

## BENEENS CONVERTS OWN WOOD WASTE INTO HEAT AND ELECTRICITY

*At construction, carpentry and interiors company Beneens, sustainability runs in the family. When the heating unit of the company needed replacing in 2009, former owner Karel Beneens decided the time had come to invest in a new, sustainable installation that ran on the wood waste produced by the company.*

The goal was to install a system that produces both heat and electricity. It soon became apparent that the wood waste produced by the company was not sufficient to meet energy demands. Therefore, the Beneens company contacted VITO to conduct a feasibility study of the project. VITO studied which business model should be used, looked at the business case and how to optimise the system. To realise the project, both partners took part in the MIP project B-Wood2Energy and the European Horizon2020 project Story. In the future, the installation can be expanded with a heat grid to deliver heat to neighbouring companies.

**Johan Van Bael** of VITO: "On the one hand, VITO studied whether cooperation with other companies to supply wood waste to burn was possible. On the other, it checked whether it was feasible to install an Organic Rankine Cycle (ORC) to generate energy and meet the electricity demand of the company. We also added several innovative aspects."

**Joeri Beneens**, owner of the Beneens company: "At the end of April 2016, we connected all the pipes to the new system and put the installation into use. We will continue implementing the sustainability vision of my late father, Karel Beneens. Not only with this project, but also with our new office building, which combines energy-saving techniques and will of course be provided with electricity and heat by the new installation. Our eventual goal is to become an energy-neutral company."

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photo: Dirk Boeckx, Joeri Beneens, Jo Beneens,  
 Johan Van Bael (VITO)

# vito VISION

VITO VISION / 2016 / MAY EDITION

BALMATT SITE  
 OPERATIONAL IN 2017

BIO-AROMATICS READY  
 TO BE SCALED UP

KNOWLEDGE  
 VALORISATION IN PRACTICE

 vito  
VISION

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Dear reader,

In the last 25 years, VITO has grown to become a strong player in the Flemish science and innovation landscape, with extensive international connections. We have aimed our research focus at cleantech and sustainable development. We support companies and federations active in energy, materials and chemistry and contribute to a sustainable Flanders.

We will tell you how we do so in this edition of VITO VISION. In the Kempen, our geothermal drilling brings sustainable heat and electricity within reach and contributes to a solution for climate change. Bio-aromatics, sustainable raw materials for chemistry, are almost ready to be scaled up. And we turn our eyes abroad: in China, the work of our subsidiary VITO Asia is becoming more and more successful. You will be able to read all this and much more.

We hope that you find this edition interesting and informative!

Dirk Fransaer  
Managing director VITO

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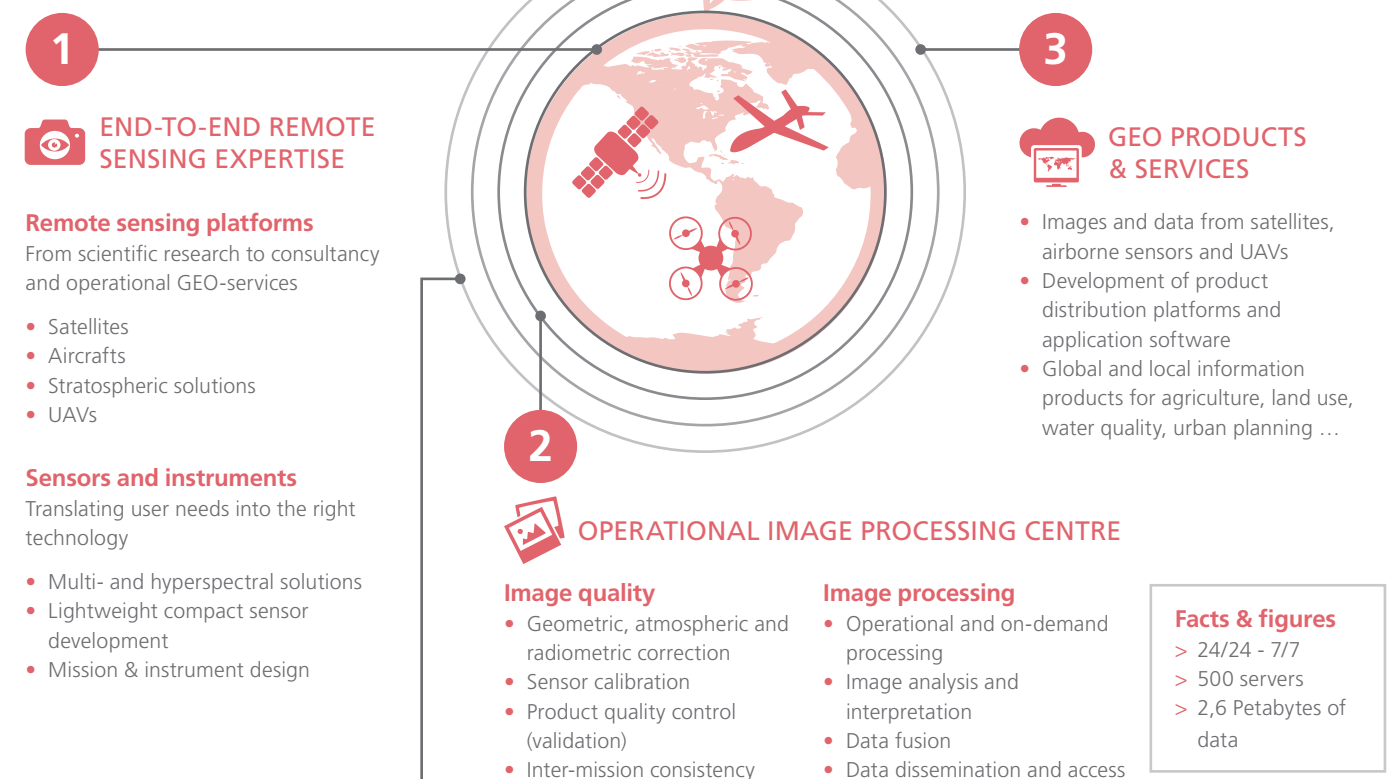
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REMOTE  
SENSING

VITO's expertise in remote sensing extends to the entire chain: aerial observations, data collection from diverse sources, data quality control, processing raw images and developing ready-to-

use information products and services. VITO makes this ready-to-use information available to scientific partners, governments and industry and provides tailored services, in Flanders and abroad.

More information: [remotesensing@vito.be](mailto:remotesensing@vito.be)



## CLIENTS



SCIENCE



GOVERNMENT



INDUSTRY

## Facts &amp; figures

- > More than 80 national and international partners
- > Active in more than 115 countries across the world
- > Operational processing services for COPERNICUS Global Land Services, PROBA-V, SPOT-VEGETATION, APEX ...

## Applications/market



## LAND USE

- Ecosystem monitoring
- Deforestation
- Biodiversity
- Desertification
- Climate variables
- ...



## AGRICULTURE

- Precision agriculture
- Food security
- Crop monitoring
- Yield forecasting
- Disease detection
- Agro-insurance
- ...



## WATER &amp; COAST

- Water quality
- Dredging support
- Coastal vegetation
- ...



## SAFETY

- Disaster management support
- Situational awareness
- ...



## INFRASTRUCTURE

- Energy
- Construction
- Urban planning
- ...



# VITO BRINGS GEOTHERMAL HEAT TO THE SURFACE

BALMATT SITE OPERATIONAL IN 2017



On the Balmatt site in Mol, the fourth largest geothermal power station in Europe is being built.

*In the Kempen, the fourth largest geothermal energy plant in Europe is being built. VITO is working on the second drilling well on the Balmatt site in Mol. Sustainable heat and electricity are within reach.*

3,610 metres: near the end of 2015, VITO reached a geothermal reservoir in the Kempian soil at that depth. It is the deepest hole ever drilled in Flanders. A geothermal project of such scope has never been seen before in our region. But that is about to change.

"A geothermal energy plant needs at least two drilling wells: one to pump up

water, the other to inject it back into the soil," says Ben Laenen, research leader at VITO. "The first drilling was a success. Along the way, we encountered a few difficulties, but those provided us with plenty of additional information on the geological situation. Those data are invaluable. Among other things, they allowed us to adapt the route of the second drilling."

## Pump test

After a successful pumping test at the start of this year, the second drilling was started right away. Ben Laenen: "In January 2016, we pumped up water from the geothermal reservoir. The

positive results were reason enough to start the second drilling."

That drilling will not be as deep as the first one: 'only' 3,300 metres. But because its trajectory is slanted, it will be longer (4,200 metres). Ben Laenen: "Thanks to the knowledge we gathered while drilling the first well, we can now work a lot faster. We hope to finish drilling by the beginning of June 2016. As soon as the second well is operational, we can study the temperature and flow rate during a longer period of time and research all the possibilities of the underground reservoir in full. We are also studying the composition of the

water. We may even be able to extract metals and other valuable elements."

## Geothermal energy plant

Scientists already know that the future plant will offer plenty of opportunities. "Not only do we want to provide heat, we also want to provide electricity," Ben Laenen says. "For heat, we are installing a heat exchanger. We want to generate electricity with an Organic Rankine Cycle (ORC). The current two wells should be able to provide 12 to 17 megawatts of thermal energy or 1.5 megawatts of electric energy. Enough to deliver energy to 5,000 households and several companies. But our goal is a full energy plant with a maximum of six wells. With those wells, we can generate up to 5 megawatts of electric energy."

VITO's plans are fully-formed: by summer 2017, the sites of VITO and the neighbouring SCK•CEN and Belgoprocess should be heated with sustainable geothermal heat. "The surrounding municipalities should follow. We want to give companies and families in the area the chance to benefit from this project," says Geert De Meyer, Business Developer at VITO. "For the heating season of 2017-2018, we have come to an agreement with energy provider



The drilling tower on the Balmatt site marks the two drilling wells of the new geothermal energy plant.

Eandis to build and maintain the heat grid. This will allow us to take the first steps towards rolling out heat grids. These are indispensable to transport the heat efficiently to the consumer. And we are discussing the issue with the municipal governments of Mol and Dessel."

## Support

Strong support at the administrative level is needed to roll out heat grids in the area and fulfil the potential of geothermy. "But we are also telling the story to a wider audience," says Ben Laenen. "We live in a world in which we are growing more and more dependent on non-renewable fuel sources, with all

of the subsequent environmental problems and price fluctuations. That is why we deliberately invest in education: we are considering opening a visitor centre on the Balmatt site. Today, we already receive plenty of visitors, mostly school groups, in cooperation with Voka Kempen, the GoodPlanet organisation and the province of Antwerp. This spring, the one thousandth student came to visit. Earlier this year, the enthusiasm of teenagers was already apparent during ontSTEMDd!, a musical created by secondary schools in Geel and Mol and performed underneath the drilling tower. Hundreds of children attended a performance and got a playful look at the power of geothermy.

## FIRST THE KEMPEN, THEN LIMBURG?

*Drilling on the Balmatt site only started after careful preparations: geological research which proved that there was geothermal potential in the Kempen. Because researchers suspect that similar potential is hidden in the area of Hasselt, Meeuwen-Gruitrode, Maaseik and Zutendaal, they conducted a seismic campaign in 2015. The results are promising.*

"With a seismic campaign, we can chart precisely what the soil far beneath our feet looks like," says David Lagrou, geologist at VITO. "We work

with acoustic waves. Trucks with a wave generator move past hundreds of receivers, or geophones. These register the reflected acoustic signals. As such, we can create a type of echography of the soil."

## New geothermal projects

Geologists at VITO were looking for the carbon lime layer, the layer in which the geothermal reservoir in the Kempen was found. "We found it at a depth of 1,000 to 2,500 metres. At a depth of 2,500 metres, we suspect the existence of water with a tempera-

ture of 85 °C in the top layer. Together with the municipalities involved, we are studying whether new geothermal projects are possible."

VITO's know-how on modelling subsurface layers to enable geothermal mining is well-known abroad. At Venlo in the Netherlands, VITO is taking part in a project to heat greenhouses sustainably using geothermy.

More information (in Dutch):  
[www.diepegeothermie.be](http://www.diepegeothermie.be)





# BIORIZON AIMS FOR COMMERCIAL PRODUCTION OF BIO-AROMATICS

BIO-AROMATICS READY TO BE SCALED UP

**Biorizon**  
The way to aromatics

*Forty percent of all chemicals contain aromatic structures. Aromatics therefore serve as important raw materials for chemical products. Today, most aromatics are created from oil, but VITO wants to change that together with the Shared Research Center Biorizon. By 2025, bio-aromatics created from lignin should be ready for commercial use.*

Lignin is a component of the walls of plant cells and the second most common raw material in nature. Waste streams from among others the pulp and paper industry are also rich in lignin. Lignin is a natural source of aromatics and, as a bio-based raw material, far more sustainable than aromatics from fossil sources. From lignin, VITO wants to develop specific chemicals with additional, innovative properties.

## Biorizon

At the beginning of 2014, VITO, TNO (the Dutch organisation for applied scientific research) and the Green Chemistry Campus launched the Shared Research Center Biorizon. VITO unit Manager Bert Bouwman: "At Biorizon, we study innovative technologies in order to obtain sustainable and profi-



Bert Bouwman and Karolien Vanbroekhoven

table functional aromatics from sugars and lignin. Next, we want to elevate the bio-aromatics to an industrial level. Since its inception, Biorizon can already boast of a number of business cases and several patents. In 2014, we succeeded in fractionating complex lignin derivatives and isolating the chemical building block furfural."

VITO makes its extensive experience with membrane separation technology available to Biorizon. It also supports the entire value chain, from lignin to functional end products, with a range of analytical facilities. VITO programme manager Karolien Vanbroekhoven: "Membrane separation allows us to fractionate, purify and

concentrate the mixture of lignin derivatives. Our thorough research on functional ceramic membranes, which can be used for affinity separations with high separation factors is a significant advantage. Membrane separation is an energy- and cost-efficient technology which is easily scalable to an industrial environment."

## Scaling

Biorizon is now getting ready to scale the technology. This allows the centre to prove that the technology not only functions on a lab scale, but can also produce larger amounts of bio-aromatics for industrial applications. The technology will be scaled up in the BIO-HArT project (Biorizon Innovation and

## ON A LARGER SCALE

VITO is also testing actual industrial applications in other research projects in cooperation with the industry and working to scale up the technology. The MAIA project (Manufacturing of Advanced & Innovative bio-Aromatics) uses waste wood and flax fibres as raw materials. The lignin fractions are processed into functional aromatics; the cellulose pulp can be converted into paper or functional sugars.

Within the European cooperation Smartli (Smart Technologies for the Conversion of Industrial Lignins) VITO researchers succeeded in supplying defined fractions of bio-aromatics at kilogram scale to industrial producers of, among other things, wood-plastic composites, laminates, resins and polyurethane.

Scaling of Renewable Aromatics Technology), a cooperation between Biorizon and nine other partners. Karolien Vanbroekhoven: "In the last few years, we have developed commercially promising technologies to convert wood, sugars and lignin into aromatics. By scaling up the technology within BIO-HArT, we increase faith in its industrial applicability and decrease the investment risk. By the end of 2018, the cooperation should result in functional process setups. We will then develop the results of BIO-HArT along with the industry. This should allow us to reach our ultimate goal: commercial production of bio-aromatics by 2025."

## Toxicity

Biorizon recently created a new strategic roadmap. "Scalability is an important part of it," says Karolien Vanbroekhoven. "Our initial focus is on phenol resin, which is used in glues. Today's phenol resin contains toxic components such as formaldehyde and phenol. By replacing those components with a bio-based alternative, we decrease the toxicity."

But just because a substance is bio-based does not always mean it is safer. Karolien Vanbroekhoven: "Within Biorizon, we are also working on a way to assess the toxicity of bio-based components very rapidly. That is important in order to comply with the REACH regulations, the European system for registration, evaluation and authorisation of chemical substances. REACH dictates that the safety risks of all new chemical substances in the European Union must be studied and described. Karolien Vanbroekhoven: "We don't just replace substances with bio-based equivalents. We also test the toxicity of the new components extensively."

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## BIORIZON AND BIO-AROMATICS EVENTS

The Biorizon community has now reached the milestone of 100 members and organises the third edition of its event on December 1, 2016. The first day of the i-SUP congress in October (Monday October 17, 2016) will be dedicated entirely to bio-aromatics. Biorizon will also be represented on the EFIB event in Scotland on October 20, 2016.



*\*The BIO-HArT project came about through the contribution of the European programme Interreg-V Flanders-Netherlands, which stimulates innovation, sustainable energy, a healthy environment and the labour market through cross-border projects. Interreg provides 50 % of the total cost of the project.*



## 3DFD CREATES CATALYSTS LAYER BY LAYER

Ninety percent of chemical reactions only take place efficiently if a suitable catalyst is present. A catalyst influences the progression of a reaction without being used itself. The contact time between the catalyst and the initial product is one of the factors that decide the progression and the speed of the reaction. By changing the design of the catalyst – in particular, the porous structure – the contact time can be adjusted.

Using the 3DFD technique, VITO can influence the design of the catalyst down to the smallest details. The catalyst is constructed layer by layer. Depending on the desired chemical reaction, VITO experts can design the exact shape using a computer model. Should the contact surface be large or small? How about the contact time? How large should the pores be and what is their exact position? The computer model controls an extrusion device that constructs the catalyst. The result following post-treatment is a ceramic or metal structure with particular control over the porous architecture (see picture).

The advantages of such catalysts manifest in particular in reactions where product distribution is crucial, such as with fine chemicals or in the pharmaceutical industry.

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## FLEMISH RECYCLING KNOW-HOW IS RECOGNISED

### EIT RAW MATERIALS OPERATIONAL



Karl Vrancken

*At the start of this year, the Flemish Public Waste Company (OVAM) received the Circular Economy Award along with its partners, VITO among them. The prize was awarded by the Forum of Young Global Leaders at the annual convention of the World Economic Forum. High praise for Flanders' leading role in the area of recycling and the circular economy. Flanders is also a driving force in the recently-launched consortium EIT Raw Materials.*

Sustainable material management and striving for a circular economy: it has become a Flemish specialty. Other countries follow the ground-breaking work of OVAM, Plan C, the Flemish universities and also VITO with great interest. "Sustainable material management is one of the cornerstones of VITO's research," says Karl Vrancken, research leader at VITO. "For example, we know how to process steel slag in useful ways. We supplement that scientific knowledge with policy support, such as our cooperation with OVAM.

That is very important, because the market for raw materials is very unstable and Europe is currently dependent on foreign imports."

#### Flemish expertise

Turning that dependence into an advantage: that is the goal of the Knowledge and Innovation Community (KIC) EIT Raw Materials, which was founded by the European Institute of Innovation & Technology last year. Karl Vrancken: "In the start-up phase, I was interim COO and partially responsible for establishing the consortium structure. We gathered 115 partners in 22 member states who share their know-how with regards to recycling, substitution of critical materials and green mining. Those are mining methods that take ecology into account, for example concerning energy efficiency and water use."

Flemish partners VITO, Umicore, KU Leuven and UGent along with Walloon partners ULiège and CRM have a prominent presence in the consortium. This is because of our knowledge on recycling, substitution of critical materials and green mining. Karl Vrancken: "Flanders was even allocated its own co-location centre in Leuven. The headquarters of the EIT Raw Materials is situated in Berlin, but through six co-location centres all across Europe, we spread our knowledge in a targeted manner using outreach programmes. We combine the work of companies, universities and research institutes and lay the foundation for the start of new business activities in the materials sector."

#### Engine for innovation

That is the ambitious goal of the EIT and the KICs: fully integrating research, education and industry during seven years to kick-start innovation on themes with strategic importance in Europe. Eventually, the KICs' knowledge must add value to business initiatives. Then innovative technologies can take root in a business environment and start-up companies get the chance to fully develop. Karl Vrancken: "In 2016, EIT Raw Materials is really taking off. We have been allocated a budget of 26 million euros this year, which will be divided among the different co-location centres. In Flanders, we will be working on the development of a business game. This is aimed at business leaders who want to invest in the circular economy. We will test it with the help of Voka East-Flanders. But there is more. Plan C, the Flemish circular economy network, has developed a business model innovation grid that should inspire companies to invest in the circular economy. We are turning that grid into a useful tool for a wider European context."

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# KNOWLEDGE VALORISATION AT VITO

## VITO STRIVES FOR CONTRACT RESEARCH, VENTURE PROJECTS AND INTERNATIONALISATION



Walter Eevers

*Several Flemish companies already use tailored VITO technologies. VITO is now also active in the Middle East with its own subsidiary. Walter Eevers, director of Valorisation and Strategic Cooperation at VITO: "These commercial and international activities are part of a clear strategy on knowledge valorisation, which we want to use to continue developing our growth."*

To provide an answer to future challenges, VITO has the social responsibility to conduct research on climate, energy, sustainable industry, a healthy environment ... But supporting the economic structure is also an implicit part of VITO's societal goals. Walter Eevers: "As in every enterprise, the viability of a product or service is important to us. As soon as the knowledge we deve-

loped finds a concrete application in companies and those companies are prepared to reimburse the value of this knowledge, we can speak of true impact and added value. The revenue from intellectual property is necessary to support our activities and ensure VITO's growth."

### Clear strategy

To better valorise its knowledge and generate societal impact, VITO designed its strategy around three areas: performing traditional contract research, launching spin-offs and expanding its activities abroad. "The Flemish government and industrial sector have been relying on our technological and scientific support for many years," says Walter Eevers. "VITO also wants to create spin-offs and conduct technology transfers with industrial players. That allows us to turn the knowledge we have acquired into market-ready products. Such valorisation tracks are running in each unit and research domain that VITO works on.

"Lastly, VITO also exports its knowledge to other countries. Nineteen Chinese cities and provinces use our models to monitor their air quality," says Walter Eevers. The knowledge institute is now also present in the Middle East. VITO's subsidiary VITO Middle East works on energy and sustainable construction.

### Brilliant - VITO Innovation Plan

On October 1, 2015, VITO launched Brilliant, an inspiring knowledge data-

base full of cleantech innovations. With Brilliant, VITO meets the need of companies to be involved in research from an early stage. That means the research is more focused and tailored to the actual needs of an industry. This process allows VITO to acquire better patents that add value more easily. The knowledge institute goes one step beyond and also rolls out co-creation tracks. "Together with the companies, we develop their ideas for sustainable business creation, using VITO technology as the catalyst," says Walter Eevers.

## BRILLIANT INTERNATIONAL

In 2016, we are investing in international knowledge exchange. That is why the knowledge database Brilliant will also be made accessible to foreign research and technology centres. The centres can share their technologies on the platform. And they can share solutions created by VITO with their network. A win-win for all parties.

More information:  
[brilliant.vito.be](http://brilliant.vito.be)

## SUCCESSFUL SPIN-OFFS

*VITO invests in commercialising its sustainability research and its exchanges with important stakeholders. In 2016, the knowledge institute is focusing on further expanding the start-up ecosystem in cleantech, internationalising Brilliant and rolling out co-creation trajectories.*

VITO's spin-off Laser Cladding Venture (LCV) – launched at the end of 2015 – and the Belgian dredging company DEME signed a cooperation agreement of three years to reinforce the cutting wheels the company uses to dredge hard materials. Laser cladding is a coating technique where a laser melts metal powder onto an object. This causes less wear and tear and corrosion and reinforces the durability of the objects. A pilot project studied the applicability of laser cladding to reinforce cutting wheels. The results revealed that the cutting wheels lasted longer even in extreme weather.

Together with Flight Plus, VITO created the spin-off Unifly. Thanks to this software programme – another one of VITO's spin-offs from 2015 – unmanned airplanes such as drones can move safely through airspace. The platform should accurately inform drone users about where and when they can fly their drone. Moreover, it ensures that air traffic control services are aware of the drones. The SOFI fund of investment company PMV and the venture capital fund QBIC are investing in the further expansion of this project. Unifly has already been launched successfully in Switzerland and the United States. The product was launched in Belgium at the Drone Days in March 2016.

## CO-CREATION REMOTE SENSING TRACK

On March 22, 2016, the first workshop on a co-creation track on remote sensing took place. Using co-creation, VITO unites innovative companies in order to realise their ideas. In the track on remote sensing, participants are exploring new opportunities in the agricultural, infrastructural and safety sectors and for the study of vegetation. VITO provides its know-how on data capture with satellites, airplanes and drones, which use several sensors. The participating companies can also rely on VITO's

knowledge on processing raw data into ready-to-use geomaps. Lastly, VITO can help develop data analysis algorithms and calculate growth indices, chart pathologies in crops or develop 3D visuals. The project is executed in cooperation with the province of Limburg, Droneport, the Innovation Support Centre and Agropolis.

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## UNIQUE PORTFOLIO OF URBAN LIVING LABS

### THE CHALLENGE

The global population keeps increasing and more and more people live in cities. This puts a lot of pressure on urban environments. At the same time, an increasing number of cities consciously invest in a climate-neutral, sustainable future.



**70 %**  
of the global population will live in urban areas by 2050.



**40 %**  
higher GDP/capita in European cities compared to the national average.



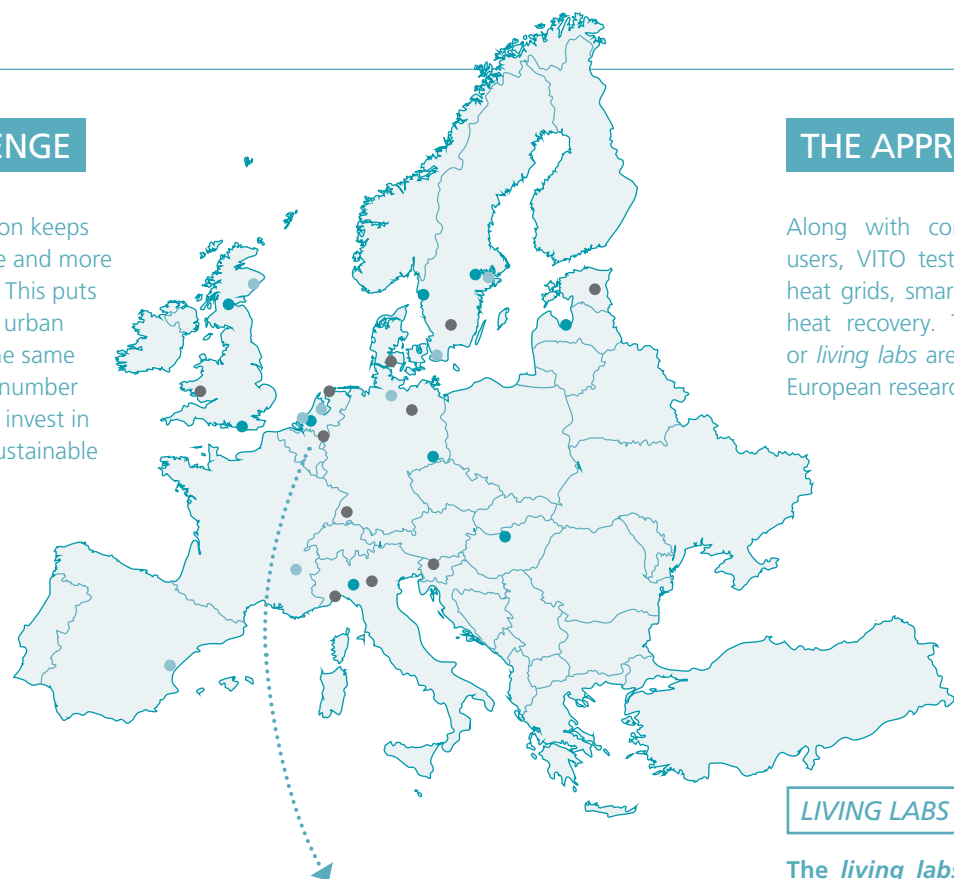
**80 %**  
of global energy use is consumed in cities.



**75 %**  
of global resources are used in urban areas.



**33 %**  
of global carbon emissions come from buildings.



### THE APPROACH

Along with companies and end-users, VITO tests concepts such as heat grids, smart meters and waste heat recovery. The demo projects or *living labs* are generally part of a European research framework.

### LIVING LABS

The *living labs* focus on policy and technology or test integrated approaches in an urban environment.



**POLICY/END-USERS**  
STEP UP, STRATEGO, ARTS



**TECHNOLOGY**  
Resilient, STORM, REFURB, Geothermal energy & district heating, District heating, E-hub



**INTEGRATED APPROACH**  
SEISMIC, Transition coach, City-Zen, EcoDistr-ICT, Smart Thor, Smart Energy Cities Network, e-harbours, Request to Action

The colour of each city on the map represents the focus of the research.

From 2010 onwards, VITO and its partners from industry, government and knowledge institutes cooperated in 55 urban testing grounds – *living labs*.



## VITO MEASURES BLACK CARBON AND ULTRAFINE PARTICLES

### TWO PROJECTS CHART AIR QUALITY

*The average air quality in Flanders has drastically improved in recent years, thanks to thorough measures taken by the Flemish government. Using air quality measurements and model calculations, VITO offers policy-makers the right scientific tools.*

To measure air quality, accurate mapping is a necessity. Local sources, such as traffic, can lead to large differences in the concentration of certain pollutants. VITO's air quality measurements and model calculations provide reliable spatial air quality monitoring. Governments can use that information to reduce high concentrations or promote the use of green areas.

### Black carbon

A growing number of cities and municipalities want to know where the highest concentrations of black carbon occur. Traffic might be an important local cause. But the environment also determines the degree to which emissions affect local air quality. The distance from the source and the degree to which dilution is possible play an important part.

Conventional measurements are useful for longer time series, but are generally limited to one or a few locations. That is why VITO developed an accessible and easy-to-use alternative: airQmap. Bart Elen of VITO says: "Using this tool, we can chart black carbon emissions in several streets. Cities and municipalities can loan measuring devices from us and use them to measure the black carbon emissions. At set times, volunteers must travel along pre-determined routes by bike or on foot. We process the data and turn them into

interactive colour maps that can be freely consulted online."

A useful exercise, because the black carbon concentrations differ strongly between streets. Bart Elen: "For example, the concentrations are higher in places where traffic cannot maintain a constant speed, such as at traffic lights or speed bumps."

### Ultrafine particles

Black carbon is far from the only pollutant that affects our bodies. In the European project JOAQUIN (JOint Air Quality INitiative), which ran from 2012 to 2015 and was led by the Flemish Environmental Organisation (VMM), the City of Antwerp and a

### SEVEN CITIES AND MUNICIPALITIES

Since its launch in 2015, airQmap has been used successfully in seven cities and municipalities: Kortrijk, Antwerp, Zutendaal, Beringen, Brussels, Liège and Amsterdam. Gerda Flo, programme director of Climate City Kortrijk, recounts: "AirQmap was received enthusiastically by many of our citizens. We quickly found volunteers and the maps were frequently consulted. With the results of the measurements, we will now take further action."



Air quality differs strongly from street to street.

number of international partners, new air pollutants were studied. VITO took part in the research on black carbon and ultrafine particles. Felix Deutsch of VITO: "Ultrafine particles are particles of less than 0.1 micrometre. The smaller the particles, the deeper they can penetrate our bodies. Currently, there is not a lot of knowledge on the specific effects of these particles. The possibility of negative health effects can therefore not be ruled out."

In Antwerp, VITO conducted a detailed study. Felix Deutsch: "Traffic is the most important factor in the spread of ultrafine particles. Diesel engines without particulate filters and petrol engines with direct injection are major causes of pollution. The research showed that limiting diesel engines without a particulate filter to introduce a low emissions zone in Antwerp is an effective measure. According to our prognosis, this measure will help reduce the amount of ultrafine particles by 2020."

More information:

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airQmap



MAO DEBIN, BUSINESS  
DEVELOPMENT MANAGER  
FOR VITO PROJECTS IN CHINA

“I HAVE SEEN VITO  
GROW IN CHINA ON A  
COMMERCIAL LEVEL.”

VITO is expanding its Chinese commercial activities. Mao Debin is a central figure. He coordinates all of VITO's projects in China.

#### How did you end up at VITO?

While working on my PhD at the University of Antwerp, I performed research in the analytical department of VITO. I had already performed some studies in VITO's labs while earning my Master's degree in Sweden. Even before my thesis defence, I travelled to China along with our managing director Dirk Fransaer. That was back in 2009, when VITO started to explore the Chinese market from a more commercial angle. After obtaining my doctorate, I first combined research and business work at VITO, but after a few months I took on a dedicated business development function.

#### What does your role entail?

I have a scientific background, but at VITO, my role is more business-oriented, especially since the foundation of our subsidiary, VITO Asia. I am responsible for the

Chinese market and all of VITO's projects in China. Therefore, I am up-to-date on every project in every domain: air quality, materials, energy, remote sensing ... I establish contacts, launch projects and continue monitoring them. I also function as a facilitator: I try to minimise linguistic and cultural barriers. It is a very challenging role.

#### How do you see your future at VITO?

I have been living in Belgium for almost 10 years and I have been working at VITO since 2009. I got married here and my two sons attend school in Mol, so for now we are staying in Belgium. Working at VITO is very different from working at a university or company. VITO combines both worlds: we are very socially-oriented, but adding commercial value is an equally important objective.

VITO offers a lot of flexibility. I work with various units and groups across very different domains. Not only do I have to understand the market needs, I also need to have a good understanding of VITO's know-how and technologies. By combining the knowledge, I can decide which projects we will be developing in China at which specific time based on the market needs and the technology readiness level of the technologies themselves. I have seen VITO growing and expanding its business scope in China. A few years ago, we mainly worked on projects for the European Union, but now we are working more and more on commercial projects. I am proud to help VITO get established further in China.

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## PROBA V & MEP BRING DATA AND USERS CLOSER TOGETHER



### VITO LAUNCHES INNOVATIVE RESEARCH PLATFORM

*Scientists around the world use the detailed images of the popular mini satellite PROBA-V. For them, VITO has launched the Mission Exploitation Platform (MEP): a research platform that allows scientists to analyse remote-sensing data easily and use them for their own purposes.*

Since its launch in 2013, PROBA-V charts vegetation all across the world on a daily basis. The reliability of the mini satellite and its unbeatable accuracy have resulted in an increasing following in the scientific community in the last two years. Today, PROBA-V has about 2,500 loyal users in 94 countries.

#### Innovative

A boost for the entire team, says Erwin Goor, project manager of MEP PROBA-V. “The data archive grows in size every day and until recently, users had to download those images, save them and interpret them locally. That required a lot of computing power: a major challenge for smaller companies with fewer means. Such a situation was not tailored to the research methods of the twenty-first century.”

More than enough reason to launch an innovative research platform in cooperation with ESA: the Mission Exploitation Platform PROBA-V, or MEP. Erwin Goor: “The idea is simple. The huge mass of images provided daily by PROBA-V can now be processed directly through MEP, along with the images of PROBA-V's predecessor SPOT-VEGETATION. MEP is the inter-

face through which users can perform their research and analyses efficiently. Instead of requiring users to download the data, VITO provides the computing power and direct access to the data on a cloud-based platform.”

#### Tools

Each researcher can use their own tools on the development platform. But VITO also installed pre-programmed tools. Jeroen Dries, technical lead of the project, explains: “Those tools are

important for people who need the images, but are less familiar with data analysis. Policy-makers, for example. Today, three tools are already operational. With the GEO viewer you can study cloud-free images at full resolution. With the time series viewer, you can track and analyse the evolution of the images. A user can also have images generated on-demand according to their needs on a high-performing and scalable computing cluster.”

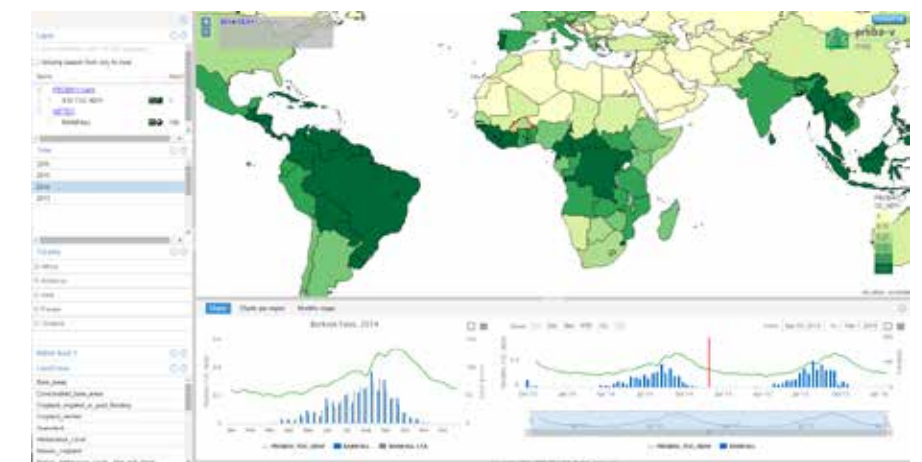
### USERS TESTIFY

**“THE PROBA-V MISSION EXPLOITATION PLATFORM IS PAVING THE WAY FOR NEW CONCEPTS OF DATA ACCESS IN THIS ERA OF BIG DATA AND HOSTED PROCESSING.”**

Bianca Hoersch, PROBA-V Mission Manager  
(ESA Earth Observation)

**“PROBA-V CAPTURES INFORMATION ABOUT WHAT IS HAPPENING AT THE EARTH'S SURFACE ON A DAILY BASIS AT UNPRECEDENTED RESOLUTION.”**

Dr. Kevin Tansey, Head of the Department of  
Geography (University of Leicester)



The Time Series Viewer of the MEP offers the possibility to explore long time series in a user-friendly way.