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Nordic Council of Ministers

A Bioeconomy for the Baltic Sea Region

- impact, engaging the private sector and financing cooperation

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Executive summary

This workshop paper is the second paper under the Nordic Council of Ministers initiative “10 Steps towards realising a Bioeconomy for the Baltic Sea Region”. It is prepared with a view to inspire discussion at the workshop in Berlin 18-19 September 2014. The paper picks up on the key conclusions from the workshop in Tallinn 26-27 March 2014. In Tallinn it was concluded, that in going forward it is important to: 1) emphasize on the translation of dialogue and policies into concrete actions and impact; 2) engage the private sector through cooperation platforms that are attractive to businesses; and 3) use existing network structures and partnerships to support project practitioners to navigate between financial mechanisms for cooperation in the Baltic Sea Region.

Below follows a summary of the key findings, conclusions and recommendations:

Ensuring **impact** requires an emphasis first on the enablers – be it e.g. human capital, intellectual property, natural capital, infrastructure, markets, financial capital and smart policies – and how these (through linkages, networks and interaction) can impact on R&D, training, technology, economy, environment, culture and society etc. While Albert Einstein was quoted with “Not everything that can be counted counts, and not everything that counts can be counted” it was stressed that if one does not measure, one cannot manage, improve or optimize. A set of SMART impact indicators (Specific, Measurable, Achievable, Realistic, Time-dependent) or key performance indicators (KPI) was suggested.

Realising the bioeconomy will call for comprehensive efforts to: Ensure responsible and participative governance; engage the public to develop an understanding of the bioeconomy and its impacts and benefits; improve the availability and quality of information on bioeconomy products and processes, including their social, economic and environmental impacts and the related ethical concerns, and foster future-oriented multi-stakeholders dialogues; facilitate the development and acceptability of regional and national bioeconomy strategies; facilitate the flow from discovery to market applications and to speed up the innovation process through closer ties between activities throughout the research and innovation chain; unlock the growth potential by including social innovation and social entrepreneurship resulting in new skills and practices etc.; and contribute to increasing the number of innovative products and processes reaching the market, and increasing the number of new companies and new jobs created from trans-disciplinary research, innovation projects with access to risk willing capital and public procurement schemes.

Engaging the **private sector** is obviously of critical importance – not least noting that private companies and citizens account of 80% of consumption. Main drivers for engaging the private sector in the bioeconomy involves efforts that address in particular: Productivity, i.e. the relationship between outputs in terms of priced value of products and the costs of inputs used to produce them; Innovation and technology, i.e. new products, new services and/or new ways of producing products and services – not necessarily just cheaper but also products and services with improved properties such as more sustainable; Markets, as it is fundamentally through the availability of markets that companies can engage in the bioeconomy; Confidence and Stability because without such companies will be unlikely to invest in the bioeconomy;

and Financing because without the availability of financial mechanisms, companies will be unlikely to change the way they develop, produce and deliver products and services.

The workshop paper further stress that throughout the Baltic Sea Region there are many examples and many “pockets of smartness” in terms of engaging the private sector in the bioeconomy. These include biorefineries; joints test and demonstration facilities; bio-, life-science- and cleantech clusters; industrial symbiosis; business and business-investor matchmaking; green public procurement; labelling and economic-environmental improved agricultural practices. The workshop paper recommends that in going further, efforts should be made to identify more such “pockets of smartness”, to communicate these results; and to encourage wide-spread multiplication of the efforts by champions pioneering the bioeconomy in the private sector.

As regards *financing* the bioeconomy the workshop paper stress that realizing the bioeconomy ultimately goes hand in hand with a transformation of the way that companies produce and the way citizens consume products and services. After all private procurement account for vast majority of GDP. However, public sector financial support can play an important role in seeding, fertilizing and enabling multiplication of practices and models for growing the bioeconomy.

In the Baltic Sea Region there are a number of organisations and programmes that may support transnational cooperation towards realizing the bioeconomy.

These include European Union funded programmes such as Horizon 2020, The Baltic Sea Region Programme 2014-2020, The Central Baltic and The South Baltic 2014-2020 Programmes, and EUSBSR Seed Money Facility.

In addition the Council of the Baltic Sea States (CBSS) has a Project Support Facility, providing seed funding to develop cooperation activities. So does the Swedish Institute (Si), though the latter only in the South Eastern part of the Baltic Sea Region.

The Nordic Council of Ministers, Nordic institutions and Nordic cooperation bodies also provides a number of funding opportunities to seed, fertilize and grow cooperation efforts towards realizing the bioeconomy.

There seem to be many opportunities for fertilizing synergies and to avoiding duplication of bioeconomy efforts through improvements in monitoring and communication between enabling cooperation programmes that target in part or in full development of the bioeconomy in the Baltic Sea Region. How to actually and practically go about this may be challenging – but important. The paper suggest to consider the development of a funding map/observatory as well as the development of a network/working group to engage a large number of financing partners, including those mostly providing credits (EIB, NIB, NEFCO, etc); those mostly providing grants/co-financing (Nordic Innovation, NordForsk and the European Commission); and those national/regional/local financial stakeholders targeting the bioeconomy with various funding programmes.

1. The context

The bioeconomy is about economic, social and environmental sustainable development - it is about economic activities based on optimal utilization of maritime and terrestrial biological resources. The bioeconomy is furthermore an approach that builds on a circular thinking; and an approach that aims to enable a transition from a fossil-based to a bio-based society.

Thus the bioeconomy is complex – and it arises from a realization that there is a need for an integrated response to a number of global mega-trends and the associated challenges¹:

- Food security concerns arises from a fast growing global population and higher life expectancy giving rise to food and feed production and demand (according to FAO with a much as plus 70% by 2050).
- High dependence on fossil-based resources result is an increasing need for strengthening energy security and for diversifying the energy supply range.
- As a result demand for biological resources for bio-based products is increasing.
- Also on the increase is sustainability concerns (e.g. GHG emission reduction, moving towards a zero-waste society, environmental sustainability of primary production systems, increasing land use competition, etc.).

Other mega-trends include, a shifting weight of global economic activity towards Asia, falling trade barriers and transportation costs, and a continuation of the re-organisation of global value chains leading to increased specialisation of locations around specific activities and functions. Also, the continued shift towards a knowledge driven economy will remain another key trend.

Collaboration across the Baltic Sea Region provides an opportunity to deal with these multiple trends and challenges.

Through a large number of efforts in the Arctic, Nordic and Baltic Sea Region the Nordic Council of Ministers aims to accelerate the transition towards the bioeconomy. The Nordic Council of Ministers will: *seed* the bioeconomy by providing intelligence to showcase opportunities and inspire joint efforts; *fertilize* the bioeconomy providing meeting places and platforms for stakeholder engagement and cooperation; and *grow* the bioeconomy by supporting development of tangible and visible on-ground cooperation activities with potential to make an impact on the realization of the bioeconomy.

As part of these efforts, this Workshop Paper aims to inspire dialogue at the workshop 18-19 September 2014 in Berlin. The workshop is the second of three workshops planned for 2014 under the project “Realizing the bioeconomy in the Baltic Sea Region” – which is a cooperation effort implemented within the framework of the Nordic Bioeconomy Initiative (NordBio) and

¹ European Commission. 2013. Bioeconomy and sustainability: a potential contribution to the Bioeconomy Observatory. European Commission, Joint Research Centre, Institute for Environment and Sustainability.

the Action Plan for the European Union Strategy for the Baltic Sea Region.

At the first workshop in Tallinn 26-27 March 2014 it was concluded that in going forward it is of particular importance to “hit the ground” i.e. to *ensure impact* of cooperation activities; to *engage more the private sector* through cooperation efforts that are attractive to companies; and to *support stakeholder in navigating more effectively between financial mechanisms* for cooperation in the Baltic Sea Region.

It is these issues of **impact**, **private sector engagement**, and **financial mechanisms** for cooperation in the Baltic Sea Region that this paper will address below.

Note! This paper is meant to inspire stakeholder dialogue and further cooperation efforts. The paper is not meant to be exhaustive. There are additional tools and levers; more good practices; and thus many more opportunities for accelerating the transition toward the bioeconomy than those discussed below. It is the hope that this paper will enable a fruitful discussion in Berlin 18-19 September 2014, a discussion that goes beyond the findings of this paper.

2. Impact

The bioeconomy has already made its impact in Europe. Today the bio-economy represents a market estimated to be worth over EUR 2 trillion and providing more than 22 million jobs².

The further development and shape of the bioeconomy will depend on breakthroughs in basic and applied research in the biological sciences; commercial opportunities; and development of new business enabling regulations, other framework conditions, and business models. External factors – such as population and incomes, demographics and education, energy consumption, the availability and cost of key resources such as food and water, access to healthcare, and both supporting and competing technologies – will also play an important role. All these factors will influence the location and the size and types of markets for food, feed, fibre, fuel, plastics, fine chemicals, pharmaceuticals and other biotechnology products.

2.1 Bioeconomy assets and enablers

In order to develop and realize the potential impact of the bio-economy in the Baltic Sea Region and pursue the ambition of becoming one of the world’s leading regions in green, innovative and sustainable development, the relevant enablers and impact indicators should be identified and discussed with the regions’ wide range of actors.

With circularity being a key component of the bioeconomy it is important to facilitate and utilize the synergies of the inter-linkages between the sub-sectors like the use and re-use of biological resources between industries. But, also circulating good market development, research and development practices between the sub-sectors can create valuable and

² European Commission working document (2012) “Communication on Innovating for Sustainable Growth: A Bioeconomy for Europe”.

sustainable new economic, environmental and social benefits. Assets and enablers provide the main building blocks of innovation in bioeconomy.

Thus and as also concluded in the Nordic Innovation report³ (www.nordicinnovation.net), intangible assets like **human capital** and **intellectual property** with access to global IP are very important as they provide competencies and background.

When looking for more tangible assets we find natural capital and infrastructure. The **natural capital** consists of natural resources like forests, water, flora and fauna and the value of natural environments and ecosystems.

Infrastructure consists of assets such as current industrial production facilities and supporting infrastructures such as logistics and energy grids. Other assets can be world-class research standards, access to next generation technologies and access to knowledge pools.

Enablers can either drive or hinder innovation, and thus development and growth in bioeconomy. According to the report by Nordic Innovation, the most important enablers include **markets**, **financial capital** and **smart policies** designed to release and develop the potential of the assets. We will take a closer look at these enablers in the next chapter – but because they are so significant for realizing impact in efforts a few further details here:

Markets often do not differentiate between a bio- or fossil-based product as performance and price are the most important factors. Bio-based products can with their unique properties enter and generate entirely new markets. For example there are no fossil alternatives to the bio-based enzymes. Sustainability is another example of product differentiation in the market. It is therefore important to look at sub-enablers e.g. the value chain integration, new business models and innovative funding streams.

An often mentioned weakness in the innovation/commercialization chain is the so-called “innovation chasm”. This refers to the inability to close the gap in the innovation cycle between the markets first two adaptor groups (innovators/early adaptors) and the early majority. It is therefore crucial for enablers to address the “innovation chasm” between research results and that socioeconomic outcomes are implemented.

An important influence on potential bioeconomy markets is the attitude of the public towards biotechnology products. The acceptance varies between health, agricultural and industrial applications. The ethical views of a population can influence the bioeconomy through impact on regulations and other laws that affect research, markets and business models.

Financial capital and competitive funding are very important factors when developing business cases. In particular in capital intensive innovations in bio-based production comparable to fossil-based chains. To enable the bioeconomy, a low cost feedstock is required with no sourcing risks (sustainability or availability), effective conversion technology and low technology risk, and ensured market off-take with reasonable and stable price level.

³ Nordic Innovation publication 2014:01 "Creating value from bio-resources - Innovation in Nordic Bioeconomy"

Smart policy means coherent regulatory frameworks, which support sustainable utilization of assets of bioeconomy with high value addition and positive cumulative effects in the economy. Regulations and their alignment can initiate the necessary policy push favoring the bioeconomy dimensions, production, consumption, biodiversity and environmental sustainability.

Policies and national priorities which affect the bioeconomy affects also other sectors and a systemic view on removing of the regulatory bottlenecks is required. In practice sectorial policies in forestry, energy and agriculture need to be aligned and looked at from a broader perspective. With this approach raw material utilization can be directed towards the highest possible value addition efficiently.

However, to fully realize the potential of the innovation in the bioeconomy the business ecosystems and stakeholders in general should be encouraged to take part in industrial symbioses showcasing and inspiring for further **crosscutting understanding** through linkages, networks and interaction. This calls for a close cooperation between the research institutions, regional, national and local authorities and the business sector as well as the general public.

In practice bio-based resource flows and side streams between the various sectors need to be looked at in a holistic view. Tailoring the different expert services to sector specific needs requires cross-cutting understanding. Piloting and demonstration are therefore crucial in attracting the proper investments before accessing the markets and the end users. This makes the risks of scaling up the production more manageable.

Linkages, networks, and interaction among the actors are needed. No individual company by itself can develop or implement remarkable systemic innovations. Companies can form R&D consortia and joint ventures, and universities and research organizations can provide these consortia with research services.

To unfold the potential benefits from cooperation, the actors need to interlink, network and interact to have a constantly updated understanding of the best actors in their field and associated fields and sectors. This takes communication and marketing. Just think of the fact that waste of one company is a potential raw material for another company.

As mentioned already we will come back to bottlenecks, assets and enablers associated to “bio-business” in chapter 3 “Engaging the private sector”.

2.2 Impact and benefits

The value of macro-regional cooperation on advancing the bioeconomy will be to increase efficiency in effort, not least ensuring impact. The key role of stakeholders – public and private, and local, national and international – will be to discuss and describe the pathways leading towards concrete objectives, actions, impact and ultimately the benefits to society.

Since the bio-economy is cross-sectoral in nature and influenced by a wide range of

interconnected global drivers and constraints, understanding and managing the bioeconomy requires an integrated multi-dimensional approach and an integrated assessment and monitoring. It is therefore important to discuss relevant and appropriate success criteria and their associated indicators for measuring or assessing the impact and benefits of the bioeconomy.

Usually the traditional socio-economic typologies are used when measuring or assessing impact. However, the inherent complexity of bio-economy actions and the subsequent need for cross-cutting approaches, calls for a great variety of impact types.

In discussing the implications for cooperation towards realizing the bioeconomy in the Baltic Sea Region a list of impact types may serve as a checklist or catalogue. Key impact types include:

- **Science impacts:** Research results have an effect on the subsequent progress of knowledge, thanks to advances in theories, methodologies, models, and facts. They affect the formation and development of disciplines and training and can also affect the development of research itself, generating interdisciplinary, cross-cutting, and international research.
- **Research policy impacts:** Research influences how policy makers and policies act. It can provide evidence that influences policy decisions and can enhance citizens' participation in scientific, environmental, societal, economic and technological decisions.
- **Training impacts:** These are impacts of research on curricula, pedagogical tools, qualifications, entry into the workforce, etc.
- **Technology impacts:** Product, process, and service innovations, as well as technical know-how, are types of impacts that partly result from research activities. There are few indicators, other than patents, for properly assessing this dimension. Additional efforts on innovation surveys including both an analysis of outputs and impacts, as well as innovation activity itself, could potentially provide improved impact indicators.
- **Economy impacts:** These refer to the impact on an organisation's budgetary situation e.g. operating costs, revenues, profits, the sale price of products; on the sources of finance, investments and production activities; and on the development of new markets. At the aggregate level, they can also refer to economic returns, through either economic growth, productivity growth or job growth, of a given geographical unit.
- **Culture impacts:** These relate to what people often call public understanding, but, above all related to four types of knowledge: know-what, know-why, know-how, and know who. In other words, these are the impacts on an individual's knowledge and understanding of ideas and reality, as well as intellectual and practical skills, attitudes, interests, values, and beliefs.
- **Society impacts:** Research affects the welfare, behaviour, practices, and activities of

people and groups, including their wellbeing and quality of life. It also concerns customs and habits: consumption, work, sexuality, sports, and food. Society impacts can contribute to changing society's views and modernize ways of doing business.

- **Organisation impacts:** These refer to the effects on the activities of institutions and organisations: planning, organisation of work, administration, human resources, etc.
- **Health impacts:** These relate to impacts on public health, e.g. life expectancy, prevention of illnesses, and the health-care system.
- **Environment impacts:** These concern management of the environment, notably natural resources and environmental pollution, as well as the impacts on climate and meteorology.
- **Symbolic impacts:** These are the gains in areas such as credibility due to e.g. undertaking R&D, or linked to universities or research institutions that offer gains in terms of potential clients, etc.

2.3 Implications for cooperation towards realising the bioeconomy in the BSR

To support further the process and breaking down the steps from input to benefits one may label the relevant impact types according to an “input-to-benefit” value chain approach that articulates how, and by what mechanisms, planned activities will affect the intended impacts⁴.

- **Inputs** – assets, financial and human resources, communication, cooperation.
- **Outputs** – discoveries, publications, citations, patents, etc.
- **Transfers/Exchanges** – engagement with end-users.
- **Outcomes** – new/improved products, services, or processes.
- **Impacts** – achieved improvements.
- **Benefits** – to society.

A set of SMART impact indicators (Specific, Measurable, Achievable, Realistic, Time-dependent) or key performance indicators (KPI) could be very relevant and useful tracking tools, as long as one remembers: Though, like Albert Einstein said “Not everything that can be counted counts, and not everything that counts can be counted”. On the other hand: if one does not measure, one cannot manage, improve or optimize!

As mentioned already, the bioeconomy encompasses the production of renewable biological resources and the conversion of these resources and waste streams into value added products, such as food, feed, bio-based products and bioenergy. The bioeconomy cuts across many different sectors and research and innovation fields, and has a wide range of socio-economic implications.

From the discussion above a number of implications for realising the bioeconomy emerge:

⁴ Henning Klarlund “Research impact for global challenges”, Research Global February 2010.

- Sustainability imperatives require an engagement with the whole natural resource base: e.g. bio-energy competes with wind and water, making it important to embrace the entire natural resource base.
- Competition takes place in every part of the bio-supply chain e.g. production factors (e.g. land, water, fertilizers, labor, capital) biomass, feedstock and consumption etc.
- Competition can lead to increasing intensification on favorable sites and further marginalization on unfavorable sites. However, cooperation can help to lower the economic, social and environmental costs of competition.
- Different places create different possibilities and different forms of engagement with people, rural land and nature.
- New coalitions and sustainability partnerships constitute an alternative development strategy.
- Traditional institutional and technical path dependencies hinder the room for maneuver.
- Engagement with consumers and wider stakeholders is essential to overcome path dependencies and build or rebuild trust.
- Solutions developed collaboratively under new forms of governance and embedded in actions and behaviors are more likely to be durable and sustainable.
- Creating an innovation-supporting context is essential and multiple actors must be engaged.
- The bioeconomy is not just a technical challenge. The big challenge in the social dimension is exploring the capacity of the myriad coalitions, partnerships and initiatives under way. This may well also require a new trans-disciplinary way of doing science to meet it, incorporating “a pathways to impact” approach in the bioeconomy value chain.

From the above discussion of assets, challenges, enablers, benefits and their implications follows a number of **recommendations**:

Over all, establishing a bioeconomy in the Baltic Sea Region holds great potential: it can maintain and create economic growth and jobs in rural, coastal and industrial areas, reduce fossil fuel dependence and improve the economic and environmental sustainability of primary production and processing industries.

More specifically, addressing the comprehensively inter-connected societal challenges related to the bioeconomy calls for efforts to:

- Ensure responsible and participative governance.

- Engage the public to develop an understanding of the bioeconomy and its impacts and benefits.
- Improve the availability and quality of information on bioeconomy products and processes, including their social, economic and environmental impacts and the related ethical concerns, and foster future-oriented multi-stakeholders dialogues.
- Facilitate the development and acceptability of regional and national bioeconomy strategies.
- Facilitate the flow from discovery to market applications and to speed up the innovation process through closer ties between activities throughout the research and innovation chain.
- Unlock the growth potential by including social innovation and social entrepreneurship resulting in new skills and practices etc.
- Contribute to increasing the number of innovative products and processes reaching the market, and increasing the number of new companies and new jobs created from trans-disciplinary research, innovation projects with access to risk willing capital and public procurement schemes.

3. Engaging the private sector

In chapter 2 we have already touch upon a number of bottleneck and enablers for engaging more the private sector in the bioeconomy. In this chapter we will dig a bit deeper in the discussion of how to engage more companies in advancing the bioeconomy. We will also present a number of good practices from around the Baltic Sea Region – and discuss their possible implications for further cooperation on how to speed up the transition towards the bioeconomy in the Baltic Sea Region.

3.1 Bottlenecks and enablers for private sector engagement in the bioeconomy.

Productivity: Productivity is a measure for efficiency in production – or in other words the relationship between outputs in terms of priced value of products and the costs of inputs used to produce them.

In this way the productivity is also a measure for the competitiveness of a company, and thereby its very existence. Today a critical bottleneck for engaging the private sector into the bioeconomy is that input costs related to fossil-based energy and materials are mostly lower than alternative bio-based inputs. A transformation leading to a substitution towards use of bio-based production inputs would therefore, all other things being equal, reduce competitiveness – unless if:

- a) Additional costs of bio-based production are offset through taxes on fossil-based production inputs.
- b) Introduction of consumption taxes on fossil-based products offset the additional costs of producing bio-based alternatives.
- c) Customers are willing to pay a higher price for bio-based products.

Therefore **firstly**, enablers to engage the private sector in bioeconomy may include hard measures such as tax incentives on production and consumption; as well as soft measures encouraging consumers to buy (and pay more for) sustainable bio-based product substitutes.

Innovation and technology: Innovation can shortly be defined as new products, new services and/or new ways of producing products and services – not necessarily just cheaper but also products and services with improved properties such as more sustainable.

Technology, understood as a collection of tools to perform tasks cheaper or better is often a part of innovation – though it is important to realize that technologies may well produce negative externalities on environmental sustainability. For example increased *economic efficiency* in exploitation of natural resources may lead to increased depletion of the environment. When we address technological advancement in the context of the bioeconomy we refer to economic activities based on optimal utilisation of biological resources for economic *as well* as social and environmental sustainable development – or in other words technologies that produce positive externalities for people and planet.

Innovation and technology bottlenecks and enablers for private sector engagement in the bioeconomy include:

- a) Path dependency; dominance of existing technologies and systems; and lack of access to and/or awareness of new technologies and innovations – all of which prevent bio-based production alternatives from entering value chains.
- b) Lack of cooperation across innovation and technology disciplines may prevent inter-industry linkages and cross-fertilization and with that restrain radical innovation opportunities. For example, many of the technologies and innovations driving forward the bioeconomy of today have roots in a mix of biotech, cleantech and ICT industries.

Therefore **secondly**, enablers to engage the private sector in the bioeconomy include measures that engage companies in development and application of bioeconomy innovation and technologies. To this effect hard enablers may include tax reliefs on private RTD, research vouchers etc. Soft enablers may include various efforts to link better private companies with knowledge and research centres e.g. by means of technology transfer centres, open innovation networks, business incubators etc. Soft enablers may also include facilitation of business-to-business cooperation and innovation-investor match making – as well as, quite obviously, provision of talented workforce.

Markets: It is fundamentally through the markets that companies can engage in the

bioeconomy. Increasing private sector engagement in the bioeconomy is therefore highly dependent on the availability of markets.

Governmental organisations – local, national and international – may develop bioeconomy markets in a number of ways:

- a) Regulations and taxation can encourage producers and consumers to substitute fossil based products and services to biobased alternatives.
- b) Bioeconomy public procurement schemes may be effective – both in terms of creating new immediate markets, and well as by encouraging private sector RTD activities leading to a higher future supply of bioeconomy products and services.
- c) Public awareness campaigns that encourage end-users to substitute consumption towards more sustainable alternatives, even if economic costs are higher.

Therefore **thirdly**, again enablers to engage the private sector in the bioeconomy include hard measures in terms of regulations and tax incentives – and a mix of soft measures whereby the public sector may leverage both supply and demand.

Confidence and Stability: Engaging the private sector in the bioeconomy will call for companies investing in the bioeconomy – either by changing the way they produce or the nature of the products and service they produce. The level of investment in any field is a function of companies' expectations and confidence – and thus the availability and stability of markets. Only if a company feels it has some level of certainty that an investment will produce sustained economic benefits, the company will be likely to make the investment.

Thus **fourthly**, an important enabler to engage the private sector in the bioeconomy is therefore the provision of long-term enabling frameworks, that allows companies to “do the math” on their investments in the bioeconomy. This goes for hard tax incentives and well as softer measures such a governmental multi-annual commitments toward green/bioeconomy procurement practices.

The importance of confidence and stability is well illustrated by the result of the Swedish government's sustained commitment towards developing technologies and markets for biogas. This was undoubtedly instrumental for Sweden's current world-leading position in this area. Similarly can be argued as regards the PV industry in North and East Germany and wind industry in Denmark.

Financing: Financing investments and other costs associated to a transformation of the way companies develop, produce and deliver products and services may obviously be a bottleneck for companies engagement in the bioeconomy.

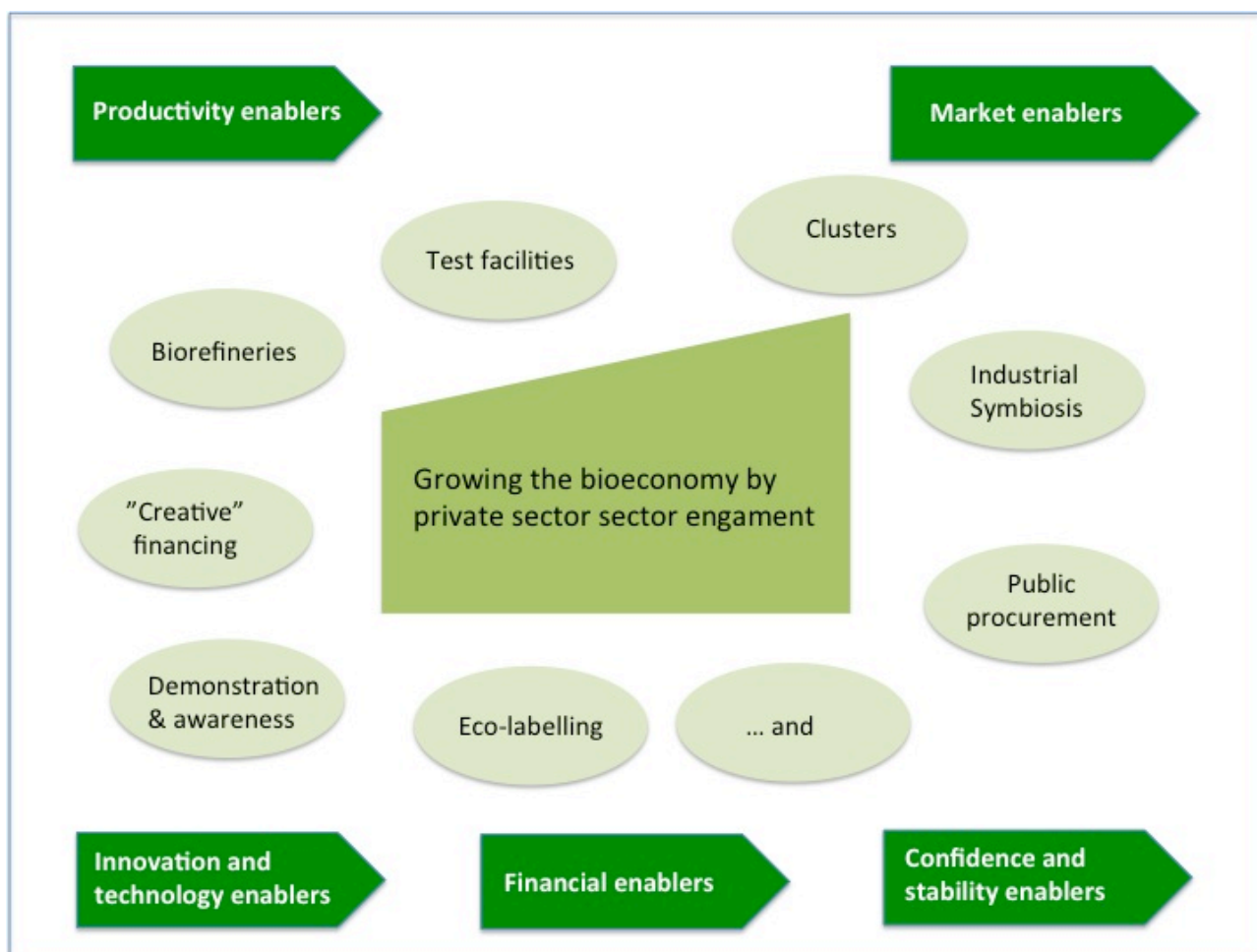
Thus, **finally** – realizing that the public sector can only finance a small part of the costs associated to making the transition towards the bioeconomy – it is critical to encourage non-subsidy approaches that reduce companies' costs of developing and deploying new more sustainable technologies and innovations.

Financial enablers fertilizing private sector engagement in the bioeconomy may include venture capital and business angle schemes – as well as financial services that factor into the cost of credits also the expected future reduced production operating costs and/or increased profitability resulting from production of more valuable products.

3.2 Good practices

There are a number of good practices from around the Baltic Sea Region that has led to increased engagement of the private sector in green growth activities, including within the context of the bioeconomy. The examples of good practices presented below all include a number of the enablers discussed above – and touch upon a number of the issues related to impact as discussed in chapter 2.

Figure 1: Enabling and engaging the private sector in the bioeconomy



Biorefineries: A biorefinery is a plant that convert different biobased feedstocks (trees, energy crops, waste etc) to a wide range of products, including food, feed, chemicals, materials, and energy. Over the past few years the feasibility – and potential profitability – of biorefineries in the Baltic Sea Region has been proven. As a result full-fledged biorefineries

are emerging. This situation provides immediate business opportunities for investors in and operators of biorefineries. More importantly however, up-scaling and technological advancement of biorefining will reduce output prices, and thus companies will increasingly find it attractive to utilize bio-based production inputs (be it of low-value, high-volume products such as fuels and energy – or high-value, low-volume products such as ingredients in the production of cosmetics, drugs, dietary supplements, feed or food). Because the cost of inputs in production is so critical to companies productivity – and thereby their very existence – the availability of price-competitive bio-based alternatives from biorefineries may be *the* most important single determining factor for engaging the private sector more in the bioeconomy.

Test facilities: The emergence of biorefineries is to a large extent a result of piloting activities that test/prove the feasibility of new technologies and demonstrate the application of the technologies on a commercial scale. Good practice examples in the bioenergy area are test and demonstration efforts by Lund University Biobased Industry Research Centre (www.lth.se); The Swedish Knowledge Centre for Renewable Transportation Fuels (www.f3centre.se); and Inbicon (www.inbicon.dk). The cost of testing is a major bottleneck for development and application of new technologies and their potential commercial application, not least for smaller companies. (More) joint test facilities – that reduces the cost of testing for individual companies and/or demonstrates economic, social and environmental benefits of various bioeconomy related technologies – could be key to engage more the private sector in the bioeconomy. Such joint test facilities could also promote an objective of smarter specialisation in the Baltic Sea Region.

Bio-, life-science- and cleantech clusters: Regions around the Baltic Sea contribute to a transition towards the bioeconomy by engaging the private sector in a number of cluster initiatives – whereby the companies cooperate with universities, research and technology centre and local and national authorities. Cooperation efforts include joint technology development and transfer; enhancing excellence and specialization; market development; improvements in the business enabling environment etc. – i.e. various efforts that enhance the competitiveness of companies within the clusters. A number of the business solutions for bio-, life-science- and cleantech industries are also environmental solutions for sustainable development – and for realizing the bioeconomy in the Baltic Sea Region. Already for a more than a decade bio- and lifescience clusters in the Baltic Sea Region have cooperated under the ScanBalt Bioregion umbrella. More and more cleantech clusters are also increasing their cooperation. Co-operation within and between clusters have proved productive for enhancing the competitiveness of individual companies, regions and countries, and the greater Baltic Sea macro-region. Cross-fertilization between related industries across different industry clusters – such as life-science, cleantech and ICT – could be a key to spur development and application of new technologies and innovations in the bioeconomy area⁵.

⁵ The report “Creating Value from bio-resources” from Nordic Innovation (2014) concludes: “The largest innovation and growth potential of bioeconomy seems to be in its cross-cutting nature. The following interesting crosscutting growth areas of the bioeconomy in the Nordic countries were identified: bio-based chemicals, biomaterials, biofuels and bioenergy, bio-refineries, resource-efficiency and industrial symbiosis and services based on ecosystem services”.

Business networks, competitions and matchmaking: Various **business networks**, industry specific or across bioeconomy subsectors such as ScanBalt Business Club, already exist in the Baltic Sea Region (www.scanbaltbusiness.com). Engaging with such networks to further promote awareness, visibility and matchmaking opportunities for companies, organisations and investors located in the Baltic Sea Region could accelerate private sector engagement in the bioeconomy. **Innovation competitions** have also proved effective in terms of both engagement and communication of opportunities, for companies and societies. One example is Nordic Built (www.nordicinnovation.net) that is a competition to promote solutions for and awareness about sustainable building concepts. **Matchmaking** challenges (buyers) and solutions (providers) also offer opportunities. One example is the Nordic Innovation Accelerator (www.nordicinnovationaccelerator.com) that is a Finnish facilitated effort aiming to connect a provides of environmental solutions and owners of an environmental challenge/problem.

Industrial symbiosis: In Kalundborg in Denmark companies from very different industries has over the past 20 years clustered successfully in an industrial symbiosis. In the Kalundborg Symbiosis, public and private enterprises buy and sell waste products from industrial production in a closed cycle. About 20 companies participate in the cycle. The residual products traded can include steam, dust, gases, heat, slurry or any other waste product that can be physically transported from one enterprise to another. Thus a residual product originating from one enterprise becomes the raw material of another enterprise, benefiting both the companies (and thereby the economy) and the environment. For more information: www.symbiosis.dk.

Public Procurement: The project Green Public Procurement (www.balticgpp.eu) implemented under PA SME of the Action Plan for the European Union Strategy for the Baltic Sea Region has crystalized good practices and build capacity in public organisations on how Green Public Procurement can advance environmental innovative, eco-efficient products and services. With public procurement constituting up to 20% of GDP in the European Union, the potential of such market pull is obviously large. In Denmark, the Municipality of Mariagerfjord have tasked Blue Planet Innovation (www.vfl.dk) and other local public and private partners to develop a framework that will enable the municipality to make the transition from fossil fuel dependency to become fuelled on local biomass. Today the municipality spends annually approximately EUR 140 Mio on fossil-based energy. With the initiative the municipality has thereby “overnight” created a market worth EUR 140 Mio for locally produced and used biomass. The sudden availability of such a market spurs local farms’ and firms’ engagement in innovation and sustainable development activities.

Private financing: Throughout the Baltic Sea Region various financial schemes have been developed and deployed to reduce the costs of making the transformation of producing and consuming more sustainably. One examples is **Energy Performance Contracting (EPC)** which is a performance based financial modality that allows funding of energy upgrades from cost reductions – more specifically whereby a Energy Service Company (ESCO) implements a energy saving or renewable energy project, and uses the stream of income from the cost savings, or the renewable energy produced, to repay the costs of the project (iet.jrc.ec.europa.eu, www.energysolutions.dk and www.renesco.lv). Other examples of

“creative financing” include **Crowd Funding**, e.g. as facilitated by Companisto in Berlin, whereby start-ups can raise capital for further development through equity investments. More specifically this happens through web-based matchmaking and counselling on www.companisto.com. A similar example – targeting rural areas and small towns – is the **Local Capital** schemes as facilitated by Crowd Equity AB in Sweden (www.crowdequity.com).

Eco-labelling: Negative externalities on people and environment of producing and consuming are today mostly not priced (fully) into the costs of product and services. The result is that sustainable products and services tend to be more expensive than less sustainable alternatives. Consumers can however be persuaded to consume more expensive alternatives IF this has additional sustainable properties valued by the consumers. One such example is organic food. The challenge is however that consumers will only pay the premium if they feel confident and trust that what they buy is indeed organic (i.e. produced according to certain standards for organic food production). Labelling plays an important part in such trust-building and thereby for creating a new market – and with that an incentive for farms and firms to engage in the bioeconomy. There are numerous examples of such eco-labels around the Baltic Sea Region: “Luomo” in Finland; “KRAV” in Sweden; “Aloa” in Latvia; “Bio” in Germany; etc. For non-food products (detergents, cosmetics, paper, electronics and more) the Nordic Council of Ministers has introduced The Nordic Ecolabel – which today is being used throughout the Nordic region to market products with favourable environmental benefits.

Improving agricultural practices, Baltic Deal: The Baltic Deal project (www.balticdeal.eu), a project under PA Nutrients of the Action Plan for the European Union Strategy for the Baltic Sea Region, has successfully united farmers and farmers’ advisory organisations around the Baltic Sea Region in a joint effort to improve agri-environmental practises. More precisely the cooperation has supported farmers in reducing nutrient losses from their farms while at the same time maintaining production and competitiveness. Pilot activities have for example improved water utilization; fertilization methods; manure management and treatment of run-off waters – all of which produce environmental benefits for society and economic benefits for farmers.

Manure as resource rather than waste, Baltic Manure: Baltic Manure, a project under PA Agriculture of the Action Plan for the European Union Strategy for the Baltic Sea Region, has gathered leading research and innovation communities in an effort “to change the general perception of manure from a waste product to a resource, while also identifying its inherent business opportunities with the right manure handling technologies and policy framework” (www.balticmanure.eu). The project has produced a number of recommendations for how to manage and use manure more effectively both as regards the profitability of farms and sustainability of the surrounding environment.

Blue growth, Submariner: The Submarine Network (www.submariner-project.eu), a project under PA Innovation of the Action Plan for the European Union Strategy for the Baltic Sea Region, has developed a compendium and road map for furthering sustainable development in the Baltic Sea Region through environmentally friendly and economically attractive uses of marine technologies. Also, new uses of biological resources were tested in real conditions, leading to feasibility studies for new uses in specific areas, assessment of technological and financial needs, as well as estimations of impacts on environmental and socio-economic

conditions, and evaluation of specific legal constraints.

3.3. Implications and opportunities for engaging more the private sector

From the above discussion further efforts to engage the private sector in the bioeconomy could be implemented under the following headlines:

- Map, analyse and encourage multiplication of **good business practices** by storytelling successful green business cases that produce positive social and environmental externalities. Effective communication would inspire more companies to embrace the opportunities offered by the bioeconomy.
- Further map, analyse and encourage multiplication of **good policy practices** by storytelling successful policies and incentives for improving the bioeconomy business enabling environment. This would inspire governments and authorities elsewhere in the Baltic Sea Region to provide similarly attractive bioeconomy framework conditions.
- **Network and fertilize existing platforms for bioeconomy business cooperation** (within food & feed, biobased non-food and bio-based energy) to achieve benefits of scale, resource efficiency and smart specialisation – be it cluster programmes; science- and business parks; business and investor matchmaking platforms, crowd-funding schemes etc.

Most importantly: It may be rather trivial but it is nevertheless an area where many public partners and public funded efforts struggle, engaging the private sector requires efforts that are close to business i.e. efforts that, also in the short term, **impact on the profitability** of companies.

There seems to be little doubt that the reason why the cooperation project Baltic Deal was successful was because it mixed successfully the (public) environmental objectives with the (private) profit making objectives (i.e. reduced utilization of fertilizer, reduces cost of fertilization, and with production output intact, the profitability of farming increases.) Energy Performance Contracting is another good example of a win-win situation that benefits environment and profit margins for the companies using and producing energy services. Identification and communication of many more such similar **win-win opportunities** is a key to accelerate companies' engagement in the bioeconomy.

Another low-hanging fruit could be further matchmaking activities at the BSR level among companies – and together with consumers of bioeconomy products and services, including local, regional and national public authorities and bodies. Such efforts would **increase the BSR “home market”** – and with a larger market attract more companies to do business in the bioeconomy field. Efforts to increase the “home market” could also be inspired by simple tools such as the Business Roaming Agreements resulting from the Mobile Vikings ICT cooperation project in the Baltic Sea Region. The Business Roaming Agreements is essentially an exchange programme in which companies are able reciprocally to use each other's industry

development hubs and infrastructures, thereby decreasing their internationalisation costs and fertilizing co-innovation and development among companies across the Baltic Sea Region. Many business-enabling infrastructures are already in place and paid for, so why not share them to achieve scale?

4. Public financing to bioeconomy cooperation efforts

It goes without saying that realizing the bioeconomy ultimately goes hand in hand with a transformation of the way that companies produce and the way citizens consume products and services – after all private procurement account for vast majority of GDP. However, public sector financial support can play an important role in seeding, fertilizing and enabling multiplication of practices and models for growing the bioeconomy.

4.1 Financial support for transnational cooperation on bioeconomy in the BSR

In the Baltic Sea Region there are a number of organisations and programmes that may support transnational cooperation towards realizing the bioeconomy.

Horizon 2020 provides a number of funding opportunities – aimed to support the EU strategy “Innovating for Sustainable Growth – A Bioeconomy for Europe”. Through Horizon 2020 European Union support to advancing the bioeconomy will be provided to efforts in:

- Agriculture and Forestry (food supply, environmental sustainability and economic opportunity through agriculture).
- Food Safety and Healthy Diet (safe, healthy, high quality and affordable food and feed - produced and consumed sustainably).
- Bio-based industries (enabling a shift towards biological raw materials and biological processing methods).
- Aquatic resources (manage, sustainably exploit and maintain aquatic living resources while maximizing social and economic marine/water benefits).
- Biotechnology (Key Enabling Technologies (KETs) that are multi-disciplinary, knowledge and capital-intensive; that cuts across diverse sectors; and that are important for the competitiveness of European industry, growth and job creation).

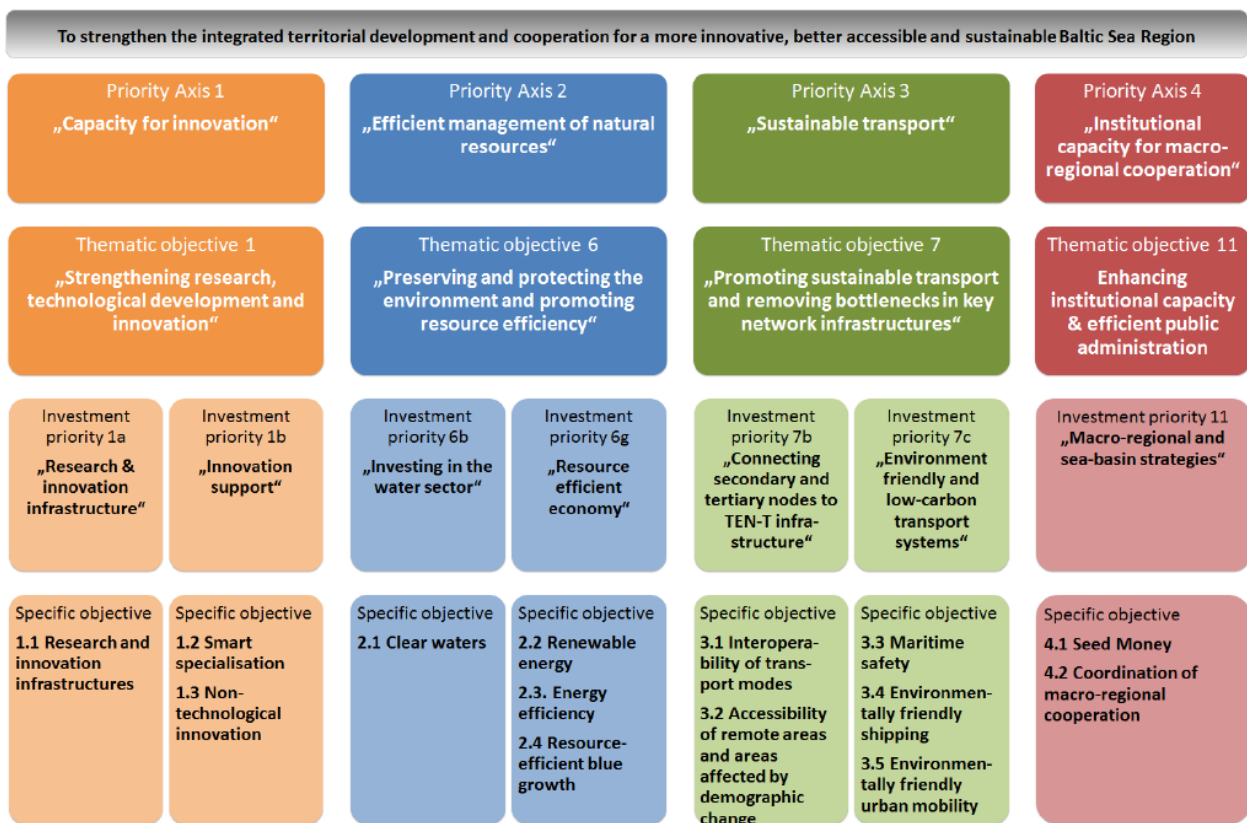
There are multiple calls with different deadlines. Detailed information about the various calls is available on: <http://ec.europa.eu/research/participants/portal/desktop/en/home.html>.

The Baltic Sea Region Programme 2014-2020 is expected to launch its first call towards the end of 2014. This programme could potentially provide for substantial funding to implement a number of bioeconomy cooperation activities.

The Baltic Sea Region Programme funds “support cooperation projects working for a more innovative, more accessible and sustainable Baltic Sea region, where partners look for joint solutions to common issues”. At least three partners from three countries in the region can form a project. Projects should demonstrate clear links to needs and assets in regional development. Successful projects will be those with transferable results and high visibility.

The funding from the EU under the Baltic Sea Region programme is in total EUR 263 Mio for the period 2014-20. EU co-financing may go up to 75-85% in projects. Partners eligible for support are: “Public authorities from local, regional and national levels, research and training institutions, NGOs, sectoral agencies and associations and, new in this period, enterprises can also take part in projects and receive funds.”

The types projects that may be supported are summarized in the figure below.



Source: www.eubaltic.net.

The Central Baltic and The South Baltic programmes will also support cooperation activities related to utilisation of natural resources and sustainable development – though in a more in a smaller geography than the Baltic Sea Region wide programme. The conditions for eligibility, funding etc. for these two programmes are similar to those of the Baltic Sea Region Programme. More information on: www.centralbaltic.net and www.southbaltic.eu.

EUSBSR Seed Money Facility provides EU seed financing “to prepare projects that contribute to one of the priority areas or horizontal actions of the EU Strategy for the Baltic Sea Region. Partners that receive seed money funding should draft a project plan that can be

further developed into an application to any of the EU or national funding sources e.g. the European Structural and Investment Funds programmes 2014-2020. The plan “has to include a description of activities and outputs; the composition of the partnership; the indicative budget; and an analysis of funding possibilities.” The total budget of the seed money project may range from 30,000 to 50,000 EUR (in some cases up to 100,000 EUR) – with EU support accounting for up to 85%. Applications can be submitted continuously. More information on www.seed.eusbsr.eu.

CBSS Project Support Facility provides seed funding “to co-finance the development and implementation of Baltic Sea macro-regional cooperation projects, which would bring added value for the Baltic Sea region, show impact in regional cooperation and foster long-term partnerships. The next call for applications is foreseen to be in the Spring of 2015. Three of five target areas of intervention are: “Environment, such as climate change, sustainable development and innovation”; “Economic development, which may include innovation, competitiveness, fostering entrepreneurship, transport & logistics, labour markets”; and “Energy, which may include energy security, energy efficiency and saving, renewable energy and the impact of energy on the environment.” The maximum co-financing granted is EUR 50.000 for project with a duration up to one year. It is a requirement that project partners contribute with at least 10% self-financing. More information on: www.cbss.org.

The Swedish Institute provides seed funding up to SEK 440.000 to initiate cooperation projects aimed at promoting “an ecological sustainable region”; “sustainable growth and prosperity” and/or that address “regional challenges”. Unlike the other seed funding mechanism mentioned above, seed funding from Swedish Institute requires a Swedish lead partner and at least two more partners from Estonia, Latvia, Lithuania, Russia or Poland (or Belarus, Ukraine, Moldova or Georgia). Partners from other Baltic Sea Region countries may participate in projects but may not benefit financially. Proposals may be submitted continuously until 30 June 2015. More information on: www.si.se.

Nordic Council of Ministers Bioeconomy Seed Financing. The Nordic Council of Ministers offers pre-seed money grants up to approximately EUR 5.000 to cover meeting and travel costs associated to the development of cooperation activities that support the objectives of the EU Strategy for the Baltic Sea Region Horizontal Action on the sustainable bioeconomy. Funding is available for such 10 cooperation efforts during 2014, under the heading “10 steps towards a bioeconomy for Baltic Sea Region”. The first five projects are committed as per August 2014. For more information contact mrw@norden.org.

Nordic institutions and cooperation bodies – such as Nordic Agricultural Committee for Agricultural and Food Research (www.nkj.nordforsk.no), Nordic Forest Research (www.nordicforestresearch.org), Nordic Gene Resource Centre (www.nordgen.org), Nordic Innovation (www.nordicinnovation.net), Nordic Research Council (www.nordforsk.no), and Nordic Energy Research (www.nordicenergy.org) - all provide funding opportunities partners’ efforts in pursuing the different aspects of the bioeconomy.

Currently for example Nordic Agricultural Committee for Agricultural and Food Research has an open call for bioeconomy network and research projects with deadline **15 September**

2014 – and with the same deadline Nordic Innovation has an open call for marine innovation cooperation projects.

Depending on the various work programme priorities and calls, funding may be in the form of short-term seed financing or more substantial funding for multiannual cooperation projects. In Nordic projects usually there is a requirement of participation of partners from three Nordic countries. Partners from Estonia, Latvia, Lithuania and Northwest Russia may participate and benefit mostly also financially. Partners from Germany and Poland are welcomed – however these may not benefit financially.

4.2 Aligning funds to create synergies and avoid duplication of efforts

The European Union Strategy for Baltic Sea Region and associated Action Plan offer platform for dialogue on how to actually and practically go about pursuing the bioeconomy in the Baltic Sea Region.

However, because the Strategy and Action Plan do not offer additional funding beyond seed funding to a limited number of cooperation efforts, it is of critical importance that efforts are made to facilitate that the available (numerous) financial instruments and programmes supporting regional cooperation support and reinforce each other: firstly because there are opportunities for creating synergies – and secondly, because it is obviously important to avoid duplication in public funded efforts.

There seem to be opportunities for fertilizing synergies and to avoiding duplication of bioeconomy through improvements in monitoring and communication between enabling cooperation programmes that target in part or in full development of the bioeconomy in the Baltic Sea Region.

A web-based bioeconomy **funding map/observatory** – with introductions and links to calls under the e.g. Horizon 2020, Territorial Cooperation Programmes, Nordic institutions etc. – could be an effective information channel. Beyond information on funding opportunities the web place could provide information of good practices, solutions, matchmaking etc. thereby becoming a focal point for knowledge and inspiration on approaches to pursue the bioeconomy in the Baltic Sea Region. A virtual Baltic Sea Region macro-regional bioeconomy observatory could benefit from and contribute to the planned European Union Bioeconomy Observatory, which aims to collect and communicate data and knowledge on: “Investments in Research, Innovation and Skills (research pillar); Reinforced policy interaction and stakeholder engagement (policy pillar); and Enhancement of markets and competitiveness in Bioeconomy (markets pillar)”⁶.

To further these efforts it could be considered to also establish a **working group “Financing the Bioeconomy in the Baltic Sea Region”** with a view to engage a large number of financing partners, including those mostly providing credits (EIB, NIB, NEFCO, etc); those mostly providing grants/co-financing (Nordic Innovation, NordForsk and European Commission DG Research and Education and DG Regional Policy); and those national/regional/local financial stakeholders targeting the bioeconomy. The working group could meet a few times a year –

⁶ http://ec.europa.eu/research/bioeconomy/policy/observatory_en.htm

possibly back-to-back with related macro-regional development events – with a view to share information on efforts, work priorities and also to facilitate that project proposals are channelled towards the most appropriate and best enabling funding mechanism.

4.3 Assisting stakeholders to navigate more effectively between financial mechanisms

As we have seen there are quite a number of funding opportunities for bioeconomy cooperation in the Baltic Sea Region, including EU Territorial Cooperation Programme; EU Horizon 2020; Nordic funds from NordForsk, Nordic Innovation, Nordic Energy Research and more; funds from CBSS; and EU, national and regional funds for cross-border, national and local cooperation activities.

For bioeconomy stakeholders eager to pursue bioeconomy development efforts it can be difficult to find the right way through this “forest of opportunities” – and expensive too. The EUSBSR Action Plan was adopted with an important objective to make pursues of cooperation easier, better coordinated and to avoid duplication in efforts.

In moving forward the bioeconomy an important contribution by the public sector partners would be efforts that make it less complicated – and less expensive – to pursue new cooperation efforts.

Joint programmes – such as for example joint calls for proposals for bioeconomy cooperation projects as planned for 2014-15 by Nordic Innovation and NordForsk – are obviously attractive because it provides for pooling of funds and allows for cooperation across disciplines with a single access point. There might be additional such opportunities for merging funding instruments, however, such coordination is administratively cumbersome and seem not likely to become the order of the day.

Efforts to align financial support and efforts through information exchanges among funding partners and mechanism, as presented in section 4.2 above, seems to be a more likely tool to support stakeholders in navigating more effectively between various cooperation enabling frameworks.