NEXT GEN
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White paper

DRIVE THE FUTURE OF DUTCH CHEMISTRY WITH SELFLESS LEADERSHIP

OUTCOMES & RECOMMENDATIONS OF THE KNCV – NEXTGEN LEADERS IN DUTCH CHEMISTRY SUMMIT 2025

EXECUTIVE SUMMARY

Chemistry plays a crucial role in tackling societal needs such as energy transition, materials innovation, and advancements in medical and pharmaceutical solutions. This thriving ecosystem, however, faces unprecedented challenges: A stark influx of principal investigators (PIs) with a contemporaneous decrease in government contributions in R&D, a changing Dutch legislative environment aimed at reducing the international character of universities, and a lack of decrease in leading industrial R&D efforts shifting applied research towards academia. All these factors threaten the world-wide competitiveness and innovation of the Dutch chemistry sector.

We, a cohort of 26 emerging young PIs in the Netherlands along with the Royal Netherlands Chemical Society (KNCV) recognize these issues and provide a unified vision to ensure a sustainable future for chemistry in the Netherlands to maintain a world leading position and ensuring economic stability and national security.

Where do we start?

To address this question, KNCV partnered with alumni of NextGenChem—a network of early-career researchers in chemistry—to organize a KNCV-NEXTGEN Leaders in Dutch Chemistry Summit which took place in July 2025 at the Lorentz Center in Leiden. The aim of the initiating parties was (and is) to crystallize such a vision through a platform focused on cultivating and retaining the talent and capabilities of future leaders in the national and international chemistry communities. Guided by a process that resembles the Marie Kondo principle "*Keep what brings you joy and get rid of everything else*", the cohort elaborated on the current position of chemistry in the Netherlands, met with experts from across various disciplines of society and shaped leadership visions. The cohort is ready to step forward—not just as experts, but as collaborators and change-makers.

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1. WHAT IS THE CURRENT POSITION OF CHEMISTRY IN THE NETHERLANDS?

The Netherlands hosts a thriving and dynamic chemistry community, both in academia and industry. With over 1,500 distinct chemical enterprises, the chemistry sector stands as a cornerstone of the Dutch economy, generating a net turnover of €71 billion in 2021 alone. Its continued distribution amounts to over 2% of the Dutch Gross Domestic Product (GDP). At the same time, academics in Dutch academia stand out for their remarkable performance, evident in both the quality and impact of their publications. Their work is widely cited globally, surpassing the average citation rate by 72%. When we look at the 20 most research-intensive countries, the Netherlands, along with Switzerland, leads in scientific impact. Accordingly, this significant impact is attributed to internationalization, facilitated by the recruitment of internationally trained staff and collaboration with researchers across borders. Despite the Dutch chemistry sectors' exceptional performance, public investment (and trust) has been declining, a development that highlights a growing misalignment between academic excellence and funding priorities. Academic impact often focuses on scholarly excellence (*e.g.*, originality, scientific rigor and fundamental understanding) but policymakers and industry stakeholders tend to prioritise demonstrable societal benefits, economic value, and technological readiness. Addressing this divergence requires a clearer, shared understanding of what constitutes 'impact' and a funding landscape that supports both fundamental scientific discovery and its translation into real-world applications within a long-term vision. **Sustained investment is essential, not only to maintain scientific excellence but also to ensure a robust and continuous pipeline of knowledge, technologies, and skilled researchers.**

1.1 The Dutch chemical industry under pressure

The Dutch chemical industry—historically one of the pillars of the national innovation ecosystem—is currently facing a structural and increasingly urgent set of challenges. While the sector continues to represent substantial economic value, the industrial landscape has entered a phase of profound pressure driven by a combination of persistently high energy and feedstock costs, escalating ETS (EU Emmission Trading System) obligations, rapidly shifting regulatory frameworks, and increasingly competitive international markets. These developments have resulted in the temporary shutdown of production lines, postponement or cancellation of major investments, and, in several cases, the permanent closure of facilities. As a consequence, companies are compelled to prioritize short-term survival over long-term innovation, thereby weakening the industrial capacity that has traditionally acted as an essential counterpart to academic research. Where the Netherlands once held a highly attractive position for both chemical production and industrial R&D, companies are now progressively reallocating activities to regions with more favourable conditions, such as lower energy costs, greater policy stability, and more predictable long-term investment climates. This relocation trend poses a significant risk to the national innovation infrastructure: industrial R&D capacity declines, high-skilled employment becomes less secure, and the symbiotic relationship between academic excellence and industrial application is increasingly strained. As such, the Dutch chemical industry is approaching a critical inflection point that may have long-term consequences for the country's scientific competitiveness, technological sovereignty, and resilience in key strategic value chains.

Despite abovementioned developments, the National Growth Fund still invests substantially in biobased, circular, and advanced technological research. ChemistryNL, for example, recently published the Kennis- en Innovatieagenda (KIA) Circulaire Chemie en Materialen, coordinated with the Dutch Ministries of Climate Policy and Green Growth, Infrastructure and Water Management, and Economic Affairs. This KIA is important because it outlines exactly how chemistry could contribute to the strategic autonomy and future value potential of the Netherlands as a whole. In this context, it is essential that we strengthen collaboration across academia, industry (including startups), government, and society to position chemistry as a key driver of constructive, impactful societal transformations which foster excellence through a **stable and ambitious research environment.** Regrettably, however, the Netherlands continues to underinvest in R&D compared to neighboring countries, creating a risk of diminishing national research capacity and long-term competitiveness (2.23% GDP in 2023 vs. 3.11% in Germany and 3.32% in Belgium). For example, investments in the domains of technology and resilience, the Netherlands is falling significantly behind: While the country ranks third in the EU for leading innovations, it places only ninth in terms of investment. Reversals in government commitments such as in Higher Education, and regulatory instability undermine trust and continuity. Innovation needs appropriate investments in funding instruments to sustain

competitive talent development and enable the Dutch chemistry community to maximize societal impact and researcher satisfaction. At the core, we call for the government to show strong commitment (and trust) in scientists. Adequate proof is the allocation of funds towards research and development, which would allow us to retain our strong position in science, quality in education, and public-private partnerships. Recent developments such as the Ministry of Defense's to initiative to establish a DARPA-like program called Nationaal Agentschap voor Disruptieve Innovatie (NADI) illustrates an excellent example of a strategy that is both stable and ambitious, enabling strong public-private partnerships to flourish in parallel with fundamental research. One could envision the introduction of philanthropic funding instruments similar to the Fonds der Chemischen Industrie or the Simons Foundation, or donor- and alumni-driven foundations.

Taken together, these developments highlight the dual reality facing chemistry in the Netherlands: A field defined by internationally recognized excellence and substantial economic contribution, yet simultaneously confronted with structural pressures that threaten its long-term vitality. Addressing these challenges will require coordinated efforts across academia, industry, government, and society to secure a stable, ambitious, and future-proof research and innovation environment.

1.2 Re-focusing the core mission: Universities thrive on minds, not on metrics

Universities are uniquely positioned to create knowledge and innovations that shape society. At the heart of every university are its academic, technical, and support staff who drive research and educate students. The primary role of a university is to advance fundamental knowledge and to prepare future generations (BSc, MSc and PhD students alike) to tackle emerging global challenges. However, there is a growing concern that university management increasingly perceives scientists as resources, rather than as the essential force that sustains and propels the institution. This erosion of mutual trust shifts focus away from research and education, undermining the foundational mission of the university. When the emphasis drifts toward managerial processes and bureaucracy rather than academic excellence, both the quality of research and the education of students suffer. In time of unprecedented budget cuts, the university must recommit to supporting and enhancing fundamental research, creating an environment in which academic staff are motivated to innovate and mentor the next generation, instead of being driven and burdened by short-term performance metrics and administrative pressures. In addition, processes need to be streamlined, university services and overheads trimmed, and the universities´ core missions refocused. Society, too, should be included in the research process, with public trust placed in the expertise and integrity of scientists. Only through such openness and recognition can universities fulfill their societal role as engines of progress and knowledge creation. Universities must commit to sustaining an environment in which academic staff are genuinely empowered, while streamlining bureaucratic processes and administrative overhead as ***we—academics—are the university.***

2. WHY DO WE NEED NEW LEADERS?

The Royal Netherlands Chemical Society (KNCV) recognizes the importance of supporting both national and international next-generation leaders to strengthen talent retention and to secure a sustainable future for chemistry in the Netherlands, particularly within an increasingly multidisciplinary and dynamic research landscape. A 2016 study by Nuffic found that only 36% of international students in the natural sciences remain in the Netherlands five years after graduation. Furthermore, a survey conducted by the KNCV revealed that 60% of STEM internationals in the Netherlands experience difficulties in building a social network, and 70% report receiving no training or guidance on Dutch working and living practices. Among the 30% who did receive such training, 44% regarded it as insufficient. When asked what would most support their navigation of Dutch academia and industry, respondents highlighted language-learning resources, assistance with housing, and expanded networking opportunities. Interactive training formats such as mentoring and facilitated group discussions were identified as the most beneficial. In response to these findings, the KNCV has launched a mentoring program that aligns strongly with the needs of this community and has already attracted substantial interest. The pilot phase of this program was initiated in November 2025. Therefore, we need a platform for academic leadership that strengthens the impact of early-career researchers across Dutch academia and industry. An environment that attracts and retains the next-generation leaders is crucial for fostering innovation and ensuring the sustainability of the Dutch chemistry sector.

2.1 Ensuring balance, responsibility and sustainability in individual and team science

An effective scientific environment is rooted in the balance between individual and team achievements. At the heart of scientific progress lies nurturing collaborative teams where growth, recognition, and shared success is emphasized. Ensuring flexibility, equality and joy in everyday work protects against burnout and sustains long-term excellence. However, creating an environment for team science cannot come at the expense of academic freedom. Guaranteeing independence to research (for example, extending ius promovendi to all professors) and teaching while providing structural administrative support is a central cornerstone of attracting and retaining talent. Institutes are confronted with persistent structural dilemmas, including resource allocation and recognition practices that too often undermine team science. Solutions include tying research investment to strengthening project-based funding and individual grants and restructuring metrics to reward team-based accomplishments. All stakeholders must share responsibility for **creating a safe, social, and scientific academic culture**.

2.2 Building the coalition of the willing through selfless leadership

The future of Chemistry in the Netherlands hinges on reviving core values of leadership; one that prioritizes the collective ambition and well-being of the scientific community over personal gains. We need **selfless leaders who unite individuals towards creating a shared vision**. In this vision, leadership becomes less about enforcing hierarchy and more about nurturing transparency and catalyzing collaboration across disciplines, institutions and generations. Importantly, leadership must include the broader public domain (visibly or behind the scenes) to shape the strategic direction of Dutch chemistry. Through active public engagement, lobbying, or policy advising, we will play a crucial role in articulating the pivotal choices ahead to guide society toward responsible and forward-looking paths. Leadership, in this sense, is not confined to formal roles, but manifests in how individuals step up to navigate complexity with a commitment to the common good. Such a structure involves cultivating environments in which mentoring is prioritized. Within this frame, success must be recognized in the advancement of the team and setbacks must be tackled collectively.

3. WHAT ARE THE FUTURE FOCUS AREAS?

Forming public–private partnerships to advance sustainable technologies for food, health, energy and waste through better chemical processes and technology. Next-generation Chemistry leaders are confronted with a variety of urgent societal challenges, including increasing waste generation, unsustainable food systems, healthcare costs and increase in fossil fuel dependent energy supply, among many others. These issues are not isolated, and they require coordinated responses from a diverse network of stakeholders including industry, government, academia, and public. Addressing them demands not only innovative thinking but also new models of collaboration and commitment across sectors. Translating vision into action demands dialogue among academia, industry and government. Stakeholders must articulate their respective needs and co-design solutions, supported by dedicated mechanisms (*e.g.*, public-private partnerships, co-funded calls, and sector-specific innovation) that make such exchange systematic and productive. The VIRAN Industrial Advisory Council of NIOK, formerly a highly effective conduit between Dutch catalysis researchers and industry demonstrates both the value of such platforms and the risks associated with their neglect. Its diminished visibility underscores the need to revitalize or replicate similar interfaces to maintain vibrant, results-driven collaboration.

3.1 Re-defining 'Impact' and why public funding matters

Fundamental chemical research delivers value on two interconnected fronts: *i) Knowledge Creation*: exploratory, often high-risk research uncovers the fundamental principles that later underpin scientific breakthroughs. *ii) Talent Formation:* training from BSc to MSc, Doctoral and post-doctoral levels equips researchers with advanced problem-solving skills, data-driven mindsets—strengthened by AI-accelerated predictions, syntheses, and experiments—and an innovation culture that diffuses into Dutch chemical sector. To make this contribution visible and to justify sustained public investment, we propose a national framework co-developed by universities, funding agencies and industry. This envisioned framework would 1. *Track dual outcomes*: *i)* Scholarly excellence (*e.g.*, originality, conceptual innovation, scientific rigor, contribution to fundamental understanding, influence on research community) and *ii)* Societal returns (*e.g.*, carbon abatement, health care cost savings, circular economy metrics, high skilled jobs generated). *2. Highlight time horizons*: distinguish near term translational wins from longer term

foundational advances, and *3. Guide funding portfolios*: balance discovery driven grants with mission oriented programs, ensuring that high-risk, high-reward science continues to thrive. Such a transparent, jointly owned framework will clarify why the Dutch state should continue to fund principal investigators and PhD training, and how that investment translates into long term prosperity for the Netherlands.

3.2 Increasing impact through a talent pipeline and outreach

Public-private partnerships and science communication are crucial for addressing the impending shortage of new talent entering in chemistry. Delegating structured media engagement to a professional organization, such as KNCV can strengthen the translation of scientific progress into clear, accessible message for policymakers, industry stakeholders, and the general public. To support this mission, KNCV operates Eyeopeners, a dedicated platform where researchers present their work in a simple manner within one minute, making complex concepts more understandable for general audience. An additional initiative under consideration is the development of podcasts featuring young and emerging researchers, offering an engaging and conversational format to communicate scientific insights in an enjoyable and relatable way. This removes the burden of constant self-promotion from individual researchers (unless they choose to) and maximizes the societal visibility of Dutch chemistry. Leveraging, media in particular can amplify the impact and reach of various initiatives, ensuring that progress is sustained while universities can retain their primary focus on research and education. Ultimately, with media collaboration we can actively redefine chemistry's public image, thereby securing the talents needed to turn today's challenges into tomorrow's opportunities.

4. WHAT IS THE NEXT STEP FOR CHEMISTRY IN THE NETHERLANDS?

We find ourselves in a time of rapid societal transformation, shaped by geopolitical tensions, environmental crises, and shifting global priorities. As Dutch chemists, we are uniquely positioned to lead through this uncertainty. The challenge lies in boldly pursuing high-risk, high-reward research while building strong, trust-based partnerships across academia, industry, government and society.

2025 cohort Next-generation chemistry leaders. Top row, *From left to right: Kevin Neumann (Radboud University), René Lafleur (Ardena), Thomas Hansen (VU Amsterdam), Jordy Saya (Maastricht University), Trevor A. Hamlin (VU Amsterdam), Alberto Pérez de Alba Ortíz (University of Amsterdam), Ghislaine Vantomme (Technical University Eindhoven), Stephan Hacker (Leiden University), Rob van der Weegen (Ardena), Pascal Vermeeren (VU Amsterdam), Cees Haringa (TU Delft), Thomas Kodger (Wageningen University & Research), Georgios Katsoukis (University of Twente).* ***Bottom row****, from left to right: Dulce M. Morales (University of Groningen), Niels Hauwert (Symeres), Alina Rwei (TU Delft), Madeline Kavanagh (Leiden University), Albert S. Y. Wong (University of Twente), Ioana M. Ilie (University of Amsterdam), Michael M. Lerch (University of Groningen), Sebastiaan van Nuffel (Maastricht University), Matteo Monai (Utrecht University), Ivana Qianqi Lin (University of Twente).* ***Also participated but not on the picture:*** *Wouter Coppes (Corbion), Nong Artrith (Utrecht University), Loredana Protesescu (University of Groningen).*

4.1 Expanding our circle of influence

The group (**Figure above**) represents the first cohort composed of young chemists committed to strategically addressing the challenges outlined in this white paper. Collectively, we, a cohort of next-generation chemistry leaders will begin by: **1) Sustaining and strengthening collaboration with the KNCV**, and other European Chemistry Societies, to ensure continuity and support for future cohorts in the Netherlands, and Europe at large.; **2) Launch a special collection in collaboration with Wiley** on the Next Generation of Leaders in Dutch Chemistry to highlight emerging research and perspectives, as well as to inspire international colleagues; **3) Engage proactively with stakeholders** across local institutions to align efforts and share expertise with complementary initiatives from *e.g.*, ChemistryNL, the Dutch Research Council (NWO) and its Chemical Sciences section, Dutch Chemistry Council, The Royal Association of the Dutch Chemical Industry (VNCI) as well as young academies (the Dutch Young Academy, DYA, and other local, European, or Global Young Academies and Assistant professor network, APNET); **4) Promote cross-disciplinary scientific dialogue** within the broader context of Emerging Technologies in the Netherlands, relevant to both the Ministry of Economic Affairs and the Ministry of Education, Culture and Science. To remain globally competitive and societally relevant, Dutch chemistry must embrace selfless leadership, long-term investment, and collaborative innovation. In order to maximize this effort, we call on policymakers, institutions and industry partners to join us in this shared mission.

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