

ROADMAP TOWARDS VERIFIABILITY OF SUSTAINABLE CHEMICAL PRODUCTION AND PRODUCTS



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1 INTRODUCTION

“In 2040 the chemical sector is the binding element in a sustainable and vital society. The Dutch chemical sector is the worldwide example of sustainability. All their products and services are 100% circular and have societal value.”

TRUE LIFE CYCLE COSTS AND TRANSPARENCY IN THE CHEMICAL SECTOR

Within CSR Netherlands (MVO Nederland) sector specific networks are active within the program International Corporate Social Responsibility (ICSR-program). The International CSR network for the chemical sector has the aim to improve the sustainability of the international value chains of Dutch chemical companies with developing countries and emerging economies.

The ICSR network supports (SME) frontrunners with realizing their vision and ambition: *“In 2040 the chemical sector is the binding element in a sustainable and vital society. The Dutch chemical sector is the worldwide example of sustainability. All their products and services are 100% circular and have societal value.”*

This roadmap focuses on two sub-ambitions of this vision and ambition:

1. In 2040 companies take into account true life cycle costs (societal- and environmental impact) for their products and for their investments;
2. The international supply chain of companies is fully transparent when it comes to sustainability issues.

Especially the lack of transparency in the value chain on the true costs of products and processes leads to inability to judge whether a product is sustainable or not. A study of CSR Netherlands (Roelofs, Van Gendt et al, 2015) concluded that even for large companies it is difficult to get transparency regarding sustainability issues in the whole value chain and to get insight in the true life cycle costs of their products. Even more so, this is the case for SME-companies in the chemical sector. In order to be able to develop sustainable products and execute the coinciding due diligence¹ for sustainability issues in the value chain, an easy to use methodology was lacking.

THE COMMON METHODOLOGICAL BASIS IS HARDLY OPERATIONAL

Currently, the UN Sustainable development Goals are very inspiring for many stakeholders that want to act on sustainable development. It makes sustainability concrete, but not directly measurable. Many international developments take place to make sustainability measurable, such as IPCC, REACH, Social Life Cycle Metrics for Chemical Products (WBCSD

2016), Together for Sustainability, Product Environmental Footprint (PEF), Organizational Environmental Footprint (OEF) and ILCD of the EC, OECD sustainable manufacturing handbook etc. This forms a methodological basis for verifiable sustainability. However, this basis is so broad and complex, it is hardly accessible for non-expert users in industry and often not useful for strategic management decisions.

METHODOLOGIES ARE LACKING FOR THE NEEDS OF SMES

Existing sustainability assessment methodologies and databases have been analysed by TNO to see to what extent current methodologies fulfil the needs of SMEs. By this analysis it was concluded that current methodologies do not fulfil the needs of SMEs. For most existing methodologies, a lot of data, expertise and time is required. An easy to use methodology by which they can measure sustainability is indeed lacking. Availability of data, quality of data and confidentiality of data are identified as barriers for sustainable product development by SME's.

SUSTAINABILITY HOTSPOT SCAN: A FIRST STEP

Assigned by the ICSR-network for the chemical sector, TNO developed together with this network the Sustainability Hotspot Scan. Based on the most relevant methodologies of the chemical sector, the scan provides a first step in measuring sustainability of chemical products for SMEs. By combining publicly available databases and LCA expertise, few data

¹ SME's as well as large companies doing business internationally are held by the OECD-guidelines and UN Guiding Principles for Business and Human rights. This means companies have to perform a check on sustainability issues occurring in their value chains (due diligence) and determine what their responsibility is (direct or indirect contribution, linkage). Also they have to act upon this responsibility alone or together with other stakeholders.

is necessary for the scan. The scan provides insight in sustainability challenges and opportunities of the entire value chain of a product.

NEXT STEPS: DEVELOPMENT OF A ROADMAP ON SUSTAINABILITY ASSESSMENT

The Sustainability Hotspot Scan is the first step to come closer to the sub-ambitions to take into account true life cycle costs of products and achieve transparency on sustainability issues in the international value chains. The forelaying document shows the next steps.

Hereto, TNO developed together with the ICSR-network a roadmap for SME's to achieve verifiability of sustainable chemical production and products. Here, a roadmap is defined as a set of scenarios that match short-term and long-term development and aims with specific solutions to help meet those aims. It helps reach a consensus about the possible solutions, and it provides a framework to help plan and coordinate future actions.

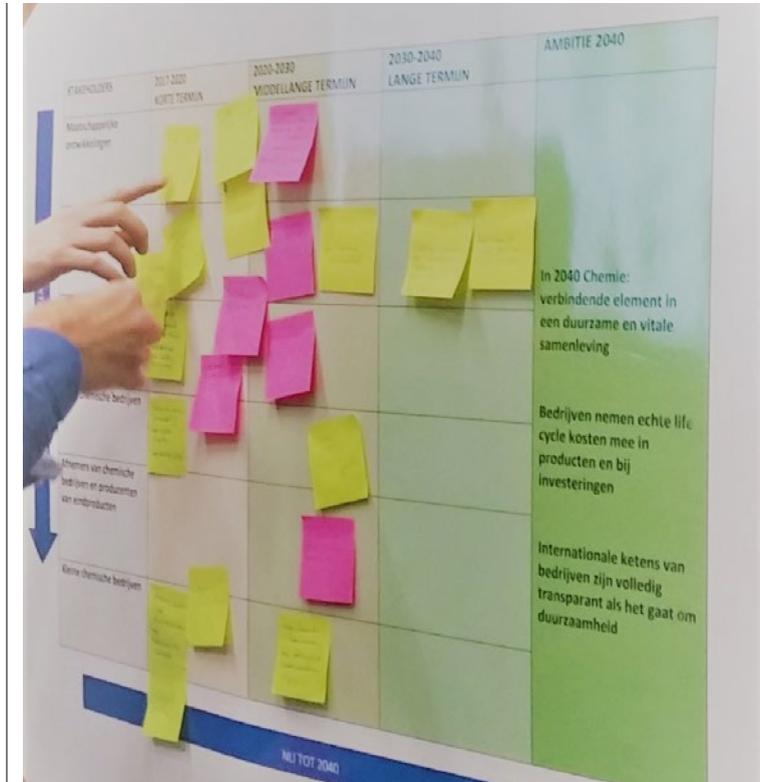
A STAKEHOLDER CONSULTATION ON SUSTAINABILITY

Based on the first version of the Sustainability Hotspot Scan, a workshop with different stakeholders and four interviews with important stakeholders have been held. The workshop was focused on the question what should be done to reach a transparent, verifiable sustainability performance in the chemical sector in 2040. The following stakeholders took part in the workshop:

- SME in the chemical sector: Baril and Kornuyt
- 250+ company in the chemical sector: Croda
- Government: Ministry of economic affairs and ministry of foreign affairs
- Knowledge institutes: TNO and the national institute for public health and the Environment (RIVM)
- Education: Avans University of Applied Sciences (sustainable financing department)
- NGO: MVO

Interviews have been done with:

- Dutch branch organization for the chemical industry: VNCI
- German branch organization for the chemical industry: VCI
- Supplier of sustainability ratings for global supply chains: Ecovadis
- Large chemical company: DSM



In the workshop and the interviews the following time horizons have been distinguished:

- Short-term: 2017-2020;
- Mid-term: 2020-2030;
- Long-term: 2030- 2040.

In the workshop and the interviews, the following categories of stakeholders have been identified as relevant for the question on transparent sustainability performance:

- SMEs
- Corporate clients of SMEs in industry
- Large chemical companies
- Branch organizations
- Supporting organizations (knowledge institutes, consultants, NGOs)
- Governments
- Consumer of end-products

BROADER DEVELOPMENTS IN SOCIETY

The following societal trends were observed by the participants of the workshop, which will serve as a background scenario in the roadmap. This scenario is common for each solution identified. Scenario trends are seen at government level, consumer level, company level and NGO level. In 2015, at UN level at the Conference of Parties on climate change in Paris (COP21) for the first time in 20 years of UN negotiations, a legally binding agreement has been made with the aim of keeping global warming below 2°C. In the short term the COP21 will be ratified by all countries. Also in 2015, the UN Sustainable Development Goals have been adopted by over 190 countries. On the medium-term countries will mobilize efforts to achieve the sustainable development goals and thereby aim at end in all forms of poverty, fight inequalities and tackle climate change, while ensuring that no one is left behind. On the long-term, the COP21 goals will be accomplished. At European level on the medium-term Product Environmental Footprint (PEF) legislation will be enforced, thereby companies will be obliged to create environmental footprints of their products.

On the consumer level, it is noticed that consumer demand for sustainability is increasing. It is expected that this demand will increase further on medium-term and long-term.

On the company level, it is noticed that companies are trying to take sustainability as a competitive advantage. In this respect, it has been noticed by industry that especially Asia is very eager and capable to improve sustainability performance fast.

On NGO level sustainability is pushed, however it is also felt that NGOs have limited budget to drive action.

ACTIONS IN THREE ROUTES

Based on the outcomes of the workshop and the interviews the following routes have been identified towards verifiable sustainability performance in chemical production and products:

-  Production agreements and statistics route;
-  Product demand and labelling route;
-  Accountancy and legislation route.

Stakeholders can use these routes to learn from. The routes aim to inspire for action for different stakeholders and particularly SME's towards achieving the ambition of taking true life cycle costs transparent into account. The routes differ with respect to stakeholders taking the lead and the instruments being used in improving sustainability performance. No preferred or more probable route has been identified. The routes aim at organizing the outcomes of the workshops and interviews, they can be combined to other routes as well.

In the following chapters the routes are being explained.

2 PRODUCTION AGREEMENTS AND STATISTICS ROUTE



SME'S, LARGE CHEMICAL COMPANIES AND CORPORATE CLIENTS OF THE CHEMICAL INDUSTRY

In this route, the industry takes the lead in driving towards sustainability by cooperation in the field of sustainability and putting sustainability more and more at the core of their strategic decision making. Focus is on sustainable and transparent production. Instruments used are voluntary agreements (among the industry partners as well as between industry and government) as well as ecotaxation. An example is the agreement between the European Commission and the European Car Manufacture Association to reduce CO₂ emissions from passenger cars.

On the short-term, the industry will continue building networks sharing their insights in sustainability and thereby improving the strength of shared knowledge. In these networks, they can start sharing data on MSDS's, CO₂ footprint and the origin of products. Large companies will have to help small companies to take sustainability into account. On the medium-term networks such as Together for Sustainability can be enlarged through the entire value chain including all types of organizations. Also similar initiatives will have to be set up for SMEs. Furthermore, to show society industry is taking responsibility they will have to come to voluntary but binding agreements. On the long-term the industry will link their operational data to datamining systems. This will be a challenge from a competition point of view.

SUPPORTING ORGANIZATIONS SUCH AS BRANCH ORGANIZATIONS, NGO'S KNOWLEDGE INSTITUTES, CONSULTANTS

On the short-term knowledge institutes and consultants can support industry by providing simple tools for measuring sustainability, such as the Sustainability Hotspot Scan. On the medium-term these can be more detailed also including measures to compare the costs of implementing sustainability to the costs of damage if sustainability is not being implemented. On the long-term knowledge institutes and consultants can support by providing data mining and statistical tools thereby linking national data, company data and process and product specific data.

Thereby reducing the amount of bureaucracy necessary to determine sustainability.

On the short term, branch organizations can facilitate networks within industry assessing sustainability. For example, by organizing workshops for the industry in which sustainability is assessed by means of the Sustainability Hotspot Scan. On the medium-term they can take the lead in voluntary but binding agreements on sustainability within the industry. On the long-term they can support the process to link data.

GOVERNMENTS

In this route on the short-term governments provide industry with support for collecting data and measuring impact. SMEs will have to get special support to make sure they can contribute. On the medium-term they make sure sector specific KPI's are developed to take sustainability into account in comparable ways. On the long-term governments can strengthen the sustainable development in this route by ecotaxation.

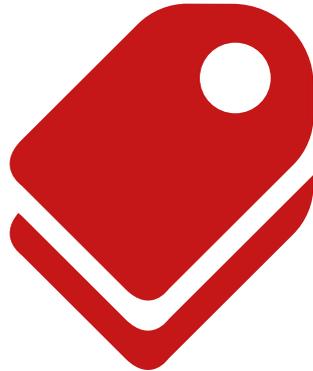
CONSUMERS OF END-PRODUCTS

Consumers of end-products are rather passive in this route and trust that sustainable production is being realized and external effects are being included in product prices.

PRODUCTION AGREEMENTS AND STATISTICS ROUTE

Stakeholders	Short term 2017-2020	Medium term 2020-2030	Longterm 2030-2040	Ambition 2040
Broader developments in society Consumers of end-products	Increased consumer demand for sustainability; COP21 ratified; UN Sustainable development goals adopted; China is competing with Europe on sustainability; NGOs can push but have limited budget.	PEF legislation; COP21 goals accomplished; UN Sustainable development goals 2.0 adopted; Resource scarcity will increase.	Cop21 goals accomplished; Circularity is a driver; Sustainability is a driver.	International CSR program in the Chemical Sector (IMVO Chemie); Sustainability is the norm in 2040 the chemical sector; Is the binding element in a sustainable and vital society; Companies take into account true life cycle costs (societal and environmental impact) for their products and investments; The international supply chain of companies is fully transparent when it comes to sustainability issues.
	Ask companies for sustainable production and products	Sustainable production and products will be favoured	Only demand for sustainable production of products; based on sustainable pricing	
Governments Supporting organisations; knowledge institutes, consultants, NGOs	Provide support to SMEs in collecting data and measuring impact	Develop sector specific KPI's	Taxes on damaging and/or scarce products	
	Simple tools for measuring sustainability	Detailed tools to compare costs and benefits of sustainability	Data mining, statistical tools: linking national data, company data and product data	
Branch organizations	Facilitate assesment of sustainability	Take the lead in voluntary but binding agreements	Support the process to link data	
Large chemical companies	Support SMEs to take sustainability into account	Enlarge networks as Together for Sustainability	Link operations data to datamining systems	
	Share data, MSDS, CO ₂ footprints, origin of products			
Corporate clients of SMEs in industry	Share data, MSDS, CO ₂ footprints, origin of products	Be part of networks	Link operations data to datamining systems	
SMEs	Networks to share the burden	Is part of voluntary but binding agreements	Link operations data to datamining systems	
	Share data, MSDS, CO ₂ footprints, origin of products	Initiatives as Together for sustainability are also available for SMEs		

3 PRODUCT DEMAND AND LABELLING ROUTE



CONSUMERS OF END-PRODUCTS

In this route measurement of sustainability and transparency is dependent on the demand from the consumer. The consumer will push sustainability and transparency on sustainability forward by taking it into account in purchases. Instruments that belong to this route are product (life cycle) information and labelling, potentially supported by the government with ecotaxation. An example is the EU Eco-label, a market-based instrument to stimulate supply and demand of greener products, based upon ecological criteria for product groups as developed by the European Union Eco-labelling Board.

SME'S, LARGE CHEMICAL COMPANIES AND CORPORATE CLIENTS OF SMES

On the short-term they will be asked by consumers to provide some basic information on sustainability. On the long term only sustainable products over which is communicated transparently, will have markets. Therefore, over time industry will be asked to provide more detailed data and be transparent on their production processes more and more. Particular SMEs but also Original End-use Manufacturers (OEMs) are also consumers of ingredients, half-fabricates. They will be supported in this route in demanding information and transparency of their suppliers.

Hence, large chemical companies will face similar challenges as SME's. Since the entire supply chain will have to move towards sustainability, they have to provide data.

GOVERNMENTS

On the short term the government can play a role in facilitating the consumer by creating awareness on sustainability and providing insights on the importance of sustainability. Thereby stimulating the consumer to take sustainability into account. In the medium term the government can provide consumers with information on sustainability and make sure pathways through the woods of labels and sustainability claims are clear. In a perfect world in the long term the consumer pushes the market into

a sustainable direction, however if the market is failing in the long term the government can impose taxes on damaging and/or scarce products to make sure that external costs are being internalized, thereby forcing the consumer in the right direction.

SUPPORTING ORGANIZATIONS SUCH AS BRANCH ORGANIZATIONS, NGO'S KNOWLEDGE INSTITUTES, CONSULTANTS

On the short term supporting organization should provide policy advise to increase sustainable entrepreneurship. Furthermore, they can provide industry with basic information on sustainability and measuring sustainability.

On the medium term, supporting organizations should provide a pathway through all different types of labels and sustainability claims to help the consumer in making sustainable choices and support the industry in using information and data efficiently. In the long run supporting organizations should really harmonize the labels and claims so that sustainability can be measured unambiguously and transparent. Also branch organizations should play a role in this by providing the industry with information on sustainability requirements in the market, data transparency and harmonization.

PRODUCT DEMAND AND LABELLING ROUTE

Stakeholders	Short term 2017-2020	Medium term 2020-2030	Longterm 2030-2040	Ambition 2040
Broader developments in society	Increased consumer demand for sustainability; COP21 ratified; UN Sustainable development goals adopted; China is competing with Europe on sustainability; NGOs can push but have limited budget.	PEF legislation; COP21 goals accomplished; UN Sustainable development goals 2.0 adopted; Resource scarcity will increase.	Cop21 goals accomplished; Circularity is a driver; Sustainability is a driver.	International CSR program in the Chemical Sector (IMVO Chemie); Sustainability is the norm in 2040 the chemical sector; Is the binding element in a sustainable and vital society; Companies take into account true life cycle costs (societal and environmental impact) for their products and investments; The international supply chain of companies is fully transparent when it comes to sustainability issues.
Consumers of end-products	Ask for transparency on sustainability of products and production	Reward transparant products (labels) and companies (reporting)	Only demand for sustainable products and production; based upon full transparency (labels, info)	
Governments	Create awareness on sustainability	Focus on increasing consumer demand	Open databank on products	
Supporting organisations; knowlegde institutes, consultants, NGOs	Policy advice for sustainable entrepreneurship			
	Provide basic info on sustainability	Provide a pathway in the woods of labels and sustainability claims	Harmonize the woods of label and claims	
Branch organizations	Provide information on sustainability demand	Support industry on data transparency	Facilitate harmonisation	
Large chemical companies	Provide information on sustainability	Improve data quality	Sustainable companies see their business grow	
Corporate clients of SMEs in industry	Ask for sustainability and transparency	Reward transparant companies	Purchase only products with proven sustainability	
SMEs	Provide basic info on sustainability	Transparant on data and central storage in database	Sustainable SMEs see their businesses grow	

4 ACCOUNTANCY AND LEGISLATION ROUTE



GOVERNMENTS

In this route, governments will take the lead in transparency on sustainability by enforcing this by legislation and an accounting system for sustainability similar to the financial accounting systems. This will be realized by supporting organizations such as consultants and knowledge institutes. For example, currently the EU Eco-Management and Audit Scheme (EMAS) is running, being a voluntary management tool for all public and private organizations, based upon ISO 14001, to evaluate, report and improve their environmental performance.

On the short-term pilot projects for Product Environmental Footprint (PEF) legislation are done taking into account competition and consumers. On the medium-term stimulating legislation will be created to make sure companies all companies have to report in the same way on sustainability. On the long-term the government will install an authority comparable to the authorities of the financial market to supervise the market on sustainability.

SUPPORTING ORGANIZATIONS SUCH AS BRANCH ORGANIZATIONS, NGO'S KNOWLEDGE INSTITUTES, CONSULTANTS

Supporting organizations will support SME in their data collection and preparation for legislation. On the medium-term they will have to provide guidance on how to measure and report. On the long-term they will do register accounting work for companies in the same way it happens on financials.

Branch organizations in the short term can help industry by preparing for legislation and lobbying to create stimulating legislation instead of discouraging legislation also taken into account SMEs. On the medium-term they can provide the industry with information on the legislation and support implementation.

SME'S, LARGE CHEMICAL COMPANIES AND CORPORATE CLIENTS OF THE CHEMICAL INDUSTRY

On the short-term frontrunners industry will start to prepare for legislation. Large chemical companies will be able to lobby whereas this will be more difficult for SMEs. On the medium-term they will have to provide data showing compliance with legislation. On the long-term they will have to do sustainability accounting including making use of controllers.

CONSUMERS OF END-PRODUCTS

Consumers of end-products are rather passive in this route and trust that the elected government will organize a reliable system including an authority that safeguards sustainability.

ACCOUNTANCY AND LEGISLATION ROUTE

Stakeholders	Short term 2017-2020	Medium term 2020-2030	Longterm 2030-2040	Ambition 2040
Broader developments in society	Increased consumer demand for sustainability; COP21 ratified; UN Sustainable development goals adopted; China is competing with Europe on sustainability; NGOs can push but have limited budget.	PEF legislation; COP21 goals accomplished; UN Sustainable development goals 2.0 adopted; Resource scarcity will increase.	Cop21 goals accomplished; Circularity is a driver; Sustainability is a driver.	International CSR program in the Chemical Sector (IMVO Chemie); Sustainability is the norm in 2040 the chemical sector; Is the binding element in a sustainable and vital society; Companies take into account true life cycle costs (societal and environmental impact) for their products and investments; The international supply chain of companies is fully transparent when it comes to sustainability issues.
Consumers of end-products	Ask government for control on sustainable production of products	Demand for standards; Very unsustainable production will be phased out	Sustainable production of products; based on trust in authorities	
Governments	Investigate possibilities for legislation	Create stimulating legislation for accounting	Authority for sustainable markets is created supervising the market	
Supporting organisations; knowledge institutes, consultants, NGOs	Support SMEs in collecting data	Guidance on how to measure and report and benchmark	Register accounting could be done by supporting organisations	
Branch organizations	Prepare industry for legislation and lobby	Support industry with information on legislation	Support industry with accounting	
Large chemical companies	Frontrunners will start to prepare and lobby for stimulating legislation	Provide transparent data	Sustainability accounting including controllers	
Corporate clients of SMEs in industry	Frontrunners will start to prepare for legislation	Contribute to transparent data	Sustainability accounting for corporate consumers including controllers	
SMEs	Frontrunners will start to prepare for legislation	Provide transparent data	Sustainability accounting including controllers	

5 THE WAY FORWARD

THREE ROUTES TOWARDS VERIFIABLE SUSTAINABLE PERFORMANCE

In this roadmap, different routes have been identified to achieve the ambitions that:

- In 2040 companies take into account true life cycle costs (societal and environmental impact) for their products and for their investments;
- The international supply chains of companies are fully transparent when it comes to sustainability issues.

Three routes have been developed on verifiable sustainability assessment that is needed to support the achievement of these ambitions, being:

-  Production agreements and statistics route;
-  Product demand and labelling route;
-  Accountancy and legislation route.

These routes are what-if scenarios - without exact probability - with the purpose to learn about possible situations with respect to sustainability performance in the chemical industry. The routes differ with respect to stakeholders taking the lead and the instruments being used in improving sustainability performance.

WHAT HAVE THE ROUTES IN COMMON?

The following broad conclusions can be drawn from the routes; In all routes:

- There is a need for data and data harmonization and standardization. All stakeholders should cooperate to achieve this.
- The same type of data is needed - only the level of detail and focus differs;
- Industry plays a pivotal role in making sustainability measurable.

The choice is not so much on the data itself that is needed to verify sustainability performance, but on the level of detail of data that is opened up to the public, the form the data are being harmonized, the way this is organized and the speed that is taken.

THE COMMON METHODOLOGICAL BASIS IS HARDLY OPERATIONAL

Currently, the UN Sustainable development Goals are very inspiring for many stakeholders that want to act on sustainable development. It makes sustainability concrete, but not directly measurable. Many international developments take place to make sustainability measurable, however, this basis is so broad and complex, it is hardly accessible for non-expert users in industry and often not useful for strategic management decisions.

A FIRST STEP

Moreover, current methodologies do not fulfil the needs of SMEs. For most existing methodologies, a lot of data, expertise and time is required. An easy to use methodology by which they can measure sustainability is indeed lacking.

A first step has been taken by drawing the Sustainability Hotspot Scan from this common basis and hence make it accessible for SMEs. This scan fits in the route in which industry takes the lead to come closer to the ambition. To continue this route on the short-term, companies should start using the Sustainability Hotspot Scan and share their outcomes and findings. This can start with pilots with frontrunners and then extended through the whole chemical sector.

NEXT STEPS

Harmonized Key Performance Indicators are needed to measure the sustainability performance of production chains and perhaps product chains. These KPIs need to be chosen in such a way that they are meaningful for all international stakeholders and can be available publicly. The verifiability of the KPIs is a requirement but can be organized in different ways. This has to be chosen in order to reach the goal on transparent international production chains.

TAKING THE LEAD?

Today parts of all three routes are already being developed. Consumers of end-products take sustainability more and more into account. Governments are preparing for example PEF legislation. The chemical industry is developing their own sustainability assessment methodologies.

In case industry chooses to be in the lead, the route **Production agreements and statistics** gives the most food for thought. It tries to reduce bureaucracy as much as possible. This route also fits best with the ambition to become the binding element in a sustainable and vital society. This is only possible by harmonisation of KPI's, making agreements and publish and/or share certain data, starting within the sector but also with authorities and the public. This requests an offensive approach in which the chemical industry leads the market and society towards sustainability. Herewith, verifiability will be key.

This all will take place in an international policy context, say at European level. However, the industry could cooperate at the level of for instance the Antwerp-Rotterdam Rhein Ruhr Chemical megacluster, which is particularly relevant for the Dutch SME's. It would concern SME's and large companies, involving also companies in the international supply chain. In this international context sustainable production in the entire supply chain will be a competitive advantage in which taking the lead could be crucial for the future of the chemical industry in the Netherlands.

This roadmap has been developed by TNO in the framework of the Branch Innovation Agenda for SMEs with financial support of the Ministry of Economic Affairs and was commissioned by the International CSR program in the Chemical Sector (IMVO Chemie), Baril Coatings B.V. and C. Kornuyt B.V.

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