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1. MANAGEMENT SUMMARY

Through its location and infrastructure, the Biobased Delta region in Southwest Netherlands is becoming a global competitive top region in the ‘Next Economy’, a sustainable circular and biobased economy that respects the internationally agreed millennium goals. The Biobased Delta Foundation (hereinafter abbreviated to the BBD Foundation) is committed to establishing the circular, biobased and energy-related themes.

The region also includes a large number of multinationals and SMEs, strategic international seaports, an excellent road, water, rail and air infrastructure, strong infrastructure for knowledge and application centres and a dynamic and innovative entrepreneurial climate. Within the region, a distinctive and competitive position for circular and biobased business is developed on a regional, national and international scale with support of the BBD Foundation.

The BBD Foundation's strategy is based on 4 pillars, 3 regional agendas, 6 action lines and 3 flagship projects. The figure below shows schematically the interrelationship. The different parts are explained in chapters 2, 3 and 4.

![Figure 1: Explanation of BBD Foundation activities](image-url)

This multiannual plan describes the ambition of BBD Foundation in collaboration with its stakeholders for the period 2018-2020, and is a continuation and intensification of the expanded strategy that began in 2011 with the report ‘Agenda biobased economy Zuidwest-Nederland: Agro meets Chemistry – Propositie naar topgebieden van Rijk en Europa 2020’. For the period 2018-2020, this multiannual plan focuses on four main lines:

1. Continuation of the development of sustainable circular and biobased programs - Redefinery, Sugar Delta and Biorizon, focusing on consortium formation and acquisition
2. Extending the national and international network to accelerate knowledge, R&D and business development and accelerate new business initiatives (MNO, SME, startups and scale-ups)
3. Increase the added value of the operating lines supporting the (I) regional circular and biobased SME ecosystem and (II) the regional operating lines in cooperation with regional economic development agencies and (III) superregional coordination and linking between top locations and application centres
4. Reorientation & repositioning
Reorientation & repositioning (ref 4) is planned on the following subjects:

- **Strategy:** mission, objectives, connection with government policy regarding public funding, added value and earnings model (*Attract business partners with financial and / or in-kind contributions*)
- **Structure:** organisation and governance
- **Flagship projects:** acquisition, consortia, scalable business cases (*connect MNOs, SMEs, startups and scale-ups*)
- **Operating lines:** intensification and optimization, focused on supporting circular and biobased MNOs, SMEs, startups and scale-ups.

On behalf of the Board and Management of the Biobased Delta Foundation,

Herman de Boon
*Chairman*

Rop Zoetemeyer
*Director*
2. **FLAGSHIP PROGRAMS**

2.1 **REDEFINERY**

Purpose of the Redefinery program is the start of large-scale biorefinery in 2021-2022, using wood pellets or wood chips as raw material. The biorefinery produces sugars and lignin, raw materials for adjacent (or established chemical industry) and possibly energy generation. The BBD Foundation has modelled several biorefinery processes in detail, with the aim of determining input-output relationships, mass and energy balances, plant design, technical feasibility, CAPEX, OPEX, financial feasibility and financial risks.

The capacity of the proposed biorefinery is between 500 and 1,000 kton of wood pellets or chips per year. Because the Netherlands cannot or hardly produce this volume itself, the wood pellets or chips will be bought on the international wood market.

The following milestones will be realized in 2017:

1. Agreement with the potential biorefinery operates. This company will be:
   - Lead investor
   - Responsible for the EPC-contract
   - Responsible for the exploitation
2. Understand logistic choices for the transport and biorefinery of wood pellets or chips
3. Pre-feasibility of the biorefinery
4. Further consortium building

In the period 2018-2020, the BBD Foundation is aiming at:

- 2018: the operator has conducted an analysis of the feasibility and basic engineering of the biorefinery. This shows that the biorefinery is technically and financially feasible, licenses can be obtained and the project can be funded
- 2019-2020: the operator has worked out a detailed engineering of the biorefinery, concluded the contracts for the financing and an EPC contract with the contractor that will build the biorefinery

Then follows:

- 2021-2022: purchase land, construction of the biorefinery, commissioning and startup

In 2018, the operator will take over the initiative of the BBD Foundation. The latter remains involved, but less intensive.

**Biorefinery international**

The operator leads the preparation and construction of the biorefinery. The BBD Foundation expects to stay involved in these activities, but more in an advisory role. Since its start, the BBD Foundation has built up an international network, consisting of wood pellets suppliers, investors, technology suppliers, chemical industry, power companies, government organizations, etc. This network is being developed into an international consortium. The purpose of this consortium is to establish a new biorefinery based on:

- Finding international customers purchasing products from the lignocellulose biorefinery
- Finding locations for new biorefineries
- Logistics of wood pellets and products
- Develop downstream processes based on the Biorizon-program
- Preparing technical and economic feasibility
Informing and training
Industrial scale biorefinery and the handling of raw materials, technologies and products are new to many companies. This also applies to downstream processing, supply chain and technical and financial risks.

The experiences of BBD Foundation and Redefinery represent a lot of knowledge. Together with international technical universities a program will be developed to pass this through to next generations. In the Redefinery program many pre-treatment technologies have been researched. New ones are being prepared. Redefinery aims at becoming an information and training centre on these technologies and provide insights on:
- Overview of technologies, its providers and TRL levels
- Matrix of pre-treatment and fermentation technologies applicable to process woody biomass in a biorefinery for sugar, lignin and building block production
- Performances of technologies, in terms of yields, energy, CO2 and costs
- Performances of combinations of technologies
- Combining technologies to guaranteed processes.

2.2 SUGAR DELTA
The aim of the Sugar Delta program is to stimulate non-food activity based on existing carbohydrate flows.
Background
A recent study by Deloitte (June 2015) and additional research by BBD Foundation confirms that the South-West of the Netherlands has the unique characteristics to grow into a global top region in the biobased economy. The unique characteristics are:

- **Closeness to outlets.** The Biobased Delta region is in the center of the European Chemical Industry.
- **Availability of raw materials.** The region has a strong position in the production of sugars and starches with Cosun/SuikerUnie and Cargill based in the Biobased Delta and significant production capacities in the surrounding areas. The liberalization of the EU sugar market will increase production levels and availability of raw materials.
- **Locations with large synergy potential.** There are several locations for the production of biobased products that offer both cost-effectiveness potential in CAPEX and OPEX, by taking advantage of synergies with existing activities at those locations.
- **Logistics.** The Biobased Delta region is connected to logistical hubs such as the ports of Rotterdam, Moerdijk, Zeeland and Antwerp.
- **Ecosystem.** The Biobased Delta triple helix stimulates and facilitates investments in biobased activities in the region. This unique combination connects (regional) government agencies, large and small / medium-sized enterprises and educational / scientific institutions in an organization that seeks the connection of agro and chemistry.

Vision and objectives
There are significant market opportunities for biobased products. In addition, the Biobased Delta region has an excellent location and preconditions for establishing new economic activity for the production of biobased products. Therefore, the BBD Foundation aims to stimulate the creation of additional sugar and starch processing capacity in the region. Initially, this is aimed at attracting established companies operating in existing markets with existing technologies, followed by stimulating economic activities around new biobased products. Within this project, the construction of at least 1 operational and commercial carbohydrate processing plant is provided. This plant will produce biochemical products, intermediates and ingredients for non-food applications in the Biobased Delta region and should be planned or under construction in 2020. In addition, the creation of one or more consortia for the development of new technologies and or products is foreseen. These consortia provide long term economic impact in the Biobased Delta region.

Activities and milestones

**2017**
- Continue established project plan
- Secure project funding for 2018-2020
- Confirm interest in investing in the Biobased Delta region from minimum one company looking for capacity expansion
- Formation of first consortium for new technology/product

**2018**
- Confirmation of industrial scale investments in the Biobased Delta region
- Further acquisition and matchmaking
- Submit a project application to the EU / BIC for a consortium aiming at new product or technology development

**2019**
- Beginning of construction of an industrial scale production facility for biobased products (*existing technology / existing market*)
- Pilot production of new products in the Biobased Delta region in cooperation with a consortium
2020-2021

Start of the production of a new biobased product (existing technology / existing market) on an industrial scale.

2.3 BIORIZON

Biorizon is a ‘Shared Research Center’ with a focus on technology development for the production of biobased bulk aromatics (BTX) and functionalized biobased aromatics for performance materials, chemicals & coatings. Biorizon is anticipating the expected growing shortage of aromatics from the petrochemical industry and the widely shared ambition to green the chemical industry. Biorizon aims to enable commercial production of bio aromatics by 2025 and be a leading European Center for (functionalized) biobased aromatics within 3 years and to be in the global top 3 within 5 years. This way the participating companies will get the best results possible. Biorizon is powered by TNO, VITO and ECN at the Green Chemistry Campus.

Biorizon has 3 horizons (program lines) on the roadmap, each led by one of the initiators. The figure below shows the program lines schematically.

![Infographic of the Biorizon project](image)

**Figure 4: Infographic of the Biorizon project**

**Shared research**

The concept of shared research is based on bringing together talent, experience and facilities of both industries and knowledge organizations. In order to grow Biorizon’s brainpower, the pole of technology partners is expanding and further formalized in agreements. As an example, VITO will develop a biopolymer group on the GCC. Knowledge providers WUR / FBR, KU Leuven and VTT will be contracted as Biorizon’s technology partners.
Upscale new products
This project is now in the phase where the laboratory environment can be left behind and emphasis is placed on upgrading the processes to kg/hour scale on small skid-mounted pilot lines.

Start-up will take place in 2017 and 2018. In the next phase upscaling to ton scale and additional investments are required. For example, the sugar/furan pilot line (40 tons/year) planned for 2020 requires an investment of around €15 million.

Figure 5: Biorizon past, present and future

Application development
In parallel with the scaling process, application and market development are conducted by and through industrial partners. 100 gram samples have already been evaluated and the first results look promising. Together with industrial partners, this process of market development is continued on kg and later tonnes of scale.

IP management
The IP (knowledge) portfolio is steadily growing, the freedom to operate and the protection of knowledge for all Biorizon partners is guaranteed. This process requires ongoing attention. The first application patents are now being developed by the industrial partners.

ECN (Horizon 1)
The core of Horizon 1 is gasification and pyrolysis. The plan is to build a large demo gasification plant in Alkmaar, construction starts in 2017. This will include a skid mounted pilot unit for BTX side streams. In addition to these BTX by-products, a technology will be added to put ethylene into ethylbenzene, a valuable aromatic building block for industry. While this scaling takes place, much attention will be paid to the application and market development for these aromatic products, at the GCC. For the pyrolysis developments, lignin is the raw material and in Petten a 5 kg/h pilot line is already operational. The next step is scaling up to 50-100 kg/h, with the pilot installation being ideally located on the GCC or in Moerdijk. In close cooperation with VITO the pyrolysis cluster of Moerdijk will be further developed. The DSP (separation and purification) as well as application development are extremely important aspects that offer great opportunity for collaboration with VITO and other technology partners within Biorizon. ECN's special low-temperature acetone organosolv biorefinery technology can be a source of high quality lignin as well as 2nd generation sugars. Both streams are of great importance to the raw material side of the Biorizon program. To scale up this process to a large plant, the possibility of cooperating with Fraunhofer Institute (Leuna pilot plant) is being investigated.
TNO Waste to Aromatics (Horizon 2)
Regarding raw materials, work is done on organic residual material from various sources (GFT, diaper waste, etc.) in order to achieve a good comparison of this residual material and a cost effective source of furan. Planning is to have a viable business case for a major pilot line by the end of 2017. The consortium consists of 11 parties (with different positions in the value chain) and 2 different process technologies are evaluated so that the most successful combination of waste stream with conversion technology can be selected for the pilot line.

TNO (Horizon 2)
The core of Horizon 2 is sugar / furan technology. Promising routes to highly functionalized aromatics (di-tri-acids and alcohols) have been developed on labscale and now focus is on the decrease and start-up of skid mounted pilot units for kg scale production. Various products show promising results for application in lacquers, polymers and lubricants. The next step is scaling up to 40 tons / year and the business case and investment for this are being prepared.

VITO (Horizon 3)
The core of Horizon 3 is the separation and purification of lignin and its further processing into functionalized products. Also for this development the initial labscale work has revealed promising perspectives and a roadmap, available for the scale up process, has been delivered. This roadmap contains 3 phases:
- Cooperation with an existing pre-treatment pilot facility (e.g. Leuna)
- Construction of a Biorizon pilot line at 40 t/yr scale (location Antwerp) in cooperation with Catalisti and the industrial partners
- Construction of a demo plant in close cooperation with the industry

As the process- and product development is progressing through scale up there will also be a strong focus on application and market development. An important aspect in this perspective is the development of a lignin application lab at the GCC (with a strong focus on polymer and resin applications).
3. REGIONAL AGENDA

For the period 2018-2020, with regard to SMEs, the Foundation will express added value for SMEs in relation to the other partners already linked to initiatives in the Biobased Delta region. The BBD Foundation will develop action lines in which it can effect its added value. In this respect, the following areas of attention for value creation in cooperation with regional economic development agencies are relevant:

- Linking core themes, R&D programs and top locations
- Access to national and international financing instruments
- Access to national and international programs and networks
- Lobby on circular biobased government programs
- Stimulating the development of demand-driven education and applied research
- Collaboration on branding, communication, networking, etc.

Representatives of the board enter into consultation with (groups of) SME entrepreneurs in order to clarify what the Foundation can do for SMEs and which tasks are not yet, or only partly, covered by other partners. Thereafter, in consultation with the partners and the Supervisory Board, it is determined in which way the Foundation can support SMEs. The conclusion may also be that there is no need for a specific SME policy to be implemented by the Foundation. In drawing up the annual plans, attention will be paid to this, in the meantime, the Foundation remains involved in the current regional SME approach.

3.1 CIRCULAR & BIOBASED ECONOMY

On a global, national and regional level there is a growing awareness that our current economic growth is not sustainable and leads to the depletion of non-renewable raw materials and energy sources. The circular economy is urgent and promising, both for the economy itself and for the ecological and social domain. A circular economy, in addition to energy policy, is indispensable for meeting CO2 climate objective that have been agreed globally in Paris in 2015. As stated in the Investment Agenda for the cabinet formation 2017 "Towards a Sustainable Netherlands", a sustainable approach consists of three components: approach to energy, circular economy and climate change.

In recent decades, the issue has been considered primarily as an issue of sustainable development, mainly from the environmental point of view. Since the beginning of the present decade, this has evolved and the issue is also approached from an economic point of view. A circular economy is urgent and likely to ensure a strong competitive economy in the future. On the one hand, due to the current scarcity and geopolitical factors, security of supply and prices of raw materials are under pressure, legislation is being tightened and preferences of consumers and shareholders change. On the other hand, because of great opportunities for a new economy, through the possibilities of the Internet of Things (IoT), digitalization and big data, combined with the possibilities of HighTech and design (thinking).
McKinsey, the Ellen MacArthur Foundation and the German SUN (Stiftungsfonds für Umweltökonomie und Nachhaltigkeit) estimate that the maximum use of the technological revolution that is currently taking place, the European Union will yield **€ 1,800 billion** by 2030. This amount is based on cost savings due to efficient utilization of raw material, saving of primary raw material consumption and other non-commodity-related additional savings.

Therefore, action plans and implementation programs are prepared at all levels, and funds are released to facilitate the transition. At the end of last year, the Dutch Program "The Netherlands Circular in 2050" was published on behalf of different ministries, which states that the Netherlands will be 100% circular in 2050 and 50% in 2030. In January 2017, government and business and government organizations, including the BBD Foundation, signed the ‘Raw Materials Agreement’, implementing the Dutch sustainability program.

The Dutch government applies the following definition for circular economy:

> Circular economy is the economic system that takes the reusability of products, materials and commodities and conserving natural resources and pursues value creation for human, nature and economics in every link of the system.

In order to achieve the transition towards a circular economy, the Dutch government sets three strategic goals:

1. Raw material in existing value chains are used in high value applications
2. Where new raw materials are needed, fossil, critical and non-sustainable raw materials are replaced by sustainable, renewable and widely available raw materials (for example, through the biobased economy)
3. Development of new production methods, new product design, geographical planning, and promote new ways of consuming, such as circular business models

Circular economy is a very promising development, which, according to national reports, is leading to business opportunities. New business concepts contribute to the national and regional objectives in terms of material efficiency, energy efficiency, employment and making the economy more sustainable. The circular economy is a perennial complex task that calls for a system transition, which cannot be solved solely with technology. This includes, for example, behaviour, organization, legislation, regulation and funding. This calls for entrepreneurship, not only companies, but also governments, and a combination of various players at multiple levels.

**Circular economy in relation to BBD Foundation**

In its sustainability program the Dutch government distinguishes five priority themes:

1. Biomass and food
2. Plastics
3. Manufacturing industry
4. Construction and Infrastructure
5. Consumer goods

Biobased economy is an important part of the circular economy and connects with theme 1: Biomass and Food. The biobased economy has a crucial role in the circular economy in many ways. "Biomass and food" is also defined as a major priority theme within the so-called "raw material agreement" of the circular economy. Not only on the subject of sustainable raw materials but also with regard to reuse of materials, production methods, interior design, new consumption, the biobased economy offers clear possibilities for sustainability and circularity.

Finally, the production of plant biomass helps to reduce the unavoidable CO2 emissions (which will also take place if the transition to a circular economy is formed). "With photosynthesis, CO2 is re-recorded in biomass. The BBD Foundation, as a cluster, is pursuing biobased development in the Southwest Netherlands, facilitating a large number of companies in its contribution to the circular economy.

The reorientation of the mission and strategy of the BBD Foundation (see also section 5.1 Reorganization and repositioning), includes the following elements:

1. Research among stakeholders in the Biobased Delta region about what they expect from the BBD Foundation in the realization of their goals in the circular economy. On the basis of this, objectives are formulated and translated into concrete action plans for 2018-2020
2. Analysis of already available data on the extent to which greenhouse gas emissions, from human consumption (energy and materials consumption), can be neutralised through biomass production (= CO2 assimilation). Analysis should provide semi-quantitative insight into the impact of circular economy as well as the biobased economy with respect to the mitigation or discontinuation of climate change.
3. Consistently and explicitly illustrate the consequences of adaptability in a circular economy: what about recycling possibilities and end-of-life solutions? (provide LCA tools to stakeholders?).
4. Facilitate stakeholders with referral to specialized parties in the field of priority CE themes other than biomass-related questions.
3.2 GREEN PUBLIC PROCUREMENT (GPP)
Market development is essential for new biobased or circular products, to ensure more biobased products are developed and produced. Procurement by governments and large companies accelerates the development of biobased outlets.

Launching customers are essential in the transition towards a biobased economy. The CocaCola PlantBottle is an eminent biobased example. The BBD Foundation aims to promote the purchase of bio-based and circular products by focusing on:

**Biobased procurement by governments**
The different governments of Europe are large consumers. By using their purchasing power and choosing environmentally friendly goods, services and works, they can make a significant contribution to sustainable consumption and production.

Although GPP is a voluntary instrument, it plays a key role in the EU’s efforts to become a more sustainable and resource-efficient economy. It helps to get a critical mass of demand for more sustainable goods and services, which would otherwise have a longer time-to-market. GPP thus is a strong incentive for biobased innovation.

Research conducted by the Ministry of Economic Affairs shows that governments and so-called specialty sector companies have bought for about €73.3 billion in 2015. The Provinces of South Holland, Brabant and Zeeland are active in incorporating circular and biobased purchasing into their policies. For example, the Province of Zeeland (total purchase volume of € 200 million) together with the Center of Expertise Biobased Economy (CoE BBE) has developed a methodology for biobased purchasing.

In order to be effective, GPP requires clear and verifiable environmental criteria for products and services in awarding public assignments. The European Commission and a number of European countries have developed guidelines by setting national GPP criteria in this area. The challenge is to attract more government agencies to this end, so that GPP becomes a common practice remains unchanged. Another challenge is to ensure that green purchasing conditions are comparable between the Member States, creating a level playing field and stimulating the environmentally friendly goods and services market.

**Pilot facilities / Trial gardens**
Governments can play a role in creating opportunities for new biobased products to be tested. Examples in the Netherlands are a biobased road rail and a fiber concrete wall at a provincial roadworks station. This provides the biobased manufacturer a first "proof of concept".
Role of the BBD Foundation:
- Lobby to the Dutch government and the European Union to include circular and biobased products in their procurement policy
- Lobby to the European Union to (continue) providing grants for the development and exploitation of biobased pilots facilities
- Keep the authorities in the Biobased Delta region keen to take their role in biobased procurement and providing test facilities

Unleash biobased product portfolio SME’s
The availability of biobased products is unknown to many governments and commercial outlets. The BBD Foundation has a role to play in collaborating with partners (Government, CoE Biobased Economy, Clusters, ROMs, RVO, ...) to provide insight on biobased products available to companies in the Biobased Delta region.

Promote biobased/circular procurement by large companies
When large companies buy biobased / circular, this stimulates biobased activity. Within the Biobased Delta region, companies (e.g. VDL, Unilever, Heineken) are operating a large supplier network. The BBD Foundation strives to engage with brand owners and MNOs to incorporate green procurement in the coming years.

The Foundation and its partners actively pursue sustainable use of materials. Here the principle ‘practice what you preach’ applies and for this reason, green purchasing policy will also be a key factor in the future expansion of top locations and application centres within the Biobased Delta region. It will, of course, involve smaller purchasing volumes, but nonetheless, a signal will be issued to buyers in both public and private organisations.
4. OPERATING LINES

4.1 TOPLOCATIONS & APPLICATION CENTRES
Currently there are 14 top locations in the Biobased Delta region (including a number of application centres) aiming to speed up innovations. These locations are currently operating units, which cooperate in many areas. Creating a (structural) relationship between the different locations is a possible next step in improving the utilization of these training- and pilot facilities.

The objective for this multiannual period is to: improve, create and better utilize training and pilot facilities at (knowledge) institutes and companies where multi-, inter- and trans-disciplinary levels from various training centres cooperate in order work on innovation issues that both companies and knowledge facilities are facing. The secondary objective is to bring together companies, sectors and knowledge institutes in the circular and biobased economies to stimulate industry developments and structurally link the labour market to education.

A second goal is to make a national overview of all top locations (including COCIs, i-Labs), application centres, clusters, and other test/pilot locations (and keeping it up to date on the BBD Foundation website). Both at companies, educational institutions and provinces and municipalities.

Figure 8: Overview top locations, application centres and knowledge providers Biobased Delta region

In addition to top locations and application centres, there are specific clusters within the Biobased Delta region (divided by province):

**Brabant**
- Packaging
- Construction & Infrastructure
- Fibers
- Horticulture
- Pyrolysis (biomass/waste);
- Colorants and pigments
- Circular economy
Important Brabant locations with facilities and infrastructure to accelerate these developments, are the Green Chemistry Campus (hosting the Biorizon technology cluster focusing on bio aromatics, and application centres for natural fibers, colorants and biopolymers), Nieuw Prinsenland (application and development green commodities), Port of Moerdijk (pyrolysis application and realize resource efficiency through energy circles) and the Amerstreek region (fiber applications from agro-streams aiming at various markets such as construction, packaging, horticulture, etc.). Chain concepts like ‘circular horticulture’ and ‘closing the mineral chain’ (phosphates recovery) are also covered by consortia.

Zeeland
- Biobased Innovation Garden
- Construction & Infrastructure
- Green procurement
- Aquatic biomass (algae & seaweed)

In Zeeland, Impuls (regional economic development agency) has established the 'Biobased Economy and Food' cluster. Many projects with algae and weeds for food consumption, aqua, chemistry and energy are developed and facilitated in this cluster. In addition, the ‘Delta Smart Resources’ initiative has been launched in the region to achieve resource efficiency in the process industry, for example by sharing residual heat. Zeeland has a number of focus points for biobased activities: Biopark Terneuzen, the Zeeuws-Vlaamse Kanaalzone with the Biobase Europe Training Center in Terneuzen, Bevelanden, several pilot locations for both algae and weeds and the Rusthoeve with the Biobased Innovations Garden.

Zuid-Holland
- Green chemical building blocks (focus on Port of Rotterdam)
- Plant ingredients / fine chemicals (focus on Green Ports)

Delft is an important location within the province of Zuid-Holland because of the Bioprocess Pilot Facility, the Biotech Campus and the incubator Yes! Delft. Also the port of Rotterdam is of great economic importance, due to the import of biomass and the presence of large-scale chemical industry. Test- and pilot facilities for biobased and circular processes are available in PlantOne, SuGu and BlueCity010. In Zuid-Holland, work is being done on green chemistry, industrial biotechnology (focus Delft) and high-value plant ingredients.
4.2 INNOVATION & BUSINESS DEVELOPMENT

Every year, the BBD Foundation organizes the 'Biobased Business Development Day'. This networking event provides companies the opportunity to search for collaboration partners and pitch for funding. This annual event is attended by approximately 150 participants. In addition, various events are organized locally. For example inspiration sessions and workshops at the Rusthoeve, networking events focussing on green chemical building blocks and theme sessions focussing on specific themes such as natural fibers.

BBD Foundation takes active part (booths and speakers) at international events such as the EFIB, the Plant Based Summit and the BIO World Congress in Industrial Biotechnology (WCIB). Participation in these events will be continued in the period 2018 - 2020. Various smaller events will be organized in the regions.

Objectives for the multiannual period 2018 - 2020

Future events focus on attracting SMEs with the aim of increasing market demand for biobased products, project funding, IP management and informing new technologies and products. The BBD Foundation continues organizing the 'Biobased Business Development Day', aiming at 150-200 participants (75% SME). In addition, the Foundation organizes at least one event on a specific theme; this could be an event on biobased products (including a market place), plant ingredients or an event organized by a company (Cosun, Sabic) to attract innovations from SMEs (in analogy with, for example, AKZO Open Space Innovation). Target group is (international) SMEs. The company or organization is in the lead for hosting the event and the BBD Foundation acts as co-organizer or sponsor.

In addition to organizing events, the BBD Foundation also wants to actively participate in other (international) events aimed at activating the SMEs potential in its innovative eco-system. This includes events where SMEs from the region can promote their products on an (international) market that they do not visit on their own initiative. Here one can think of biobased pop-up stores.

Superregional the following activities are foreseen:

✓ Accelerate (international) projects
✓ Biobased Business Development Day
✓ Pop-up stores
✓ (International) cooperation agreements
✓ Developing the circular and biobased innovation ecosystem (both nationally and internationally)
4.3 EDUCATION & KNOWLEDGE (HCA)
A talented labour market in a region is a prerequisite and a starting point for growth through innovation and for attracting investment. This makes the human capital agenda of paramount importance to the objectives of the Biobased Delta region. Within the boundaries of the Biobased Delta region, the national centres that drive the innovation agenda through education (both mbo and hbo) are present. Both the Center for Innovative Crafts Biobased (ROC West Brabant) and the Center of Expertise Biobased Economy (Avans and HZ) have received funds from the Ministry to conduct the human capital agenda, both regionally and nationally.

The added value of the BBD Foundation in respect to the Human Capital agenda is based on: (1) highlighting the urgency for well-educated staff at companies and governments and (2) promoting the connection between the needs of companies and the supply of education by knowledge institutes and (3) monitoring the size and quality of the biobased labour market. The large business network of the Foundation is valuable and can be of added value to better match education with business needs. To accelerate the transition from fossil to green raw materials, management and professionals within companies need new insights and knowledge about these often more complex raw materials and processes. In addition, new chains and new business models need be created and implemented.

Continuous training on state-of-the-art technologies for the current population of employees should be of particular importance to good employer ship. The transition to a biobased and circular economy offers new job and requires a different set of skills and knowledge of future professionals.

In addition, it is important for the Biobased Delta region to claim an international knowledge position. The BBD Foundation can play a role in promoting international cooperation in education development and exchange, for example with European partners such as Belgium, France, Germany and Sweden, but also non-EU countries like, Brazil and Canada. The Foundation will organize meetings with this target group and HR managers in consultation with relevant partners, to inspire and create awareness.

4.4 COMMUNICATION & BRANDING
The Biobased Delta region is internationally recognized as one of the leading biobased clusters in Europe. This is due to the effective communication and branding that has been executed in recent years and the frequent participation in major biobased events in the Netherlands, Europe and abroad. Focus over the past two years: highlighting success stories of (SME) companies in the Biobased Delta region. Over the last five years, the region has built up a strong profile (national and international). Biobased developments lead to concrete processes and products. The valorisation clusters better cooperate and the network of partners (national and international) has been expanded and strengthened. They inform each other and exchange best practices. In the period 2018-2020, the coordination of all partners’ communications (including CoE / CIV, GCC and BOM) will be intensified.

Positioning
In what way the BBD Foundation is relevant to society and stakeholders? Four subjects are addressed:
1. Follow developments in society and in the circular and biobased economy and respond to relevant propositions, clear statements and profiling
2. Understand the interests, views, perceptions and objectives of stakeholders.
3. Activities based on stakeholder needs, views and goals (through co-creation)
4. The connection between the core values of the Biobased Delta and those of stakeholders
In the course of 2018, a reorientation (see also section 5.1 Reorientation and repositioning) takes place on the current positioning, slogan (Agro meets Chemistry), core values (cooperative, entrepreneurial, pragmatic), specific themes and primary target groups. Based on this, the Foundation will create a clear, coherent and stimulating proposition regarding biobased and circular economy. Communication contributes to this by taking strategic principles and choices in positioning as starting point. And translating these principles and choices into a joint tactical communication planning (calendar), and the choice of resources and activities (implementation), such as presentations, events, news reports, website and social media.

4.5 FINANCING INSTRUMENTS
The current earnings model of the BBD Foundation is largely dependent on public contributions from the affiliated regional authorities. Redefining the earnings model provides the opportunity of achieving growth for the Foundation. The Foundation will (re)define her earnings model before the start of the new financial year 2018.

Finance expertise team
The current status of the biobased economy is relatively new with a majority of companies in the startup or scale-up phase. Companies in these phases often lack the knowledge to find funding for achieving their ambitions. A variety of funding sources and instruments are available on the market. The BBD Foundation has the ambition to provide entrepreneurs with insight into the possible financing instruments and to share knowledge on this topic. The Foundation will set up an 'Expertise Team' funding where entrepreneurs get informed of finance related topics. The team will define / categorize the question and then use its financial network to answer business questions. The finance team will also periodically consult the (regional) authorities in order to align the financing needs of its stakeholders with the policies pursued in the top sectors and innovation- and sustainability programs.

Stakeholder analysis
In the course of 2018, stakeholder analysis will be conducted to map the interests and views of (potential) stakeholders. This analysis gives insight into:

- Who are (potential) stakeholders? Provinces, (sub) regions, MNOs and SMEs (startups and scale-ups), banks, other financial institutions, etc.
- What is the added value of the Foundation in terms of services and products (network, financing, internationalization, product portfolios) to the various stakeholders?
- Role of the Foundation in supporting funding issues of, for example, application centres
- Best practices: How do other clusters like IAR, Brightlands, Maintenance Valley generate their financial resources?
- How to secure long term financing of the activities carried out by the Foundation (public/private)?

4.6 INTERNATIONAL AGENDA & LOBBY
The International Agenda aims at providing companies, entrepreneurs and knowledge institutes in the Biobased Delta region with the benefit of better and faster access to knowledge, markets, products, applications, platforms and partners via the international network of the BBD Foundation. Best practices can also be exchanged in a variety of areas. In addition, the Foundation is acting as an important biobased ‘agro meets chemistry’-ecosystem on a European and even global scale, where significant developments are taking place and the interest (leading to possible establishment) of various international parties, such as clusters, companies and knowledge institutes is present.
Objectives for the multianual period 2018 - 2020
The BBD Foundation has built up a good international position (branding and profiling in Brussels, The Hague and partners) and is part of a network with lobbying capabilities. As a result of a strategic session with the management and core team of the Foundation, discussing the strategic agenda for internationalization and lobbying, four axes have been appointed. These axes point out how internationalization and the lobbying agenda can be implemented (not only pragmatic but also directional to make strategic choices). The four axes are:

1. **Accelerate.** The BBD Foundation aims to accelerate the transition to a biobased economy. To realize this ambition the Foundation is pursuing a number of major transition programs (Redefinery, Sugar Delta, Biorizon) and supporting SMEs. For the larger transition programs, it is easier to have a strategic approach from the perspective of internationalization and lobbying. Results are already visible; Vanguard, Redefinery, BIG-Cluster, Biorizon. The Foundation will, in each case, discuss with the parties directly involved what added value can be provided. In respect to SMEs, internationalization is more complex, but the internationalization of the German ‘Spitzencluster’ seems to offer excellent opportunities for entrepreneurs to start well-defined projects and achieve the desired acceleration.

2. **Knowledge.** The world outside the Biobased Delta region is many times larger than the regions that are currently represented by the Foundation. Obviously the larger part of the knowledge needed to accelerate the biobased transition, has to come from outside the Biobased Delta region. The Foundation provides an excellent platform to (international) knowledge providers that are outside the current range of current stakeholders (current stakeholder mainly look at their own (sub) regions).

3. **Network & positioning.** BBD Foundation is a member of BBI, but can only represent a very limited number of SMEs. In the past OP-ZUID scheme, the Foundation was in the lead for linking strategic initiatives to the interests of the southern part of the Biobased Delta region. Nowadays, key interests of policy makers are shifting towards circular economy, and most likely the policy makers will shift to CO2 / Energy neutral or Industry4.0. Keeping biobased on the regional, national and international agenda and stress out the bottlenecks to market is an important task for the Foundation. In addition, there is an important role to play in helping to effectively eliminate bottlenecks: lack of scaling (facilities), adequate funding (investment funding seems a commodity in the world, however not just the right risk / return profile for biobased initiatives). Furthermore, the mechanisms to protect pioneers from product failures are lacking. Active participation in national and international processes is crucial for addressing obstacles, learning how to eliminate these obstacles (Europe has taken over the Green Deal approach of the Netherlands) and learning how to speed up other/future entrepreneurs.

4. **Sourcing.** ‘Without biobased feedstock no biobased economy’. The same here applies, there is more feedstock available outside the Biobased Delta region than inside. Entering strategic (purchasing) relationships with strong regions with regard to feedstock will benefit in the shorter and longer term. In the short term, cooperation provides access to "test quantities" and to local (handling, preservation and processing) knowledge. In the longer term, it provides a better basis for trade relations and treaties. In addition, the development of the biobased economy is also based on finding the right capital. Not only in public funding, but also in private-finance relationships (for example, through innovation fund / Innovation Circle in Belgium). Participation in European projects can directly contribute to a healthier financial foundation for the BBD Foundation itself. This certainly applies to the biorefinery (Redefinery) program, for which large amounts of wood pellets will be needed. International contacts have already been established.
5. OUTLOOK TOWARDS 2020 AND BEYOND

During the climate conference in Paris in 2015, 195 countries have reached a climate agreement on the reduction of greenhouse gas emissions. This agreement entered into force on November 4, 2016. During the Climate Change Conference in Marrakech in 2016 it was agreed that the objectives should be elaborated in concrete plans within two years. As part of this concession, the EU has stated that greenhouse gas emissions by 2050 should be less than 20% of those in 1990. More than 75% of energy production should come from renewable sources. For electricity, this is even 97%. This means that far-reaching decarbonizing throughout industries is necessary. As the chemical industry consumes a lot of fossil raw materials (both as raw material and for the required energy), it must also decarbonize. The biobased economy will play an important role in the quest for a low carbon economy. Together with consortium partners, the ‘agro meets chemistry and markets’-strategy will be further deployed by the BBD Foundation.

A macroeconomic study, conducted by the Bio-based Industries Consortium (BIC), has found that the bio-economy of Europe is worth € 2.100 billion. The bio-economy includes the food, animal feed and beverage sectors, as well as the bio-based industries such as chemicals and plastics, pharmaceuticals, paper and paper products, forestry, textiles, biofuels and bioenergy. It also turned out that bio-based chemicals, plastics, paper, textiles and biofuels contribute about € 600 billion. Emerging sectors, such as biomaterials, bio aromatics and green chemistry, already contribute. The transition to a biobased economy will depend on new and improved technologies in a series of processes, reaching a breakthrough in terms of technical performance, scalability and cost-effectiveness.

Biobased products and materials have the advantage of a more balanced carbon cycle compared with fossil alternatives. The rate at which CO2 comes from biobased products corresponds to the rate at which it is recorded in the biomass. The rate of CO2 emissions from fossil products (1-10 years) is significantly higher than the millions of years that CO2 (organic matter) requires for fossilization and conversion to petroleum, natural gas or coal. In other words, the biobased economy is instrumental in demonstrating and commercializing sustainable biobased ingredients, products and materials that can feed the EU’s circular economy.

Increasing demand for biobased building blocks and materials
Multiple corporate brand owners (e.g. Unilever, Nestlé, Danone, Coca Cola) have set the ambition to gradually replace their current packaging material with biobased materials by 2020. Market-driven research should focus on creating biobased products and materials and serving new markets. Instead of mimicking only fossil product properties, biobased products should focus on specific functionalities, making full use of the intrinsic properties of biomass and its components.

Essentially, biobased products, materials and building blocks achieve at least the same level of quality as their alternatives on a fossil basis and also have a lower carbon footprint.

In correspondence with the current trend of large companies investing in biobased alternatives to achieve their sustainability goals (CSR), the Biobased Delta region will build on existing demand but also stimulate ‘market push’.
5.1 REORIENTATION & REPOSITIONING

The BBD Foundation plans for a reorientation and related repositioning in the underlying multiannual plan, on the following subjects:

- **Strategy**: mission, objectives, connection with government policy regarding public funding, added value and earnings model (*Attract business partners with financial and / or in-kind contributions*)
- **Structure**: organisation and governance
- **Flagship projects**: acquisition, consortia, scalable business cases (*connect MNOs, SMEs, startups and scale-ups*)
- **Operating lines**: intensification and optimization, focused on supporting circular and biobased MNOs, SMEs, startups and scale-ups.

A stakeholder analysis will be conducted by the Foundation in early 2018. The stakeholder insights provide input for each of the above topics and are incorporated into the subsequent annual plans.

5.2 DELIVERABLES MULTIANNUAL PERIOD 2018-2020

Deliverables foreseen in the multiannual period 2018-2020:

- Insight into stakeholder interests and views
- Articulation of the social impact resulting from the activities of the Foundation
- Economic growth (€ / FTE)
- CO2-reduction
- Growth of (international) networks/partnerships
- Application oriented knowledge dissemination
- International branding of the Biobased Delta region
- Scalable technologies and applications
- Access to green finance for entrepreneurs (both established and new)
- Improving balance between public-private funding of the foundation

Monitor

In 2017, a monitor was launched in collaboration with RVO, which provides insight into (regional) developments in the biobased economy and signals significant trends. In addition, the knowledge development of the biobased economy is analysed. Early in 2017, a baseline survey has already been carried out for West-Brabant; followed by South Holland and Zeeland in the course of 2017. The following KPIs represent the basis of the monitor and are evaluated annually.

<table>
<thead>
<tr>
<th>Description of KPIs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Number of students following courses in the field of Biobased Economy</td>
</tr>
<tr>
<td>2 Number of test facilities</td>
</tr>
<tr>
<td>3 Number of application facilities</td>
</tr>
<tr>
<td>4 Number of companies cooperating in the value chain (1 or &gt; partner and obtain public funding</td>
</tr>
<tr>
<td>5 Number of cluster initiatives initiated</td>
</tr>
<tr>
<td>6 Number of initiated and supports business cases</td>
</tr>
<tr>
<td>7 Number of companies guided to funding</td>
</tr>
<tr>
<td>8 Number of companies guided to funding and ‘closing the deal’</td>
</tr>
<tr>
<td>9 Number of projects funded aiming at green energy</td>
</tr>
<tr>
<td>10 Number of biobased projects funded</td>
</tr>
<tr>
<td>11 Number of biobased companies</td>
</tr>
<tr>
<td>12 Number of FTE hired by biobased companies</td>
</tr>
<tr>
<td>13 Investment volume</td>
</tr>
</tbody>
</table>

*Figure 9: KPIs monitor BBD Foundation*