



Sustainable Solutions

Advancing life around the world, in-line with global sustainable development priorities, requires a strong focus on science and technology, a culture of innovation that permeates all our business processes, and strong skills and capabilities in our areas of expertise.

As a group of companies, with a team of more than 21,000 individuals, bound by a common purpose and a shared vision, we work to deliver sustainable solutions in all our markets. This chapter includes key examples of Orbia solutions contributing to the UN Sustainable Development Goals.





A New Partnership for Sustainable Living

In early 2021, we announced a new partnership with the [Resilient Cities Network \(R-Cities\)](#), the world’s leading city-led network. Through our brands Wavin, Netafim and Dura-Line, we will work with R-Cities members to develop innovative solutions to ongoing challenges such as transportation infrastructure, water supply, urban food systems, and connectivity that can enhance urban quality of life. These initiatives will aid progress towards three Sustainable Development Goals



“Resilient Cities Network is a city-led organization that is building urban resilience around the world. Active in more than 100 cities in 40 countries, we deliver projects that can be brought to scale across our global city network and have a positive impact on the lives of urban dwellers. Our unique partnership with Orbia aims to accelerate this important work—delivering projects that incorporate innovative solutions cities can apply to address the complex and interrelated challenges of globalization, urbanization and climate change.”

Lauren Sorkin

Executive Director, Resilient Cities Network



Innovation

Our purpose to advance life around the world is our inspiration; innovation is our springboard.

We will not solve the world's most pressing challenges by doing what we have always done. We will only create a resilient future by pushing the boundaries, not only of science and technology, but also of our own imagination and determination. We need to adopt a mindset of innovation that becomes a natural part of the way we do things across the entire organization.

A foundational culture of innovation will drive our realization of resilient solutions for people and for the planet. This is our approach at Orbia and in 2020, we made new strides in advancing innovation in practice and innovation in spirit.

\$61.5M investment in innovation R&D in 2020

A selection of 2020 achievements include:

Investing in Startups

Following the establishment of our multi-year \$130 million venture capital fund [Orbia Ventures](#) in 2019, in 2020 we continued our outreach and assessment of early-stage startups.

We screened over 550 investment opportunities and conducted due diligence on more than 20 startups that offer new technologies in one of our seven defined focus areas:



Agriculture and food tech



Circular economy



Building and infrastructure



Energy storage



Smart cities



Medical



Communications

During the year, Orbia Ventures completed two investments.

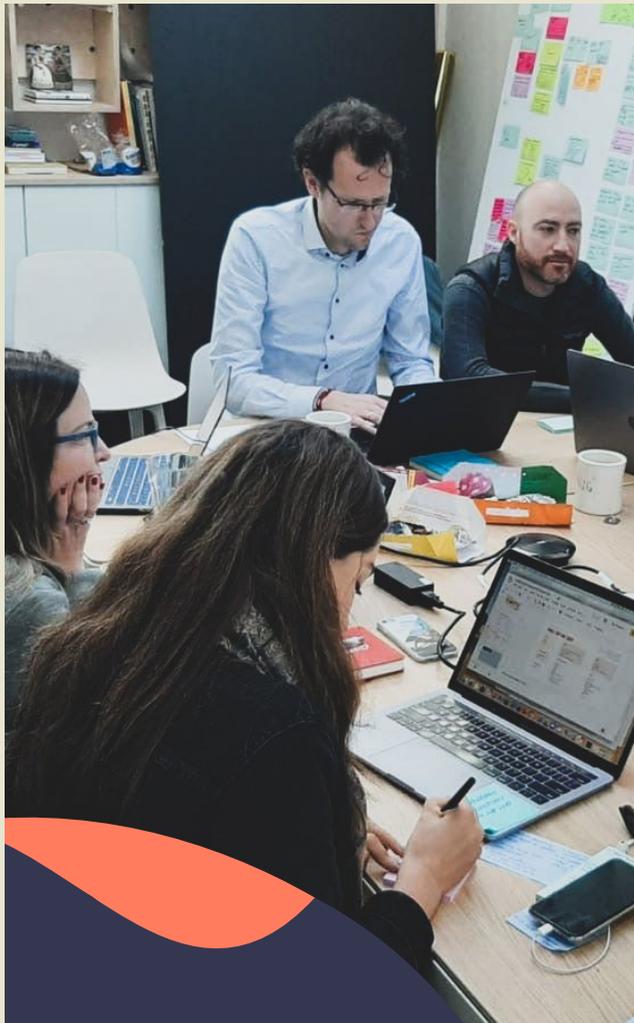


SeeTree

[SeeTree](#) offers farmers an 'intelligence network' for trees, an end-to-end service to manage and optimize the health and productivity of their trees, using artificial intelligence (AI) based on records of each individual tree.

Silvec Biologics

[Silvec Biologics](#) is developing the first non-GMO process to inoculate against tree, vine, and bush diseases in seedlings and mature trees. This breakthrough technology can prevent widespread farming losses from disease.



Empowering Intrapreneurship

Launched in 2020, our internal innovation program, LaunchPad, invites Orbia employees to suggest value-generating ideas and receive development funding and support if approved. 140 trained Innovation Champions support the ongoing implementation of the Launchpad challenges throughout Orbia. During the year, we ran four Launchpad Challenges across three Business Groups. These yielded more than 780 individual ideas resulting in 11 innovations that are now progressing with management funding. Overall, LaunchPad initiatives are projected to deliver in excess of \$50 million in value (efficiencies or new revenue) in the next five years, while supporting the delivery of resilient solutions for our customers in different sectors.

Educating for Innovation

Our Innovation Academy aims to drive Orbia's innovation culture through upskilling and training. In 2020, thousands of employees engaged in more than 6,400 hours of specialized innovation training covering Rapid Prototyping, Advanced Analytics, Circular Economy, Open Innovation and more.

Designing Innovation

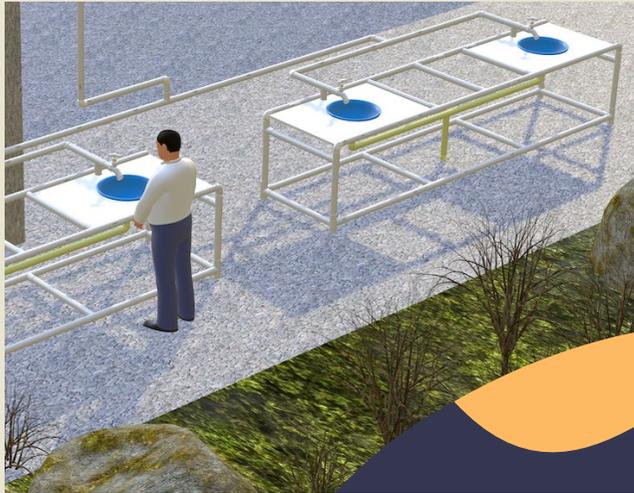
We continued to build our team at [Orbia Lighthouse](#), our venture studio, and completed assessments of new projects in areas such as electric vehicles, leak detection in urban water networks and more.

Advanced Analytics

We launched a program that focuses on identifying opportunities to leverage advanced technologies such as machine learning (ML) and artificial intelligence (AI) to solve problems or generate value in ways that we could not have achieved with existing technologies or capabilities.



Essential During COVID-19



The COVID-19 pandemic disrupted life as we had known it across the world, and more rapidly than we could have imagined. Despite the challenges, at Orbia, we have remained grounded in our values and focused on our three priorities: keeping our people safe, supporting our communities and ensuring business continuity.

Through the pandemic, we quickly realized that several of our business lines were essential to support healthcare, hygiene and sanitation, food security, telecommunications and other industrial demand in different sectors. In all cases, we went the extra mile to maintain and increase supply where needed and support our customers around the globe as they navigated a new set of priorities.

Key Orbia products that proved essential during COVID-19 included:

Medical grade propellants

During 2020, we increased our production of metered dose inhalers for asthma patients by 12% to meet increased demand during this time.

Medical Grade PVC Compound

During 2020, we helped meet a significant increase in demand for these materials, used in a range of medical equipment, including IV bags, tubes, oxygen masks, face shields, and other equipment used in hospitals and healthcare centers around the world.

Chlorine and fluorine derivatives

We maintained supply of derivatives used in many essential healthcare, hygiene and sanitation applications through 2020 to all existing and new customers.

Data communications conduits and infrastructure

We accelerated production of our essential conduits and installations to meet service provider demands to expand capacity with urgency, to support the explosion in Internet needs and data communication traffic.

Protective face shields

Some of our factories converted production lines to enable production of PPE to support our employees, communities and markets.

Precision irrigation equipment

In particular, our remote sensor technology for drip irrigation enabled farmers to continue to monitor their crops and secure agricultural output. Our service to farmers was not disrupted during COVID-19.



Sustainable Solutions in Practice

In 2020, alongside navigating the COVID-19 pandemic, we continued to advance life around the world through our innovative, sustainable solutions to the many challenges facing humanity that we address through our business. In this section, we share progress made across different sectors and topics.

 **Enhancing food security and helping farmers thrive**

 **Managing stormwater for resilient cities**

 **Enabling connectivity for smarter, safer, low-carbon, cost-efficient cities**

 **Cooling supply chains without warming the planet**

 **Exploring options for fossil-free resin**

 **Enabling a low-carbon transition**

“Incorporating sustainability considerations in capital allocation is now a regular part of our thinking and practice. By supporting solutions for resilience in our markets, I believe, we are supporting the resilience of Orbia as a company with a long-term future. In fact, this thinking was reinforced in meetings Orbia held this year with several of our key investors, who made their expectations clear. From a financial standpoint, investing in sustainable innovation and practices makes sense.”



Edgardo Carlos
Chief Financial Officer, Orbia



Enhancing Food Security and Helping Farmers Thrive

Netafim's proven Community Irrigation model in India brings together public and private sector decision-makers to organize smallholders into "irrigation communities". Through the community model, farmers benefit from regular water supply through improved infrastructure, efficient irrigation equipment, modern farming practices and a hub of technical and commercial assistance that enables them to deliver strong yields, assure a regular income and contribute to their local economy. As part of this model, Netafim trains farmers and provides agronomic support over a period of 5 years to help farmers be self-sustaining over the long term.

In 2020, we commenced a significant expansion of the Community Irrigation model in partnership with Megha Engineering and Infrastructure Limited (MEIL). The expansion includes three projects covering 66 villages and 35,000 farmers on an area of 50,000 hectares in the Nandwadgi and Singatalur regions of Karnataka bringing our total reach since 2017 to more than 97,000 farmers across 202 villages.

Based on our experience of our first Community Irrigation project in Ramthal (2014-2017), we expect initiatives that commenced both in 2018 (ongoing until 2023) and in 2020 to deliver up to 30% higher yields across a broad range of planned crops while reducing water requirements for irrigation by 40% compared to current farming practice.

Netafim's Community Irrigation Projects in India

Accumulated	2018	2019	2020
Projects	1	5	8
Villages	28	136	202
Farmers	7,000	62,000	97,000
Hectares	12,000	56,000	106,000
Value	\$60 million	\$160 million	\$245 million

Main crops:



Corn



Peanut



Sunflower



Bean



Vegetables



Flowers



Onions



Chili



Rice



Cotton

Sustainable Rice at Scale

At Netafim, we have been studying rice cultivation for more than a decade, in collaboration with agricultural experts and customers in multiple field trials. Success of the commercial-scale drip irrigation in Turkey and India demonstrates that we can transform rice production worldwide to deliver improved yields, 70% water savings, fertilizer reduction, >90% reduction of methane emissions and significant reduction of arsenic uptake into rice grains. With rice being the predominant source of nourishment each day for more than 1.6 billion people around the

world¹, transforming rice production can substantially help deliver Sustainable Development Goal #2: Zero Hunger.

Any Crop, Anytime, Anywhere

In early 2021, Netafim acquired Gakon Horticultural Projects, a leading Dutch turnkey greenhouse solutions provider. In response to the growing trend towards locally grown fresh produce, expanding greenhouse availability and offering state-of-the-art greenhouse solutions will offer farmers new possibilities to grow any crop, anywhere, any time. With Gakon's specialist expertise in all aspects of greenhouse project execution and Netafim's established leadership in advanced irrigation technologies, already in use in 80% of the world's professional high-end greenhouses, local food cultivation can now become a reality around the world.

“We are excited to be able to apply our deep knowledge and skills of greenhouse horticulture to new markets and be part of a group that is set to drive forward sustainable and profitable crop production.”

Pieter van Berchum

Director of Gakon Horticultural Projects

1. <https://www.worldatlas.com/articles/most-important-staple-foods-in-the-world.html>





Managing Stormwater for Resilient Cities

Urban flooding is a large and costly problem for local governments, and it's growing.

“With shorter cycles of extreme floods and damage, Europe’s current average losses of €4.9 billion a year could reach €23.5 billion by 2050, a rise of almost 380 percent.”² Stormwater is excessive rainfall that is not absorbed into the ground, flowing through the city into drain sewers, picking up contamination and debris on its way. Such runoff can cause serious flooding, pollution, damage to property, harm to aquatic life, rivers, lakes, aquifers and also to humans. Not only that, uncontrolled stormwater damage requires large municipal budgets to fund clean-up and restoration.

Wavin has dedicated its business to delivering stormwater solutions that take the frustration out of a rainy day and offer peace of mind to city dwellers. Under our Wavin brand, using our unique technology, we offer gutters, roof drainage systems, gullies, subsurface attenuation and infiltration tanks and tree bunkers. In 2020, we applied these solutions around the world to enable people to live in cleaner cities.



AquaCell infiltration tank made from 100% recycled material

2. <https://www.scientificamerican.com/article/europes-flood-losses-to-soar-by-2050/> Accessed April, 2021



Wavin is building a global offering of data driven sustainable infrastructure services to support their customers in solving some of their most urgent challenges. In this journey, Wavin has started a cooperating with one of the leading ports in the world.

At critical locations, Wavin has equipped drainage equipment with monitoring functionality. This enables our client to secure flawless operation under all weather conditions as well as optimizing planning of its maintenance activities.



Tegra Gully made from post-consumer recycled material

Sweden

With heavy stormwater accumulation hindering residential and commercial expansion and construction in Swedish cities, Wavin's XL pipes offered relief. For Sundsvall's Tivoli Works wastewater plant, we created a novel solution deploying a 550-meter-long sea pipeline, which we constructed in 50-meter sections, to transport purified water out into the sea. See a video of the Tivoli works water pipeline [here](#).

Colombia

The city of Bogotá, with over 8 million inhabitants, urgently needed a system to separate rainwater from wastewater. Rainwater that is channeled to a wastewater plant is both a waste of city resources and also prevents sustainable use of rainwater for irrigation. The solution: Wavin's patented Tegra gullies throughout the city filter out debris and contaminants and channel rainwater for storage and reuse, rather than treatment. Similarly, we are using innovative trenchless diagnostic and rehabilitation technologies to continue upgrading 8 kilometers of the city's sewer network, avoiding the need for excavation of roads and other disruption during installation. These improvements serve more than 150,000 people in 15 neighborhoods and will enable Bogotá to manage water efficiently for the benefit of its population for many years to come.

Netherlands



WaviCore stormwater solution

To solve a unique problem experienced in cities in the Netherlands, where water levels are so high that regular stormwater solutions are not effective, we developed a new product, WaviCore, a slotted subsurface pipe that is run between the gullies so that infiltration can occur under a larger surface of road. We are currently testing this solution in one major city and expect it will be a perfect solution to infiltrate rainwater in areas with a high groundwater table, combining good performance and low maintenance.



Enabling Connectivity for Smarter, Safer, Low-carbon, Cost-efficient Cities.

It's estimated that more than 50 billion devices will be connected by 2025³ and that internet traffic will increase between 10 to 100 times from 2020 to 2030.

Only fiber optic cables can reliably transport the huge volume of data required to support this expansion and 5G or even 6G mobile broadband networks will be needed for fast and responsive low latency connectivity. Not only this, greater digitization is a key element in mitigating climate change: by 2030, internet communications and technology have the power to hold global carbon emissions at 2015 levels⁴. As we all know, COVID-19 has accelerated the connectivity transition at an unprecedented pace, and many of these new digital habits of living, working and consuming will remain in a post-COVID-19 world. Our brand Dura-Line has for years been a leader in enabling connectivity, providing the conduit technologies and pathways for connection that helps us all live better in a more sustainable world.

Dig Once Becomes Law

The practice of “dig once” refers to the inclusion of broadband conduit in construction of roads, railways, and communities to allow for future capacity expansion and access for connectivity. This is important not only because it allows more people to be connected, but also because it increases the efficiency of infrastructure projects:

fiber optic installation at the time of road construction saves around 90% of regular installation costs. In 2020, we were delighted to see the U.S. government enact the Nationwide Dig Once Act adopted into law, following tireless campaigns by [California Congresswoman Anna G. Eshoo](#). In responding to Congresswoman Eshoo's earlier call for solutions for universal access to broadband, our Dura-Line experts worked with the [Fiber Optic Sensing Association](#) to provide research and policy materials to help inform this legislation. With this law, connectivity infrastructure is positioned for the future in the most cost and resource-efficient way.

In 2020, in addition to our dedicated support for our communications service provider customers as they augmented their networks in response to the explosion of internet demand, we continued to enable access across rural U.S. and in other countries.

Mass Transit Expansion in Seattle

October 2020 we were proud to have received the Platinum Innovator Award from Cabling Installation & Maintenance for our work on the Seattle Sound Transit Authority Railway system. [The Northgate Extension](#) of Sound Transit in Seattle is a light-rail tunnel section comprising under-and overground routes with expected daily use by more than 40,000 passengers. To assure the safety of all, a robust communication and security infrastructure system is

needed to process data from security cameras and train tracking systems. However, routine operations in the transit tunnels are challenging due to poor ventilation that traps toxic exhaust gases. Taking this into account, our Low Smoke Zero Halogen (LSZH) conduits, that have low friction potential and greater air-jetting distances for cable installation at speed, were installed over more than 6,700 meters. The LSZH solution supports clean air for passengers and for those working in the tunnels, including, for example, firefighters, while providing Sound Transit with an optimal connectivity infrastructure.

Bridging the Urban-Rural Digital Divide

Chariton Valley, a Missouri communications provider, wished to expand broadband internet to local underserved areas, especially rural areas that had no or poor access.

39% of rural Americans lack home broadband access – in contrast to only 4% of urban Americans.⁵

To do so, Chariton Valley needed to partner with other local communications carriers. Essential to this approach was a standardized connectivity infrastructure, which Dura-Line's FuturePath 7-Way and 4-Way conduits enabled. Using our FuturePath multiple pathway conduits, with minimal installation effort as the new conduits are pulled into existing ones, Chariton Valley was able to rapidly and efficiently connect thousands of individuals in the region.

3. <https://www.itu.int/en/mediacentre/backgrounders/Pages/5G-fifth-generation-of-mobile-technologies.aspx>

4. The #Smarter2030 opportunity: ICT Solutions for 21st Century Challenges, published online by GeSI: <http://smarter2030.gesi.org/the-opportunity/>

5. <https://theconversation.com/reaching-rural-america-with-broadband-internet-service-82488>





Cooling Supply Chains Without Warming the Planet

As a global leader through our Koura brand, delivering fluorinated products that play a fundamental role in enhancing everyday lives, we are excited by the role we can play in greening supply chains and making a positive impact.

Climate-friendlier refrigerants

Refrigerants are essential materials for many supply chains and are used in multiple industries for cooling applications including air-conditioning, food production, transportation, healthcare and many more manufacturing uses. Globally, refrigerants will represent an estimated \$30 billion market by 2025⁶. However, increasingly, current refrigerant solutions have been recognized as a contributory factor to global warming. Our brand Koura has leveraged its expertise in fluorinated products and researched and developed new technologies to create a new class of refrigerant that achieves both high performance and significantly lower global warming potential (GWP) than current materials. For example, one of our new offerings from our portfolio of development products, Klea[®] 473A, for use in ultra-low temperature refrigeration applications such as bio-medical storage, has a GWP of 1,830 which is 85% lower than a comparable refrigerant, R-23, which has a GWP of 14,800. Additionally, Klea[®] 473A offers

improved cooling capacity and energy efficiency compared to R-23. These development products will progressively bring new sustainable, low GWP and high energy efficiency solutions to a broad range of refrigeration applications from food preservation and building climate control, to bio-medical storage solutions.

Greening Propellants

Our focus on low GWP solutions applies also to our medical propellants. Koura supplies over 70% of the fluorine-based medical propellants used in the metered dose inhalers (MDIs) relied upon by tens of millions of asthma patients worldwide every day. Last year, we announced our new offering Zephex[®] 152a (1,1-difluoroethane), a propellant gas for MDIs with a GWP more than 90% percent lower than commonly used propellants. This year, we increased that commitment with a multi-million-dollar investment into a new Zephex[®] 152a production facility at our site in Runcorn, UK. This investment enables scaling-up production capacity to meet the increasing demands of customers for this new low GWP, high purity, medical grade propellant. Additionally, the successful progress of Zephex[®] 152a, has empowered us to announce our delisting of a high GWP medical propellant, Zephex[®] 227ea, from 2021.

“We are building on our existing portfolio though investment to provide new sustainable, high energy efficiency and low environmental impact solutions to a broad range of societal needs, from new refrigerants and medical propellants to battery solutions and energy storage. Advancing life around the world means providing solutions that will enable us all to be more resilient.”



Gregg Smith
President, Fluorinated Solutions (Koura), Orbia

6. <https://www.marketsandmarkets.com/Market-Reports/refrigerant-market-1082.html>





Exploring Options for Fossil-Free Resin in the Future

Through Vestolit, a leading global producer of vinyl resins for decades, we have gained deep expertise in the production of PVC and derivatives, and their application across multiple industries from healthcare products to shoe soles and from pipes and conduits for data communications to films for wrapping. In the last year, we leveraged our expertise to reduce the carbon footprint of our portfolio to develop a PVC that is free from fossil fuels.

Ethylene and fuels for electricity and heat, main contributors to the Global Warming Potential (GWP) of PVC, account for more than 80% of its climate change impact. Replacement of these with sustainable alternatives enables us to offer PVC with a GWP reduction of 40% or more.

Three technologies to deliver fossil-free PVC

Our innovation team is actively working on three technologies to transform the carbon footprint of PVC:

- **Carbon capture:** PVC manufactured using a process that captures carbon dioxide that would otherwise be emitted into the atmosphere, for example, industrial gas emissions from suitable industries. Our challenge in scaling this option will be to source feedstock at scale and establish appropriate infrastructure for raw material transportation.
- **Circular:** PVC manufactured using carbon derived from post-consumer mixed plastic waste. Our challenge is to source sufficient volumes due to low technical maturity.
- **Bio:** PVC manufactured using carbon sourced from plants. Our challenge will be to source suitable bio feedstocks without disrupting food supply chains.

In all three cases, we are actively working with our customers to advance this industry transformation. This is dependent upon several factors, including our ability to source raw materials that meet our strict criteria for sustainability, quality, and consistency.

We hope to bring some of these new specialty products to market during 2021.

“We advanced this development in 2020 in the midst of the COVID-19 pandemic. Our team never actually met in person and we connected to customers virtually as well. Sustainability is like a game of chess. Reading a book about the rules won’t get you anywhere. We put the rules aside and focused on our contribution to a more sustainable world. These new fossil-free carbon PVC options move us, and the entire PVC industry, towards this goal.”

Dr. Katharina Kleine

Head of Innovation Management, Polymer Solutions Business Group (Vestolit), Orbia



Enabling a Low-carbon Transition

At Orbia, through our diverse business lines, we are able to contribute to a low carbon world in many more ways than we are able to summarize in one report. In addition to the sustainable solutions already noted, examples of progress in 2020 include:



The Natural Park, Turkey

Indoor climate solutions for low carbon living

We leverage the expertise of our brand, Wavin, to offer innovative solutions for temperature control and ventilation that reduce the carbon footprint of residential buildings. In 2020, we transformed the 104 apartments of The Natural Park residential complex in Sanliurfa, Turkey with the installation of our new Sentio Indoor Climate Control system in combination with solar-powered heat pumps. Sentio delivers heating and cooling via underfloor pipes, avoiding the need for air conditioning or other heating installations. Residents can control apartment temperatures using an app, so, for example, with high summer temperatures reaching 40° C, indoors, you can enjoy the day at 20° C. Typically, residents save up to 21% of energy by using zone control, up to 20% by using underfloor heating instead of radiators and up to 34% in cooling versus air-conditioning.



In 2020, we extended the capabilities of the Sentio Indoor Climate Control System to include a Smart Radiator Thermostat, enabling each room in the home to

be individually scheduled to achieve a specific temperature at each moment of the day, using the Sentio app that controls the underfloor heating system. In this way, residents can tailor the temperature of their apartment to their home activity while saving on energy consumption.

Advancing the future of electric mobility

Koura is actively developing fluorinated materials that can improve the safety and performance of electrolytes use in lithium-ion batteries, the main power source for electric vehicles. In 2020, we commenced a new partnership with the U.S. Department of Energy (DOE) Argonne National Laboratory (ANL) to improve the process of integrating electrolyte additives for lithium-ion battery applications. The project uses funding from the DOE's Office of Energy Efficiency and Renewable Energy, with cost sharing by Koura. A key challenge to date has been the scaling of processes using certain fluorinated substances that can significantly improve the performance of batteries for electric vehicles. This new collaboration promises to pave the way for a green, clean, mobile future.



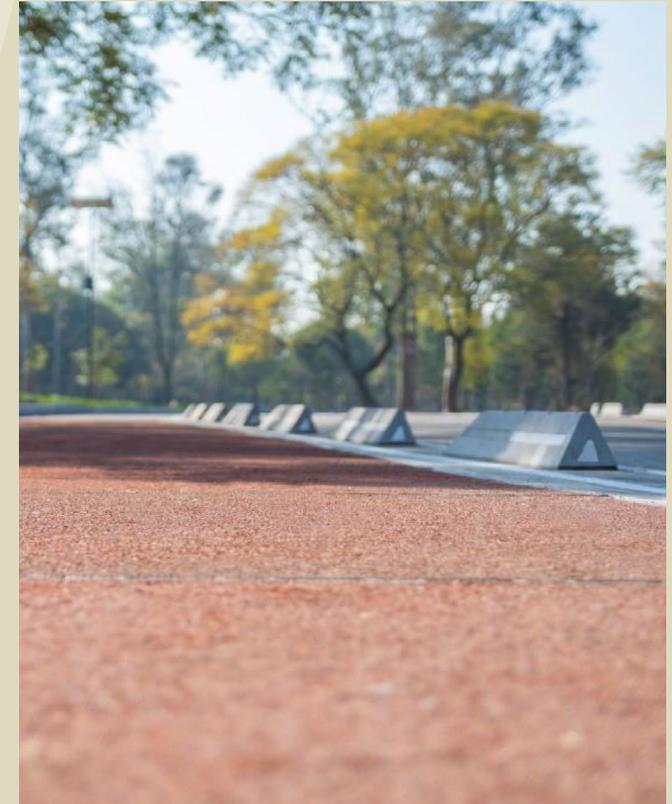
Circularity enabling stabilizers

Through our Alphagary brand, we are constantly developing our range of stabilizers that enhance the capabilities of PVC to incorporate recycled materials. For example, our VINASTAB® range includes calcium-based stabilizers that bring PVC to life for a variety of applications, including healthcare masks and tubing, irrigation systems, electric vehicle charging systems, rainwater harvesting and flood protection products, as well as purpose-designed formulations that support the use of recycled PVC in a variety of applications. We expect that VINASTAB will help grow the market for recycled plastics and advance a circular economy. Specifically, Alphagary designed VINASTAB stabilizers in collaboration with Wavin, to help bring more stability and consistency to the extrusion process of Wavin's Recycore products that use recycled PVC.

To support the growth of these essential additives, in 2020, Alphagary injected \$6 million into the expansion of our UK facility that delivers VINASTAB products. Our purpose-built facility is designed with closed loop additive and transfer systems, high automation, low energy consumption and zero waste capabilities.

PlasticRoad: The low-carbon way to get places

Wavin's award-winning PlasticRoad is the world's first bicycle path made of 90% post-consumer recycled plastic and is poised for commercialization, with production coming onstream in the Netherlands in 2021. In 2020, following two years of trials and a million users on foot and on bicycles, we concluded a further pilot of PlasticRoad in Mexico City's Chapultepec Forest, made from 1,000 kilograms of recycled plastic waste, the equivalent of half a million plastic bottle caps. Beyond initial testing as a bicycle path, PlasticRoad has proven able to handle heavier transport loads, and has potential to replace asphalt in certain conditions. Further, PlasticRoad is engineered to store water during extreme rainfall and incorporates sensor technology for climate monitoring. Its faster installation delivers up to 80% fewer greenhouse gas emissions during the construction phase compared to traditional road construction. Together with durability, faster installation and underground drainage control, it's no surprise that PlasticRoad received the Topsector Energy grant of €700,000 from the Dutch Ministry of Economic Affairs in 2020 to help scale production and adoption in the Netherlands.



For further information:

 PlasticRoad.com