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CORDIS Results Pack on
Horizon in Bulgaria

A thematic collection of innovative EU-funded research results

April 2025

Supporting pioneering research, from drone airlines to cancer care

Research and Innovation

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Editorial

Supporting pioneering research, from drone airlines to cancer care

For over 40 years, the European Union has supported cutting-edge science, research and innovation. By driving scientific progress, the EU R&I programme helps to tackle some of the most important challenges facing Europe, from cancer to climate change.

This CORDIS Results Pack on Horizon in Bulgaria highlights the impact of EU funding in fostering scientific innovation, increased competitiveness, employment opportunities, and the growth and scale-up of innovative businesses.

Bulgaria has a long history of scientific innovation. Artefacts recovered from the Varna Necropolis represent the oldest known gold treasure and jewellery in the world, reflecting an active metallurgy industry that existed in this region nearly 7 000 years ago.

Bulgaria continues to uphold this tradition of science, technology, industry and commerce to this day. Its scientists and innovators have produced major advances in chemistry, physics, pharmacology, microbiology, aeronautics, astronomy, spaceflight, and much more. The first digital electronic computer, jet engines, airbags, the tuberculosis vaccine, and commercial yoghurt production all owe their existence to the contributions of Bulgarian researchers.

Through its flagship funding programmes, most recently Horizon 2020 (2014-2020) and Horizon Europe (2021-2027), the EU has invested over EUR 500 million across almost 700 research and industry organisations in Bulgaria[1]. This support comes from various initiatives, including the European Research Council, Marie Skłodowska-Curie Actions, European Innovation Council, and more.

The nine projects in this Pack highlight the breadth of the research supported through Horizon in Bulgaria. They include work improving women's access to medicine via advanced screening technologies, the use of lasers to produce materials with novel surface properties, uncrewed drone airlines for short-haul logistics, improved diagnostics, eco-friendly bioplastics, forensic techniques to uncover clandestine bomb labs, and more.

Together, these projects showcase the continuing importance of Bulgaria's contributions to science, research and innovation, and the country's central role in tackling major challenges of our time.

[1] Data retrieved from Horizon Dashboard March 2025, see bit.ly/HorizonBulgaria

AI and thermal imaging assist rapid disease diagnosis

A clever technique that incorporates thermal imaging and artificial intelligence from the EU-funded AI-CARE project could transform the detection of a difficult-to-diagnose condition that affects millions of people.

Peripheral arterial disease (PAD) involves the narrowing or blockage of vessels that carry blood from the heart to the legs. Although less well-known than other vascular conditions such as heart disease or stroke, the condition is widespread – and poorly diagnosed.

"More than 230 million people suffer from PAD globally," says AI-CARE project coordinator Georgi Kadrev, co-founder and CEO of Kelvin Health in Bulgaria.

"Every year, more than 22 million people develop the most severe form of the disease, called critical limb ischemia, which markedly reduces blood flow. This can lead to amputations, and has a fatality rate of 70 % within five years of diagnosis."

Clinical need for innovations

Current diagnosis methods include taking blood pressure measurements at various points in the ankle, which can be imprecise. In particular, diagnosing patients with diabetes can be challenging due to arterial calcification and a lack of sensitivity in the legs. More invasive methods, including angiography (X-rays used to check blood vessels), are only used in cases suspected to be serious.

Any abnormalities will be picked up by the algorithms, telling us of the presence of any arterial blood supply problems.

For Kadrev and his colleagues, there was a clear clinical need for a simple, accurate and affordable diagnosis of this silent disease. "Our concept was to develop a system that applies a portable thermal imaging camera that captures body thermodynamics," explains Kadrev. "This generates a series of images, which are then segmented and analysed using artificial intelligence (AI) image recognition algorithms."

Kadrev demonstrates the technology by attaching the thermal camera to his mobile phone and taking images of himself. Any anomalies related to the peripheral vascular system would be detected using the system's machine learning algorithms.

"The whole premise of the concept is that our local body temperature is related to blood flow," explains Kadrev. "Any abnormalities will be picked up by the algorithms, telling us of the presence of any arterial blood supply problems."

Bringing medical innovation to market

Bringing the technology to market requires traversing what is known as the 'valley of death', with significant investment needed to translate an idea with promise into a viable marketable product.

"We need to externally validate our prototype in a clinical setting," says Kadrev. "Just getting to this stage requires a great deal of administrative work, intellectual property analysis, and awareness of issues such as medical data protection. We also need to develop a market access planning strategy."

The AI-CARE project provided Kelvin Health with the support it needed to reach this critical milestone. "We are now preparing for actual clinical validation and starting to collect clinical data," adds Kadrev. "All this is a prerequisite to commercialisation."

Regular screening of at-risk patients

The project has also helped to raise the profile of innovation in Bulgaria. "We have been able to work with key opinion leaders," notes Kadrev. "We were recently invited to the American Heart Association Scientific Sessions in Chicago last November, and the LINC conference in Leipzig, the leading European conference on arterial interventions."

Horizon's support for European innovation ecosystems is also key to fostering a start-up culture. This is especially true where existing venture capital is not oriented towards research solutions, especially in the healthcare space, because of the time and risks involved. "This has helped to put us on the map," remarks Kadrev.

The ultimate goal is to bring this innovation into clinical settings, and to establish the technique as an effective and cost-effective means of screening for PAD. "We could see a situation where patients at risk of PAD – heavy smokers, people with diabetes – are screened twice a year, helping to save resources and save lives," adds Kadrev.

PROJECT
AI-CARE – Thermography AI – cornerstone in future preventive healthCARE

COORDINATED BY
Kelvin Health in Bulgaria

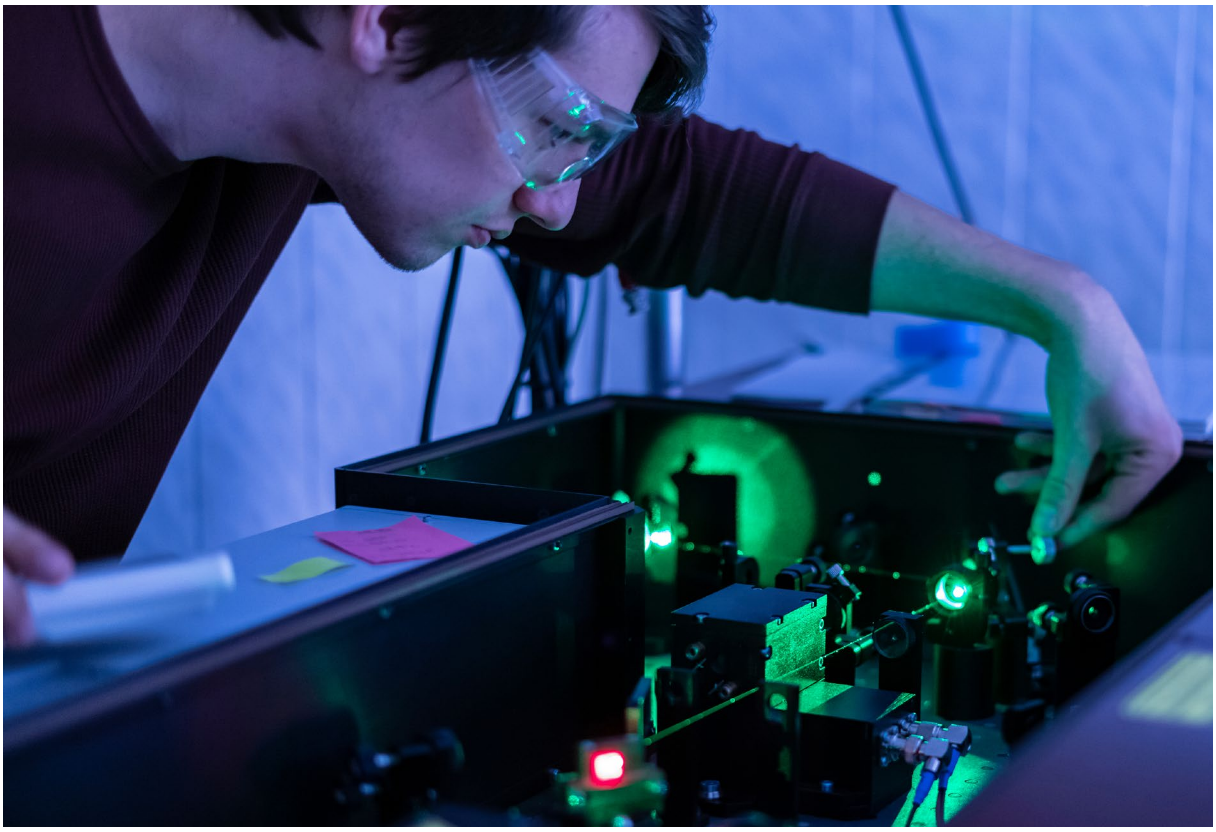
FUNDED UNDER
Horizon Europe – European innovation ecosystems

CORDIS FACTSHEET
cordis.europa.eu/project/id/101113791

PROJECT WEBSITE
kelvin.health

Scientific exchanges strengthen nanotech laser modelling

More accurate modelling of laser-matter interaction led by the EU-funded ATLANTIC project could lead to new industrial applications and help establish Bulgaria as an important research hub in the field.



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In nature, nanoscale structures on the surface of materials give rise to properties such as the vibrant colours of butterfly wings and the hydrophobic qualities of a lotus leaf. In the lab, scientists can replicate this process using bursts of intense laser light, offering novel materials with desirable properties.

"Short pulse laser technology could provide solutions for many industrial applications," explains ATLANTIC project coordinator Tzveta Apostolova from the New Bulgarian University. "These include microprocessing of biopolymers and metal alloys for medical stent fabrication, removing thin layers from solar cells, drilling micro vias on printed circuit boards, as well as forming nanostructures used for memory storage in electronic components, bone implants."

The nanostructures themselves find use in bone and dental implants, in particle acceleration, and for memory storage in electronic components.

Understanding effects of laser light at nanoscale

The ATLANTIC project, which was supported by the Marie Skłodowska-Curie Actions programme, sought to strengthen Bulgarian and, more broadly, European excellence in this field, primarily through creating a worldwide network of scientists and fostering academic exchanges. Countries involved in the project included Argentina, Japan and Uzbekistan, along with several EU Member States.

ATLANTIC demonstrated the importance of communication between scientific communities, particularly in times of profound geopolitical troubles.

As part of the project, some 40 established and early-stage researchers travelled and worked in different institutions for a few months. This enabled them to experience different cultural environments and to share ideas. A key aim was to develop and train researchers in new quantum simulation techniques, which can better predict the effects of laser light at the nanoscale on material.

"We really wanted to advance these techniques and bring them beyond the state of the art," says Apostolova. "Ultimately, the aim is to introduce the predictive power of these theoretical quantum techniques into models used potentially by companies and laser engineering groups."

Bringing global scientific communities together

The project's collaborative work has resulted in a number of published papers, which have helped to advance scientific understanding of how materials respond to laser irradiation. This could open the door to potential new industrial applications in fields such as laser physics, chemistry, biology and pharmaceuticals.

For Apostolova, a major benefit of the project has been the research exchanges. "These have demonstrated the importance of communication between scientific communities, particularly in times of profound geopolitical troubles," she adds. "Interdisciplinarity has been at the core of this project, and we were able to bring together experts in material physics, quantum chemistry, materials engineering and laser-materials processing."

For many early-stage researchers, the secondments were their first scientific experiences outside their home countries. "These have been foundational experiences," notes Apostolova. "We hope these exchanges will act as catalysts for future initiatives in the spirit of the ATLANTIC project."

Future initiatives might include further advancing the theoretical modelling of laser-matter interactions, and better understanding nanoscale phenomena that so far remained unexplained.

Experimental and simulation facilities in Bulgaria

The objective now for the New Bulgarian University is to build upon this work, by continuing to collaborate with scientific communities across Europe.

"It would be fantastic if this could lead to small-scale laboratories being established in Bulgaria," says Apostolova. "This would enable young researchers to conduct cutting-edge laser-matter interaction experiments and modelling right here. Our young researchers are bright and ambitious, and projects like ATLANTIC are really important."

This could strengthen the country's research competences in a potentially lucrative field. The global laser technology industry was recently valued at EUR 20 billion and is expected to be worth EUR 33.1 billion by the end of 2034.

PROJECT
ATLANTIC – Advanced theoretical network for modeling light matter interactIon

COORDINATED BY
New Bulgarian University in Bulgaria

FUNDED UNDER
Horizon 2020-MSCA-RISE

CORDIS FACTSHEET
cordis.europa.eu/project/id/823897

PROJECT WEBSITE
n/a

World's first cargo drone airline prepares for take-off

Goods have long been transported by land and sea, less by air. That could soon change, as the world's first cargo drone fleet, developed by the EU-funded Dronamics project, positions Europe as innovation front runners.

Rapid and reliable logistics help boost economic growth and improve quality of life for citizens. While in principle the skies could offer the best option for transporting goods, air freight only accounts for 1 % of freight transport worldwide, largely due to the cost of building and operating traditional aircraft and infrastructure.

Spotting a clear market opportunity, the Dronamics project has harnessed drone technology to offer the first cross-border middle-mile cargo deliveries.

"We believe that everyone should have access to rapid and reliable logistics. Our cargo drones will open up the skies to communities and businesses that currently don't use air freight," says project coordinator Svilen Rangelov, co-founder and CEO of the project's host company, also called Dronamics.

Flying delivery vans

As a capital-intensive and highly regulated industry, innovating in the commercial aviation space is challenging. Consequently, most new aircraft are iterations of existing designs.

We are the most advanced player in this area, giving Europe a rare advantage in the strategic sector of advanced air mobility and logistics.

Disrupting this trend, Dronamics has developed a new type of remotely piloted aircraft, engineered only for cargo and built to reduce production and operation costs.

"Drones offer a tremendous opportunity to deliver goods more efficiently, particularly in remote or hard-to-reach regions. They can significantly reduce delivery times by flying directly between two points that aren't hubs, getting cargo closer to businesses and consumers, faster," explains Rangelov.

While most drones carry small loads, essentially replacing 'last-mile' couriers, Dronamics has developed high-payload, long-range drones built specifically for 'middle-mile' cargo. Creating what Rangelov describes as "a flying delivery van", these drones could deliver between European towns and cities as apart as Sofia, Bulgaria and Porto in Portugal, for example.

"Our 16-metre wingspan cargo aircraft, the Black Swan, carries up to 350 kg or 3.5 cubic metres for up to 2 500 kilometres, needing only 400 metres to land and take off. This makes it suitable for the 50 000 smaller regional airports and airfields worldwide," notes Rangelov. "Compared to traditional air freight, our solution offers up to 80 % time savings and 50 % cost savings. Shortening the travel distance and being fuel-efficient, it also saves up to 60 % of CO_2 emissions."

While currently equipped with Rotax propeller engines widely used in aviation, Dronamics is preparing for the day when more sustainable options such as hydrogen-fuelled engines become feasible.

The Black Swan is piloted remotely from a land-based cockpit, by commercial aviation pilots experienced in route planning and risk management. While most of the flights are pre-planned with pilots only monitoring operations, the pilots can take over if needed.

The project team has been testing the Black Swan since 2017, starting with quarter-scale models incorporating avionics systems that mimic full-scale aircraft, before developing, testing and optimising larger prototypes.

European Innovation Council (EIC) funding has helped Dronamics run a continuous test programme of the full-scale aircraft, which will soon include a third and shortly after, fourth, Black Swan iteration, designed and built at Dronamics' Sofia-based R&D centre.

The first European droneport

The Dronamics company is both a technology manufacturer and an airline, selling capacity in cargo holds optimised for e-commerce parcels and fast-moving consumer goods, alongside time-sensitive deliveries such as pharma items or perishable products.

Initially targeting existing infrastructure, the team is close to establishing the first European droneport, with details to be revealed soon.

"Ultimately we want to establish droneports globally as cargo gateways, especially for areas underserved due to geography or infrastructure, including the 20 million people in Europe living on islands," adds Rangelov.

Dronamics is the first cargo drone airline to obtain designator codes from the International Air Transport Association (IATA) and International Civil Aviation Organization (ICAO), putting it on a par with traditional airlines.

Flying in shared airspace, the drones are also subject to European Union Aviation Safety Agency (EASA) and local Civil Aviation Authority (CAA) regulations, with the Black Swan even assigned its own call sign.

“We are the most advanced player in this area, giving Europe a rare advantage in the strategic sector of advanced air mobility and logistics. This is a unique chance for Europe to be an innovation front runner,” remarks Rangelov.

PROJECT
Dronamics – The first European cargo drone airline

COORDINATED BY
Dronamics in Bulgaria

FUNDED UNDER
Horizon Europe – European Innovation Council

CORDIS FACTSHEET
cordis.europa.eu/project/id/190132011

PROJECT WEBSITE
dronamics.com

The bio-based packaging films poised to be ahead of the pack

As a timely alternative to fossil fuel-based packaging, a novel bioplastic from the EU-supported FOIL'ON project could help reduce plastic pollution – and consumer guilt.

© LAM'ON LLC

Half of the world's plastic waste is caused by packaging. With only around 9 % recycled, the rest ends up in landfill or incinerators, polluting the environment.

Due to the composition of its plastic, laminating and packaging film is particularly challenging to recycle. With most intended as single use, it significantly increases plastic pollution.

The FOIL'ON project, hosted by LAM'ON, has developed a unique bioplastic alternative that offers the same functionality as conventional laminating and packaging film, while avoiding the disastrous environmental impact.

As project coordinator Gergana Stancheva explains: "Made from bio-based and renewable resources, our solutions naturally transform into compost when discarded; with our production using half the energy normally needed for film extrusion."

Unrolling the biodegradable product line

The key ingredient for FOIL'ON's packaging solutions is polylactic acid, a biopolymer sourced from corn starch. The team mixed this with other bio-based additives to develop two product lines: LAM'ON for laminating films, and PACK'ON for packaging films.

"We discovered bioplastic laminating film is extremely hard to perfect, so while we have continued working on this, we also successfully released two packaging film products into the European market, PACK'ON Classic and PACK'ON Shrink," says Stancheva.

Made from bio-based and renewable resources, our solutions naturally transform into compost when discarded.

The PACK'ON Classic film is an all-rounder, designed to wrap everything from fresh produce and cosmetics to garments and electronics. Whereas PACK'ON Shrink is geared towards securing multipacks.

Both underwent tests to evaluate performance and attributes such as tensile strength, flexibility, durability and film opacity. Life cycle assessments (which factor in raw materials, production, transportation and end-of-life options) were also conducted in independent accredited laboratories, to ascertain biodegradability, environmental impact and compliance with international sustainability standards.

The team found that PACK'ON Classic's greenhouse gas (GHG) emissions were around 1.682 kg CO_2e (carbon dioxide equivalent), compared with 4.076 kg CO_2e for traditional PET-based films, and 3.690 kg CO_2e for polypropylene-based ones.

PACK'ON Shrink was also found to improve upon competitors, with GHG emissions of 2.707 kg CO_2e, compared with 3.573 kg CO_2e for LDPE-based films and 3.064 kg CO_2e for HDPE-based versions.

"Our products can be produced by standard packaging manufacturing lines, meaning there is no additional machinery or staff retraining costs," adds Angela Ivanova, financial officer at LAM'ON.

The company's Sofia production facility houses the equipment needed to further develop and test prototypes, alongside manufacturing more product lines for validation in real-world conditions with the help of packaging companies and leading brands.

"Because Research and Development inevitably generates waste, we also bought equipment to recycle the films back into granules for future use," notes Stancheva.

The coming age of bioplastics

With EU rules tightening around single-use plastic packaging, companies will increasingly want to switch to recycled and/or compostable solutions. "As all our products can be composted or recycled as bioplastics, we are well placed for the growing demand to separate bioplastics into a different waste stream," notes Ivanova.

LAM'ON is now focused on developing a barrier film for food packaging, complemented by another that is marine biodegradable, suitable for various applications. Meanwhile, the team will continue to improve the recipe for LAM'ON, the laminating film, aiming to launch the line by the end of 2025.

Currently focused on the EU market, by the end of 2025 the aim is to double PACK'ON production capacity, making it available Europe-wide, with expansion into Asia and North America planned for 2026.

PROJECT
FOIL'ON – developing and producing biodegradable and suitable for compost laminating film called LAM'ON and packaging foil PACK'ON, lowering plastic pollution

COORDINATED BY
LAM'ON in Bulgaria

FUNDED UNDER
Horizon Europe – European Innovation Council

CORDIS FACTSHEET
cordis.europa.eu/project/id/190131184

PROJECT WEBSITE
lam-on.com

Understanding, tracking and preventing the use of home-made explosives

Using a combination of artificial intelligence, supply chain monitoring, and advanced aerial and terrestrial drones, the EU-funded ODYSSEUS solution is helping law enforcement address the evolving threat of home-made explosives.

When it comes to fighting terrorism, there is no one-size-fits-all solution. Law enforcement agencies require an arsenal of tools capable of addressing not only existing threats, but evolving ones too.

One of those evolving threats is the use of home-made explosives. Helping to address this growing threat is the ODYSSEUS project. According to project host the Bulgarian Defence Institute (BDI), terrorists are using the internet to discreetly source legitimate chemical substances, turning everyday materials into home-made explosives.

From artificial intelligence to autonomous drones

The BDI-coordinated project has developed a comprehensive solution to help law enforcement and security services better understand, track and prevent the use of home-made explosives.

The solution includes an artificial intelligence (AI)-powered, open-source intelligence platform that can uncover those threats hidden online. It can also be used to monitor supply chains and track the circulation of chemicals that could be used to make explosives.

In addition, the project developed cutting-edge land and aerial drones that can be deployed to autonomously detect traces of chemicals used in home-made explosive devices. If such chemicals are found in the air or water, the ODYSSEUS Threat Assessment and Decision Support tool (TAS) calculates the risk level and then presents this information to users via the ODYSSEUS Dashboard.

All of the project's solutions are designed to seamlessly work together to prevent a terrorist threat before it has a chance to even begin. The project followed strict ethics and privacy-by-design principles in the development of its solutions.

Tested in real operational scenarios

The ODYSSEUS solution was fully tested in real-world operational scenarios across Europe. In Italy, a remotely operated water sampling system was deployed to determine the concentration of a chemical compound found in a sewer network. With this information, security teams were able to trace its release source.

During a field test in Greece, the national police had a chance to get hands-on experience using the solution to detect airborne and water-based chemicals that could indicate the presence of a home-made explosive. Users also had an opportunity to test the project's AI-driven web and supply chain monitoring capabilities.

An important new antiterrorism tool

Late last year, ODYSSEUS held its final conference at the Central Military Club in Sofia, Bulgaria. During the event, the project's partners discussed both outcomes and future steps. The conference also featured presentations by other security-related EU-funded projects, including INHERIT, MELCHIOR and STBERNARD, amongst others.

The key takeaway: law enforcement now has another important tool to add to their ever-growing arsenal of solutions for effectively detecting and preventing emerging terrorist threats.

PROJECT
ODYSSEUS – Preventing, countering, and investigating terrorist attacks through prognostic, detection, and forensic mechanisms for explosive precursors

COORDINATED BY
Bulgarian Defence Institute in Bulgaria

FUNDED UNDER
Horizon 2020-SECURITY

CORDIS FACTSHEET
cordis.europa.eu/project/id/101021857

PROJECT WEBSITE
odysseus-h2020.eu

Realistic models give a clearer view of breast cancer

Accurate physical and virtual anthropomorphic models developed by the EU-funded PHENOMENO project are playing a key role in the development of the advanced imaging techniques used to diagnose breast cancer.

It is estimated that 1 in 11 women in the EU will develop breast cancer before the age of 74. Although breast cancer mortality rates have been declining in most EU countries, it still has the distinction of being the deadliest form of cancer for women – meaning there's room for improvement.

"One of the best ways to reduce cancer-related deaths is early detection, and that starts with breast imaging," says Kristina Bliznakova, a biomedical engineer at the Medical University of Varna in Bulgaria.

But before a new breast imaging modality can get to work detecting cancer, it first needs to undergo extensive testing to prove its effectiveness and safety. However, due to ethical considerations, regulations and costs, such experiments cannot be performed on human patients. Instead, researchers depend on physical and virtual models of breast tissues.

"Having access to realistic and accurate physical and computational anthropomorphic breast models is an ultimate requirement for the successful development of advanced imaging techniques," adds Bliznakova. Delivering those models is the EU-funded PHENOMENO project.

Realistic breast models

Bringing together industry partners and universities, the PHENOMENO project used actual MRI breast images to deliver innovative computational and physical breast models.

One of the best ways to reduce cancer-related deaths is early detection, and that starts with breast imaging.

"Developing a realistic-as-possible model required our team to conduct extensive research on breast tissue characterisation, breast compression techniques, and the use of breast imaging simulations," explains Bliznakova.

The project, which received support from the Marie Skłodowska-Curie Actions programme, also developed novel printing materials and 3D printing techniques for producing realistic breast models.

According to Bliznakova, the resulting virtual and physical models are now ready to be used in the testing of new X-ray-based breast imaging techniques. "We produced an anthropomorphic breast model that's being used in the testing of a very promising, contrast-enhanced mammography procedure," she says.

Photon-counting and artificial intelligence

By enabling the effective testing of advanced imaging modalities, the PHENOMENO models represent an important step in reducing the incidence and impact of breast cancer. Yet, as Bliznakova points out, there's still plenty more work to do.

"Because of the strong collaboration established between the project's partners, we are able to continue our work and further develop our breast models," she notes.

For example, researchers are currently looking to manufacture breast models that feature lesions. The models will then be used to test a new micro-CT scanner being developed by the Medical University of Varna. Furthermore, several of the project's partners are working on an advanced photon-counting detector, while another is leveraging its expertise in artificial intelligence to help radiologists better interpret breast images.

"Not only is this work contributing to the development of advanced techniques and tools, they are also building a community of high-quality researchers equipped with the skills needed to further improve breast cancer diagnostics," concludes Bliznakova.

PROJECT
PHENOMENO – Physical breast anthropomorphic models and technology for their production

COORDINATED BY
Medical University of Varna in Bulgaria

FUNDED UNDER
Horizon 2020-MSCA-RISE

CORDIS FACTSHEET
cordis.europa.eu/project/id/101008020

PROJECT WEBSITE
phenomeno.eu

Using nature's resilience for drought-proof crops

In the face of worsening climate change impact and increasing drought, the EU-funded RESIST project aimed to mitigate their effects on crop yield and quality. Delving into the survival mechanisms of 'resurrection' plants, the project aimed to revolutionise the future of crop resilience.

© Veselin Petrov

Resurrection plants such as *Haberlea rhodopensis* and *Xerophyta viscosa* possess the extraordinary ability to survive extreme dehydration of their vegetative tissues. In fact, they can lose up to 95 % of their water content and, upon rehydration, resume normal physiological functions. This makes them ideal subjects for studying how crops might be developed to survive droughts.

Advancing agriculture with genomics

The RESIST project, carried out with support from the Marie Skłodowska-Curie Actions programme, employed advanced '-omics' approaches – including genomics, transcriptomics and metabolomics – to dissect the molecular and genetic foundations of these plants' resilience.

"We wanted to drastically increase the available data on resurrection plants," says Veselin Petrov, head of department funding at the Center of Plant Systems Biology and Biotechnology (CPSBB) in Bulgaria. "We sequenced the genomes of one species endemic to Bulgaria and three species endemic to South Africa, generating vast amounts of data for big data analysis, transcriptomics, metabolomics, and more."

By identifying the genes and pathways that help plants survive and adapt to drought conditions, researchers aimed to transfer these traits to commercial crops.

"The field is still in its early stages, but by combining complementary approaches, we are opening the door to future applications in crop breeding," Petrov explains.

Coordinated by the CPSBB in Bulgaria, RESIST brought together renowned institutions, including the Max Planck Institute of Molecular Plant Physiology in Germany, Ben-Gurion University of the Negev in Israel and the University of Cape Town in South Africa. This international collaboration ensured a comprehensive exploration of plant resilience, while a total of 33 researchers participated in its secondments.

From the lab to the field

One of the project's major achievements was the use of molecular priming, a process that treats crops with bioactive substances to enhance their stress tolerance. "We used an extract prepared from Atlantic Ocean algae to improve the performance of crops under drought conditions," adds Petrov. "The results are very promising. In our trials with berry crops, we not only increased yield but also reduced sun blotch, a condition that affects the market quality of raspberries."

The knowledge gained from resurrection plants is set to be a game changer for agriculture as well. By integrating drought-tolerant traits into staple crops, farmers can cultivate varieties that maintain yields under water-scarce conditions.

Moreover, enhancing crop resilience contributes to sustainable farming practices. Drought-tolerant crops require less irrigation, conserving water resources and reducing the environmental footprint of agriculture. This aligns with global efforts to promote sustainable food production systems.

RESIST has already achieved significant milestones, including the sequencing and annotation of three genomes (*Haberlea rhodopensis, Xerophyta elegans and Xerophyta humilis*). Fourteen candidate genes linked to desiccation and other extreme stress tolerance in *H. rhodopensis* were also identified, with functional analysis under way.

We are opening the door to future applications in crop breeding.

Further studies on nine crops (barley, tomato, pepper, eggplant, potato, lettuce, raspberry, blueberry and onion) demonstrated enhanced stress resilience and improved yields using the molecular priming approach.

The future of farming

As climate change challenges agricultural productivity, RESIST could offer tangible solutions. In harnessing the natural resilience of resurrection plants, the project could help develop crops that can thrive under environmental stresses. This not only helps secure Europe's food supplies, but also promotes sustainable agricultural practices, ensuring a resilient future for farming worldwide.

RESIST has also inspired further research. "Thanks to the project's success, we are involved in two new EU-funded projects, CropPrime and BOOSTER, that focus on enhancing plant resilience and optimising bio-stimulants for drought tolerance," says Petrov. "We have taken the first steps, but this work is far from over."

PROJECT
RESIST – Resurrection plants reveal secrets of vegetative desiccation tolerance

COORDINATED BY
Center of Plant Systems Biology and Biotechnology in Bulgaria

FUNDED UNDER
Horizon 2020-MSCA-RISE

CORDIS FACTSHEET
cordis.europa.eu/project/id/823746

PROJECT WEBSITE
resist.cpsbb.eu

On the road with energy-efficient buildings

Raising awareness about the many benefits of green and sustainable buildings through informative, interactive and fun events and training opportunities.

Responsible for 40 % of the EU's total energy consumption, Europe's building stock is the Continent's single largest energy user. It's also a major roadblock to Europe being able to achieve its ambitious climate goals.

"The path to climate neutrality starts with energy-efficient buildings," says Dragomir Tzanev, executive director at EnEffect, a Bulgarian think tank on the efficient use of energy resources.

Addressing this challenge are policy initiatives such as the Energy Performance of Buildings Directive, which mandates that, as of 2021, all new buildings be nearly zero-energy buildings (NZEBs), and the [renovation wave strategy](), which aims to double the annual energy renovation rates of existing buildings over the course of the next decade.

While these policy initiatives would put a substantial dent in the building stock's total energy footprint, their success is heavily dependent on there being demand for such energy-efficient buildings and renovations, as well as for trained and qualified professionals to carry out these projects.

We did all kinds of crazy and fun activities, all of which aimed to educate and raise awareness about the importance of energy efficiency and how it saves both money and the environment.

For The nZEB Roadshow, an EU-funded project, the best way to stimulate such demand is to go straight to the end users: the homeowners. So, they packed up their relevant training materials, tools, equipment and demonstrators and hit the road.

Raising awareness about energy-efficient buildings

With the goal of showcasing the benefits of green and sustainable buildings, the project took its message across Bulgaria, Croatia, Greece, Italy and Romania.

"We built mobile training and demo units designed to raise awareness about the benefits of NZEBs and to get homeowners, building professionals and other stakeholders interested and talking about energy-efficient buildings," explains Tzanev, who served as the project coordinator.

The project organised a wide range of events, including conferences, product exhibitions, training for professionals and information sessions for homeowners. There were also press conferences, events with policymakers, events for kids and school visits.

"We did all kinds of crazy and fun activities, all of which aimed to educate and raise awareness about the importance of energy efficiency and how it saves both money and the environment," adds Tzanev.

Fun for the entire family

The project even held energy efficiency festivals for the entire family. For example, in Croatia, the 'MUZA' demo truck has already visited 14 different cities, where it set up shop at popular locations. Families could go from tent to tent and participate in different hands-on activities, including games and contests, and learn about the benefits of energy efficiency – all while having fun.

"What really made this event unique is that, while the entire exhibition was dedicated to NZEB, there was something for everyone – professionals, politicians, suppliers, homeowners and, most importantly, young people," notes Tzanev.

The Croatia roadshow was such a success, it received the National Geographic Award for best educational initiative. MUZA is now permanently hosted at the Nikola Tesla Technical Museum in Zagreb.

Connecting homeowners with building professionals

In total, the project organised over 30 public events, which attracted tens of thousands of visitors. It also successfully trained more than 4 000 building professionals in energy-efficient construction and renovation.

"We helped connect homeowners who were excited about energy efficiency following one of our events with these newly trained professionals – showing how education and awareness raising can go a long way in terms of stimulating demand," concludes Tzanev.

The project is currently working with cities and authorities from across Europe – and beyond – to help them implement similar energy efficiency roadshows in their own countries and regions.

Note: this article was last updated on the 27th of March 2023.

PROJECT
The nZEB Roadshow

COORDINATED BY
Center for Energy Efficiency EnEffect in Bulgaria

FUNDED UNDER
Horizon 2020-ENERGY

CORDIS FACTSHEET
cordis.europa.eu/project/id/892378

PROJECT WEBSITE
nzebroadshow.eu

The tampon leading a women's health revolution

The EU-funded VMS – Vaginal Microbiome Screening project set out to make gynaecological screening and preventive care for women more accessible, comfortable and effective using innovative tampons.

For decades, invasive and uncomfortable screening methods in gynaecology have deterred women from seeking the preventive care they need. By using tampons for sample collection, the VMS project offers a way to disrupt the status quo. The approach makes health screenings more accessible, empowering women to take control of their health with comfort and confidence.

Tampons as tools of change

Traditional screening methods, such as speculum examinations and swabs, have remained largely unchanged for over a century, creating barriers to access. Many women and those assigned female at birth (AFAB) avoid screenings due to discomfort, embarrassment or logistical issues, leaving a significant proportion of gynaecological infections undiagnosed.

“Over 30 % of women avoid HPV screenings,” says Valentina Milanova, VMS project coordinator and CEO of Tampon Innovations in Bulgaria, “while 70 % of infections are asymptomatic, increasing the risks for serious complications like cervical cancer and infertility.”

The VMS project offers a groundbreaking alternative screening method: tampons repurposed as sample collection devices. This new approach increases accessibility and enables women to take charge of their health comfortably and privately. “We wanted to make preventive care something women can embrace, rather than avoid,” Milanova explains.

VMS also aimed to bridge the gender gap in medical research by generating valuable data on the vaginal microbiome, a field historically underfunded and overlooked.

Validation and innovation

The journey to making VMS a reality involved several significant steps. Central to its success was clinical validation. Trials conducted in partnership with Liverpool Women’s Hospital and NHS Lothian in the United Kingdom demonstrated that tampons were as effective as swabs in detecting HPV and sexually transmitted infections.

The project also introduced a digital platform that integrates with the at-home screening kits. Through the VMS app, users can access test results, consult with healthcare professionals and receive personalised treatment plans. This holistic approach represents a shift from traditional diagnostics to a more comprehensive model of care.

Another highlight was the creation of a biobank for anonymised samples, aimed at advancing research into gynaecological conditions such as endometriosis and polycystic ovary syndrome (PCOS).

Tackling barriers head-on

Trying to shake things up in women’s and AFAB healthcare comes with a unique set of challenges. Navigating regulatory requirements required careful coordination with legal experts. VMS also secured funding through a combination of public grants and private investments.

Developing the technology was equally demanding. The team collaborated with academic partners to refine a proprietary DNA extraction method for tampons, while overcoming supply chain disruptions by diversifying suppliers and investing in in-house manufacturing capabilities.

VMS has received widespread praise from users and healthcare providers alike. Over half of the service’s users were first-time participants in gynaecological screening programmes, and 78 % of them reported that the at-home kits eliminated barriers such as embarrassment and logistical difficulties.

It is more than just a screening tool, it’s a new way of thinking about gynaecological health.

Crucially, healthcare providers see immense value in the initiative, which reduces waiting times and enhances patient outcomes. Public health collaborations (including partnerships with United Kingdom NHS Trusts) have expanded its reach.

The future of VMS

Long-term plans for the project include expansion into North America, introducing diagnostic tools for fertility assessments, and working with global health organisations such as the World Health Organization (WHO).

“Project VMS is more than just a screening tool, it’s a new way of thinking about gynaecological health,” Milanova adds. “We want every woman and person AFAB, regardless of location or socio-economic status, to have access to care.”

PROJECT
VMS – Vaginal Microbiome Screening – Commercialisation and scale up of a Vaginal Microbiome Screening service with a menstrual tampon collection device and a digital layer to provide diagnosis, disease risk evaluation and aftercare.

COORDINATED BY
Tampon Innovations in Bulgaria

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CORDIS FACTSHEET
cordis.europa.eu/project/id/190192897

PROJECT WEBSITE
yourdaye.com/en-eu/products/at-home-vaginal-screening

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