to solve important problems; the problem is that they lack the access to funding, networks and other resources that their peers in more developed start-up ecosystems have.

CEE contributes an estimated 3.7% of global GHG emissions, but from 2013 to H1 2021 it attracted only 0.79% of all climate tech investments. Moreover, as in our global analysis, investments are heavily concentrated in specific sectors and territories. As at the global level, so in CEE mobility and transport start-ups attracted the most funding, with 54% last year; Estonia and Lithuania drew 82.98% of the total. In CEE, no less than globally, the carbon funding gap is a real issue.

In addition to in-depth climate tech investment analysis across territories and sectors, this report profiles 50 CEE-based innovators in seven key sectors. We identified 170 climate tech start-ups across CEE and invited them to apply to be shortlisted in the report. After assessing 95 eligible applications on 11 indicators across three categories (maturity stage, scalability and climate impact), we selected 50 innovators from CEE who illustrate the opportunity to decarbonise across all sectors. Still, this list is neither exclusive nor exhaustive.

The purpose of the Net Zero Future50 report – CEE Edition is to shine a spotlight on these start-ups and founders, helping them gain visibility and potentially supporting them in matching with the right class of investors. We want to help build a CEE community enthusiastic about becoming a part of the climate crisis solution and achieving sustained results.

Among the 50 start-ups, 12 countries are represented, including Poland (14), Estonia (13), Lithuania (5), Ukraine (4), Latvia (3), and the Czech Republic (3). Meanwhile food, agriculture and land use (12); energy (10);



built environment (9); and industry, manufacturing and resources management (9) are the most represented sectors.

Although the CEE climate tech ecosystem is in its early days, its start-ups are showing signs that they have an appetite to scale up and might present interesting entry opportunities for climate tech investors. At the moment, more than 70% of the start-ups assessed are in between early stages and what we refer to as the ‘sweet spot’ for investors' entry – the point where exponential growth is possible. All but one of the companies report that their technologies have passed the MVP or the Prototype (TRL 4-6) stage.

Still, founders must work hard to develop an in-depth, measurable and verifiable understanding of the extent of their climate impact and/or emissions reduction potential. Twenty of the start-ups don’t have a precise understanding of their impact. If they manage to include the emission reduction potential of their technologies into their value proposition, they could have greater potential to attract investment.

Climate tech solutions are not a silver bullet, but they are amplifiers of intent, and adoption could open the space for many promising climate mitigation or adaptation levers. That could not only deliver value for our planet, ecosystems and humanity – but also present attractive financial returns.

At a glance – Climate tech investments in CEE

US$1.758 bn

Invested in climate tech between 2013 – H1 2021

US$502m

More than US$502m invested in climate tech in H1 2021

0.79%

Share of global climate tech investment directed to CEE start-ups between 2013 – H1 2021

57.22%

Compound annual growth rate (CAGR) between 2013-2020

170+

Climate tech start-ups identified

Most active investment hubs (H1 2013 – H1 2021)

1. Tallinn, Estonia
2. Vilnius, Lithuania
3. Sveta Nedelja, Croatia
4. Budapest, Hungary
5. Warsaw, Poland

42.61%

Share of CEE climate tech investment directed to Estonian start-ups between 2013 – H1 2021

59.80%

Share of CEE climate tech investment directed to Mobility & Transport start-ups between 2013 – H1 2021

Still in search of unicorns

There are no climate tech start-ups valued at US$1 bn+ in CEE

74 unique investors identified

16 active in H1 2021

20 active in H2 2020

The top 3 most active investors

by average deal size are: Girteka Logistics (Latvia), Market One Capital (Poland) and OTB Ventures (Poland)

Background

The Net Zero transformation challenge

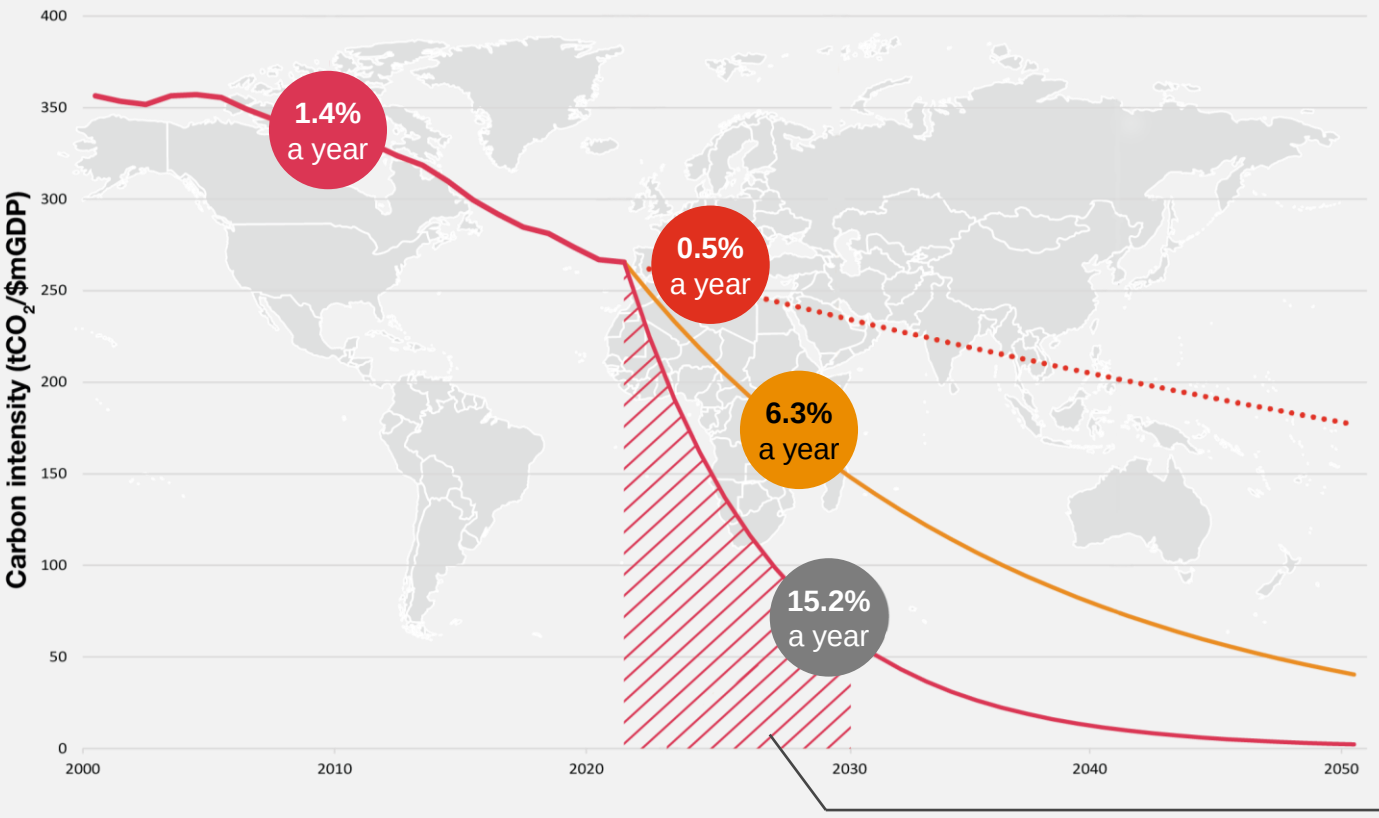
If the COVID-19 pandemic led to the largest absolute drop in emissions ever recorded – a fall of approximately 2.4 Gt of CO_2 or 6.4% of emissions – that fall was temporary. By 2021, we were already back above the pre-pandemic levels, with emissions rising across all sectors. Post COVID-19 economic recovery, coupled with adverse weather and energy market conditions, saw an increase in energy demands, pushing the total global greenhouse gas emissions to their peak levels. In 2021, we surpassed the previous all-time high and produced 40.8 Gt of CO_2 – a six percent increase. And the predictions for 2022 are no less pessimistic. UNFCCC's preliminary data shows that global CO_2 emissions in 2022 (January to May) are 1.2% above the levels recorded during the same period in 2019.

Looking at the sectors, the biggest increase took place in electricity and heat production, where CO_2 emissions neared 14.6 Gt.

Global CO_2 emissions from the industry and buildings sectors rebounded back to their 2019 levels, while oil demand for transport remained well below 2019 levels due to continued lockdowns and other COVID-19 mobility restrictions.

The numbers are alarming. While the CO_2 levels grow, decarbonisation levels are decreasing. The latest calculations from the PwC Net Zero Economy Index 2022 show that, at 0.5%, the G20 economies decarbonisation rate in 2021 was the lowest in over a decade. In comparison, to reach the set goal of limiting global warming to 1.5°C in line with the Paris Agreement, decarbonisation needs to be more than 30 times higher, at 15.2%. At the same time, global carbon intensity needs to drop to 77% by 2030. In the current times of geopolitical and economic uncertainty, there is a need for strategic partnerships and innovative solutions.

Figure 1: Net Zero Economy Index 2022



Global carbon intensity fell by an average of 1.4% per year from 2000 to 2021

Global carbon intensity fell by 0.5% in 2021

To limit warming to 2°C, an annual decarbonisation rate of 6.3% is needed

To limit warming to 1.5°C, an annual decarbonisation rate of 15.2% is needed

A 77% reduction in carbon intensity is required this decade to limit warming to 1.5°C

The role of innovative technological solutions

Achieving our climate goals and the net zero transition will require a whole-economy transformation. According to the International Energy Agency scenarios, there are four broader set of actions:

1. Significantly decarbonise high-emitting assets
2. Phase out some high-emitting assets
3. Material efficiency and behaviour change
4. Build new, low-emitting assets and technologies.

Technology is a key driver of innovation across all industries. For incumbent market players, failure to innovate can mean a loss of market share as new business models emerge and their competitive advantage is put under threat by upcoming players. When the goal is achieving net zero by 2050, the role of innovative technological solutions is even greater. They offer speed and scalability that are key to catching up with the increasing decarbonisation needs.

Why now for climate tech?

Globally speaking, we are seeing a ‘resurgence’ of decarbonisation-related technologies, but with a much broader range of solutions and focus on sectors other than energy, as well as the introduction of the climate adaptation dimension. Between 2006 and 2011, there was a recognised boom of ‘clean tech investments’ concerning the energy sector, which saw a boom (and bust) of VC investments. Nearly US$23 billion were invested into the clean tech sector and lost in a handful of years.

But the times are different now, and all evidence suggests that climate tech is surging rapidly as an attractive vertical for investors of all sorts. New technology advances, as well as exponential growth and infrastructure investment, are enabling green innovative solutions to be scaled and optimised, making new technologies much more affordable and accessible.

In addition, stakeholder expectations are changing. For instance, 83% of consumers think companies should be actively shaping ESG best practices and 86% of employees prefer to support or work for companies that care about the same issues they do. And regulatory settings are changing too – new regulations are coming into play on all levels particularly in the European Union, driving the ESG agenda from the directive on non-financial reporting and corporate and supply chain due diligence and products requirements which drive further the interest of corporate and institutional investors in transforming their assets and portcos respectively.

Lastly, the imperative of taking climate action and transitioning the global economy towards net zero has gained huge momentum – more than 500 institutional investors representing more than US$130 trillion of assets under management are gathered under the Glasgow Financial Alliance for Net Zero, with the goal to coordinate efforts across all sectors to accelerate the transition to a net-zero global economy.

Climate tech is not only seen as more desirable in terms of reputation, but also corporate ambition and, of course, investor interest.

The climate funding gap and its implications

One of the key challenges is financing. 2021 has been a record year for green finance, with over US$350 bn in green bonds issued and a first annual trillion expected in 2023. However, by 2050 the investments worldwide need to reach $2 trillion and then double again by 2030 for the goal of 1.5 C to stay within reach.

Some substantial steps have been made in this direction. The EU Green Deal and REPowerEU, as well as the new climate bill in the US, are both sure to positively impact the levels of investments. However, the US$100 billion target committed by donors to support low- and middle-income countries by 2020 has not been met, and the discrepancies between advanced economies and emerging markets and developing economies remain stark. They expose the risk of new dividing lines. With spending so far concentrated mostly on advanced economies, a dramatic jump in future emissions can be expected as the developing world attempts to catch up. The scale continues to be firmly tilted to the side of emission growth.

Climate tech solutions critical to enabling the transition to net zero are attracting growing investor interest. From 2013 to 2019, total venture funding in climate tech increased more than 3,750%. Our last year's analysis showed further progress. The average size of climate tech deals nearly quadrupled in the first half of 2021, and we have seen over 200% growth in terms of total volumes year on year. Investments are rising and that is encouraging.

However, much of that money is flowing into quite a narrow set of climate tech solutions – those whose products, services and business models have already been proven. All the while there are sectors that remain starved for capital while dealing with problems hardest to solve.

Impact from the Venture Capital Deep Freeze in 2022

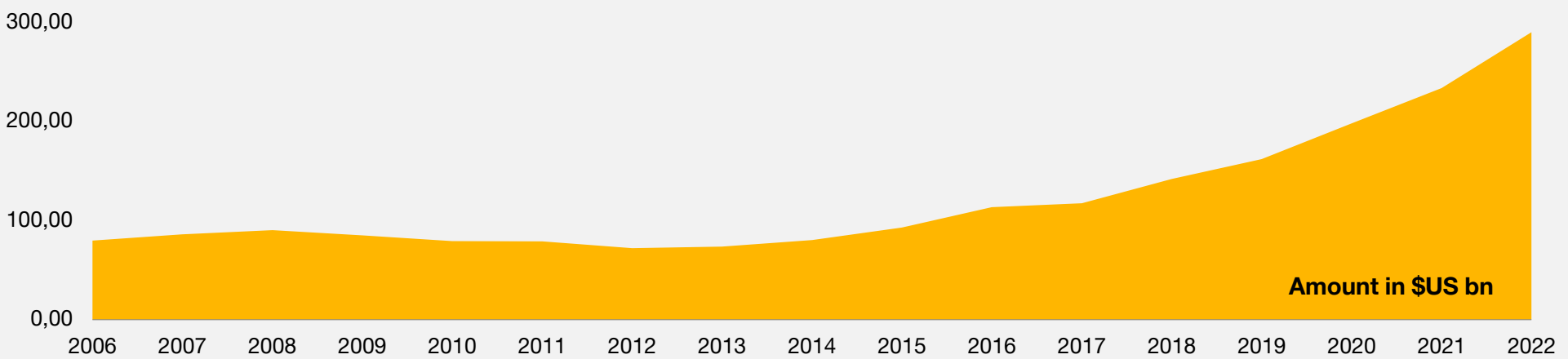
The year 2022 has already seen a good deal of macroeconomic headwinds and geopolitical disruptions. The protracted war in Ukraine, rising inflation and interest rates as well as broken supply chains all have contributed to a mounting uncertainty which is impacting both VCs' risk appetite levels and their amount of available capital or 'dry powder'. The LPs who make their money available to VCs for investment are seeking safety and decreasing their allocations to the risky assets that they perceive VCs' portcos to be.

There are two competing dynamics at play. On the one hand, VCs are being a lot more scrupulous in picking deals in general. On the other hand, the ever more decisive rhetoric on climate by international bodies or country blocs (e.g. the EU, which not only raises awareness but also puts tangible incentives and obligations in place), encourages a shifting entrepreneurial effort towards the area of climate change and energy.

Although the world, and the CEE region in particular, is facing turbulent times in light of the global pandemic recovery period, the Russian government's invasion of Ukraine and its spillover effects among others – the promise that climate technologies can help address the issues around energy security, supply chain and agriculture could play a role in raising VCs' appetite for new portfolio additions.

These sectors have all emerged as key sectors of focus globally and especially in the CEE region, which as a whole has become a major region of focus. Decisions made in the coming months will impact CEE for years to come. Investors, corporations and regulators need to work together to recognise the time-critical and strategic opportunity climate tech offers and to free up more capital to address existing climate funding gaps.

The rise of US VC dry powder



How is PwC seeking to address the climate funding gap with this report?

The CEE edition of the Net Zero Future50 builds on and localises PwC's global efforts to address the climate funding gap by shining a spotlight on climate innovators based in CEE, to help them gain visibility and potentially match them with the right class of investors. Along with Wolves Summit, we have identified more than 170 climate tech start-ups across CEE and invited them to apply for the opportunity to be shortlisted in the report. We received 95 eligible applications and our CEE ESG Hub colleagues examined these companies extensively to arrive at a shortlist of interesting climate innovators.

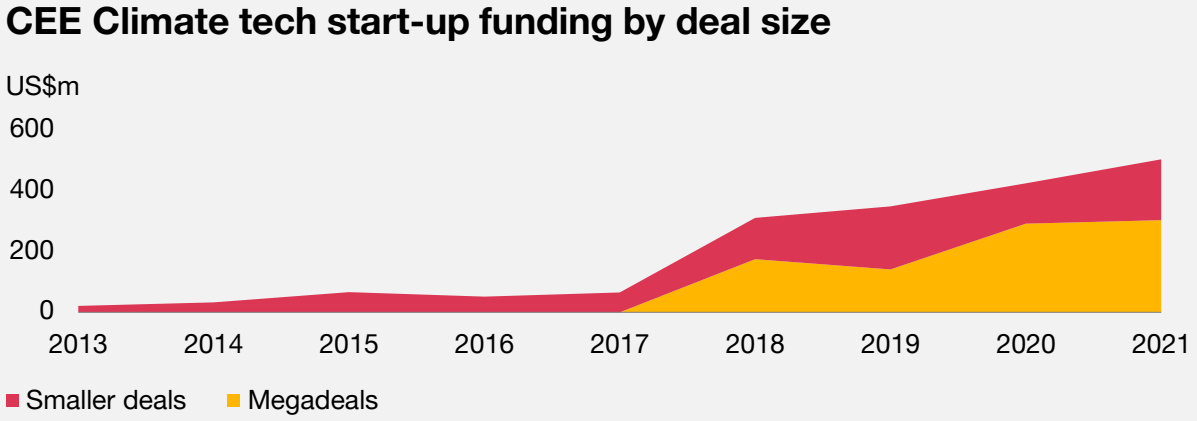
The report looks at examples of innovative CEE start-ups across the climate tech landscape, covering Built Environment; Climate Change Management and Reporting; Energy; Financial Services; Food, Agriculture and Land Use; GHG Capture, Removal and Storage; Industry Manufacturing and Resource Management; and Mobility. We have allocated the number of start-ups based on an assessment methodology built by PwC's Disruption and Innovation practice in the UK.

Key findings on investments

Funding deal by split size

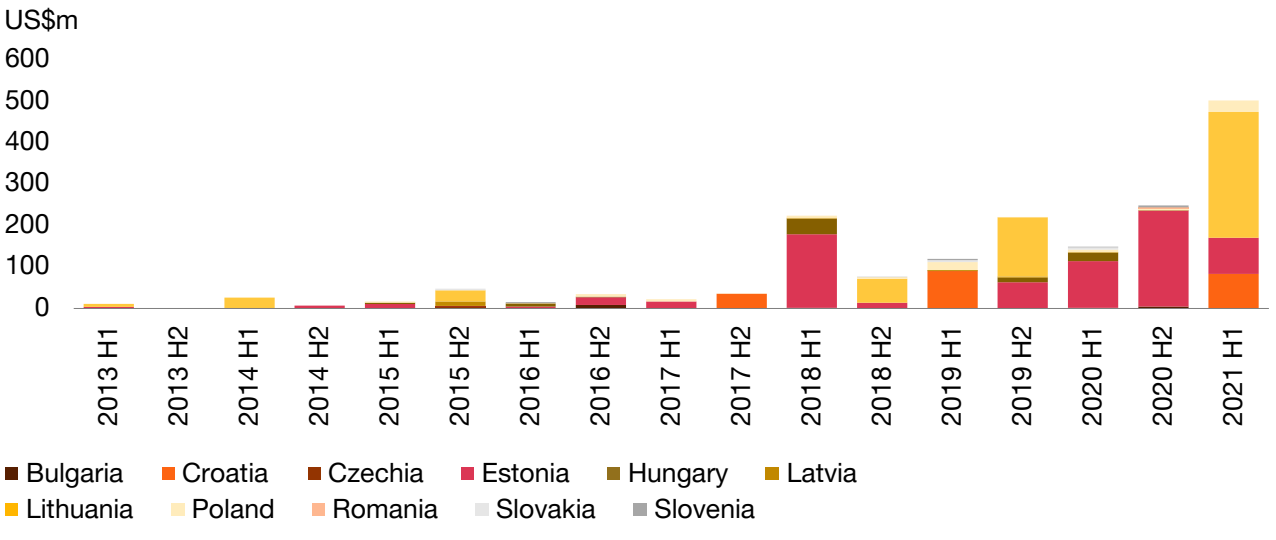
The average deal size continues to rise steadily: in 2021 megadeals raised US$303.78 million and smaller deals US$200.55 million, growing from US$291.9 million and US$132.45 million in 2020 respectively.

CEE Climate tech start-up funding by deal size



Breakdown of investment by country

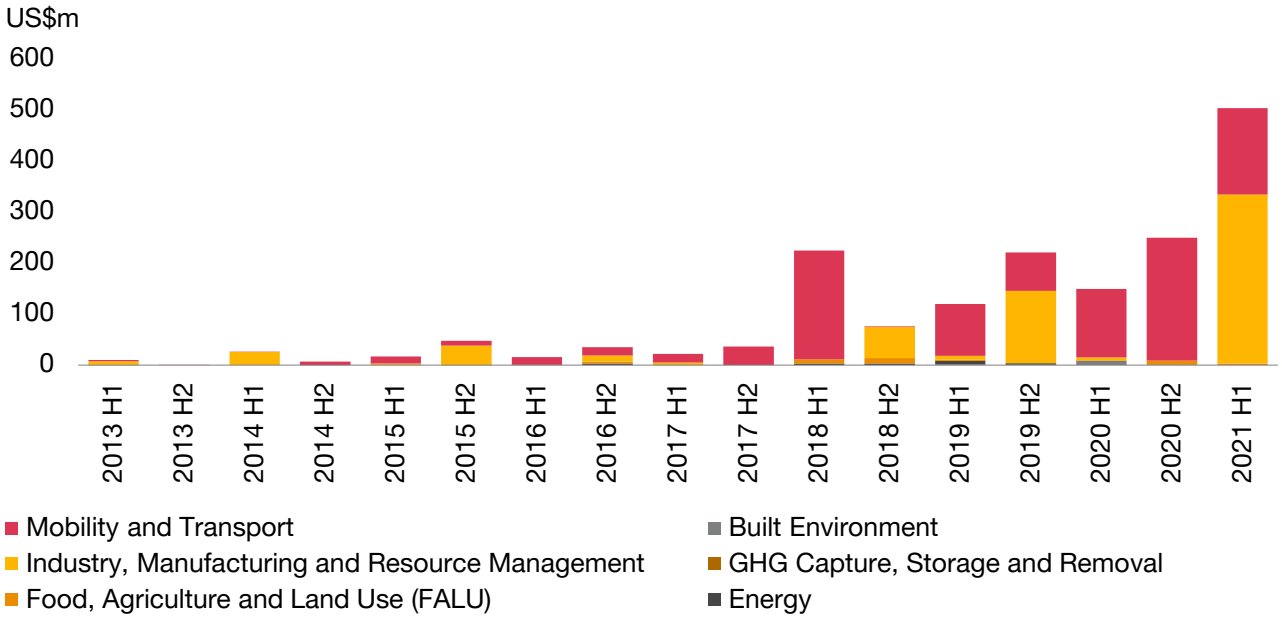
CEE Climate tech start-up funding by country



In H1 2021, estimated investments in CEE were already 20% higher than in all of 2020, with Lithuania as the clear front runner at US$303.78 million invested. Estonia noted an almost US$25 million decrease compared with H1 2020.

Breakdown of investment by sector

CEE Climate tech start-up funding by sector



The two most dominant sectors are mobility, where investments in H1 2021 reached US$169.10 million, solid growth from US$133.91 million a year earlier, and industry, manufacturing and resource management, where investments jumped almost 60-fold from 2020, to US$329.93 million.

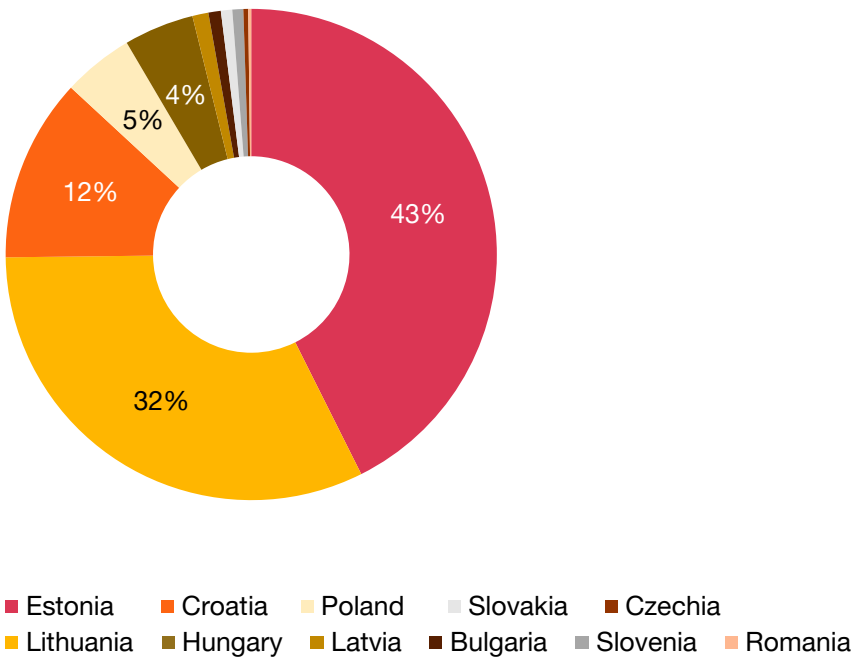
Top 10 Start-up HQ: Countries

Estonia and Lithuania dominate the list of most active investment hubs, with estimated funding accounting for three-fourths of the climate tech investment landscape in CEE.

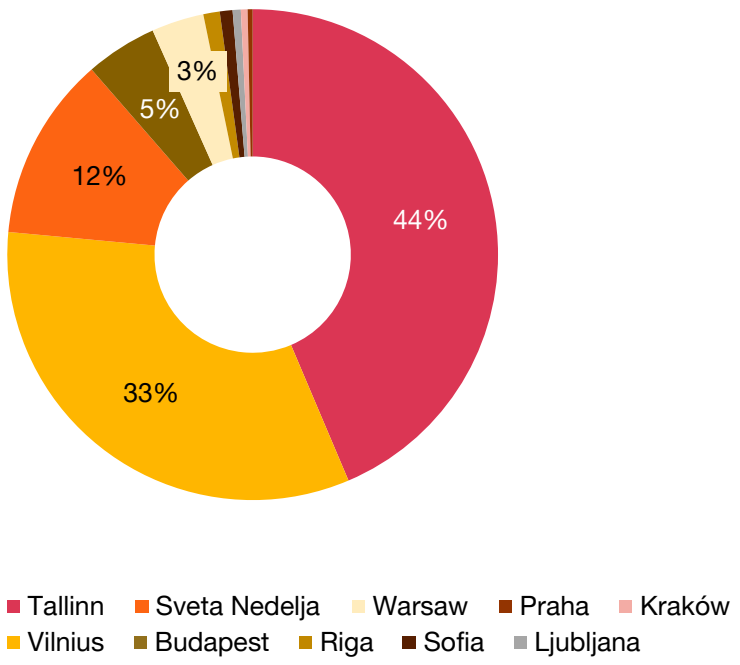
Top 10 Start-up HQ: Cities

The Lithuanian and Estonian capitals, Tallinn and Vilnius, traditionally attract a high share of investment in the sector. Intriguingly, Sveta Nedelja is making its case as an important climate tech hub in Croatia and the wider South-East Europe (SEE) region.

CEE Climate tech start-up funding – top ten most active countries



CEE Climate tech start-up funding – top ten most active cities

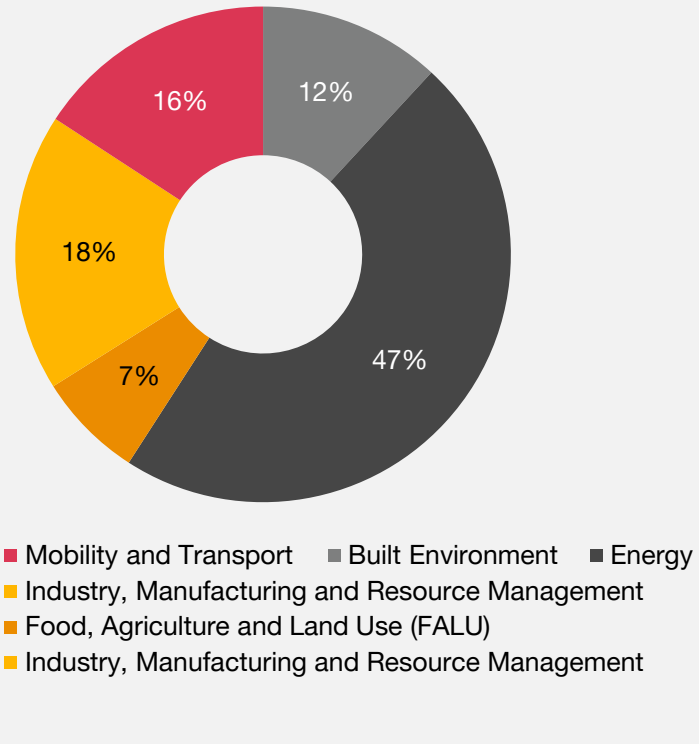


Key findings on emissions

Breakdown of emissions by sector

The Energy sector has the highest emissions, with nearly half of the total (47%), followed by Industry, Manufacturing and Resources Management (18%) and Mobility and Transport (15%).

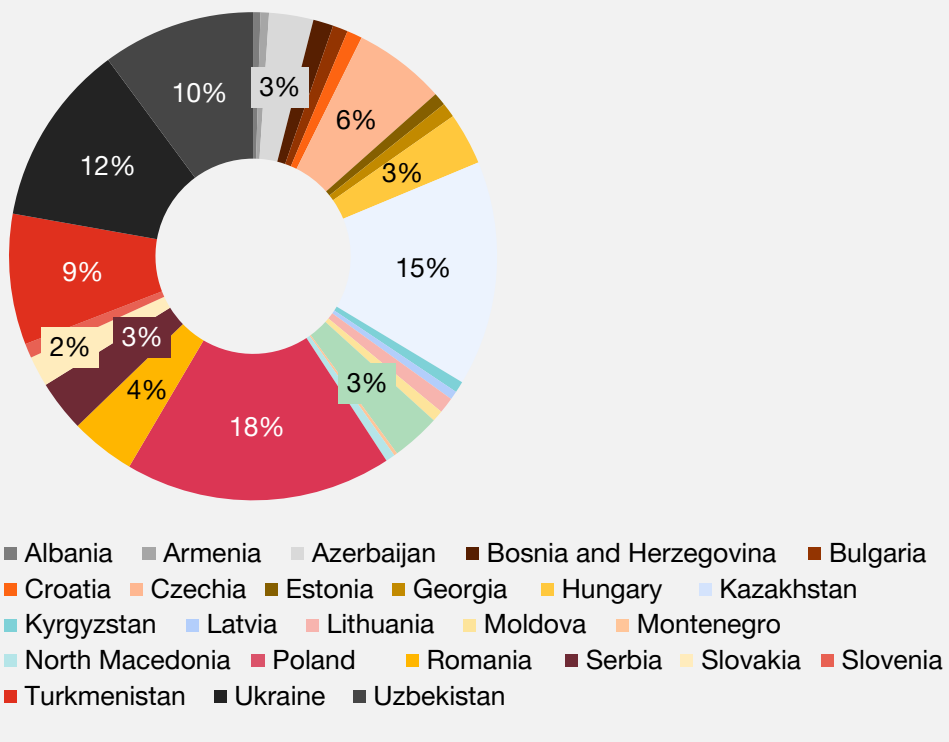
CEE GHG emissions by sector in 2019 (27 countries)



Breakdown of emissions by country

Poland (17.7%), Kazakhstan (14.9%) and Ukraine (12.1%) are the three largest emitters of GHG emissions in CEE and represent nearly half (44.7%) of all GHG emissions across the 27 CEE territories.

CEE GHG emissions by contry in 2019 (27 countries)

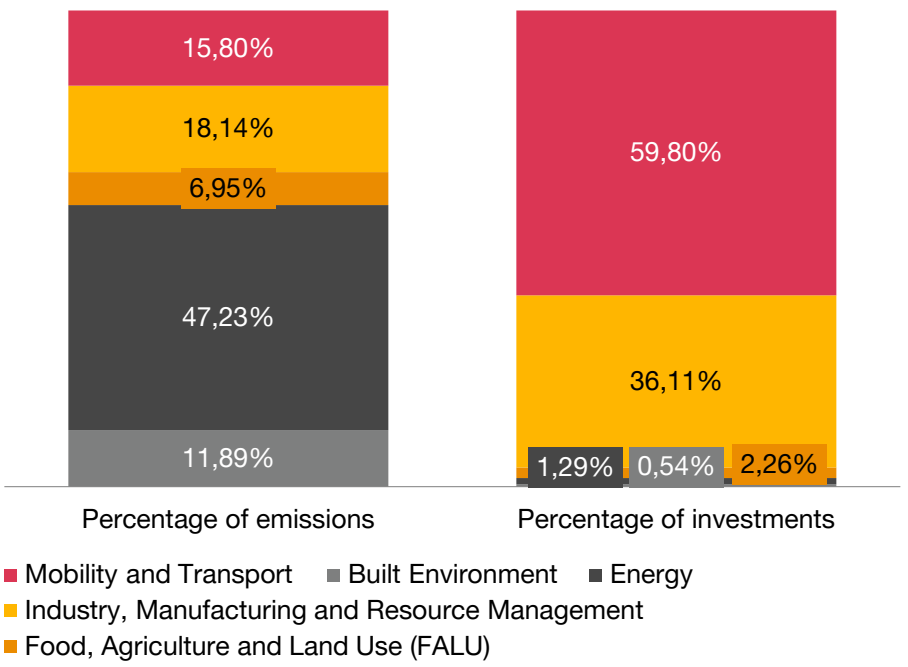


Comparing climate impact against climate investments

Comparing CEE GHG emissions by sector to the investment capital each has received, it's clear that some areas are severely underfunded compared to the top two (Mobility & Transport and Industry, Manufacturing & Resource Management). The Energy sector, which accounts for nearly half of all emissions (47%), has received just 1.9% of all climate tech start-up investment.

Built Environment stands out as the sector which has attracted the least funding, at 0.54% of total investments in CEE. Food, Agriculture and Land Use, which accounts for a smaller proportion of total GHG emissions (6.95%), has received an even smaller share of investment with 2.26% .

Comparing climate impact against climate investments



At a glance –

Future50 CEE Edition start-ups

Below is the selection of Net Zero Future50 – CEE Edition companies by sector and type of solution:

Built Environment (9)

Type of solutions:

Renewable Energy Generation (3)

SOLARSTONE

PLATIO

Roofit.solar

Smart Management of Devices (3)

avrio energy

R8 tech

BeiT

Low GHG Construction Processes (2)

SVELTE

wehealtheplanet

Transformative Circularity and Recycling (1)

rongo

Climate Change Management and Reporting (3)

Type of solutions:

Emissions Data, Monitoring, Management and Reporting (2)

Deeplai

TIMBETER

Climate/Earth Data Generation (1)

FOUR POINT INDUSTRY 4.0

GHG Capture, Removal and Storage (1)

Type of solutions:

Direct Air Capture / Storage (DAC/S) (1)

CARBOMINER

Energy (10)

Type of solutions:

Renewable Energy Generation (4)

Light Mirror

PowerUP ENERGY TECHNOLOGIES

SOLAR PLEX

SolarAide

Grid Management (2)

Fusebox

inion

Alternative Fuels (1)

GLOBE GREEN ENERGY

Energy/Resource Efficient Manufacturing Processes (1)

ADVANGRID

High Efficiency Energy Intensive Electronic and Smart Monitoring / Management (1)

mTap

Waste Heat Capture/Conversion/Storage (1)

SOLHOTAIR

Food, Agriculture and Land Use (12)

Type of solutions:

Precision Agriculture and Robotics (5)

agrieye

Intelligent Hives

ATFIELD TECHNOLOGIES

AGRONET

Harventi Vision

Food Waste Technology (2)

ecobean

NOSPOILERS

Earth and Marine Protection (2)

arbo technologies

sebelo

Agricultural Biotech/Genomics and Natural Solutions (1)

MAKABI SMART AGRITECH SOLUTIONS

Alternative Foods/Low GHG Proteins (2)

Nasekomo

LOCAL OCEAN

Industry, Manufacturing and Resource Management (9)

Type of solutions:

Transformative Circularity, Recycling and Low GHG/Efficient Materials (4)

S.Lab Rethinking Materials

Swapp!

MIRET

Low GHG Plastics or Alternatives (2)

RAIKU

ringo

Waste Management Technology (1)

Bin-e

Low GHG Iron, Steel, Aluminium (1)

BiotaTec

Low GHG Concrete and Alternatives for Construction (1)

ReBe BUILD ROAD IN THE RIGHT WAY

Mobility and Transport (6)

Type of solutions:

Low GHG Light and Heavy Duty Transport: EVs and High-Efficiency Vehicles (2)

BASETRACK

VOK

Efficient Transport Systems (2)

MOBILYZE

CHRG NETWORK

Micro-mobility (1)

MEREDOT

Batteries/Fuel Cells (1)

SKYCORP

*Note on the Financial Services sector: we did not identify any eligible candidate. More details can be found in the Appendix.

Future50 Edition methodology

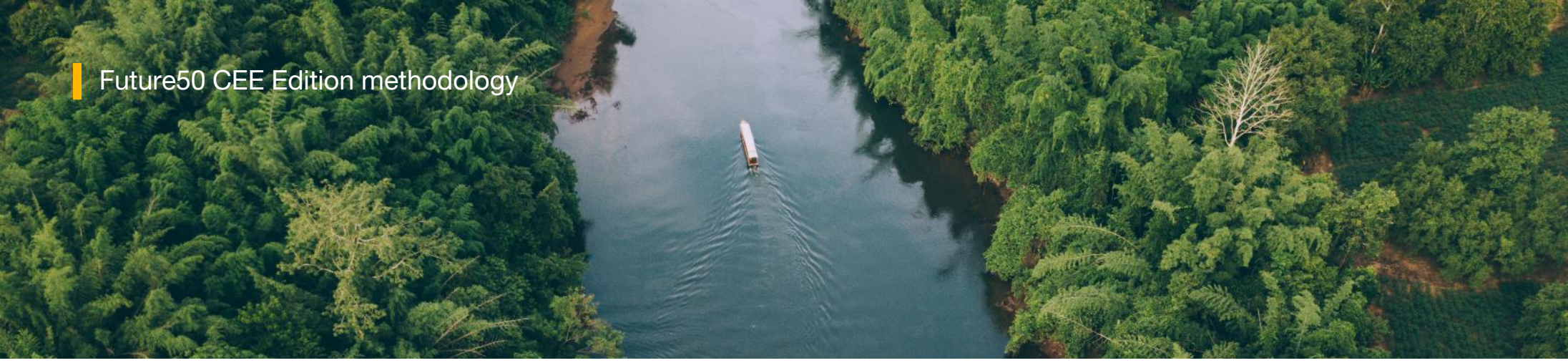
Scouting	Scoring	Selecting
Along with Wolves Summit, build a long list of climate tech start-ups across CEE	Invite start-ups across CEE to submit applications	Select a list of 50 start-ups across sectors that represent emerging technological solutions in CEE
Result: 170+ start-ups identified	**Result:** 95 eligible applications obtained	**Result:** 50 start-ups selected
Calibrate PwC UK's Net Zero Future50 assessment framework to design an application with standardised questions	Score the start-ups against PwC UK's Net Zero Future50 assessment framework	Engage with start-ups to request additional information for further assessment and company profiles

1. Scouting

Using multiple sources, and collaborating with Wolves Summit and PwC teams in the UK and Belgium, we scanned the market to map emerging climate tech innovators across our 27 territories of focus in CEE. We identified 170+ start-ups with the potential to deliver solutions across the key challenge areas of decarbonisation and the net zero transition.

Along with Wolves Summit we organised a series of events, including two panel discussions and a pitching track, to raise awareness among founders, investors and the overall start-up community about the state of climate tech globally and to pursue our goal of understanding it better in CEE.

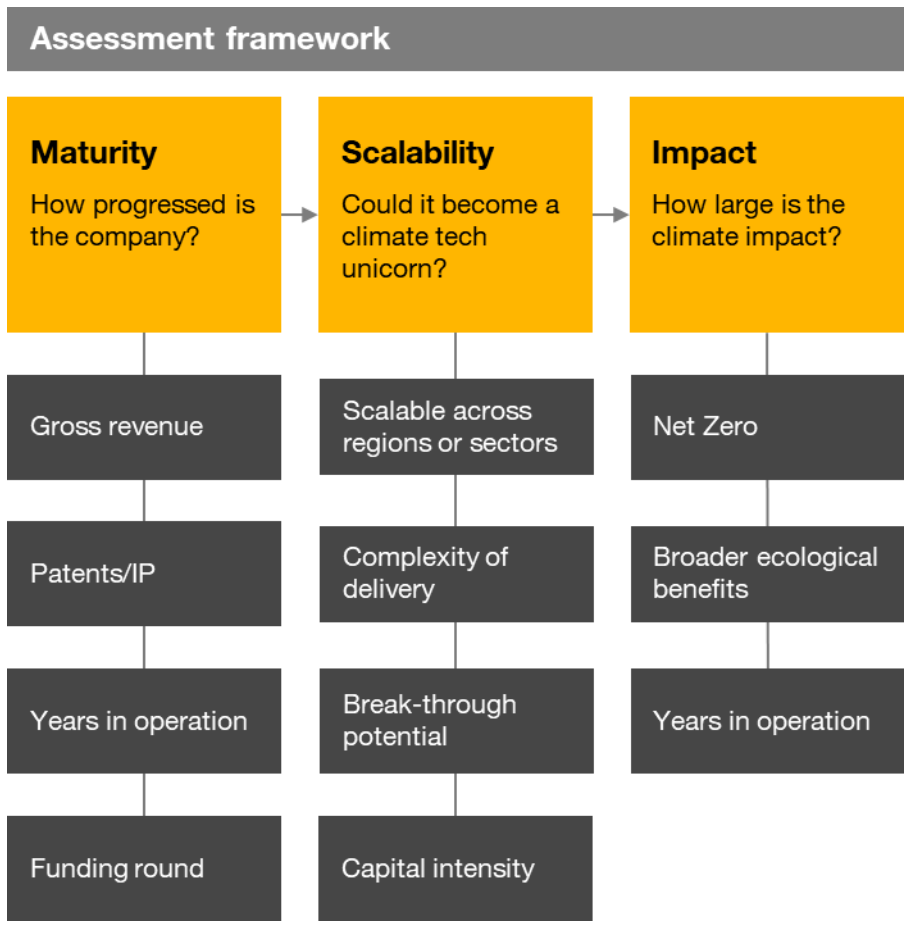
Through these events we gained preliminary knowledge of the state of the climate tech ecosystem from the perspective of stakeholders, including founders, early stage investors, accelerators and corporations. This allowed us to calibrate the assessment framework built by PwC UK, designing an application with standardised questions. Start-ups were invited to apply from late May through early July 2022.



2. Scoring

We then implemented the PwC Net Zero Future50 assessment framework to evaluate candidates for the Net Zero Future50 report – CEE Edition. We analysed 95 eligible applications against 11 indicators derived from three key dimensions:

- Maturity – Their current stage along the maturity journey and whether they are at the 'knee of the curve'
- Scalability – The speed at which we think it is possible for them to accelerate and whether they could become climate tech unicorns
- Impact – The size of their climate and broader environmental and social impacts.



3. Selecting

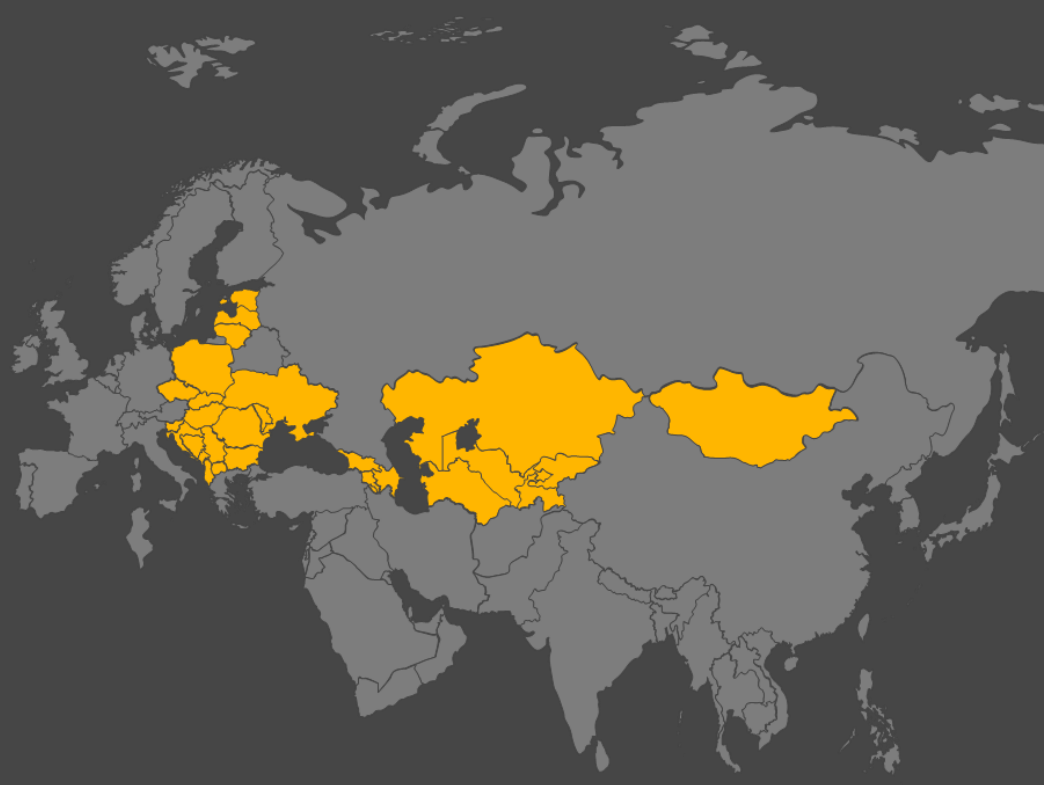
We then selected the final Net Zero Future50 – CEE Edition based on the composite ranking of net zero impact, maturity and scalability, and engaged with the start-ups in late July – early August to request additional information.

This list is neither exhaustive nor exclusive, but rather is an independent showcase of the emerging decarbonisation opportunities across CEE. The company information has been derived from submissions by the companies themselves; publicly available sources; and discussions with management. PwC has not independently verified any of the company information. Where statistics or research are discussed in the profiles of the companies, the sources have been quoted from the company website where available.

We then undertook a cross-check review to make sure all sectors and sub-sectors have enough coverage to give readers insight into the breadth of innovation taking place, allocating the number of start-ups by sector as much as possible proportionately to the sector's total GHG emissions globally and in CEE, but noting also that shortlisted companies were the relative top performers against the assessment framework.

27 territories of focus:

Albania
Armenia
Azerbaijan
Bosnia and Herzegovina
Bulgaria
Croatia
Czech Republic
Estonia
Georgia
Hungary
Kazakhstan
Kosovo
Kyrgyzstan
Latvia
Lithuania
North Macedonia
Mongolia
Montenegro
Moldova
Poland
Romania
Serbia
Slovakia
Slovenia
Turkmenistan
Ukraine
Uzbekistan



The Net Zero Future50 report – CEE Edition looks at the state of climate tech start-ups across 27 territories in Central and Eastern Europe (CEE) and Eurasia. The report also profiles a selection of 50 companies that illustrate the opportunity to decarbonise across all sectors, but is neither exclusive nor exhaustive.

The information has been derived from information submitted by the companies themselves, publicly available sources and discussions with management; PwC has not independently verified any of the company information. Where statistics or research are discussed in the bios of the companies, the sources have been quoted from the company website where available. Alongside the company summary and impact, PwC has also provided selected highlights of the opportunities for the technology and a shortlist of the start-up's strategic industry alliances.

Future50 CEE Edition results

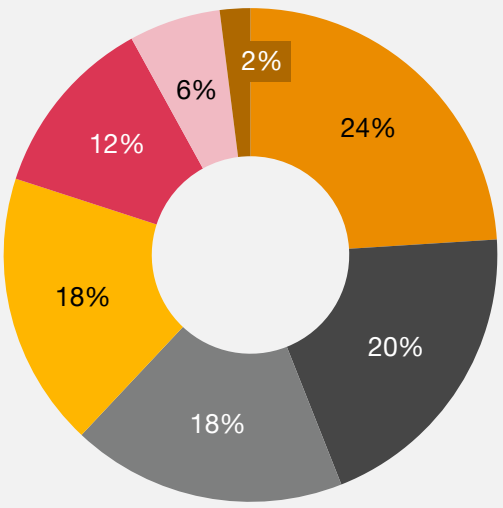
Breakdown by sector

The top five represented sectors are Food, Agriculture and Land Use (12), Energy (10), Built Environment (9), Industry, Manufacturing and Resources Management (9), and Mobility and Transport (6), with significantly fewer activities in Climate Change Management and Reporting (3), and GHG Capture, Removal and Storage (1).

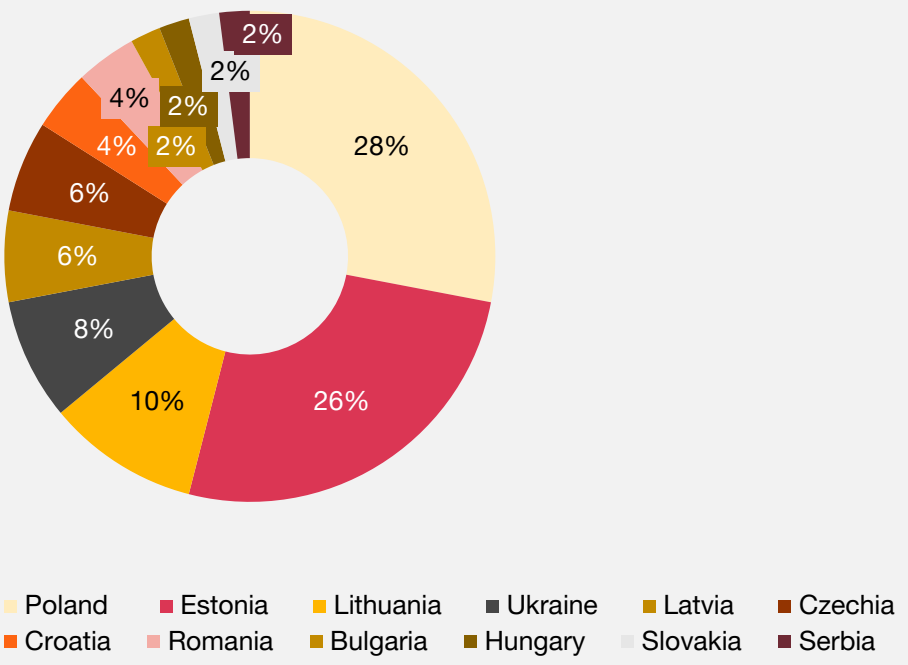
Breakdown by country

Of 12 countries represented, the top are Poland (14) and Estonia (13), followed by Lithuania (5), Ukraine (4), Latvia and Czechia (3 each), Croatia and Romania (2 each) and Bulgaria, Hungary, Slovakia and Serbia (1 each).

CEE Net Zero Future50 start-ups by sector



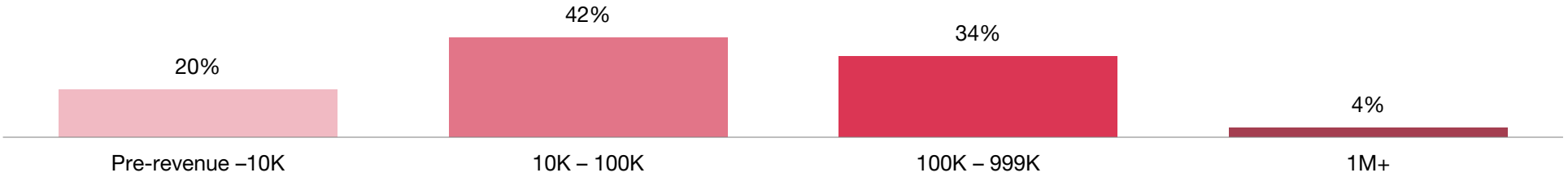
CEE Net Zero Future50 start-ups by country



Gross revenue

Seventeen companies report generating €100,000–999,000 in annual revenue, which suggests they have already found a commercially viable business model. The only two companies reporting more than €1 million both operate in the integrated solar panel rooftop industry.

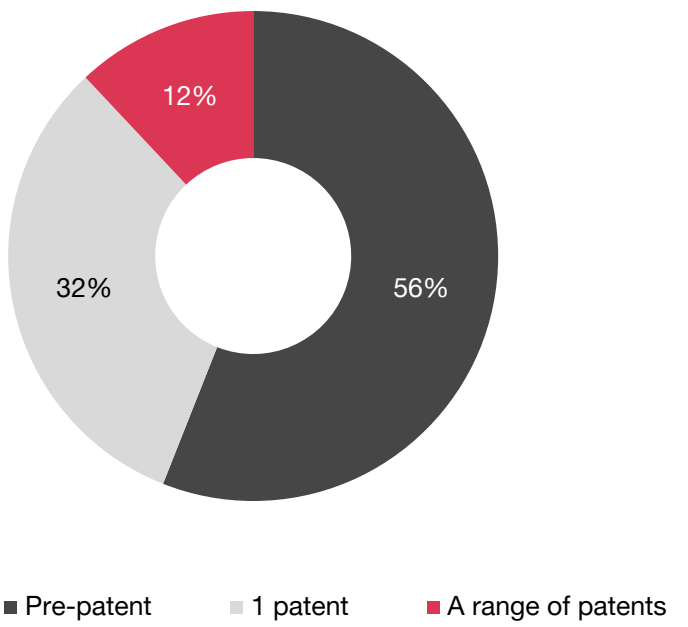
CEE Net Zero Future50 start-ups gross revenue



Number of patents

Only 16 start-ups report having a single patent; 16 more are in the process of application. But only six of them hold more than one patent, suggesting their founders recognise that a single patent is not enough to prevent threats from new entrants.

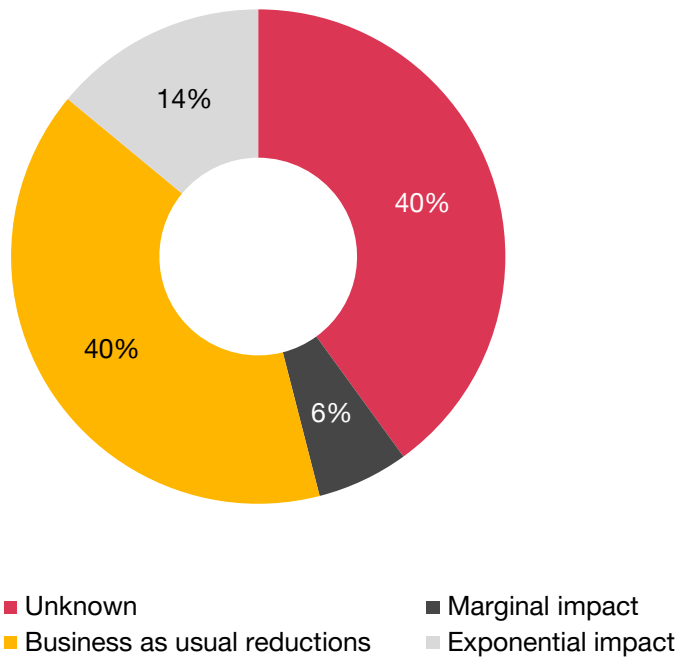
CEE Net Zero Future50 start-ups number of patents



Net zero impact

Forty percent of the start-ups report having no precise understanding of their technology's emission reduction potential; this is an important area, which founders can't overlook if they want to seize all possible fundraising opportunities.

CEE Net Zero Future50 start-ups net zero impact



Future50 CEE Edition – Sector analysis

Summary of approach

Across each sector, we explore the scale of the net zero transition challenge compared to climate tech investments and the number of deals in the CEE region. We also implement a bottom-up analysis of the CEE Net Zero Future50 start-ups to examine the state of these emerging climate innovators in CEE.

In the following pages we present answers to the following questions:

Headlines from PwC analysis for the CEE territories

- What is the sector's GHG contribution?
- What is the sector's amount of investment?
- What is the sector's number of deals?

In-depth sector analysis

- What are the available types of solutions?
- What are the cross-cutting technological themes which are driving uptake of those solutions?
- What are the market trends which are driving uptake?
- What are the historically underfunded 'nascent solutions' with relatively smaller emission reduction potential (ERP) but which are likely to play a pivotal role in decarbonisation? More information in the Appendix section.

Industry insights

- What are the biggest 'barriers' to scaling up climate tech solutions? How should these challenges be addressed collectively?
- What are the biggest 'drivers' you see behind climate tech solutions? What would need to happen to accelerate this at scale?

Built environment

Built environment

Market trends

The search for cost savings and reduction: Rising costs of construction materials and utilities are driving the search for cost efficiencies such as better technologies for construction, building operations and resource management. This is especially relevant for individual consumers, as energy- and resource-efficient buildings can significantly reduce household expenses.

Adoption of emissions reduction technologies: As many CEE countries still struggle with air pollution from low-stack emissions, technologies that contribute to solving this issue are seeing significant development and innovation. They focus on factors including energy efficiency and eco-friendly alternatives to fossil fuels in housing.

The rise of the circular economy: Many construction materials can be reused or recycled, which not only saves resources but can also drive down the cost of construction materials. Moreover, the circular economy in the construction industry is also a focus of upcoming EU policies, which further enhances the need for investment in this field.

The drive for digitalisation and automation: Digital transformation has also become a trend in the built environment, as data-driven solutions allow for better management of production/construction processes and of building operations. This strengthens the resilience of buildings, reduces operating costs and enables round-the-clock monitoring of key systems.

Nascent solutions:
Low GHG concrete
Low GHG iron and steel

Type of solutions: Renewable Energy Generation (3); Smart Management of Devices (3); Low GHG Construction Processes (2); Transformative Circularity and Recycling (1).

Technological themes: Advanced materials (2), AI (2), Biomaterials (1), Biotechnology (1), Blockchain (1), Circular (2), Cloud computing (1), Data platforms (2), Green manufacturing (2), IoT (1), Machine learning (2), Marketplaces (1), Mobile apps (1), Nano materials (1), Other (2), Renewable Energy (3), Robotics (1), Smart cities (6), Smart materials (1).

Headlines from PwC analysis

11.89%
Share of CEE GHG emissions

9
Start-ups in the Net Zero Future50 report – CEE Edition

Investment level

N/A
H2 2020 – H1 2021

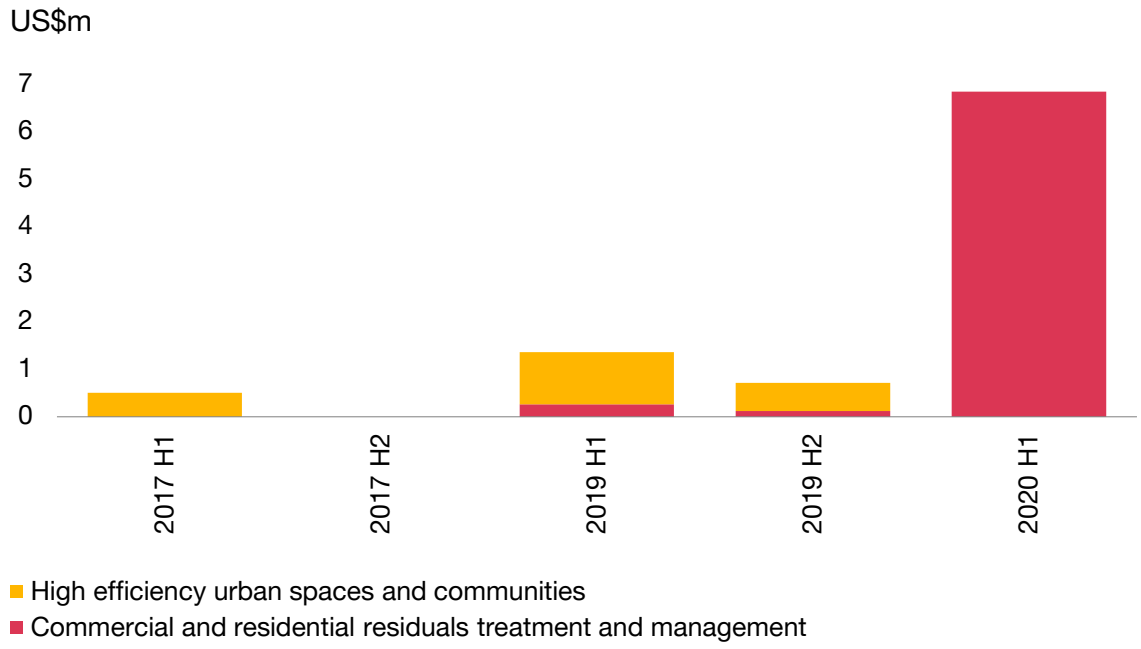
US$9.44m
(0.54% of total investment for this period)
H1 2013 – H1 2021

Number of deals

0
H2 2020 – H1 2021

11
H1 2013 – H1 2021

Built environment climate tech start-up funding in CEE by type of solution



Industry insights

Triinu Lukas

CEO of Beamline Accelerator Estonia

On barriers

In this sector there may be many gatekeepers between the producer and the final consumer:

1. In many cases, municipalities are deciding to finance pilots, because there are few investors with the patient capital that's needed for rapid scaling after e.g. five years. Often local governments' decisions have to be aligned with the plans of the city planning department. Which takes time.
2. Construction companies pay for the solution upfront, so they often cannot go with higher-priced products because it would be hard to find buyers.
3. Architects. More often than not they are the ones that a start-up needs to convince to build their idea into the project.

There might be no better way to support the built environment than grant money. Because the environment is a common good, it makes sense to contribute taxpayers' money to get pilots going. If successful, investors and buyers will follow, because such complex solutions usually enjoy much less competition when already on the market, and thus are very scalable.

On drivers

Novel building materials, because 8% of global carbon emissions come from concrete, with the need for new buildings constantly increasing with the Earth's population moving to urban areas. Not to mention the problems later on of handling non-reusable waste. Innovators make building materials such as carbon-capturing concrete (e.g. Blue Planet), or mycelium (Myceen) that provides a better indoor climate and is extremely fireproof. With its great properties, lumber can also already be used for tall constructions, with optimised designs.

With new materials, several practices are beginning to diverge from the status quo (steel, concrete), e.g. load and material usage calculations. So it becomes important to use advanced **structural analysis software** for the project (e.g. Modugen). Several innovations are also helping design buildings with maintenance in mind so they can last longer.

Renewables-based residential **heating and cooling solutions** (SolNavitas) are to look forward to be scaled. It's very energy intensive to heat a house, and even more so to cool one.

The digital solutions we've already mentioned are also important for optimising existing resources (e.g. R8 Technologies). European decisions strongly support the energy efficiency of buildings, which can be achieved with these **smart building solutions**.

To be fit for 2055, financial markets need to come in with their monetary resources (i.e. pension funds) to invest in sustainable innovation across fields of cleantech. Green procurements also help, especially in the built environment category.

Country: Poland

Type of solution: Smart Management of Devices

Summary

Avrio offers an AI-powered virtual facility manager for small and medium-sized commercial buildings, targeting customers such as retail chains, gas stations and warehouses. The platform collects and analyzes operational data from multiple building operations processes and provides recommendations for cutting energy and maintenance costs. Avrio‘s investors include Schneider Electric, a global leader in building management.

Impacts

Avrio suggests its technology offers potential annual reductions of 0.22 Gt CO_2 per year within the next 10 years, compared with total global emissions from building operations of approximately 10 Gt.

Highlights

Number of patents: Patent-pending

Avrio claims its partnership with Schneider Electric gives it access to 100+ countries and provides future scalability opportunities as Schneider Electric has large international retail clients. Avrio suggests it has the potential to reduce 40% of direct and indirect carbon emissions during the entire building lifecycle for the mid-market.

Strategic Alliances

Business (large companies), Business (SMEs), Government (local authorities), Investors, Utilities

avrio.energy

BeiT

Country: Czechia

Type of solution: Smart Management of Devices

Summary

BeiT provides an all-in-one automated solution for building management based on a single smart open data platform where utility suppliers, condominiums, property managers and tenants interact seamlessly. The system can collect, centralize and remotely track all utility consumption data, allowing tenants to analyze usage in real time.

Impacts

BeiT says its solution can shrink buildings' carbon footprint by 5%. It claims real-time monitoring can cut consumption by up to 30%, helping address the energy poverty that affects 8% of the European Union's population.

Highlights

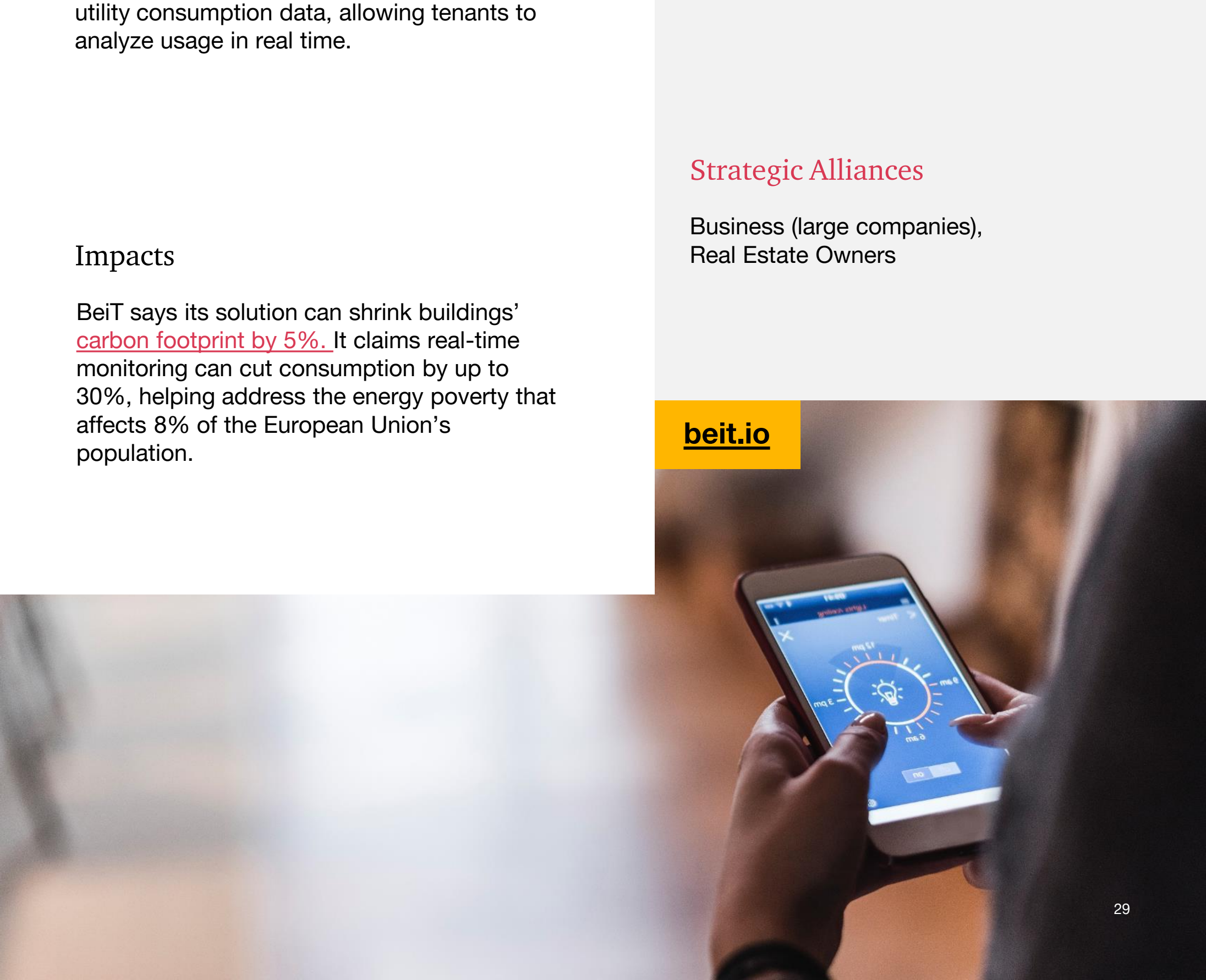
Number of patents: No Patent

BeiT aims to combine all the functionalities needed to manage large portfolios of buildings very efficiently, by digitalising property management and integrating real-time data from IoT devices, utilities and tenants in a seamless ecosystem. The company reports that its customers manage a portfolio of 100,000 households.

Strategic Alliances

Business (large companies),
Real Estate Owners

beit.io



wehealtheplanet

Country: Czechia

Type of solution: Low GHG Construction Processes

Summary

Glas IN's solution is applied to double-glazed windows, giving them better insulating properties than new triple-glazed windows and thus reducing the need for heating and air conditioning; it also improves soundproofing. The company focuses on R&D and is ready to license its technology around the world.

Impacts

The company estimates that over the lifetime of a 1 sq-metre double-glazed window, its product can save 1 tonne of CO_2 emissions, as well as avoiding the emissions from producing new glass.

Highlights

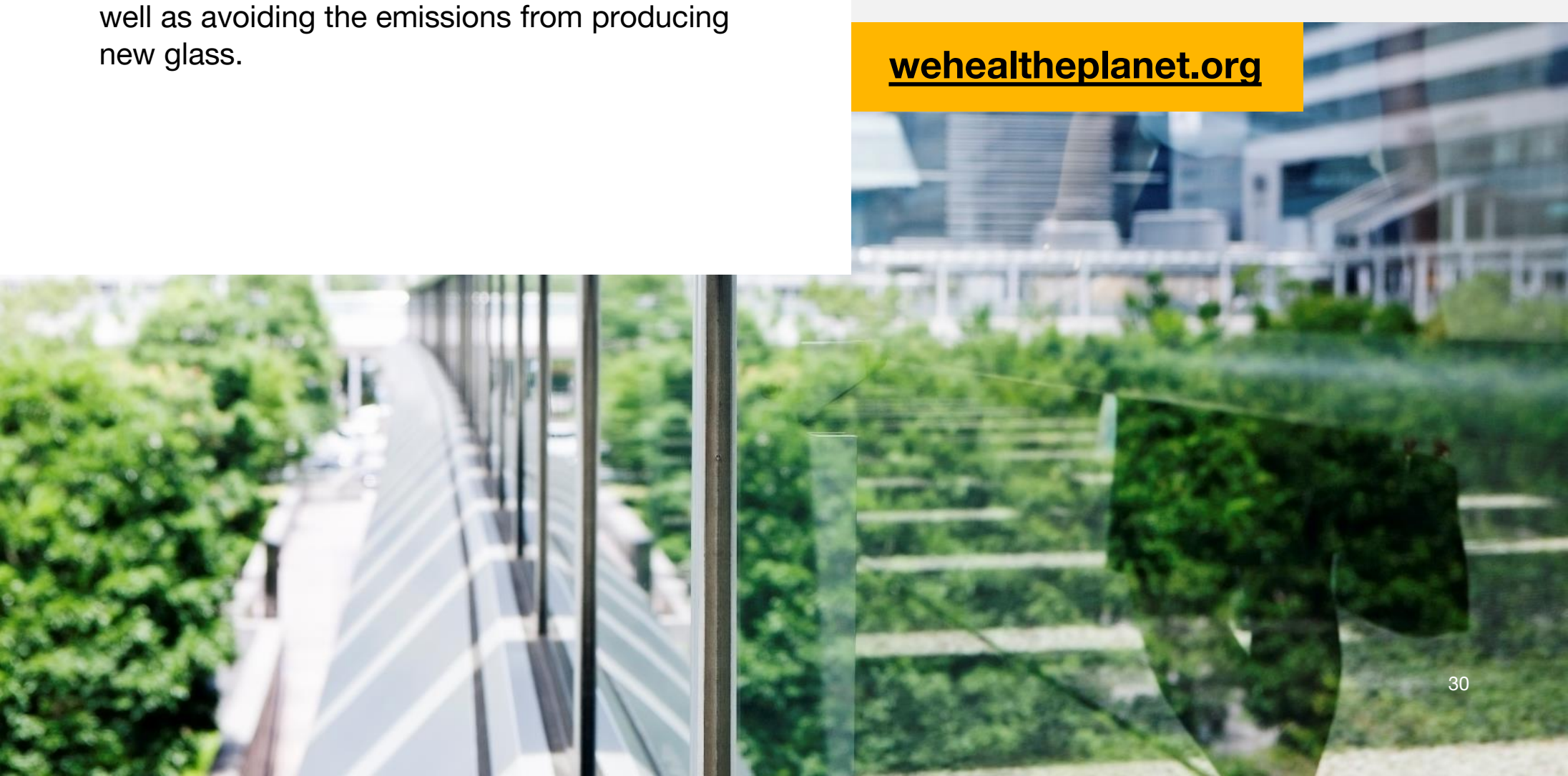
Number of patents: Patent pending

The company says it has licensed its technology to a London-based producer, which has already made more than three times the amount of the solution as Glas IN itself.

Strategic Alliances

Business (SMEs), Government (central authorities), Government (cities), Government (local authorities), Investors

wehealtheplanet.org



PLATIO

Country: Hungary

Type of solution: Renewable Energy Generation

Summary

Innovatív Térburkolatfejlesztő makes PLATIO pavers with built-in solar panels, which is made of recycled plastic and the company distributes through a network of 26 partners around the world. The pavers can be used in residential, public and industrial spaces, for surfaces such as walkways, cycle paths, and driveways as well as in off-grid solutions including EV charging stations.

Impacts

The company says 1 square metre of PLATIO pavers recycles the equivalent of 400 PET bottles of plastic and reduces nearly 25kg of GHG emissions compared to existing alternatives.

Highlights

Number of patents: A range of patents

PLATIO pavers can support vehicles weighing up to 8 tonnes. Since 2015 the company says it has installed nearly 2,500 square metres of pavers, recycling nearly 32 tonnes of plastic waste, saving 125 tonnes of CO_2 emissions and generating approximately 440,000 kWh of electricity.

Strategic Alliances

Business (large companies), Business (SMEs), Government (cities), Government (local authorities), Other (if selected, please elaborate on the next question)

platiosolar.com

Country: Estonia

Type of solution: Smart Management of Devices

Summary

R8tech uses artificial intelligence to manage existing building automation systems, helping save energy and improve indoor comfort in more than 1.6 million square metres of commercial space for clients including WeWork, CBRE, Radisson Blu, Swedbank and others. Its cloud-based software provides HVAC (Heating-Ventilating-Air Conditioning) systems autonomous control solutions.

Impacts

The company estimates it has already saved more than 15,000 tonnes of CO_2 emissions, that is average energy savings are 15-20%, together with improved indoor occupant comfort.

Highlights

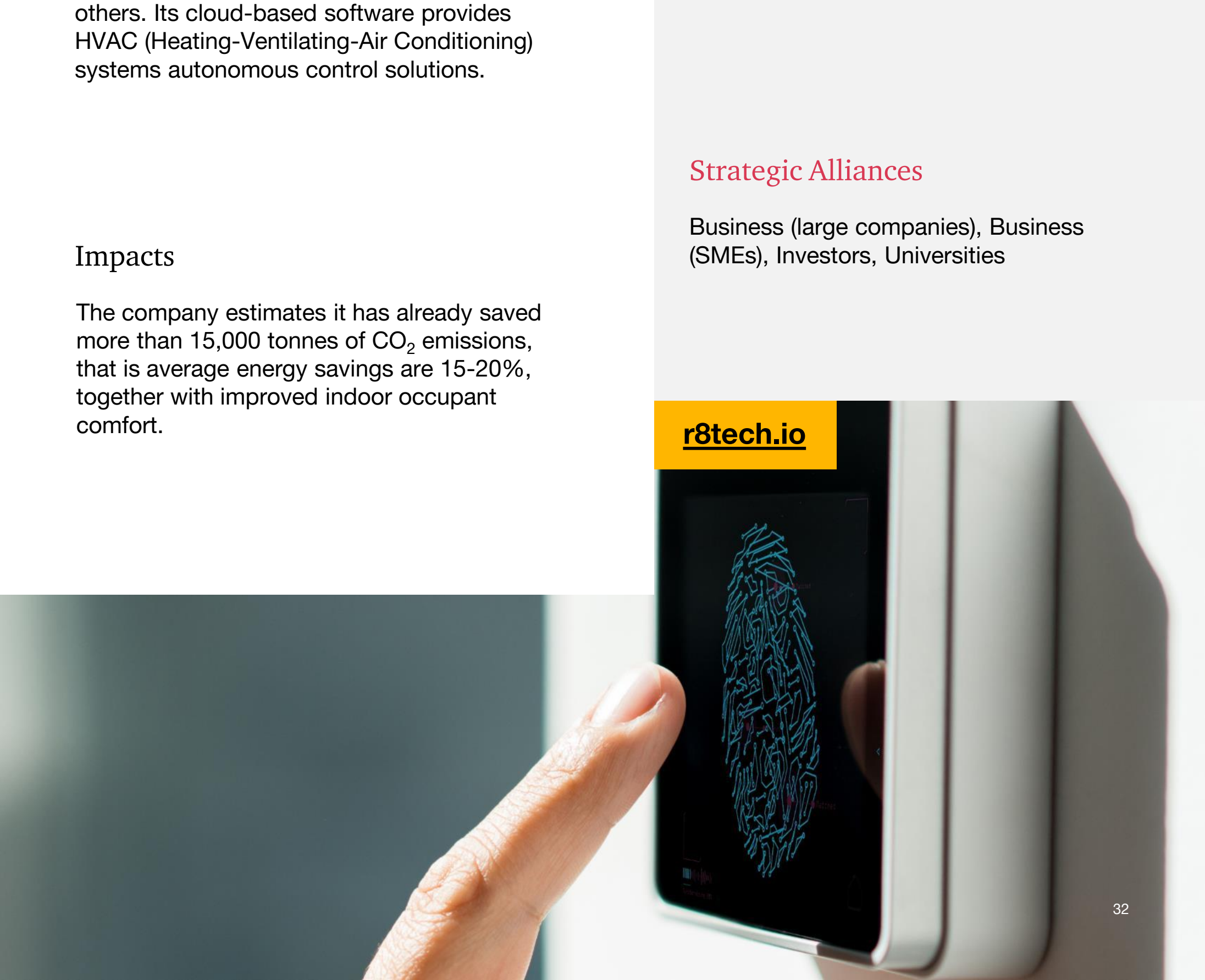
Number of patents: No Patent

R8tech is active in 19 countries across Europe, including the UK, Finland, Portugal, Austria, Poland and the Netherlands. It has been named by the European PropTech Association a European TOP50 Proptech 3 years in a row.

Strategic Alliances

Business (large companies), Business (SMEs), Investors, Universities

r8tech.io



Country: Romania

Type of solution: Transformative Circularity and Recycling

Summary

RongoDesign is a biotechnology start-up that uses organic waste, including coffee grounds and residues from crops such as hemp, hops and sunflowers, to make innovative, safe and durable interior design products with biophilic features, replacing artificial materials.

Impacts

RongoDesign estimates that its manufacturing process is carbon-negative, mycelium captures twice its weight in CO_2 during cultivation processes and its products are 100% biodegradable thus reducing environmental impacts by the nature of the technological process and prevention of waste creation.

Highlights

Number of patents: Patent-pending

RongoDesign says its solution provides 40% better thermal insulation and 70% better sound insulation compared to polystyrene materials. The company has won funding from European Union programmes including the COSME program and Start for Future and is exploring to integrate new types of residues in collaboration with a research institute.

Strategic Alliances

Business (SMEs), Investors, Multilateral Development Banks, Research Institutes, Universities

rongodesign.com

Roofit.solar

Country: Estonia

Type of solution: Renewable Energy Generation

Summary

Roofit.solar makes traditional Nordic design style steel roofs with integrated solar panels, generating on-site energy and reducing installation costs and the carbon footprint of roofing materials. The company reports installation of more than 200 systems in 10 European markets and having a manufacturing facility with outputs of 10MW per year.

Impacts

The company says its 2-in-1 roofing material with solar modules does not use aluminum frames. They claim its product offers roughly 9% CO_2 emission reductions compared with mainstream solar panels in Estonia.

Highlights

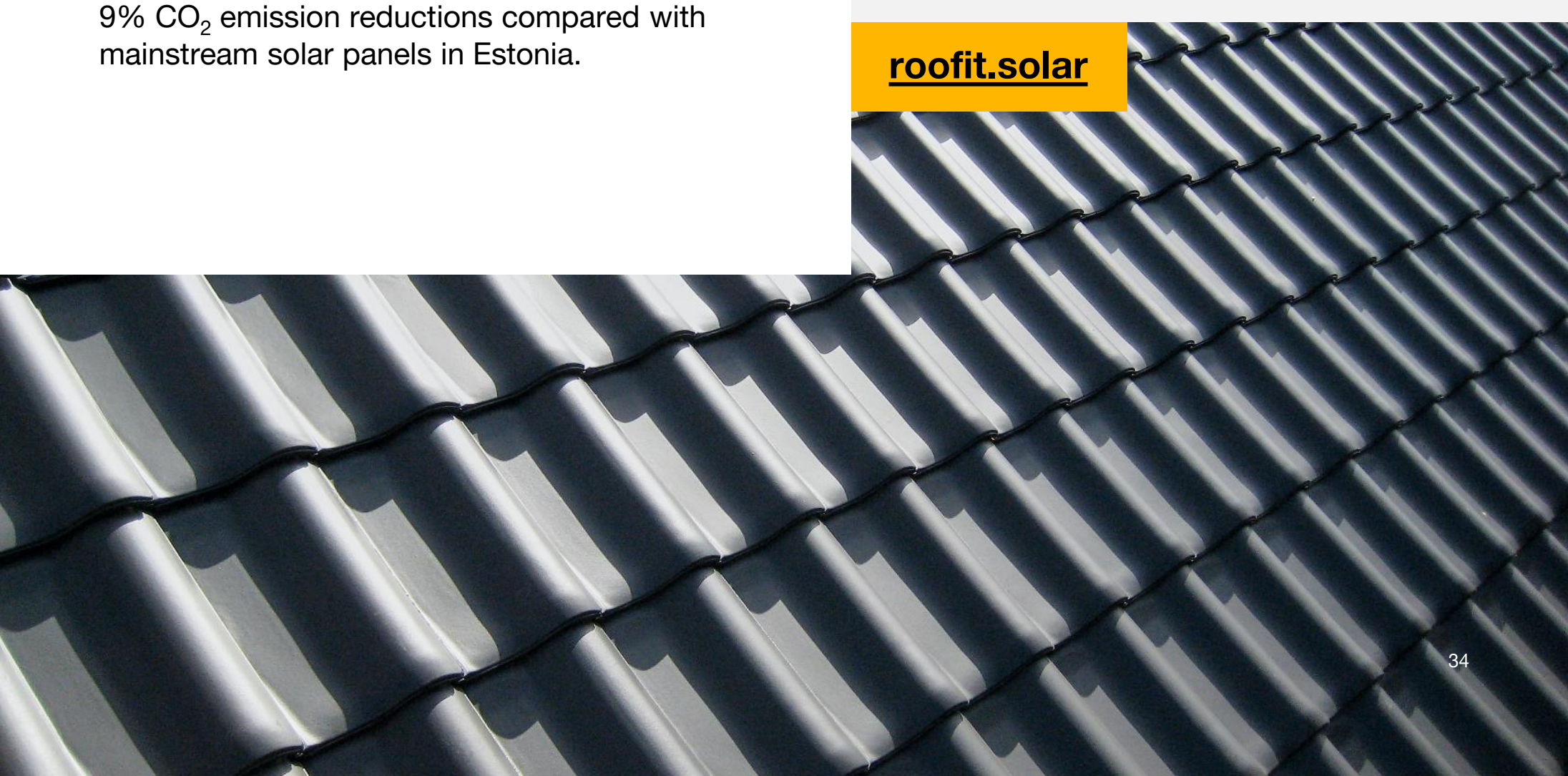
Number of patents: Patent-pending

Roofit.solar says it is seeking to build an all-European solar value chain to reduce dependence and exposure on imports from China. The company says offering larger roof modules rather than individual small solar tiles cuts intensive manual labor and costs.

Strategic Alliances

Investors

roofit.solar



SOLARSTONE

Country: Estonia

Type of solution: Renewable Energy Generation

Summary

Solarstone makes building-integrated photovoltaics (BIPV) that integrate solar panels with regular roof tiles. It also makes an aluminum framing system that can transform solar panels into a two-in-one sublayer-free roofing material that is waterproof. Solarstone collaborates with BMI, the world's largest tiled roof producer.

Impacts

Solarstone claims its products require just half the amount of building materials that traditional solar roofs require.

Highlights

Number of patents: A range of patents

Solarstone's Click-on Full Solar Roof concept aims to address three challenges: complexity, compatibility, and price; standard PV modules can be attached to the framing with no screws or adhesive. The company says it has installed more than 700 roofs, in eight markets. Solarstone reports €1.8 million in revenue for 2021.

Strategic Alliances

Business (large companies), Business (SMEs), Government (cities), Government (local authorities), Investors

solarstone.com

SVELTE

Country: Romania

Type of solution: Low GHG Construction Processes

Summary

Svelte designs, developes and manufacturers machines that produce topologically optimized construction elements and architectural surfaces. It claims its technology can deliver production of surfaces up to 40 times faster than current methods, including moulds for casting building elements such as walls, floors and beams.

Impacts

Svelte claims its 288 systems on the market as of today can save up 2.74 million tonnes of CO_2 per year, reducing use of raw materials, and emissions including nitrous oxide and methane. It also says its systems can cut construction costs by as much as 60% and improve buildings' weight to height ratio by up to 30%.

Highlights

Number of patents: 1x patent

The company says its proprietary systems take 2.5 hours to make the amount of materials that would take 100 hours using CNC milling, and unlike 3D printing its products allow the use of reinforced concrete. Svelte has received SME Instrument and EIC Accelerator grants from the European Commission's Horizon 2020 programme.

Strategic Alliances

Business (large companies), Investors, Research Institutes

svelte.eu

Climate Change Management and Reporting

Climate Change Management and Reporting

Market trends

The push for operational efficiency: Efficient management of operations and sustainability risks drives down operating costs and increases competitiveness. Moreover, optimised processes use less resources, limit emissions and reduce overall climate impact.

Digital transformation: The amount of data collected at different operation sites, across the supply chain and internally, calls for better management of (big) data. This allows companies to better monitor processes and make better decisions. The evolving needs of the market in terms of digitalisation are enabling innovations within e.g. blockchain, IoT and SaaS solutions.

Demands for accountability and transparency: Stakeholders have become more aware of sustainability risk in recent years, demanding access to management and reporting tools that will provide up-to-date, accurate and unbiased information. Moreover, introduction of efficient management tools allows for accurate tracking of resources and how they are used, and companies' impacts, which makes operations more transparent.

Regulatory factors: Management of sustainability topics is required by existing and upcoming regulations such as the SFDR and CSRD and compliance with reporting standards and frameworks, such as the GHG Protocol, ISO 14064-1, and the TCFD recommendations, among others.

Types of solutions: Emissions Data, Monitoring, Management and Reporting (2); Climate/Earth Data Generation (1).

Technological themes: AI (3), Blockchain (1), Cloud computing (2), Data platforms (2), IoT (1), Machine learning (3), Mobile apps (2), Renewable Energy (1), Satellites & space (1).

Headlines from PwC analysis

N/A
Share of CEE GHG emissions

3
Start-ups in the Net Zero Future50 report – CEE Edition

Investment level

N/A
H2 2020 – H1 2021

N/A
H1 2013 – H1 2021

Number of deals

0
H2 2020 – H1 2021

2
H1 2013 – H1 2021

Industry insights

Michał Lasocki

Partner, EEC Venture
Poland

On barriers

Many climate oriented-companies, including SaaS providers, are very capital intensive as they incur heavy upfront development costs, and the payback from revenues is slower than for other products and services. Many climate companies are complementary in terms of their services, which are directly or indirectly dependent on large utilities/energy companies. These are regulated businesses, which means innovators' profit margins are limited. That poses difficulties in financing growth in a typical SaaS way, especially in times when funding is drying up.

On drivers

Any idea that actually reduces final fossil fuel consumption is of great value during an energy crisis. Therefore any solution resulting in energy efficiency, smart grid management or better energy storage has great potential. Energy markets are dominated by large infrastructure players, who value security and reliability because of what their customers need. We need these large players to be willing to allocate a larger share of resources to R&D and product testing, and accept that while some of the solutions will fail, others will be successful.

Marija Ručevska

Co-founder & Managing Partner of Helve
Latvia

On barriers

We are currently launching the third programme of Future Hub, our corporate sustainability accelerator. Throughout the process of matchmaking we have had the opportunity to meet with many climate-tech start-ups. What they often have in common is their especially long sales cycles. Outside corporate sustainability accelerators such as ours, which bring together innovative corporations looking for these kinds of solutions, in the real world it is hard to get management buy-in for such products.

And it is particularly painful for climate-tech solutions, which have some of the longest go-to-market cycles. In addition to all this, capital availability for climate-tech start-ups is still in its early days, though it is slowly catching up. In 2021 only about 13% of all European venture funding went to climate-tech start-ups.

Today we see that in the corporate world, decisions on sustainability innovation are driven either by PR purposes or by legislative changes. When it comes to legislation, experts predict that sustainability will continue to shape the overall regulatory landscape of business operations, which means future investment decisions will also be considered through this lens.

In general, that’s good news for climate-tech start-ups. However, as an ecosystem we need to shine more light on this niche of solutions to make sure that corporations know what is out there whenever they are ready to go in this direction. We need to send out a clear message: those investing in climate-tech start-ups today have a shot at becoming the next decade’s unicorns.

Country: Poland

Type of solution: Emissions Data, Monitoring, Management and Reporting

Summary

Deeplai's TimberFingerprint tracks forestry product provenance from logging to the final wooden product, delivering data for certification, carbon footprint monitoring and carbon credit management. The product uses a combination of a cloud enterprise software, dedicated mobile app, embedded software on a hardware unit using a unique variable code marking pattern.

Impacts

TimberFingerprint aims to provide data to help companies reduce their carbon footprints and exposure to illegal logging activities.

Highlights

Number of patents: Patent-pending

TimberFingerprint's has initiated the unique variable code marking pattern (Dcode) used to create a digital database of logs. The company says replacing the current barcode labeling method can reduce costs by 70%.

Strategic Alliances

Business (large companies), Government (central authorities), International Development Agencies, Investors, NGOs

deeplai.com

Country: Poland

Type of solution: Climate/Earth Data Generation

Summary

Four Point provides mechanical structures and design services in the following spaces: remote sensing for opencast mines (RSOM), autonomous transport platform (ATP), space resources extraction (SRE) and R&D. The company aims to complete by 2023 its first operational prototype of an autonomous vehicle powered by hydrogen which could be used on Earth and in space .

Impacts

Its autonomous extraction solutions can optimize the extraction process by reducing machine running time, raising the productivity of transport of heavy materials and reducing emissions.

Highlights

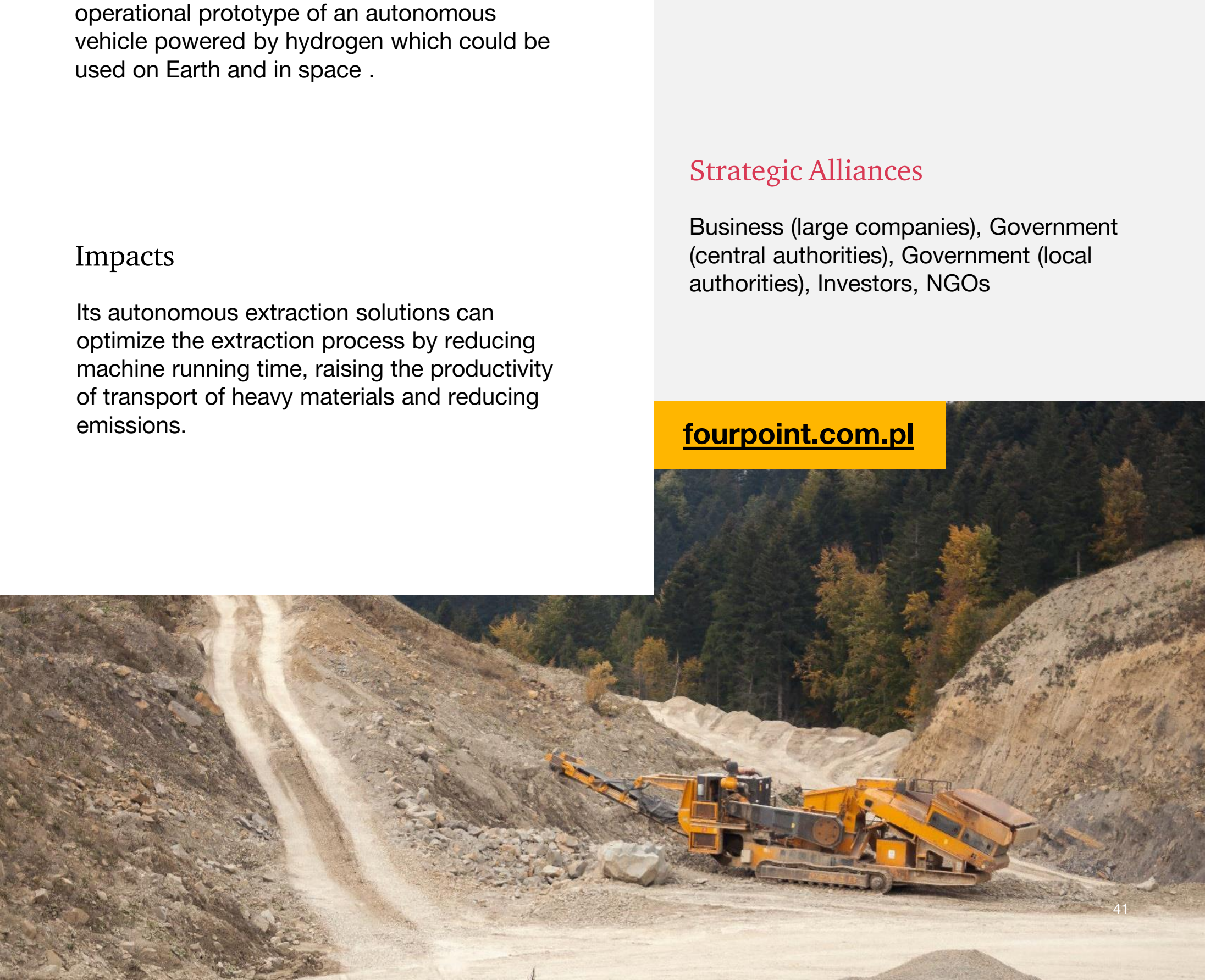
Number of patents: No Patent

The company is implementing projects financed by European Funds EcoSat and MineCam and collaborates with the European Space Agency (ESA). The company also recently entered into a collaboration with Astroport Space Technologies to use its Autonomous Transport Platform (ATP) technology to help construct lunar landing and launch platforms.

Strategic Alliances

Business (large companies), Government (central authorities), Government (local authorities), Investors, NGOs

fourpoint.com.pl



TIMBETER

Country: Estonia

Type of solution: Emissions Data, Monitoring, Management and Reporting

Summary

Timbeter uses artificial intelligence for timber measurement and data management, counting and measuring logs and tracking their origin to improve transparency and control for the forest industry and helping to fight illegal logging. The time to measure a pile of logs can be cut to just 2 minutes from 30.

Impacts

Timbeter says its system optimises planning of timber transport, improves measurement of logs and helps fight illegal logging, which reduces biodiversity and threatens the livelihoods of rural and indigenous communities.

Highlights

Number of patents: 1x patent

Timbeter says its roundwood digital database is the world's largest, with more than 65,000 users in more than 60 countries. It works with large international companies including CMPC (Chile), Suzano (Brazil), Georgia Exports (USA), Green Resources (Africa), with government-level pilot projects ongoing in Lithuania, Poland, Georgia, Costa Rica and Kenya

Strategic Alliances

Business (large companies), Business (SMEs), Government (central authorities), International Development Agencies, Investors

timbeter.com

Energy

Energy

Market trends

The rise of the prosumer: Small-scale energy production by consumers (e.g. through solar) is becoming more and more popular, especially in new developments, as it drives down household power and heating costs. This is likely to be further enhanced by local regulations and EU targets that will require new buildings to be equipped with photovoltaics or similar technologies..

Companies' ESG targets: The switch to green energy sources is a milestone for companies who have committed themselves to sustainability goals such as net zero, carbon neutrality or science-based targets (SBT), as it allows them to dramatically cut GHG emissions.

The political environment: Shifting to a more sustainable energy mix and investment in alternative energy sources is a key element of both national and European energy policies for the coming years. Together with sharp energy price increases connected to the current political situation and GHG emission targets, this is encouraging rapid growth of technologies that will increase grid efficiency, cut energy consumption and raise the productivity of sustainable power sources.

Nascent solutions:
Ocean & tidal power

Types of solutions: Renewable Energy Generation (4); Grid Management (2); Energy/Resource Efficient Manufacturing Processes (1); Alternative Fuels (1); High Efficiency Energy Intensive Electronic and Smart Monitoring / Management (1); Waste Heat Capture/Conversion/Storage (1).

Technological themes: Advanced materials (2), AI (4), Circular (2), Data platforms (5), Green manufacturing (1), IoT (4), Machine learning (1), Marketplaces (1), Other (2), Renewable Energy (5), Smart cities (4), Smart materials (1) .

Headlines from PwC analysis

47.23%
Share of CEE GHG emissions

10
Start-ups in the Net Zero Future50 report – CEE Edition

Investment level

US$0.59m
H2 2020 – H1 2021

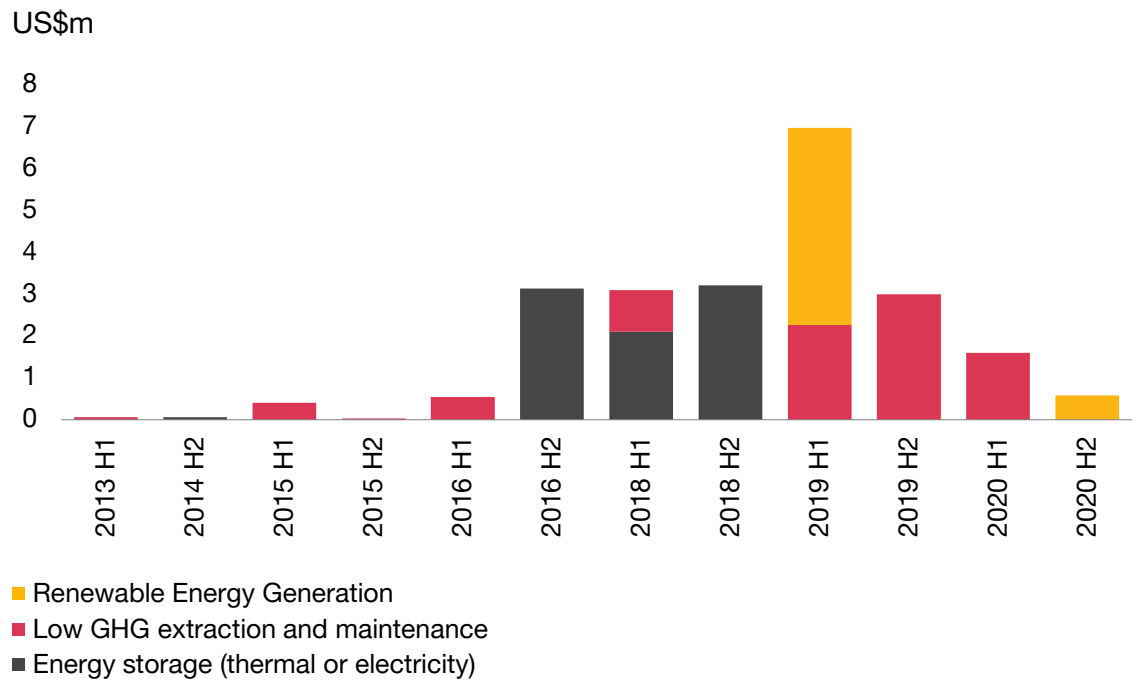
US$22.73m
(1.29% of total investment for this period)
H1 2013 – H1 2021

Number of deals

6
H2 2020 – H1 2021

23
H1 2013 – H1 2021

Energy climate tech start-up funding in CEE by type of solution



Industry insights

Darius Maikštėnas

Chair of the Management Board and the CEO of Ignitis Group Lithuania

On drivers

Ignitis Group’s robust performance in such turbulent times is clear evidence that we’ve made the right strategic decisions and are taking the right approach towards prioritising achievement of sustainability objectives and making the world Energy Smart. The consistent successful growth of our renewable energy capacities portfolio in the region and empowerment of climate tech innovation in recent years was fundamental for carrying out the largest IPO in the Baltics in 2020. Further development of our renewable energy portfolio and climate tech solutions, while applying the highest standards of ESG and ensuring regional energy security and independence, will remain our core strategic priorities.

In our view, the scalability of climate positive tech is now a question of ‘when’ rather than ‘if’, but strong government and private investment is required more than ever to empower R&D and new commercially successful applications as early as possible. The energy sector transformation in the coming decade will undoubtedly create an unprecedented scale of opportunities and provide the impulse for a new era of energy technology and innovation.

ADVANGRID

Country: Latvia

Type of solution: Energy/Resource Efficient Manufacturing Processes

Summary

AdvanGrid provides a subscription-based energy management service for EU-based industrial SMEs using wireless sensors and an AI-backed data analytics platform. It provides advice on energy efficiency measures through infrastructure and consumption analysis and optimization.

Impacts

The company estimates that it can help cut energy use on average in between 10-20% and as much as 40% this could translate into significant emissions reductions.

Highlights

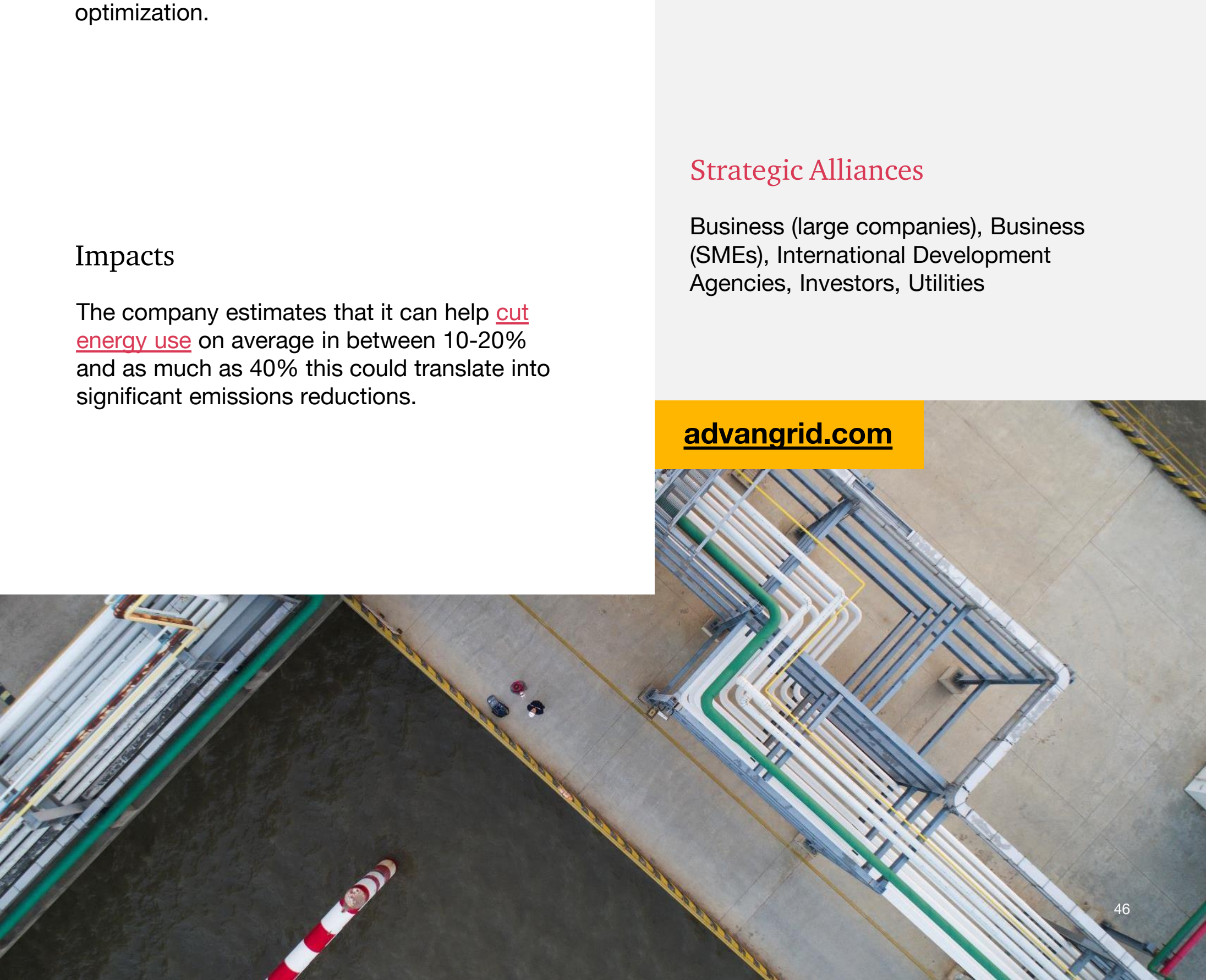
Number of patents: No Patent

AdvanGrid suggests its expertise in hardware, software, and wireless communication has allowed them to develop IoT sensors that help analyze flaws in electricity infrastructure. Last year it began collaborating with Saudi Aramco to improve their energy and operational efficiency. It also claims its expanding to new markets with the help of international development agencies.

Strategic Alliances

Business (large companies), Business (SMEs), International Development Agencies, Investors, Utilities

advangrid.com



Fusebox

Country: Estonia

Type of solution: Grid Management

Summary

The Fusebox is a Virtual Power Plant(VPP), a cloud based platform, which helps companies and consumers participate in Demand Response (DR) schemes, reducing their electricity usage to help balance power production and consumption without operational interruptions. The company estimates energy consumption levels of 700 000 MWh through its platform.

Impacts

Fusebox estimates that over 540 tonnes of CO_2 emissions have been reduced so far through its use.

Highlights

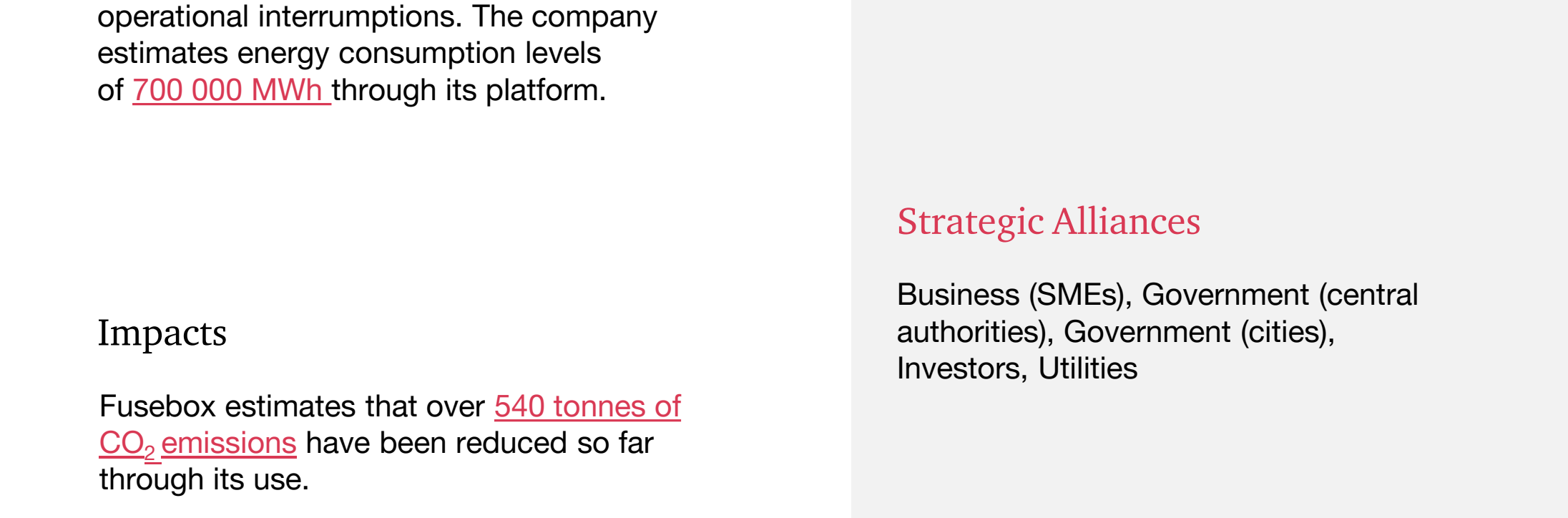
Number of patents: No Patent

Fusebox, which operates in the Baltics and Finland, says its product is highly adaptable and scalable, helping meet the needs of a variety of clients. The company has won several international accelerator programs and hackathons, including first prize in Siemens Mindsphere in Australia. It is also a recipient of a 691K€ grant by Norway's Green ICT program.

Strategic Alliances

Business (SMEs), Government (central authorities), Government (cities), Investors, Utilities

fusebox.energy



Country: Poland

Type of solution: Alternative Fuels

Summary

Globe Green Energy's Thermal System for Biomass 3000 is an innovative small scale cogeneration system for individual applications. The system can burn a variety of raw or low-processed solid biomass with very efficient and clean combustion, and is highly efficient in converting thermal energy into electricity.

Impacts

The system replaces old solid fuel boilers with more efficient, cleaner production, Green Globe says. In CEE territories millions of households have technologically obsolete coal boilers and wood, which do not meet emissions control standards. For instance, Poland alone still has more than 3 million household boilers that don't meet emissions standards.

Highlights

Number of patents: 1x patent

The company says its system works with various types of solid biomass, and allows generation of more than 50% more energy from the same calorific value of fuel. Green Globe won a €700,000 European grant to develop its small-scale cogeneration unit and says it's in talks with several potential licensees.

Strategic Alliances

Business (large companies), Business (SMEs), Investors, Research Institutes, Universities

globegreenenergy.com

Country: Lithuania

Type of solution: Grid Management

Summary

Inion Software supplies IoT solutions for energy management: PV plant monitoring and management systems, and energy management systems for battery control. The platform maximises green energy use by connecting producers and consumers in real time. It uses proprietary algorithms to estimate output levels without using sensors.

Impacts

The company estimates hundreds of solar installations connected to the platform reduced CO_2 emissions by 3,000 tonnes in January-June 2022, and the system allows users to cut energy use by up to 30%,.

Highlights

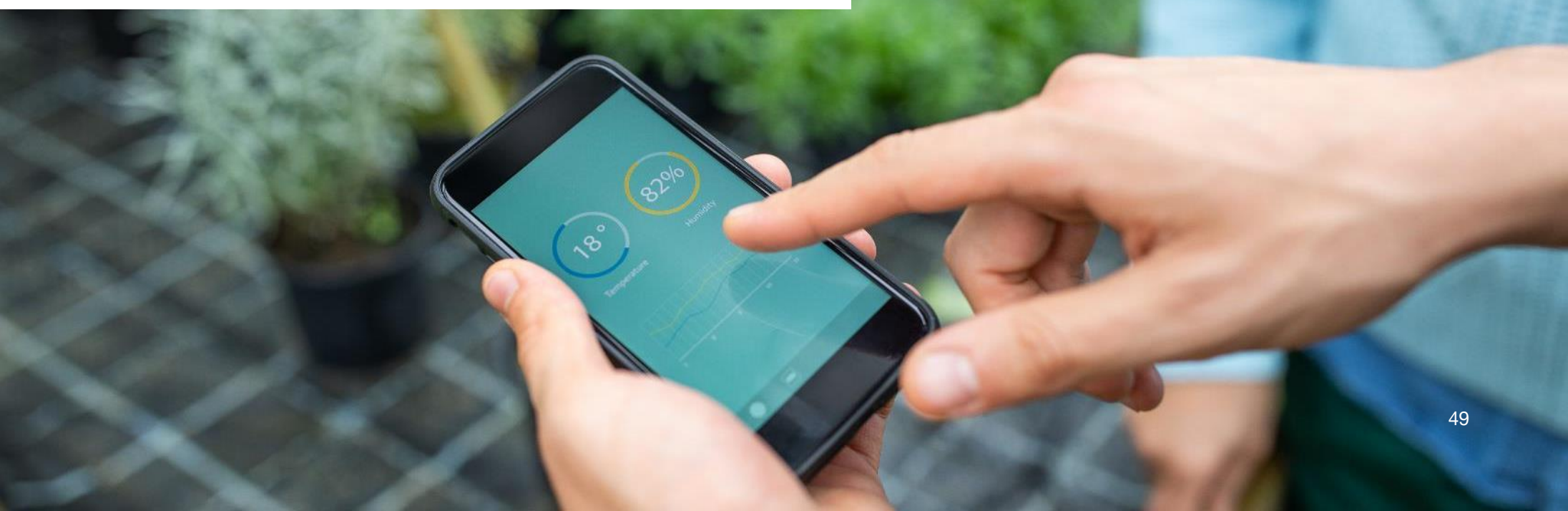
Number of patents: No patents.

Inion Software has a partnership with Abora Solar, a Spanish hybrid panel manufacturer, which plans to purchase at least 200 loggers from Inion Software this year and expect to double the amount each year after then. Its battery energy management system is available as a white label solution for battery makers.

Strategic Alliances

Business (large companies), Business (SMEs), Utilities

inionsoftware.com



Light Mirror

Country: Lithuania

Type of solution: Renewable Energy Generation

Summary

LightMirror develops controllable reflective panels to bring sunlight into hospitals and care homes, reducing heating needs. Installed reflective panels at the edges of roofs can redirect sunlight into other buildings, making natural light a controllable asset and cutting the costs of lighting and heating.

Impacts

LightMirror says its solution can cut energy needs by 10-30% for just 3.3% of the cost of an ordinary renovation, and avoids the emissions used in manufacturing building materials.

Highlights

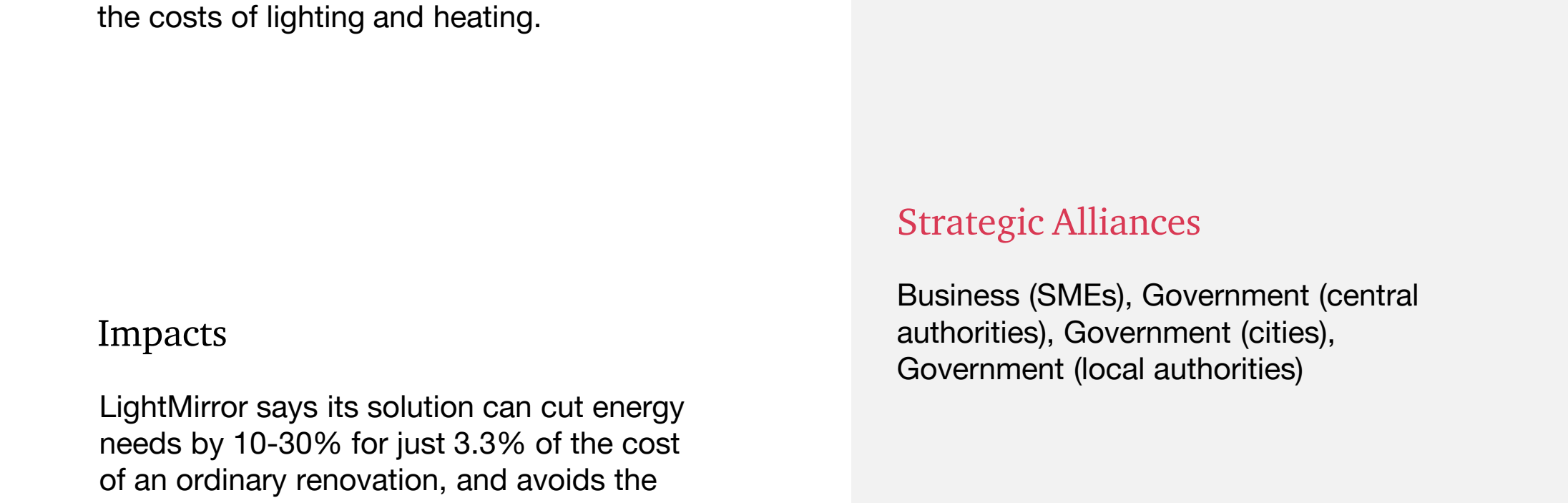
Number of patents: No patent

By addressing the lack of natural light in healthcare buildings, the company says it can help speed up the healing process by reinforcing circadian rhythms, and reduce stress and anxiety among healthcare workers. LightMirror has won two awards for start-ups from the European Commission.

Strategic Alliances

Business (SMEs), Government (central authorities), Government (cities), Government (local authorities)

light-mirror.fr



Country: Poland

Type of solution: High Efficiency Energy Intensive Electronic and Smart Monitoring / Management

Summary

mTap Smart City delivers outdoor and indoor light management hardware and software solutions. It analyses data from a range of sources, allowing users to optimise energy consumption, safety and comfort. The system provides suggestions for operators of streetlights that allow optimisation with a single tap on a touchscreen.

Impacts

mTap says it will reduce CO_2 emissions by 315 tonnes in 2022, and its solution can cut energy usage by up to 20% in the two years after it's installed.

Highlights

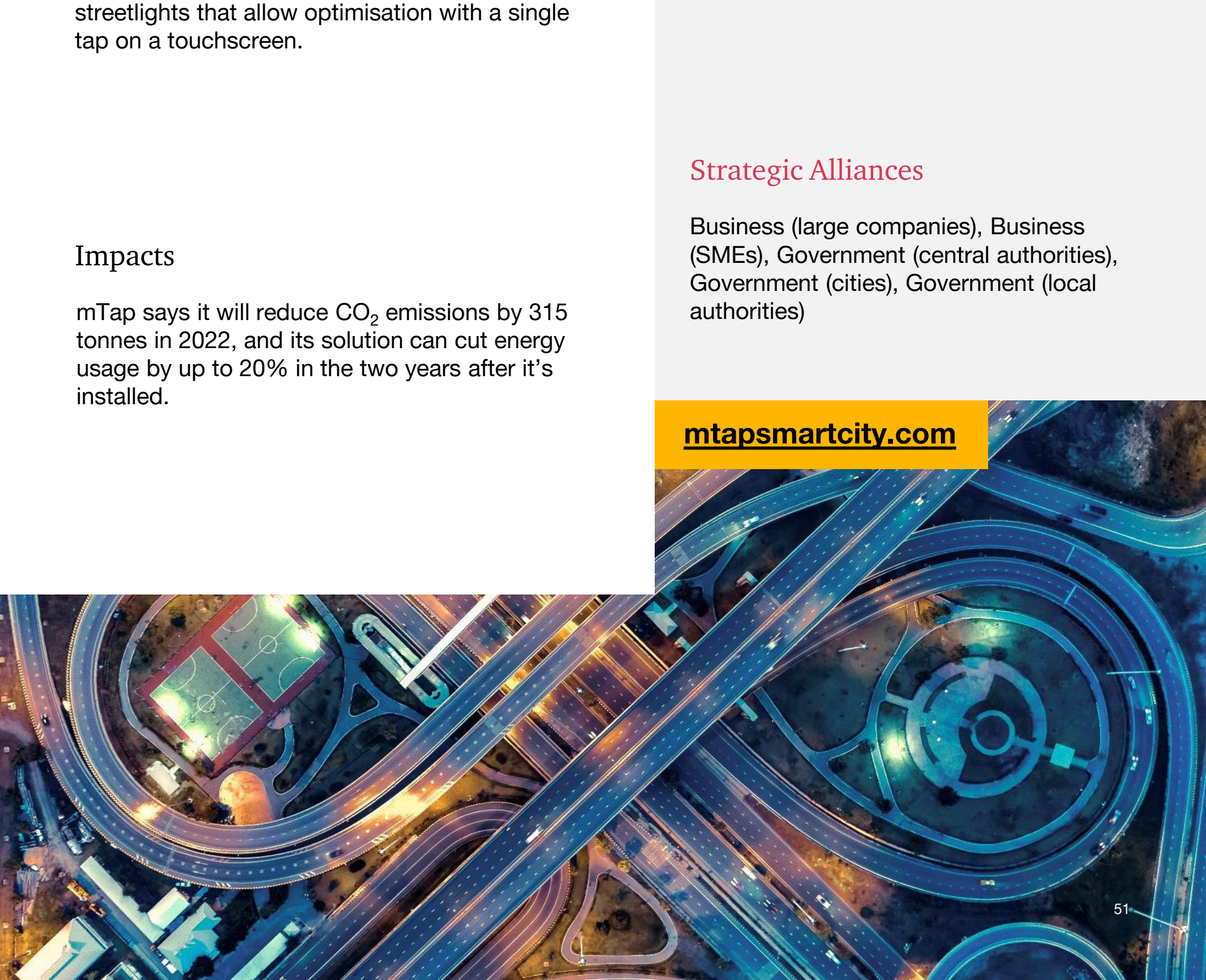
Number of patents: No patent

mTap reports that its AI-powered system is being used in 700 lighting points and it is providing an experimental solution for a gas mine object for Polish gas company PGNiG. It works with LED lamp vendors including Luxon LED.

Strategic Alliances

Business (large companies), Business (SMEs), Government (central authorities), Government (cities), Government (local authorities)

mtapsmartcity.com



PowerUP ENERGY TECHNOLOGIES

Country: Estonia

Type of solution: Renewable Energy Generation

Summary

PowerUP Fuel Cells OÜ makes electric generators based on hydrogen fuel cells for critical infrastructure protection and off-grid solutions, as well as proton exchange membrane fuel cells. The company's products are compact, lightweight, silent and require minimal maintenance. Its first commercial products include 200W and 400W portable generators.

Impacts

PowerUP estimates that its 400W system emits less than one-third the CO_2 of a diesel generator and 12.5% that of a battery over its lifetime.

Highlights

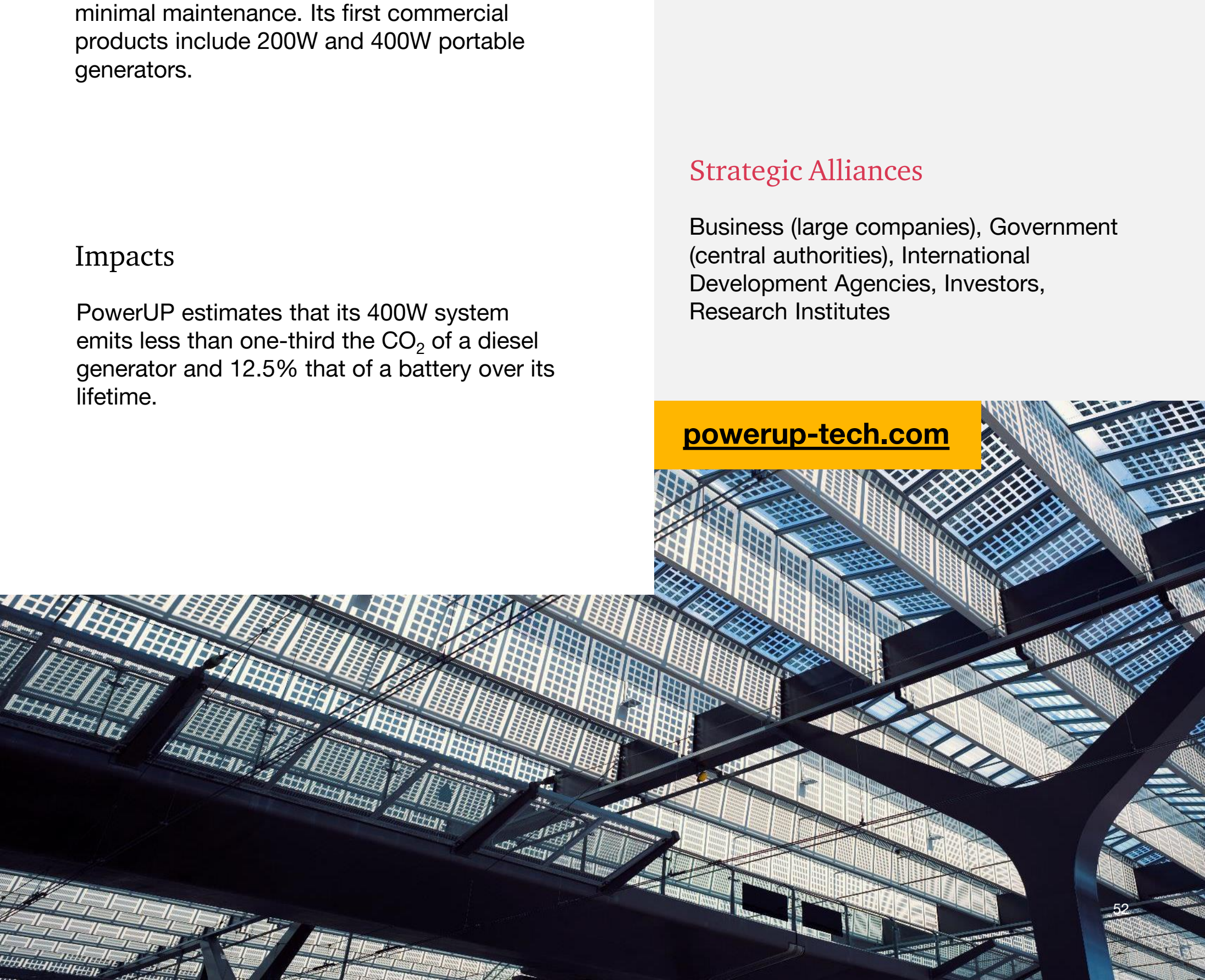
Number of patents: N/A

PowerUP is working on projects with the European Space Agency, Estonian special forces and telecoms operator Telia. In addition to its generators, PowerUP also offers an AI-powered smart grid system that can shift the load between the generator and other power sources, such as solar panels.

Strategic Alliances

Business (large companies), Government (central authorities), International Development Agencies, Investors, Research Institutes

powerup-tech.com



Country: Ukraine

Type of solution: Renewable Energy Generation

Summary

Solar Plex offers solar panels technology that can increase the overall efficiency by as much as 95%.

Impacts

PV panels upgraded with Solar Plex technology generate at least 10% more electricity and four times more heat, saving tonnes of fossil fuels, according to the company.

Highlights

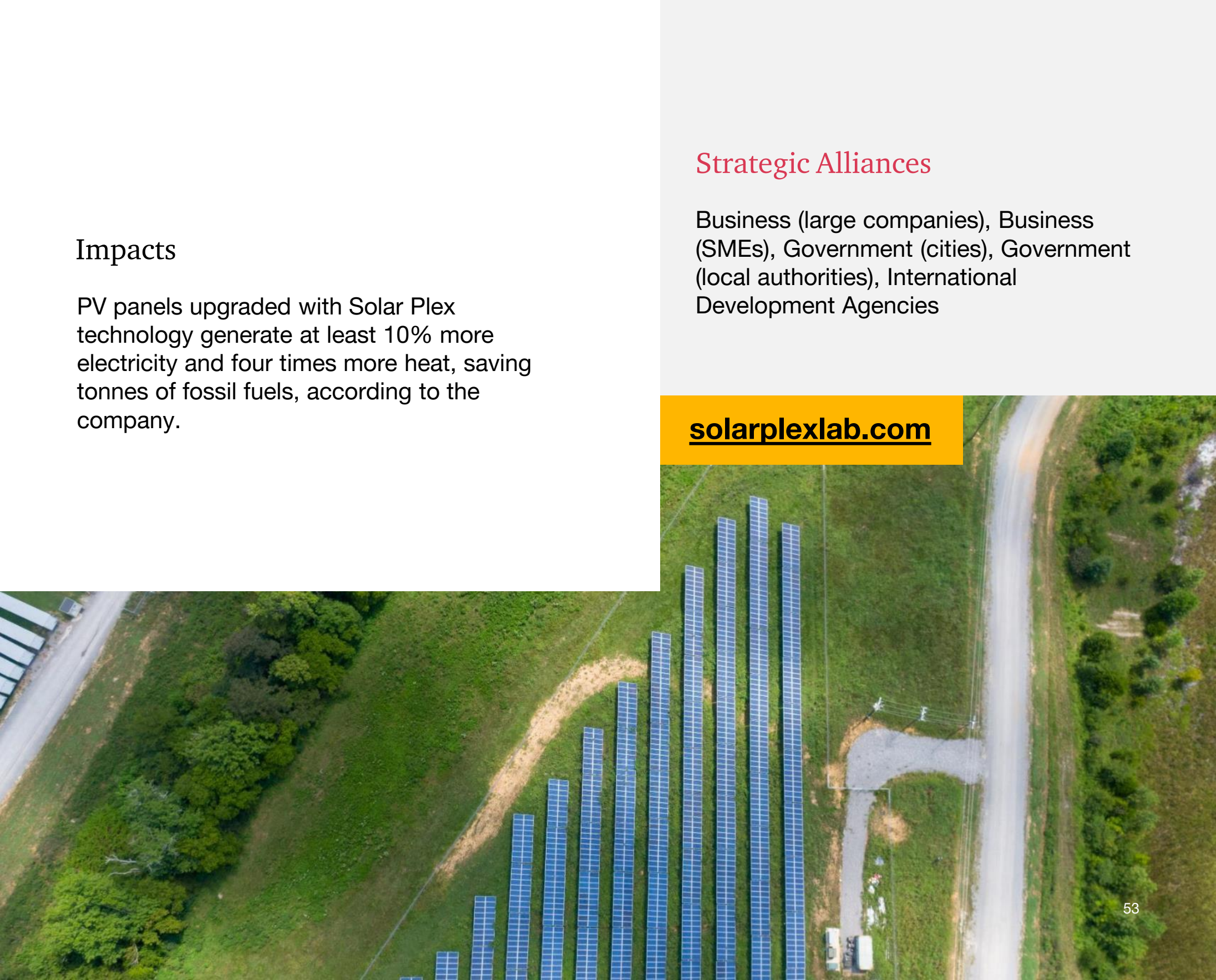
Number of patents: Patent-pending

Solar Plex provides dual-face and dual orientation panels; the company says it offers the lowest energy cost and highest energy density per square metre. Solar Plex partners with solar installers and construction companies, as well as local governments and international development companies.

Strategic Alliances

Business (large companies), Business (SMEs), Government (cities), Government (local authorities), International Development Agencies

solarplexlab.com



SolarAide

Country: Lithuania

Type of solution: Renewable Energy Generation

Summary

SolarAide is a marketplace that connects households with reliable solar installers, making the purchase process fast and easy, increasing price transparency and helping first-time solar customers avoid costly mistakes. It also installs IoT devices that collect energy consumption and production data, enabling provision of smart energy services.

Impacts

SolarAide estimates the average residential solar installation saves 50 tonnes of CO_2 emissions over its lifetime. Its solution aims to reduce the financial and non-financial costs of household solar installations.

Highlights

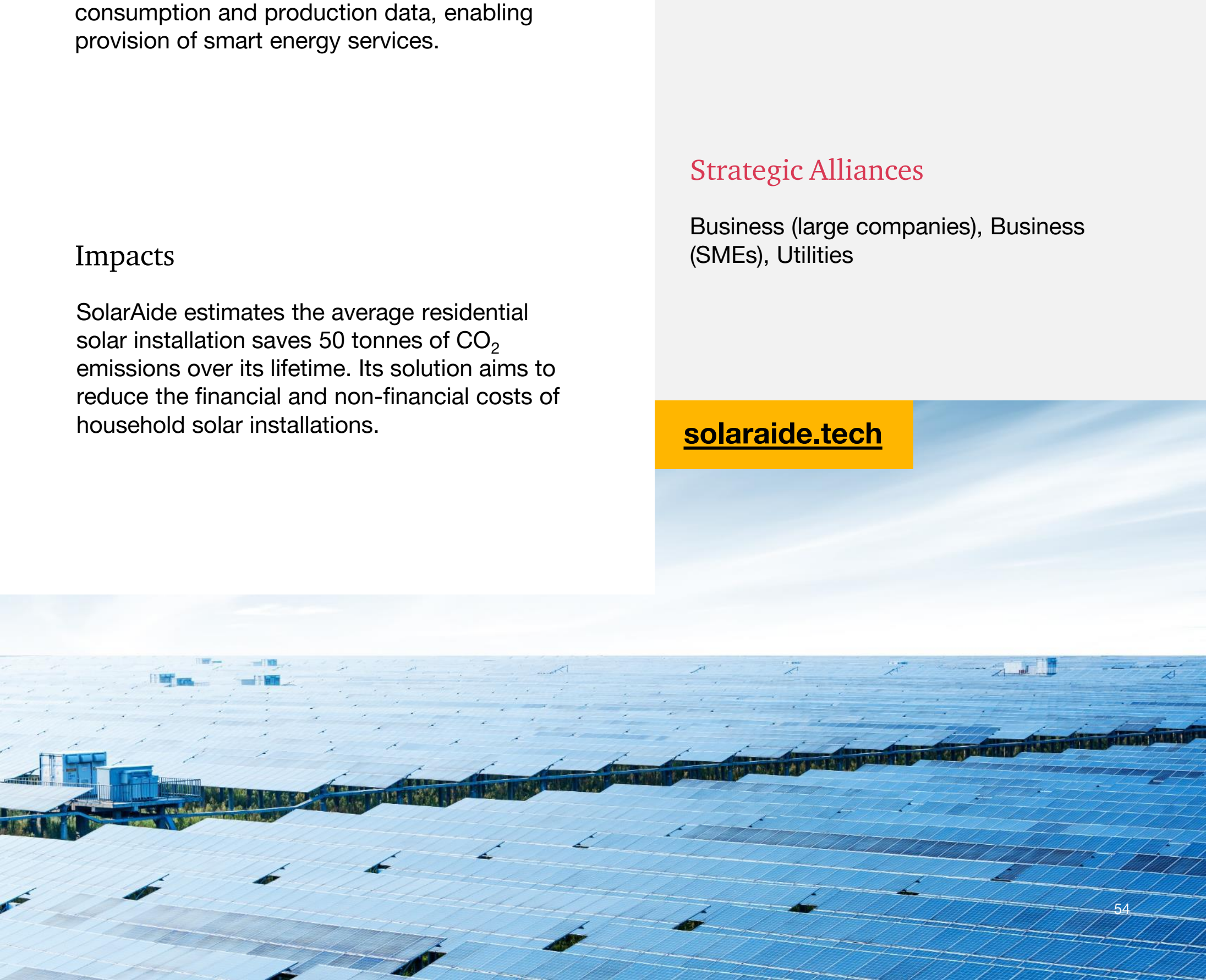
Number of patents: No Patent

SolarAide says its technology allows 95% of customers to receive instant offers from multiple installers. SolarAide is also building an energy data hub, providing insights and smart energy services for households and lowering the costs of customer access and data for energy providers to a fraction of current levels.

Strategic Alliances

Business (large companies), Business (SMEs), Utilities

solaraide.tech



Country: Poland

Type of solution: Waste Heat Capture/Conversion/Storage

Summary

Solhotair technology enables efficient heat generation by using solar collectors to generate thermal energy. The company says its collectors achieve efficiency of 83%, i.e. 19 percentage points more than others solutions available on the market today, saving as much as 40% of annual heating costs.

Impacts

Solhotair says a 2 square meter collector can produce 2,500 kWh of heat annually, replacing about 250 cubic meters of gas or 400 kg of hard coal, cutting CO_2 emissions by 1,600 kg annually.

Highlights

Number of patents: 1x patent

Solhotair says it provides a greater temperature increase above 20°C and higher efficiency than its competitors' products. It estimates its collectors can collect heat outside air at a solar radiation intensity of just G=500W/m^2, compared with 1000W/m^2 for competing products.

Strategic Alliances

Business (large companies), Business (SMEs), Government (central authorities), Government (cities), Investors

solhotair.pl

Financial Services

Market trends

Climate change is a systemic risk that is impacting the financial sector, as it is impacting all sectors of the global economy. The industry is varied in its functions though all actors have in common a fiduciary duty to act in the best interests of the individuals or organisations whose assets they are responsible for overseeing. A growing number of financial institutions recognise that climate change increases uncertainty and investment risk but also opens new opportunities.

Regulatory pressure/push

Financial institutions are under rising regulatory and commercial pressure to protect themselves from the impact of climate change and to align with the global sustainability agenda. Regulators around the world and in the EU specifically, such as the European Banking Authority, have been formalising new rules for climate-risk management, rolling out demanding stress tests in the months ahead. Many investors, responding to their clients' shifting attitudes, already consider ESG factors in their investment decisions and are channeling funds to 'green' companies. This is also the result of the already binding legislation, the EU Taxonomy and the Sustainable Finance Disclosure Regulations with the process being accelerated by the upcoming Corporate Sustainability Reporting Directive.

Commercial pressure/push

The commercial pressure for better climate-risk management is also increasing. In a competitive environment in which financial institutions are often assessed on their green credentials, it is required to develop sustainable-finance propositions and to incorporate climate factors into capital allocations, loan approvals, portfolio monitoring, and reporting.

The above requires financial institutions to identify, measure, and monitor exposure to climate risk and to ensure that the necessary technological solutions are in place.

Financial Services

Based on our analysis we found no information related to climate tech investments or start-ups with solutions regarding financial services in CEE.

Headlines from PwC analysis

N/A
Share of CEE GHG emissions

0
Start-ups in the Net Zero Future50 report – CEE Edition

Investment level

N/A
H2 2020 – H1 2021

N/A
H1 2013 – H1 2021

Number of deals

N/A
H2 2020 – H1 2021

N/A
H1 2013 – H1 2021

Industry insights

Jitka Haubová

Member of KB Board of Directors in charge of Operations including Sustainability of Komerční banka, a.s., Czechia

On barriers

In terms of financing a sustainable future and bringing climate tech solutions onto the market, at SG/KB Group we always strive to be an initiator and leader. However, there are several challenges in implementing sustainable solutions in our internal activities and reflecting these trends in our products and services. For instance, to reduce our carbon footprint we implemented a robust energy and water management programme where we monitor consumption and set targets, conducting detailed checks of our sites. Additionally, there is a great deal of new regulation that we have to implement into our processes. Often this is related to data collection and reporting, and we have to adjust our systems or documents to ensure that we comply, so we have formed teams to administer this agenda.

On drivers

We offer our clients options that help minimise environmental impacts, and we want to show them the cases in which KB Group can be the right partner for them on the path to a sustainable future. It is important for us that our clients see not only a lower environmental burden, but also financial returns and savings, and that they are aware of the subsidies available in this area. Slowly but surely we are considerably broadening our range of products and services for retail and corporate clients. While retail clients can invest responsibly in funds meeting ESG criteria, receive privileged funding for sustainable technology that generates energy cost savings and carry payment cards from recycled materials, corporate clients can use ESG advisors at KB Advisory and buy photovoltaics for just CZK 1, allowing them to benefit from solar energy without the need for initial capital; we also offer green financing and sustainability-linked loans.

Food, Agriculture and Land Use

Food, Agriculture and Land Use

Market trends

Shifting consumer habits: As people change their eating habits, there is growing demand for sustainable food products. Healthy, ‘green’ diets, veganism and vegetarianism, zero waste cooking/eating are no longer niche, charitable endeavours; they’ve become mainstream. But the need for convenience and flexibility of choice remains, thus creating an enormous market opportunity for sustainable food producers.

Growing climate risks: Climate phenomena such as wildfires, floods and heat waves pose a significant threat to traditional food sourcing, especially agriculture. There is a growing need for innovations that will increase the resilience of food production, as well as technologies that will enable the real-time monitoring and management of land.

Demand for ethically sourced food: There is a growing trend of including ‘social’ trends into the food industry, as consumers become more aware of its impact on the environment and communities. Such trends include encouraging local sourcing, social economies, detection of unfair trading and food fraud, and greater transparency in the supply chain.

Nascent solution:
Precision agriculture

Types of solutions: Precision agriculture and robotics (5); Food waste technology (2); Earth and marine protection (2); Agricultural Biotech/Genomics and Natural Solutions (1); Alternative foods/low GHG proteins (2).

Technological themes: Advanced materials, AI (5), Behaviour change (3), Biomaterials (3), Biomimicry (1), Biotechnology (3), Blockchain (2), Circular (3), Cloud computing (1) , Data platforms (5), Green manufacturing (2), IoT (6), Machine learning (7), Marketplaces (1), Mobile apps (4), Nano materials (1), Open source (1), Other (3), Robotics (3), Satellites & space (1), Smart cities (4), Smart materials (1).

Headlines from PwC analysis

6.95%
Share of CEE GHG emissions

12
Start-ups in the Net Zero Future50 report – CEE Edition

Investment level

US$329.93m
(1.61% of total investment for this period)
H2 2020 – H1 2021

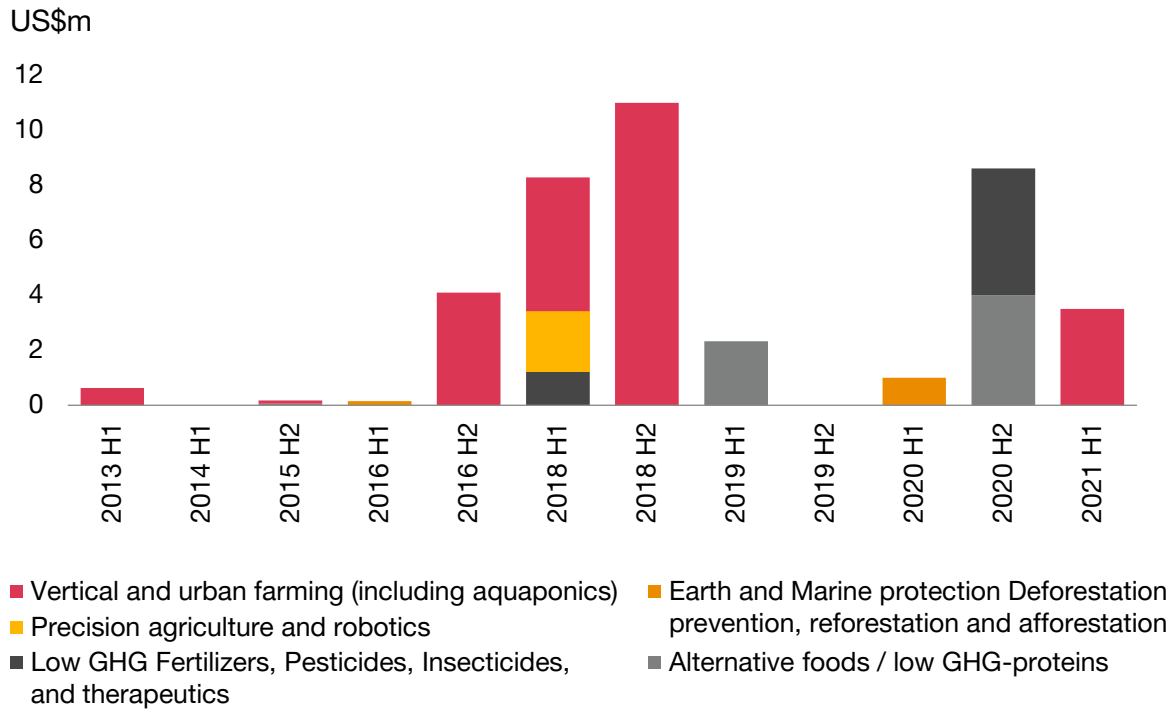
US$39.79m
(2.26% of total investment for this period)
H1 2013 – H1 2021

Number of deals

6
H2 2020 – H1 2021

33
H1 2013 – H1 2021

Food, Agriculture and Land Use climate tech start-up funding in CEE by type of solution



Industry insights

Karolina Wojtas

Investment Manager of Icos Capital Management B.V.
The Netherlands / Poland

On barriers

The process of scaling up food tech climate solutions involves mainly economic, technological and regulatory challenges. Innovative food tech solutions that aim to decarbonise this industry often rely on deep technologies such as cell culture, fermentation or new extraction methods. These solutions are characterised by a longer time to market, significant R&D spendings and greater capex investments on production. The final products also often require approvals from institutions such as EFSA or FDA, which have their own processes. In addition, an important technological question is always about a solution that works not only on a laboratory scale but also on an industrial level.

These challenges overlap and are interdependent and therefore need to be addressed collectively. First, by demonstrating commercial and impact opportunities in this space that would attract funding, a skilled workforce and the attention of policymakers. Secondly, by educating the market about technology development cycles, possible business models and financing schemes. It can already be observed on the market that more and more investors are open to taking the risk of investing in food tech climate space and building investment teams specialised in this area, including subject matter experts.

On drivers

Investing in food tech climate solutions brings benefits in terms of both financial returns and positive ESG impact. The wider market and consumers are already aware of opportunities in areas such as meat alternatives or clean label products, many of which are offered in retail. In the coming years, attention should be expanded to food production technologies and the entire food value chain.

There is an observable growing potential of production based on biotech methods and technologies making existing production processes more efficient. Why not have microorganisms that produce milk-alike proteins? Why not use food loss as a feedstock? - These and similar questions are now being asked by the industry. At the same time, people are increasingly interested in receiving information about ingredients and farm-to-fork supply chain data.

It creates commercial opportunities for those who understand trends and technology and will either create a new solution or invest in the emerging areas. In order to accelerate this, the entire food industry should become more open to experimenting with new production methods as well as implementing industry digitization solutions that will increase efficiency and ensure better control over production and its impact.

Country: Estonia

Type of solution: Precision agriculture and robotics

Summary

Agrieye develops AI-based remote sensing products for climate-smart agriculture. Its platform and CO_2 offset market for farmers and landowners use machine learning to process satellite data, making agriculture sustainable and profitable with meaningful insights and monetisation of CO_2 sequestration.

Impacts

Agrieye says its solutions can help farmers to increase their productivity with less costs and to provide vital insights on weather and climate change patterns, reducing food waste, slowing down soil erosion and providing insights on where water is needed most.

Highlights

Number of patents: Patent-pending

Agrieye says its technology maps field boundaries, identifies crops, predicts potential yield, verifies sustainable practices, and assists with sustainable practices by providing soil, moisture and weather insights. It has more than 20 unique algorithms including erosion identification, biomass calculation and precise soil moisture modeling.

Strategic Alliances

Business (large companies), Business (SMEs), Government (central authorities), Investors, NGOs

agrieye.tech

Country: Poland

Type of solution: Precision agriculture and robotics

Summary

AgronetPro is an IoT solution for smart agriculture based on more than 13 sensors that measure field conditions including air and soil temperature, soil moisture, air humidity, leaf wetness, wind speed and rainfall. The system supports farmers in decision-making to deliver high quality produce and save water, energy, fertilizers and plant protection products.

Impacts

AgronetPro says it helps more than 100 farmers reduce the number of treatments with plant protection products, cutting CO_2 emissions, and the increased efficiency causes the leaves to assimilate and sequester more CO_2.

Highlights

Number of patents: No Patent

AgronetPro cites modularity, cost and flexibility as its strengths and says it prioritizes strategic partners collaborations. Through funding from Albatros Group, the company is developing a new integrated software which will help farmers to plan, monitor and analyze all major activities on the farm. They expect to benefit from the Group's more than 20 years of experience and advisory in developing SaaS in this space.

Strategic Alliances

Business (large companies), Business (SMEs), Investors, Research Institutes, Universities

agronetpro.com

Country: Czechia

Type of solution: Earth and marine protection

Summary

ARBO provides data-driven tools to increase the average age of trees in cities and landscapes; as trees age, their ecological benefits grow exponentially. ARBO combines knowledge of urban forestry with cutting-edge technologies to make data collection more efficient and precise, providing arborists with SaaS-based technologies to better evaluate individual trees.

Impacts

A single big tree can store about 25t of CO_2, with additional storage capacity of 0.25t per year, and cool its surroundings in the city by 5 degrees, ARBO says.

Highlights

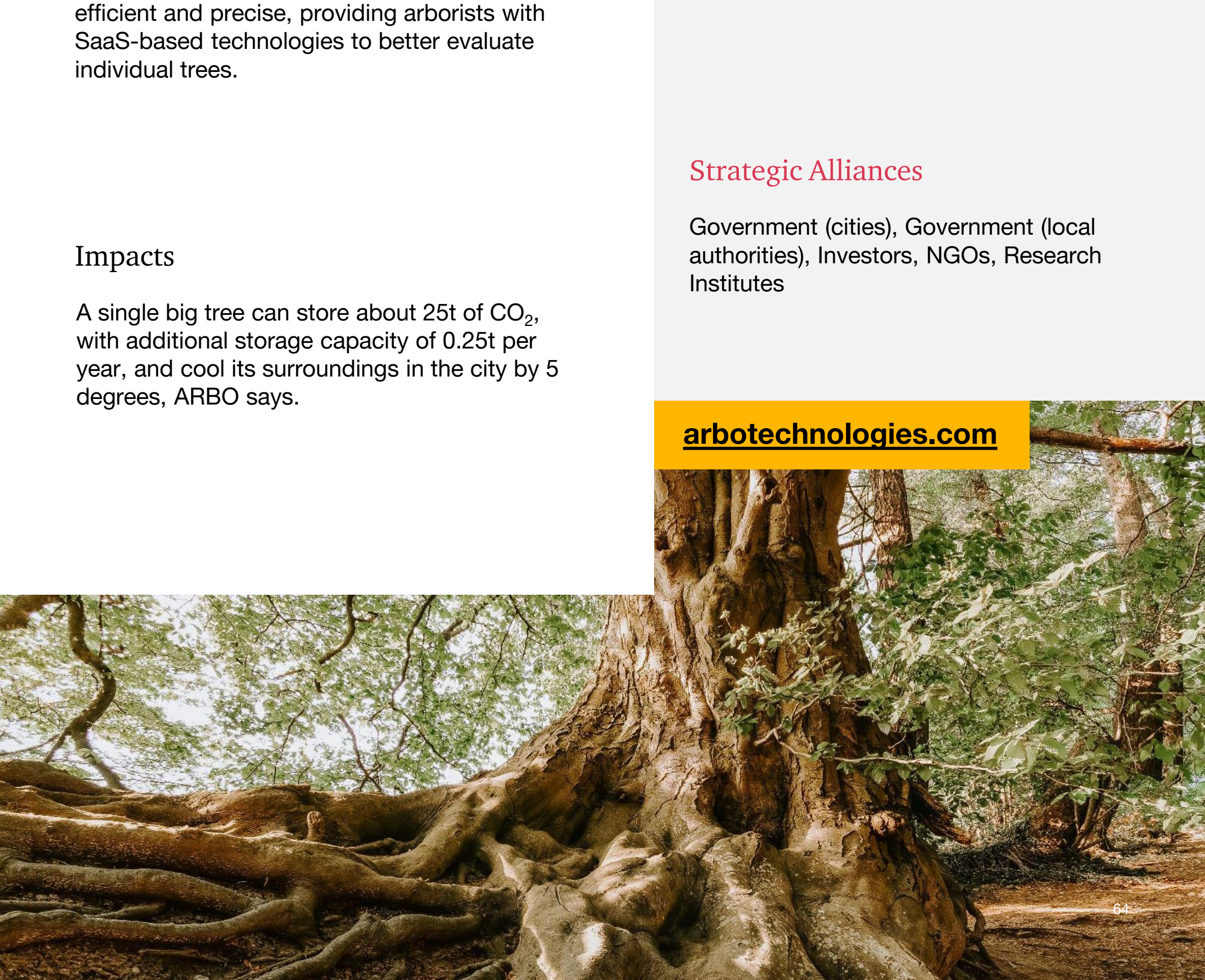
Number of patents: Patent-pending

ARBO is partnering with arborists across Europe to help them use data-driven solutions, and has a contract to collect tree data along 4,500 km of roads in the Czech Republic. The company uses a combination of technologies such as computer vision, 3D scanning, machine learning and big data analysis.

Strategic Alliances

Government (cities), Government (local authorities), Investors, NGOs, Research Institutes

arbotechnologies.com



Country: Serbia

Type of solution: Precision Agriculture and Robotics

Summary

Atfield's flagship product winessense® provides data on vineyards' microclimates, using a dense solar-powered sensor network to create a spatiotemporal data stream to improve decision-making, allowing winegrowers to save two or three sprays per season. The company aims to drive a shift in vineyard risk management by simplifying data interpretation.

Impacts

The reduction in spraying cuts CO_2 emissions by 50 kg per hectare per season, based on a 45 kW tractor, Atfield estimates; it also cuts consumption of fuel, water and chemicals.

Highlights

Number of patents: 1

Atfield reports that its sales and number of customers has grown four-fold year on year. The company says the understanding it provides of microclimate variability is growing in importance for coffee and cocoa producers. It claims to save up to 100h of labor per hectare each season in monitoring vineyards and improve the efficiency of vineyard management.

Strategic Alliances

Business (SMEs), Civil society, Research Institutes, Universities

atfield.tech

Country: Poland

Type of solution: Food waste technology

Summary

EcoBean operates in the HoReCa and Office segment by collecting coffee waste) and transforming it into sustainable raw materials and products. The solution delivered by Ecobean is introducing circularity into the coffee value chain and offering an alternative to the current status quo.

Impacts

EcoBean estimates it reduces GHG emissions in the coffee value chain by 20% by avoiding solid waste combustion, producing biofuel, using green logistics and making eco-friendly products.

Highlights

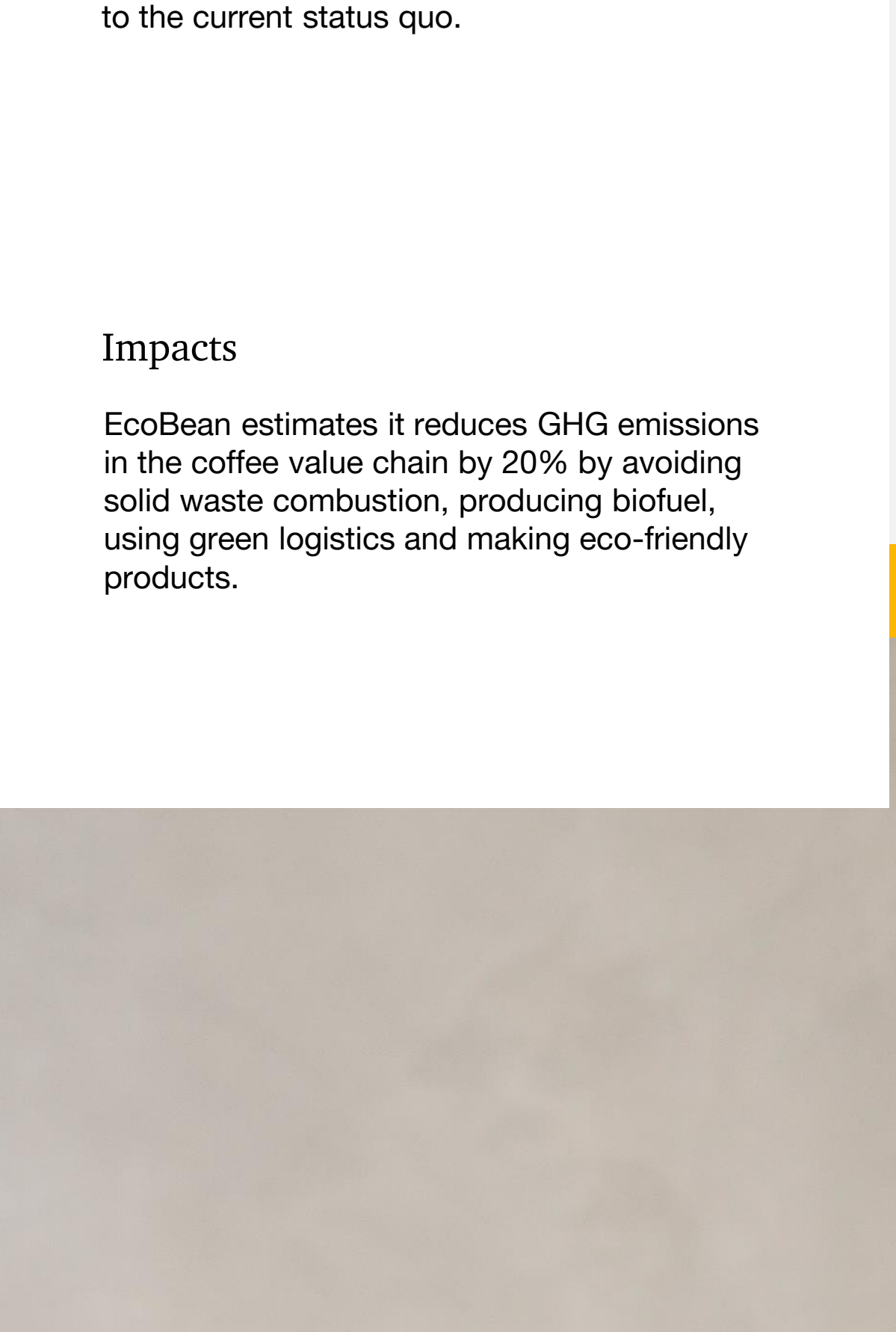
Number of patents: A range of patents

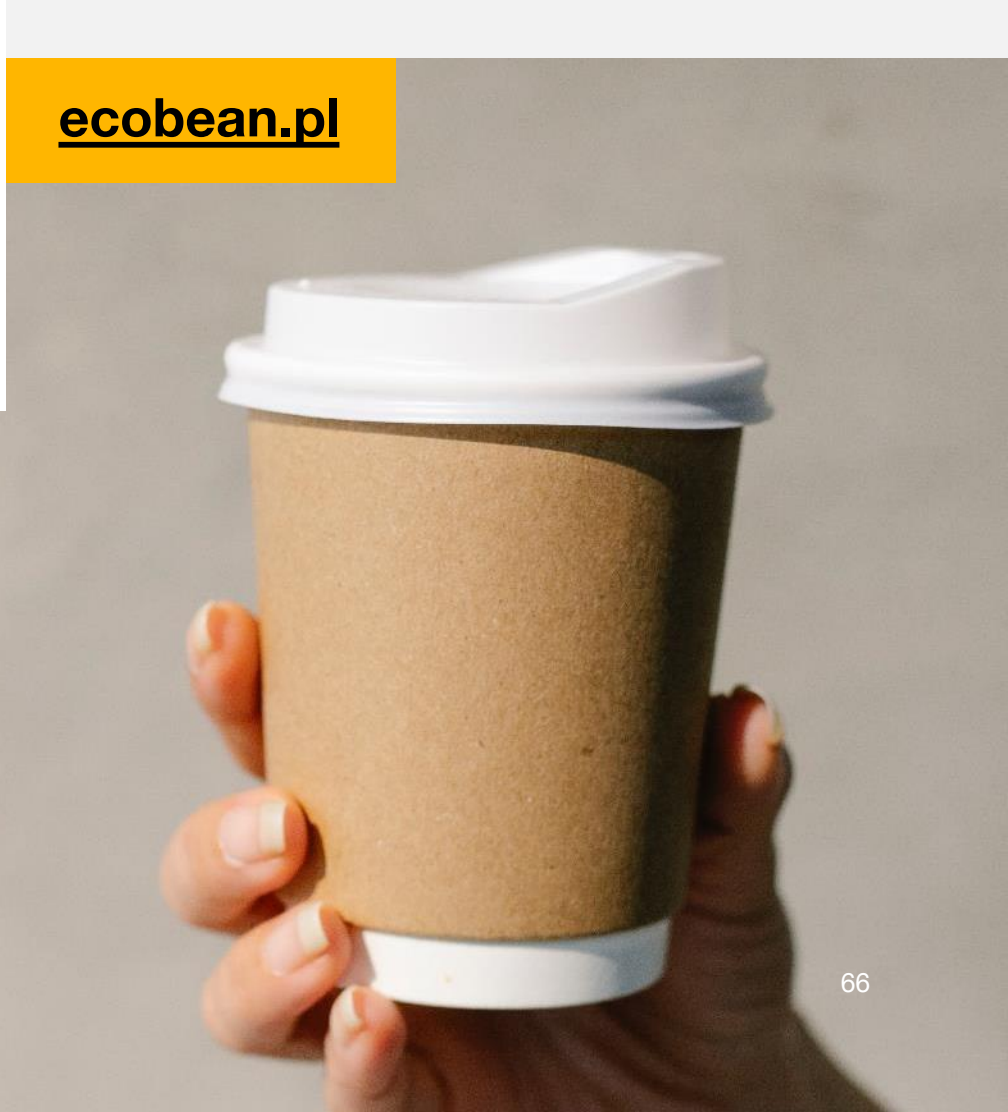
It’s working with coffee producers (e.g. Delta Cafes), chains (e.g Starbucks), petrol stations and office space operators (Cushman and Wakefield)). The company is partnering with third-parties to develop sustainable alternative implementations for the current market equivalents.

Strategic Alliances

Business (large companies), Business (SMEs), Investors, Media, Universities

ecobean.pl





Harventi Vision

Country: Poland

Type of solution: Precision agriculture and robotics

Summary

Harventi Vision’s Camvio H100 steering system for interrow cultivators and weeders uses computer vision and AI, letting farmers use mechanical solutions instead of herbicides without damaging the crop. Harventi also uses the camera data to map fields for purposes such as biomass measurement, pathogen detection and nutrient needs.

Impacts

The Camvio H100 provides solutions to reduce chemical and water usage for herbicide applications. In addition, to the environmental benefits from dropping herbicides there are also positive outcomes for human health and farmers in particular.

Highlights

Number of patents: No Patent

The AI-driven solution is designed to be user-friendly and work on multiple crops in a range of field and atmospheric conditions, and at night. It allows a 60% higher tractor speed than competitors, Harventi says.

Strategic Alliances

Investors

harventi-vision.com

Intelligent Hives

Country: Poland

Type of solution: Precision agriculture and robotics

Summary

Intelligent Hives' apiary management solution can automatically detect dangerous situations or anomalies and the change of environmental factors in the hive; supported by machine learning, it can automatically handle most bee colony maintenance. Beekeepers can remotely inspect hives, detect diseases and swarms, schedule tasks, extract honey and keep records of bees' health.

Impacts

Honey bees perform about 80 percent of all pollination worldwide with a single bee colony able to pollinate 300 million flowers each day. However nowadays bee hive colony losses average 30-50% disease, parasites, chemical poisoning, and hunger. Preventing bee mortality would help to significantly increase the production of plants and sequester carbon.

Highlights

Number of patents: Patent-pending

Intelligent Hives says its system can allow new people, without a connection to agriculture, to take up beekeeping. The system is used in more than 170 countries and has conducted more than 1 million bee counts, winning recognition in the Microsoft Imagine Cup and the Cisco Global Problem Solver Challenge, the company says.

Strategic Alliances

Civil society, Government (central authorities), Investors, Media, Research Institutes

intelligenthives.eu

Country: Lithuania

Type of solution: Alternative foods/low GHG proteins

Summary

Local Ocean's hardware and software solution for shrimp farming merges low-cost methods from outdoor pond farming and indoor RAS (Recirculating Aquaculture System) to create sustainable, low-cost, high-yield shrimp production on a small footprint. The system lets Europeans grow shrimp at scale anywhere, using AI to manage growth and water parameters.

Impacts

Local Ocean estimates replacing shrimp imports to Europe would save significant amounts of GHG scope 3 emissions from transportation and temperature control technologies, in addition to restoring flood barriers, habitats and polyculture in source countries.

Highlights

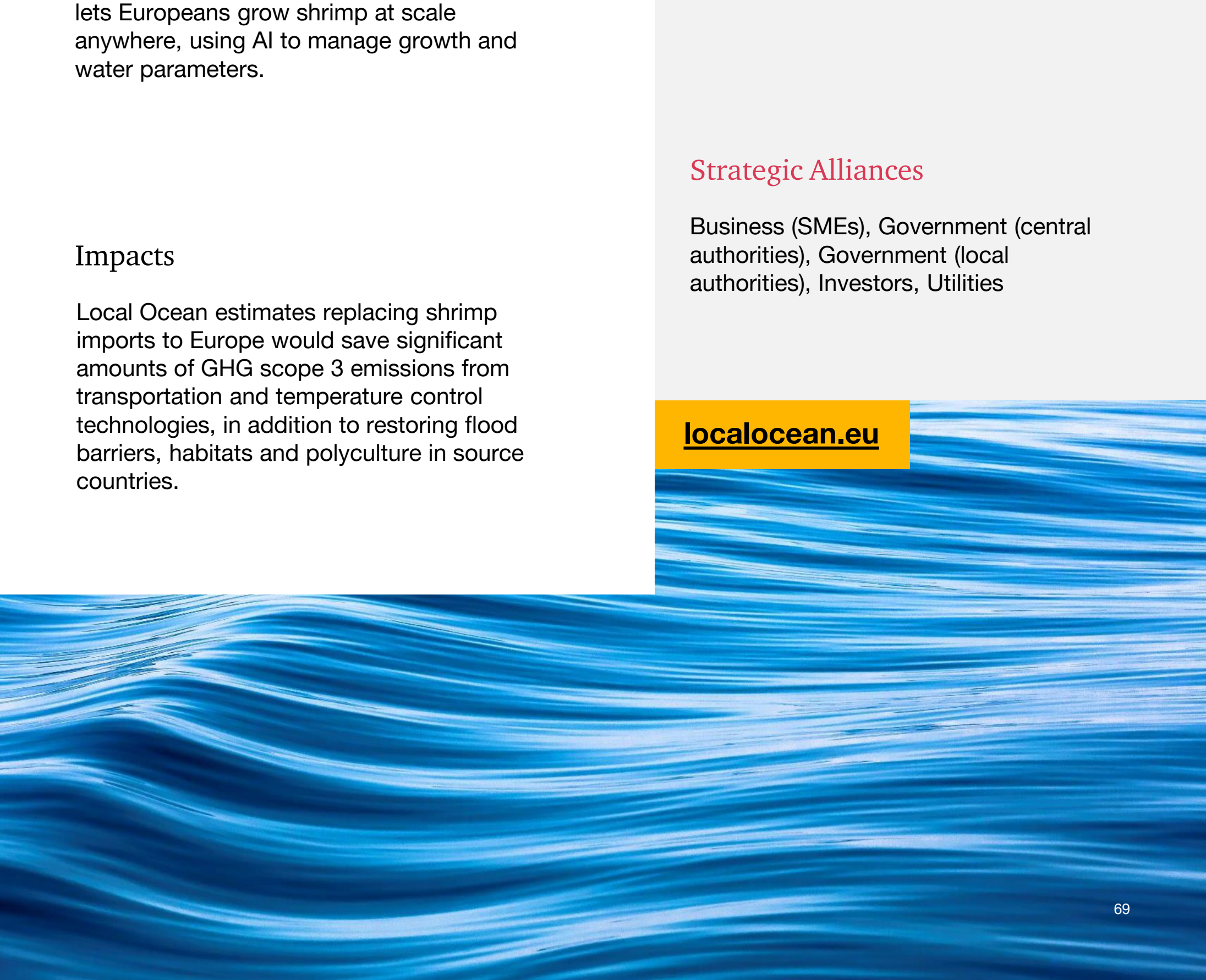
Number of patents: No Patent

Since 2020 Local Ocean has sold its shrimp in Lithuania's Maxima supermarket chain. Its system requires 5-10 times less budget compared to standard RAS farms by eliminating some equipment, and allows up to 11 harvests per year. The company is supported by Lithuania's Agriculture Ministry and Ministry of Economy and Innovation.

Strategic Alliances

Business (SMEs), Government (central authorities), Government (local authorities), Investors, Utilities

localocean.eu



MAKABI
SMART AGRITECH SOLUTIONS

Country: Croatia

Type of solution: Agricultural Biotech/Genomics and Natural Solutions

Summary

Makabi Agritech's encapsulation technology provides plant protection and nutrition, and controlled release of bioactive components, reducing pollution and the use of chemicals, mitigating climate change and increasing crops' biopotential. Makabi seeks to transfer knowledge and technology to other companies and serve as a bridge between the private sector and research institutions.

Impacts

The use of microcapsules can cut the use of agrochemicals by 30%, the company estimates, leading to higher food production and biodiversity, and mitigating climate change.

Highlights

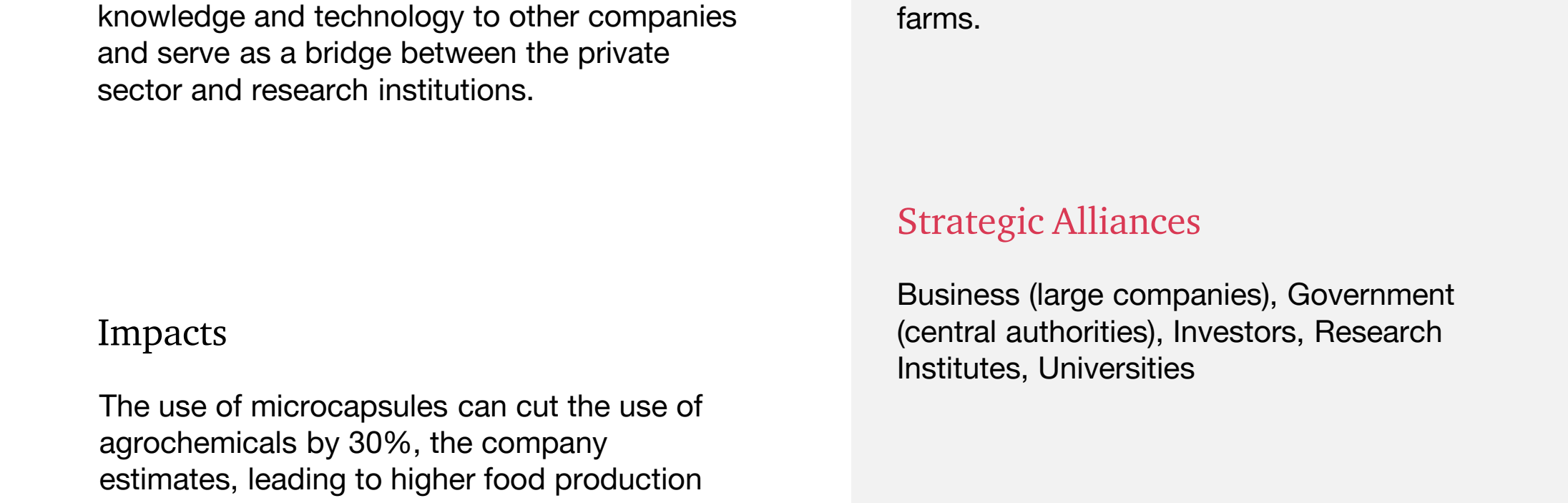
Number of patents: No Patent

Makabi Agritech has received EU Horizon 2020 programme funding for the process of microcapsule production and reports that it is working with several producers of organic and functional food. Its encapsulation process packs components including nutrients, organic compounds and microorganisms into microparticles that can be applied in fields, greenhouses and hydroponic farms.

Strategic Alliances

Business (large companies), Government (central authorities), Investors, Research Institutes, Universities

makabi-agritech.hr



Nasekomo

Country: Bulgaria

Type of solution: Alternative foods/low GHG proteins

Summary

Nasekomo is Central and Eastern Europe's largest producer of high-quality insect protein, offering sustainable and healthy alternatives to soy and wild-caught fish. It provides insect-based and scientifically-proven protein substitutes for the feed and aquaculture industries.

Impacts

One tonne of insect protein meal saves 2.5 tons of CO_2 emissions, using 1/13th of the water and 1/150th of the land for the same amount of soy protein, Nasekomo estimates.
Its Black Soldier Flies are reared in a highly bio-secure, controlled environment and grow their body mass 10,000 times in just 12 days.

Highlights

Number of patents: A range of patents

Nasekomo has secured the largest early-stage agtech funding in Emerging Europe. It specialises in technologies for black soldier fly bioconversion, whose products include flour and oil for animal feeds, and fertiliser for organic farms. Nasekomo has worked with several universities on EU-funded innovation projects.

Strategic Alliances

Business (large companies), Business (SMEs), Investors, NGOs, Research Institutes

nasekomo.life

NOSPOILERS

Country: Poland

Type of solution: Food waste technology

Summary

No Spoilers is a SaaS start-up that provides restaurant owners with tools to take control of their inventory, reducing waste, improving efficiency and making data-driven business decisions.

Impacts

The company claims its software can help to reduce food waste by almost 50% & product losses by up to 40%, and shrinking inventory control employment costs by up to 70%.

Highlights

Number of patents: Patent-pending

The company has a number of recognitions including Food Tech 500, Best Innovation by Gastro Meeting and Start-up Europe Awards.

Strategic Alliances

Business (large companies), Civil society, Media, NGOs, Universities

nospoilers.ai

sebelo

Country: Latvia

Type of solution: Earth and marine protection

Summary

Sebelo is a network of ultra-early smoke detection sensors for wildfire monitoring. Sensors can be attached to trees, poles or houses and measure parameters such as volatile organic compounds, humidity, temperature and atmospheric pressure. The central platform provides users with fire alerts, predictions of high-risk fire zones and statistics.

Impacts

Sebelo's solutions help to prevent global emissions, biodiversity, human and physical assets losses which arise from wildfires. Sebelo suggests through its technology wildfire response teams can detect fire in minutes rather than hours preventing irreparable damage.

Highlights

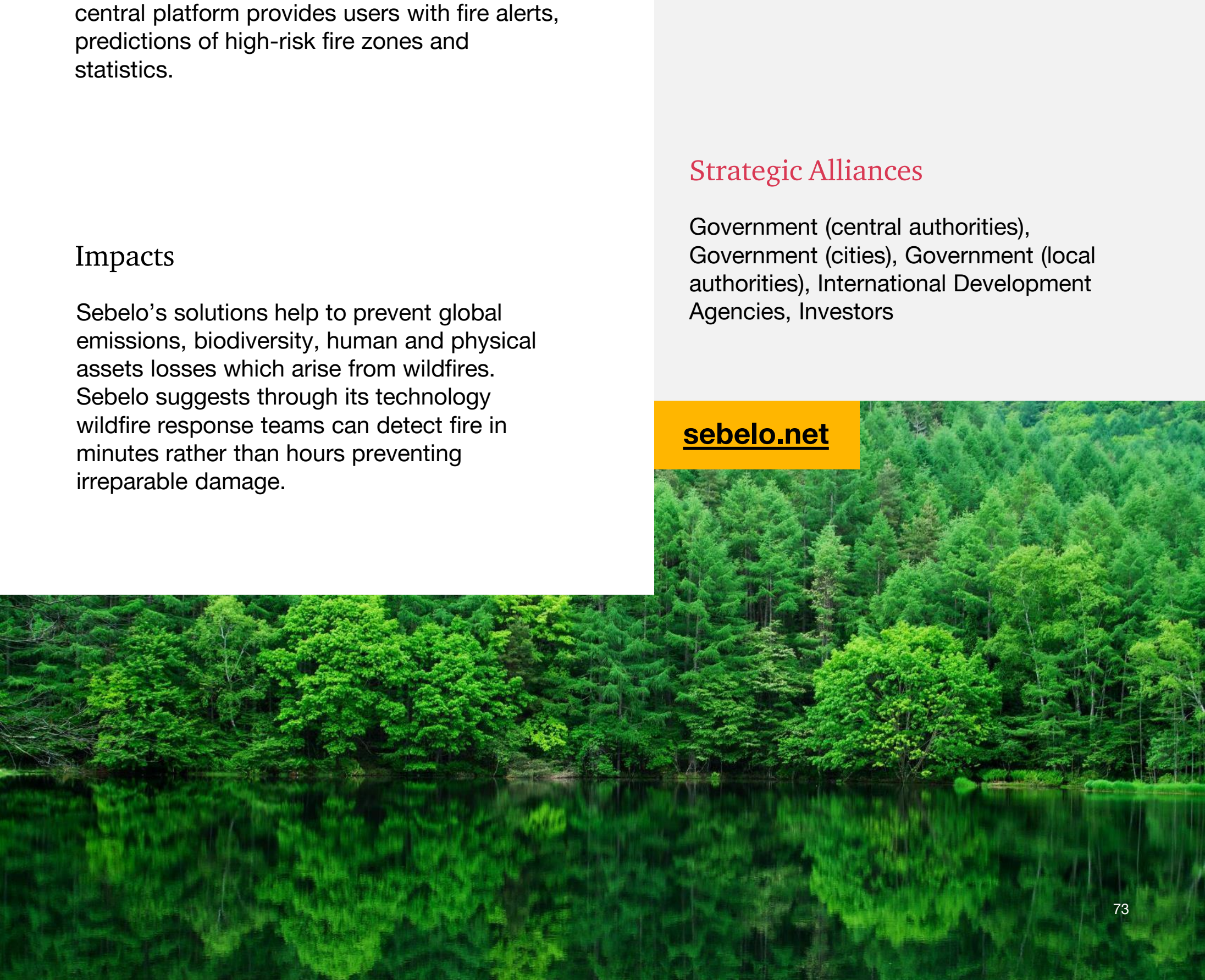
Number of patents: No Patent

Sebelo has built an open API which can connect to other existing platforms. The company has developed its sensors in cooperation with Riga Technical University.

Strategic Alliances

Government (central authorities), Government (cities), Government (local authorities), International Development Agencies, Investors

sebelo.net



GHG Capture, Removal and Storage

GHG Capture, Removal and Storage

Market trends

The rise of Net Zero pledges:
Practical GHG capture, removal and storage technologies are key for companies that have committed to climate goals such as net zero, carbon neutrality or science-based targets (SBT).

Nascent solutions:
Direct Air Capture / Storage (DAC/S)
Carbon capture, utilisation and storage (CCUS) in power

Types of solutions: Direct Air Capture / Storage (DAC/S) (1)

Technological themes: Circular (1), IoT (1), Other (1), Renewable Energy (1), Smart cities (1)

Headlines from PwC analysis

N/A
Share of CEE GHG emissions

1
Start-ups in the Net Zero Future50 report – CEE Edition

Investment level

N/A
H2 2020 – H1 2021

N/A
H1 2013 – H1 2021

Number of deals

N/A
H2 2020 – H1 2021

N/A
H1 2013 – H1 2021

Industry insights

Dr. Daniel Reese

Investment Manager of UVC Partners Germany

On Barriers

GHG capture, removal and storage solutions are provided by hardware companies, which poses three challenges:

Challenge 1: The technical complexity of a hardware business scaling up to an efficient large factory that makes a difference is not linear. Technology-based solutions are still in their infancy, and just because a small-scale prototype works doesn't mean the same concept will also work at a larger scale.

Solution: Technologies are improving, including in large-scale settings. Also, government needs to bring in regulations to shape the playing field for such technological developments.

Challenge 2: There are still too few investors who have the expertise and patience to invest into hardware start-ups

Solution: In recent years we have seen an increased need for differentiation of VC funds due to higher competition for the best founding teams. Hence, several funds have specialised in hardware, and more will follow to distinguish themselves from the myriad of software-focused investors.

Challenge 3: More outstanding founders should mindfully decide to build hardware companies; the positive impact on society of, for example, a large-scale GHG storage solution, is a massive incentive.

Solution: With more and more investors focusing on the space, combined with the increasing need for humanity to take climate change seriously, the best founders will automatically be drawn into the space.

CARBOMINER

Country: Ukraine

Type of solution: Direct Air Capture / Storage (DAC/S)

Summary

The start-up is going to provide CO_2 at a target price of €150 per ton, by using electrochemistry for CO_2 regeneration, harnessing intermittent renewable energy and offering easily transportable capture modules.

Impacts

Carbominer is building the direct air capture (DAC) unit with the capacity 46 tons of CO_2 per year. Next milestone is a bigger DAC machine able for capturing of 250 ton of CO_2 per year.

Highlights

Number of patents: Patent-pending

Carbominer says its solution has three technological advantages: it uses a combination of dry and wet capture; it uses electrochemistry for CO_2 regeneration and it allows for use of the intermittent renewable energy. The patent-pending passive air contactor allows further cost reduction.

Strategic Alliances

Business (large companies), Business (SMEs), Investors, Media

carbominer.com

Industry, Manufacturing and Resource Management

Industry, Manufacturing and Resource Management

Market trends

Shifting consumer behaviours: Awareness among consumers of sustainability issues is growing, thus requiring manufacturers to innovate in their products and their production processes. This includes zero waste, the circular economy, ethical sourcing and reduction of plastics use.

Regulatory factors: Upcoming EU and national regulations will require or strongly encourage manufacturers to look for sustainable innovations and better resource management across their whole value chains. These include the EU Circular Economy Action Plan, EU Consumer Directive, EU Corporate Sustainability Due Diligence and the German Supply Chain Due Diligence Act.

Nascent solutions:
Low GHG concrete
Low GHG iron and steel

Types of solutions: Transformative Circularity, Recycling and Low GHG/Efficient Materials (4); Low GHG Plastics or Alternatives (2); Waste Management Technology (1); Low GHG Iron, Steel, Aluminium (1); Low GHG Concrete and Alternatives for Construction (1).

Technological themes: Advanced materials (2), AI (1), Behaviour change (1), Biomaterials (4), Biotechnology (2), Circular (8), Cloud computing (1), Data platforms (2), Green manufacturing (5), IoT (1), Machine learning (1), Marketplaces (1), Mobile apps (1), Nano materials (1), Other (3), Renewable Energy (2), Robotics (1), Smart cities (2), Smart materials.

Headlines from PwC analysis

18.14%
Share of CEE GHG emissions

9
Start-ups in the Net Zero Future50 report – CEE Edition

Investment level

US$329.93m
(43.90% of total investment for this period)
H2 2020 – H1 2021

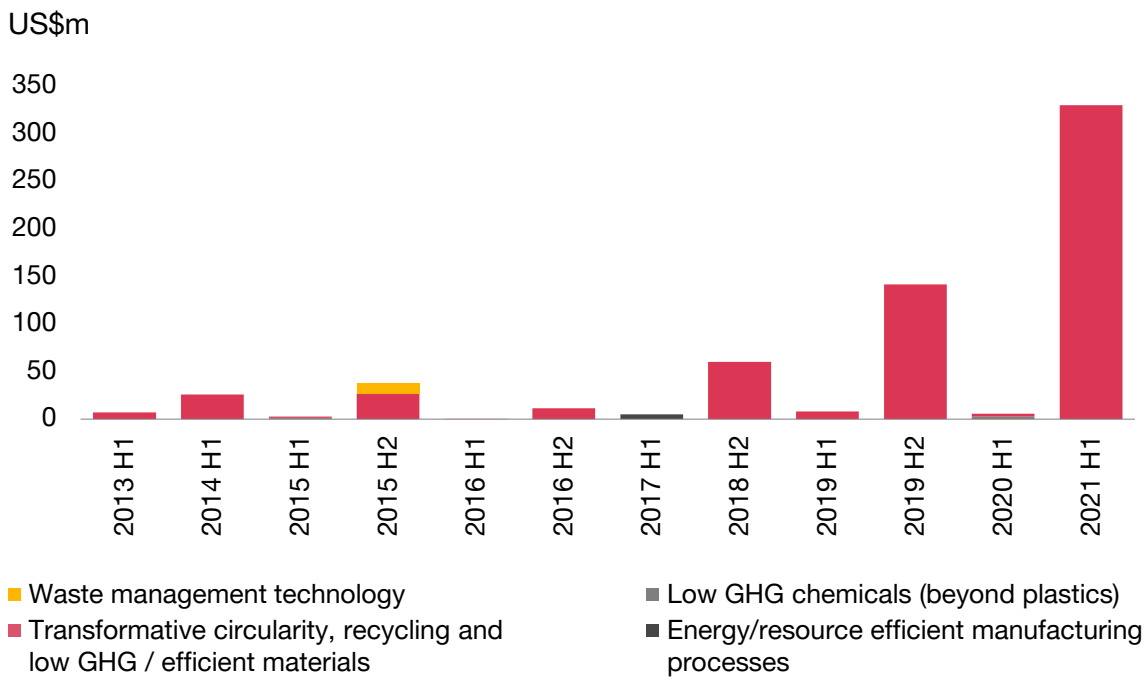
US$635.17m
(36.11% of total investment for this period)
H1 2013 – H1 2021

Number of deals

12
H2 2020 – H1 2021

49
H1 2013 – H1 2021

Industry, Manufacturing and Resource Management climate tech start-up funding in CEE by type of solution



Industry insights

Maciej Majewski

CEO & Head of Acceleration of Accelpoint Poland

On barriers

Given the deep tech nature of most climate tech ventures, it takes a lot of funding and time to reach market fit and business readiness for such products. CEE VC markets are not yet ready to commit enough funding, so to increase the adoption of climate tech solutions we should combine private and public funding. Public funding primarily provided at the early stage of development can boost innovation and at some later stage help mitigate the risk of suffering from the valley of death. Then comes the private funding, which in the case of CEE VCs is still not ready to provide enough capital on a sufficient scale. That is why improving investors' ecosystems in the CEE region and building links with their Western and US counterparts seems a must. More advanced start-up ecosystems in the West were able to raise more funds and build institutional capacity and expertise that can add value to the CEE deals. Plus, non-CEE deep tech-focused VCs are more open to obvious risks and more extended payback periods.

On drivers

The two main opportunities we believe to be the most attractive are (1) unfair competitive advantage stemming from the adoption of new technologies providing breakthrough innovations and (2) marketing advantages facilitating communicating climate focus that is on the rise, especially in Western societies. The latter however is just a temporary advantage any company can use in the short to mid-term. In the longer term, no company or enterprise that does not consider climate change will survive. The former is definitely more sustainable and the fastest way to be adopted on a wider scale is through public stimuli. Be that grants or subsidies that lower the cost of risk when introducing new technologies or through adjustments of state policies that enforce private investments, R&D activities, and systemic switch towards more favourable solutions. Private-only investments do not guarantee adoption fast enough to mitigate climate change.

Bin-e

Country: Poland

Type of solution: Waste Management Technology

Summary

Bin-e optimises waste management using technologies including artificial intelligence to automatically recognise and segregate waste, with more than 95% accuracy, increasing recycling performance and changing user behaviour. It works not only with packaging but also items such as electronics, light bulbs and batteries, and provides detailed statistics for waste reporting.

Impacts

Bin-e reduces landfilling, and raises consumer awareness of recycling with a screen that can display educational content to users, helping them develop positive habits.

Highlights

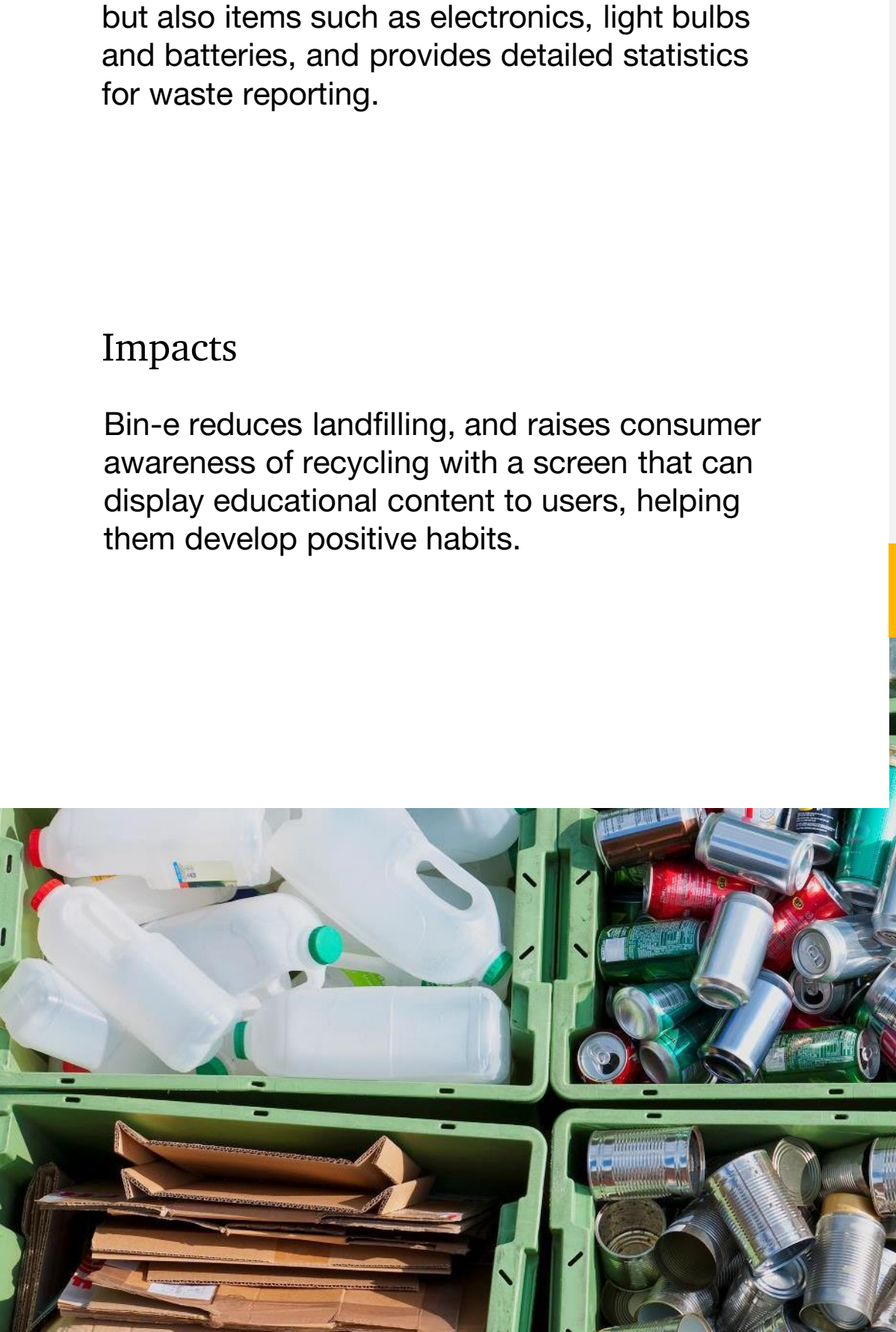
Number of patents: 1x patent

Bin-e says its users include IBM, LEGO, McDonald's and Volvo. The system is designed for public places, e.g. supermarkets, shopping centres and airports, where an efficient system can be hard to introduce. Packaging can go straight to recovery, without having to be reprocessed, boosting the efficiency of the recycling chain.

Strategic Alliances

Business (large companies), Business (SMEs), Government (cities), Investors

bine.world



BiotaTec

Country: Estonia

Type of solution: Low GHG Iron, Steel, Aluminium

Summary

BiotaTec uses microorganisms to extract metals that are vital for the energy transition, from low-grade ores, tailings, and waste (including e-waste), without high energy demand and without CO_2 emissions. The company provides solutions tailored for each customer from the metallurgy/recycling industry to extract maximum value.

Impacts

By generating valuable metals from waste while using less energy, biomining avoids the pollution from new mines; the metals themselves are necessary for the green transition.

Highlights

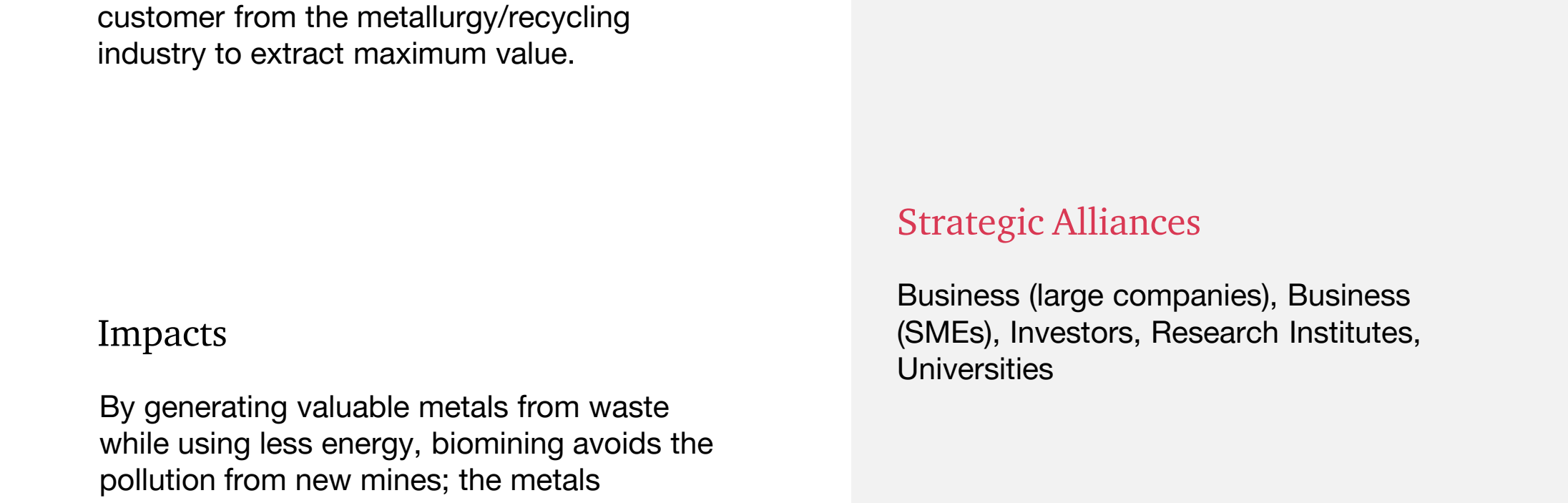
Number of patents: Patent-pending

The global energy transition hinges on mineral-intensive technologies and is expected to increase demand for certain minerals by at least 6 times, for products such as solar panels, wind turbines and batteries, BiotaTec estimates. The company has received a €2.3 million EU grant for a pilot project.

Strategic Alliances

Business (large companies), Business (SMEs), Investors, Research Institutes, Universities

biotatec.com



ReBe
BUILD ROAD IN THE RIGHT WAY

Country: Poland

Type of solution: Low GHG Concrete and Alternatives for Construction

Summary

KPMP's ReBe solution for transverse joints in asphalt roads. The company suggests one transverse joint means even 4 tons of asphalt loss and up to 60 minutes of unnecessary work. Material losses in large infrastructure projects may cost up to EUR 500 000.

Impacts

KPMP suggests ReBe can offers an easy, quick and environmentally-friendly process without cutting, forging or milling required to get a perfect transverse joint. The company estimates that up to 4 tons of materials can be saved by the use of one transverse joints lowering energy costs and emissions.

Highlights

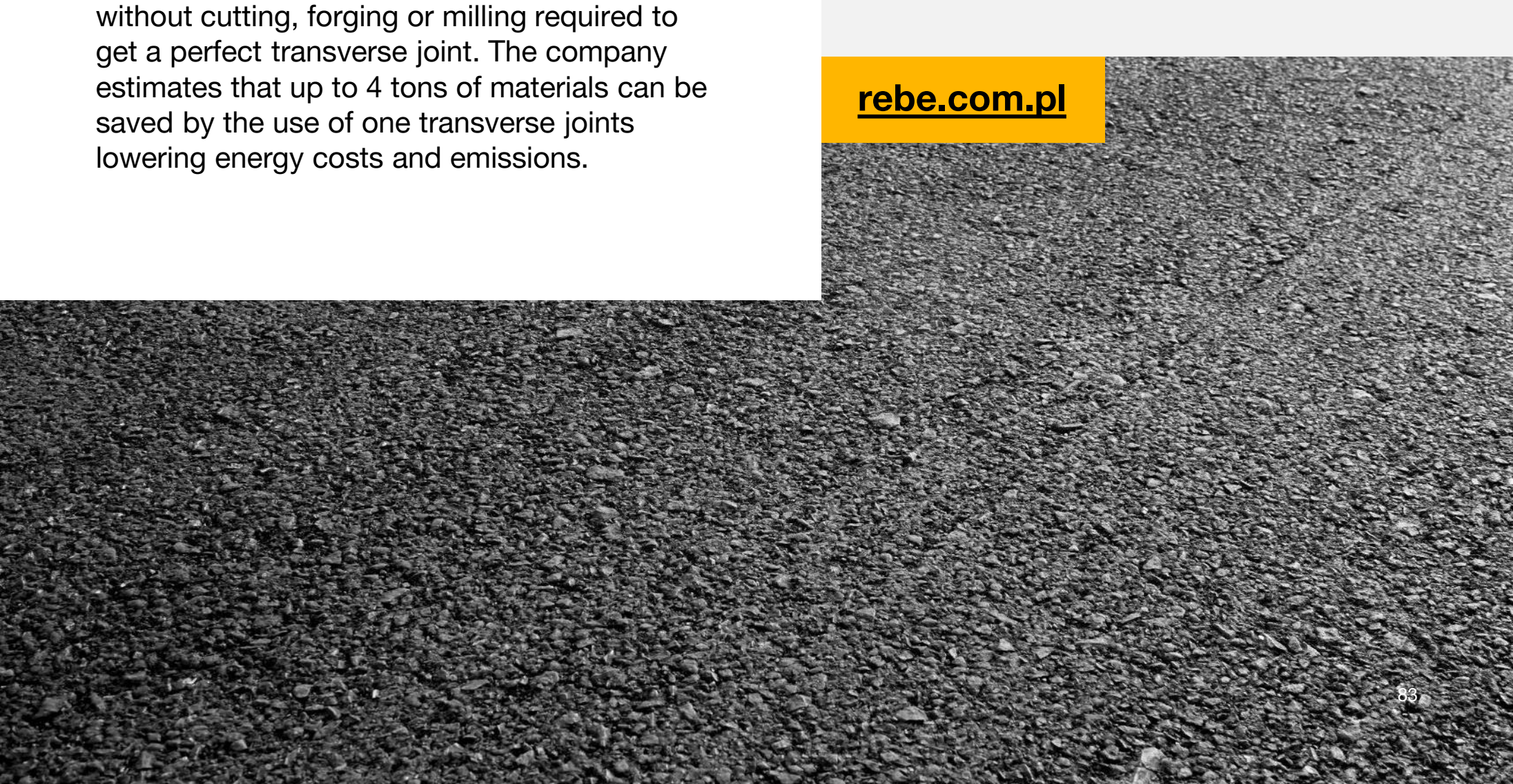
Number of patents: Patent-pending

ReBe® may be used for surfaces of all sizes, from paths to motorways. Unique, modular and light-weight design allows for easy adaptation to the type of surface and road. ReBe saves time by offering a modular solution, which claims users including Strabag and Ferrovial's Budimex unit. It has won several innovation competitions.

Strategic Alliances

Business (large companies), Business (SMEs), Government (central authorities), Investors

rebe.com.pl



MIRET

Country: Croatia

Type of solution: Transformative Circularity, Recycling and Low GHG/Efficient Materials

Summary

Miret is developing bio-based footwear that strives for zero impact on the environment, without compromising on design, durability, or comfort. The ultimate goal is a compostable, recyclable shoe made from renewable, bio-based, non-toxic, sustainably grown materials, locally sourced, locally manufactured and extremely durable.

Impacts

Merit estimates through its Life Cycle Assessment that the CO_2 emissions per pair of Miret sneakers is 4.88 kg, compared with an industry average of 14 kg. It uses hemp, which has a high carbon assimilation rate, and sustainable wool.

Highlights

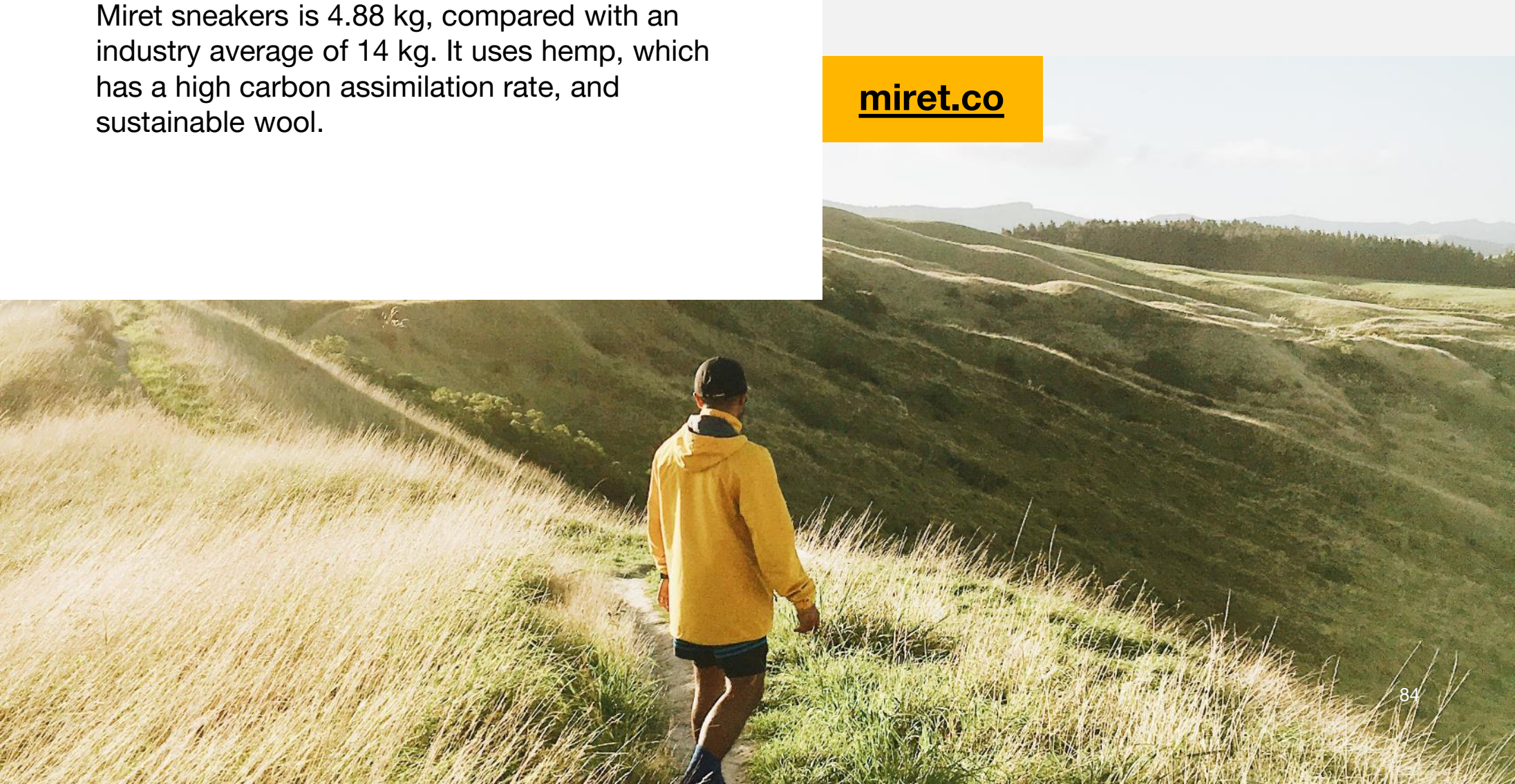
Number of patents: No Patent

Miret sneakers are made from 97% natural materials (either plant-based or ethically-sourced wool), drastically reducing the use of leather, petroleum derivatives and toxic chemicals that it says make traditional footwear so unsustainable. The company has been the recipient of several international awards.

Strategic Alliances

Business (large companies), Business (SMEs), Investors

miret.co



RAIKU™

Country: Estonia

Type of solution: Low GHG Plastics or Alternatives

Summary

Raiku offers 100% compostable flexible packaging material to replace single-use plastics such as bubble wrap. The company says it achieves 15-20 times more product volume per amount of raw material than traditional methods, giving it one of the smallest carbon footprints in the industry.

Impacts

Raiku says its packaging has a CO_2 footprint of about 10 kg per cubic meter, compared to an average 50 kg for bubble wrap and 140 kg for corrugated cardboard.

Highlights

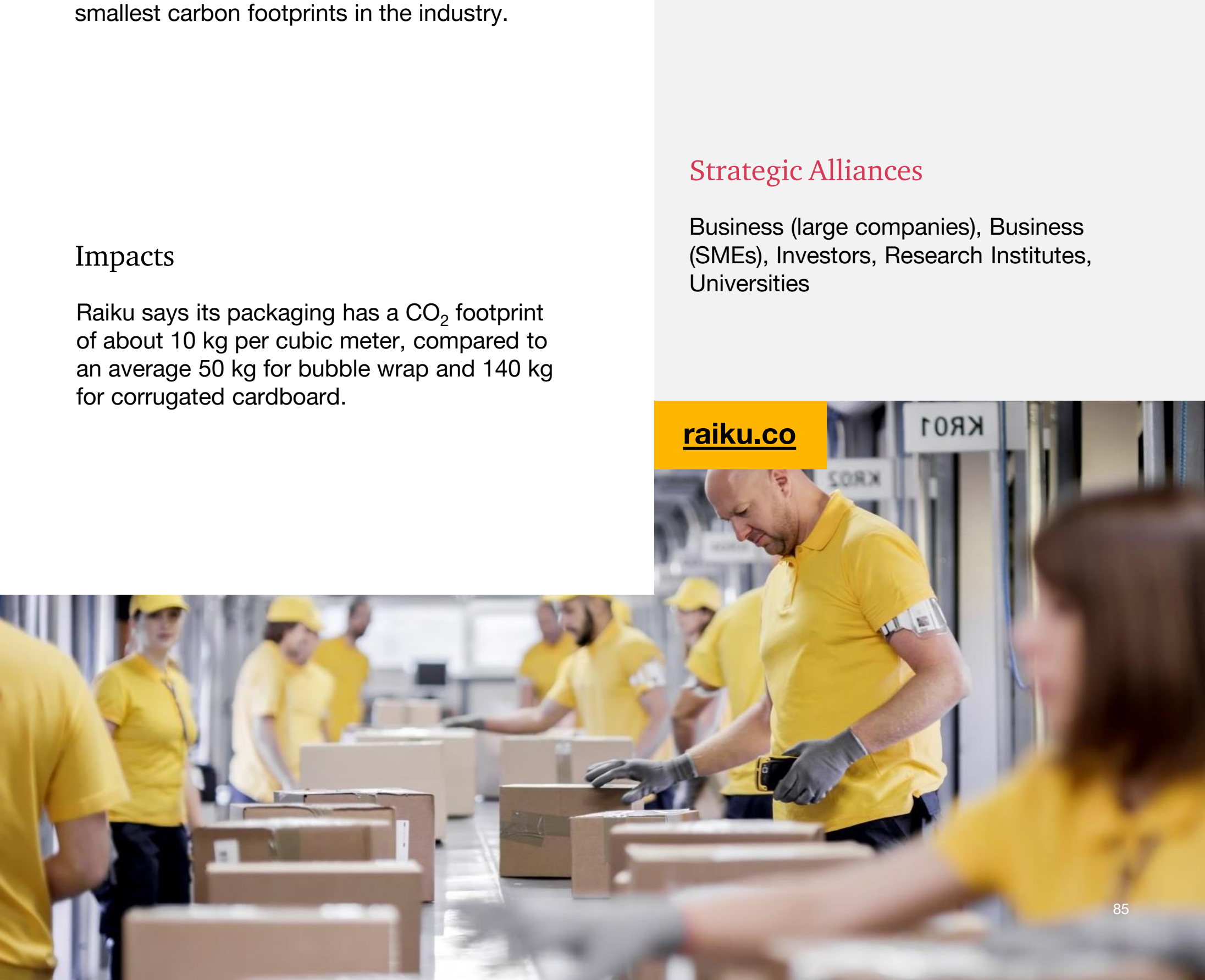
Number of patents: A range of patents

Raiku says it has proprietary IP, machinery and products, and reports that it has a pipeline of more than 50 potential clients and letters of intent with some of the largest packaging resellers. It has begun pilot production. Raiku has a partnership with Tallinn Technical University.

Strategic Alliances

Business (large companies), Business (SMEs), Investors, Research Institutes, Universities

raiku.co



Country: Ukraine

Type of solution: Transformative Circularity, Recycling and Low GHG/Efficient Materials

Summary

Releaf Paper is the world's only producer of cellulose from fallen leaves and other urban bio-waste. Its patented technology uses a unique combination of mechanical, chemical and thermal processes to generate a solid, durable cellulose fibre for paper production, saving forest resources and providing an alternative to plastic- and wood-based packaging.

Impacts

Releaf Paper reduces CO_2 emissions by 36% compared to wastepaper-based production and by 78% compared to traditional wood-based output, saving up to 148,000 trees a year, the company estimates.

Highlights

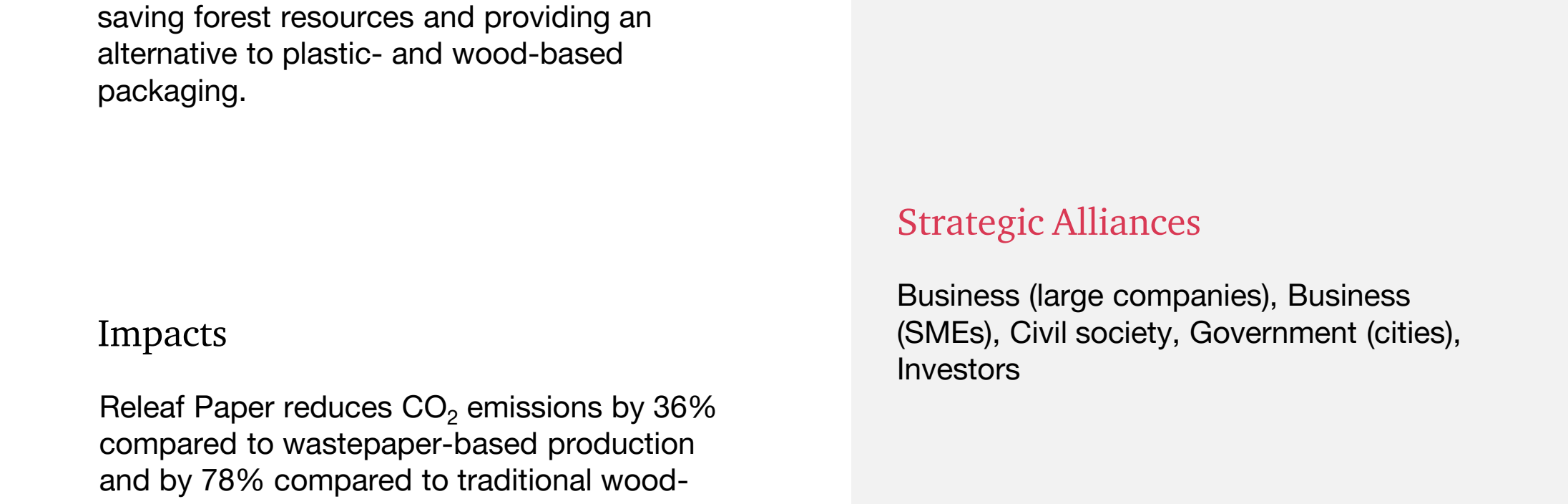
Number of patents: A range of patents

Releaf has already made its first 150 tonnes of products and reports a client list including L'Oréal, Chanel, Samsung and Ariston, while Google and the World Wildlife Fund provide sponsorship. The technology can be used in any city around the globe that has leaf waste.

Strategic Alliances

Business (large companies), Business (SMEs), Civil society, Government (cities), Investors

releaf-paper.com



ringo

Country: Estonia

Type of solution: Low GHG Plastics or Alternatives

Summary

Ringo provides reusable packaging as a vertically integrated service, including packages, technology, logistics and washing, for food producers, retailers, restaurants and events. In its first 10 months Ringo has set up 200 collection points; the company is seeking to drive a change in consumer culture toward reusability.

Impacts

Ringo estimates it will reduce Estonia's CO_2 emissions by 25 tonnes during its first year of operations, based on figures for pollution generated by single-use plastics.

Highlights

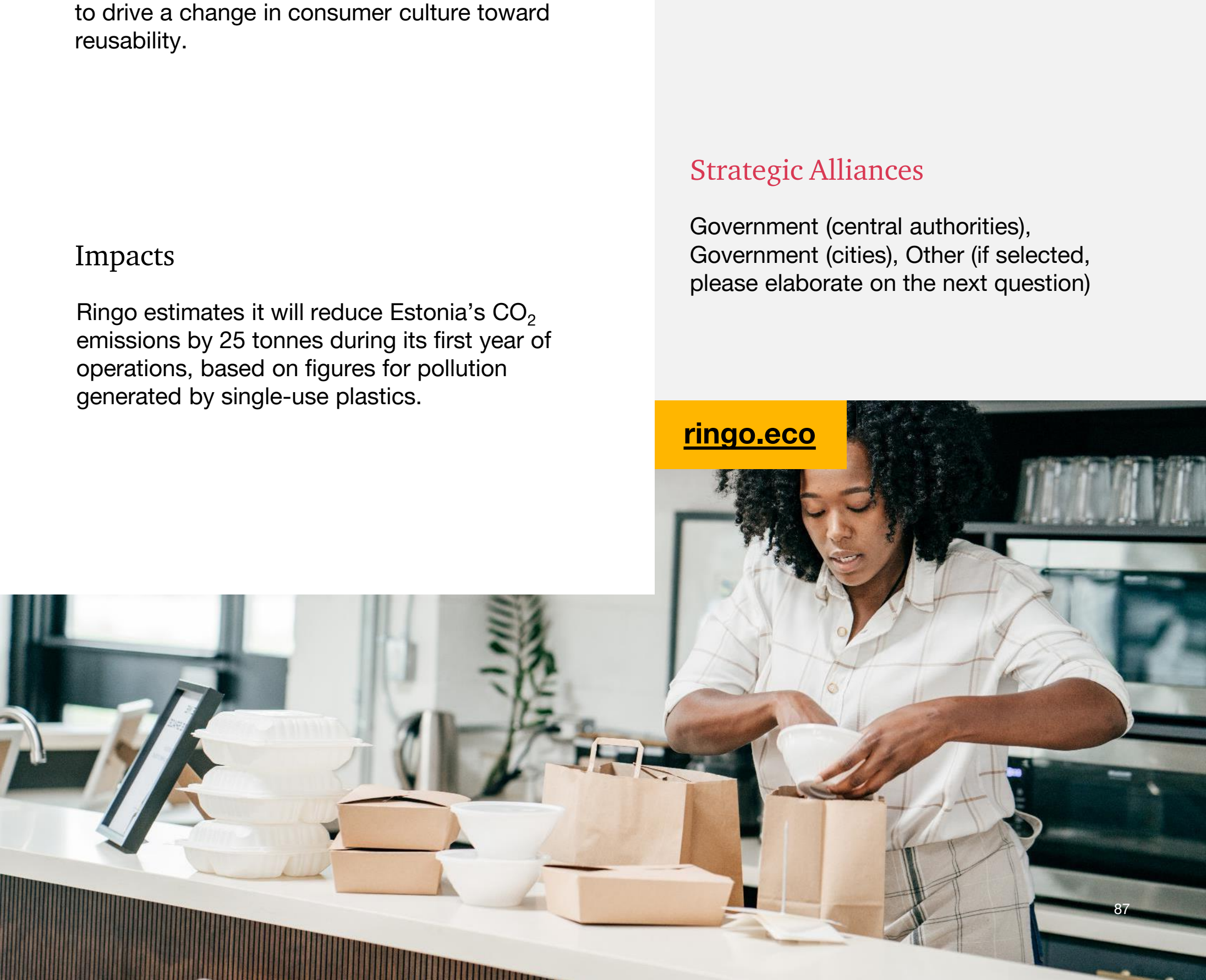
Number of patents: No Patent

Ringo says it has contracts with Estonia's two biggest retailers, and has persuaded seven clients to completely give up single-use items. The company says its QR-code based deposit handling system allows more flexible services than competitors, including different deposit rates for different users.

Strategic Alliances

Government (central authorities), Government (cities), Other (if selected, please elaborate on the next question)

ringo.eco



Country: Ukraine

Type of solution: Transformative Circularity, Recycling and Low GHG/Efficient Materials

Summary

S.Lab offers an alternative to polystyrene packaging made from just two plant-based components, which fully decomposes in 30 days after disposal. It develops unique biomass formulas using mushrooms and hemp, and sources hemp leftovers from local farming companies, making customisable, waterproof, heat-resistant and non-toxic packaging.

Impacts

Every kilogramme of polystyrene leads to 5 kg of CO_2 emissions, the company says, estimating that it has already saved 7 tonnes of CO_2.

Highlights

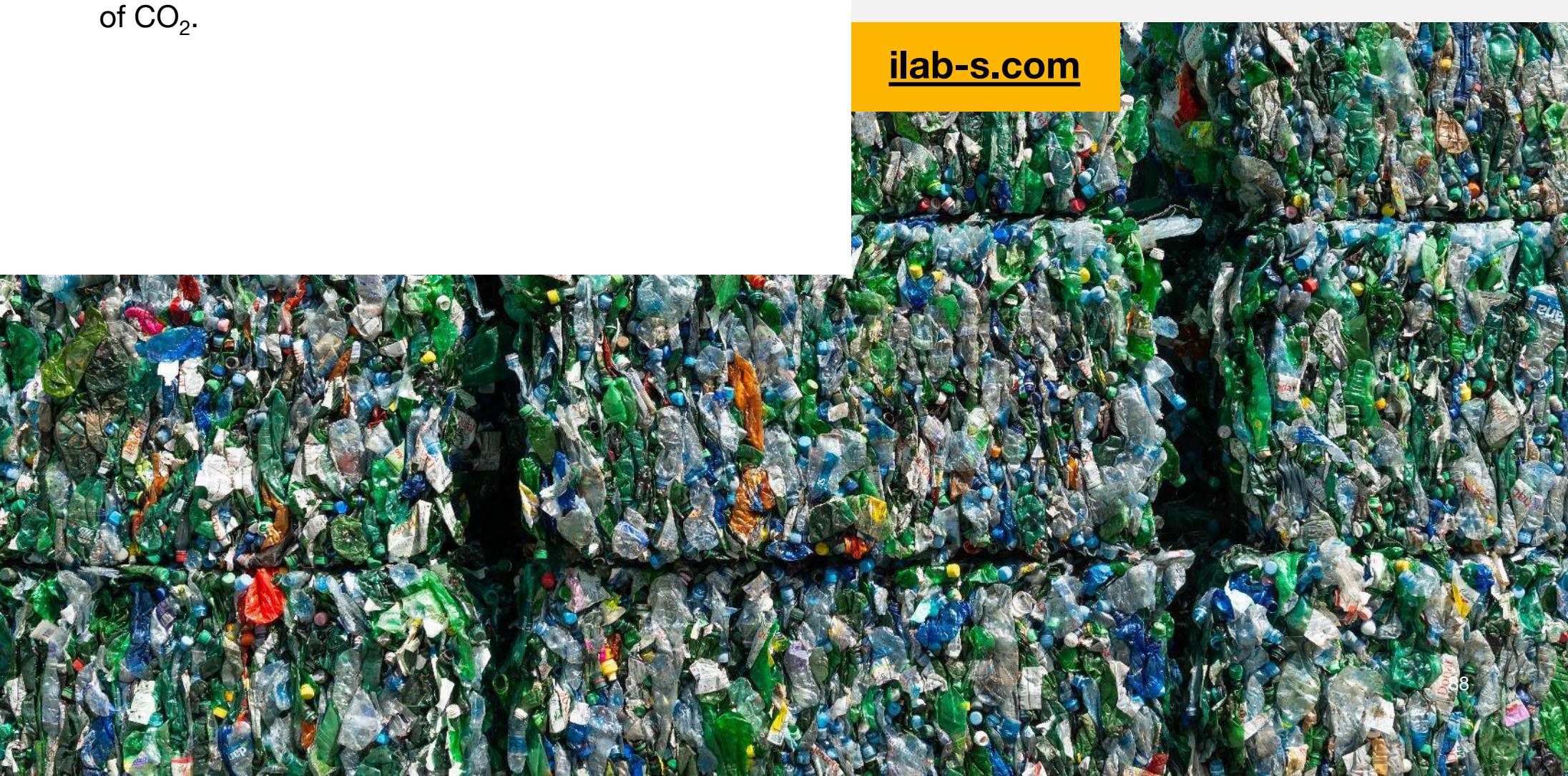
Number of patents: Patent-pending

S.Lab is building a pilot production line and ultimately plans to set up packaging production lines in 40-foot shipping containers that can be installed at the client's premises, allowing the solution to be taken up globally. The company is participating in Ukrainian Environment Ministry working groups on plastics use.

Strategic Alliances

Government (central authorities), Investors

ilab-s.com



Country: Poland

Type of solution: Transformative Circularity, Recycling and Low GHG/Efficient Materials

Summary

Swapp! offers refilling stations for daily-use FMCG products such as shampoo, soap, milk and yoghurt. It's building a network of refill stations with smart reusable packaging and connected apps, seeking to reduce single-use plastic waste and the carbon footprint of current consumption models.

Impacts

Swapp! aims to save 120 tonnes of CO_2 and remove 1 million disposable packages from the market by 2024, after already eliminating more than 4,000 single-use bottles with six refill stations. Consumers buying from a Swapp! station pay 15% less for the product.

Highlights

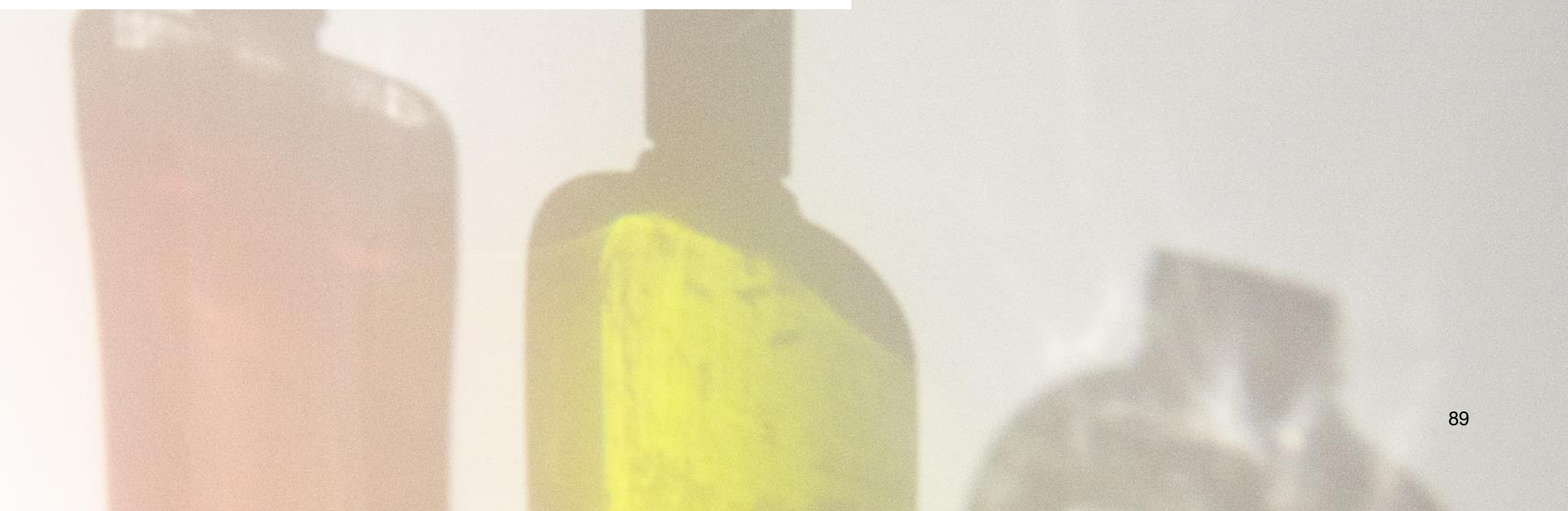
Number of patents: 1x patent

Swapp! has partnered with Carrefour, Auchan, and Super-pharm to educate the market, and is conducting tests to find the best business model and build positive consumer habits. Its competitive advantages include a single standard for many product categories, a platform open to all producers and a variety of packaging types.

Strategic Alliances

Business (large companies), Business (SMEs), Investors, Universities

swaapp.zone



Mobility and Transport

Mobility and Transport

Market trends

The rise of Mobility as a Service (MaaS): The sharing economy in transport is gaining in popularity because it allows for more flexibility for users, letting them select the most convenient mode of transport without having to worry about upkeep costs. It also compensates for the decline of car ownership in cities and goes hand in hand with citizens' rising awareness of transport pollution.

The growth of e-mobility: The growing use of electric vehicles (EVs) supports national and European policies aiming to reduce the number of internal-combustion-engine vehicles (ICEVs). The market for EVs is rapidly growing thanks both to restrictions on ICEVs in many countries and cities, and to incentives for EVs (e.g. subventions, free parking, reduced taxes/charges). Other benefits for EV users, including low upkeep and charging costs, less noise, better comfort and a smaller ecological footprint, are further driving demand for EVs and their components.

Development of autonomous vehicles: Constantly growing production, rising labour costs, a shortage of workers and the quest for efficiency in the logistics chain are driving the development of solutions that will fully or partially automate goods transport. Autonomous vehicles are also gaining popularity with local governments, as they allow for more flexible and cost-efficient transport networks.

The rollout of sustainable urban development policies: Municipalities that want to become greener and healthier are moving towards a walkable model. This enables the development of micro-mobility and solutions that enhance and digitalise public transport.

Nascent solutions: Sustainable aviation fuels (SAFs) | Low GHG shipping

Types of solutions: Low GHG Light and Heavy Duty Transport: EVs and High-Efficiency Vehicles (2); Efficient Transport Systems (2); Micro-mobility; Batteries/Fuel Cells.

Technological themes: AI (3), Behaviour change (2), Circular (1), Data platforms (2), Drones (1), IoT (5), Machine learning (2), Marketplaces (1), Mobile apps (1), Other (1), Renewable Energy (2), Robotics (3), Smart cities (2), Satellites & space (1).

Headlines from PwC analysis

15.80%
Share of CEE GHG emissions

6
Start-ups in the Net Zero Future50 report – CEE Edition

Investment level

US$408.93m
(54.41% of total investment for this period)
H2 2020 – H1 2021

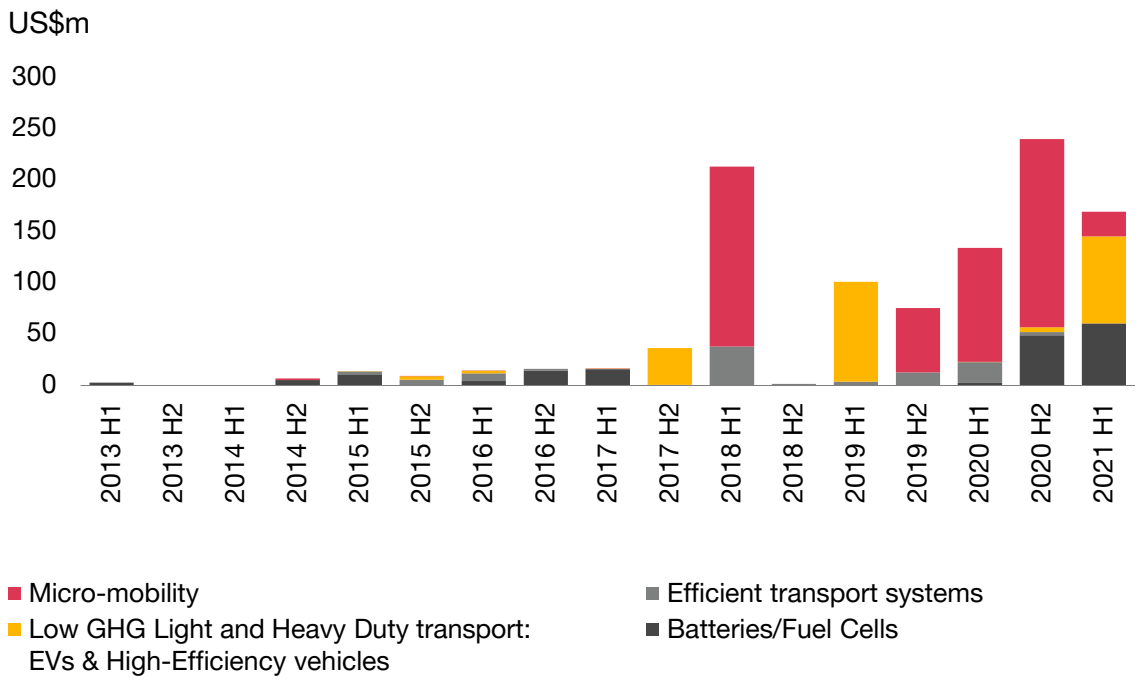
US$1.051 bn
(59.80% of total investment for this period)
H1 2013 – H1 2021

Number of deals

17
H2 2020 – H1 2021

112
H1 2013 – H1 2021

Mobility and Transport climate tech start-up funding in CEE by type of solution



Industry insights

Szilárd Gerencsér

Deputy CEO, Logistics and Operations of Magyar Posta Zrt. (Hungarian Post)
Hungary

On barriers

There are several potential use cases in the transport, parcel delivery and postal services sector for various kinds of EVs.

For last-mile delivery we are already using electric vans and several types of LEVs (three wheelers, electric bikes and scooters). For semi- and long-haul trucking the current alternative drivetrain ranges are still challenging. Either the battery is not big enough (a typical EV problem) or the refuelling infrastructure is not available everywhere it's needed (a Fuel Cell, LNG or CNG problem).

For all types of alternative drivetrain, the connecting infrastructure is a crucial element. Grid capacity and green supply of hydrogen and gas are the main bottlenecks. For EVs, smart charging can be a good solution to handle grid bottlenecks. For fuel cell and gas-based solutions, local RES capacity building is essential for clean supply.

On drivers

The main opportunities are cost-effective operation caused by fewer malfunctions, less maintenance, a better work environment for the delivery staff and positive PR.

Still, developing the infrastructure is very expensive, and the CAPEX on vehicles is still higher than continuing to use ICEVs. Dedicated financing from the private and public sectors would help a great deal. In addition, explicit state requirements may also be reasonable to accelerate the green transition in the transport sector.

BaseTracK

Country: Estonia

Type of solution: Low GHG Light and Heavy Duty Transport: EVs and High-Efficiency Vehicles

Summary

BaseTracK develops sustainable trucking solutions, including real-time optimal driving recommendations and automated acceleration/deceleration for human-driven vehicles that can improve fuel economy by 20%. BaseTracK also offers an all-weather autonomous trucking service.

Impacts

BaseTracK estimates it can provide regular fuel savings between 10 to 20% reducing costs and emissions. It also improves safety, eliminating the emissions from addressing injuries and damage caused by accidents.

Highlights

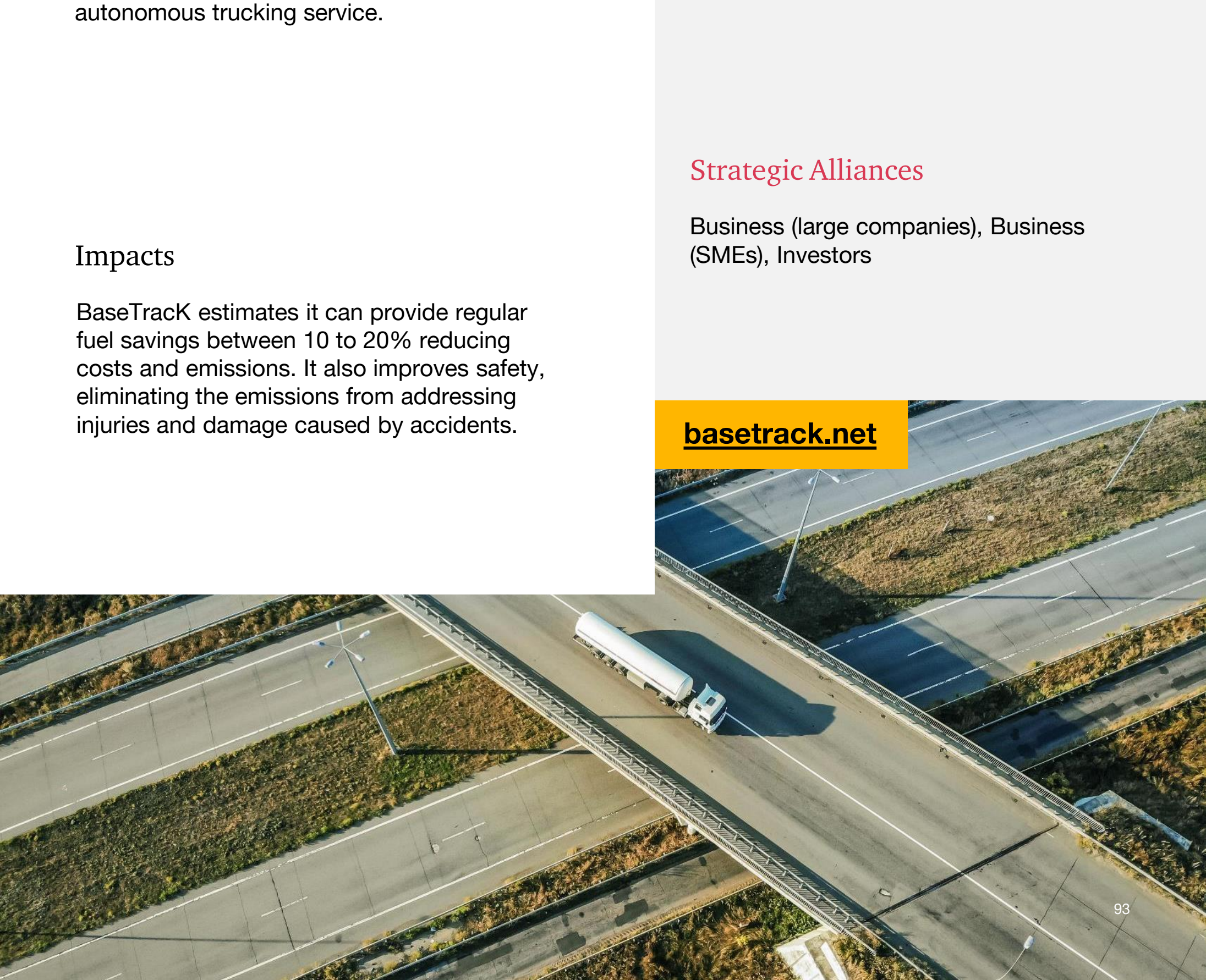
Number of patents: More than one patent

BaseTracK describes its work as "making human drivers robot-efficient". It is also demonstrating autonomous driving on public roads in harsh conditions, reaching speeds as high as 130 km/h. In 2021 BaseTracK tested its technology with 60 transport, logistics and FMCG companies. It says its solutions require less computing power than competitors.

Strategic Alliances

Business (large companies), Business (SMEs), Investors

basetrack.net



Country: Lithuania

Type of solution: Efficient Transport Systems

Summary

CHRG offers a management tool for EV charging point owners, from individuals to large operators: a software platform that connects stations into a single network, with an app that allows drivers to find, book, and pay for charging. Its unique load balancing solution improves energy efficiency.

Impacts

CHRG encourages the adoption of EVs by making the charging network more dense. Since 2019 it has helped install more than 1,000 stations.

Highlights

Number of patents: No Patent

CHRG says its software helps reduce the need to upgrade electrical infrastructure, allowing public charger installation to catch up with the growing number of EVs on the road. The company intends to begin using AI to improve the charging experience for EV drivers.

Strategic Alliances

Business (large companies), Business (SMEs), Government (cities), Research Institutes, Universities
Real estate operators, gas station operators, energy companies

chrg.network

MEREDOT

Country: Latvia

Type of solution: Micro-mobility

Summary

Meredot is developing and implementing a wireless platform for charging EVs, improving convenience by removing the need for plugging in and unplugging. The first product is a station for light vehicles such as scooters and delivery robots, and a software platform for easier control of charging infrastructure.

Impacts

Meredot estimates that the cost of building charging stations is less than 10% that of gas stations, not including the resources for fuel transport and storage.

Highlights

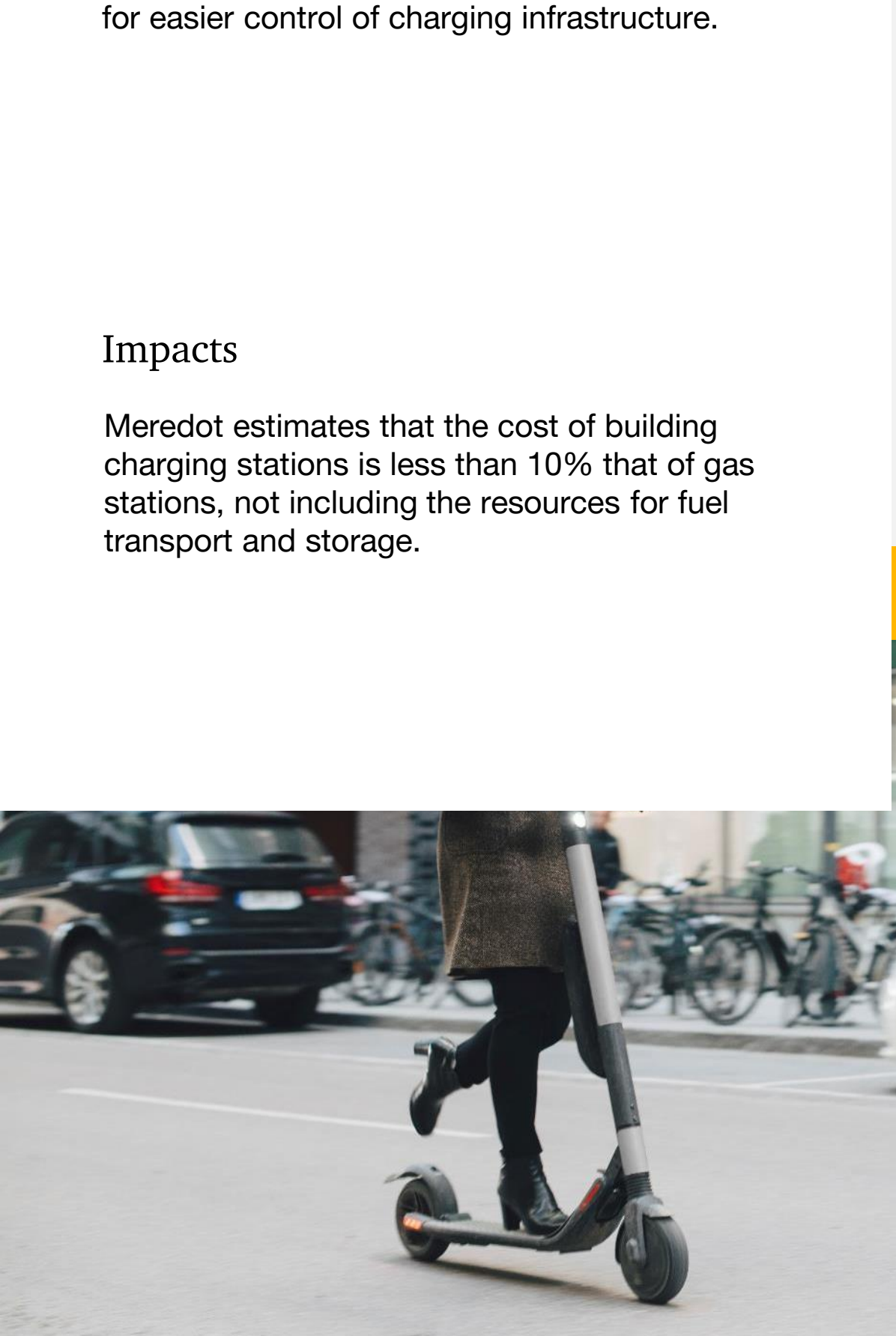
Number of patents: Patent-pending

Meredot says it has installed stations in Israel, Italy, and Latvia, and that its proprietary technology received a high score from the EU's Horizon 2020 EIC programme. The company reports that it's in talks to integrate its technology with robots from Amazon.

Strategic Alliances

Business (large companies); Business (SMEs); Government (cities); Government (local authorities); Investors

meredot.com



MOBILYZE

Country: Slovakia

Type of solution: Efficient Transport Systems

Summary

Mobilyze offers predictive analytics to help operators of public EV charging stations plan their networks, identifying the best points in any European market based on their strategy. Users can filter areas by traffic, competition, demography, predicted use and more, which will ultimately speed up infrastructure rollout and EV adoption.

Impacts

Since 2020 Mobilyze has identified hundreds of locations for its customers, saving thousands of hours of work, increasing utilisation by up to 100% and improving access for low-income households.

Highlights

Number of patents: No Patent

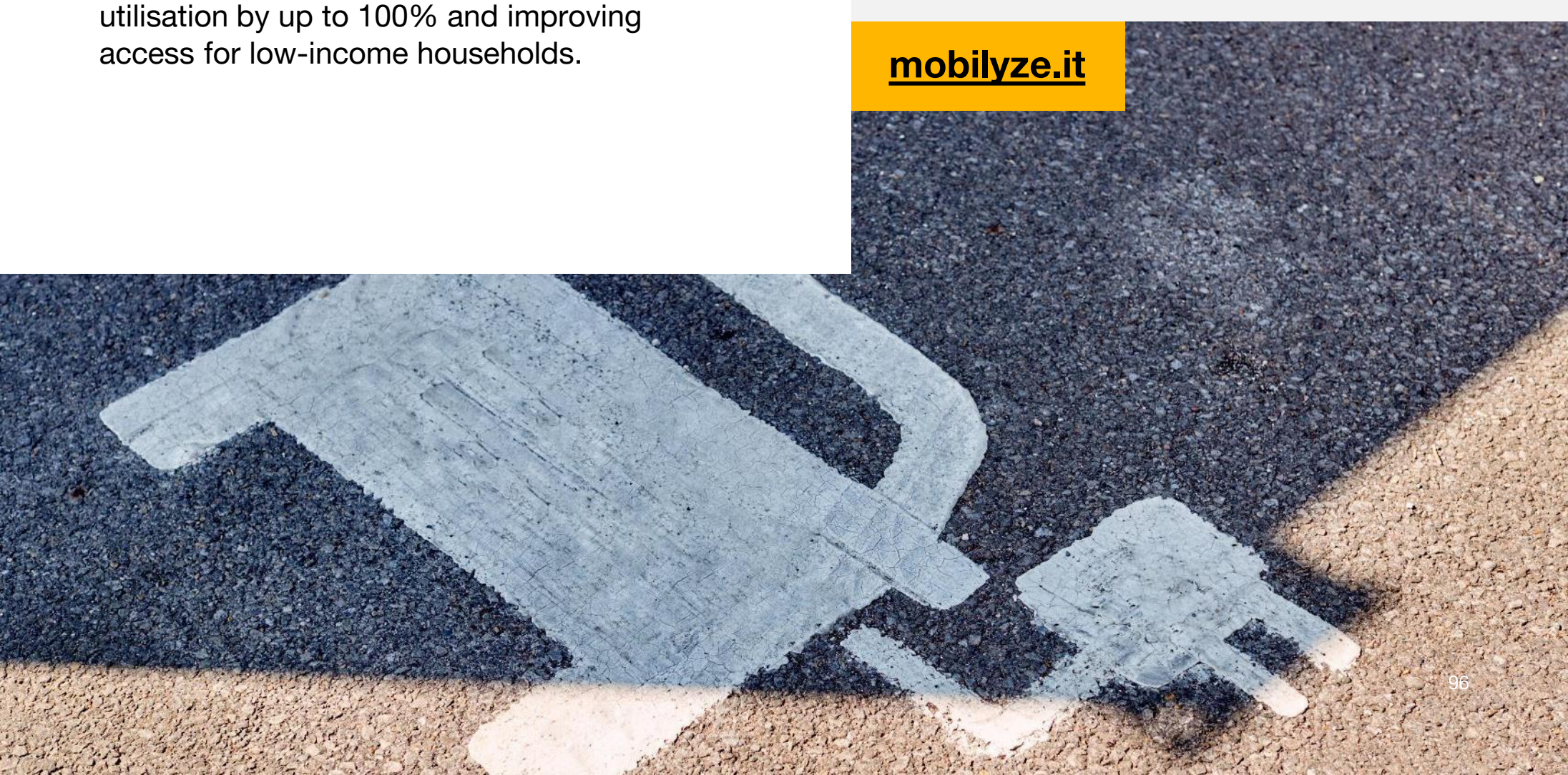
Mobilyze reports that it works with industry leaders including Shell, Fastned, Atlante, TotalEnergies and Greenway.

Mobilyze says it’s the only company that provides European-wide 360º analytics and consulting services specifically for charge point operators. It is developing machine learning models to predict usage levels and maximise utilisation.

Strategic Alliances

Business (SMEs)

mobilyze.it



Country: Estonia

Type of solution: Batteries/Fuel Cells

Summary

Skycorp produces bespoke next generation hydrogen-powered long-endurance smart drones, providing data for increased renewables and agriculture production, medical deliveries and services and disaster response/climate mitigation. It's building the world's first fully autonomous ecosystem of hydrogen drones.

Impacts

A single hydrogen drone can replace 3-4 conventional ones thanks to extended range and fast refuelling, as well as performing tasks beyond the range of battery-powered UAVs.

Highlights

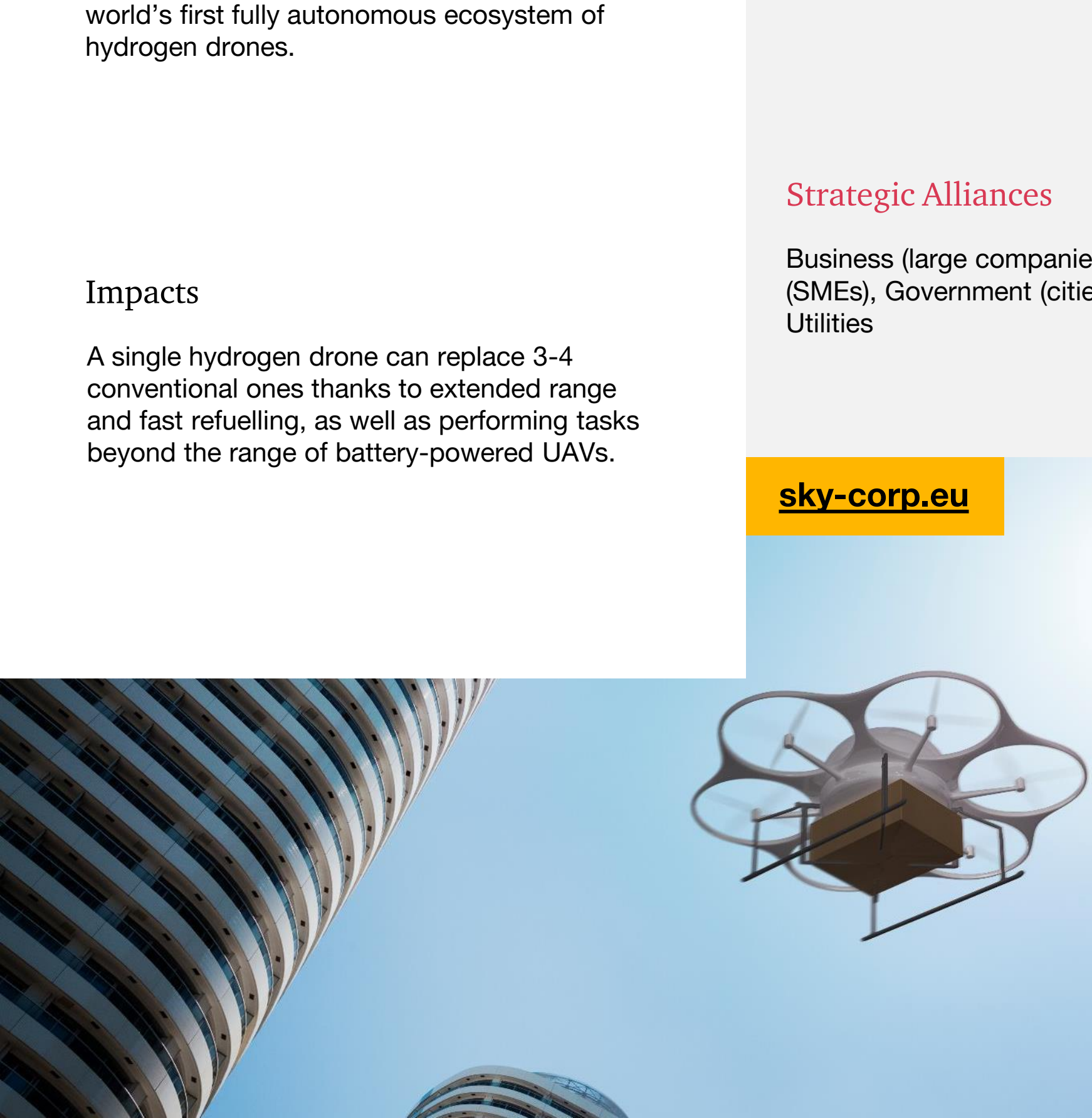
Number of patents: 1x patent

Skycorp has advised on more than €800 million of projects, becoming the first drone company to be part of the European Clean Hydrogen Alliance's Mobility Roundtable; strategic partners include the city of Tartu and the Estonian Aviation Academy. The global hydrogen-powered drone market is estimated at €1.1 billion.

Strategic Alliances

Business (large companies), Business (SMEs), Government (cities), Universities, Utilities

sky-corp.eu



Country: Estonia

Type of solution: Low GHG Light and Heavy Duty Transport: EVs and High-Efficiency Vehicles

Summary

Vok builds heavy-duty electric cargo bikes for carbon-neutral urban logistics. An alternative to delivery vans, Vok makes city spaces less congested and more human-friendly. The in-house developed hydraulic and regenerative brakes, drivetrain, batteries and tyres are designed to outlast off-the-shelf products, offering a longer maintenance cycle and creating less waste.

Impacts

Vok says its bikes emit 95% less CO_2 than a combustion-engine car (3 tonnes annually versus 58), saving 25.5 gigatonnes per year if the company meets its goal of 500,000 bikes in use by 2030.

Highlights

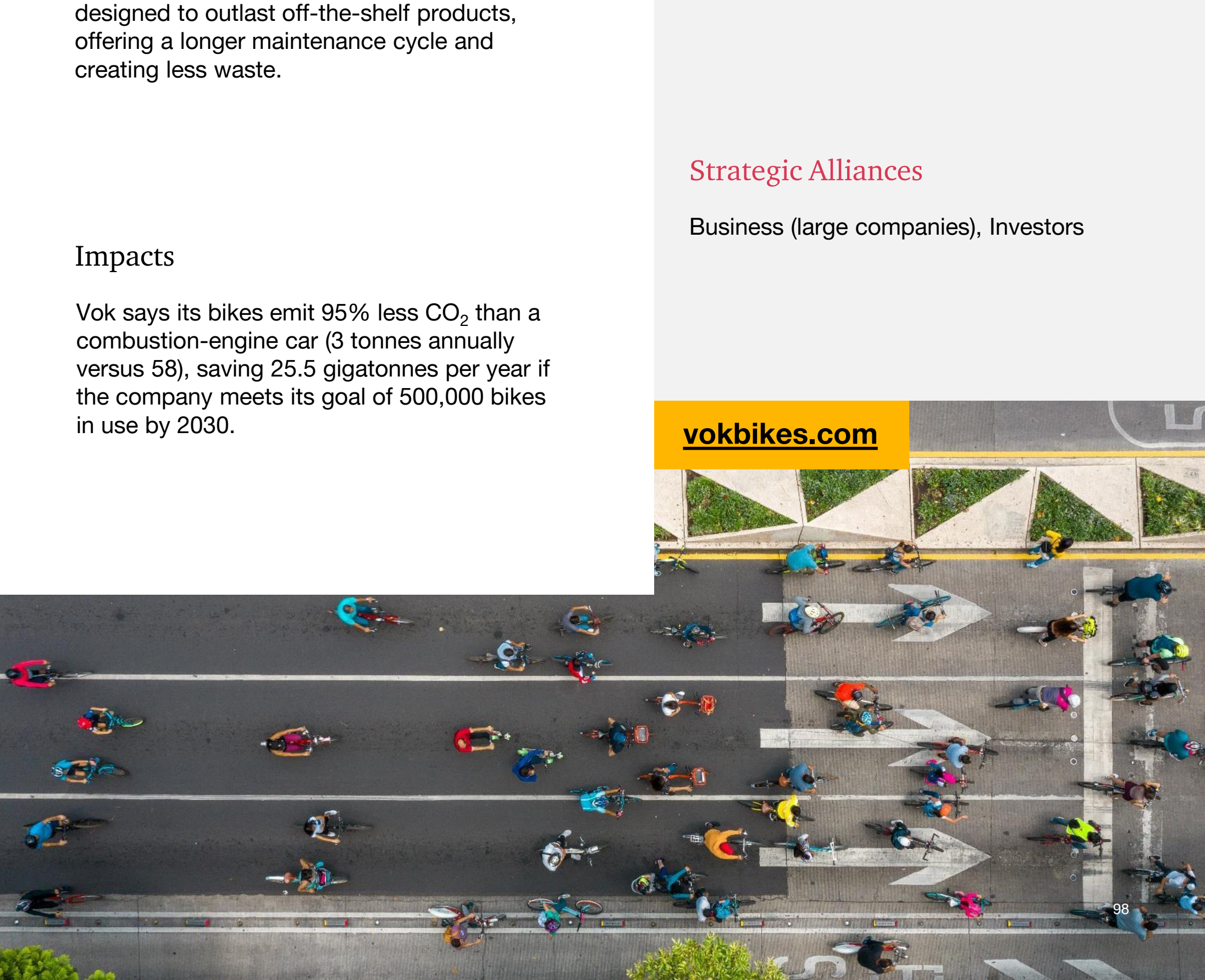
Number of patents: No Patent

Vok bikes have electric support, a roof and a comfortable seating position, and require no training to operate, which the company says makes them accessible for people of all ages and abilities, and usable in any weather – even the Estonian winter. Clients include the Estonian National Postal Service Omniva and Sweden's largest online grocery store.

Strategic Alliances

Business (large companies), Investors

vokbikes.com



Recommendations and conclusions

Our analysis has shown that the climate tech ecosystem in CEE is in its early days, especially when compared with more developed climate tech ecosystems – or other start-up ecosystems in general. Moreover, climate tech investments in the CEE region are also clearly concentrated in specific sectors and territories, leading to a prevalent ‘carbon funding gap’.

Innovative climate technologies are not silver bullets for climate action. Decarbonisation of high emitting sectors, phasing out high emitting assets earlier than planned, and behavioural changes will also play an important role in the net zero transition. But those technologies can – and will – open space for many promising decarbonisation levers in hard to abate sectors while offering financial return opportunities.

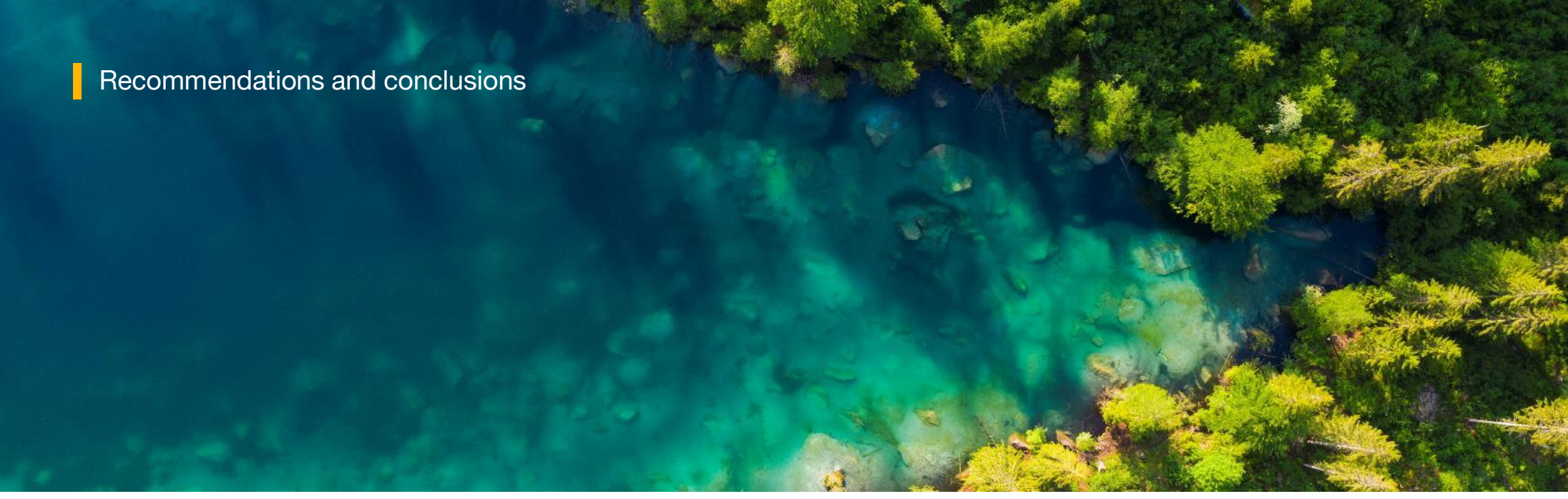
Climate tech is already emerging as a maturing asset class globally and in CEE it is also displaying steady growth, largely driven by increases in deal size. Going forward, the challenge remains how to scale up the wide range of existing technologies across sectors and territories in a short time and in a commercially viable manner. We have identified the following set of recommendations, drawn from our global and CEE regional insights and our engagement with climate tech investors to address existing barriers.

1. Close the funding gaps – beginning with early stage climate tech investment opportunities

There are several climate tech financing gaps in CEE. Many territories and sectors are yet to attract significant sums of VC investments. And for the most part, start-up founders have yet to scale up from the early stages of their growth journey. To bridge the gap, founders and investors will have to stay alert and look beyond the uncertainty and challenges to recognise emerging investment opportunities – and also recognise the strategic and time-critical role these solutions can play in improving the state of the world.

Our analysis suggests that currently the right class of investors for the CEE region are early-stage venture capitalists who are actively seeking to invest in pre-seed, seed, growth, and early stage companies and are ready to engage with start-ups in early stages of their journey.

Institutional investors such as sovereign wealth funds (SWF)s, PE houses, family offices, and others are also showing signs of interest in climate tech. For these investors, entering and understanding this ecosystem early on could aid their value creation and portfolio management strategies in the future. To quote a mid-cap Poland-based investor we spoke with during the preparations for this report:



'In PE, now our portfolio value creation process does not only mean driving the profits, but it also means driving the net zero transition. We need to be able to predict the future, and we need to know what buyers would be looking for in a few years time. Without clear and strategic PortCo decarbonisation roadmaps, it would be difficult to sell high-emitting assets in the future due to operational and reputational risks.'

Corporate accelerators could also play an important role in funding the early stage start-ups. Incumbent corporations are often able to offer the financial means, commercial know-how and market knowledge to rapidly deploy and scale new market innovations and leverage the agile features a start-up can offer, while exploring upcoming potential business models and products/services.

2. Help founders create a stronger climate value proposition

Based on our analysis of the information reported by the CEE Future50 start-ups, 40% of the start-ups have limited or no detailed understanding of the extent of their climate impact. This does not mean they do not have it, or that they are not able to demonstrate it, but it will be critical for these start-up founders and operators to demonstrate a solid climate value proposition from the very beginning in order to stand out.

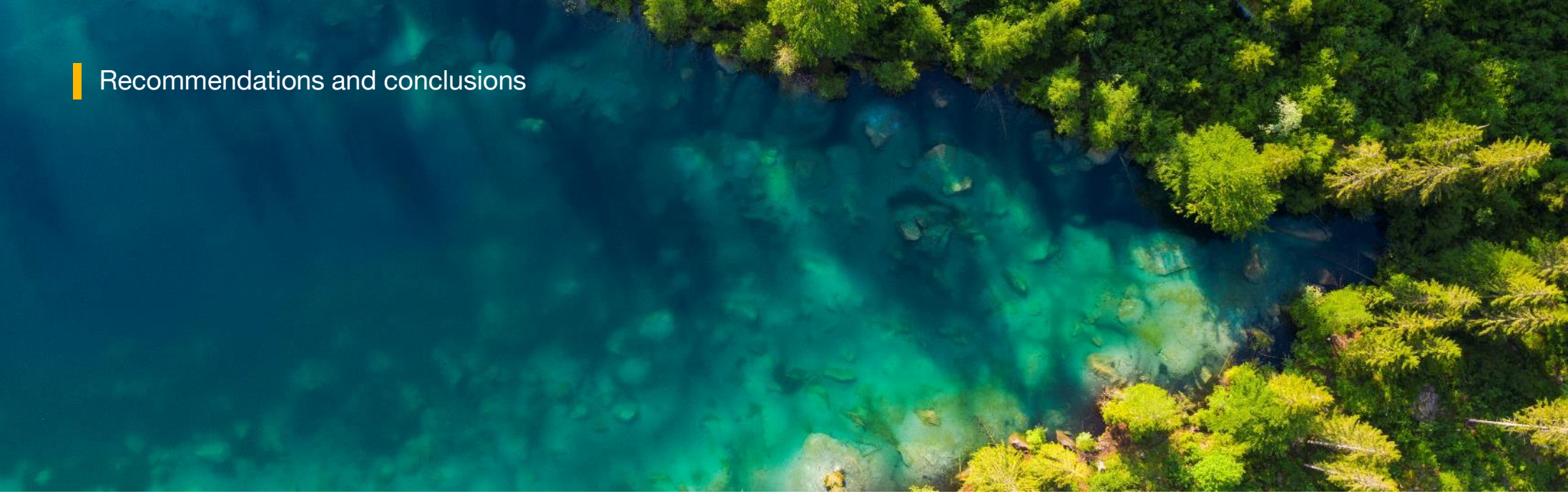
Failure to do so might influence the ability of climate tech start-ups to secure funding and stakeholder support. These start-ups should implement more rigorous impact assessment and measurement methodologies to present their technological solutions to investors and society.

Other than securing funding, there are other areas which should be considered. In terms of regulation, in the European Union a set of upcoming directives and legislation will be introduced to aid the EU Green Deal's goals of making the European Union the first climate-neutral continent by 2050, incentivising all players – including start-ups – to consider aligning their activities and reporting with emerging regulatory requirements. It is expected that this will also have spillover effects over other territories and sectors outside the EU that rely on trade relations and will be forced to follow suit.

3. Increase government funding and policy incentives for climate tech

Government interventions have the potential to play a critical role in enabling and nurturing the climate tech ecosystem. In particular, some technological solutions may never attract funding as they do not fit the risk and return requirements of most investors.

Governments should urgently focus on developing and scaling these sectors by ensuring public R&D funding goes to priority areas and public-private partnerships. They can do so by deploying public finance mechanisms such as R&D grants, innovation prizes and government backed incubators and accelerator programs. A significant proportion of CEE Future50 start-ups report having received some form of funding from the European Commission and attribute their early success to the availability of such resources.



4. Strengthen cross-sectoral collaboration along the path to Net Zero

The path towards net zero is steep and is becoming steeper with each recorded GHG emissions increase. The events of recent years – the global pandemic recovery, the Russian invasion of Ukraine, rising inflation and others – have negatively influenced our global decarbonisation efforts. Overcoming this will demand a combined effort by business, government and civil society. Technology can add a crucial push.

While our region is largely at the beginning stages in terms of climate tech maturity, it has remarkable potential to race ahead, with no shortage of tech-savvy founders.

We hope that the present Net Zero Future50 report – CEE edition is a good signpost: of where we are and of the potential paths forward. It reflects PwC's purpose of building trust and solving important problems. But we will get there only if all the members of the climate tech ecosystem work together in a coordinated manner. From innovative start-ups looking to open up access to key markets, to investors of all sizes looking to make an impact; from the next generation of companies to current industry giants looking to future-proof their business in a changing environment – we welcome you all to get in touch and see how we can work together to help make a difference.

How we can help

Our ESG practice is run by an experienced team with a wide network of resources. With over 800 PwC professionals from over 60 countries, all lines of services and industries, we are uniquely placed to advise companies on their journey to sustainability – from strategy and transformation to reporting and assurance.

Climate integrated solutions

	Strategy: shape the new reality		Transformation: put theory into practice		Reporting: show the world your true face
	Maturity and Baselining	**Strategy Development**	**Transformation Roadmap**	**Implementation and transportation**	**Reporting**
Net Zero Strategy & Transformation	Maturity diagnostic Peer benchmarking Boundary setting GHG footprinting	Decarbonisation lever Decarbonisation pathway analysis Strategy & business case Target setting Data Strategy	Value chain decarbonisation roadmap Operating model design Data roadmap	Operating model implementation Performance metrics Data management	Reporting readiness assessment Report preparation Compliance & disclosure
Climate Risk & Resilience	Maturity & gap assessment Climate risk & opportunity assessment Peer benchmarking	Product & services risks mapping Climate scenario analysis Risk & resilience strategy Climate governance review	Resilience & transition roadmap Operating model design	Climate risk management	

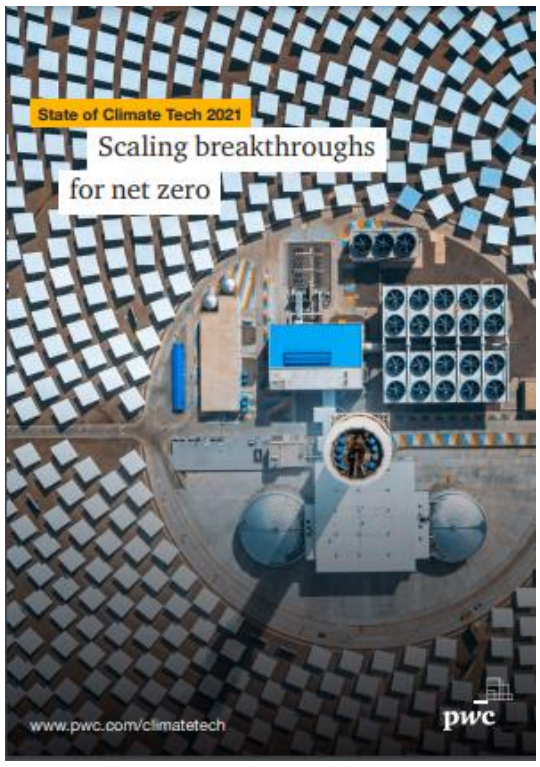
ESG Services in Deals

Group entity level	**Pre-acquisition/target-screening**	**Holding period**	**Exit**
TCFD, SFDR, EU Taxonomy requirements baselining Strategy and roadmaps Policy and framework Tools and procedures Training and capacity building KPI selection, analytics and reporting	ESG Due Diligence EFR Materiality estimation Climate risk considerations in DD Evaluation of disclosure schedules Preparation of disclosure packages (E&S) Stakeholders management and engagement Verification and support with the E&S documents	Post acquisition Review and Recommendations ESG Value Creation Portfolio Monitoring & reporting ESG Vendor Assistance Verification/support in ESMS implementation Environmental compliance support (permitting incl. EIA procedures)	ESG Vendor Due Diligence Climate risk considerations in VDD

ESG as a Managed Service

We have developed in-house an online ‘ESG Customer Assessment tool’ which can support companies with the assessment of their existing portfolio of clients, investee companies and other third party relationships. For more information please visit here.

Further reading



PwC State of Climate Tech 2021: Scaling breakthroughs for net zero

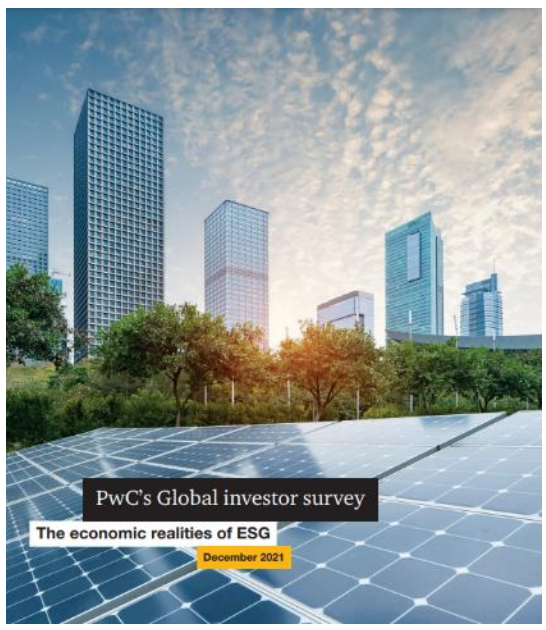
Annual look at the state of global climate tech investment, brings together a first-of-its-kind analysis of the start-up ecosystem critical to addressing climate change, highlighting potentially underfunded areas.

PwC Net Zero Economy Index 2022: Collective action needed in an era of uncertainty

The report tracks decarbonisation of energy-related CO2 emissions across G20 economies, revealing that in 2021 the decarbonisation was at its lowest level in over a decade, with decarbonisation needs rising to 15.2%.

PwC's 25th Annual Global CEO Survey: Reimagining the outcomes that matter

PwC's Annual Global CEO Survey, with its CEE regional edition, gathers perspective from 4,446 CEOs from 89 countries and territories on the current business climate and presents useful insights, including on ESG.



PwC's Global investor survey: The economic realities of ESG

A survey of 325 investors globally, offers insights into the leadership required to lead ESG business transformation, how companies tell their ESG 'story,' and the standards and transparency that can help with both.

pwc

PwC UK Net Zero Future50

A selection of 50 up-and-coming UK companies across the climate tech landscape, illustrating the opportunities for the technology and possible strategic industry alliances to support decarbonisation efforts across all sectors.

Authors and acknowledgements

We would like to thank the following people and teams for their contribution to this report:

Editorial

Agnieszka Gajewska, PwC CEE ESG Leader
José Miguel Salazar Hernández, PwC CEE ESG Hub Manager
Jeffery McMillan, PwC CEE Director of Brand, Marketing & Communications
Marta Laskowska, PwC CEE Digital Marketing & Brand Manager

Editorial support, research and data analysis

Kamil Dziegielewski, Ela Brglez, Paweł Rzepkowski, Valeriia Shapoval, Viktoriia Mostiuk, and Ewelina Łukasik-Morawska.

Graphics design

Dariya Pavliy

Strategic collaborations

The Strategy&UK Disruption & Innovation team of **Leo Johnson**, **Ed Bower** and **Elliott Malone**; and the PwC UK Sustainability & Climate Change team of **Tarik Moussa**, **Tabea Stoeckel** and **Liana Riley.**

The Wolves Summit team, especially to **Michael Chaffe, Diana Florescu, Gergo Gulyas, Monika Dawidowicz, Tomasz Samul, Alena Hloba** and **Wiktor Borkowski** for their valuable contributions during the scouting process, consultation and outreach over many months.

And we would also like to thank the following individuals for their support:

Weronika Myck, Anna Kowalewska, Enya Stenseen, András Lengyel, Birutė Purvaneckaite, Simas Trijonis, Magdaléna Kovarova, Tereza Steflova, Jindřich Henzl, and **Maija Orbidane.**

Interviewees and inspirers

Darius Maikštėnas, Chair of the Management Board and the CEO of Ignitis Group

Jitka Haubová, Chief Operations Officer and Member of Board of Directors in charge of Sustainability of Komerční banka

Szilárd Gerencsér, Deputy CEO, Logistics and Operations of Magyar Posta Zrt. (Hungarian Post)

Michał Lasocki, Partner of EEC Ventures

Karolina Wojtas, Investment Manager of Icos Capital Management B.V.

Dr. Daniel Reese, Investment Manager of UVC Partners

Triinu Lukas, CEO of Beamline Accelerator

Maciej Majewski, CEO & Head of Acceleration of Accelpoint

Marija Ručevska, Co-founder & Managing Partner of Helve, Board Member at TechChill

Appendix:

Notes and assumptions

How has PwC produced the climate tech investment data to support this report?

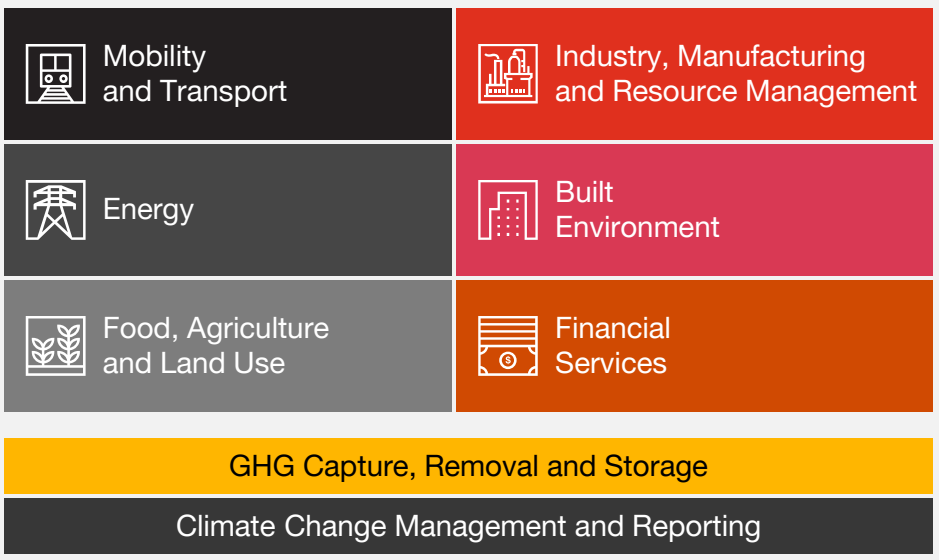
Our investment analysis is based on PwC's Climate Tech Investment Index, a proprietary and continually updated database of climate tech start-ups and investors, built with machine learning and extensive human verification, part of PwC's wider Climate Tech Platform.
Funding data is provided by PitchBook, a global data platform covering private capital markets including venture capital, private equity and M&A transactions. The data covers VC and PE equity investments into private companies (i.e. excludes investment in public equities; and excludes debt funding).

How has PwC produced the GHG emissions data to support this report?

Our GHG emissions analysis is based on Our World in Data: emissions by sector, which is based on ClimateWatch figures from the World Resources Institute (WRI) for 2019. The data were aggregated based on the five key sectors which contribute the majority of emissions. With the exception of Kosovo, which did not have data available, the GHG data presented here are the aggregated CEE region's GHG emissions data.

How has PwC categorised the climate tech start-ups by sectors?

The 8 sectors of focus are based on the PwC climate tech taxonomy. Out of which five of the verticals are the key sectors which contribute to the majority of emissions and the other vertical is the financial services sector due to the significant climate impact potential from addressing financed emissions. For more details on the full classification please see PwC's State of Climate Tech 2021 P. 56.



How has PwC defined climate tech solutions?

Climate tech is defined as technologies that are explicitly focused on reducing greenhouse gas (GHG) emissions, or addressing the impacts of global warming. Climate tech applications can be grouped into three broad sector-agnostic groups – those that:

- Directly mitigate or remove emissions
- Help us to adapt to the impacts of climate change
- Enhance our understanding of the climate.

How did PwC score and select the Future50 start-ups?

Each of the three dimensions of assessment (Maturity, Scalability and Impact) included several sub-criteria, as described in the Methodology section. Using the assessment framework, we scored each of the start-ups as high, medium or low, aggregating to derive an overall score.

The 50 companies were selected out of the top scorers, ensuring sufficient coverage across sectors to the greatest possible degree. For the financial services vertical, we did not identify any eligible candidates. This finding from the scouting process is consistent with Pitchbook data.

How did PwC define the nascent solutions?

One of the key findings of our State of Climate Tech 2021 study was that a handful of technologies are taking the largest slice of the investment pie. Thus we identified eight types of climate technology which, although they might have smaller ERPs, are likely to play a pivotal role in decarbonising their sectors, each of which contributes significantly to the global GHG emissions budget. For more information, please refer to the SOCT21 P. 45.

Contacts

ESG, Climate Risk and Net Zero Strategy

Agnieszka Gajewska
Partner, Global Leader Government & Public Services | CEE ESG Platform Leader
PwC Central and Eastern Europe
agnieszka.gajewska@pwc.com
+48 517 140 537

José Miguel Salazar Hernández
Regional ESG Hub & Climate Solutions Manager
PwC Central and Eastern Europe
jose.miguel.salazar.hernandez@pwc.com
+48 519 505 899

Brand, Marketing and Communications

Jeffery McMillan
Director of Brand, Marketing & Communications
PwC Central and Eastern Europe
jeffery.mcmillan@pwc.com
+48 519 506 633

Marta Laskowska
Digital Marketing & Brand Manager
PwC Central and Eastern Europe
marta.laskowska@pwc.com
+48 519 505 529

For more information, visit:
PwC CEE ESG | PwC Sustainability & Climate Change