catalysing innovation
Regiegroep Chemie

Polymer Innovation Programme

"A strong impulse for economic growth, quality of life and sustainability"

Bijlage 3-B: bij 'Innovatie door, in en van de Nederlandse chemische sector'

Werkgroep Human Capital

Den Haag, 1 augustus 2007

Index

Executive summary

The Polymer Innovation Programme (PIP) is one of the key-programmes of the Chemicals Sector Innovation Programme outlined by the National Chemistry Board. The ambition is: *To accomplish a quantum leap in the contribution of the Dutch polymer, science, technology and business community to quality of life, sustainability and economic growth.*

The PIP will make a substantial contribution to the Dutch society and economy, by:
- Creating Euro 2.4 billion in additional added value in 2017.
- Contributing 30% to the chemicals sector's objective of halving the use of fossil feedstock by 2032; i.e. a reduction of approximately 90 PJ. (Overall objective of the chemical industry is a reduction from 657 PJ to 328 PJ in 2032). This in line with conclusions of the "Platform Groene Grondstoffen" (the Platform Green Raw Materials) that a 50% reduction of fossil feed stock in the production of polymers can be reached.
- Maintaining and expanding the Dutch competencies in polymer catalysis and materials science at world-class level of excellence.

The PIP has been developed in close consultation with the Dutch polymer value system with strong emphasis on balanced participation of SMEs, MNCs and knowledge institutes.

The PIP has been designed along following tracks:
- *Track 1: accelerating business creation.*

Creating new market space and accelerating market driven business creation on the basis of PST, both by existing and new SMEs.
- *Track 2: executing pre-competitive research and joint development programmes.*

Stepwise improving the growth potential of SMEs by launching new joint development programmes aimed at new technology/materials and sustainability issues. And concurrently, utilizing and expanding the international pre-competitive research network for stepwise progress in addressing the challenges of the 3P agenda.
- *Track 3: competence and network building.*

Ensuring sustainable vitality of the PST&B [*] community in the Netherlands as the driver for future growth.

The PIP will be an open programme, executed by two closely linked organizations: The new DPI Value Centre (DPI VC) will manage an extensive programme aimed at additional business creation and joint development programmes by SMEs. The Dutch Polymer Institute (DPI) will manage the expanding internationally oriented pre- competitive research.

Besides the contributions of industry partners and knowledge institutes, for a successful execution of the PIP also government support is required. The requested financial contribution of the government amounts to Euro 110 M for the total programme, which has a total turnover of Euro 293 M covering the period from 2008 to 2015.

Action line	Total turnover (million Euro)	Requested support from government (million Euro)
Accelerating business creation	85	34
Research and joint development	205	76
Competence and network building	3	0.5
Total	293	110

[*] PST&B – Polymer Science Technology and Business

1. Introduction

The chemicals sector is a high-tech, knowledge-intensive sector that plays a vital role in the Dutch economy. In the decades ahead the sector wants to be the driving force behind strong economic growth and sustainable development.

The Dutch National Chemistry Board has translated this ambition in clear objectives:
- Double the contribution of the chemicals sector to the country's GDP in 10 years.
- Halve the amount of fossil feedstock in 25 years.
- Raise the technological competencies of the Netherlands in industrial biotechnology, catalysis, materials science and process technology to a world-class level of excellence and maintain them at that level.

This business plan sets out the activities to be undertaken within the framework of the Polymer Innovation Programme (PIP). Since the polymer value system creates 40% of the total added value of the chemical industry the PIP is one of the key-programmes of the Chemicals Sector Innovation Programme outlined by the National Chemistry Board. The PIP will make a substantial contribution to achieving the objectives of the Chemistry and Chemicals Sector Key Innovation Area:
- The creation of Euro 2.4 billion in additional added value in 2017.
- A contribution of 30% to the objective of halving the use of fossil feedstock by 2032; i.e. a reduction of approximately 90 PJ. (Overall objective of the chemical industry is a reduction from 657 PJ to 328 PJ in 2032).
- To maintain and expand the Dutch competencies in polymer catalysis and materials science at world-class level of excellence.

The PIP has been developed in close consultation with various stakeholders in the polymer value system. Over 50% of all SMEs active in the product and application value chain are member of the NRK, representing 85% of total production value. The visions developed and priorities defined by the membership of NRK (e.g. the themes for future development programmes and Knowledge map) have been very valuable input. Also Bio Based Business, BCPN and other special focus groups have given their inputs.

The interaction with the members of the Sounding board of the Brainport project "Polymer Value Centre" has been specifically focused on how to actively involve SME and start-ups in business growth and innovation. In combination with the interaction with NRK this resulted in a strong focus on reinforcing the role of SMEs in the polymer value system. The experience of SenterNovem in developing coherent innovation programmes has been of great assistance. Furthermore the policies and visions of the "Platform Groene Grondstoffen" (the Platform Green Raw Materials) and of AWT[1] have given guidance to developing this plan. The group of partners participating in the Dutch Polymer Institute community have been very actively involved in developing the programme focus for the pre-competitive research programme. Next to the Dutch perspective also the international context has been taken into account in developing the programme. Exchange of visions and plans on the polymer sectors in Flanders and in North Rhine Westphalia has lead to valuable contacts that will facilitate the implementation of the programme.

[1] AWT – Advies 69: "Bieden en Binden" and AWT – Advies 71: "Balanceren met beleid"

2. Focus, vision and strategic agenda

2.1. Focus and positioning

Polymers represent a major section of the international and Dutch chemical industry. They form part of an extensive value chain, from bulk chemicals to polymer production and the conversion of polymers to components which are used in end-products sold in numerous end-markets.

2.1.1. Position of polymers in the chemical industry

From an analysis of the data on the Dutch polymer sector the following picture emerges:

- The polymer sector is internationally oriented; while it contributes 1.2% to the Dutch GDP, its share in exports is approximately 5%. This is in line with the overall significance of the chemical industry, which represents 14.5% of total Dutch exports.
- Approximately 1550 companies are involved in the manufacturing of polymers and/or in the manufacturing of products and applications where polymers play a vital role. These companies employ some 57.000 people.
- The sales generated in the production of polymers by large multinationals with significant activities in the Netherlands amount to € 11 billion, while € 6.5 billion is generated by companies processing polymers into products and applications. In this part of the value chain SMEs are dominant; nine out of ten companies have fewer than 50 employees.
- Polymers have a relatively high value added ratio (30%), compared to the ratio of the broader chemical industry. Polymer processing in particular is a labour intensive activity.
- Overall R&D expenditure in the Dutch chemical sector amounts to € 1.1 billion. Polymers account for a relatively high proportion of this expenditure (€ 450 million)[2].

2.1.2. Polymer value system

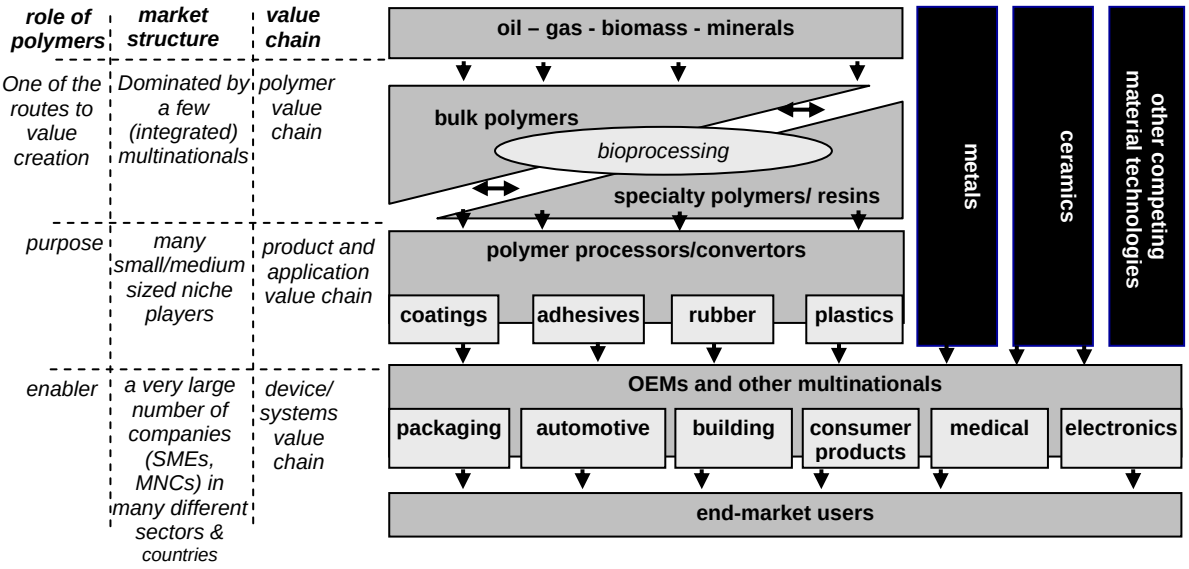
Currently the *polymer value system* consists of different types of players active in subsequent stages:

- *Polymer value chain*: chemical producers that process base chemicals into polymers. These are generally multinational companies (MNC). The Netherlands has a strong position with leading MNCs (DSM, Shell, Akzo, Dow, Sabic, GE Plastics) that have significant activities.
- *Product and application value chain:* polymer processors and converters (adhesives, rubber, coating and plastics) that use polymers as feedstock to develop and manufacture (semi finished) products for end-use or as parts/subassemblies for devices manufactured by OEM's (original Equipment Manufacturers). Many larger and smaller companies are active in this industry. Examples of larger companies are Polynorm, Helvoet and Wavin, while there are also small innovative start-ups such as Microdrop, Hysitron and Nano Specials.
- *Device/systems value chain:* semi finished (partly) polymer based products are the input that enables innovation by device producers and product integrators such as Philips, Océ, Sigma and Medtronic. They translate the functionality of polymer materials and other materials into added value for customers of the end-products.

The scope of the PIP includes companies and knowledge institutes in the entire polymer value chain, including MNCs and SMEs in the product and application value chain and on companies in the device/systems value chain with a strategic interest in polymer applications.

[2] De chemiesector in Nederland, EIM, 2006

Figure 1: Polymer value system



Based on the input of NRK (May 2007), applying the criteria defined by VNO-NCW in a 2004 study, the division of the approximately 1500 companies in the product and application value chain, is as follows:

- Innovative leaders: 125 companies with captive R&D resources.
- Innovative developers: 375 companies with development activities not having separate innovation capacity.
- Innovative users: 400 companies creating new products mainly based on knowledge from external sources.
- Other companies: 600 companies not having any focus on innovation.

Of these four categories the PIP will focus on “leaders” and “developers” with the aim of stepwise growth and innovation output, and on “users” with ambitions to make strong advancements in innovation. In the product and application value chain (adhesives, coatings, plastics & rubber) following ratio’s apply:

- 40% of companies utilize Dutch technology subsidies.
- 10% of companies utilize European technology subsidies.
- 0.2% of production value is spent on outsourced development.

On the basis of market research conducted by EIM [3] it has been concluded that companies in the *polymer product and application value chain* (SMEs in the plastics, coating, adhesives and rubber sector) are highly innovative, introducing twice as many new products and services as the average. However on aspects such as input (innovation effort) and future orientation they score significantly lower. EIM has concluded that 4 areas need improvement:

- Incorporating innovation as a key component of the company strategy.
- Improving the utilization of external knowledge networks for knowledge exchange.
- Expanding the resource base for innovation within companies.
- Expanding and intensifying the collaboration with other companies.

Weak points of the Dutch polymer sector are the limited size of companies in the product and application value chain and their low degree of market focus. Recently it has been concluded by NRK that the lack of joint development programmes is a barrier for more rapid expansion

[3] De meest innovatieve sector van Nederland, EIM, 2005

of companies in this part of the value chain, i.e. to utilize the growth potential to its full extent. Although some initiatives are taken, more focus (bundling efforts) and mass (in resources and funding) in this respect will be needed.

The number of start-ups is low compared to other sectors due to barriers in legislation that hamper the start of production activities. The balance of new start-ups, integration of start-ups in existing companies and concentration of company activities, results in a stable number of companies in the product and application value chain. Thus the PIP focuses explicitly on start-ups and their growth performance.

A current study by EIM argues that if companies were stimulated by government spending on R&D, 80% of chemical companies in the Netherlands would increase their R&D spending. EIM estimates that this would create 900 to 1300 extra FTEs and € 450-650 million in additional added value for the Netherlands. It is expected that these findings are directly applicable to the polymer sector on a pro rata basis.

2.2. Vision

The Dutch polymer community value system is part of and interacts with an open and strongly international value system.

2.2.1. International position

The Netherlands can build on a strong position in polymers due to its geographic location (creating access to feedstock), its strong cluster of companies active in all parts of the polymer value system and the close presence of important end-markets in Western Europe. Production activities in the Netherlands take place in an international context, with suppliers and/or customers being located in Belgium (the Antwerp region), Germany (North Rhine Westphalia), and other countries of the European Union or even further afield. Recently, the chemicals and plastics industry in Germany has been named as one of the country's eight leading sectors[4]. Research in polymer science and technology also takes place in an international context, for example in the European Commission's 7th Research Framework.

The Industry Memorandum 'Heart for Industry' concluded that the Netherlands has a strong primary and product industry with internationally recognized successes in the following field:

- High-value-added plastics and super strong fibres like Dyneema®, Twaron® and recyclable thermoplastic composite material like PURE®, as well as advanced lightweight materials like Glare®.
- Efficient and environmentally advanced production facilities in the fields of chemicals
- Fully automated production systems for plastics and metals which enable producers to compete with low-cost countries.

The SWOT analysis of the primary and product industries (of which the polymer industry is an important part) given in this memorandum is to a large extent still valid in 2007. Dutch knowledge institutes and companies play a prominent role in the pre-competitive research programme (managed by Dutch Polymer Institute) aimed at the polymer value chain. These programmes involve a rapidly growing number of European companies and knowledge institutes. Internationally, the Dutch model of public-private cooperation in pre-competitive polymer research is considered to be the leading approach as is frequently expressed by representatives from foreign industries, knowledge institutes and governments. Scientific evaluation has shown that Dutch polymer science belongs to the top 3 in the world. The Dutch Polymer Institute can be compared to other well-known international institutes in

[4] Zukunftatlas

strong regions such as Amherst (Massachusetts), Akron (Ohio), Max Planck Institut fur Polymerforschung and the Deutsches Kunststoff-Institut (both in Germany).

Multinationals today choose to invest in the Netherlands because of its attractive research climate. Dow, for example, has chosen Terneuzen as its worldwide centre of research in polymer catalysis and has invested millions of euros in R&D because of the polymer knowledge infrastructure available in the Netherlands. Teijin Twaron is another company that for the same reasons has decided to expand their R&D and production facilities in the Netherlands. Therefore the Netherlands must ensure that it remains attractive as a location for doing business. Multinationals that are generally 'footloose' may decide to relocate business activities if the environment and conditions are more favourable elsewhere. There is a substantial level of business activity to be lost for the Dutch economy if multinationals would relocate their polymer activities. This regret factor is significant and deserves strong cooperation between the PST&B community and the Dutch government.

2.2.2. Polymers enable 3P innovation

The polymer sector is not only of importance for the Netherlands because of the business activities in the sector itself, but also because polymers play and will play a very significant role in enabling innovation aimed at meeting People, Planet and Profit (3P) challenges. Polymers can enable innovation in application areas that have a significant impact on quality of life and sustainability. Polymers will provide input into innovation programmes such as "Food and flowers" (e.g innovation in food processing and packaging, also in developing economies where food scarcity is an eminent issue), "Water" (e.g in new membranes for water cleaning and in separation technology), "High tech systems" (e.g. input to the Holst programme on thin-film and wearable electronics), "Automotive" (lightweight polymers in automotive can improve fuel consumption -1 kg less material implies 15 kg less fossil feedstock per car). The use of new bio-resorbable and biocompatible polymers for biomedical applications and accelerated healing will significantly improve the quality of life of many people. Also building, construction and infrastructure were polymer products are an essential factor for sustainable building and the introduction of light, industrially produced, flexible and removable construction products.

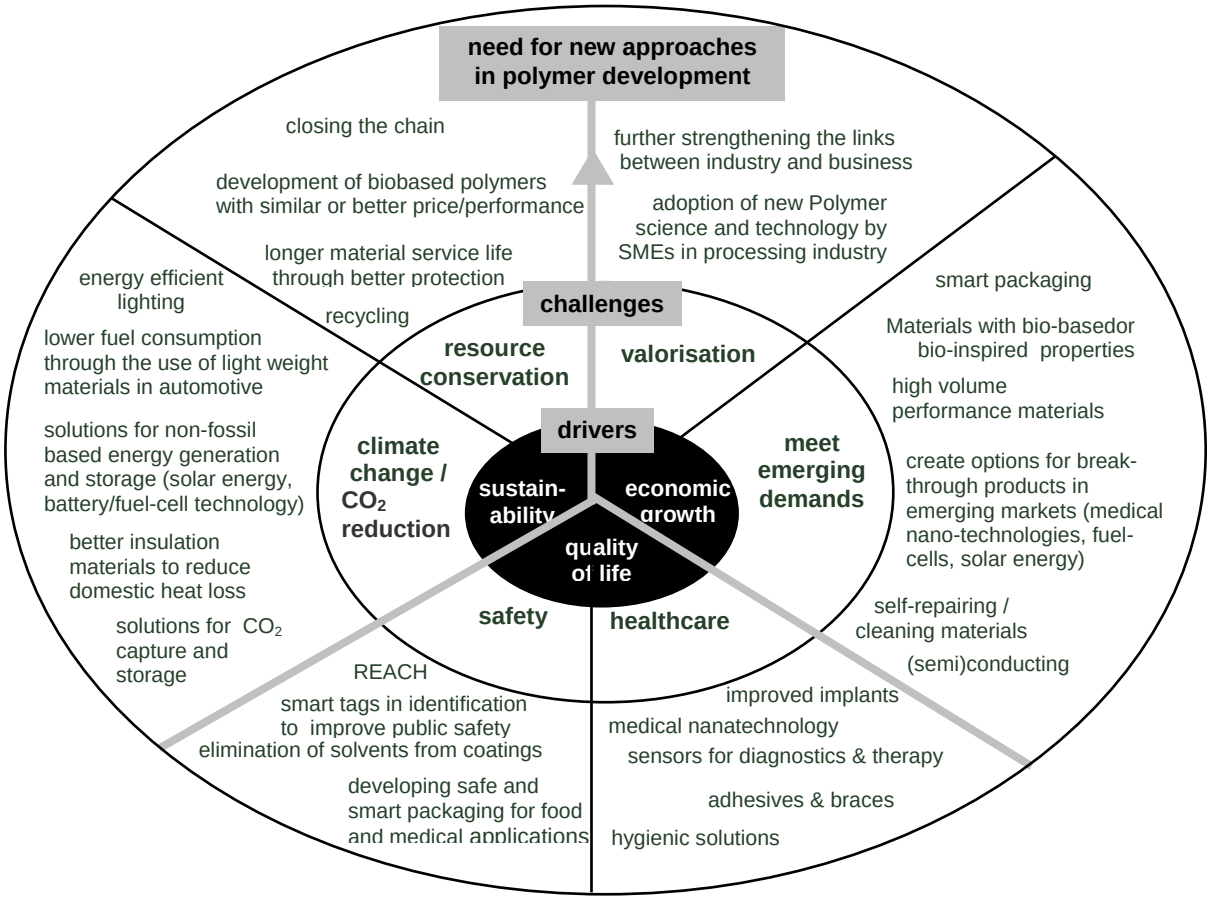
The polymer value system in the Netherlands and Europe is facing a number of opportunities and challenges:

- Market demand (both in terms of volume and performance) is increasing.
- Rapid increase in the range and quality of technological options driven by modern science and technology.
- Strong pressure from society for sustainability, quality of life and new technological solutions.
- Due to early governmental support, the United States, China and Japan have the lead in the development of biopolymers and manufacturing technology.
- New industry players enter into the game. Cargill (USA), PHB Industrial (Brazil), ADM/ Metabolix (USA), and several Chinese companies are examples of players that enter the polymer world, being backward integrated in sugar and ligno cellulose value chains.

The challenges are too broad and scientifically too complex to be addressed by single parties. Moreover, change and growth are needed fast in view of the fierce international competition and rapid global developments. Given the fact that the polymer industry and polymer science are still very strong in Europe (not the least in the Netherlands), there is a very significant opportunity for providing such new growth to the existing polymer industry and for helping new polymer-based businesses to get off the ground.

Figure 2 shows an overview of the drivers and challenges of the 3P agenda and the tremendous business opportunities for the players in various stages of the polymer value chain. Fulfilling the clear potential that polymers can play in 3P will require strong focus on the accelerated application of available knowledge as well as further development in Polymer Science and Technology (PST*).

Figure 2: Drivers and challenges of the triple P agenda



* PST – Polymer Science & Technology

2.2.3. SWOT of the polymer value system

Figure 3 shows the SWOT of the polymer sector, based on the inputs from a combination of various sources[5].

Figure 3: SWOT analysis

strengths	**weaknesses**
- strong primary and product industry with internationally recognized successes - innovative track record of SMEs in product and application - geographic position (sea harbours, cross border linkages) - availability of natural gas in the Netherlands - energy efficiency - leading intelligent use of knowledge (creativity) - international reputation public/ private partnerships in pre-competitive research	- limited scale of Dutch companies - lack of market development (too much focus on products and manufacturing) - the Dutch government is impeding growth by upholding rules and regulations too strictly - costs of energy and labour - image of the chemical industry - low number of start-ups compared to other sectors - the transfer of polymer related knowledge from universities to SMEs remains limited - overall too low level of funding of innovation - too limited open innovation practices
opportunities	**threats**
- expansion of the application areas of chemical products - agglomeration advantages of the chemical cluster in the southwest of the Netherlands (potentially linked with the Antwerp region) - continuation of and increase in public/private partnerships - spin-offs from universities - access to university labs - efficient 24/7 production through elastic/adaptable labour - after-sales and pre-sales: the marketing of products and services - giving companies the financial room to innovate - development of breakthrough technologies - increasing energy efficiency; transition to sustainable energy supply - meeting social and market demand for sustainable and environmentally friendly products - Integration of white biotechnology with the polymer value chain	- relocation of production to low wage countries - increasingly stringent environmental rules and regulations that demand ongoing investments - shortage of qualified staff - employability of senior staff - management of multinationals is often abroad - infringements on patents in some countries - international regulations that are not implemented internationally and national add-ons to European legislation - a weakened competitive position relative to countries outside Europe due to the implementation of REACH - customer industries relocating to low wage countries - fast emerging of new technologies in USA and China

2.2.4. Ambition and objectives

The ambition of the PIP has been defined within the context of the growing urgency of implementing the 3P agenda, the profile of the industry and developments in the polymer value system, the position in the international business and knowledge community, the SWOT analysis of the polymer value system and the ambition of the chemical industry.

The ambition is:
To accomplish a quantum leap in the contribution of the Dutch polymer, science, technology and business community to quality of life, sustainability and economic growth.

This ambition can be split into three aspects:

1. Economic growth

The objective of the chemical sector to double the contribution to the country's GDP in 10 years is implying that this sector has to grow in added value with Euro 12 billion. It is estimated that half of this additional added value - or Euro 6 billion - will have to come from new business. Since the polymer sector contributes approximately 40% to the added value of

[5] De Nederlandse industrie: positie en ontwikkelingen anno 2006 (EIM, October 2006).
Additions to the above SWOT analysis for the polymer industry based on Cefic, NRK, VNCI.

the chemicals sector, the economic growth target for the polymer sector has been set at Euro 2.4 billion additional value in 2017. The above average profitable growth will be a composite of the growth resulting from accelerated growth of existing companies, an increased number of start-ups and their growth performance, and the effects of a switch to higher value added products and services. Given the ultimate target of Euro 2.4 billion the following smart objectives are envisaged:

1.1 Pre-competitive research leading to increased level of valorisation of Euro 1.6 billion in 2017 to be realized by the participating companies.
1.2 Results (Euro 800 million) from additional/new valorisation initiatives with a high level of participation from SMEs and product application value chain partners.

2. Significant contribution to sustainability and quality of life

2.1. Sustainability
Based on the ambition of the chemicals sector to halve the use of fossil feedstock in 25 years, the objective of the polymer sector is to contribute pro rata to this ambition, being 30%. This implies a reduction of 15% of the current use of fossil feedstock.
This will be done by improved solutions via transition from fossil feedstock towards renewable feedstock, strong increase of recycling and re-use, increase of compostable biomaterials, reduction of energy use in the production of polymer feed stock (catalysis) and product applications, and an improved ratio of performance/polymer volume ('more by less'). In addition the use of energy will be substantially reduced by replacing traditional materials by polymers in application fields like transport and housing.

2.2. Quality of life
- Providing new and better solutions to important societal needs such as health & food, mobility, housing, infrastructure, security, safety and water.

3. Increased dynamics of the community
The polymer sector encompasses various other sectors. Increasing the dynamics is an important objective since this forms the engine for future advancements. In this way the polymer value system contributes to economic growth, sustainability and quality of life. The following result areas have been defined:
A. Research: international reputation in excellent pre-competitive research.
B. Human capital: adequate size of workforce at appropriate levels (quality and quantity) meeting future demand.
C. Preferred partner for new international polymer related initiatives.
D. New investments in R&D and production in the Netherlands.

2.3. Strategic agenda

The PIP has been developed as the path to accomplish the defined ambition and objectives. These objectives are stretching for the sector and require actions and efforts that go far beyond "more of the same". In this section the main issues and tasks will be listed that have been identified in analyzing the path towards success. Furthermore the main areas for innovative approaches are described, as well as the role of companies and knowledge institutes in addressing issues and challenges. The final item addresses the reason why support of the government is needed and to what extent.

2.3.1. Agenda for the PIP

Derived from the defined ambition the PIP addresses four main issues:

A. *Accelerating business creation and valorisation of PST.*
Creating new market space and accelerating market driven business creation on the basis of PST, both by existing and new companies.
B. *Executing joint development programmes.*
Stepwise improvement of the growth potential of SMEs in the Dutch product and application value chain by launching new forms of joint development programmes aimed at the business potential of new technology/materials and sustainability issues.
C. *Executing pre-competitive research.*
Utilizing and expanding the international pre-competitive research network for stepwise progress in addressing the challenges of the 3P agenda.
D. *Competence and network building.*
Ensuring that the required conditions for the sustainable vitality of the PST&B [*] community in the Netherlands as the driver for future growth.

2.3.2. Tasks and challenges

A. *Accelerating business creation and valorisation of PST.*

- To expand the number of innovative leaders and developers and to expand their growth. Current situation: many companies have a limited size and therefore limited resources to innovate. Furthermore there is a shortage of qualified people.
- To increase the number of start-ups and accelerate their growth. Current situation: low number of start-ups in the polymer value system due to regulations, investment barriers and a complex piloting phase hampering start-up and spin out activities.
- To accelerate the transition towards higher value added products/services. Current situation: lack of market focus and difficulty of deployment of new technology and penetration of new polymer properties.
- To exploit the emerging opportunities related to quality of life. Current situation: limited interaction with demand side of the “emerging” areas and with potential launching customers, and relative high risks related to these new options.
- To bridge the valorisation gap and step wise increase output. Current situation: SMEs are insufficiently connected to knowledge generation, and larger companies facing difficulty in organising the stages following pre-competitive research with more and different partners involved.

B. *Executing joint development programmes.*

- To convert sustainability related themes into new growth opportunities. Current situation: important issues and themes have been identified by the sector, but lack of focus and mass in addressing these.
- To stimulate the interest of SMEs and start-ups in investing in opportunities created by the 3P agenda and new developments in PST. Current situation: the market penetration of new approaches has been slow, but now a stage has been reached where societal concern will drive faster penetration.
- To initiate consortia with SMEs and knowledge institutes. Current situation: individual companies use technology subsidies (40% Dutch, 10% European), but in the product and application value chain there is a lack of joint research and development programmes.

C. *Executing pre-competitive research.*

- To improve the current level of high quality R&D while creating more focus and mass. Current situation: There is a shortage of human capital. Human talent in the form of qualified technical experts is insufficiently available. However this is a pre-requisite for existing and new companies in their decision to (re) locate their R&D or production basis.
- To provide and expand an open and excellent innovation structure for companies and knowledge institutes. Current situation: In the Netherlands quite extensive experience is

[*] PST&B – Polymer Science Technology and Business

available with successful public private R&D partnerships in which all private and non-private partners cooperate and have benefit. The challenge ahead is to extend this form to a more European structure where more partners and other governments (e.g. like the German or the Belgian governments) will join.
- To initiate consortia of companies and knowledge institutes, so that Time to Concept and Time to Market are significantly reduced for the generation and application of PST; i.e. methods for speeding up research and application/development projects. Current situation: only a few of these consortia exist due to lack of capabilities within individual companies.
- To enlarge and speed up the transition towards 3P driven pre-competitive research involving different stakeholders. Current situation: in general pre-competitive research projects are still limited in focus on 3P issues.
- To increase the level of valorisation of IP and spill over. Current situation: because of the nature of pre-competitive research results of the previous programme are now becoming available.

D. *Competence and network building.*
- To substantially increase the number of students and company staff at all levels and functions, against the existing trends over the last 10 years. Also, the challenge of retention of talent in the Dutch PST&B community as well as the better utilization of diversity (many nationalities). Current situation: insufficient supply of qualified staff for all levels required (MBO, HBO, Masters, PhD's).
- To improve the polymer value chain networks, beyond current borders. Current situation: acknowledged gaps exist between the knowledge institutes and SMEs, as well as between companies in the polymer value chain and companies in the product and application value chain. Furthermore the emerging developments in transition of feedstock, new applications and end markets require new networks. Border crossing forms of cooperation (other than customer-supplier) are not a common practice.
- To stepwise increase the investment of foreign companies in R&D and production facilities in the Netherlands. Current situation: some strong examples of companies that have invested in the Netherlands but insufficient leveraging of these successes.

2.3.3. Need for innovation and the contribution of companies and knowledge institutes

The characteristics of the polymer value system as summarized in the SWOT analysis (figure 3) combined with the ambition outlined in section 2.2.4 create the need for innovation and the active contribution of companies and knowledge institutes in the following areas:
- Growth as a joint process: improved efficiency and effectiveness in an integrated approach to more radical versions of business innovation (technology, product, customer value) with different partners. Examples of the contribution of companies and knowledge institutes:
    - Expanding the NRK programme: "Innoveer met polymer".
    - Continuing the NRK pilot project on building alliances and consortia between SMEs, MNCs and knowledge institutes.
    - Investment in innovation projects by individual SMEs and MNCs.
- Forms of cooperation: a paradigm shift in cooperation between stakeholders that currently operate in partly separated worlds in knowledge creation and exploitation. Examples of the contribution of companies and knowledge institutes:
    - Leveraging the successful cooperation between knowledge institutes and MNCs in Public Private Partnerships such as Dutch Polymer Institute and the commitment of partners.
    - Investment in consortia and joint programmes.

- Human capital growth; new and improved approaches in attracting, developing and retaining (international) talent. Examples of contribution of companies and knowledge institutes:
    - Investment of companies and knowledge institutes in new forms of training.
    - Stronger links between HBO and SMEs.
- 3P as the guiding theme: speeding up the transition from past performance and progress towards 3P as the leading principle throughout the total value system. Examples of contribution of companies and knowledge institutes:
    - Ongoing initiatives aimed at recycling and re-use by NRK, sector groups and companies.
    - Series of new developments and launches of “more by less” products and solutions.

2.3.4. Role of the government

The Dutch national government has a pivotal role in fulfilling the ambition outlined in this innovation program

- The polymer value system has a significant foot print in the Dutch economy and society. Future growth and transition demand an active government that ensures the attractiveness for major stakeholders (SMEs, MNCs, excellent talent, investors and customers in search of new solutions) to invest in the Netherlands. Especially reinforcing supply and demand chains involving SMEs and MNCs creates a innovative and competitive polymer value system.
- To secure the right quality and quantity of human capital to enable accomplishment of growth ambitions. With the current shortage a quantum leap is needed to bridge the gap. A strong focus and mass in the capability and capacity of the knowledge institutes are a prerequisite for achieving this goal.
- Efforts needed and risks involved in developing, selecting and implementing polymer based projects aimed at the 3P agenda are both huge. They exceed resources, competencies and affordable risks of individual players in PST&B community and also to create an adequate legislative infrastructure that supports an (international) 3P business practice.
- New forms of cooperation between current and new players in the polymer value system are needed. Mastering these rather complex forms of cooperation and consortia requires lead time and extensive efforts beyond the capabilities of individual companies, especially SMEs and start-ups.
- For converting societal ambitions and priorities (quality of life and sustainability) into actionable roadmaps and solutions close interaction between the government and the PST&B community is needed.
- The purchasing power of the government as a launching customer can speed up the required transition in a number of new product market technology combinations.

2.3.5. Required support of the government

Besides the contributions of industry partners and knowledge institutes, for a successful execution of the PIP also government support is required. The requested financial contribution of the government amounts to Euro 110 M for the total programme, which has a total turnover of Euro 293 M covering the period from 2008 to 2015.

Figure 4: Total turnover and requested contribution of the government

Action line	Total turnover (million Euro)	Requested support from government (million Euro)
Accelerating business creation	85	34
Research and joint development	205	76
Competence and network building	3	0.5
Total	293	110

Furthermore additional support of the government is requested for organising and monitoring the PIP as well as actively leveraging its purchasing role to speed up market acceptance for new products and technologies.

3. Polymer Innovation Programme

In line with the ambitions shown above the PIP consists of three strongly linked sub-programmes and related action lines:

- *Track 1: accelerating business creation*
- *Track 2: executing pre-competitive research and joint development programmes*
- *Track 3: competence and network building*

Figure 5: Level of impact of action lines on objectives defined

		Objectives		
		Economic growth	Quality of life + Sustainability	Community
Tracks	**Actionlines**			
Track 1	*a. New market space*	H	M	M
	b. Start ups	H	L	L
	c. High risk innovation projects	H	M	L
	d. Building cross border business initiatives with SME's	M	L	M
	e. Building consortia for increased valorisation	H	M	H
Track 2	a. Joint development programmes	H	H	M
	b. Pre-competitive polymer research programme with strong international focus	H (long term)	H	H
Track 3	*a. World Polymer Academy*		L	M
	b. Focus and mass in Dutch knowledge infrastructure and training programmes	L	L	H
	c. (Foreign) exchange programmes			H
	d. Master classes to increase innovation competence and understanding of 3P	L	L	M
	e. New investments in PST&B resources and facilities	M		M
	f. Building mass in participation in international innovation programmes	L		M

Legenda: H = High impact M = Medium impact L = Low impact = No impact

All tracks mentioned above will be detailed in this chapter, including results, key success factors and performance indicators. Details about the economic growth ambition can be found in appendix 1.

Track 1: Accelerating Business creation

"Aimed at creating additional market space and accelerating market driven business creation on the basis of PST by both existing and new companies".

I. Overall result

- Significant contribution to the economic growth objectives; Euro 800 million from additional/new valorisation initiatives with a high level of participation from SME and product application value chain partners. With an average added value of 30% being realised in the dutch polymer sector, this implies an additional turnover of Euro 2.4 billion.
- Stronger capabilities of existing companies and start-ups to successfully innovate through higher value added products, new partnerships and addressing new market needs.
- Increase of the number of innovative companies in the categories "leaders" and "developers".
- Strong progress in addressing needs and the creation of business concerning sustainability and quality of life.

II. Action lines

A. New market space

Results:

- Faster growth of existing companies and growth of number of innovative leaders and developers through a series of new and expanding high value added businesses.
- The development of best practices for close cooperation between players in the polymer value system, more specifically SMEs, and the demand side in new and emerging societal and business areas.
- An evolving portfolio of business roadmaps and of joint business development projects aimed at emerging market opportunities and societal needs.

Activities supported by PIP:

The sequence of activities will be the following:

- A series of workshops: aimed at articulating future needs and demands (roadmaps).
- Generating and exploring breakthrough ideas for short term application of current PST in addressing these needs.
- Formation of consortium based business development projects.
- Advice and support on issues such as IP/legal.

From the start the focus for these workshops and joint projects will be on tangible need areas such as innovation areas (e.g. Food & Nutrition, Water), need areas articulated by NGO's (e.g. Health, bottom of the pyramid) and the transition tracks within the Dutch energy transition programme (e.g. application of biomass and recycling). A typical example of how PIP can operate was the request of the Dutch Kidney Foundation. Experts were invited from a range of disciplines (from organic chemistry to clinical research) to a workshop to develop the roadmap for a wearable/implantable artificial kidney – a plan now embedded in the Programme Proposal Biomedical Materials.

Through the cooperation with knowledge institutes SMEs will gain an improved understanding of and access to advancements in PST (e.g. functional polymers) and related knowledge areas both in the Netherlands and abroad. Project resulting from the road mapping activities may require additional support and funding (link with other action lines) and may lead to new start-up initiatives (see action line b).

Relevant actors:
- Universities, HBO, individual SMEs active in the product and application value chain, NGO's, representatives from key innovation areas, SenterNovem.

Starting up:
In 2007 PIP will establish contacts with potential partners and organise introductory workshops. Based on the response concurrent roadmap projects will be started with knowledge institutes and SMEs. First roadmap projects start in early 2008. These will then be followed by business development projects.

Key success factors	**Performance Indicator**
# of workshops	5 per annum
# of joint road mapping projects	5 per annum
# of business development projects	5 per annum
# of companies directly involved in joint projects	15 -20 per annum
# of successfully completed projects	first results in 2008, increasing number of commercial results from growing number of companies by 2010 – 20 commercial results by 2012 – 30 commercial results
Satisfied companies and partners	over 75% of participants is positive about initiative and the results

Average cost of workshop will be Euro 15.000. Companies /NGO's will carry 50% of cost Average size of road mapping projects will be Euro 75.000. 50% of the cost will be carried by companies. Average cost of business development projects will be Euro 100.000. 75% of the cost will be carried by companies. Contribution of companies in cash and in kind.

B Start ups

Results:
- Increased number of new start-ups with higher probability of success.
- Accelerated growth of existing start-ups and of intrapreneurship inside existing companies.
- Strong (international) support network for start-ups.

Activities supported by PIP:
Focus will be on current and new start-ups and on facilitating spinning in and out. Existing start-ups will be supported by facilitating access to international networks (expertise, business and facilities), by IP/legal advice and by customized funding mechanisms e.g. for stages in the development stage where piloting capacity needs to be increased step wise. New start-ups and intrapreneurship will be stimulated by a series of workshops stimulating entrepreneurial talent to generate business/application ideas based on available PST. (Regional) intake and coaching sessions will help entrepreneurs focus on business potential and stress attention for reducing Time to Market and Time to Profit. Complementary activities will involve the creation of peer and role model networks for start-ups, the creation of a special Polymer Technopartner Fund, links with COCI (Centers of Open Chemical Innovation) and on the intensified contacts with international partners in the pre-competitive research programmes.

Relevant actors:

start-ups, entrepreneurs, Incubator 3+, COCIs, Technopartner, NRK, DPI partner network, SenterNovem

Starting up:
The current pilot cases will be continued in the course of 2007 and the intake of existing start-ups will be intensified. The role and services of PIP will be communicated to current intermediary organisations and to the “start up” network in industry and knowledge institutes. The cooperation with COCIs and Incubator 3+ will be intensified.

In 2007 and 2008 a series of workshops will be organised to stimulate entrepreneurs with ideas to create ventures and to create business ideas based on PST.

Key success factors	**Performance Indicator**
# of new start ups supported	4 per annum
# of existing start ups successfully supported	6 per annum
Level of satisfaction of start ups involved	75% of the start ups is positive about initative and the results

Budget per annum for coaching start-ups will be Euro 100.000. 50% of cost will be carried by the start-ups or supplied in kind by other supporting intermediaries.

C High risk innovation projects

Results:
- A series of new and expanding businesses of high value added.
- Reduced Time to Market & Time to Profit of promising innovation projects.
- Increased probability of project success.
- Best practices for successful approaches to high risk innovation projects.

Activities supported by PIP:
Running and future innovation projects with a high risk profile require subsidies and other forms of support. The action line aims to increase success changes by supporting the definition of clear feasibility and development projects and by bundling available support mechanisms (e.g. feasibility studies and project development grants). Other activities will encompass joint workshops for companies addressing topics such as increased attention for ”design”, creating market space by identifying new customer value and conscious decisions about commercial strategies, managing innovation projects and setting up alliances. Further more it will be stimulated to utilize the international partner network in the PST&B community.

Relevant actors:
PIP, SMEs, PTG, PSCG, TNO, companies in international network, SenterNovem.

Key success factors	**Performance Indicator**
# of feasibility studies initiated	total period: 300
# of high risk innovation projects started	total period: 60
# of high risk innovation projects successfully completed	total period: 30
Level of satisfaction of the companies	75% of companies is positive about initative and the results

Average cost of a feasibility project will be Euro 100.000. Companies will carry 66% of the cost. Average cost of a development project will be Euro 500.000. 66% of the cost will be carried by companies. Contribution of companies in cash and in kind.

D Building cross border business initiatives with SMEs

Results:
- Additional growth potential created by commercializing PST through cross border business initiatives.

Activities supported by PIP:
By a proactive approach new border crossing knowledge and business networks will be established while existing networks in the polymer value chain will be strengthened. The aim is to have Dutch innovative SMEs be more actively involved in joint development and business projects with European partners. Initially (2007) the focus will be on building stronger relationship with the regions Flanders and North Rhine Westphalia. First step will be intensifying contacts with partner organisations in Flanders and North Rhine Westphalia. This leads to organising events/workshops (approx 20 participants from the three regions) for clusters of SMEs. Events have a market driven theme and the objective is to have participants identify ideas for joint business opportunities (business dating). Subsequent steps will be the development of business roadmaps for promising opportunities and the start of joint (business) development projects. These will involve knowledge institutes.

Relevant Actors:
PIP, SMEs in Flanders, the Netherlands and North Rhine Westphalia, knowledge institutes, SenterNovem, NRK, kunststoffland NRW, Federplast, Vlaams Kunststof Centrum.

Key success factors	**Performance Indicator**
# of companies involved	40 per annum
# of workshops	on average 2 per annum16 over total period
# of business roadmap	on average 3 per annum, 24 over total period
# joint business development success	60 % of business roadmaps lead to projects and 50% to commercial business

Average cost of workshop will be Euro 20.000. 50% will be carried by companies.
Average size of business roadmap projects will be Euro 75.000 per annum. 50% of cost will be carried by companies. Contribution of companies in cash and in kind.

E Building consortia for increased valorisation

Results:
- Contribution to the additional added value of Euro 1,6 billion in 2017 that should result from valorisation efforts by partners in the pre-competitive research programme.

Activities supported by PIP:
In future individual partner companies will play a key role in the valorisation of results of pre-competitive research. However larger companies or knowledge institutes face problems in organising the development stages following the research phase in case new combinations of players (consortia) are required for joint application and development projects. Creating and managing these consortia represents a weaker spot in their valorisation process.

Jointly with a lead company (e.g. partner of DPI pre-competitive research programme) PIP support in defining the development process and key deliverables. The next step will be profiling of partner organisations for the development project (knowledge institutes, MNC, SMEs in the Netherlands or abroad) and formation of consortia (e.g. role, participation, legal, IP aspects). PIP will coordinate execution and monitor progress.

Relevant actors:
PIP, Partner in pre-competitive research, knowledge institutes, SMEs, other companies.

Key success factors	**Performance Indicator**
# of consortia started	on average 3 per annum 24 over total period
Commercial output of consortia	50% of consortia result in sustainable added value

Average size of project will be Euro 250.000 per annum. 75% of cost will be carried by lead company and consortia partners.

Track 2: Executing pre-competitive Research & Joint Development Programmes

"Aimed at stepwise improving the future growth potential of SMEs in the Dutch product and application value chain by launching new forms of joint development programmes aimed at new technology and sustainability issues. And at tilizing and expanding the international pre-competitive research network for stepwise progress in addressing the future challenges of the 3P agenda".

I. Overall result

- A positive track record for joint development programmes of SMEs in the product and application value chain, with knowledge institutes.
- PST based breakthrough solutions addressing issues in sustainability and quality of life.
- Actionable results enabling short to medium term valorisation by SMEs in the product an application value chain.
- Actionable concepts enabling medium to longer term valorisation by international partners in the polymer value system.

II. Action lines

A Executing joint development programmes.

The ambition of the Development programme is to offer Dutch SMEs involved in the product & applications value chain a highly effective route for joint development projects.

Results:

- Tangible results that individual participants will convert in new higher value business initiatives or in the implementation of new process and technologies. This will significantly contribute to the objective of additional added value of Euro 800 million by 2017.
- Increased mass and focus in developing solutions for needs in the domain of sustainability and roadmaps for implementation.
- Intensified cooperation between SMEs in joint development projects with knowledge institutes resulting in best practices for setting up and executing these joint programmes and subsequent projects.

Activities supported by PIP:

As a result of an interactive process by NRK with SMEs and larger companies a short list has been defined of themes for joint development efforts.
These themes are:

a. Deployment of new material properties and technology.

Past research has lead to (hybrid) materials (e.g. metals and polymers) with new and improved properties. With focus on higher value added, the focus for this theme is to explore new/improved product applications as well as appropriate ways for processing (moulds, process technology) these materials.

b. Deployment of sustainable feed stock and scaling up of processes.

Future research programmes will contribute to new breakthroughs in the application of biomass. However biomass based polymer solutions are currently already in various stages of market penetration. This theme will encompass aspects such as requirements and approaches for scaling up, setting up new joint development programmes with other value chains (e.g. agribusiness) and managing market acceptance of proven solutions.

c. Re-use and recycling of current and new polymers and of products partly based on polymers.

Important issues to be addressed are the purity of end products, improved approaches in the recycling of hybrid and bio based polymer materials, improvement of properties of recycled polymers and decrease of overall cost of recycling.

d. Breakthroughs in environmental aspects of applications of current materials and additives.

The focus will be aimed at high volume substitution of additives with less favourable environmental properties (e.g. cobalt, antimonium, bromium compounds, soot, silica and formaldehyde) by more attractive ones. Also approaches to lowering the volume of applied additives by means of new technology (e.g. statu-nascendi-techniques).
e. Further reduction of energy-use and energy transition for production and processing of polymers/ polymer materials.
Since 1998 companies in the product and application value chain have reduced energy-use by over 40%[6] making the sector the leader in the Dutch industry. However this theme remains a high priority topic requiring joint efforts.

In starting up the action line, following scheme will be followed by PIP:
1. Work shops exploring the themes and defining specific topics, taking an outside in and demand driven approach.
2. Development of joint programmes, definition of deliverables, required knowledge and competencies, action plans, etc.
3. Formation of consortia centred on selected themes and topics. Establishing network contacts with partners new to the polymer value chain system.
4. Monitoring of progress and evaluation of interim and final output.

Getting started:
2007 joint workshops aimed at exploring themes and defining joint programmes
2008 start of at least 2 development programmes growing towards 6 in 2010.

Relevant actors:
The stakeholders involved will be individual companies that will participate to programmes focused on one or more of the themes briefly described in the above. Close cooperation will be important with trade associations (NRK) and special interest groups such as Biobased Business and BCPN. Close cooperation with knowledge institutes (universities, TNO, HBO) focused on areas such as polymers, additives and production technology. Partners from related value chains will be very important (e.g. agro-business and metals).

Key success factors	**Performance Indicator**
# of joint development projects	2008: 2 in 2012: 8 over total period: 44 joint development projects
# of participating companies	3-8 per project; approx 150 in total and knowledge institutes
commercial output of the joint development projects	contributes significantly to the objective of Euro 1 billion in additional added value and to objective of reducing use of fossil feedstock. First commercial output in 2010

Average cost of a project Euro 250.000. 75% of cost is carried by companies
Total budget Euro 16 million. Government stake will be Euro 4 million.

B Executing pre-competitive research.
This programme can strongly benefit from the momentum and reputation of the current international partner network managed by the Dutch Polymer Institute. The new research programme has been developed with current and new partners. For further details we refer to the detailed plan issued in August 2006. The partners have made a commitment to support the execution of the plan in Euros and in kind. The ambition of the pre-competitive polymer research programme is to be a world class, European based centre of excellence in polymer science and technology.

[6] www.senternovem.nl/mja

Results:
- Science meeting high international standards.
- High level of patents and inventions per investment.
- High level of IP leading to business, and eventually contributing to Euro 2 billion in additional added value by 2017, to be realized by the participating companies.
- Attracting top talent and delivering world class researchers.
- Involvement of all major top European knowledge institutes and business in related areas.
- Participation of other European regions as funding partners (e.g. North Rhine - Westphalia and Flanders.

Activities supported by PIP:
The selection of research themes for the years 2008-2015 has been based on the potential of the research in question to contribute to:
- A further improvement of the quality of life in a global society that is increasingly becoming dependent on materials technology.
- A sustainable materials and energy economy in the light of severe resource and environmental constraints.
- New economic opportunities and long-term competitiveness for polymer-based industry in the Netherlands and Europe.

Four themes have been selected as well as a set of enabling research competences.
The four themes and related activities are:
a) Durable high-volume performance materials.
Research projects should enable:
- New technological options in housing, transportation, infrastructure, packaging, sports.
- Materials solutions needed for rapid human and urban development.
- Energy and raw material savings by less waste and improved processes (catalysis).
- Manufacturing industry needs new knowledge based on pervasive science, e.g. the development of molecular architecture to giving a rise to improved properties (strength, toughness, flow properties).

b) New polymers for sustainability.
The activities in this field are led by finding bio-based monomers that replace fossil monomers. It is foreseen that these activities create opportunities in new markets for polymers like food and health care.
c) High-added-value coatings and barrier films.
Within this activity the focus is on polymeric materials for the protection of material integrity and food quality. New options are expected to come from combined functionalities, including traditional properties with safety, shelf life, cleaning and smart functions in packaging.
This approach will create new materials with high added-value products.
Furthermore material savings through better and longer protection, solvent removal will contribute to sustainability.
d) Materials for high-tech and bio-functional applications.
Create new ICT, energy, medical nanotechnologies. Paradigm change deriving from polymer based (bio-functional) nano-science. This activity comprises the development of new knowledge to be applied in polymer-based photo-voltaics, large-area and efficient solid-state lighting, enabling components for new battery/fuel-cell technology, bio-medical applications and tracking/tracing tags. Especially well understood low-cost polymer processing and flexibility of polymeric materials will help increase acceptance of non-fossil based energy generation and storage.

Enabling research competences
Three competence areas have been identified, which are pervasive for all themes above:
1) Catalysis.

Polymerisation catalysis is a supportive competence for research on all classes of polymer-based materials. It comprises homogeneous catalysis, heterogeneous catalysis and biocatalysis and is a crucial and indispensable tool for

- Improving the process economy and product performance of existing high-volume performance polymers, coatings, fibres and films.
- Developing new, environmentally benign and sustainable processes towards such polymer products.
- Developing special, new functional materials for a.o. biomedical and electronic applications.

2) Multi-scale modeling.

An essential requirement for knowledge-based design of polymeric products, and for controlling and tuning the properties of these polymeric products to the demands of the application, is insight into the three-cornered relationship between the material's microstructure, its temporal development under external conditions and its properties. Modern theoretical and modeling research, computer and computing developments, and the spectacular new possibilities for microstructure analysis with near-atomic and chemical resolution, increasingly offer the tools to meet these requirements, and such developments will continue at a fast pace.

3) High Throughput Experimentation.

High-throughput experimentation and combinatorial materials research open the way for full and fast polymer research workflows to rapidly investigate polymers and polymeric products that show systematic variations in their composition, processing parameters, or property profiles. This will lead to defined libraries of polymers having targeted molecular structural and functional properties at surfaces and in bulk and thin-film products. Industries are confident that in the short term the high-throughput methodology will enable significantly faster fundamental breakthroughs in the search for new polymer performance. In 2007 the programme and the distinct projects will be defined in more detail and new Dutch and international partners (knowledge institutes as will as SMEs and large companies) will be attracted.

Joint activities with other sectors:

Application programmes in synergy with the Netherlands Institute for Metals Research (NIMR). DPI and NIMR, can create much synergy here in well-chosen application areas. The two institutes intend to start such synergy programmes in the following areas:

- Polymer coatings for corrosion protection.
- Polymer-metal laminates as light weight, ultra-strong materials.
- Processing and new functional properties of polymers with dispersed metal nanoparticles.

DPI and NIMR have already made a start on a joint pilot project on corrosion protection. This should develop into a larger synergy programme combining the best skills and knowledge of both institutes in relation to corrosion and coatings.

FOM Industrial Partnership Programmes on generic and exploratory topics:

At DPI and other Institutes, collective industrial interests are translated into pre-competitive application-oriented research programmes. This places the Leading Technology Institute in a natural role to also identify the needs for generic underlying exploratory science that has a longer time horizon and a broader application relevance than science focusing on only one material or product class. DPI, NIMR (metals) and Wageningen Centre for Food Sciences (WCFS, food) have decided to take up that role as industry partners with the Dutch physics-research organisation FOM via FOM's Industrial Partnership Programme (IPP).

Relevant actors:

Dutch and international companies, knowledge institutes and the Ministry of Economic Affairs.

Key success factors and performance indicators

#	Key success factors	Performance indicators
1	Selection of high quality scientific projects	Projects meet focus, mass and quality criteria
2	Selection of projects aimed at joint future agenda of society and business	At least 75% of the projects in 2010; 100% in 2015
3	High international academic ranking following CWTS method	At least comparable to reputable international academic polymer institutes as benchmark
4	Quality of scientific papers	
4.1	# of papers in refereed scientific journals	Minimum of 1 and target of 1.5 in 2010 and 2 in 2015 per researcher / year
4.2	Impact factor of chosen journals	Larger than 3.0
4.3	Citation impact of the papers (basis: web of Science) – CWTS method	Academic ranking at least equal to the benchmark, high quality of papers 2010 Citation impact 1.5x world average 2015 Citation impact 2x world average
5	# of patents and inventions	Increased level of patents and inventions per million Euro invested 2010 50% higher than 2005 level 2015 100% higher than 2005 level
6	# of fellowships and affiliations	At least ten international frontrunners
7	IP leading to business	> 50% of total output, at least 10 start-ups in 2010 and 50 in 2015
8	# of partners (government, knowledge institutes, businesses)	Increase in number of leading partners and tickets
9	Attraction of top talent	Attracting and selecting world class research talents, at least 25% op total researchers through selection channel
10	Talent transfer to industry	> 80% of transfers leads to position in European polymer sector
11	Attraction of high tech SMEs	> 50% increase: from current level of 8 to at least 12 in 2010 and 16 in 2015

Financial contributions from universities, companies and government
The research part of the activities will be following the 1:1:2 formula (25% universities, 25% companies and 50% government) in the first 4 years. In the second 4 years this will be changed to 1:2:2 (20% universities, 40% companies and 40% government). This implies a total volume of Euro 189 million (growth of Euro 27 million compared to now). During the whole budget period (8 years) the government contribution will be kept constant at Euro 9 million p.a.

Track 3: Competence and network building

"Aimed at ensuring the required conditions for the sustainable vitality of the polymer PST&B community in the Netherlands as the driver for future growth".

This part of the PIP addresses conditions highly critical for the sustainable future development of the Dutch polymer value system and for achieving the objectives as defined. However activities do not require extensive additional funding. Most of the action lines require a proactive approach by the PIP and close cooperation with various stakeholders. The importance of the action lines is such that they will be managed and monitored along with Tracks 1 and 2.
This Track should be largely self supporting financially. The total turnover has been budgeted to 3 million Euros; government support is requested for 0.5 million Euro.

I. Overall result

- Excellent international reputation ("Holland, the polymer place to be") and the Dutch PST&B community as the preferred partner for new initiatives.
- Strong inflow of new talent and investments into the Dutch PST&B community.
- Accelerated development of human capital meeting future needs.
- Increased level of interaction between current and new participants in various stages of the polymer value chain, and also across geographic and industry borders.

II. Action lines:

A World Polymer Academy

Results:

- Stepwise increase of number of well trained researchers/workers in Europe for.
- Build up of sufficient resource of well trained researchers/workers in emerging areas of the Polymer Science & Technology.

Activities supported by PIP:

- Fine tune the Human Capital Road map of the chemical industry and of the polymer based products and applications sector, and jointly with European partners develop a roadmap (5-10 years) with a European scope. This may concern more "traditional" areas (e.g. polyolefins) and emerging knowledge areas (e.g. polymer based nano science).
- Stimulate universities to timely start new programmes to meet future demand.
- Develop a series of customized modules in close collaboration with Dutch knowledge institutes and offer these as open programmes to industrial companies in Western Europe.

Relevant actors:
MNCs, knowledge institutes.

Getting started:
First tangible action will be a European initiative aimed at polyolefins. A number of European companies will fund this virtual programme and have employees participate. The overall Human Capital Roadmap for the chemical sector will guide the development of other initiatives.

Key success factors	**Performance Indicator**
# of courses and of participants	20 per annum
Level of satisfaction of companies	75% satisfied

B Focus and mass in Dutch knowledge infrastructure and training programmes

Results:
- Contribute to supply of sufficient highly qualified people for various functions in the Dutch polymer sector.

Activities supported by PIP:
Execution of high risk innovation projects (Track1), business development projects (Track 1) and joint development projects (Track 2) with strong involvement of HBO and MBO students. Based on the roadmap of required talent (quality and quantity) stimulate the players to start joint initiatives. Support the further development of PTN (Dutch Graduate School of Polymer Science & Technology). The overall Human Capital Roadmap for the chemical sector and current activities in de polymer value system will guide the development of other initiatives.

Relevant actors:
NRK, HBO, MBO.

Key success factors	**Performance Indicator**
To be discussed with partners	all relevant centers are involved

C. (Foreign) exchange programmes aimed at polymers and 3P

Results:
- Increased awareness for international aspects of the role of polymers in addressing 3P challenges.
- Increased mobility and retention of researchers and knowledge workers within Dutch community.
- More foreign researchers working in the Netherlands (in industry and knowledge institutes).
- More Dutch researchers and company employees working abroad for a certain period.
- More MBO, HBO and university students involved in exchange programmes.

Activities supported by PIP:
Create a database (linked to NRK, PIP) for supply of and demand for stages and special assignments. Stimulate companies and knowledge institutes to offer special assignments and make information about these opportunities easily accessible to interested parties. Strengthen the link between ex-pats and local PST&B community. Give special attention to options for employees at MBO and HBO to broaden their horizon by traineeships and exchange programmes in companies and knowledge institutes. Actively utilize the international network contacts to create additional value for participants to exchange programmes.

Relevant actors:
NRK, Dutch Polymer Institute, companies in polymer value system, knowledge institutes (universities, HBO).

Key success factors	**Performance Indicator**
# of foreign students and researchers working in the Netherlands	To be discussed
# of Dutch students, researchers and company employees involved	To be discussed

D. Master classes to increase competencies (innovation, 3p and new technologies/ materials)

Results:
- Improved competencies within industrial companies (SME) in managing and executing innovation/R&D projects stimulating captive innovation and R&D capacity.
- Increased awareness of the impact and opportunities related to quality of life and sustainability resulting in faster transition towards innovation focus on 3P agenda.
- Improved understanding of the potential of new technologies/materials stimulating the transition towards higher value added products.

Activities supported by PIP:
Teaming up with other Innovation programmes (e.g. F&N) for joint programmes aimed at improving the innovation and R&D competence. Actively involve expertise from PIP partner network in these master classes. Develop/offer customized programmes aimed at increasing the awareness for topics related to the 3P agenda, new technologies and materials. Focus on better utilization of available programmes by universities and NRK.

Relevant actors:
NRK, other innovation programmes (e.g. Food % Nutrition), companies in the polymer value system.

Key success factors	**Performance Indicator**
# of students involved	20 per master class
# of Master classes	3 per annum

E. New investments in PST&B resources and facilities

Results:
- A growing number of foreign companies (start ups, SMEs and large companies) establish new PST&B facilities in the Netherlands (e.g. R&D, production, commercial).
- Established companies with PST&B activities in the Netherlands expand their positions in the Netherlands.

Activities supported by:
To develop/improve information package about “the Netherlands as the PST&B place to be” and to inform organisations active in the international scene of attracting foreign investments in the Netherlands about the strengths of the Dutch PST&B community. To inform regional and specialized organisations in the Netherlands about the attractiveness of the Netherlands and to support their interaction with candidate companies by featuring the role models and establishing contacts with members of the Dutch PST&B community.

Relevant actors:
NFIA, regional development companies, VNCI. NRK, role model companies (e.g. Dow, Teijin Twaron).

Getting started in 2007:
- Specialized intermediaries are invited for an information session about the ambitions of the PIP and about role models that profile target groups of possible interest.
- Upgrading of available information package to encompass the newly defined ambitions.
- Actively follow up possible leads from the PIP network.

Key success factors	Performance Indicator
New entrants to Dutch PST&B community	To be discussed
Expansion of current foreign company in the Netherlands	To be discussed
Increase of number of foreign companies establishing a base in the Netherlands	To be discussed

F. Building mass in participation in international innovation programmes

Results:
- Increased level of participation of the Dutch PST&B community in EU programmes (e.g. Eureka, KP 7) and specifically of SMEs in these programmes.
- Increased share of available funds and of successfully completed projects.
- Stronger cooperation between Dutch companies & knowledge institutes and between Dutch and foreign partners.

Activities supported by PIP:
- Timely communication to target groups in the Netherlands about new schemes.
- Networking via the international contacts to involve Dutch partners.
- Utilize the international network to create strong consortia for joint development.
- Support the qualification process and bundle the interests of Dutch companies and knowledge institutes (focus and mass).

Relevant actors:
Both national and international: SMEs, MNCs, knowledge institutes.

Key success factors	Performance Indicator
Euro's in research funds	To be discussed
# of companies and knowledge institutes involved	To be discussed

4. Operations, Governance & Finance

4.1. Organisation

The tracks and action lines described in the above sections differ in scope, time horizon and nature of actors, as well as starting position. Based on past experience and consultation of parties involved it has been concluded that the success and impact of the PIP would greatly benefit from an organisational structure that would separate the internationally oriented pre-competitive polymer research programme (part B of Track 2) from the other Tracks and action lines. Thus the PIP will be executed by two closely linked organisations, the DPI Value Centre (DPI VC) and the Dutch Polymer Institute (DPI).

4.1.1. DPI Value Centre

This is a new organisation – a foundation - that will carry out all the tracks of the PIP except for the pre-competitive research programme. The latter will be carried out by the Dutch Polymer Institute (see under 2. for organisation details).

DPI Value Centre will be managed by a full time director with a staff of 5 FTE in 2008 and 10 FTE in 2012. This staff will consist of the following functions:
- Project office staff: project managers responsible for executing the action lines.
- Secretarial support.

A Service Level Agreement (SLA) will allow the DPI Value Centre to utilise facilities and services from the DPI core organisation at actual cost.

At the end of 2006 the first preparations for DPI Value Centre have started. This start-up phase will be largely funded by Brainport, an organisation that aims to stimulate economic activity in the Eindhoven region.

In January 2007 a Value Centre Taskforce has been formed with participants from stakeholders such as Brainport, Polymer Technology Group, NRK, DPI, TNO, Syntens, Technopartner, United Brains, Creative Conversion Factory. This Taskforce will report to the PIP Steering Group (see section on governance) and to the Brainport organisation.

In the second half of 2007 the DPI Value Centre will be officially launched having a small core organisation initiating the first pilot projects. As of early 2008 the Value Centre should be fully operational and expand the range of initiatives and the number of participating SMEs, start-ups, NGOs and knowledge institutes. By early/mid 2008 an evaluation of the pilots will be made. The Taskforce will determine on key learning points and the required modifications to the approach for the following, two-year period (2008 – 2010). During this period the Value Centre programme will establish and expand its reputation primarily with Dutch stakeholders. From 2010 onwards, the programme as well as the network of stakeholders will be expanded strongly.

4.1.2. DPI

The Dutch Polymer Institute forms the basis for the organisation of the research track. DPI consists of a small team managing a quite extensive network of activities and relations between industry and academia. The research activities will be mapped into a detailed research programme, with a four-year horizon and an annual cycle, via the principle that industry decides ‘what’ and academia decides ‘how’. Based on the interests expressed by industry (via allocation of tickets) and starting from the present situation, Technology Areas

(TAs) are established. Within these TAs, research programmes and projects are defined and IP is shared.
The research programme is managed and steered by the Programme Area Coordinator – who has the responsibility for one or more TAs – in close consultation a Scientific Chairman. These scientific Chairmen are internationally recognised scientific experts in the field of the Technology Area and chair the meetings of the so-called Programme Committees.
In regular progress meetings, at least twice a year, reports on progress and output are made to the full Programme Committee. Whenever any research inventions are made that are potentially patentable, the project leaders have to report these directly to the Programme Area Coordinator, who manages all follow-up in consultation with the Programme Committee and relevant experts and in accordance with the DPI IP rules. Furthermore, all publications intended for the public domain are to be reviewed by the Programme Area Coordinator and the Industrial Contact Persons in order to protect potentially patentable inventions.

The Scientific Reference Committee
DPI has a Scientific Reference Committee, consisting of scientists of high international reputation whose combined expertise covers the general DPI research field. This Committee will at its own initiative and at the request of the Supervisory Board or Executive Board give scientific advice, both on the research direction of the institute and on the quality of its research. At the initiative of the Scientific Director the Scientific Reference Committee will meet at least once a year and report its findings to the Executive Board and the Supervisory Board.

Internal organisation and staffing
In order to manage DPI effectively, more emphasis will be put on certain aspects of operational management, based on the following considerations:
- The acquisition of new (funding) partners will be done by the Programme Area Coordinators and management will intensify their involvement in actively engaging with new partners and managing current partner relationships. International acquisition will increase in importance.
- The Scientific Chairmen will play a key role in defining DPI's scientific research agenda.
- DPI Fellows will be appointed to increase partners' commitment to DPI and reinforce the DPI brand.
- Marketing and promotion (being an integral part of the Communication/PR task) will need additional, structured efforts aimed at expanding DPI's international network.
- DPI will recruit excellent staff who have international ambitions and extensive knowledge of PST and who are willing to work full-time for DPI.
- Legal Affairs and IP will remain an integrated function.
- HR and IT services for the DPI organisation will be outsourced DPI will continue to be a virtual institute. This implies an organisation aimed at efficiently facilitating research by multiple partners. DPI will remain a relatively lean and mean organisation. In the coming years its staff will gradually grow from 10 to 12 FTE.

4.2. Governance

To coordinate all programme tracks within the Polymer Innovation Progamme an overall Steering Group will be installed.

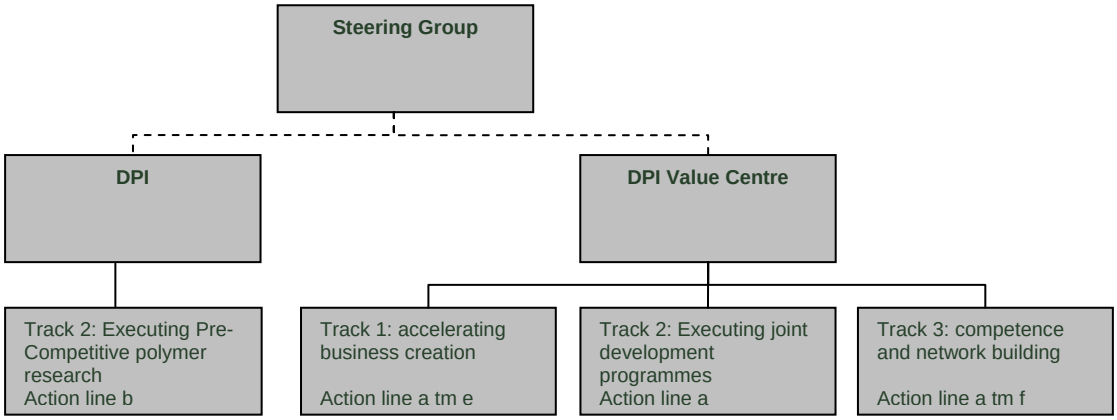


Figure 6: Governance structure

Tasks of the Steering Group will be:
- Monitoring the realisation of the mission and ambition of the PIP.
- Strengthening the relation between the activities of the various programme tracks.
- Communicate the need of demand driven research of one programme that can be carried out by the research programme.

The Steering Group will meet at least twice a year. The proposed composition of the overall Steering Group will consist of:
- An independent chairman.
- One representative of the board of each DPI Research and DP Value Centre.
- Two representatives of the National Chemistry Board.
- Representatives of national government: the ministry of Economic Affairs as well as the ministry of Education, Culture and Science.
- A representative of regional government.

4.2.1. DPI Value Centre

As was explained in the previous section DPI Value Centre will be organised in the following way:
- a small team headed by a director will act as the operational core, while
- a taskforce with broad representation will monitor the evolution of the programme and the different pilots.

The DPI Value Centre Taskforce has to secure transparency and support in decision making and has the following responsibilities:
1. To make sure the objectives will be realized.
2. To report their activities and financial situation annually.
3. To approve the yearly budget and financial data.
4. To guard and facilitate the formation of agreements in consortia.

The taskforce will contain participants from stakeholders such as Brainport, Polymer Technology Group, NRK, Dutch Polymer Institute, TNO, Syntens, Technopartner, United Brains, Creative Conversion Factory and at a later stage from North Rhine - Westphalia and

Flanders. This Taskforce will report to the PIP Steering Group and to the Brainport organisation.

4.2.2. DPI

The governance structure of the pre-competitive research programme comprises the following bodies:

- Council: this is the representative body of participants and mainly has institutional powers.
- Supervisory Board (SB): it consists of representatives selected by the Council, supervises the Executive Board (EB) and acts independently of the Council. It appoints and dismisses the members of the EB.
- Executive Board: is responsible for managing the daily operation of the organisation.
- Programme Committees (PCs): each partner company that contributes to a Technology Area has a seat in the relevant Programme Committee. The PC is chaired by a Scientific Chairman, a recognised academic expert, who is responsible for the scientific quality of the programme. The Vice-Chairman of the Programme Committee is a Programme Area Coordinator, based at the organisation's office, who has managerial responsibility for the TA research programme.
- Scientific Reference Committee (SRC): an advisory body of world-leading polymer scientists which provides advice of a scientific nature to the EB and SB. Its members are appointed by the Supervisory Board. This structure may evolve as a function of the future participation of other European governments.

4.2.3. Operational cooperation between DPI and DPI Value Centre

The two legally seperate organisations will closely cooperate on the following points:

a) In the process of transferring IP from DPI to the DPI VC.
b) In organising activities of mutual interest (e.g. conferences, workshops).
c) In sharing human and other resources for improved synergy and efficiency, based on clear agreements on costs.
d) In using each others networks (e.g. for technical or business expertise) to enhance the service quality of each organisation.

4.3. Monitoring and evaluation

One of the parts of the programme is the Monitoring and Evaluation (M&E) plan. This plan aims firstly to track the progress of the programme (information for the programme management) and secondly to justify to the government how tax payer's money is being used and what the effect has been. In cooperation with the 'Projectdirectie Innovatieprogramma's' of the Ministry of Economic Affairs, in the second half of 2007 a more detailed M&E plan will be made.

The following starting points have been formulated:

- M&E will be dependent on the type of programme and the activities in each programme.
- A central point is the aspect of building on the lessons from monitoring and evaluation (i.c. the learning aspect).
- It should meet the needs of an adequate and reliable management and reporting process
- The M&E should be based on simple and efficient process with a minimal administrative burden by using as much as possible.
    - Only the information necessary for the execution.
    - Existing monitoring processes and measurement instruments.
    - A limited set of relevant indicators.

- The role of each stakeholder will be respected. SenterNovem will give input about the projects of the PIP under their surveillance.

The evaluation of the monitoring results will consist of the following elements:
- *Zero point measurement* in 2007: relevant indicators will be selected and the set point for the indicators will be determined. The zero point measurement hence is an ex ante evaluation. This measurement will also be used to study the needs of the participants.
- A *midterm evaluation*: which nature and timing will depend on the type of programme under evaluation.
- An *effect evaluation*: the last 2 years of the programme an evaluation will be done to determine the level to which the goals have been met.
- A *follow up effect evaluation*: some years after the end of the programme, a follow up evaluation will be made. The reason for this is that effects on company performance will only show after several years.

4.4. Finance

The PIP will be financed in the following ways (see appendices 2 and 3 for details). The organisational costs of DPI and DPI Value Centre will be kept below 10% of the total turnover. The organisational cost for the research programme (DPI) is included in the budget for the research activities (Track 2: action line B.). The organisational cost of the DPI Value Centre (Track 2: action line A.) office (Euro 6.4 million) is a separate item in the total PIP budget.

Track 1 Accelerated Business Creation
Track 1 has a total turnover that amounts to Euro 79 million excluding Euro 10 million as p.m. (TechnoPartner facility). The government contribution adds up to Euro 27 million excluding Euro 10 million as p.m. (TechnoPartner facility). The remaining Euro 52 million is contributed by the participating partners. The latter contribution is without the private investments related to guarantees provided by the TechnoPartner facility.

Track 2 pre-competitive research and joint development
This Track will be financed in two different ways:
Action line A: The joint development projects will generate a total turnover of Euro 16 million of which Euro 4 million will be provided by the government and Euro 12 million from the participants (EU rule: application R&D 25% subsidy).

Action line B: The research part of the activities will be following the 1:1:2 scheme (25% universities, 25% companies and 50% government) in the first 4 years. In the second 4 years this will be changed to 1:2:2 (20% universities, 40% companies and 40% government). In the whole budget period (8 years) the government contribution will be kept constant at Euro 9 million p.a. This implies a total volume of Euro 189 million (growth of Euro 27 million compared to now). The expectation is that DPI is attractive enough to companies who want to join despite a lower leverage. At the same time it will become more attractive for universities to join this programme. In each scheme the industrial partners contribute in cash. However, the figures in attachment 1 also take into account the contributions in kind from these companies, being 50% of their cash contribution.

Track 3 Competence & Network building
This Track should be largely self supporting. The total turnover has been budgeted to 3 million Euros; government support is requested for 0.5 million Euro.

5. List of abbreviations

3P	People, Planet and Profit
AWT	Adviesraad voor het Wetenschaps- en Technologiebeleid
BCPN	Belangenvereniging Composteerbare Producten Nederland
GDP	Gross Domestic Product
HBO	Hoger Beroepsonderwijs (education at Bachelor degree)
IP	Intellectual Property
MBO	Middelbaar Beroepsonderwijs (Middle Level Education)
MNC	Multi National Company
NFIA	Netherlands Foreign Investment Agency
NRK	Federatie Nederlandse Rubber- en Kunststofindustrie
OEM	Original Equipment Manufacturer
PhD	Doctor of Philosophy
PIP	Polymer Innovation Programme
PST	Polymer Science and Technology
PST&B	Polymer Science, Technology and Business
REACH	Regulation for Registration, Evaluation, Authorisation and Restriction of Chemicals
RFID	Radio frequency identification
SME	Small and Medium-sized Enterprises
SWOT	Strengths, Weaknesses, Opportunities, Threats
VNO-NCW	Verbond van Nederlandse Ondernemingen-Nederlands Christelijk Werkgeversverbond

Appendix 1: Details on the economic growth ambition

The objective of the chemicals sector, as explained in their business plan, is to double the contribution to the country's GDP in 10 years (2007-2017). This implies a growth from the current Euro 12 billion towards Euro 24 billion. Half of this additional amount, being Euro 6 billion, will come from organic growth. The other half of this amount should come from new business a.o. through innovations. Because polymers account for 40% of the added value of the chemicals sector, the polymer innovation programme's ambition is to contribute for Euro 2.4 billion to this growth. Within the programme a division has been made in Euro 0.8 billion Euro as a result of valorisation by SMEs and start-ups (A) and Euro 1.6 billion Euro as a result of pre-competitive research (B). This will be detailed below:

A. Added value growth of 0.8 billion through valorisation by SMEs and start-ups
The pillars for this are:

- existing start-ups and SMEs can grow by using existing polymer science and technology (a.o. developed by DPI in previous years), the link with growth markets and the active support of the DPI VC community
- a strong impulse to the creation and growth of start-ups, as well as increasing their survival rate, by active support of the DPI VC community
- future results based on past, running or new research giving an additional boost to business in the period 2012-2017
- the increased effectiveness of valorisation in the period 2010-2017 as a result of the learning curve (valorisation processes and methods) during the first phase (2007-2012). The experiences within the IMEC institute are illustrative for this learning curve.
- New entrants: existing or new SMEs from outside the polymer value system starting polymer related businesses (e.g. on the fields of biopolymers, recycling etc.).

With an average added value of 30% in the Dutch polymer sector, this growth ambition implies an additional turnover of Euro 2.4 billion in 2017. The necessary turnover may turn out to be lower in reality when the real added value will be higher as a result of innovation and a focus on customer value. However, in the calculations this higher added value has not been used, but instead the current 30% level.

The realization of this additional Euro 2.4 billion turnover comes from the following tracks:

1. accelerated growth of existing SMEs in the polymer sector

As explained in the PIP, the focus of the DPI VC is on 500 companies within the polymer sector (innovative leaders and innovative developers combined).
When the DPI VC participates actively in 30% or 150 of these companies over the period of 10 years and these companies as a result realize a additional turnover of Euro 10-15 million in 2017, then the additional turnover will be Euro 1.5 to 2.0 billion.

2. new entrance of existing companies to the polymer sector

Besides point 1, there's a category of existing companies that will enter the polymer sector, e.g. as a supplier of bio feedstock materials. These are estimated at at least 20-30 with an additional turnover growth of Euro 10-50 million each, creating an additional compound turnover of Euro 300 to 600 million in the period 2007 to 2017.

3. creation of new businesses (start-ups) in the polymer sector

The additional turnover created by start-ups can be based on the objective of the DPI VC to support in total 25-30 start-ups in the period 2007-2012. The same amount will be supported

in the second period. Based on experience from this group 5-10 start-ups will realize a higher growth. It is expected that these successful start-ups will realize an additional turnover of Euro 200 million in 2017.

In summary for these three tracks:

	2007-2012	2012-2017	Total 2007-2012
1. accelerated growth	600	1150	1750
2. new entrants	100	350	450
3. start-ups	30	170	200
Total	730	1670	2400

The realization of the total additional turnover of Euro 2.4 billion will, with a (conservative) added value of 30%, lead to an added value growth of Euro 0.8 billion.

B. Valorisation by a growing number of companies (2007: 35) participating in the precompetitive research programme
The growth ambition for the added value resulting from this type of valorisation is Euro 1.6 billion. Based on the average added value of 30%, this implies an additional turnover of over Euro 5 billion. The components by which this additional growth can be realized are:

1. increased valorisation based on previously developed technology in the period 2007-2012. In the second period also results from newly developed technology will contribute.
EIM research has shown that active government participation contributes significantly to a companies own R&D efforts. According to the publication 'Innovation and productivity' of the Ministry of Economic Affairs, 1 Euro investment in R&D has a multiplier of 5 in added value.

2. additional investments in new processes and products (e.g. in the use of bio feedstock)

3. a growing group of (international) researchers enabling new business

4. the attraction of new companies and research facilities by the successful public private partnership

The expectation is that the additional turnover will grow from Euro 2 billion in 2012 to Euro 5 billion in 2017.

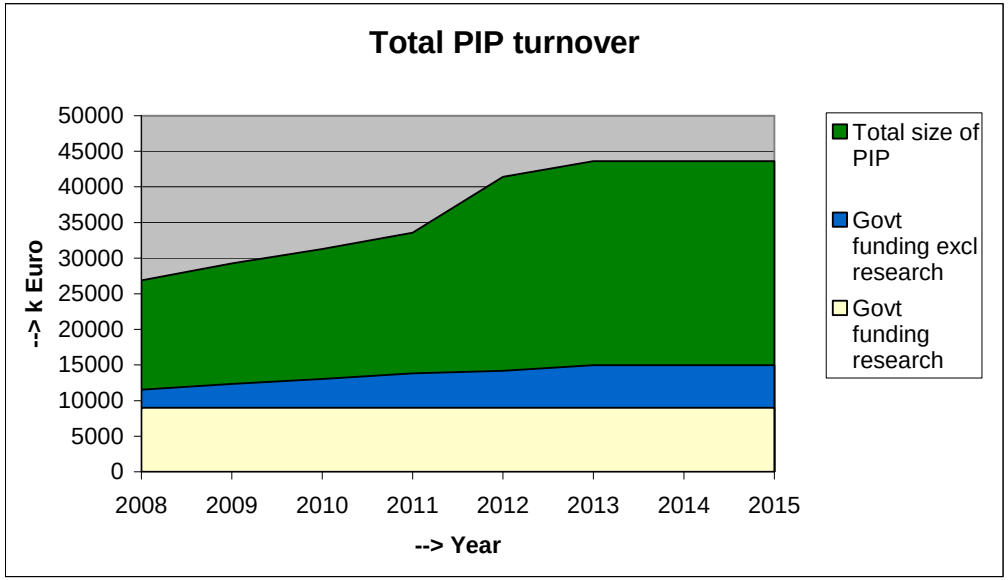
Appendix 2: Budget polymer innovation programme

Budget Polymer Innovation Programme

			2008	2009	2010	2011	2012	2013	2014	2015	Total 2008-2015 kEuro	Total Govt. kEuro	Total KI's kEuro	Total Companies *) kEuro
I		**Accelerated business creation**												
	A	Market space												
		Workshops, 5 p.a., 15 kEuro each	75	75	75	75	75	75	75	75	600	300		300
		Roadmapping, 5 p.a., 75 kEuro each	375	375	375	375	375	375	375	375	3000	1500		1500
		Business development projects, 6 p.a., 100 kEuro each	600	600	600	600	600	600	600	600	4800	1584		3216
	B	Start-ups												
		Coaching, facilitating, tech&buss support 5 p.a., 20 kEuro each	100	100	100	100	100	100	100	100	800	400		400
		TechnoPartner facility p.m.	*1250*	*1250*	*1250*	*1250*	*1250*	*1250*	*1250*	*1250*	*10000 p.m.*	*10000 p.m.*		
	C	High risk innovation projects												
		Feasibility studies 100 kEuro	1500	2300	3200	3900	4500	5000	5000	5000	30400	10032		20368
		# of projects	15	23	32	39	45	50	50	50				
		Development projects 500 kEuro	1500	2500	3000	4000	4500	5000	5000	5000	30500	10065		20435
		# of projects	3	5	6	8	9	10	10	10				
	D	Cross border business initiatives												
		Workshops, 4 p.a., 25 kEuro each	100	100	100	100	100	100	100	100	800	400		400
		Roadmapping, 4 p.a., 75 kEuro each	300	300	300	300	300	300	300	300	2400	1200		1200
	E	Building and operating consortia 3 p.a., 250 kEuro each	750	750	750	750	750	750	750	750	6000	1500		4500
		Total 1-5 excl. TechnoPartner facility	5300	7100	8500	10200	11300	12300	12300	12300	79300	26981		52319
II		**Research and joint development**												
	A	Joint development	500	1000	1500	2000	2000	3000	3000	3000	16000	4000		12000
	B	Research												
		1:1:2 scheme until 2012, 1:2:2 scheme from 2012 onwards	20250	20250	20250	20250	27000	27000	27000	27000	189000	72000	36000	81000
III		**Competence and network building**	325	325	325	325	325	325	325	325	2600	500		2100
IV		**Other**												
		Office: project mgt, administration, finance, legal, communications	500	600	700	800	800	1000	1000	1000	6400	6400		
V		**Totals**												
		Total budget track II.B	20250	20250	20250	20250	27000	27000	27000	27000	189000	72000	36000	81000
		Total budget except track II.B	6625	9025	11025	13325	14425	16625	16625	16625	104300	37881	0	66419
		Total budget all tracks	26875	29275	31275	33575	41425	43625	43625	43625	293300	109881	36000	147419
		Total govt. support track II.B	9000	9000	9000	9000	9000	9000	9000	9000		72000		
		as %	44.4	44.4	44.4	44.4	33.3	33.3	33.3	33.3		38.1		
		Total govt. except track II.B	2538	3357	4044	4830	5193	5973	5973	5973		37881		
		as %	38.3	37.2	36.7	36.2	36.0	35.9	35.9	35.9		36.3		
		Total govt. all tracks	11538	12357	13044	13830	14193	14973	14973	14973		109881		
		as %	42.9	42.2	41.7	41.2	34.3	34.3	34.3	34.3		37.5		

***) contributions both in cash and in kind**

Appendix 3: Turnover polymer innovation programme



	2008	2009	2010	2011	2012	2013	2014	2015	Total 2008-2015 kEuro	Total Govt. kEuro	Total KI's kEuro	Total Companies *) kEuro
Total budget track II.B (research)	20250	20250	20250	20250	27000	27000	27000	27000	189000	72000	36000	81000
Total govt. support track II.B	9000	9000	9000	9000	9000	9000	9000	9000		72000		
as %	44.4	44.4	44.4	44.4	33.3	33.3	33.3	33.3		38.1		
Total budget except track II.B	6625	9025	11025	13325	14425	16625	16625	16625	104300	37881	0	66419
Total govt. except track II.B	2538	3357	4044	4830	5193	5973	5973	5973		37881		
as %	38.3	37.2	36.7	36.2	36.0	35.9	35.9	35.9		36.3		
Total budget all tracks (Total PIP turnover)	26875	29275	31275	33575	41425	43625	43625	43625	293300	109881	36000	147419
Total govt. all tracks	11538	12357	13044	13830	14193	14973	14973	14973		109881		
as %	42.9	42.2	41.7	41.2	34.3	34.3	34.3	34.3		37.5		

***) contributions both in cash and in kind**