



# ANNUAL

REPORT

2019



Content	4
Board of Directors	5
VITO in figures	6
VITO connects	8
VITO shares knowledge	20
G-STIC 2019	21
VITO talent	22


Sustainable materials

<b>3D TECHNOLOGY</b>	10
Catalysts, but different	
<b>CIRCULAR ECONOMY</b>	11
Close the circle	


Sustainable chemistry

<b>CAPTURE AND USE CO<sub>2</sub></b>	12
A second life for CO <sub>2</sub>	
<b>ALTERNATIVE FEEDSTOCK</b>	13
Lignin, a hidden treasure	


Sustainable energy

<b>BATTERY TECHNOLOGY</b>	14
The search for ...	
<b>SODIUM-ION BATTERY</b>	15
The battery of the future	


Sustainable health

<b>MONITORING INDOOR AIR QUALITY</b>	16
What air can teach us	
<b>BIOMONITORING</b>	16
The Flemish Centre of Expertise on Environment and Health	


Sustainable land use

<b>SUSTAINABLE AGRICULTURE</b>	17
watchITgrow	
<b>INTERNET OF WATER</b>	18
Armed against what's coming	
<b>CLIMATE MAPPING</b>	19
Ambitious projects	



Dear readers,

With the annual report that you now have in your hands, VITO wants to provide an overview of its activities in the past year. And the results can certainly be seen.

With 959 employees - 157 of them from 45 countries outside Belgium - VITO has worked on the realisation of a sustainable future, good for a turnover of more than 200 MEUR.

Capture and reuse of CO<sub>2</sub>, new battery materials or the studies on heat islands in cities, or also the VITO contribution on climate services in EU's Copernicus programme, provide a better understanding of the climate issue and a foundation for technological solutions.

Together with other Flemish knowledge centres we are studying how lignin can become a new raw material for the chemical industry. We are strengthening Flanders and the Flemish economy and industry with a view to the major challenges of the future through our research into the circular economy, both in terms of business models and technology.

The social importance of our research is of great importance to us. That is why this year, together with six other international research centres, we organized G-STIC for the 3rd time, the conference on technology and the sustainable development goals, with 2 000 participants from more than 80 countries.

In 2019, VITO also concluded a new management agreement with the Flemish Government and with its support we hope to be able to help the Flemish economy, the Flemish people, and society as a whole even better in 2020, notwithstanding the corona threats.

I hope you will enjoy reading this report.

ir. Ingrid Vanden Berghe  
Chairman of the Board of Directors



**Chairman:** mrs Ingrid Vanden Berghe

**Members:** mr H. Martens (until April 2019), mr Dirk Fransaer, mrs Elke Van de Walle (representative PMV NV), mr Michel Meeus, mrs Claire Renders, mr Wim Van den Abbeele, mr Eric Vermeylen, mrs Caroline Ven, mr Marc Decorte, mrs Isabel Van Driessche, mr Luc De Schepper, mr Kurt Deketelaere (from April 2019 – not present in picture)

**Government Commissioners:** mr Eric Sleenckx, mrs Nele Roobrouck

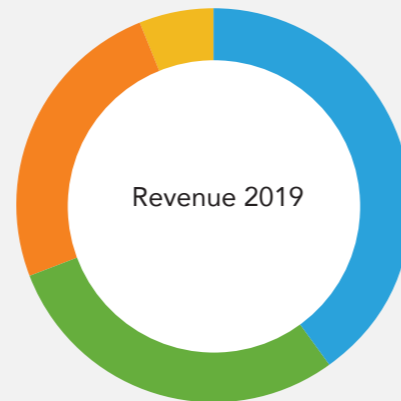
**Observers:** mr Frank Gérard (PMV), mr Wesley Boëne (VITO), mr Maarten Spruyt (VITO)



BOARD OF DIRECTORS

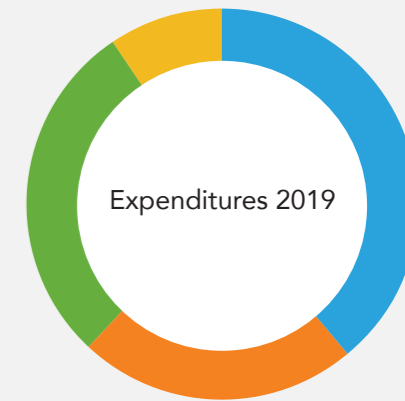
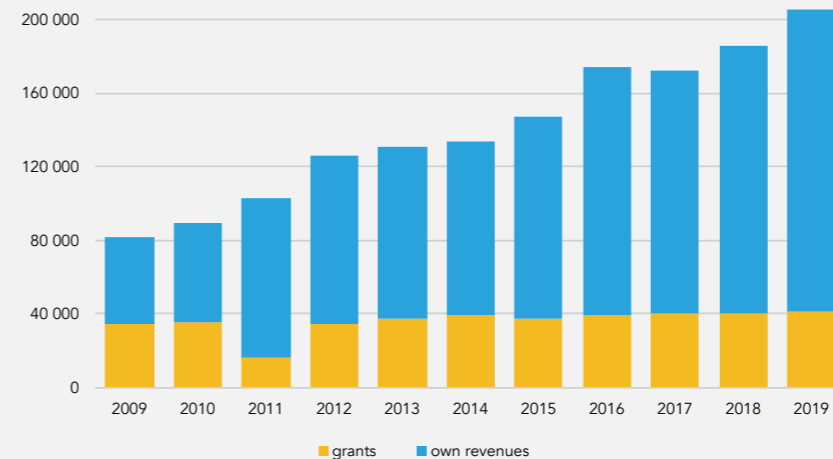
“The year 2019 was marked by a significant increase in the total budget and the number of researchers. With this, VITO continues to grow and strengthen its position as a research centre, not only in Flanders but also internationally, with already 157 international employees from 45 different countries. It proves that our research themes and the way in which VITO deals with them are relevant both for companies and in scientific research projects. It remains the challenge to keep pursuing this course even in more difficult times, such as post-corona”.

**DIRK FRANSAER**  
Managing Director

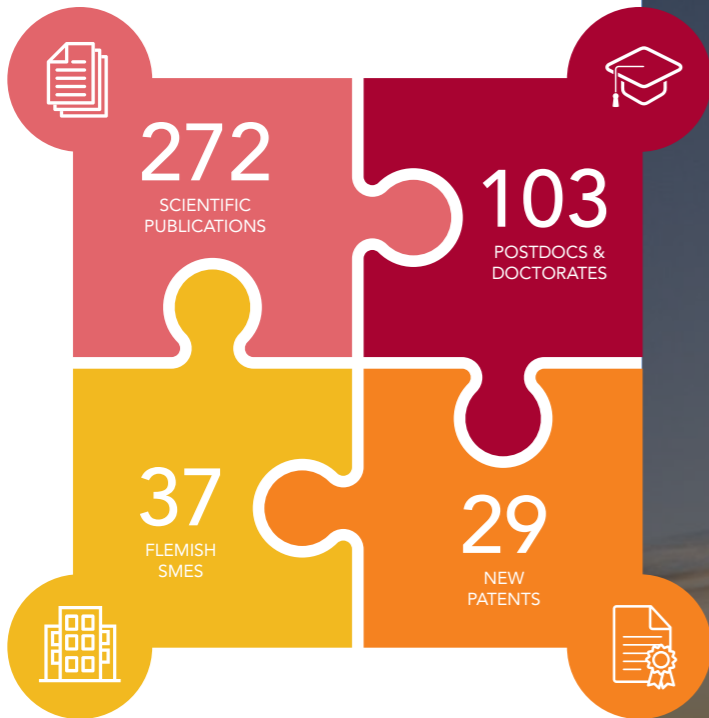


Business Revenue	82 660
Activation R&D	59 600
Grants	51 035
Financing Reference Tasks	12 098
<b>Total</b>	<b>205 393</b> (kEUR)

Evolution of revenue (kEUR)



Salaries	80 776
Depreciation R&D	59 600
Operational Means	47 531
Normal Depreciation	19 134
<b>Total</b>	<b>207 041</b> (kEUR)



WE ACCELERATE THE TRANSITION TO A SUSTAINABLE WORLD. WE DE-RISK INNOVATION FOR BUSINESSES AND WE STRENGTHEN THE ECONOMIC AND SOCIETAL FABRIC OF FLANDERS, WITH INTERDISCIPLINARY RESEARCH AND LARGE-SCALE PILOT INSTALLATIONS.

### VITO & SCIENCE

VITO has a strong reputation in the Flemish and European scientific communities and works together with internationally renowned institutions.

### VITO & COMPANIES

VITO is working together with companies, either directly or in partnership with industry networks such as the spearhead clusters and employers' organisations, to reduce the risk of sustainable innovation for companies. In Flanders and by extension internationally.

### VITO & SOCIETY

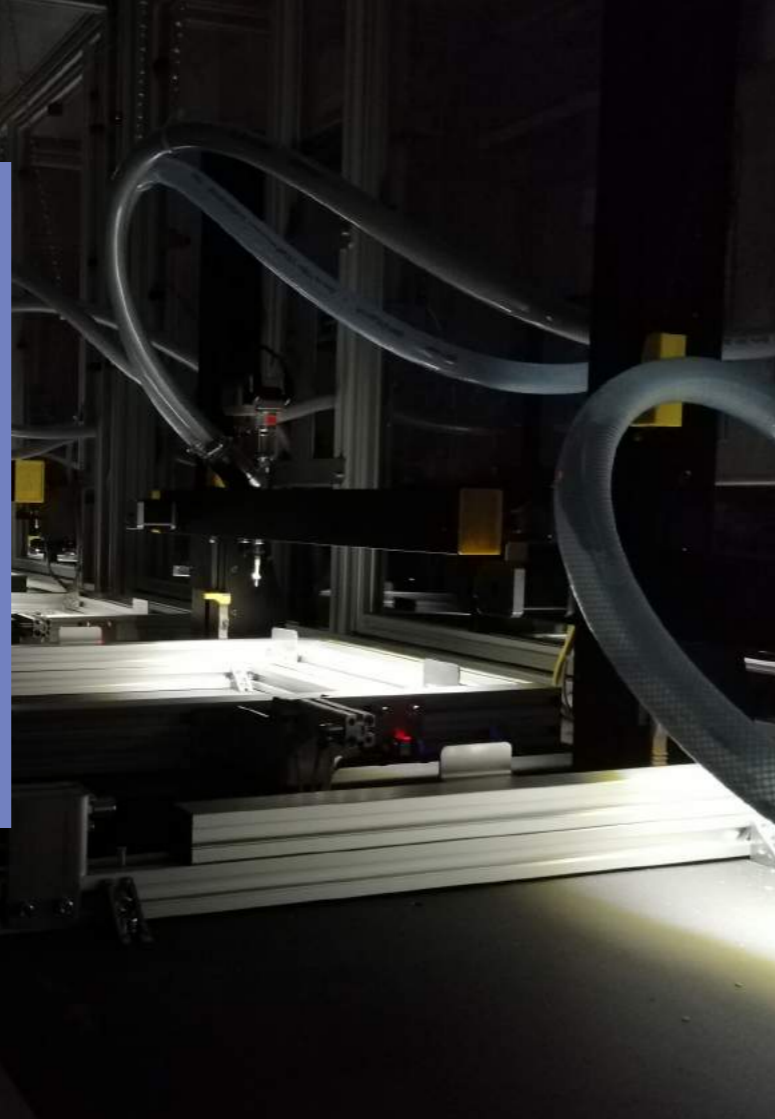
VITO makes objective and scientific information available to policymakers and citizens in order to have an impact on social debates about the transition to a sustainable society and the achievement of climate goals.



## 3D TECHNOLOGY

### CATALYSTS, BUT DIFFERENT

Catalysts are essential for any company in the chemical sector, as they are required in 90 % of all chemical processes. By adapting the size and shape of the catalyst correctly, the efficiency is positively influenced. Optimisation is still possible in this respect. VITO is a pioneer in 3D printing of catalysts and has developed an innovative micro-extrusion technology that enables large-scale catalyst production. The catalysts, produced with a smart 3D printing technology, have the ideal shape and structure and bring many advantages, including higher product quality and lower energy consumption. This innovative technology represents a major step towards a greener and more sustainable chemical industry.



## CIRCULAR ECONOMY



### CLOSE THE CIRCLE

Circular economy is a necessary condition if we want a sustainable society. We often want to make a U-turn, but we are not sufficiently aware of the consequences of these choices. Research is needed to provide the right answers and solutions. VITO takes the lead in this.

Circular economy is a comprehensive concept. On the one hand, it concerns sustainable materials management, reducing waste streams and recovering what is still usable in those waste streams. For example, VITO is intensively exploring how we can store solar energy effectively, how we can extract expensive metals from waste streams and whether we can process them into a high-quality product. On the other hand, circular economy also involves raising awareness. We are looking for sustainable solutions for everyday things, such as household appliances that fail. Together we close the circle.



## CAPTURE AND USE CO<sub>2</sub>

### A SECOND LIFE FOR CO<sub>2</sub>

CO<sub>2</sub> or carbon dioxide, however paradoxical it may sound, is crucial for life on earth. But our planet can no longer cope with the massive emissions of CO<sub>2</sub> and it now poses a threat to our climate. VITO is therefore actively looking for solutions to capture and use CO<sub>2</sub>.

In order to prevent (too much) carbon dioxide from ending up in the air, we can capture CO<sub>2</sub>. On the one hand by capturing CO<sub>2</sub> before it leaves the factory chimneys and on the other hand by removing it directly from the air. In this way we ensure less carbon dioxide in the air. But what about the "harvested" CO<sub>2</sub>? Can we use the emissions for the production of bricks, or do we use them in the production of non-fossil fuels? VITO is strongly committed to research into the various possibilities of giving CO<sub>2</sub> a sustainable second life.



## ALTERNATIVE FEEDSTOCK

### LIGNIN, A HIDDEN TREASURE

We have known for a long time that raw materials of fossil origin are not inexhaustible and that they place a heavy burden on our climate. The search for alternatives is therefore of vital importance. Lignin, together with cellulose, is the most common organic material on earth. In collaboration with various partners, VITO is exploring its potential. After all, it can replace aromatics based on fossil oil in a number of applications. For example, it can be used as a renewable raw material for the production of bio-aromatics. VITO is working very hard on that potential and is studying the practical and economic feasibility of this hidden treasure.



**Biorizon**  
The way to aromatics

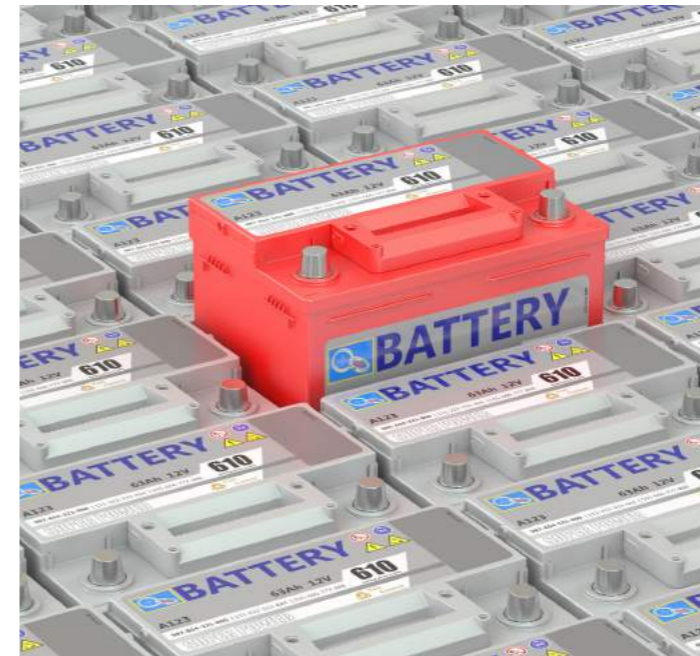
## BATTERY TECHNOLOGY

### THE SEARCH FOR ...

Storing green energy in a green battery. How wonderful would that be? Research into the development of sustainable, reliable batteries that can store renewable energy efficiently is therefore at full speed. VITO/EnergyVille is doing its bit in this respect, not only contributing to various European projects, but also putting itself on the map with its own far-reaching research. In addition, we offer online courses that highlight the various facets of battery technology.

The fact that electric storage is not impossible is proven by the victory of the Punch 2, the solar car designed by KU Leuven students. This ingenious car is built in such a way that it does not stop in the absence of sunlight. A reliable battery management system (BMS) is essential for this. VITO/EnergyVille is responsible for the further development of this innovative system.

## SODIUM-ION BATTERY



### THE BATTERY OF THE FUTURE

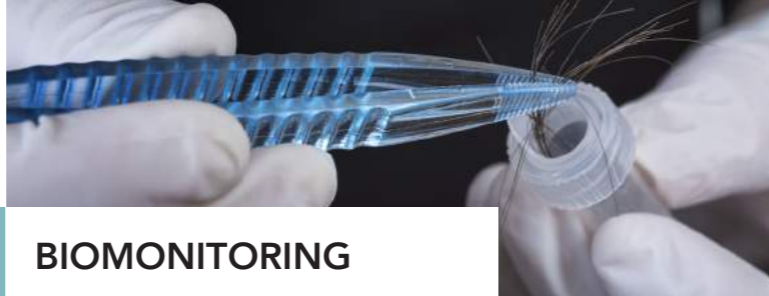
The need for a European battery that is not only sustainable, safe, efficient and inexpensive, but that is also an alternative to the traditional lithium-ion battery is a fact. With project Naiades, about ten partners are looking for the development of a sustainable sodium-ion battery. To achieve such a reliable and safe battery, a good battery management system is necessary. VITO/EnergyVille will gladly take care of the development of this system. Together, the various partners in the project developed the new sodium-ion battery. During the test phase, everything was closely monitored, from voltages and currents to the temperature. Although this pioneering project has not yet been fully completed, it is already proving the feasibility and potential of the sodium-ion battery as an alternative to lithium-ion batteries in certain applications.



## MONITORING INDOOR AIR QUALITY

### WHAT AIR CAN TEACH US

We spend on average ninety percent of our time indoors. So a good air quality in our houses is no superfluous luxury. Air quality meters for homes have been around for a while, but many of them are unreliable or limited. At the request of the Environment Department, VITO developed a unique Sensorbox that collects and processes large quantities of reliable data. The in-depth data analysis that follows is unique and, of course, GDPR-compliant. The meticulous tests result in reliable data with which we can then determine how the behaviour of residents influences the air quality. If a Sensorbox is installed in hundreds of houses, it can provide relevant information for policymakers on, for example, ventilation and damp problems. The ultimate goal is to develop an extensive Belgian sensor network to monitor and optimize indoor air quality where necessary.



## BIOMONITORING

### FLEMISH CENTRE OF EXPERTISE ON BIOMONITORING

People are exposed day in, day out and often unconsciously to all kinds of chemical and other harmful substances. The Flemish centre of Expertise on Environment and Health charts exposure to pollutants via blood and urine samples and continues to look for the relationship with early health effects. VITO researchers are looking for answers to questions such as “Do people who heat their homes with a wood-burning stove bring in more chemicals than those with underfloor heating?”, “Do environmentally friendly materials in the home have an effect on health?” and “How do our eating habits affect our health? It seems simple, but these far-reaching studies are not. European research projects such as Horizon 2020 are therefore an essential financial support in the search for answers.

## SUSTAINABLE AGRICULTURE

### WATCHITGROW

WatchITgrow is a useful online information platform for the Belgian potato sector with the main objective of better estimating production and increasing it in a sustainable way. Using various data sources, including satellite images, weather data, soil and machine data, farmers have quick and efficient access to a lot of useful information about their parcels and crops. Based on the data collected, growers receive individual and targeted advice and alerts in the event of unexpected changes or problems so that timely action can be taken if necessary. Shadow maps, temperature and precipitation data, ideal planting and harvesting dates, fertilisation schedules, etc. are also available on a personal account. WatchITgrow is a good example of how research can be converted into a user-friendly platform to support the entire potato sector.





## INTERNET OF WATER

### ARMED AGAINST WHAT'S COMING

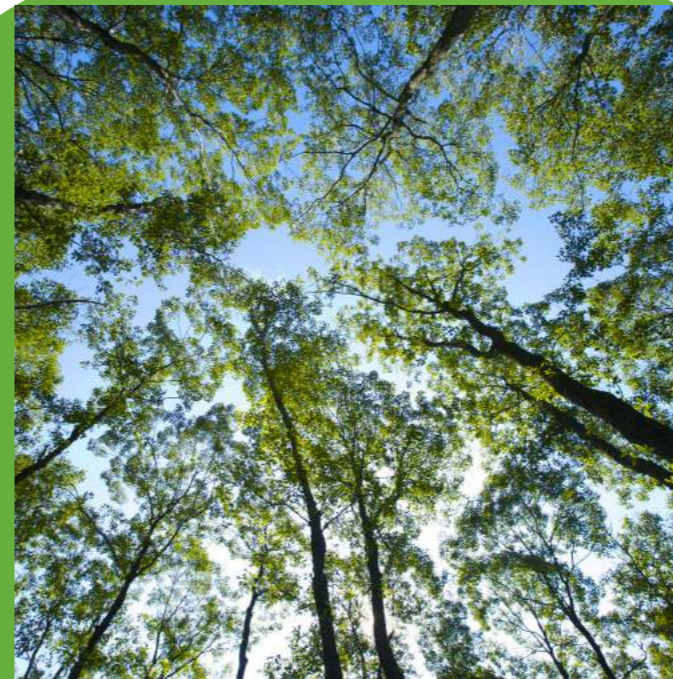
Dry summers follow each other in rapid succession and we are increasingly confronted with water scarcity. Internet Of Water is an intelligent and large-scale water management system that permanently and in real time monitors the water quality and quantity in the Flemish waters. Thanks to the data collected by a network of more than 2 500 sensors spread over the whole of Flanders, Flanders will be able to better arm itself against water nuisance, water scarcity and water pollution in the future. By means of real-time data and realistic forecasts, water managers can intervene correctly and timely and protect our regions against water nuisance, scarcity or pollution. The five partners (VITO, Aquafin, De Watergroep, imec, VMM), with the expert support of Vlakwa, aspire with this project to become an international pioneer in smart water management.



## CLIMATE MAPPING

### AMBITIOUS PROJECTS

Climate is a theme that concerns us all, and worries us too. Besides the core of the word, climate is also what surrounds us, the city in which we live, the circumstances in which we feel good as citizens. In order to approach climate in the broadest sense of the word, numerous projects are being set up, because measuring is knowing. VITO deploys its expertise for many of these projects. From projects on biodiversity, to measuring devices for urban temperature, to the further development of the ATMO-Street air quality model. VITO supports these ambitious and socially relevant projects and underlines the importance of taking action.







**1 612**

MENTIONS  
IN THE FLEMISH PRESS



**77**

EVENTS  
ORGANIZED



**295 000**

VISITORS ON THE  
VITO WEBSITE



**+ 5 000**

NEW FOLLOWERS  
SOCIAL MEDIA  
VITO



## G-STIC 2019

### SUCCESSFUL EDITION

With 2 000 participants, 150 speakers from 75 countries, inspiring lectures and valuable conclusions we can conclude that G-STIC 2019 was a success.

G-STIC is a three-day global conference on sustainable technology and innovation. The great importance of G-STIC is that the results and conclusions of the discussions, the panel discussions and the lectures are passed on to the United Nations. "This is important for VITO," explains Dietrich Van der Weken. "The UN and governments now want a database of technologies - a living library. It is up to us to engage in discussions with organisations to see which technologies can be included that will help to achieve the SDGs."

During the conference, entrepreneurs, researchers, investors and policy makers search for technological solutions that contribute to six major societal challenges: a safe climate for all, education for all, energy for all, health for all, sustainable oceans for all and water for all.

VITO organised G-STIC together with 6 co-hosts. We are already planning a next edition, because the innovation for a more sustainable society does not stand still.



**Dirk Fransaer**, Managing Director of VITO, looks back with satisfaction: "G-STIC is the conference that you can't, shouldn't and don't want to miss when you're working on sustainable technology and innovation. Strong supporters and opinion makers who are already blocking their agendas for the next edition, that makes a person happy".



"After my PhD, I will be looking for an R&D or design job in a (sustainable) company, acting in a field broadly related to energy. The job should allow me to utilise my gained skills and knowledge, while challenging myself and allowing me to learn continuously."

Willem Faes



"I see myself expressing my passion and enthusiasm best in research."

Lise Soetemans



"Using my scientific background and translating technical information in a way that helps customers to reach their goals or solve their problems is a challenge I would excel at."

Jeroen Van Dijck



"I would like to start in an engineering position: either as a process or project engineer"

Matthias Van den Bergh



"I would like to stay in research with a focus on remote sensing, data exploration, analysis and finally developing an operational product for the stakeholders involved."

Yasmin Vanbrabant



"I would like a research oriented career which aims to bring new and emerging technologies to the market."

Kudakwashe Chayambuka



"I would like to develop technologies and solutions that lead to a more sustainable (energy) system in a pleasant work environment."

Annelies Vandermeulen



"After finishing the PhD I would like to work in an environment that highly values a strong team effort, while still providing individual challenges."

Tim Mertens



© 2020 VITO NV – All rights reserved

Although care has been taken to ensure the accuracy, completeness and reliability of the information provided, VITO assumes no responsibility therefore. The user of the information agrees that the information is subject to change without notice. VITO assumes no responsibility for the consequences of use of such information, nor for any infringement of third party intellectual property rights which may result from its use. In no event shall VITO be liable for any direct, indirect, special or incidental damage resulting from, arising out of or in connection with the use of the information.

## GROW & GO

Each year, new young researchers choose to start working at VITO to boost their future careers. VITO has an extensive doctoral programme in collaboration with universities from all over Europe. More than 80 PhD projects ran in 2019. Postdoc talent is recruited from all over the world to leverage our excellence. While working at VITO young researchers are stimulated and supported to develop their competences and hard and soft skills. They leave VITO, ready for careers in both the academic world and industry.





**Responsible publisher**  
Dirk Fransaer, Managing Director  
**Design** Phobos & Actor  
**Printing** Antilope De Bie Printing

**VITO NV - Boeretang 200 - BE 2400 MOL**  
Tel.: +32 14 33 55 11 - [vito@vito.be](mailto:vito@vito.be)

