



Evaluation of the Flemish Institute for Technological Research (VITO)

Management summary

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Management summary

Background of the evaluation

VITO was officially established on 12 June 1991. Its societal goal is to carry out integrated scientific research in the areas of energy, the environment and raw materials, including new materials. This research had to be part of the Flemish Executive's economic policy and in line with societal aspects such as the environment, health, risks and technology assessment. In the meantime, VITO has expanded into a Strategic Research Centre (SRC) with about 650 staff carrying out research on 'clean technology' ('cleantech') and the circular economy. Since 2009, VITO has been working formally on five specific research themes: Sustainable Energy, Sustainable Chemistry, Sustainable Materials, Sustainable Health and Sustainable Land Use.

VITO falls under the 30 April 2009 Decree regarding the organisation and financing of science and innovation policy.¹ This Decree designates VITO as Strategic Research Centre and states that VITO's strategic and operational objectives will be incorporated under a multiannual management agreement (MA) between VITO and the Flemish government. In 2013 VITO and the Flemish region concluded the current MA² for the period 2014 to 2018. This agreement outlines the strategic objectives and financial support which the Flemish government offers VITO for this period.

As the present agreement covers the period until the end of 2018, according to the evaluation article in the current MA (Art. 24), an evaluation of VITO will be carried out based on the stated strategic, operational objectives and indicators. At the same time it will be determined to what extent VITO has achieved additional tasks (Art. 13). The evaluation is also focused on the policy context at an international (and especially European) level, as well as VITO's broader societal and economic impact.

Considering the previous management agreement ended in 2012 and the new agreement is only valid as of 1st January 2014, it was requested to foresee an evaluation with a longer time window than the period 2014-2018. The evaluation therefore covers the period 2012-2018 (regarding the ex-post part). However the evaluation also looks forward to the period 2019-2023 (ex-ante). The results of the evaluation form the basis for drawing up a new management agreement between the Flemish government and VITO.

The department of Economy, Science and Innovation (EWI department) of the Flemish government has commissioned Dialogic, through a public procurement process, to conduct this evaluation. It is led by a steering group, formed and chaired by the EWI department. The steering group's role is to ensure both the quality and the progress of the evaluation, as well as to verify that the execution of the task results in concrete recommendations that

¹ Changed under the 21 December 2012 Decree regarding various provisions referring to the organisation and financing of science and innovation policy, and under the 25 April 2014 Decree to change various provisions in the 30 April 2009 Decree regarding the organisation and financing of science and innovation policy and elimination of certain provisions. The changes involved combining the science and innovation policy decrees for institutes in one single decree, aligning the provisions for evaluating the Science & Innovation institutes, the content of management agreements and incorporating a number of new generic provisions regarding the balanced participation of men and women in advisory and management bodies and also the policy for Science communication. Hereafter we will refer to this decree as the W&I Decree.

² 2014-2018 Agreement between the Flemish region and VITO, hereafter referred to as 'the agreement' or 'the 2014-2018 Agreement'.

adhere to the regulations. During the evaluation, Dialogic has discussed the approach and progress on several occasions with the steering group, who have provided comments on the reporting and validated this in the meantime. In accordance with the evaluation practices of the EWI department, VITO has also been given the opportunity to review the final report (validated by the steering group) in order to correct material errors. The material errors that were found have been corrected in this current report. The evaluation took place in the period October 2017 – April 2018.

VITO's goals, organisation and activities

During the current management agreement period 2014-2018, VITO has described its mission thus: *"As an independent and customer driven research organisation, VITO provides innovative technological solutions and scientifically based advice and support to stimulate sustainable development and strengthen Flanders' economic and social fabric."*

Based on Article 6 of the management agreement, this mission encompasses VITO's strategic objectives:

1. To be an internationally famed research organisation in the research domains of cleantech and sustainability development as outlined in the strategic plan of VITO.
2. To contribute to the development of human capital.
3. To contribute to the reinforcement of the economic and social climate in Flanders with special attention to SME's, within the framework of the innovation policy of the Flemish government (ViA, Pact 2020 and "Innovation Flanders").³
4. To contribute as an independent research organisation to the Flemish policy in the research domains of cleantech and sustainability development within the framework of the innovation policy of the Flemish government (ViA, Pact 2020 and "Innovation Flanders").
5. To perform as an independent research organisation, assignments (reference tasks) commissioned by the Flemish government and outlined in the by-laws regarding these reference tasks⁴

These strategic objectives are elaborated in operational objectives and related KPIs (see below). VITO's official tasks according to Article 37 of the W&I Decree:

- Expand the necessary knowledge and experience in a structural way, for example by conducting its own research and development activities, with or without third party co-financing;
- Perform reference tasks set by the government, whereby the precise nature, objective and form of compensation are determined by Flemish government regulations;
- Carry out policy-oriented research, provide specific services and formulate technical-scientific advice and policy recommendations on a contract basis for the

³ Vlaanderen in Actie (and accompanying Pact 2020 objectives) was the previous Flemish government's vision for the future and thus forms part of the 2014-2018 Management Agreement. In the meantime, the current Flemish government has presented its latest vision 'Visie 2050'.

⁴ The Management Regulations specify the further agreements between the Flemish government and VITO regarding the provision and financing of reference tasks. Currently the 2015-2018 VITO Management Regulations apply.

Flemish government and public organisations and institutions outside the Flemish government;

- Carry out fundamental research projects and provide specific services on a contract basis for private organisations or persons;
- Protect and valorise knowledge and research results in the most appropriate way.

Alongside official tasks and strategic objectives, the Flemish government has determined certain additional tasks for VITO (Art. 13 of the MA), namely:

- VITO is obliged to collaborate in providing qualitatively good open data to the Flemish research portal FRIS.
- VITO supports the Flemish science communication policy and is thus committed to the principles of the relevant marketing and communication plan.⁵
- VITO will establish cooperation with excellent research groups at Flemish universities and colleges, in line with its own research strategy and with the Flemish government's crosslink innovation policy.
- At the latest one year after signing the 2014-2018 management agreement, VITO will participate in the Flemish Commission for Scientific Integrity.

VITO is set up as a public limited company (with the Flemish government as major shareholder) and its research is carried out very much independently. The Flemish government together with PMV⁶ are shareholders and take part in the *General Meeting*. The General Meeting has the formal right to appoint experts from government, industry and research as members of VITO's board of directors.

VITO's *board of directors* has a maximum of 14 members, each with a mandate of a maximum of six years. One of the members is always a representative of PMV. Two government commissioners represent the Flemish government and their mandate is to monitor VITO and block management and administrative decisions. At least one in three of the members is independent of the participants and daily management of VITO.⁷ From 2017, this is four of the current 12 members. Members of the board never have at the same time a political mandate or a jurisdiction at EU, federal or regional level. Nor are they VITO employees. The board of directors meets at least six times a year.

The board's *Executive Committee* is tasked with:

- Drawing up and developing a long term institutional strategy
- Achieving structural interaction between the research groups
- Bringing about the research groups' structural involvement in decisions concerning:
 - The institutional shaping of the research institute
 - The description of the themes and methodology for Organised Scientific Research.

⁵ This relates to the Marketing and Communication Plan 'Wetenschap, technologie en innovatie in Vlaanderen 2012-2014'.

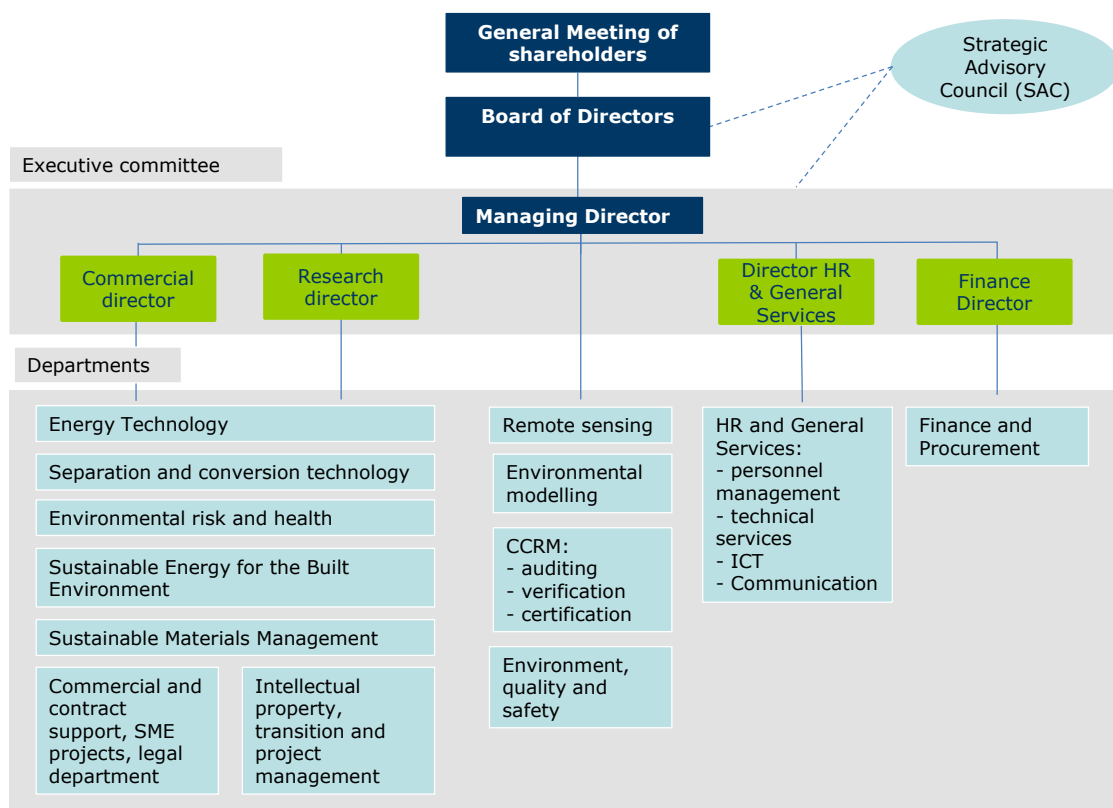
⁶ PMV is an independent investment company which was set up by the Flemish government and invests in Flemish industry.

⁷ In accordance with the Decree of 27 November 2013 regarding corporate governance in the Flemish public sector.

The board currently comprises: the managing director and the directors responsible for commercial affairs, research, finances, HR and general affairs. This adjustment was carried out during the current period. The current commercial director has been employed for less than one year and the financial director for two years.

The *Strategic Advisory Board (SAR)* advises the board of directors. It examines VITO's institutional operations and the execution of the research cycle. For each research theme the SAR evaluates every two to four years the research carried out and makes recommendations to the board of directors for improvement.

Each of VITO's seven research departments (or units) is led by a Unit Manager. These managers overview the entire research department and are supported in this by programme managers for HR and financial management, account managers for contact with the client and research leaders for each of the (strategically based) research programmes.



Evaluation of the evolution of the organisation

In recent years the VITO organisation has been further professionalised. The composition of the board of directors has changed and now consists of: the managing director and directors of commercial affairs, research, finance, HR and general affairs. A new aspect is that the various research themes fall under the responsibility of the various directors. Sustainable Land Use still falls directly under the managing director.

The board of directors has ensured that a number of internal policy areas have been further developed and implemented throughout the organisation, for example R&D management, intellectual property, valorisation, collaboration with universities and internationalisation.

The role of the Strategic Advisory Board (SAR) has expanded since 2016. The SAR now has a great impact on VITO's strategic choices, for example advising on programming and prioritising research within the five themes. We notice a similar development on the Executive Board, for instance with large investment decisions, but also for determining research guidelines.

Staff numbers have remained consistent, although there are relatively more foreign employees nowadays. The number of women in higher management roles is relatively low. The institute is populated by motivated and high quality employees at all levels.

VITO has a too broad focus (five research themes) and an accumulation of tasks (meeting the needs of local, regional and international markets, conducting basic research, contract research and reference tasks, integrating various smaller organisations in the Flemish innovation landscape and expanding its activities to pilots and demonstrators). The distribution of people and resources (and locations) over these wide-ranging themes and tasks, means that VITO – certainly from an international perspective – has a sub-critical mass to become excellent in every theme.

Follow-up recommendations from the previous evaluation

In the previous period VITO has made an effort to follow up the recommendations from the earlier evaluation. Most of these recommendations have been fully or partly carried out. At the same time we conclude that VITO is in a permanent change process and within that process a few recommendations still need to be addressed. Most of the progress is with the recommendations for improving the management and structure of the organisation (but some adjustments remain debatable, such as focus). Less progress has been made with the recommendations aimed at VITO's external orientation.

Financial accountability

VITO has had a positive financial result in every year of the evaluation period. These results have fluctuated from year to year: from 83,000 euros in 2013 to nearly 13 million euros in 2017.

In the evaluation period VITO has succeeded in attracting more external funding, especially the income from contract research. This has risen every year, with the exception of 2012-2013. The income from contract research was much higher during the evaluation period than in the years before (as indication: income in 2009 was 26 million euros compared to 38 million in 2017). We observed, however, large differences between the various research themes. Sustainable Land Use, for example, is responsible for the majority of the increased total income from VITO's contract research. The income in this theme from cofinancing Strategic Basic Research (SBR) dropped sharply in the period 2012-2017. This drop was compensated by the fact that SBR increased slightly in the other domains.

The funding from the Flemish government has remained significant and will be necessary in the future to keep VITO's knowledge base at the right level and to compete internationally with other research institutes. A sound knowledge base leads to external tasks and external funding. In this respect Flemish government funding acts as leverage.

Role and position in Flanders

As SRC, VITO has a clear role and position in Flanders, because the institute:

- Plays a key bridge role between scientific knowledge and valorisation. In that role, the collaboration with universities and the business world is improving progressively (also via the spearhead clusters). Not everyone agrees if the pilots and demonstrators are contributing to this bridge role.

- Fulfills a role as independent centre of expertise in the cleantech and sustainable development domains. The subsidies for basic research also allow VITO to continue focussing on long term issues. The operational objective to acquire more contract research (KPI5) can damage this independent position. This also applies to domains where VITO, with the help of the Flemish government, can secure a knowledge monopoly.
- Contributes to underpinning Flemish government policy and strengthening the economic fabric of Flanders (see below).

Integrating smaller structures

Integrating the Flemish Knowledge Centre VLAKWA (and now iCleantech Vlaanderen (ICTV)) is a logical step in simplifying the Flemish innovation landscape. The integration does however risk VITO becoming internally more fragmented. Certainly because this integration is mainly a paper exercise limited to internal processes. VLAKWA has remained a relatively autonomous entity (location, nomenclature, website, activities). Integration seems to be more driven by a political agenda or random opportunities and less from a viewpoint of potential synergy.

International role and position

VITO is becoming increasingly active on the international scene and more and more interwoven with the international research and policy circuit, thanks to employing a greater number of international staff, increased participation in international research projects, attracting more international research funds and more contract research for foreign clients.

VITO still lacks an underpinned internationalisation strategy. Especially the aim to work in China and the Middle East seems to be more driven by random opportunities rather than the result of an informed choice that VITO's knowledge and technology can make a difference abroad. There is also a worry that the Flemish business world (still) does not benefit sufficiently from these international activities and that there is not always good cooperation with other Flemish organisations that operate abroad (e.g. other SRCs).

Compared to the three foreign reference institutes (DTT, TNO and VTT) in the benchmark, VITO has stronger aims beyond Europe (the other institutes envisage greater and more costly risks) and VITO does more in pilots and demonstrators. These other institutes have fewer additional legal obligations (contributing to scientific communication, supporting SMEs) but do carry out these activities in practice.

Achieved output

Almost all the KPIs were achieved in the period 2014-2017. Only KPI2 in 2015 (income from strategic basic research) and KPI9 in 2016 (income from public contract research) were not achieved. In both cases the deviation was about 11 percent lower than the minimum value.

The current KPIs are not always optimal for measuring and following up VITO's performance and impact, because:

- The number of KPIs (nine) is large which means VITO is controlled by (too) many aspects. Moreover the KPIs affect each other (more spin-offs mean less potential for contract research).
- KPIs don't always give the full picture, because the impact of a scientific article could fall outside the period that the associated KPI is measured.
- KPIs can trigger strategic behaviour. This can apply in VITO's case if it scores very high for a KPI in year t (and is thus successful), and is consequently obliged to achieve at least the same score in year t+1. The KPI in question is expected to increase every year.

- KPIs measure impact insufficiently. In order to measure the impact on the economic fabric, turnover and operating spin-offs are a better indication than creating spin-offs.
- KPIs go further than just measuring performance that is directly related to basic funding, as the income from contract research can also be a KPI.

Additional tasks

VITO has managed to achieve all its additional tasks (open data, science communication policy, collaboration with knowledge institutes and participation in the Flemish Commission for Scientific Integrity).

Portfolio analysis of contract research and customer satisfaction

Based on a portfolio analysis of the contract research, we conclude:

- Contract research is increasing, but this differs for each research theme. The amount of contract research is especially increasing in Sustainable Energy.
- Contract research is above all commissioned by large companies (with government organisations having the largest share).
- The income from commissions for SMEs remained steady in the period 2014 – 2016. The number of SME commissions varies considerably from year to year.
- Most clients are outside Flanders, but within the EU. A great deal of the work is carried out for organisations in neighbouring countries, like the Netherlands, Germany, the UK and France.

The surveyed clients give VITO a good to very good score for contract research, regarding general appreciation, support, communication, execution time, quality and applicability as well as cost of the work delivered for a research project.

Scientific impact

VITO achieves scientific impact through:

- The presence of motivated and high quality research staff. It is however a challenge to recruit and retain talented (and international) employees.
- Publishing highly valued articles in top international journals. In addition many of these articles have a high citation impact (higher than could be expected based on the size of the institute). Much published work is the result of increasing international collaboration.
- An increase in scientific collaboration especially with Flemish universities and other knowledge institutes (for example EnergyVille).
- Collaboration and exchange by means of PhD programmes. The number of programmes has increased considerably in the past 15 years and the number of foreign PhD students is rising.
- Smart programming of research in the five themes, whereby sustainable energy, chemistry and materials score relatively well along with achieving cross-overs (which can be further strengthened).

Impact on Policy (especially reference tasks)

The Flemish government is satisfied with how VITO carries out reference tasks. VITO is however found to be relatively expensive.

The reference tasks themselves are not an issue, but we question whether VITO should continue to carry out all these tasks. These tasks are not very innovative and thus do not entirely belong in a Strategic Research Centre that by government decree must strive for excellence and knowledge transfer. In addition, the tasks can have a potentially undesirable

impact, whereby governments understandably prefer to define work as a reference task, but then ignore the impact on the market (other parties could share a task). A shared assessment framework is lacking, to determine what constitutes a reference task.

Economic impact

VITO achieves economic impact by:

- Conducting contract research (for companies), but the volume of this work has remained consistent over the years. Valorisation of knowledge is still a challenge and requires (even) more collaboration with companies.
- Acquiring patents (the patent portfolio has quadrupled since 2003), certainly once the accumulated knowledge is made known to companies.
- Supporting SMEs. VITO runs an SME programme, but the SMEs that approach VITO are usually frontrunners (innovative companies). It is difficult (and unnecessary) for VITO to serve all the SMEs. VITO still tends to prioritise the technological solution instead of client demand.
- Creating spin-offs. In recent years VITO has established 14, now employing about 30 highly qualified people. This is yet another challenge because starting up a new company requires a different approach and skill set than carrying out research.
- Its economic footprint. VITO is a (regional) employer offering work to hundreds of people. Suppliers in the area benefit from this.

System evaluation

VITO contributes to the seven functions of technology specific innovation systems, concentrating on developing knowledge through research, investigating new and promising technological innovation domains and mobilising resources for research and valorisation.

Compared to other SRCs, VITO has a relatively broad focus (not building on one theme like other SRCs), fewer connections with universities (but these are increasing), fewer direct links with companies (more via clusters) and an additional relationship with the government (via reference tasks and because the Flemish Community is the only direct and indirect shareholder), greater focus on higher Technology Readiness Levels (pilots and demonstrators) and VITO is less of a world player than imec and VIB.

VITO plays an active role in the policy system, because the institute:

- Helps to simplify and rationalise structures in the Flemish innovation landscape (but also sets up new organisations).
- Contributes to achieving the Vision 2050 transition priorities.
- Participates in the spearhead clusters.
- Provides concrete input to policy (e.g. via reference tasks).
- Works actively with local, regional, national and international governments.

SWOT

Regarding strengths, VITO has developed into a professional organisation with high quality and motivated research staff. This has resulted in high scientific output (articles, patents, PhDs, joint ventures) and a growing impact.

Regarding weaknesses, VITO still suffers from a too broad focus and range of tasks combined with an insufficient critical mass to become a world player in one or more research themes. VITO is still very much technologically driven and not sufficiently driven by client demand.

An opportunity for VITO is the fact that cleantech and sustainable development are on the scientific, political and societal agenda. As institute it can therefore play a significant role as springboard to expand these domains in Flanders and beyond.

A threat for VITO is that it will not manage to create more focus so that resources can be bundled. With its emphasis on pilots and demonstrators, VITO chooses more risky investments, certainly if these do not get sufficient embedding and support.

Draft strategic plan 2019-2023

The extensive strategic plan deals with most topics you would expect based on developments in recent years. VITO:

- Wants to play an active role in the Flemish and international innovation eco system and clearly secure its place as reliable partner in this system.
- Continues to position itself as an SRC that fulfils a bridge role between fundamental research and valorisation in cleantech and sustainable development.
- Wants to extend internationalisation by establishing branches or achieving collaborative partnerships in regions where it can have a significant impact.
- Will maintain a relatively broad focus (5 research themes) in the coming years.
- Wants to tailor its internal management to its core task of doing research and therefore adjust all the supporting processes and systems in order to maximise the time for these core tasks.
- Deliver a financial underpinning for its strategic plan, in three scenarios.

Despite the comprehensiveness of the strategic plan, we conclude that in a few aspects it falls short. The plan:

- Does not clarify which external developments can affect VITO as SRC.
- Does not show precisely to what extent pilots and demonstrators are sufficiently supported by the outside world and how to prevent these costly tools being applied in the 'wrong' technology.
- Does not make it completely clear if the chosen topics in the research themes fulfil the Flemish industry's needs and so whether the strategic basic research is sufficiently tailored to the industry's long term issues.
- Lacks a good substantiation why VITO precisely wants to operate in certain foreign regions – and more importantly – to what extent internationalisation is aligned with other SRCs operating abroad.
- Avoids some choices especially regarding the substantively broad focus and numerous types of tasks. There is no scenario with fewer themes and tasks.

The plan also mentions a highly ambitious new mission giving VITO a more societal (instead of technological) position, but that mission puts great emphasis on pilots and demonstrators. The plan clearly states how VITO will be involved in policy (see earlier conclusions) and international organisations. It also provides a financial substantiation for VITO's aims. We wonder whether raising the basic subsidy by at least 30 percent is realistic and if the Valorisation Income Model (acquiring additional resources via spin-offs, licences and technology transfer) will actually deliver the anticipated income.

Recommendations for VITO

- Create a sharper demarcation by reconsidering (and preferably reducing) a number of substantive domains and (additional) tasks. This consideration would need to be made with the most relevant stakeholders (the Flemish government, cluster organisations), because a sharper demarcation can have a noticeable impact. Also bear in mind the number of locations where VITO has branches.
- Continue to improve and harmonise the internal management processes. These are for example the 'shared services' regarding knowledge transfer, but also the good administration of client data, the alignment of teams' commercial strategies, HRM, etc.

- Bring the management of the research topic Sustainable Land Use in line with that of the other research themes.
- Invest in internal HRM by setting up an attractive training and career programme for talented employees and by improving the gender balance in management roles. In the competition for international talent, look into how VITO can position itself as an attractive employer for Flemish and foreign talent.
- The dependency of the topic Sustainable Land Use on contract research (and thereby on one client) can be reduced. Also because the absence of basic research puts the knowledge role under pressure. Consequently, this topic could once again be entitled to basic funding.
- Ensure that the integration of VLAKWA and ICTV is completed in such a way that these organisations are fully incorporated in VITO. Integrated organisations with too much autonomy create internal and external uncertainty, making it more difficult to achieve synergy. During the integration process, ensure good consultation with the parties involved.
- Develop a committed and ambitious internationalisation strategy that marks out a path so that VITO's technological solutions can make a difference world-wide (thus with less focus on one particular country or region). This strategy should also include how other Flemish players can be involved in order to extend the potential benefits of internationalisation. That does not mean discontinuing the current activities, but rather framing them in a broader strategy.
- Develop an internal information system to ensure client data is complete and up to date. To measure client satisfaction, carry out the surveys among a broader group of clients.
- Continue to foster greater cooperation with universities. This is the best guarantee for the long term that VITO remains well connected to the fundamental knowledge that is required to bridge the gap with industry and spread the risks (because for example it supports joint investments in expensive facilities).
- Discuss with the Flemish government (EWI and the Department of Environment (OMG)) whether all the reference tasks should be carried out by VITO, if an alternative can be found (put out to tender, outsource to agency) or the current situation continues.
- Increase the economic impact by paying even more attention to customer demand and fine-tuning services and technological solutions accordingly. A significant portion of the additional financial resources required to achieve the new aims will have to be generated through contract research. This also means investment in employees' skill sets (extending skills in entrepreneurship, innovation, commercialisation) and offering them more scope to implement bottom-up initiatives.
- The draft strategic plan can be fine-tuned by: (1) applying more external focus (testing in the environment); (2) making more clear-cut decisions about what to do and what not to do; (3) reinforcing internationalisation more substantially; (4) substantiating even more strongly the strategic choice for pilots and demonstrators, specifying more in depth the areas where these are applicable, and considering how to limit the financial risks and optimise social embedding.

Recommendations for the Flemish government

- Keep the basic government funding for VITO at least at the same level.

- Encourage VITO even more than is currently the case to focus on and position itself as a Strategic Research Centre. This includes inviting VITO to make concrete choices regarding its substantive domains and tasks. In addition, this implies reconsidering some of the reference tasks (see following recommendation).
- Determine whether all the reference tasks should still be carried out by VITO, or if perhaps an alternative can be found (put out to tender, agency). Apart from this decision, it is worth developing a shared framework to determine what constitutes a reference task. As part of the discussions, consider how to best solve future and long term knowledge questions on policy, in the context of core funding, reference tasks and contract research.
- Be critical when integrating small organisations in VITO, despite the low impact on VITO and the contribution that this integration makes to simplifying the innovation landscape. Integration should not lead to more internal fragmentation; the incorporated organisations' knowledge, skills and networks must be in keeping with VITO's domains and tasks.
- Adjust KPIs by (1) keeping less to an annual cycle and striving to achieve a minimum value, but rather an average over the whole management agreement period, and (2) putting more emphasis on measuring impact (e.g. not the number of spin-offs but the amount of new jobs created structurally thanks to spin-offs; or not just the number of scientific publications but also the number of non-scientific publications).



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