WEBTOOL HELPS PREDICT POTATO HARVEST

EFFICIENT AND SUSTAINABLE CHEMICAL PROCESSES

FRESH CAPITAL FOR DRONE PLATFORM UNIFY
Dear Reader,

For 25 years, VITO has been making a priority of sustainable energy. In 2016, we lived up to our name as research centre when we drilled two wells 3.6 kilometres deep to obtain piping-hot water from the Kempen underground. We will soon be heating the buildings of VITO/SCK and Belgaprocess with geothermal energy.

VITO’s research focuses on cleantech and sustainable development. This edition of VITO Vision also puts exciting projects in the spotlight. One of the research lines of VITO, for example, focuses on process intensification, i.e. making production processes more efficient and more sustainable. In the pharmaceutical and chemical industries, traditional separation processes – essential to production – use large amounts of energy. VITO-patented membrane technology is capable of cutting this energy consumption by more than half. VITO/EnergyVille in turn is creating a reduced-regulation test zone for projects with solar and thermal energy. And with the ESTMAP project, we are making planning and decision-making about the future energy system in Europe easier.

Would you like to know more about VITO Middle East, the CON4EI project, we are making planning and decision-making about the future energy system in Europe easier.

I hope you enjoy reading this edition of our VITO VISION,

Dirk Fransaer
Managing director VITO

NEW WEBTOOL HELPS PREDICT POTATO HARVEST

The research project Ipot was launched in June 2014. Together with three partners, VITO created a system for the Belgian potato sector to monitor the growth of potatoes. In 2017, the commercial version of this webtool will be marketed under the name Watch iT Grow.

Ipot is an initiative of VITO in collaboration with Belgapom (the professional association of the Belgian potato industry), CRA-W (the Walloon Agricultural Research Centre in Gembloux) and the University of Liege. Isabelle Piccard of VITO: “We are developing a web application that helps potato traders and the processing industry to monitor the growth of the potatoes. By using weather data, satellite images, aerial images (taken with drones) and data from ground measurements, users are able to follow whether the crops emerge properly from the ground, how the growth is developing, whether diseases might be present, when farmers can start harvesting... The University of Liege combines the collected data into crop growth models. Using this, the webtool is able to predict the expected yield per plot.”

Sustainably increasing potato production

Belgium is the largest exporter of frozen potato products in the world. Romain Cools of Belgapom: “Each year, Belgian companies process four million tonnes of potatoes into French fries, potato chips and other products. To continue to grow, we need more potatoes. But expansion of agricultural land is not an option. Using Watch iT Grow, we are better able to monitor potato production and increase yields. This allows us to ensure and further expand our role as a global player in the potato industry.”

The Ipot project ends in May 2017. What started as a research project, funded by the Federal Public Planning Service for Science Policy (BELSPO), has grown into an innovative webtool. From the spring of 2017, not only the academic world but also industry and farmers will be able to use the tool. Romain Cools: “The tool helps farmers optimise their available surface area, so they can continue to grow in a sustainable way. We thus are strengthening the Belgian economy and ensuring that Belgium remains the largest exporter of frozen potato products.”

The commercial webtool will be called Watch iT Grow. “The application will be provided free of charge during the first year, after that it will be a paid service,” says Isabelle Piccard. “Users can continue to rely on expert support. In the future it will also be possible to monitor crops other than potatoes.”

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3.4 MILLION EUROS IN EUROPEAN FUNDING FOR SUSTAINABLE CHEMISTRY INCUBATOR IN ANTWERP

At the end of November 2016, the Flemish Government announced it was granting 3.4 million euros in European funding to BlueChem, the future incubator for sustainable energy in Antwerp. The incubator aims to valorise knowledge and experience in the chemical industry through the creation of new companies. The investment is part of the renewed Flemish innovation policy that designs chemicals and plastics as a spearhead cluster.

Antwerp is home to one of the world’s largest chemical complexes. Yet it is not easy to valorise all the knowledge and experience accumulated there. The BlueChem incubator aims to help start-ups and innovative projects in sustainable chemistry grow and succeed. The 3,745 m² incubator, located in the Blue Gate Antwerp business zone, will offer a mix of flexible workplaces for start-ups, and individual offices and labs for SMEs, large enterprises and research institutions. The building will cost a total of 8.68 million euros. Its opening is scheduled for early 2020.

Important export sector

The Flemish Government’s investment in BlueChem is part of the renewed Flemish innovation policy that designates the chemical sector and the plastics industry as a spearhead cluster. Along with pharmaceuticals, chemicals and plastics are Flanders’ principal export sector. They are crucial for employment and the competitiveness of the Flemish economy. With its strategic choice, the Flemish Government is supporting the many innovations in the chemical and plastics processing industry that are looking for alternative or bio-based raw materials, greater energy efficiency and the reuse of waste and incidental flows in a circular economy. The ‘Chemicals and Plastics spearhead cluster’ will build on the experience of Catalisti and Flanders’ PlasticVision (FPV). VITO was actively involved in the creation of the new spearhead cluster and will continue to support it.

JAPANESE MARKET LEADER CONFIRMS CONFIDENCE IN VITO SPIN-OFF

Unifly is a partner in international initiatives around standardisation and regulation, as well as the inclusion of drone users where and when they can legally fly. The VITO spin-off recently obtained 5 million euros in fresh capital.

The rapidly-growing market for drones or UAVs (Unmanned Aerial Vehicles) is creating a greater need for systems that ensure safety and enforce the newly-introduced regulations. Unifly develops and markets a platform to safely integrate drones in the airspace. The system includes air traffic control for drones, drone management of drone activities, drone users who register receive an overview of the airspace and the ability to plan a flight using a user-friendly interface. The system includes airspace management of drone activities. Drone users who register receive an overview of the airspace and the ability to plan a flight using a user-friendly interface. The system includes airspace management of drone activities.

Market confidence

Unifly was founded as a VITO spin-off in 2015, and in June 2016 was already receiving financial support from the Flemish region (SORI Fund) and the investment fund Qbic. On 17 November 2016, the VITO spin-off completed a second round of financing for a total of 5 million euros. Eighty percent of this comes from Terra Drone, the Japanese market leader in drone management and systems integration. The additional funding will allow Unifly to develop the UniflyUTMS platform more quickly into a de facto standard for UTM. “The investment by Terra Drone, along with that of Qbic and the investment company PMV, shows the market’s confidence in our technology,” says Unifly CEO Marc Kegelaers. “With the new funding, we aim to become a global player in the domain of UTM.”

More employees

As a direct result of the investment, Unifly will grow from twelve employees today to over forty in 2018. This is partly thanks to the Flemish government, which invested very early in the young high-tech company and thus gave private partners the confidence to do the same. Unifly’s technological head-start, its in-depth industry knowledge and the fact that Unifly is a partner in international initiatives around standardisation and regulation, are additional strengths to succeed in the highly specialised drone world.

FLEMISH INNOVATION POLICY SUPPORTS BLUECHEM

A drone to study agricultural crops, to inspect solar panels, to deliver packages... as the number of applications for drones grows, so does traffic in the airspace. UniflyUTMS is a software platform developed by Unifly that informs drone users where and when they can legally fly. The VITO spin-off recently obtained 5 million euros in fresh capital.

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More info:

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“TOP EXAMPLE OF VITO’S VALORISATION STRATEGY”

Unifly is a fine example of the valorisation strategy used by VITO in recent years. The combination of advanced technology and market opportunities ensures that the start-up quickly evolved into a successful company in a future-oriented sector. Walter Eevers, Research Director at VITO: “We are proud of the Unifly team. They have proven to be capable of conquering the world on their own, and of contributing to the safe integration of drones in the skies.”
PRODUCING MUCH MORE WITH MUCH LESS

Continuing to produce top quality pharmaceutical drugs and fine chemicals while limiting costs and energy consumption is a challenge that VITO is addressing, alongside the pharmaceuti- cal and fine chemicals industries. VITO develops practical solutions to improve industrial processes. In this, sustainable- ness is still the guiding principle, with cost reduction, energy saving and higher product yields the result.

To remain profitable, the chemical and pharmaceutical sectors must undergo a process of reinvention. “VITO develops technologies that accelerate this process,” says Marzio Monagheddu of VITO. “We focus among other things on process intensification, making processes more efficient and more sustainable. In this, low consumption of energy and other resources are an absolute necessity.”

Process optimisation 2.0

“Of course, these industries have progressed during the past few years,” continues Roel Vleeschouwers of VITO. “Many companies have already invested heavily in process optimisation. They look for disruptive solutions that outperform the traditional chemical methods: process optimisation 2.0, as it were. VITO offers innovative technolo- gies and state-of-the-art test infrastruc- ture at lab and pilot scale and conducts techno-economic feasibility studies. As a neutral research partner, we are able to give objective advice, independent of third parties. Our customers also benefit from our extensive network in the research community and industry.

They gain access to complementary expertise and collaboration.”

Different needs per player

VITO targets R&D players as well as manufacturers, explains Metin Bulut of VITO. “R&D players aim at the short- est possible time to market, a higher success rate and higher performance. They encounter technical prob- lems such as process inhibition, they can come to us. For one R&D company, we are for example investigating the enzymatic synthesis of an industrial protein.”

“Organisations that manufacture for pharmaceutical companies on a con- tract basis can also call on VITO, for example, to reduce their production costs without sacrificing product qual- ity. Looking at it this way, they too are focused on innovation. Large pharma- ceutical companies are driven to inno- vation by time to market and the need to reduce production costs. VITO pro- vides solutions for these challenges, such as our patented VID technology.”

50 to 90 % lower energy costs

Industrial processes often involve complex separation steps in which components are isolated, purified or concentrated. On the one hand, VITO offers solutions for downstream pro- cessing in which target molecules are purified to a final product in successive steps. On the other hand, VITO works on the integration of separation and conversion. “In each case, membranes are key to reducing energy costs,” says Roel Vleeschouwers. “Traditional sep- aration processes absorb energy: from 40 to as much as 70 % according to a detailed study of industrial chemical processes. In comparison with conven- tional processes such as evaporation and distillation, membranes are much less energy-intensive, since the separ- ations generally take place at room temperature, without the different components undergoing a phase tran- sition. Thanks to membrane technol- ogy, energy costs can be reduced by 50 to 90 %. Moreover, higher prod- uct quality can be obtained for tem- perature-sensitive molecules. Organic Solvent Nanofiltration (OSN) is an interesting example of the evolution in membrane technology that is con- tributing to sustainable chemical pro- cesses. Also, the compactness and the possibility of scaling up a modular system are major industrial benefits of membranes.”

Functional membranes

And development continues. VITO together with the University of Antwerp has developed a new genera- tion of functional membranes with the patented FunMem® platform. Marzio Monagheddu: “FunMem® allows separ- ations to be performed based on affinity, not just based on size. Specific organic groups applied to the sur- face of ceramic membranes make the membrane functional. An interesting application is the removal of impurities from so-called Active Pharmaceutical Ingredients or APIs. Another example is the separation of catalysts from the production process, so that they can be reused. For example, we succeeded in recovering the expensive noble metal palladium, a widely used cata- lyst in the chemical industry.”

OPTIMIZATION WITH VID TECHNOLOGY

So-called substrate inhibition occurs in certain chemical reactions. When this inhibition of the process takes place, high concentrations of sub- strate can lead to the formation of undesirable by-products, with reduced yield and lower product quality as a result.

For this reason companies prefer to perform these vulnerable reactions in a highly-diluted medium. This has a major disadvantage: you need large quantities of solvent and bulky reactors to create small amounts of a final product, for example 6 000 litres of solvent for only 50 kilograms of product.

Roel Vleeschouwers: “VITO’s patented VID technology (Volume Intensified Dilution) integrates membranes directly in the process, so that more product can be made with smaller reactors, and less solvent. VID makes inhibited reactions much more efficient by reproducing a diluted reaction mixture in a smaller reaction vessel. Sending the reaction mixture over a membrane allows the solvent to be reused. Some reactions benefit from efficiency increases of more than 80 %.”

CHEAPER WITH FUNMEM® MEMBRANES

Chiral molecules have two forms: they look the same, but in fact are each oth- ers mirror image. But this distinction is crucial. One form has the desired ther- apeutic effect, while the mirror image can result in life-threatening side effects.

Metin Bulut: “Traditional chiral separa- tion is done using chromatography, but this is expensive and time consuming. It uses a lot of solvent and is detrimental to the environment. We are now exam- ining whether we can perform chiral separations using FunMem® mem- branes. A test case for chiral amines has already shown that membrane separation is economically viable if we combine the right membranes. It’s promising for the pharmaceutical and chemical industry.”

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VITOFOAM ALLOWS IMPLANTS TO ATTACH THEMSELVES STRONGLY IN THE BODY

VITOFOAM is a patented process for manufacturing titanium foam. In short, titanium powder with water and other substances is whipped to a foam structure, creating a porous metal. VITO developed the alloy foam for hip and other implants: thanks to the foam structure, human bones attach themselves more quickly.

“Titanium is biocompatible and the structure of the titanium foam approximates the composition of the sponge-like interior of a bone,” says Steven Mullens of VITO. “By giving parts of an implant a rough, porous exterior, bone ingrowth is possible and the implant becomes firmly anchored in the body.”

VITO recently sold the patent for VITOFOAM to the Chinese high-tech company BZHB. It aims to bring hip and other implants to the market in the short term. At the request of BZHB, VITO gave the titanium foam custom shapes – such as the ‘socket’ of a hip implant. Marleen Rombouts of VITO: “A knowledge transfer from VITO to BZHB will take place over the course of 2017, so that the company itself can produce titanium foam and give it the desired shape. The patent transfer presently applies only to the Chinese market, but this can be expanded later.”

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RESEARCH INTO SUSTAINABLE ENERGY SUPPLIES IN CITIES

VITO/ENERGYVILLE WANTS REDUCED-REGULATION ZONE FOR ENERGY TESTS

Integrating energy research and encouraging innovation around sustainable urban energy, that in a nutshell is the goal of the VITO/EnergyVille project ‘Towards a sustainable energy supply in cities’. EnergyVille wants to create a reduced-regulation zone for new projects with solar and thermal energy: “Such an experimentation space is invaluable in testing the energy systems of the future.”

“Towards a sustainable energy supply in cities” is a joint project of VITO with the KU Leuven, imec and Hasselt University. The partners wish to explore energy opportunities in an urban context: harvesting renewable energy close to the user and coupling electric and thermal energy. This project is part of the SALK Strategic Action Plan for Limburg and is supported by the European Regional Development Fund (ERDF).

Sun and heat

“In this project we are working on three major objectives: improving the laboratory infrastructure of EnergyVille, integrating research projects to create technological innovation, and showing this innovation on the basis of demonstrators,” says Bert Gysen of VITO/EnergyVille. “A clear proof of the possibilities of a new concept can attract both local industry and international partners.”

The new project consists of three work packages. Two of these focus on solar energy and heat. Bert Gysen: “Within SolSThore, we are working on Building-Integrated PhotoVoltaics (BIPV): how can we integrate solar panels into buildings? How can we link these PV systems to an intelligent electricity network? And how do we achieve maximum energy yield by also connecting batteries to the BIPV? We also develop a better-performing battery management system for this battery. GeoWatt places the focus on fourth generation thermal networks, which balance local demand and the local supply of heat and cold. We are also examining the buffering capabilities of flooded mines in combination with district heating networks.”

Smart systems

The third work package, SmartThor, is examining the techno-economic framework needed to implement smart, CO2-neutral energy clusters. Bert Gysen: “In SmartThor we are examining the possibilities of intertwining electric and thermal energy vectors. Specifically, in Thor Park, where EnergyVille is located, we wish to set up a reduced-regulation zone that would give us more freedom to try out innovative ideas. Such an experimentation space would be invaluable in thoroughly testing new market models for multi-energy networks.”

The project ‘Towards a sustainable energy supply in cities’ was launched on 1 July 2015 and runs until 31 May 2018. Funding is provided through the ERDF, the Flemish Government, the Province of Limburg and partners.

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REMOTE SENSING CO-CREATION PROJECT TO BE CONTINUED

VITO completed its co-creation project around remote sensing at the end of 2016. Ten innovative companies together with VITO experts sought new opportunities in agriculture, infrastructure, safety and the study of vegetation. The participants were able to count on the expertise of VITO, including in the field of satellites, drone images, data analysis and 3D visualisation.

Market potential
“In 2017, we will be further developing in follow-up projects the three ideas with the most market potential,” says Bart Dooms of VITO. “The first is ‘damage detection’ in agriculture, a methodology that uses drone images to identify damage to crops. At the first try-outs, our results were almost identical to those of the claims manager. The methodology has been in place for a few months and this is certainly a possible business for a drone company. A second use case is the Green Buddy, a set of sensors that monitor the state of a lawn and send the results to VITO through the Internet of things. VITO visualises and enriches the information with other data. A football field or golf course manager can in this way know, for example, whether it is necessary to irrigate. Finally, there is Solar Parks Infrared Detection: we fly with a thermal camera over solar panels to check which ones need to be replaced. Solar panels are connected in series: if one fails, you lose the yield of an entire series. By intervening quickly, efficiency remains high.”

“In the coming months we will see which partners we can involve in these projects in order to increase their chances of success. VITO will also continue to start new co-creation projects in 2017. The themes will be announced shortly.”

More info: co-creation.vito.be

REMAKE FOR BRILLIANT KNOWLEDGE PLATFORM: “MORE DIALOGUE WITH OUTSIDE WORLD”

On 16 October 2016, VITO launched a remake of Brilliant, the knowledge bank of sustainable innovations that saw the light of day a year earlier. “The remake allows for greater dialogue and information exchange between VITO and the outside world,” says Nathalie Barthels of VITO. “We want to optimally tailor our research to the needs of society. For this, communicating with technology companies and stakeholders is essential. The revamped Brilliant portal offers among other things new functionalities to easily contact us for innovation opportunities. We will also be organising workshops and events to discuss together the technology trends and sustainability. This will also give us the opportunity to find partners that can deploy our technologies. In order to allow the Brilliant community – which now has more than three hundred members – to grow rapidly, we have greatly simplified the membership procedure.”

More info: brilliant.vito.be

KNOWLEDGE VALORISATION AT VITO

VITO MIDDLE EAST GUIDES SUSTAINABILITY ANALYSIS OF BUILDINGS IN QATAR

With VITO Middle East, VITO is giving a boost to its activities in Qatar, Oman and the United Arab Emirates. The regional company is, for example, working on a new sustainability label for buildings in Qatar.

VITO Middle East is VITO’s second international company, following VITO Asia. The division in Qatar has been in place since late 2015 and is focusing on the transition to sustainable energy and buildings. An important partner of VITO Middle East is GORD, the Gulf Organisation for Research and Development. This research institute is currently working on a GSAS label (Global Sustainability Assessment System): a certification system that describes a building’s sustainability. VITO is supporting GORD in the implementation of the new evaluation system.

Carolin Spirinckx of VITO/EnergyVille: “The GSAS system comprises multiple categories: materials and raw materials, energy, water, location, urban connectivity, indoor environment, cultural and economic value, management and operation. The total score of all results indicates how sustainable a building is. In the past, we already developed a web application for GORD that assists building owners in applying for GSAS certificates. Currently we are supporting them in the implementation of the ‘materials and raw materials’ category. For this category, building owners in the Middle East can request from VITO a Life-Cycle Analysis (LCA) and Environmental Product Declaration (EPD) for their building materials. This gives them extra points.”

Open communication
VITO has concluded a framework agreement with GORD to prepare LCAs and EPDs for local building and project developers. The experts at VITO and GORD in the Middle East are responsible for organising a kick-off meeting, conducting interviews and explaining to companies which data they need to collect. Carolin Spirinckx: “When all the data is available, we at VITO can calculate the environmental performance of building materials. This usually happens in Belgium. After a preliminary analysis, we draw up an initial environmental profile and point out possible improvements to the producer. In total, it takes at least three to four months to conduct a full LCA and to prepare the EPD.”

“In the LCA, we analyse the environmental performance of the selected building materials throughout their lifecycle. What is the environmental impact of the extraction of raw materials, transport to the factory, the production processes used and the use of the material in the building? Are there any possibilities for reuse or recycling? The results go to GORD in the form of an EPD. The EPD then receives the Gulf Green Mark EPD label. Companies that have negotiated with the government of Qatar, in the context of IFA 2022, the requirement that all new buildings, renovations and infrastructure must have a GSAS certificate. This has motivated many building owners to request the label. We have similar systems in Europe, but these are usually non-binding. In the Middle East, the mandatory GSAS label is an additional incentive.”

Due to the growing number of applications for LCAs and EPDs, VITO is gradually becoming a familiar name to manufacturers of building materials in the Middle East. “The project is great for our visibility,” says Carolin Spirinckx. “In the Middle East, VITO is increasingly requested as a speaker at conferences on sustainability. We can now translate to the Middle East the knowledge and experience we have acquired in Europe over ten years: an exciting challenge.”

Additional incentive
Building owners are not required to request a GSAS label for all their designs. Yet this is happening more often, and for good reason. Carolin Spirinckx: “GORD has negotiated with the government of Qatar, in the context of IFA 2022, the requirement that all new buildings, renovations and infrastructure must have a GSAS certificate. This has motivated many building owners to request the label. We have similar systems in Europe, but these are usually non-binding. In the Middle East, the mandatory GSAS label is an additional incentive.”

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Since August 2015, VITO has a leading role in CON4EI, an international project investigating eye irritation. The goal: demonstrating that animal testing is not necessary to examine whether substances irritate the eye. The project partners combine a mix of technologies into an innovative strategy: “We hope to have our proposal included in the new OECD laws (Organisation for Economic Co-operation and Development).”

Each chemical that enters the market in Europe is tested for consumer safety. The conditions that substances must meet are laid down in the REACH legislation (Registration, Evaluation, Authorisation and Restriction of Chemicals). “Traditionally eye irritation is tested with experiments on rabbits – the Draize test – but Europe is aiming to abolish animal testing wherever possible,” says An Van Rompay of VITO. “Many in vitro tests have been developed in recent years, but everyone uses different tests and test combinations. This is not optimal, therefore the European Chemical Industry Council (CEFIC) last year issued a call to develop a reliable test strategy and database for in vitro tests. CON4EI was chosen (CONsortium for in vitro Eye Irritation testing strategy).”

Optimal combination

CON4EI uses a combination of eight test methods to test and classify eighty different substances: An Van Rompay. “By comparing the results with known results of animal testing, we are able to develop an integrated testing strategy. Which test do we use for an initial screening? Which tests are suitable for classifying products? VITO carries out three tests itself: the BCOP (a test on the eyes of slaughtered calves), the BCOP-LLBO (a refined BCOP test with laser light), and the SkinEthic HCE (an in vitro test using cultured cells). Our partners handle the other tests. Based on the test results, we develop a strategy with an optimal test combination. Once all European countries approve the strategy, it can become part of the new OECD laws.”

New technology

The BCOP device with laser light was developed by VITO. Now the BCOP at the end of 2017.”

Testing on the eyes of slaughtered calves is part of the CON4EI test strategy.
How did you end up at VITO?
“I’m from Tunisia and studied Material Science in France. After my PhD at the University of Bordeaux, I moved to Belgium. Flanders has few specialists in my field – materials for batteries and energy storage – and it was easy for me to find work at the Flanders’ DRIVE research centre. But I wanted to work for VITO because the sustainability aspect appeals to me. After I responded to a job opening, I was invited for an interview.”

Could you describe your job?
“Together with my colleagues I work on research into energy storage. We design tests for lithium-ion batteries, often for companies, and conduct these tests ourselves in our battery lab. I also do research into the ageing process of batteries so that we can develop methods for batteries to last longer.”

“All of our projects revolve around sustainability. Among other things, we use batteries in smart grids to store wind and solar energy. This is necessary because the supply of renewable energy can be very erratic, depending on weather conditions. We also test batteries for electric vehicles: cars, bicycles … And we do a lot of research on rechargeable batteries. How and when to best charge them? Under what circumstances do they retain their maximum energy? Rechargeable batteries are more sustainable than the alkaline batteries that we need to replace with a new battery after use.”

How do you see your future at VITO and EnergyVille?
“I’ll continue to work on similar projects in the short term, because there is still a lot of research to be done. We are gaining experience and expertise, and seeking partners to bring new technologies to market. Currently I’m working with my team on a battery management system project: we’re developing a device that allows us to better control the functioning of batteries. Here at EnergyVille, we all believe in a future with intelligent, sustainable energy and electric mobility. I want to be an active part of this.”

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AERIAL IMAGES INCREASE VISIBILITY OF NO₂ POLLUTION

In urban areas with high levels of industry or traffic, people are often exposed to high concentrations of nitrogen dioxide (NO₂). The existing methods for measuring NO₂ locally do not allow a proper assessment of the extent of the health risks. Measurements from ground stations, located at fixed sites, cannot simply be extrapolated to an entire region. Satellite images in turn are not detailed enough to provide reliable information.

Koen Meuleman of VITO: “In the BUMBA project (Belgian Urban NO₂ Monitoring Based on APEX remote sensing), we use hyperspectral images to map out NO₂ pollution levels. This bridges the gap between the limited data from ground stations and the coarse data from satellite images. To estimate the NO₂ concentrations, we worked with the Belgian Institute for Space Aeronomy (BIRA-IASB). VITO Remote Sensing provided the hyperspectral data, tailored to the application being used.”

In 2015 and 2016, several flights were made above Antwerp, Brussels and Liege. The NO₂ concentrations that were derived from the APEX data were very similar to the results of the ground measurements. VITO and BIRA-IASB will now be translating the data from the aerial shots to NO₂ concentrations on the ground. This allows better identification of human exposure to the harmful gas and allows policy-makers to take the right decisions.

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NO₂ concentrations in Antwerp on 15 April 2015 (up: APEX image; down: NO₂ map). The major sources of nitrogen dioxide in the port are clearly visible.