



Netherlands Enterprise Agency

International market opportunities Biobased Economy

Where do we stand and what
can NL do to improve our
success in identifying,
creating and seizing the
existing opportunities?



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0.0 Background

The Dutch government supports Dutch companies and knowledge institutes in identifying, creating and taking international market opportunities in the Biobased Economy

Netherlands Enterprise Agency ([RVO.nl](https://rvo.nl), before NL Agency) carries out the **Global Sustainable Biomass** Fund (focussed on creating sustainable biomass chains, in emerging and developing countries, for local or international energy use) and the **Sustainable Biomass Import** Fund (focussed on large scale application of biomass for energy or chemistry in the Netherlands), commissioned by the Ministries of Foreign Affairs and Economic Affairs.

Nearly 40 projects of companies, NGOs and knowledge institutes are financially supported in these programmes in the last 4 years ([see annex C for an overview of projects](#)).

These projects have shown there are a number of international market opportunities for Dutch organisations.



Bio-ethanol production from cassava – Agro2, Panama



0.1 This assignment

The biobased economy (BBE) is developing rapidly globally. How can the Netherlands take advantage of the international opportunities arising from these developments?

The above question was the starting point for the underlying project. The project has been carried out by [Partners for Innovation](#) between 1 October 2013 – 1 June 2014, commissioned by [RVO.nl](#). Main aim for RVO.nl is to support Dutch organisations doing business abroad. The specific objectives for this assignment are:

- ❑ Develop “information products” that will facilitate Dutch organisations doing international business in the biobased economy (BBE);
- ❑ Develop recommendations how the Netherlands (government, private sector and knowledge institutes) can improve taking advantage of the existing market opportunities in the BBE.

Results: the project resulted in 5 different ‘products’:

1. **16 country reports** (8-10 pages) with BBE related information of a country
2. **4 examples** of Dutch companies active abroad
3. Presentation **overview of major global developments** related to the BBE
4. **Overview of the 195 reports /** publications that have been studied
5. Underlying **final report** providing an overview of the project’s results and recommendations



0.2 Aim of this report

This report provides the reader with an overview of the project's results and deliverables

[Chapter 1](#) briefly describes the different projects deliverables, with a web link to the actual deliverables. In [chapter 2](#) the expected growth in biomass use, for different applications, is shown. Chapter 2 is a summary of the deliverable "Overview of global BBE developments". [Chapter 3](#) describes the strengths and weaknesses of the Dutch green sector. [Chapter 4](#) is the result of the analysis of chapters 2 and 3, providing a global view on the opportunities for Dutch organisations doing international business in the biobased economy, specifically bioenergy. [Chapter 5](#) provides an overview of the identified obstacles for doing business and in [chapter 6](#) the identified recommendations, to overcome these obstacles, are presented.

The [annexes](#) provide some further background information on:

- Organisations that have participated in the project;
- Market opportunities in the 16 selected countries;
- Supported projects of the Sustainable Biomass programme;
- The project's approach;
- Relevant sources that have been used.



0.3 Introducing the Biobased Economy

Which sector was the subject of research for this project?

The Biobased Economy (BBE) is an economy in which biomass is used for energy and chemistry purposes. In this project we have researched the international market opportunities for Dutch companies and knowledge institutes active in the BBE but with a focus on biomass for energy use. International business includes import, export, direct foreign investments in companies /projects and research and knowledge exchange. The focus in this project is on:

- Production of biomass;
- Import and/or export of biomass, materials and machines;
- Logistics and transport of biomass;
- (Pre)treatment and conversion of biomass into chemicals and energy(carriers);
- Biomass and bio-energy policies and sustainability.





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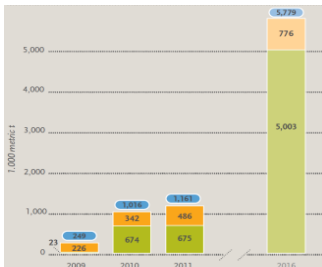
Ch.1 The 5 project deliverables



16 country reports (8-10 pages) with BBE related information of a country. For usage by companies interested in doing business in one or more of the 16 countries.



5 examples of Dutch companies active abroad. For usage by industry organisations and government to enthuse companies doing business abroad.



Overview (presentation) of the major global developments related to the BBE. For usage by all interested in major (global) trends in the BBE.

#	Title	Region	Country	Keywords	Summary
001	Bilaterale Samenwerking Algerije	Africa	Algerije	gas, biogas, distributie, kennisoverdracht, efficiëntie, hernieuwbare energie	Algerije en Nederland vervullen beiden een sleutelrol in de distributie van gas. Nederland heeft belangstelling voor aframe van Algerijns gas; Algerije is geïnteresseerd in de kennisinfrastructuur van Nederland op het gebied van efficiëntie en duurzame energie. Algerije wil meer toegang tot Europese energiemarkten. Begin 2012 wordt een G20 project ontwikkeld dat inspelt op deze interesses.
002	Bilaterale Samenwerking China	Asia	China	cleantech, solar PV, wind, bioenergy, biomass, biofuels, coöperatie, hernieuwbare energie	China groeit hard binnen de 'cleantech industrie' op het gebied van o.a. zonnepanelen, wind- en bioenergie. Voor NL biedt China een platform voor ontwikkeling van nieuwe energiegerelateerde technologieën en een afzetmarkt voor bestaande kennis en producten. China ziet NL als innovatieve speler op energiegebied waarmee intensieve samenwerking (energiebesparing, energiezuinigheid, hernieuwbare energie, transport en infrastructuur), aantal lopende projecten aanwezig.
003	Bilaterale Samenwerking Kazachstan	Asia	Kazachstan	policy, law, efficiëntie, hernieuwbare energie, CO2, emissies trading scheme	Nederland heeft Kazachstan geholpen bij de ontwikkeling van hun wet- en regelgeving op het gebied van energie efficiëntie en duurzame energie. Op het gebied van CO2 reductie heeft Kazachstan grote ambities. Het doel is de Kazachstaanse CO2 emissies in 2020 terug te brengen naar 15% onder het niveau van 1990. Om de uitstoot van broeikasgassen door Kazachstaanse bedrijven en andere bronnen te beperken ontwikkelt het Kazachstaanse Ministerie van Environment Protection (MEP) een Kazachstaans Emissions Trading Scheme (KZ ETS) dat is gebaseerd op het Europese ETS.

Sources overview of the 195 publications and reports that have been studied. For usage by all organisations interested in major global trends and developments in the 16 selected countries.

Deliverables can be downloaded from:
www.rvo.nl/biomass/opportunities



Underlying final report: overview of all results and recommendations. For usage by all interested organisations.



1.1 Result 1: 16 country reports

Europe	Germany, France, UK, Spain, Finland, Lithuania
EU/Asia	Russia
Asia	China, India, Thailand
Americas	USA, Canada, Brazil
Africa	South-Africa, Ghana
Oceania	Australia

The country reports contain information on:

1. General country information
2. Economic indicators
3. Biomass availability
4. Energy profile
5. Energy and biomass policies
6. Funding opportunities
7. Business climate
8. Important contacts





1.2 Result 2: 5 examples of Dutch companies active abroad in bioenergy

Kara Energy Systems (South-Africa)



2,1 MW wood waste combustion installation to produce steam

Nollen group (South-Africa)



Biomass steam installation using invasive alien plants

Thermaflex (Germany)



Piping for using waste heat from biogas digester

Triogen (Finland)



ORC at Biogas CHP from water treatment plant in Helsinki

Colsen International (USA)



A double Bidox® biological scrubber to remove H₂S and expand boiler lifespan

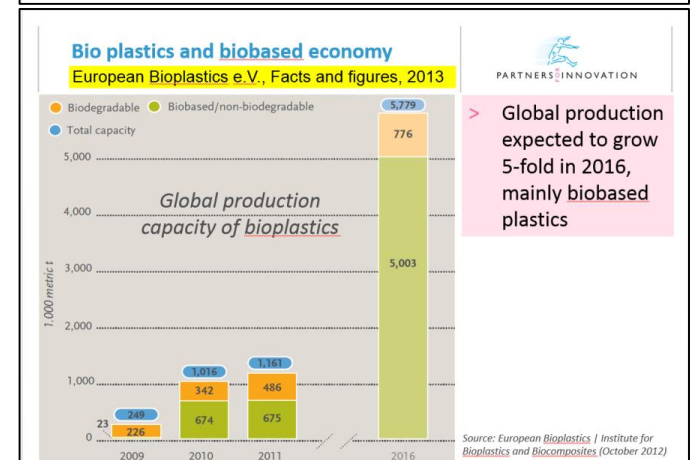
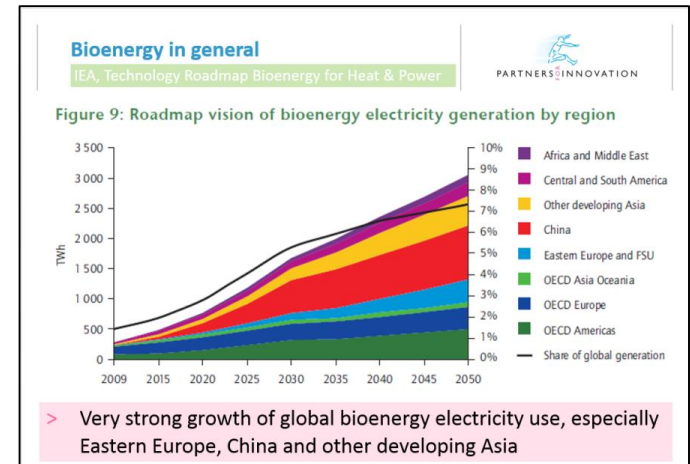


1.3 Result 3: Overview of global BBE developments

The presentation is based on recent and publicly available reports and sources, covering the following topics:

1. Global energy demand and supply
2. Bioenergy in general
3. Biogas
4. Wood pellets
5. Biofuels
6. Bio plastics and biobased economy
7. Opportunities and Market Trends

On the right side of this page two examples of sheets from the presentation.





1.4 Results 4 and 5: Overview of used sources and Final report

For this project 195 sources / publications have been used

For easy access for other organisations we have made an overview of the used sources / publications containing: the title, the relevant country/region, relevant keywords and a short summary.

Underlying report is the final report of the project.

All deliverables can be downloaded from:
www.rvo.nl/biomass/opportunities



Ch.2 Biomass for energy and chemistry use will keep increasing world wide

Biomass use as energy and chemistry feedstock (including plastics) has increased in past years and will continue to increase in the coming 10-30 years. The graph below is a good example of this trend for the EU27 but many more literature sources support this.

Final energy consumption (FEC) and final energy and feedstock consumption (FEFC) of biomass in the EU27 in 2010 and projections for 2020 based on the National Renewable Energy Action Plans (NREAP)

Sector	2010	NREAP	OECD BAU
	exajoules	2020 exajoules	2030 share of FEFC
Power generation	0.4	0.8	2.4%
Heat (solid biomass)	2.4	3.4	2.1%
Heat (biogas and bioliquids)	0.3	0.4	
Transport	0.6	1.3	2.2%
Feedstock		Not included	Small
Total	3.6	5.9	6.7%

From: PBL (2012), "Sustainability of biomass in a bio-based economy", PBL publication number 500143001, The Hague, PBL Netherlands Environmental Assessment Agency.

Source: NREAP (Beurskens and Hekkenberg, 2011); BAU scenario (OECD 2011, 2012)



Ch.2 Biomass for energy and chemistry use will keep increasing world wide *(continued)*

The next pages are a selection from the presentation “[Global biomass bioenergy and bioplastics trends](#)” (result 3 of this project), detailing this global rise in biomass use:

- 2.1 Global energy demand will increase more than 40% until 2035, 95% in non-OECD countries;
- 2.2 Strong growth of global bioenergy use expected: 20% in 2020 and 40-60% in 2035;
- 2.3 Only 5-7% of biogas potential currently used;
- 2.4 Strong growth (factor 3) of wood pellet market expected, especially in EU and China;
- 2.5 Biofuel demand is growing globally but strongest in Asia;
- 2.6 Biobased plastics market is expected to grow 3-fold in 2020.

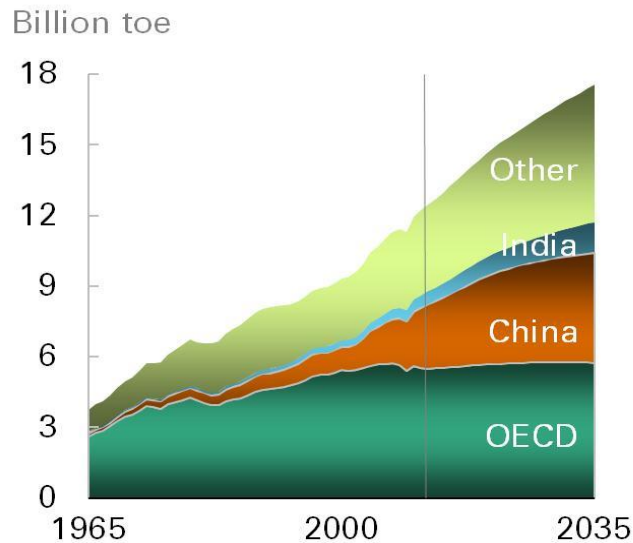


2.1 Global energy demand and supply increases, especially in non-OECD countries

BP: “We project that by 2035 global energy consumption will increase by 41% from today’s levels with virtually all (95%) the growth in non-OECD countries and more than half coming from India and China”.

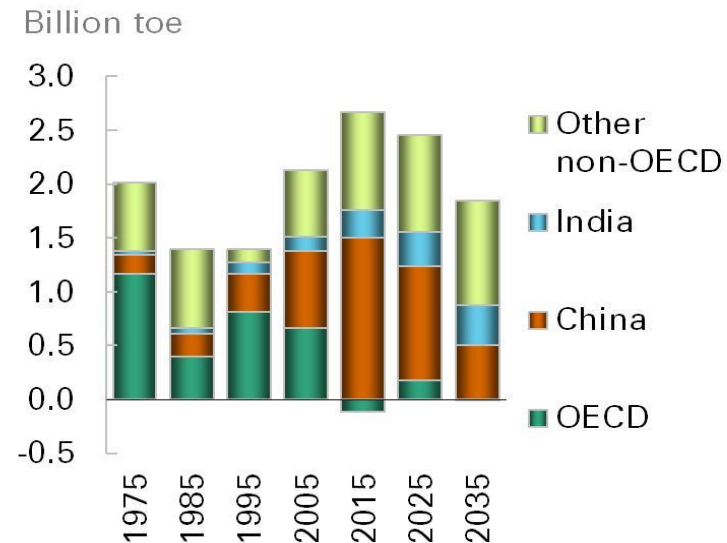


Consumption by region



Energy Outlook 2035

Ten year increments by region

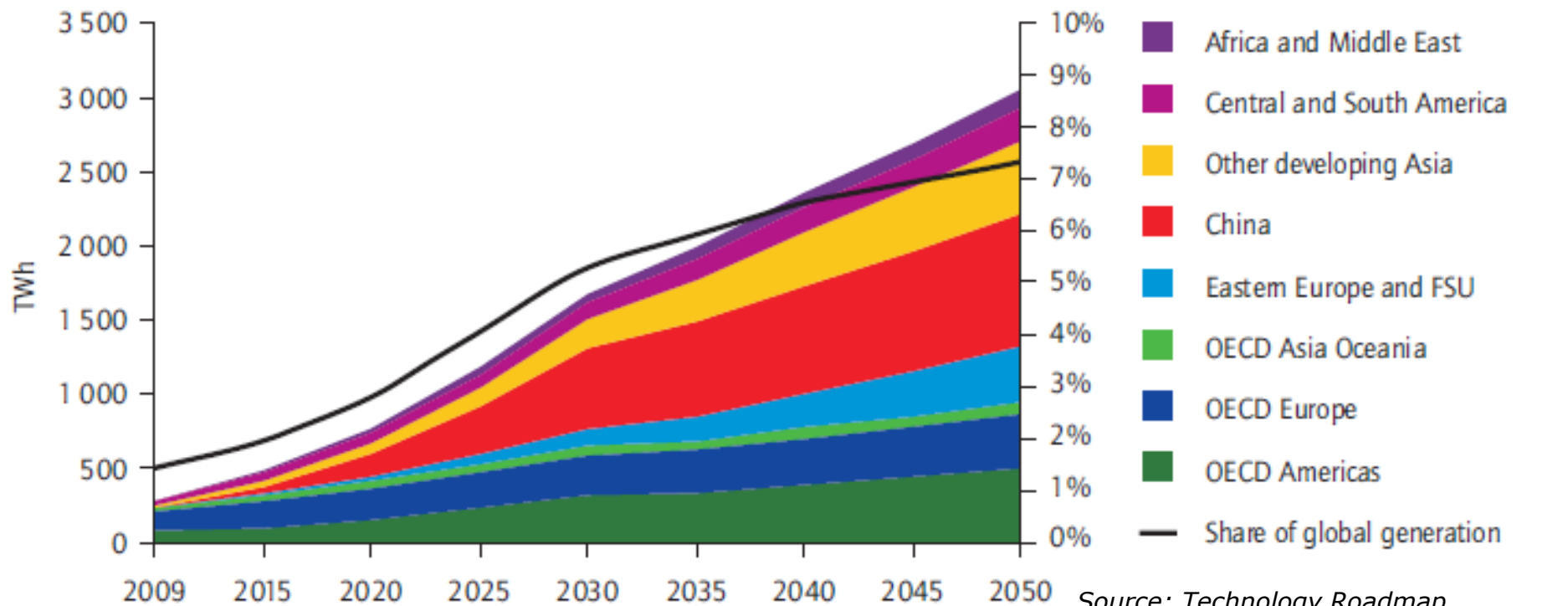


© BP 2014



2.2 Strong growth of global bioenergy use; 20% in 2020 and 40-60% in 2035

Figure 9: Roadmap vision of bioenergy electricity generation by region



Source: Technology Roadmap
Bioenergy for Heat & Power, IEA, 2013



2.3 Only 5-7% of biogas potential currently used

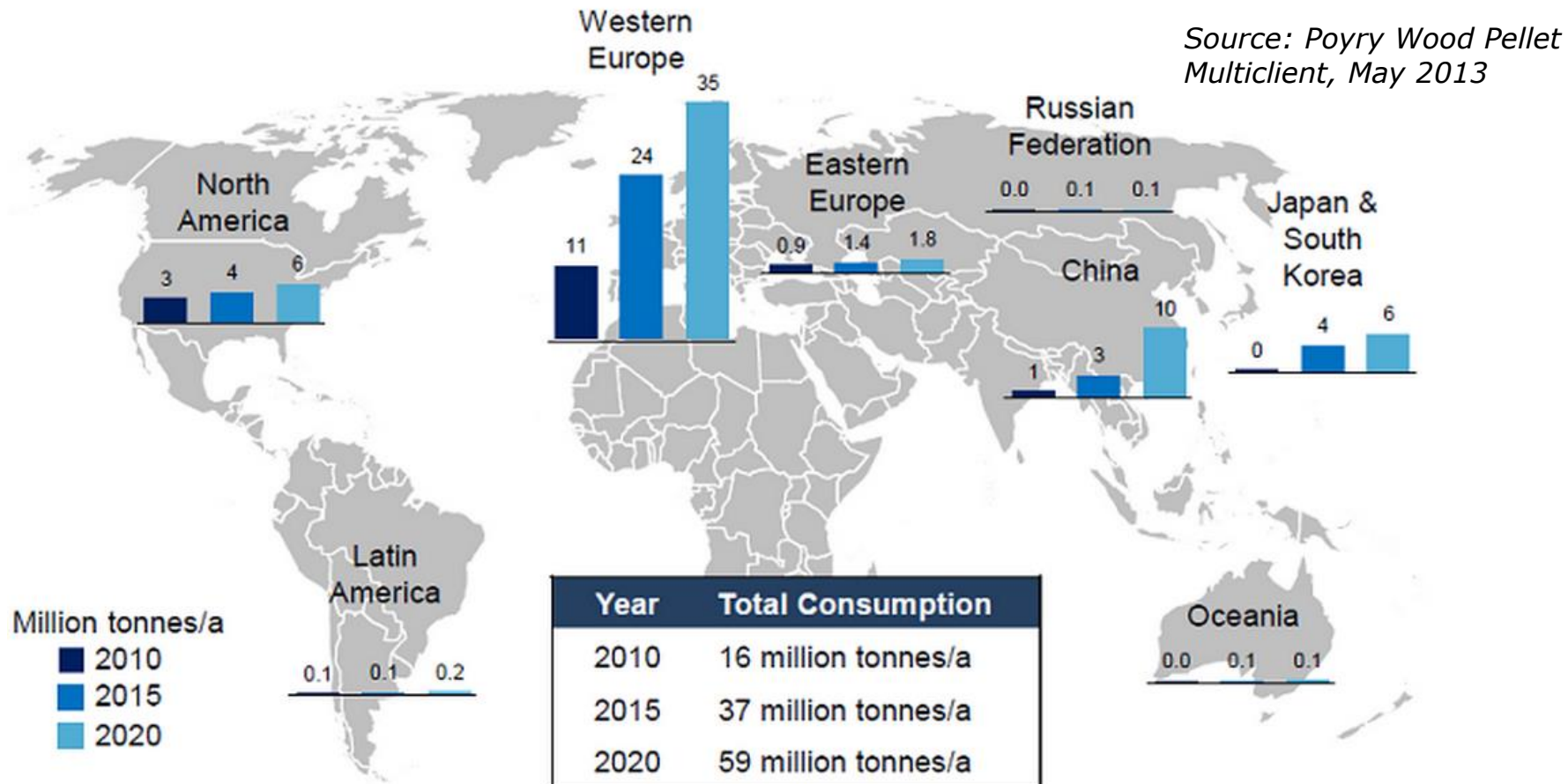
TABLE 5: POTENTIAL FOR BIOGAS IN PJ (BILLION M³ BIOMETHANE), CH₄: EU 27, CHINA, WORLD

Type of resource	EU 27 [4] PJ	EU 27 [4] Billion m ³ CH ₄	China [8,9] PJ	China [8,9] Billion m ³ CH ₄	World [7] PJ	World [7] Billion m ³ CH ₄
Manure	738	20.5	2591	72		
Residues (straw from grain, corn, rice, landscape cleaning)	407	11.3	1152	32		
Energy crops	978	27,2	1799	50		
Total from agriculture	2123	59	5542	154	22674	630
Urban waste (organic fraction of MSW)	360	10	2591	72		
Agro-industry waste (organic fraction)	108	3	1152	32		
Sewage sludge	216	6	576	16		
Total waste, billion m³ CH₄	684	19	4319	120	13316	370
Total (agriculture and waste)	2807	78	9861	274	35990	1000
Total in EJ	2.8		9.9		35,9	

Source: WBA Factsheet biogas, WBA, May 2013



2.4 Strong growth of wood pellet market, especially EU and China

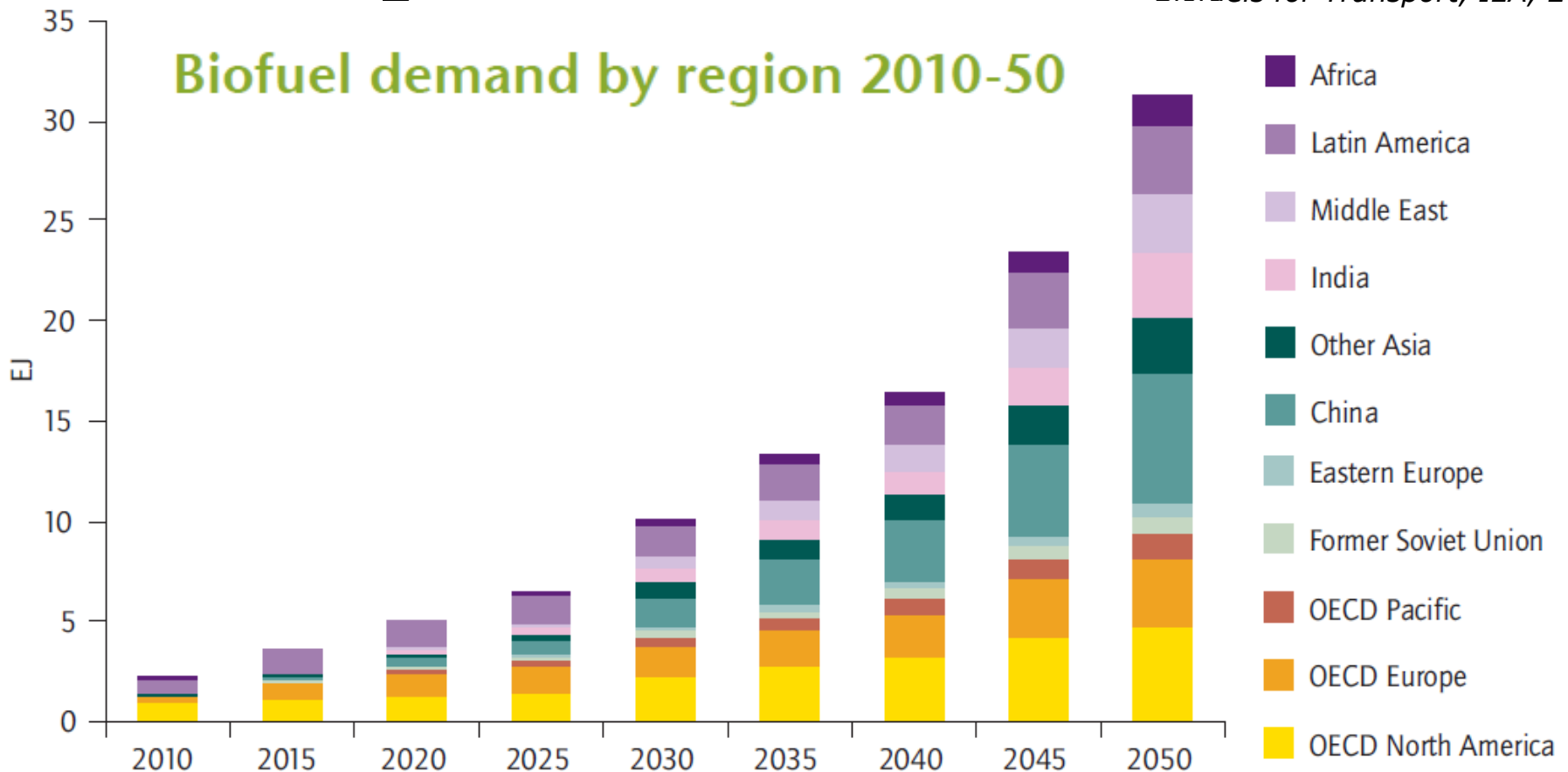




2.5 Biofuel demand is growing globally but strongest in Asia

Source: Technology Roadmaps: Biofuels for Transport, IEA, 2011

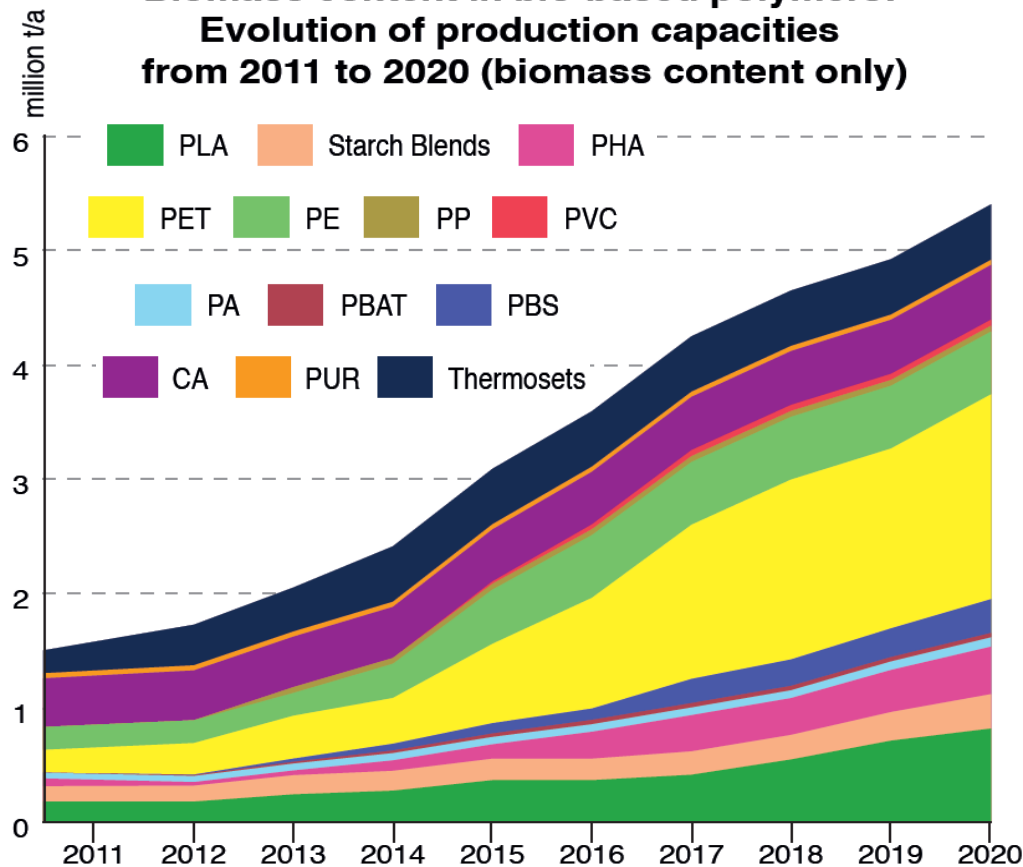
Biofuel demand by region 2010-50





2.6 Biobased plastics market is expected to grow 3-fold in 2020

**Biomass content in bio-based polymers:
Evolution of production capacities
from 2011 to 2020 (biomass content only)**



Source: *Bio-based polymers in the world, nova-Institute, 2013*

Cellulose Acetate	CA
Polyamide	PA
Polybutylene Adipate Terephthalat	PBAT
Polybutylene Succinate	PBS
Polyethylene	PE
Polyethylene Terephthalat	PET
Polyhydroxy Alkanoates	PHAs
Polylactic Acid	PLA
Polypropylene	PP
Polyvinyl Chloride	PVC
Polyurethane	PUR



Ch.3 The BBE is a chance for the Netherlands as we are well positioned

The Dutch green sector has many strengths but also some weaknesses

This chapter is mostly based on the Planbureau voor de Leefomgeving report, "Vergroenen en verdienen; Op zoek naar kansen voor de Nederlandse economie", Den Haag, 2013. PBL has compared our strengths and weaknesses with (ostensibly) frontrunners in the green economy; Germany, Denmark and United Kingdom.

The PBL report concludes: ***"The Biobased Economy is a change for the Netherlands as it offers cost advantages and is a global growth market"***.

The Netherlands is well positioned to take these changes due to our:

- > Currently high innovation level and strong knowledge position in biotechnology, food-chemistry, agrofood and chemistry.
- > Economic structure with a well positioned agriculture and chemistry industry.
- > Strong export position.



Ch.3 The BBE is a chance for NL as we are well positioned *(continued)*

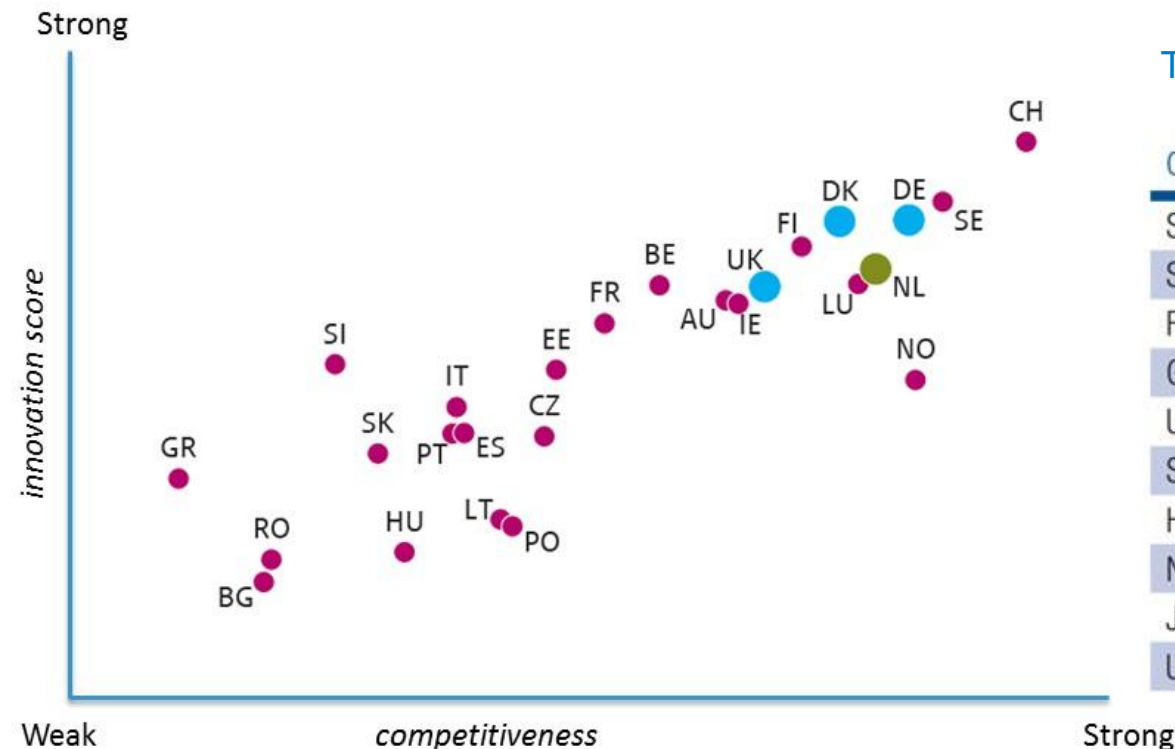
The challenge (weakness) is to create strong relationships between the innovative and competitive agrofood sector and the strong (but lacking behind in green innovation) chemistry sector.

The next pages provide more details about our strengths and weaknesses:

- 3.1 The Netherlands is a very innovative and competitive country
- 3.2 The Netherlands excels in horticulture, biotechnology and plant breeding
- 3.3 The Netherlands is leading in a number of waste areas
- 3.4 We are lacking behind with green innovations, except in food and beverage and transport
- 3.5 We are lacking behind patenting green innovations
- 3.6 Our industry is energy and material intensive and energy and material reduction are not a priority



3.1 The Netherlands is a very innovative and competitive country



The Global Competitiveness Index 2013-14

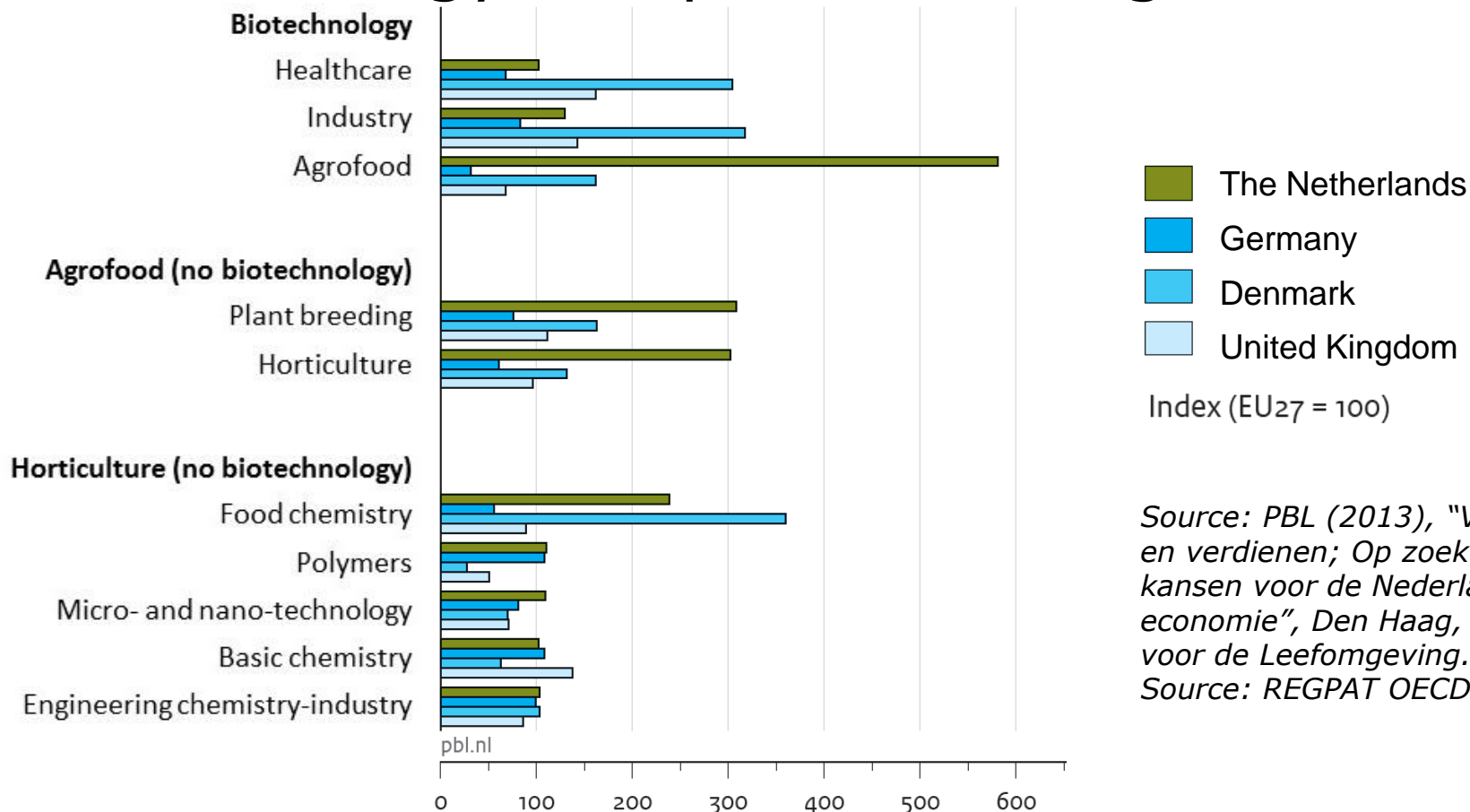
Country/Economy	Rank (out of 148)	Score (1–7)	GCI 2012–2013
Switzerland	1	5.67	1
Singapore	2	5.61	2
Finland	3	5.54	3
Germany	4	5.51	6
United States	5	5.48	7
Sweden	6	5.48	4
Hong Kong SAR	7	5.47	9
Netherlands	8	5.42	5
Japan	9	5.40	10
United Kingdom	10	5.37	8

Sources:

- European Union (Innovation Union Scoreboard), 2013;
- IMD World Competitiveness Center (World Competitiveness Index), 2012



3.2 The Netherlands excels in horticulture, biotechnology and plant breeding

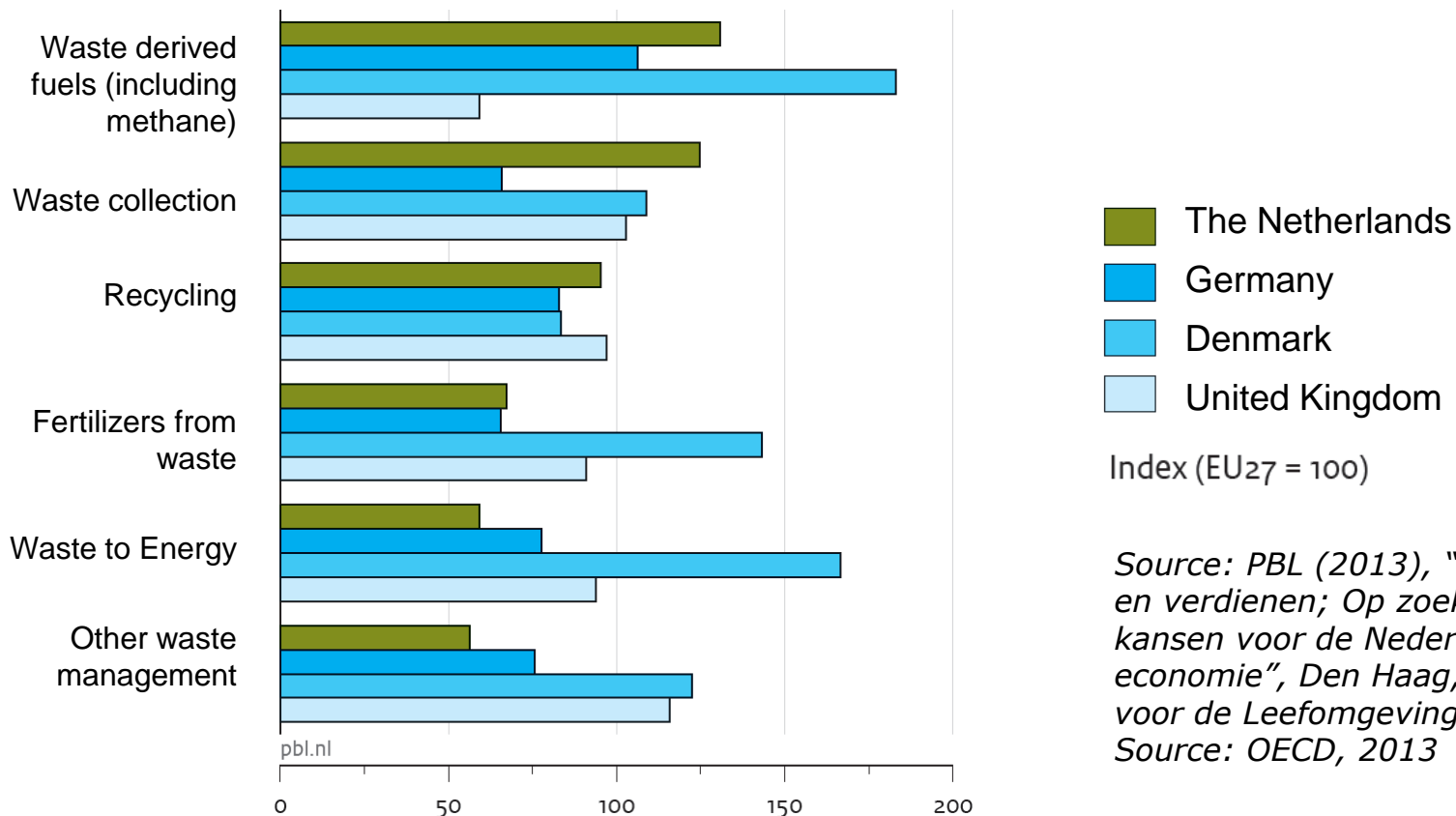


Source: PBL (2013), "Vergroenen en verdienen; Op zoek naar kansen voor de Nederlandse economie", Den Haag, Planbureau voor de Leefomgeving.
Source: REGPAT OECD, 2013



3.3 The Netherlands is leading in a number of waste areas

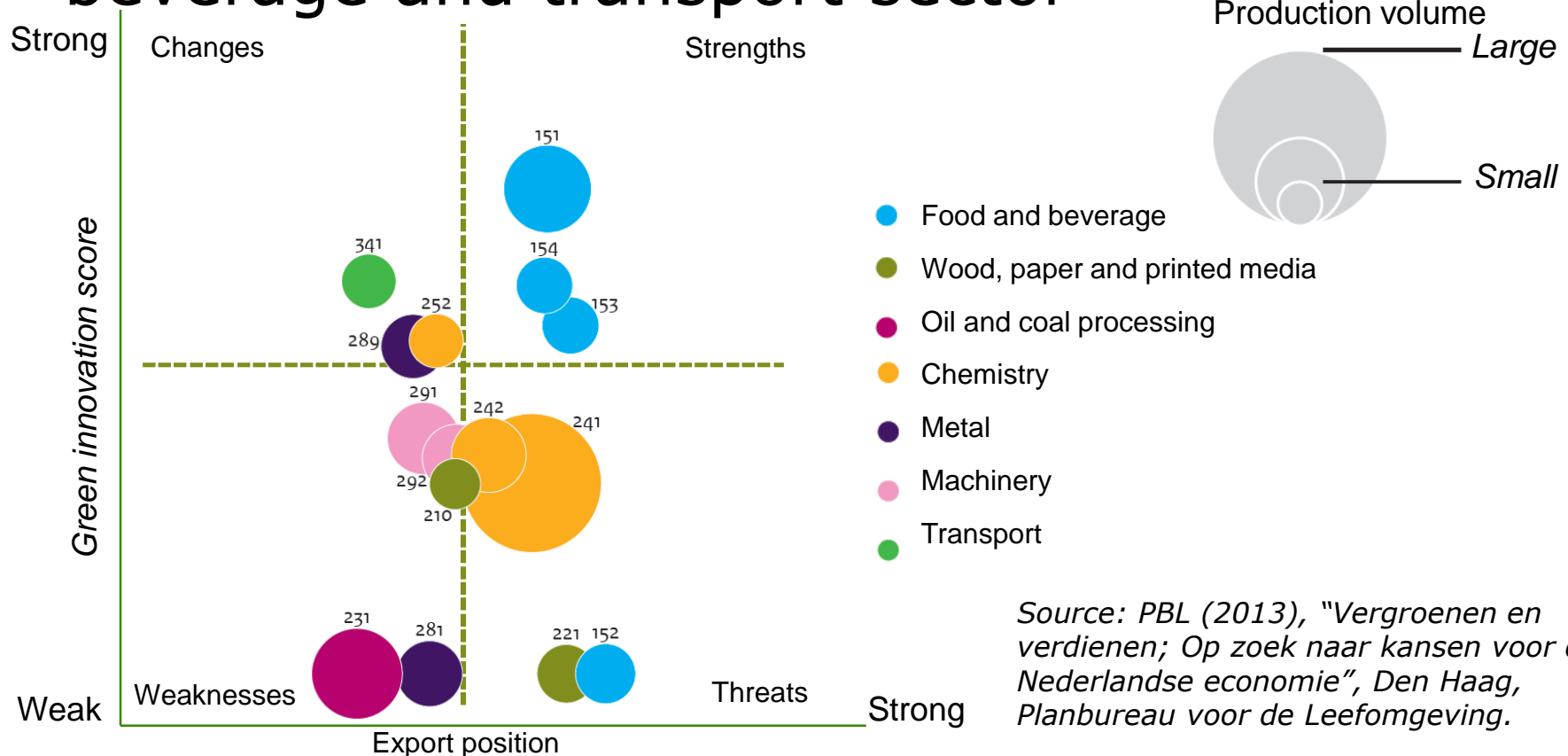
Number of green patents for OECD countries with more than 30 green patents per year



Source: PBL (2013), "Vergroenen en verdienen; Op zoek naar kansen voor de Nederlandse economie", Den Haag, Planbureau voor de Leefomgeving.
Source: OECD, 2013



3.4 We are lacking behind with green innovations, with the exception of the food and beverage and transport sector

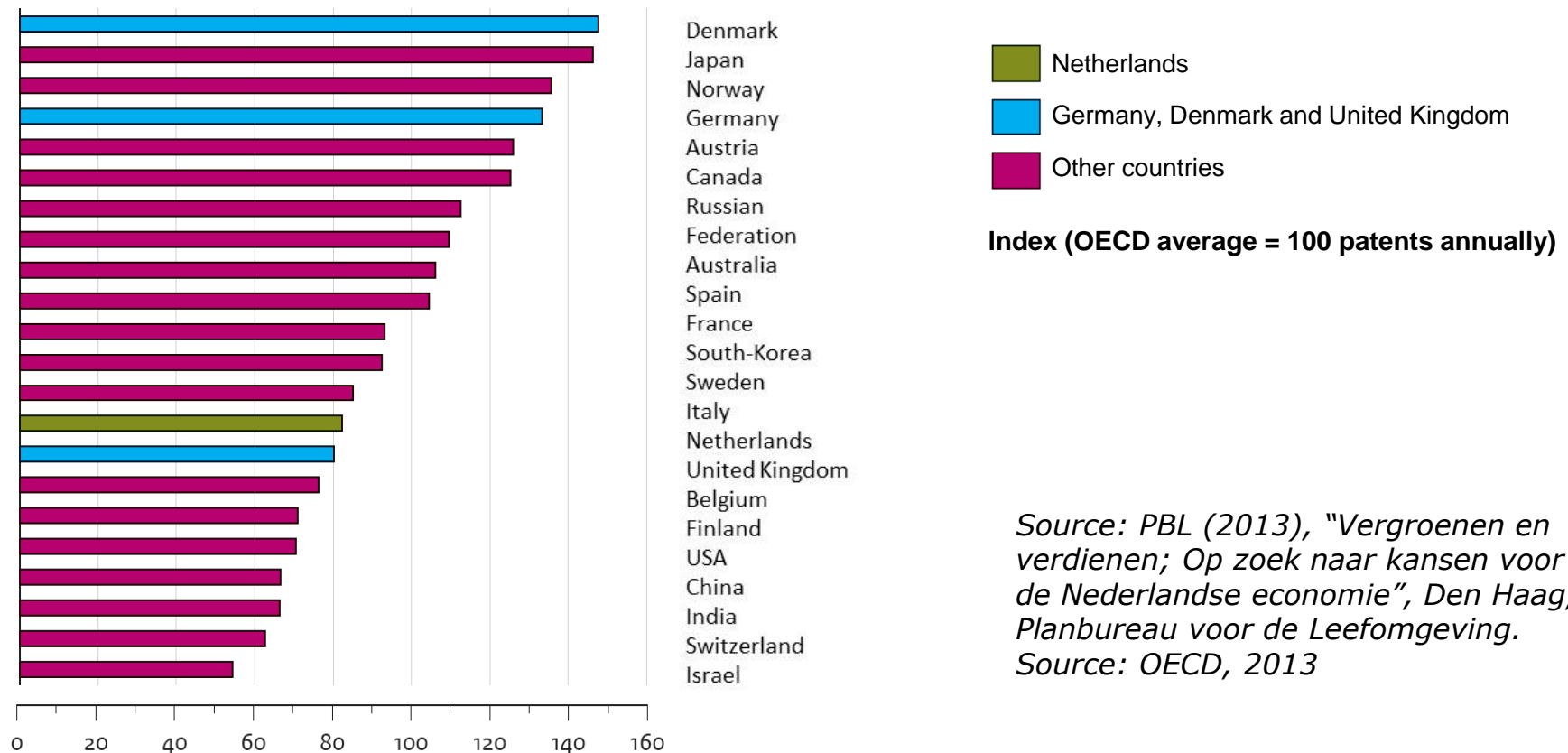


Source: PBL (2013), "Vergroenen en verdienen; Op zoek naar kansen voor de Nederlandse economie", Den Haag, Planbureau voor de Leefomgeving.



3.5 We are lacking behind patenting green innovations

Number of green patents for OECD countries with more than 30 green patents per year

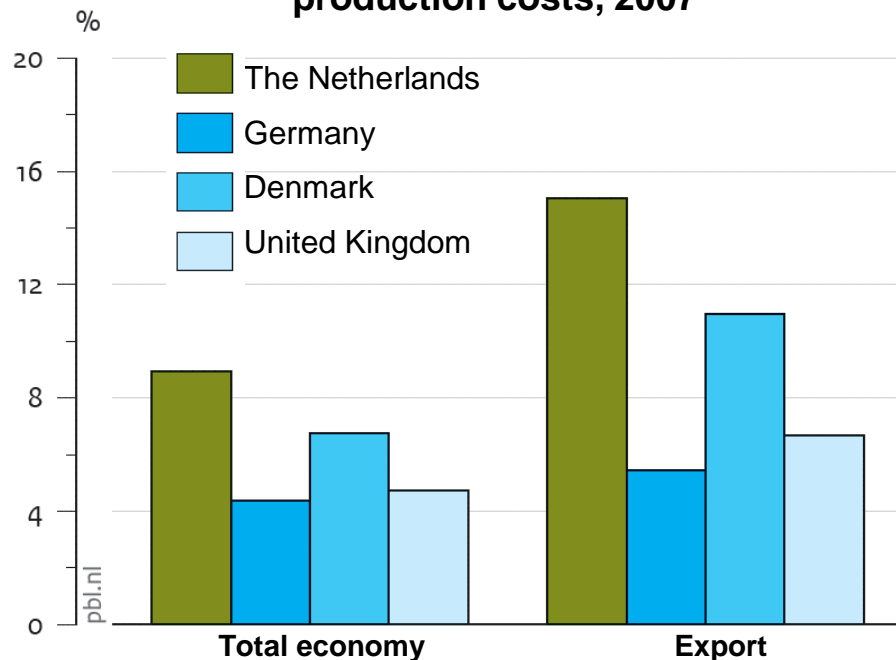


Source: PBL (2013), "Vergroenen en verdienen; Op zoek naar kansen voor de Nederlandse economie", Den Haag, Planbureau voor de Leefomgeving.
Source: OECD, 2013

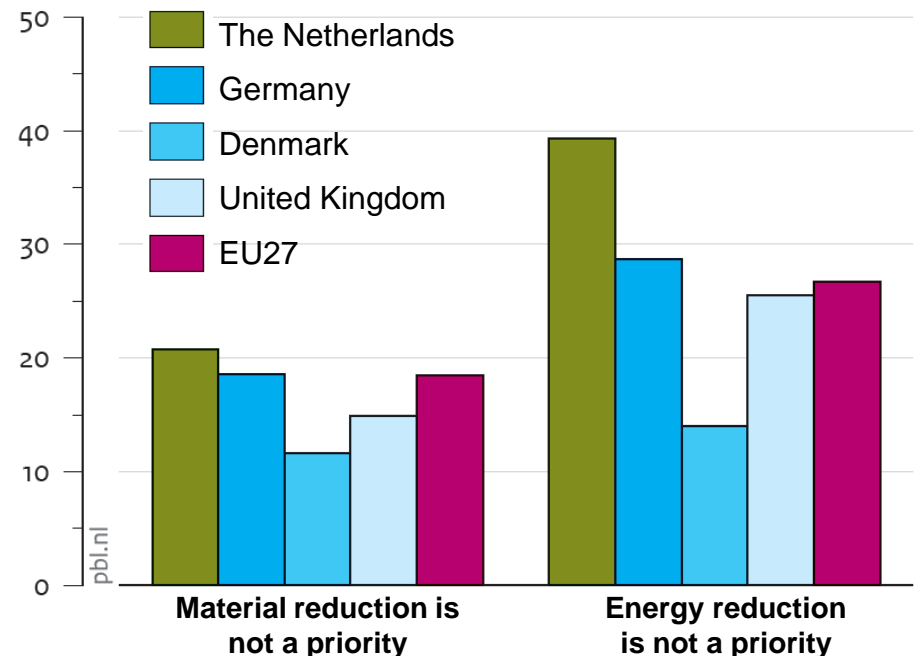


3.6 Our industry is energy and material intensive and reduction is not a priority

Share of costs for materials and energy in total production costs, 2007



% of companies perceiving material and energy reduction NOT as a priority



Source: PBL (2013), "Vergroenen en verdienen; Op zoek naar kansen voor de Nederlandse economie", Den Haag, Planbureau voor de Leefomgeving.

WIOD, 2007 (share of costs) and Eco Innovation Scoreboard, 2102 (energy and materials reduction)



Ch.4 International market opportunities for the Dutch bioenergy sector

Based on our analysis of existing reports and sources (which formed the basis for chapters 2 and 3 of this report) we have come to the following conclusions:

- ❑ A strong global growth in modern biomass use is expected.
- ❑ Biomass will become a mainstream commodity for use as feedstock for energy, material and chemistry applications.
- ❑ The following 6 interesting global bio-energy areas have been identified for Dutch businesses and knowledge institutes:
 - 4.1 Biogas from systems of all sizes and for all energy applications
 - 4.2 Biomass heating technologies
 - 4.3 Wood pellets, especially for heating
 - 4.4 Sustainable biomass chains
 - 4.5 New generation biofuels
 - 4.6 Integrated biomass-food-feed-energy-chemistry industries

In addition 'Waste to Energy' has been identified as an opportunity for Dutch businesses. The fraction of non-biological waste is not part of the project. The biological fraction is incorporated in the above 6 areas which are detailed in the following pages.

Country specific developments, for the 16 selected countries, are presented in [annex B](#).



4.1 Biogas from systems of all sizes and for all applications (electricity, heat and transport)

Opportunities for Dutch knowledge and technology suppliers

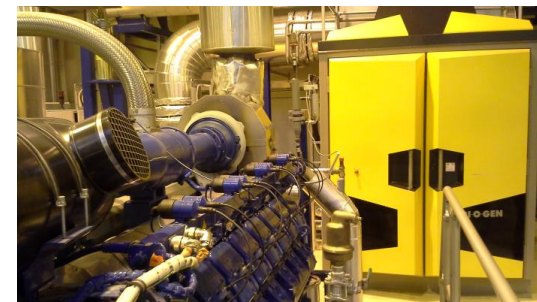
There is a growing interest globally for biogas systems of all sizes and biogas applications (electricity, heat and transport).

Small systems for households, small villages and institutions (schools, hospitals etcetera), using gas for cooking get growing attention world-wide due to their positive local socio-economic impact. For **larger systems** producing biogas for heating or electricity production (feed lots, abattoirs, food production, sewage plants and etcetera), a huge market potential is still available (less than 10% of potential is currently used).

This offers opportunities for the Netherlands as **knowledge and technology supplier** (e.g. biogas systems, gas engines, ORC systems). In addition the Netherlands can offer **innovative solutions for utilising the available waste heat**. Our greenhouses producing all kinds of crops and installations producing duck weed or algae for feed, food and chemistry are offering a great potential for innovative and efficient closed loop systems, also applicable in this field.



Colsen Bidox® biological H₂S scrubber - GreenPac USA, Niagara Falls



Triogen 125 kWe ORC sewage gas system - Finland



4.2 Biomass heating technologies

Opportunities for Dutch knowledge, technology and biomass feedstock suppliers and project developers / investors

Use of biomass heating technologies is growing, including CHP plants, district heating systems, cooling systems for commercial and public buildings and industrial process heat, predominantly at “small or medium scale” of 5-10 MW.

This offers opportunities for the Netherlands as knowledge, technology and biomass (as fuel) supplier (e.g. heating technologies, cooling systems and piping) and project developer / investor.



Kara - 2,1 MW wood waste combustion installation, South-Africa



4.3 Wood pellets for heating

Opportunities for wood pellet traders, logistics sector and application in small-medium heating installations

The market for wood pellets is expected to increase from 16 million tonnes in 2010 to 59 million tonnes in 2020, with 2/3 of the market in Europe.

For the Netherlands there is a huge potential for increased use of **wood pellets in small and medium sized heating installations**. Globally we have a strong position in **setting-up sustainable biomass (residue) chains**, both for local and use in Europe.

As a result the Netherlands can become the most important **gateway for sustainable wood pellets** with Rotterdam and Amsterdam as important landing ports for the hinterland (Germany and the rest of Europe).



Examples of wood pellets



Rice husk as fuel in gasification plant – BULOG Indonesia



4.4 Sustainable biomass chains

Opportunities for transport/agriculture sector, knowledge institutes and technology suppliers

The growing demand for sustainable biomass for energy and chemistry (including plastics) purposes creates opportunities to market our knowledge and experience in **setting-up international supply chains** for sustainable biomass.

This creates opportunities for:

- 1) the transport / logistics and agriculture / horticulture sectors, combining biomass streams for different purposes;
- 2) research organisations and consultancies with knowledge of sustainability and certification and;
- 3) technology and knowledge suppliers for new biomass conversion technologies (pyrolysis and torrefaction).



10 tonnes of biomass pellets imported from Ukraine – RVO.nl, Green Matter Magazine



Feedlot, location of a 3 MWe biogas digester – Bio2Watt, South-Africa



4.5 2nd and 3rd generation biofuels

Opportunities for Dutch high tech companies and research institutes working on 2nd and 3rd generation biofuels and the logistics sector

Biofuel demand will continue to grow to about 32 EJ (760 Mtoe) in 2050, 10 times more compared to the current demand.

There are opportunities for Dutch high tech companies, consultants and research institutes related to **2nd and 3rd generation biofuels, biopolymers and sustainable biofuel policy development** in countries around the world (especially emerging and developing countries). Also the Dutch logistics sector can play a vital role in **storage and distribution of biofuels**, with the Amsterdam and Rotterdam harbour as a gateway for Europe.



Sustainable jatropha grown by small-scale Tanzanian farmers – RVO.nl



Torrefied bamboo pellets as alternative for charcoal – Colombia



4.6 Integrated biomass-food-feed-energy-chemistry industries

Opportunities for knowledge/technology suppliers and project developers/investors

We have a leading position globally in agrofood, biotechnology and horticulture. Our waste, chemistry and logistics sectors are amongst the best in the world.

Together with our strong research and knowledge sectors we are able to **develop and implement integrated bio refineries**; integrated multi-purpose co-production systems.

Examples are:

- 1) the production of sugar based ethanol, sugar, electricity and biogas and also the utilization of the leftover waste for fertilizer, chemicals, biofuels and animal feed;
- 2) the production of meat (in a feedlot), biogas, electricity and utilization of the waste streams (CO₂, biodigester residue and heat) to produce proteins (e.g. duckweed and algae) for food or feed and chemicals. This offers opportunities for knowledge and technology suppliers, project developers and investors.



*Duck weed as feed for cows –
Groot Zevent Vergisting, Beltrum*



Ch.5 Companies face a number of obstacles doing international business

Based on the surveys, interviews and discussions with the organisations involved in this project (see [annex A](#)) and some relevant literature ([annex F](#)), we have identified the main obstacles for companies doing international business in the Biobased Economy. These obstacles are:

- 5.1 A trustworthy local partner / network is the most important success factor
- 5.2 The majority of international active SMEs need government support
- 5.3 Government support for international business is not optimal
- 5.4 Information exchange between public and private sector need improvement
- 5.5 General information of a country is important for a first assessment of the possible opportunities
- 5.6 The BBE is a divers sector without focus on international business development
- 5.7 There is a lack of funding and credit facilities for international business



5.1 A trustworthy local partner / network is the most important success (or failure) factor

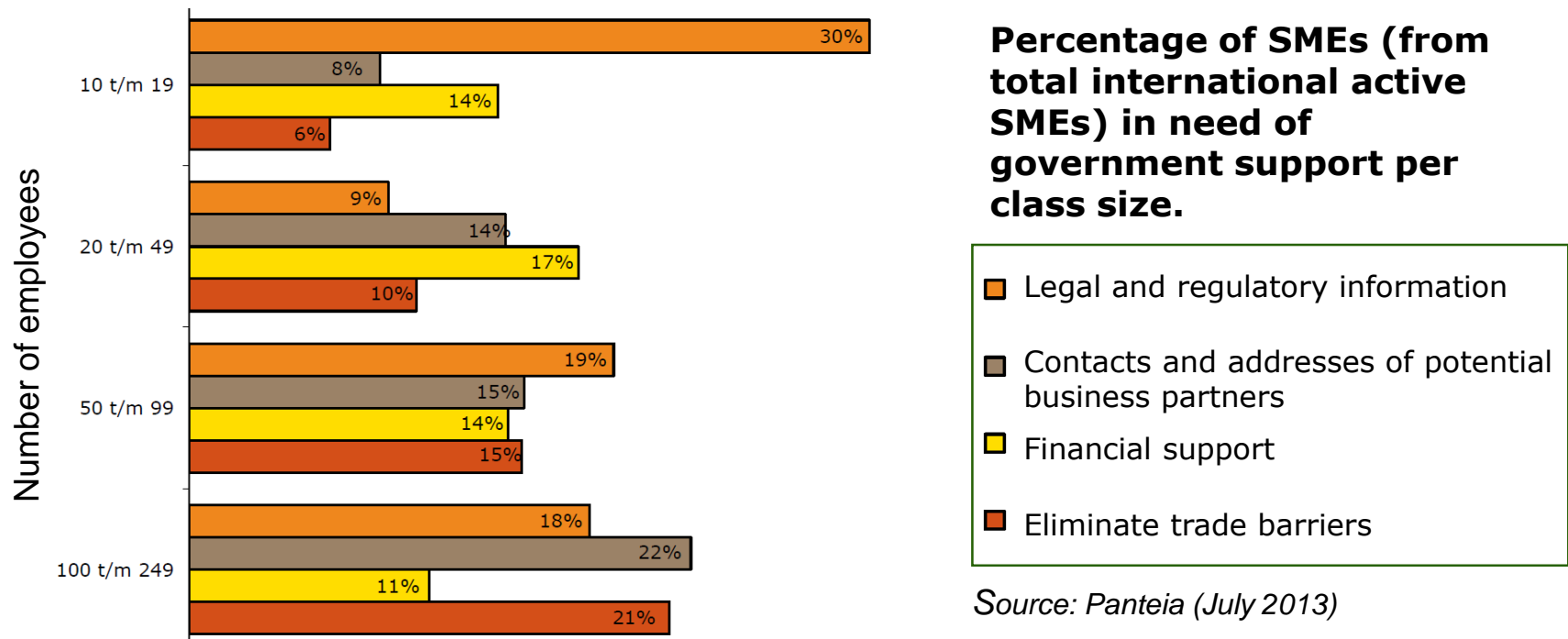
The survey (82 respondents) revealed the importance of success and failure factors for doing international business in the Biobased Economy.

Success- and failure factors doing international BBE business	Responses (82)
1. A trustworthy local partner / network	55 %
2. Stable local government	25%
3. Supporting local legal and regulatory framework	15%
4. Availability of project financing	15%
5. Biomass availability and access	10%
6. Sufficient logistical infrastructure and reasonable costs	7%
7. Stimulation by Dutch government	7%
8. Technical expertise	5%
9. Cultural differences	5%



5.2 The majority of international active SMEs need government support

Our own research and all other studies related to this topic shows; “businesses do need government support for doing international business”. Between 70-95% of the companies acknowledge this with some differences between specific sectors and the size of companies. Also the required support differs amongst the different target groups.





5.2 The majority of international active businesses need government support *(continued)*

Different sectors and class sizes are in need of different types of support ¹:

- > The Energy sector requires financial support and information on potential business partners
- > The Agri&food sector requires information about laws and regulations, especially outside EU
- > Medium sized companies require information on potential business partners and government support for solving trade barriers
- > Small sized companies require information about laws and regulations and financial support

Off course companies can be successful by themselves, but it has been recognised that specific and targeted government support will increase the chance of success and also decreases the lead time (period between making profit and the first investment).

¹ Source: Panteia (July 2013)



5.3 Government support for international business is not optimal

The report from Panteia (December 2013), “Het exporterende bedrijfsleven aan het woord” discusses how RVO.nl can improve its service level for all potential and current (exporting) clients. It describes an action plan addressing five topics:

1. Improved profiling of RVO.nl on international business development
2. Increase the number of services to clients amongst the target group
3. Detail the services provided to businesses
4. Improve communication to exporting businesses
5. Improve cooperation with intermediaries

In the underlying report (and project) the focus is on the Biobased Economy and the necessary actions for all actors (RVO.nl, other public organisations, the private sector and knowledge institutes) to improve the international position of the Dutch private and knowledge sector.

The above five actions recommended in the Panteia report are complementary (some partly overlapping) to the recommendations in this report and will have give a positive contribution to the objectives of this project; “improve the international position of the Netherlands in the biobased economy”.



5.4 The information exchange between public and private sector should be improved

The questionnaires and discussions with private companies and public organisations (embassies, Innovation and Agricultural Attaches and NBSO's) clearly indicate, their information exchange need to be improved:

- > The current supporting instruments and services provided by the Dutch government are not very well known to the private sector, especially not to SMEs.
 - Companies aware of the DHK, PiB, PEI and PSI instruments are positive about them. They also are positive about the role of embassies and their services related to partner search, partner analysis and getting acquainted with the local culture.
- > Embassies are in need of clear insight in the markets, Dutch companies are looking for as well as an overview of the composition of specific sectors and there USPs.



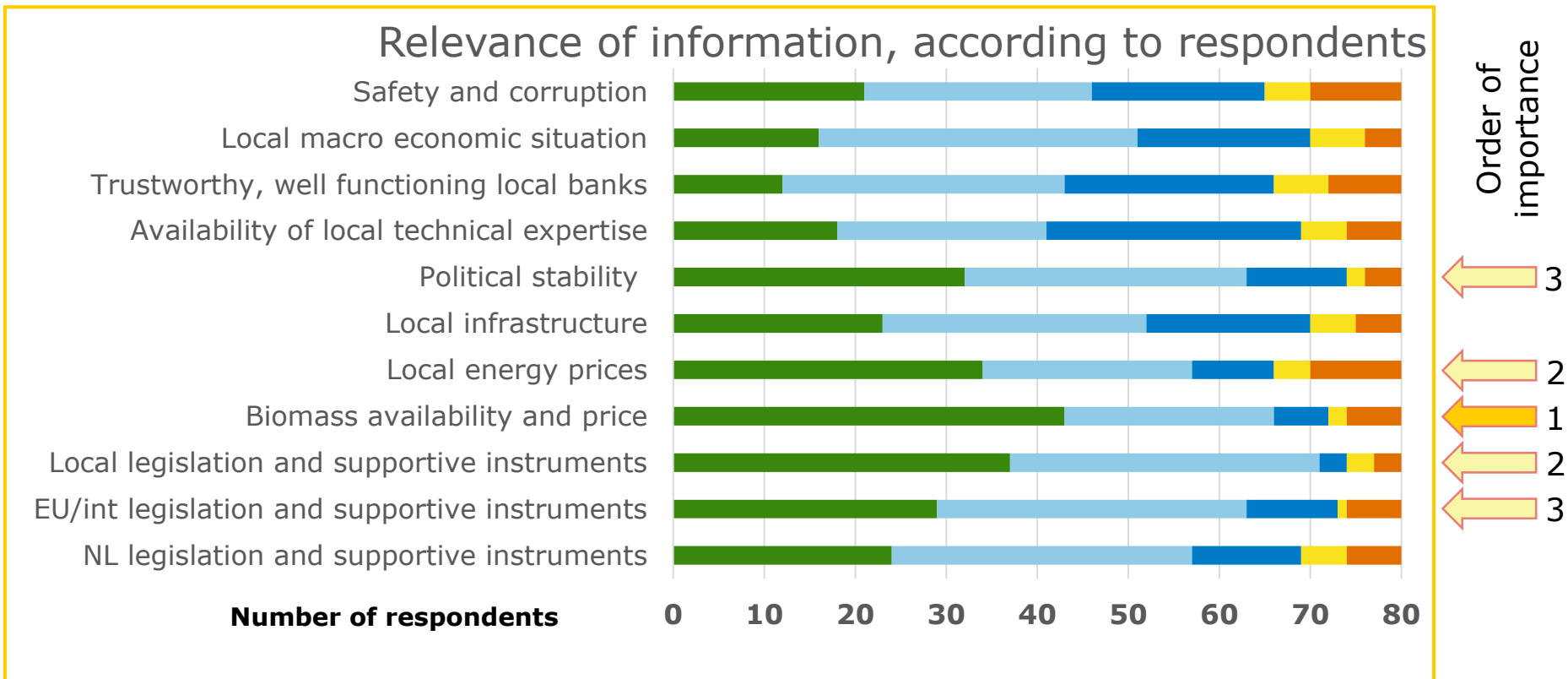
5.4 Information exchange between public and private sector should be improved *(continued)*

- > A lot of relevant and useful information is already being collected by public organisations, but not being disseminated via existing appropriate information channels. Two examples:
 - The Dutch foreign network collects very useful and up-to-date (market)information that is only being distributed via their local embassy channels e.g. website and not, for example, via the RVO.nl country pages;
 - RVO.nl has a lot of interesting reports, country information, overviews of financed projects, etcetera related to the biomass and bioenergy (www.rvo.nl/biomass) and International Energy cooperation (Portal Energy International = [PEI](#)) but this information is not accessible via the regular RVO country web pages.



5.5 General information of a country is important for a first assessment of opportunities

Crucial information for a first assessment of opportunities (based on survey with 82 respondents; Nov 2013)





5.6 The BBE is a divers sector without focus on international business development

The biobased economy is the transition from a fossil based to a biobased economy. The production chain of biobased products include: 1) the production and collection (residues) of biomass, 2) processing of biomass, 3) transport and storage, 4) conversion of biomass into pharma and chemicals, food and feed, fibres and materials, fuels and energy.

Sub-sectors related to these production chains include:

1. Agriculture and forestry
2. Food
3. Energy producer
4. Pharma and chemicals
5. Logistics and trade
6. Technology and equipment suppliers
7. Service and knowledge providers
8. Investors and project developers
9. Research institutes

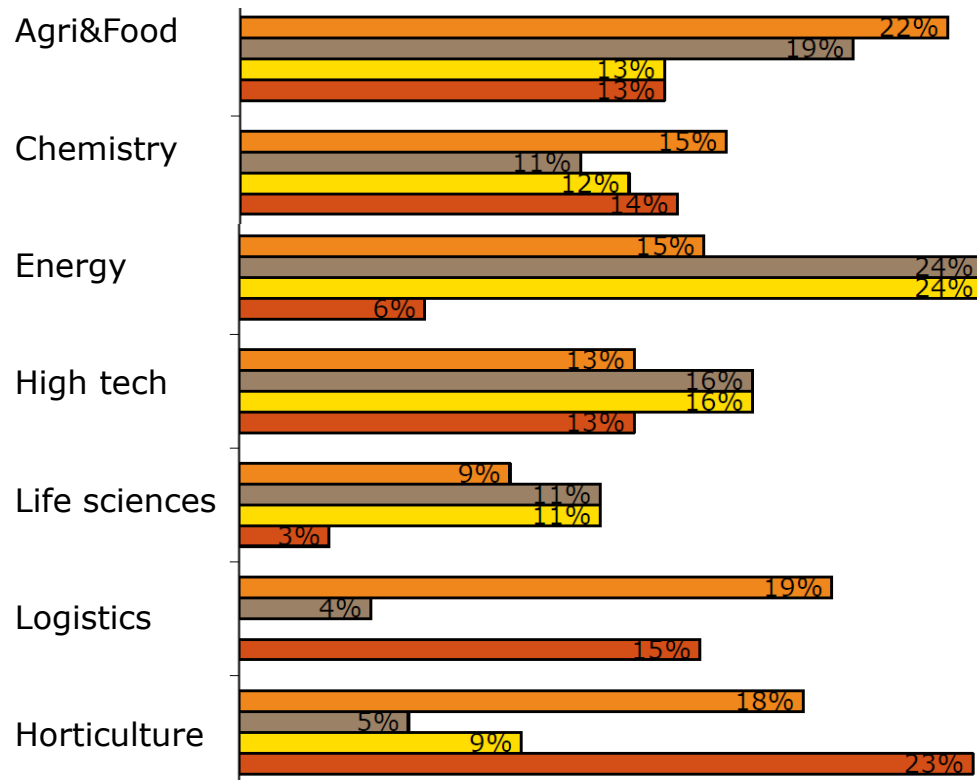
In this project we have focussed on the production chains with fuel or energy as final product. In these production chains a lot of sector activities ("Topsectoren") are taking place but activities **focussed on international markets** are rare.

Although both the energy and chemical sectors ("topsectoren") have developed (already in 2012) plans for international market approach, not a lot seems to have happened since then.



5.7 Lack of funding and credit facilities are important obstacles for international business

SMEs (from total international active SMEs) in need of government support



Due to the current economic situation, companies in general and SMEs particularly, experience difficulties getting funding or credit insurance for project and/or business development.

This is the case for all project stages: feasibility, first application and commercialisation.

- Legal and regulatory information
- Contacts and addresses of potential business partners
- Financial support
- Eliminate trade barriers

Source: Panteia (July 2013)



Ch.6 Conclusions and recommendations

In the previous chapters we have identified the **global trends in the BBE** ([chapter 2](#)), **our strengths and weaknesses compared to our main competitors** ([chapter 3](#)), the **global market opportunities** ([chapter 4](#)) and the **main obstacles** for Dutch companies (especially SMEs) doing business abroad ([chapter 5](#)). This leads to the following main conclusions:

- 1. The Biobased Economy is a global growth market and offers many international market opportunities for the Netherlands.**
- 2. Both the private and public sector need to make additional efforts (by themselves and together) to be able to seize these opportunities.**



Ch.6 Conclusions and recommendations (*continued*)

Based on the desk research, questionnaires, interviews and feedback from all participating organisations, the following topics have been identified as crucial success factors:

- 6.1 Creation of active PPPs focussed on international business development.
- 6.2 Synergy between governmental policies on environment, international cooperation and industrial entrepreneurship.
- 6.3 Increased information level and improved access to available information, public services and instruments.
- 6.4 Improved access to funding and credit facilities, especially for SMEs.

These crucial success factors are described in more detail on the following pages. The descriptions are followed by the recommendations that have been gathered in the interactions with the participating organisations, especially the RVO.nl workshop that was held on the 17th March 2014 in Utrecht. The recommendations are clustered for the private sector and the public sector.



6.1 Creation of active PPPs focussed on international business development

The project participants acknowledge that a widely supported sectoral approach is crucial for success, since we are competing with countries like the US and Germany. The creation of active PPPs (combining companies, government, knowledge institutes and NGOs) focussing on international business development and cooperation, will help to create the momentum and critical mass that are needed to be successful.

The project participants suggested that these PPPs should be able to offer comprehensive solutions for the problems clients are facing. PPPs activities should focus on:

- Consistent Holland branding via: joint participation and presentation at international conferences and trade fairs.
- Providing an overview of the Dutch sector and its Unique Selling Points.
- Initiating, coordinating and executing projects and trade missions.

A good example of such a PPP is the Netherlands Water Partnership (NWP), see next page.



Example PPP Netherlands Water Partnership

The [Netherlands Water Partnership](#) (NWP) - uniting Dutch Water Expertise - is a PPP consisting of 200 members in which Dutch water expertise in different fields (technology, policies and market opportunities) is bundled.

NWP acts as a centre of information on water expertise, policy developments and market opportunities. In addition NWP initiates, coordinates and executes projects for its members, such as trade missions, exhibitions and conferences.

As NWP functions as a hub for the entire water sector it often partners in government programmes like "Partners voor Water", the 'Water OS' program, the "Young Expert Programma Water (YEP) and the "Disaster Risk Reduction team".





6.2 Synergy between governmental policies

The synergy between international environmental policy (Min. IenM), cooperation development policy (Min. BuZa) and international trade policy (Min. EZ) can be improved, creating a better breeding ground for Dutch organisations working abroad.

A good example is the facilitation of and assistance in developing sustainable bioenergy policies (including legislation and enforcement) in emerging and developing countries (BuZa and IenM). More stringent policies will, for example, result in more stringent emission requirements. Such stringent requirements are more favourable for Dutch technologies, which are often characterised by higher technical standards but also by higher costs.



6.3 Increased information level and improved access to info, services and instruments

Basic (country) information available for business

A sufficient information level is important for businesses to be able to identify opportunities and assess potential risks in international business. Some information is available but not all and especially SMEs lack the capacities to gather the necessary information by themselves.

The following information topics have been identified to be of interest for the majority of organisations, internationally active or wanting to become active, but are not easy to find and/or need to be updated periodically:

- 1) Information on local laws and regulations ranging from environmental, agricultural (renewable) energy, business administration and im- and export.
- 2) Information on available NL and local supporting instruments and funding.
- 3) Basic country data like the 16 country monitors (e.g. Scandinavian countries, Nigeria, Cameroon, Benin, Turkey, Ukraine, Malaysia, Indonesia, Colombia and Cuba);
- 4) Specific sector studies / market analysis for selected countries/regions

*Project participants also indicated that the gathered information should be: **regularly updated, reliable and easy to find.***



6.3 Increase information level and improve access to info, services & instruments *(continued 2-4)*

Knowledge and information exchange between Dutch businesses and the Dutch foreign network

The feedback received from the Dutch foreign network showed they are actively seeking opportunities in the biobased economy in their respective focus countries for Dutch businesses and research institutes. The network collects relevant information, organises trade missions and meetings on the subject and spreads the collected information via their communication channels. This information is however not widely distributed via other communication channels, like the RVO.nl country pages.

The Dutch foreign network generally acknowledged that they will be able to better position and market The Netherlands if they have:

- a clear insight in the markets Dutch companies are looking for;
- a detailed overview of (selected) Dutch private sectors (e.g. biogas, waste and waste to energy, biofuels) and their USPs.



6.3 Increase information level and improve access to info, services & instruments *(continued 3-4)*

Existing information, government services and funding

A lot of information has been and is already being collected by public organisations (like RVO.nl). The Dutch government also offers a number of services and financial instruments to support organisations in exploring, setting-up and creating international business.

The awareness, amongst the target group, of these supportive measures seems insufficient. Especially SMEs are not very well acquainted with the available supportive measures.

Examples of existing helpdesks for SMEs are:

- ❑ **mkb-financiering “advies op maat”**: a RVO.nl unit helping SMEs finding the most appropriate financing solutions inside and outside RVO.nl (rvo.nl/adviesopmaat);
- ❑ **“Informatie op maat”**: a RVO.nl unit supporting Dutch exporting SMEs (rvo.nl/informatie-op-maat).



6.3 Increase information level and improve access to info, services & instruments *(continued 4-4)*

Other examples of existing information and government services are:

- ❑ The “work in progress” document from the French embassy on the biobased economy in France and their excellent weblogs (<http://frankrijk.nlbassade.org/nieuws>);
- ❑ Existing factsheets and market studies developed by RVO.nl:
 - Bio-energy Cooperation between China and The Netherlands;
 - Doing business in South-Africa; Bio energy and Waste to Energy;
 - Factsheets bioenergy opportunities: Ukraine, Mozambique, Vietnam and Indonesia;
 - Bio-energy market study Russia;
- ❑ Relevant reports from the Sustainable Biomass Program (www.rvo.nl/biomass).

RVO.nl is actively promoting their services. Good examples are:

- The recently published “FinancieringsSpecial” a magazine focussing on how companies can get financing for their activities (http://wereldzaken.rvo.nl/wereldzaken_nummer15/);
- The online tool “[Kieswijzer Financieringen](#)” to help you find financing instruments;
- A recently published overview of public services and financial instruments “[Onderneem, bespaar en innoveer – De overheid helpt](#)”.



6.4 Improved access to funding and credit facilities, especially for SMEs

Risks of doing business internationally, in general, are higher than doing business in the Netherlands. In addition the economic crisis makes it more difficult for companies to acquire financing, especially from banks. Government support is therefore needed to support companies in all stages of business development with funding and/or credit facilities.

Project participants stated that funding and/or credit facilities are needed in all stages of business development: feasibility – pilot/demo – first application (first mover) – commercialisation.

The next table presents some examples of funding / credit facilities RVO.nl is offering. Many SMEs are not aware of the funding instruments already offered.

- ❑ [DHK](#) (Demo, Haalbaarheid en Kennisverwerving): subsidy for feasibility studies, demonstration projects and strategic advice when doing business in emerging markets.
- ❑ [FIB](#) (Finance for International Business: government loan (max 35 %) co-funding for international business deals.
- ❑ [BMKB-guarantee](#): government guarantee (60-67,5% of loan) for starters and innovative companies wanting a loan from a bank.



What can NL private sector do to increase successful international biobased business?

Based on our analysis and input from project participants the following recommendations have been drafted for the NL private sector:

- 1) The Dutch government has many instruments, services and funding schemes available, especially for SMEs. Make good use of them. As a start you can contact:
 - **mkb-financiering "advies op maat"**: helping SMEs finding the most appropriate financing solutions inside and outside RVO.nl (rvo.nl/adviesopmaat) and/or;
 - **"Informatie op maat"**: supporting exporting SMEs (rvo.nl/informatie-op-maat).When exploring possibilities and/or starting activities in a specific country contact the local Dutch foreign network. See "buitenlandnetwerk" on [RVO.nl](https://rvo.nl).
- 2) Together with sector partners initiate a strategic approach for specific markets / countries (you can make use of the "Partners in Business" ([PiB](https://piB.nl)) support program of RVO.nl).
 - Initiate specific sector studies / market analysis for selected countries/regions.
- 3) Support the creation of, for your business, relevant PPPs.



What can the NL government do to increase successful international biobased business?

Based on our analysis and input from project participants the following recommendations have been drafted for the NL government:

- 1) Facilitate the creation of Biobased Economy PPPs**, with a structure and aim similar to NWP. The chosen sectors for such PPPs should be dependent on the interest and action focus of the sector itself and the importance (now and in the future) of such a PPP for NL as a whole. As a supportive action a study could be initiated assessing the structure and importance (GDP, jobs, ...) of different biobased economy sectors and their international activities now and in the future.
- 2) Initiate a “Partners for Bioenergy” government program** (like “Partners for Water”), combining international environmental/energy, Dutch energy, cooperation development and industrial policies. The following specific activities are suggested:
 - Initiate a study assessing the potential synergies of existing policies and policy instruments for the bio-energy sector.
 - Initiate a study identifying 3-5 countries that are of importance to the Netherlands for large scale import of biomass for energy purposes.
 - Facilitate implementation of sustainable bioenergy policies and creation of actual business driven biomass import chains in the above 3-5 countries.



What can the NL government do? *(continued 2-3)*

- 3) Improve access to funding and credit facilities, especially for SMEs.** Partly this includes additional promotion of already existing facilities and partly the development of new facilities (if necessary). The following specific activities are suggested:
- Carry out a small inventory amongst the participants of this project, that have indicated financing is an obstacle. The inventory should assess whether and in what way the current financial instruments do not suffice or if these are not sufficiently known to them.
 - Project participants have indicated that a very interesting funding facility is provided by the USA state bank ([Ex-Im Bank](#)), providing subsidies combined with a guarantee for the buyer. Investigate this type of facility and its potential application in NL.
- 4) Increase the level of information for the private sector.** A number of information topics have been identified by the project participants as crucial but lacking. It is suggested to improve the information level for the following topics:
- Local (foreign) laws and regulations and available supporting instruments and funding.
 - Additional Country Monitors (e.g. Scandinavian countries, Nigeria, Cameroon, Benin, Turkey, Ukraine, Malaysia, Indonesia, Colombia and Cuba).
 - Specific sector studies / market analysis for selected countries/regions. The exact subjects and countries (or regions) should be chosen in close cooperation with businesses and research organisations.



What can the NL government do? *(continued 3-3)*

5) Increase the accessibility of existing information, government services and available funding. The following specific activities are suggested:

- Initiate an inventory of all information, services and instruments already available from public organisations (RVO.nl, Dutch foreign network, Ministries, etcetera), promote/make this information available via the general RVO.nl country pages and regularly make an up-date. Examples are:
 - The “work in progress” document from the French embassy on the biobased economy and their excellent weblogs (<http://frankrijk.nlambassade.org/nieuws>);
 - Existing factsheets and market studies from the Sustainable Biomass Program (www.rvo.nl/biomass) for China, South-Africa, Ukraine, Mozambique, Vietnam, Indonesia and Russia.
 - Documents and reports gathered during this project;

6) Provide the foreign network with information on the Dutch Bioenergy sector. To be able to better market The Netherlands’ bioenergy sector, the foreign network needs: a clear insight in the markets Dutch companies are looking for and an overview of relevant actors in the sector and there USPs. It is suggested that the above information is provided to the Dutch foreign network for a selection of sectors, preferably those sectors that have formed a network / networks focussed on international business opportunities.



Annexes

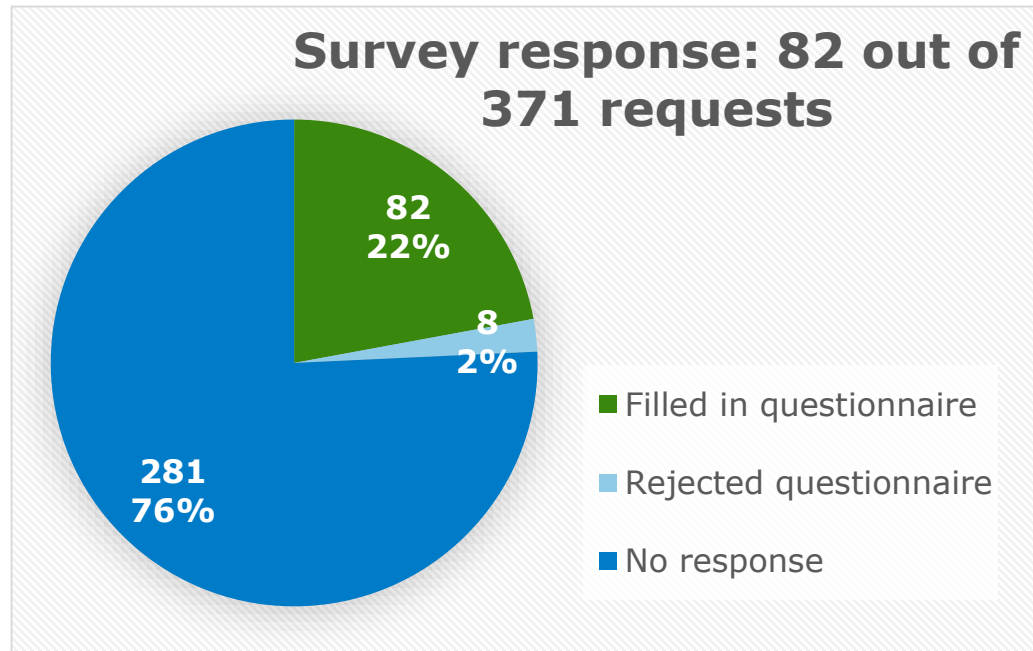
- A. Background of participating organisations:
 - Survey November 2013 - Dutch businesses and knowledge institutes
 - Overview of all organisations involved in the project
- B. Bio-energy market opportunities for the 16 selected countries
- C. Supported projects of the Sustainable Biomass programme
- D. Project approach: surveys, desk research and discussions with the sector
- E. Expert opinions on major market trends and opportunities
- F. Conclusions & recommendations PBL report “vergroenen en verdienen”
- G. Most relevant sources assessing obstacles doing international business



Annex A Background of participating Dutch organisations

Participating organisations – survey November 2013

Based on existing list with contact details (RVO.nl and Panteia) and personal contacts (Partners for Innovation) a list of 371 Dutch companies and knowledge institutes was created. The focus of the contacts is bio-energy related.



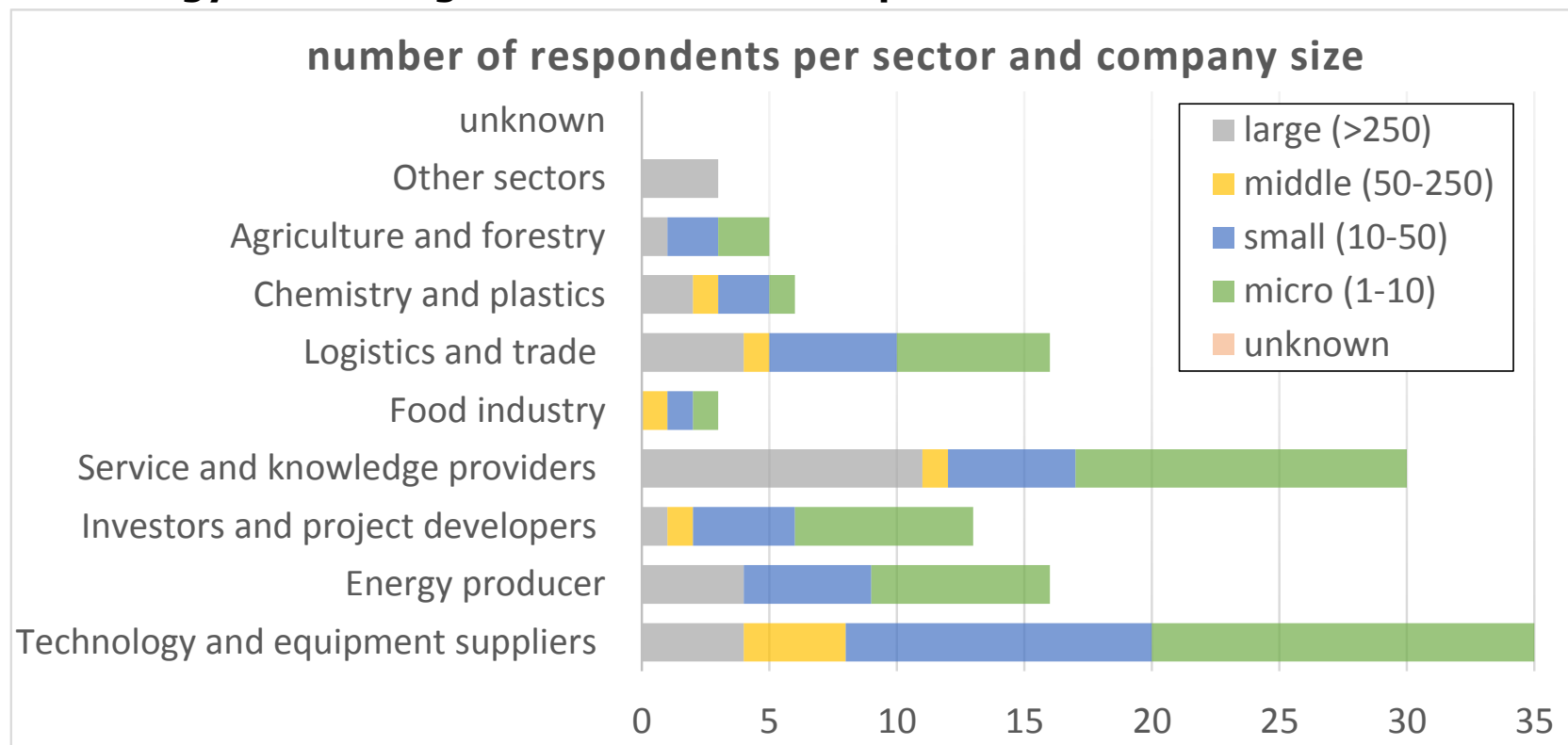
An online survey was send to the 371 contacts. The survey covered the following topics:

- Information necessary for doing international business;
- What kind of government support needed;
- Success and failure factors;
- Countries currently doing business;
- New countries wanting to do business in.



Annex A Number of survey respondents per sector and company size

Bio-energy related organisations are overrepresented



Most of the organisations are represented in more than 1 sector



Annex A Companies are active in more than one sector

Strong relationships between 5 sectors:

1. Bioenergy technology supplier
2. Energy production

3. Knowledge and service providers
4. Investment/project developer
5. Trade and distribution

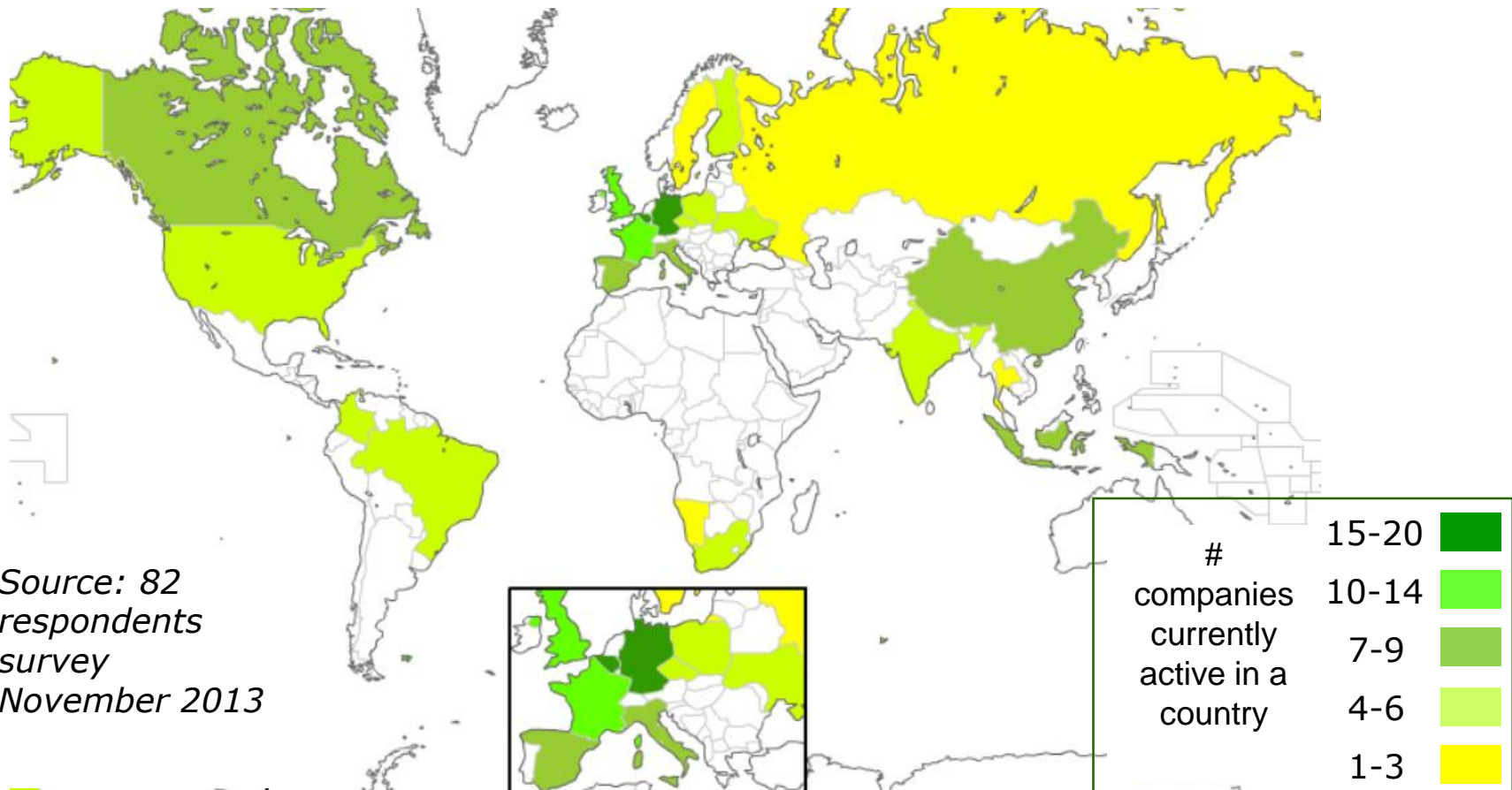
			TL	EP	IP	DK	VM	HTL	OV	CK	LB
TL	Biomass / bioenergy technology supplier	34		32%	21%	26%	3%	18%	0%	6%	9%
EP	Energy production	20	55%		30%	40%	15%	10%	0%	15%	20%
IP	Investment / project development	12	58%	50%		50%	8%	25%	0%	8%	8%
DK	Knowledge and service supplier	27	33%	30%	22%		11%	26%	0%	11%	15%
VM	Food	5	20%	60%	20%	60%		0%	0%	20%	40%
HTL	Trade and distribution	15	40%	13%	20%	47%	0%		0%	7%	20%
OV	Other	2	0%	0%	0%	0%	0%	0%		0%	0%
CK	Chemicals and plastics	7	29%	43%	14%	43%	14%	14%	0%		29%
LB	Agriculture and forestry	8	38%	50%	13%	50%	25%	38%	0%	25%	

Example: The figure 55% means: 55% (11) of the EP respondents are also active as biomass / bioenergy technology supplier.

			TL
TL	Biomass / bioenergy technology supplier	34	
EP	Energy production	20	55%



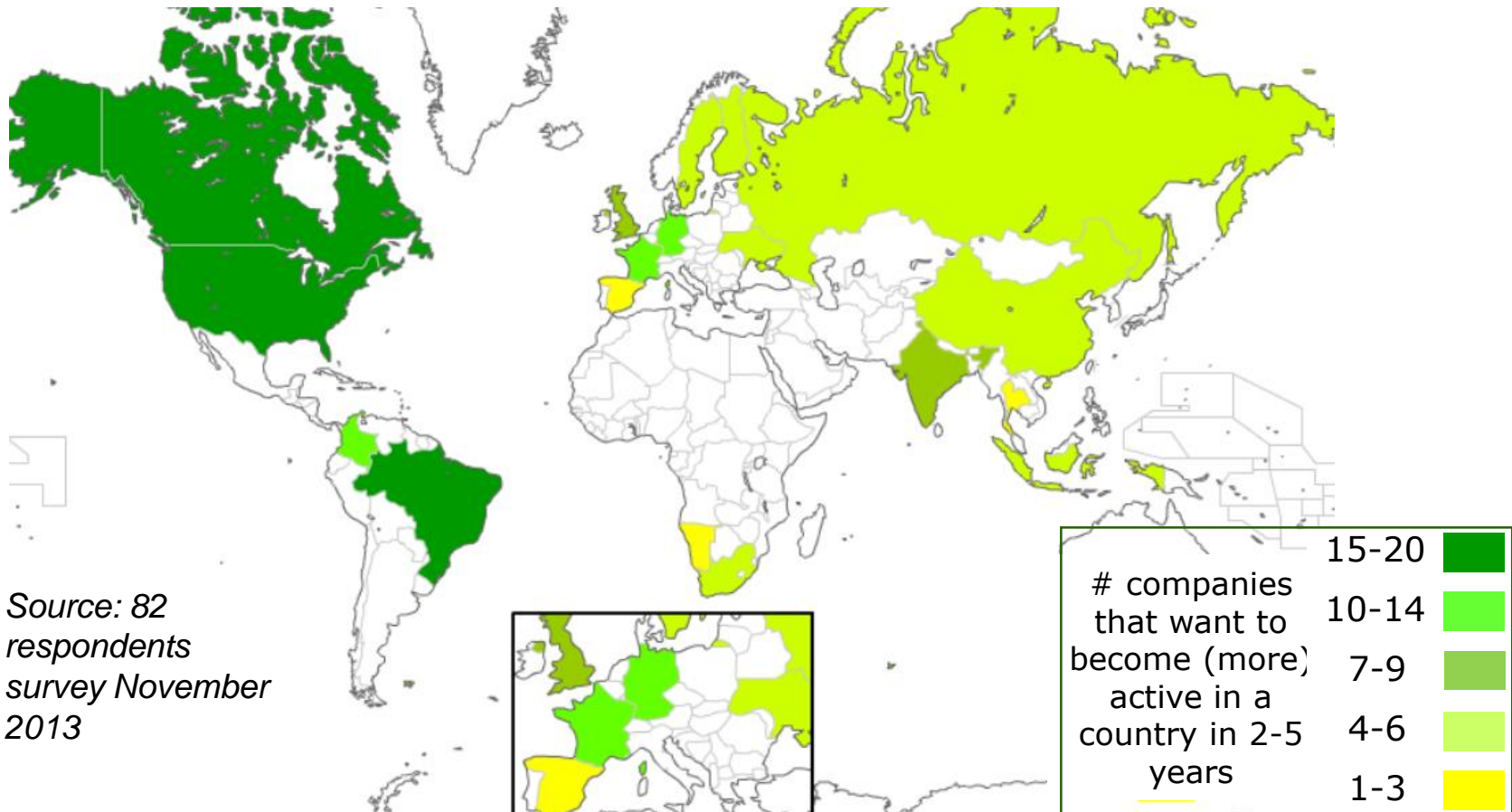
Annex A Countries where respondents are currently doing business



Source: 82 respondents survey November 2013



Annex A Countries where companies want to become (more) active in 2-5 years





Annex A Overview of all organisations involved in the project

Companies and knowledge institutes:

33 Asset Management / 33 Forest Capital	Dutch Cocoa	Platform Bio-energie
Abstraction Bio-Based Opportunities	Dutch Milling Technology International	Plospan
Anode Biomass Centre B.V.	Duurzame Energie Koepel	Process Design Center BV (PDC)
Avantium Chemicals	ECN	Projectgroep Biomassa en WKK
Biobased Trade Connections	Ecos	Pure Air Solutions
BioBTX	EECT-Turbomachinery	PurePower
Bio-energiecluster Oost-Nederland	Empowerbiomass	Reed Valorization Initiative
Biogas Plus	Eneco	Serigas International
Bioliquid	Enki Energy BV	SGS
Biomass Research	Essent	Solarix BV
Biomassa Stroomlijn B.V.	Everest Energy	Solaroilsystems
BTG Biomass Technology Group	Fairchar, Sorghum Africa	Tebodin Netherlands B.V.
Carbo Europe B.V.	FMO	Thermaflex
Cirmac	Fuenix	TNO Bouw en Ondergrond
Clean Algae	Gastreatment Services	Torrcoal
Colsen International	GF Energy B.V.	TRIOGEN
Dahlman	Gierkink Machinetechniek	TU Delft
De Bruijn - Advies & Realisatie	GMSP	Twence B.V.
Dekra Certification BV	HarvestaGG (Green Goods) B.V.	Unica
DLV plant	Haven Bedrijf Amsterdam	VieVal
DMT-et	HoSt	Wageningen Universiteit
DotX Control Solutions	ICL	Waste Treatment Technologies
Dr Ten BV	Indaver NL	WUR Plant Sciences
DSD (Dutch Sustainable Development)	Ingenia	World Wide Recycling Group
	KARA Energy Systems	Yellow & Blue Investment Management
	Nollen group	



Annex A Overview of all organisations involved in the project *(continued)*

Embassies and Attaches from:

Australia
Canada
China

Finland
France
Germany

Russia
Spain
Thailand

United Kingdom
United States of America



Annex B Market opportunities in the 16 selected countries

The following 5 pages present the market opportunities we have identified during the project in the 16 selected countries.

Australia

On a global scale, serious investments are needed to introduce resource and cost efficient technologies. For Australia this need can be found in a strongly increasing horticulture sector, decreasing sources like water and land and a rise in demand due to a growing population and increasing export market in Asia. Stimulated by government incentives, the market for renewable energy solutions is increasing. There are opportunities for Dutch companies and research organisations (including consultancies) for bioenergy solutions using agricultural residues and waste to energy.

Brazil

Major opportunities for Netherlands are for consultants and research institutes related to biomass technologies (next generation biofuels, biogas, etcetera) and policies. Export to Brazil of technology is only feasible with a local joint venture. Opportunities for technology and knowledge suppliers are: using biomass residues for local energy production, improving efficient use of biomass and technology, waste to energy, jet fuels, sustainability and certification and management and policy studies on these subjects. Import of sustainable biomass (residues) from Brazil, for heating purposes in Europe, also offers opportunities for the Netherlands.



Annex B Market opportunities in the 16 selected countries *(continued 2-6)*

Canada

Traditionally, Canada is a country of resources and raw materials. Oilseeds are used to produce biofuels for various purposes. To a large extent biomass is processed into wood pellets, making this one of the largest renewable export products of Canada. The Netherlands has a potential role as a gateway for these renewable energy products. The provinces Saskatchewan, Manitoba and British Columbia are becoming increasingly important in renewable energy from biomass resources.

China

In the upcoming five years, China will become world's largest energy consumer. Investment projects that convey clean energy production, such as biogas, are given priority in entering the market. Dutch companies are actively participating in Chinese projects focussing on converting municipal waste into biodiesel and biogas. March 24th 2014 China and the Netherlands signed a MoU, initiating a better collaboration in the field Sustainable Energy. Identified potential cooperation / international trade topics are:

- Landfill gas extraction: export of equipment and technical and management expertise;
- Anaerobic digestion: co-research fermentation process, transfer dry fermentation technology and biogas plant equipment export /co-manufacturing;
- Biogas upgrading: export of low cost technologies;
- Gasification: supply of new gasifier manufacturing technology and process;
- Cellulose conversion: export enzymes and reaction process;
- Co-combustion: Export low capital cost gasifier and O&M;
- Flue gas/ash/slag cleaning/processing: export of knowledge and equipment for improved technologies;
- Torrefaction: export equipment and knowledge of improved processes/technologies;
- Sludge drying: export of mature anaerobic digestion technologies and management experience.



Annex B Market opportunities in the 16 selected countries *(continued 3-6)*

Finland

Finland has a friendly business climate (the best framework conditions for entrepreneurship in Nordic countries), with minimal bureaucracy and a stable and competitive economy. Furthermore Finland belongs to the innovation leaders of Europe for biomass activities, and is among the leading EU countries in bioenergy use (more than 20 % of all primary energy consumption). Finland has the highest percentage of forest cover in Europe (73%) and a highly developed wood and paper industry.

France

France is an important player for Europe in the Biobased Economy, due to the abundance of biomass resources and highly developed chemical sector. France is the largest producer in the EU of cereals, sugar, protein and oil crops, potatoes, flax and hemp and has a large forestry area (4th place in EU). An intensive cooperation between The Netherlands, France and Germany has been established in developing a European strategy for the BBE.

Germany

Germany has a good position for a biobased economy. Germany is rich in biomass resources (both wood and agricultural sources). Furthermore Germany is one of the leading countries in Europe when it comes to innovation, bioenergy and bio-refinery and has supporting policies, like the 'Roadmap Bioraffinerien', innovation clusters and support schemes. The transition to renewable energy is determined by the 'Energiewende', although very successful, is now starting to lose some support due to rising costs. Since Germany is a natural business partner for The Netherlands, there are several Dutch-German biobased partnerships. Furthermore, an intensive cooperation between the Netherlands, France and Germany has been established in developing a European strategy for the biobased economy and is part of the transnational research network 'ERANET', together with Germany, Denmark, Sweden and Ireland.



Annex B Market opportunities in the 16 selected countries *(continued 4-6)*

Ghana

Doing business with Ghana from The Netherlands is not too difficult because of good flight connections and long-time existing trade relations between the countries. Ghana, with its fast growing economy, is an upcoming market in Africa and can serve as a hub for the region. Important export products are cacao (and other agricultural products), gold and in the near future potentially oil. Ghana has a lot of forestry and agricultural residues available that are currently not being used. There seems to be a good market for medium sized biogas and waste to energy systems. The government of Ghana has recently put in place a feed-in tariff for renewables.

India

For the past two decades India has been among the world's fastest growing economies, therefore also energy consumption and production have increased significantly. The Indian government shows large interest in development towards a biobased economy, which offers an emerging market with high potential for European investors. Waste to Energy is one of the fastest growing focus areas, covering whole India and showing large interest in Dutch technology and expertise. Another area offering opportunities is biogas for cooking, heating and electricity production both from small (household systems) and medium-large systems (e.g. sewage systems and abattoirs).

Latvia

Within the EU, Latvia has the largest share (1/3) of renewable energy in its energy mix. Wood and water are the most widely used renewable energy resources: wood as fuel is used for district heating, both centralised and local, and for heating individual buildings. Latvia announced an increase of bioenergy with 50 biogas and 50 biomass projects.



Annex B Market opportunities in the 16 selected countries *(continued 5-6)*

Russian Federation

Russia has an abundant supply of biomass in the form of wood, animal waste and agricultural residues. The country is, however, characterized by a relatively low domestic utilization of biomass and a growing export-orientated wood pellet industry. The opportunities for Russia are twofold. There is a huge potential with regard to using alternative and sustainable energy resources for which they do not have the technology yet nor is there a real existing domestic demand. Therefore this is a long term goal which allows them to use sustainable bio-energy and to reduce CO₂ emissions and thereby contribute to a healthier climate. The second opportunity is the possibility to create a market for their (biological) waste material.

South-Africa

In South-Africa, the bioenergy, waste to energy and biobased economy sectors are still in its infancy but developing fast. South-Africa now has an effective and efficient renewable energy support programme, which has been very successful in attracting investment in wind and solar, but much less so in bio-energy. The government is therefore supporting a number of initiatives investigating the role of bio- and waste to energy in rural development and job creation. A biofuel blending obligation (gasoline and diesel) starts October 1, 2015. In January 2014 the National Bioeconomy Strategy has been launched, positioning bio-innovation as essential to the achievement of government's industrial and social development goals.

Spain

Spain is the fifth largest energy consumer in Europe and has virtually no domestic production of liquid fuels or natural gas. Spain is the third biggest biomass resources country in the EU. The renewable energy sector in general, is hit hard by the current radical reforms, resulting in a loss of subsidies, grants and investments. Therefore, opportunities in biomass export to other European countries are most likely for this moment.



Annex B Market opportunities in the 16 selected countries *(continued 6-6)*

Thailand

Thailand was among the first countries in Asia to introduce incentive policies for the generation of electricity from renewable energy sources. The Thai Government is now adapting its policies to take account of recent technological progress and market growth, continuing to offer an enabling environment for RE investments. Apart from a greener environment, sustainable development is necessary since Thailand is dependent on energy imports and electricity needs are continuously growing.

United Kingdom

The United Kingdom is a significant player in industrial biotechnology and therefore has a good position for the development of a biobased economy. The UK lags behind their renewable energy targets, still a large effort is needed to increase from the current 4% to 15% renewables share in 2020. Biomass is the largest renewable sector (63.5% of total UK renewable energy consumption in 2012) and increased by 45.4% since 2008. The UK is currently Europe's largest consumer of wood pellets, with 4.54 million metric tons of demand in 2013, driven by large-scale power plants.

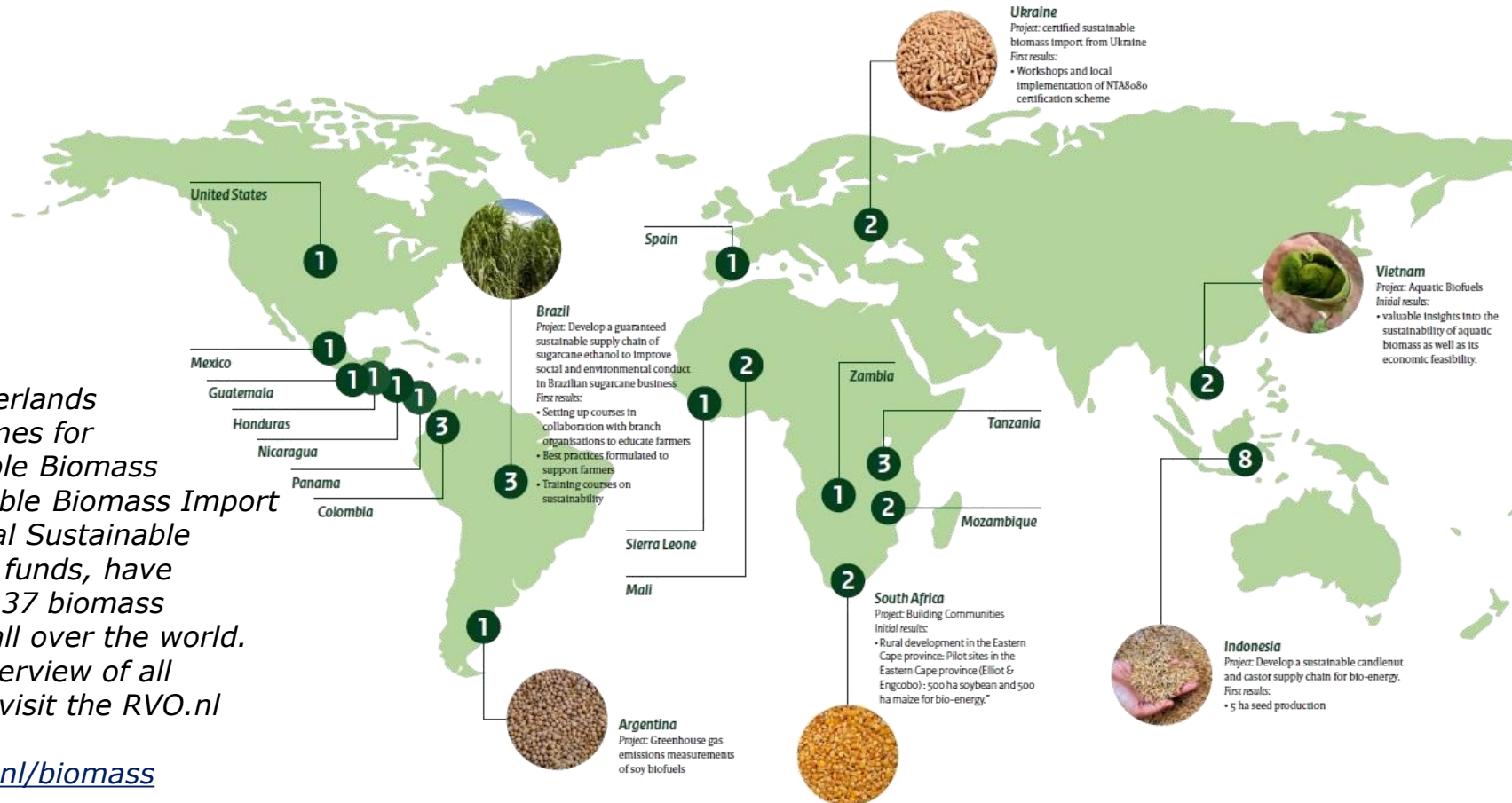
United States

The United States cover a large surface, giving home to an enormous variety of biomass species and other resources. This offers various opportunities in the field of renewable energy. Energy crops, agricultural residues, waste materials and forestry biomass are examples of potential feedstock. An overarching policy exists, but detailed renewable energy policies on this topic vary from one state to another. This has to be taken into account when entering this growing market with large opportunities. The US has a well-developed supportive biofuel policies. Currently this offers opportunities for European companies exporting biodiesel and bio-ethanol.



Annex C Overview of supported projects of the Sustainable Biomass programme

The Netherlands Programmes for Sustainable Biomass (Sustainable Biomass Import and Global Sustainable Biomass) funds, have launched 37 biomass projects all over the world. For an overview of all projects, visit the RVO.nl website: www.rvo.nl/biomass





Annex D Project approach: surveys, desk research and discussions with the sector

Executed activities

This project was executed between 1st October 2013 and 30 April 2014. The following activities have been carried out as part of the project:

1. A survey amongst 82 (out of 350) businesses and research institutes active in the BBE (Annex A provides an overview of the survey respondents);
2. Interviews and one on one discussions with 20 companies, mostly SMEs;
3. Participating in 8 meetings and conferences addressing the subject;
4. A survey amongst 12 (out of 16 countries) embassies, especially the attaches;
5. Gathering of 5 examples of Dutch companies with international activities;
6. The RVO.nl workshop (17th March 2014) with 16 participating companies, mostly SMEs, and 4 participants from RVO.nl;
7. Reviewing 195 publicly available reports and sources.

Limitations

As a result of the approach, and limited time and resources the project is focussed on bio-energy and SMEs.



Annex E Expert opinions on major global market trends and opportunities

Market trends:

- > **Biomass becomes a mainstream commodity** in standard forms like pellets or bio-heating oil (from pyrolysis/torrefaction).
- > **Increased production of biogas** from sewage plants, manure, and organic waste, and cheaper biogas plants made with new materials. Biogas maybe also used for transport.
- > **Much greater use of biomass heating technologies**, including CHP plants, district heating systems, cooling systems for commercial and public buildings, and industrial process heat, predominantly at “small or medium scale” of 5–10 MW.
- > **Integration into agricultural and forestry industries** through integrated “bio-refineries.” Trend toward multi-purpose co-production systems, which co-produce biofuels, sugar, electricity, and biogas, and also utilize leftover waste for fertilizer, chemicals, biofuels, animal feed, and other chemicals.

Source: Renewables 2013 Global Futures Report, REN21, 2013



Annex E Expert opinions on major global market trends and opportunities *(continued)*

Market opportunities:

1. **Electric power infrastructure:** Developing countries will need to build “lots of infrastructure” in the next 10 years; “on” and “off-grid” options.
2. **Diesel generator replacement** with renewable-hybrid alternatives will become increasingly competitive. Many cited the use of hybrid wind-diesel systems or biomass powered systems.
3. **Shift away from traditional biomass cookstoves** to more modern forms of stoves and fuels, including efficient biomass stoves and stoves burning biogas or biofuels
4. **Strong growth in modern biomass use:** (1) expanding wood chip/pellet markets in countries such as Argentina, Brazil, Chile, the Philippines, and Sri Lanka; (2) greater use of biogas for cooking, heating, and electricity generation in countries such as Nepal, Vietnam, and Kenya (in addition to China and India); and (3) continued expansion of biomass power generation and cogeneration in countries such as Brazil, the Philippines, and Thailand, and throughout Africa (e.g. Kenya, Mauritius, Tanzania, Uganda, and Zimbabwe)

Source: Renewables 2013 Global Futures Report, REN21, 2013



Annex F Conclusions and recommendations PBL report “vergroenen en verdienen”

The report PBL (2013) concludes there are two main tracks for a successful green economy in the Netherlands:

1. Strong economic (home country) green and innovative companies should focus on internationalization, especially SMEs can be much more active in this area.
2. Strong economic (home country and international) companies should focus on greening their business.

The Dutch government should facilitate these tracks, amongst others, with:

- > Supporting innovative start-ups with financial guarantees, credit facilities or a revolving fund.
- > A strong innovation policy where greening is leading.
- > Focus on supporting SMEs, they usually create more radical innovations and are more in need for (financial) support.
- > Support green products with public procurement and more strict product requirements

Source: PBL (2013), “Vergroenen en verdienen; Op zoek naar kansen voor de Nederlandse economie”, Den Haag, Planbureau voor de Leefomgeving.



Annex G Most relevant sources assessing obstacles doing international business

Most relevant sources used for assessing the obstacles faced by companies doing international business (especially in the BBE) are:

- ❑ PBL (2013), "Vergroenen en Verdienen: op zoek naar kansen voor de NL Economie, Den Haag
- ❑ AgentschapNL (mei 2013), "IA Special Bio Based Economy in Nederland", Den Haag
- ❑ Topteam Energie (november 2012), "Marktbewerkingsplannen Topteam Energie"
- ❑ Topsector Chemie, projectgroep Internationaliseringsagenda (maart 2012), "Agenda Internationaliseringsoffensief Topsector Chemie
- ❑ Panteia (juli 2013), "Topsectoren in beeld; Internationale oriëntatie topsectoren", Zoetermeer
- ❑ Panteia (december 2013), "Het exporterende bedrijfsleven aan het woord", Zoetermeer



More information?

www.rvo.nl/biomass/opportunities

@SustBiomass

T: +31 (0) 88-602 9200

Kees Kwant

or

Jobert Winkel

kees.kwant@rvo.nl

jobert.winkel@rvo.nl

Authors:

Partners for Innovation BV

Emiel Hanekamp, Saskia de Lint and Floor Osseweijer

e: e.hanekamp@partnersforinnovation.com

t: +31 (0) 20-620 0511