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PERSPECTIVES ON BIOECONOMY

Cases from the ERDI Partner Regions

Perspectives on Bioeconomy - Cases from the ERDI Partner Regions

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Publisher: ERDI -Empowering Regional Development and Innovations- project , 2017
Karelia UAS, University of Pardubice

ISBN: 978-952-275-245-1

eRDI
Empowering Regional Development and Innovations

Co-funded by the Erasmus+ Programme of the European Union

ERDI – Empowering Regional Development and Innovations
562603-EPP-1-2015-1-FI-EPPKA2-KA

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Figure 1. ERDI partner regions. Source: Google Maps, maps.google.com, own modifications.

1 Introduction

Liisa Timonen, Karelia University of Applied Sciences

ERDI – EMPOWERING REGIONAL DEVELOPMENT AND INNOVATIONS IN SHORT

ERDI - *Empowering Regional Development and Innovations* -project aims for better graduate employability and improved competitiveness of the regional economy to gain better income in the future. The Eastern- and Northern European partner regions from Czech, Finland, Hungary, Netherlands and Slovakia as well as the associated partner region in Canada struggle with economic and social challenges. Remote rural regions suffer from decreasing economy, unemployment and migration.

ERDI seeks solutions to these problems by boosting the expertise, entrepreneurship and co-creation of knowledge in bioeconomy. ERDI strengthens regional development fostering the beneficiaries: students', teachers' and working life partners' multidisciplinary and international knowledge, networks and skills. ERDI internationalises the education, fosters innovations and builds pathways between the stakeholders on different levels and regions.

Bioeconomy business is one of the growing businesses in Europe. Bioeconomy is seen as a tool for sustainable and inclusive economic growth and job creation. However, it still suffers from a lack of skilled labour force and too few business initiatives. Bioeconomy in ERDI refers to a sustainable but profitable use of renewable natural resources in the field of energy and agriculture. This publication discusses the bases of bioeconomy in the partner regions.

ERDI CONSORTIUM

ERDI has sixteen partners in total from which five are associated partners supporting and even implementing some of the actions with their own funding. The consortium combines higher education organisations, working life partners and local administrators as described in table 1.

Table 1. ERDI partners

Partner group	Organisation	Country
Higher Education	Karelia University of Applied Sciences (lead partner)	Finland
	HAS University of Applied Sciences	The Netherlands
	Savonia University of Applied Sciences	Finland
	Slovak University of Agriculture in Nitra	Slovakia
	Széchenyi István University	Hungary
	University of Pardubice	Czech
Working Life	ENAMRO	Hungary
	Local Action Group of Železnohorský region	Czech
	ProAgria North Karelia	Finland
	ProAgria North Savo	Finland
	SLOV-MART Ltd.	Slovakia
Associated Partners	The Collège communautaire du Nouveau-Brunswick	Canada
	Groupe Savoie	Canada
	The Province of North Brabant	The Netherlands
	Regional Council of North Karelia	Finland
	Université de Moncton	Canada

The alliance has been created based on previous successful development actions bridging organisations providing expertise needed to fulfill the project implementation following some of the Europe2020 and Smart Europe policy actions. ERDI partnership relies on an adequate combination of expertise and competences from different European partner regions from North, East, West and South. These HEIs combine a multidisciplinary network exploring bioeconomy, education and regional development from varied perspectives and expertise: administration, agriculture, business, economy, European affairs and law, regional development, renewable energy and social issues. Also the working life partners represent versatile expertise (business, NGO, policy making and advisory services) and they are geographically diverse. Each HEI brings in one working life partner whom they have been carefully chosen to support the action plan.

Furthermore, the consortium gains great added value from the Canadian partners. CCNB, University of Moncton and Group Savoire share their expertise in business models and contribute into the discussion of new potential markets. Furthermore, ERDI is supported by the North Karelia Regional Council from Finland as an associated partner who especially enhances the dissemination activities.

ERDI ACTIONS

The ERDI idea is based on sharing the best practices, learning from each other, networking, finding innovative solutions and sharing business models and further elaborating the shared expertise in a best possible way. The added value comes from the very systematic, cross-sectorial and transparent way of doing this.

Firstly, the key to a successful bioeconomy business and regional development lies in a skillful work force and entrepreneurship. ERDI defines the key competences for a bioeconomy expert and develops the HEIs' curriculum together with their working life partners. By doing this, the HEIs can serve the region, boost the business and educate labour fitting for the future oriented needs.

Secondly, the need for an easy access to the digital information is important in the today's chaotic knowledge flow. ERDI develops digital, open educational materials to promote the accessibility of education. *Thirdly,* the shared expertise between the working life partners and HEIs (Higher Education Institution) supports the bioeconomy business and the region. ERDI builds innovative and flexible models for the co-creation of knowledge to ensure the meaningful collaboration. *Fourthly,* the regions need empowerment of the business and employability. ERDI builds regional and international business networks sharing best business models and seeking for new, innovative business possibilities.

ERDI fosters prosperity on different levels. The beneficiaries in ERDI are the students and staff of HEIs, the local bioeconomy business, the staff of working life partners, the associated partners and, in a long term, the people living in the regions. ERDI also brings added value for all the partners strengthening the organisations' capacity.

PERSPECTIVES ON BIOECONOMY - THE MEANING OF THIS PUBLICATION

Nationally, in Finland education and RDI in the focus areas are highly promoted. Education and bioeconomy are in the focus of the Regional Development Programmes both in North Karelia and North Savo. Karelia and Savonia universities of applied sciences develop the expertise in bioeconomy, aim for area serving regional development and operate with the working life partners. In the Czech Republic, Hungary, Slovakia and the Netherlands the regional policy is based on integrated and result-oriented regional development. The approach relies on the endogenous potential to increase the competitiveness of the organisations and regions. Priorities are set in the national and organizational strategies. The education sector is undergoing significant changes in interlinking the education, training and labor market needs. HAS, Pardubice and SUA are especially skillful in regional co-operation and networking between administrators, industry and universities. SZE sets targets of increasing openness, accessibility and attainment levels by developing digital learning tools.

This issue, Perspectives on Bioeconomy – Cases from the ERDI Partner Regions, provides a baseline for the development of bioeconomy within the ERDI project and more widely. This publication is a result of the work package 1, Current State Analyses, combining outputs 1 and 2, regional background and SWOT analyses. The case studies provide a versatile picture of the ERDI entity including the regional scope to bioeconomy, strengths and opportunities of development in each of regions, regional key players and the identified educational needs. This study formulates a base especially for creating and expanding the ERDI business networks and knowledge alliances.

2 Methodology

Martin Maštálka, **University of Pardubice**

The aim of this analysis is to offer the basic facts about the regions involved in the ERDI project. It serves as a “knowledge base” for the further work of the ERDI consortium in all related work packages. In compliance to the aims of the project there have been the level of NUTS III taken as the main level for the regional analysis. Considering the specific situation of the regions in Canada and the Netherland, the team responsible for the regional analysis have decided to use the other regional levels where it was legitimate.

All the regional analyses are divided into two main parts. The first part consists of so called “hard indicators”. Hard indicators collect the statistical data from national statistical offices and other sources and describes the development of the region in long-time perspective and in relation with the national trends as well. The indicators used for this part follow the idea of sustainable development and therefore are divided into three groups – environmental, economic and social.

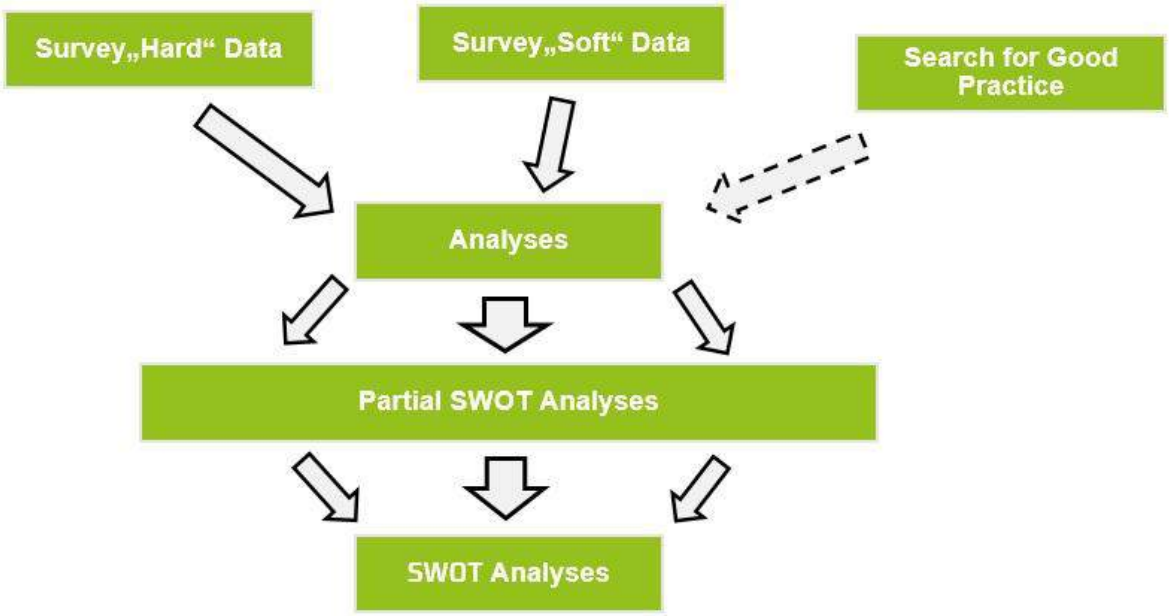

Figure 1. Analysis workflow chart

The table of indicators is based on the experience with indicators of sustainable development (Šilhánková, 2011). The indicators reflect all three pillars of the sustainable development. In the analysis, data from the year 2015 is used (the most current data available). In this material, there are presented only the data from the year 2015 (2014 resp.) but within the project the consortium uses the data from previous years as well. They are not presented in the document because of limited space but they are available at the coordinator of the ERDI project. For the SWOT analyses and other descriptions of the region data time-lines are used as the basis.

Table 1. Statistical indicators used for the ERDI regional analysis. Source: Own construction

Area		Indicator
environment	landuse	land covered by urbanized areas
	landuse	population density
	landuse	population density in urban areas
	quality of ambient air	presence of sources of polution in the area
	quality of ambient air	localities with worse ambient air
	water treatment	% of households connected to public sewerage systems
	energy supply	% of different energy sources
economy	regional budget	operating profit of reg. budget
	regional entrepreneurship	No. of entrepreneurs
	regional entrepreneurship	No. of entrepreneurs per 1000 inhabitants
	regional entrepreneurship	NACE structure of companies in the region
	regional entrepreneurship	structure of companies according the number of employees
	economy level	household income by net money income per person
	economy level	inflation
	economy level	unemployment rate
	economy level	GDP, GDP per capita
	economy level	average gross monthly wages
	regional economy	commuting to work or school
	regional economy	% employment in economic sectors (primary…)
society	inhabitants	no. of inhabitants
	inhabitants	relative migration balance
	inhabitants	population by age
	inhabitants	% of foreigners
	inhabitants	population by sex
	education level	population education structure (university degree)
	political participation	% participation in regional elections
	political participation	% of women elected to regional government (authority)
	quality of urban environment	% of abandoned buildings
	quality of urban environment	household ownership types
	quality of urban environment	no. of household users (inhabitants)

The presented table had been designed at the beginning of the project and all the project partners were able to fill the table with regional NUTS III data. The sources are the national statistical offices and other regional sources (e.g. regional councils, thematic regional analysis etc.). Nevertheless, all the partners were able to offer the requested data, there were some regional exceptions – especially in case of the Netherlands and Canada.

The second part of the analysis consists of so called “soft data” set. It´s main aim is to offer an overview about the regional networking, cooperation between the regional stakeholders and to introduce the regional attitude to the bioeconomy.

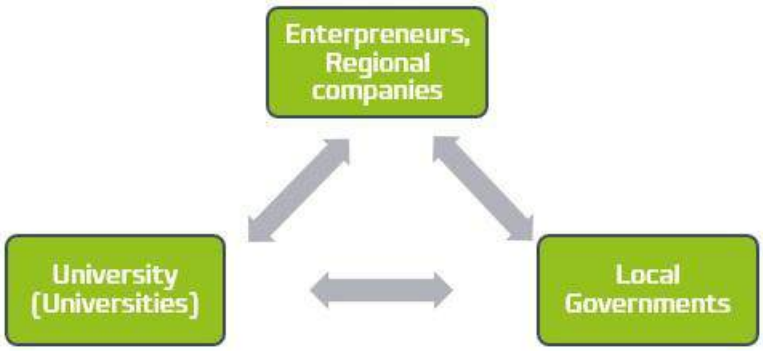

Figure 2. Regional stakeholders identified as the most important for the regional development in the ERDI project, Source: ERDI

As the ERDI consortium consists from varied regions with different social, political and industrial history there has been long discussions about the methodology that would be used for this part of the analysis. The consortium decided to split the methodology into two main streams that deliver the same data in different ways:

- the representatives of the former Western European countries (Finland, the Netherlands) decided to organize thematic workshops and provide the requested information based on the discussion with the partners;
- the representatives of the former Eastern European countries (the Czech Republic, Hungary and Slovakia) decided to do the regional qualitative survey based on the questionnaires among the key regional players.

The chosen way has shown that both methodological attitudes are able to provide the answers to the main given questions:

- do the regional stakeholders cooperate?
- what are the expectations of the regional players?
- are the universities really the key actors in regions?

The data presented in this analysis offers regional data from the ERDI regions and helps to understand the situation that is specific for each of them. Despite the different regional situation, they are many similarities among the ERDI regions that can help them to learn from each other and to improve their development through the mutual inspiration.

Regional cases have the same structure. They present the situations in the regions by describing the following points:

- summary - short description of the region (position, landscape, no. of inhabitants) including the regional SWOT analysis and description of regional policy and strategy;
- regional scope to bioeconomy – what is the regional attitude to bioeconomy, what is understood under the term, what is the relation of regional stakeholders to bioeconomy;
- regional SWOT analysis on bioeconomy;
- regional key players – in compliance of the ideas of the quadruple helix, the analysis try to identify regional key players who are the most active/important for the regional development;
- facts and figures – the hard data as described above.

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North Karelia Finland

Petkeljärvi, Ilomantsi, North Karelia, Finland.
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3 North Karelia Region, Finland

Helena Puhakka-Tarvainen, Karelia University of Applied Sciences

SUMMARY

Figure 1. Location of the North Karelia Region. Source: maps.google.com.

North Karelia region is situated in the easternmost part of Finland and European Union (Regional Council of North Karelia 2014a, 6-7). It is a sparsely populated region of 165 000 inhabitants, and the regional economy is strongly dependent on natural resources and business across the Russian border.

Regional swot analysis

Strengths	Weaknesses
-Wide natural resources -Safe and healthy living environment -Diverse economic structure -High amount of students (2 HEIs) -High coverage of broadband also in rural regions -Active rural development and vital rural villages -High level in use of renewable energy	-Sparse population challenges service production -High rate of (especially youth) unemployment -Low fitness of domestic market based industry and tourism -Centralized workplaces and services -Long distances and poor public transport system -Harsh and energy consuming climate conditions -Long distance to capital region and main transport routes
Opportunities	**Threats**
-Proximity to Russia -Immigration -Growth and export potential in several business sectors -Change of regional administration system -Relatively high number of entrepreneurs -Nature tourism and recreation -Rich cultural life and history	-Ageing population -Ageing entrepreneurs and deficit in changes of generation -Highly dependent on Russian export -Migration of graduates out from the region -National policy of centralization -Change of service structure and struggling municipal finances -Cease of key industrial factories

Figure 2. SWOT analysis of the strengths, weaknesses, opportunities and threats for the development of the North Karelia Region, Finland (based on findings of Regional Council of North Karelia 2014a).

REGIONAL SCOPE TO BIOECONOMY

What is bioeconomy in our region?

The regional economy of North Karelia region, Finland, is strongly dependent on natural resources and business across the Russian border (Regional Council of North Karelia 2014a, 6-7). Forest bioeconomy is nominated as one of the three main development sectors of the regional Smart Specialization strategy (Regional Council of North Karelia 2014b, 8). The region is European forerunner in the use of renewable energy and aims for completely fossil fuel free by year 2030. The other specialization areas Technology and materials and Russian know-how support the development of forest bioeconomy, e.g. in terms of importing wood for bioeconomy industry from Russia.

North Karelia region is a nationally recognized forerunner in bioeconomy. For example, the regional capital city Joensuu has been responsible of implementation of national bioeconomy activities in Innovative Cities programme INKA (Tekes 2016). The goals of the programme can be summarized as follows (Regional Council of North Karelia 2014a, 30):

Seamless cooperation between forest and agrobioeconomy provides synergic models for operation, joint technological development and application possibilities, and wide research and business networks. The key innovations will be found from the interface of different knowledge sectors.

North Karelia region aims for oil free region by the year 2030. The goal is challenging but possible. Actually, 64 % of the regional energy is produced renewably, mostly by using forest biomass (Table 2). Recovering the transport oil possesses the biggest challenge towards the transition to renewables.

Forest bioeconomy sector employs more than 6000 people in the region (Regional Council of North Karelia 2014a, 41), and the turnover of the business is ca. 1.7 billion euros annually. If agriculture, food industry, energy, waste and water management, wood construction and biotechnology are included, the estimate of workers in bioeconomy is 15 000 people, which covers ca. 25 % of the total amount of workers in the region (Puhakka-Tarvainen et al. 2015, 19).

What are the regional goals for development?

Regional Strategic Programme aims at creating jobs, wellbeing and vitality in a sustainable manner (Regional Council of North Karelia 2016). The three priorities are (1) Smart specialisation, (2) Fossil oil free region, and (3) Lifelong inclusion. The region's production priorities are wellbeing, stone and mining industry, creative industries, tourism, forestry and bioenergy, food production and processing, technology industry, plastics and metal industry, materials technology and ICT. Key sectors are developed by strengthening competitiveness of the business life, upskilling people, internationalisation and resource efficiency. The geographical proximity to Russia is a great possibility for export. Special emphasis is put on local development of rural areas, promotion of the region's attractiveness, and empowering the youth.

North Karelia is internationally known hub of forestry expertise (Regional Council of North Karelia 2014b, 8). The main aims of the North Karelia's smart specialisation strategy are (1) Forest bioeconomy, (2) Technology and Materials, and (3) Russian Know-how (Figure 3). In the expertise in technology and materials, especially the expertise in photonics is internationally at very high level.

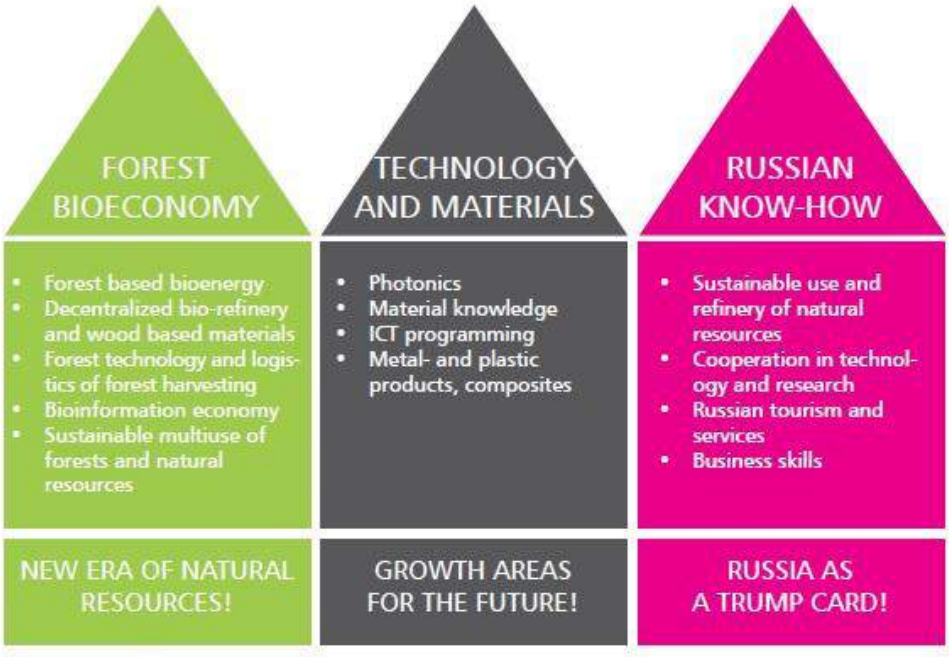

Figure 3. The Smart Specialization strategy foci of North Karelia region, Finland (Regional Council of North Karelia 2014b, 8).

Regional strategy and policy in short

North Karelia's vision and strategic goals for year 2030 include internationally competitive business life, reinforcement of expertise and employment, wealthy and safe region, and sustainable regional structure and accessibility (Regional Council of North Karelia 2010). Core of development goals are strengthening of business competitiveness, level of expertise, internationalisation and resource efficiency.

North Karelia is a in front region towards the new regional administration system in Finland (Siun SOTE 2016). National reform for arranging social, health and administration services at regional level will cover the whole country by January 2019. North Karelia started the process upfront and is changing the administration system gradually starting from 2017. At the moment, regional power of decision has been on city and municipal councils. After the reform, 60 % of the municipal responsibilities and budget will be administered on regional level by newly elected regional councillors.

REGIONAL SWOT ANALYSIS ON BIOECONOMY

Strengths	Weaknesses
-Wide natural resources -Flourishing forestry and forest industry sectors -High level of expertise, distinguished at international level -Stong international companies in the region -Strong regional will in development -Wide international networks -Bioeconomy as key development goal in regional funding schemes -Vast amount of actors (quadruple-helix)	- Ageing population - Economic recession brings on financial challenges - High dependence on basic production instead of refined products - Long distances and poor public transport system - Harsh and energy consuming climate conditions Long distance to capital region and main transport routes
Opportunities	**Threats**
-Large potential investments in biorefinery and new products -Demonstrations and pilots in development of innovations -Regional goals for low-carbon solutions and oil free energy production -Wood construction -Diverse business sectors, innovation potential in interfaces (e.g. fotonics) -Russian import of raw materials and export of products -Skilled workers and students	-Status of forests as carbon sink -Unpredictability of national policies and subsidies -Graduates migration out from the region -High dependence on Russian trade -Cease of key industrial factories

Figure 4. SWOT analysis of the strengths, opportunities, weaknesses and threats of the bioeconomy in the North Karelia Region, Finland.

REGIONAL KEY PLAYERS

Who are the key players and what are their roles?

Bioeconomy players in North Karelia follow quadruple-helix model (Puhakka-Tarvainen, H., Korhonen, V-P., Siikanen, R., Ojajärvi, P. & Talkkari, A. 2015, 15-16). Key actors are bioeconomy entrepreneurs and primary producers; cities, municipalities and regional development companies; energy, water and waste management organisations; higher educational institutes and other schools, colleges and research institutes; administrational organisations; and NGOs. North Karelia is also coordinating or part of many international institutions and networks as European Forest Institute (EFI), North Karelia Biosphere Reserve and ENO Environment Online (EFI 2016; ENO Programme 2016; North Karelia Biosphere Reserve 2016). More than 500 research and development experts related to forestry and bioeconomy work in the region.

Bioeconomy companies in North Karelia are mostly SMEs and operate on local level, e.g. in forest and energy management. Large international companies operating in the region include e.g. Stora Enso, UPM and John Deere Forestry. The amount of farms and gardens is ca. 2000 and the

trend has been descending in the previous years. Table 2 summarizes the key regional players and their main roles related to bioeconomy.

Table 1. Summary of the key regional bioeconomy actors in the North Karelia region, Finland (based on Puhakka-Tarvainen et al. 2015).

Organisation	Main role	Contact
Business sector		
Joensuu Regional Development Company JOSEK Ltd.	Regional business policy and development, business counselling, marketing of the region (Joensuu region)	http://www.josek.fi
Central Karelia Development Company KETI Ltd.	Regional business policy and development, business counselling, marketing of the region (Central Karelia region)	http://www.keti.fi
Pielinen Karelia Development Center PIKES Ltd.	Regional business policy and development, business counselling, marketing of the region (Pielinen Karelia region)	http://www.pikes.fi
Joensuu Science Park	Business development, support and incubation. Leader of the national bioeconomy Innovative Cities programme.	http://www.tiedepuisto.fi
State Forest Enterprise	Provides natural resources sector services to a diverse customer base, from private individuals to major companies. Operations are based on the knowledgeable and co-operative use of state land and water areas.	http://www.metsa.fi
Administration		
Regional Council of North Karelia	Politically guided, regional municipal coalition for the development and interest supervision in the region. Responsible for regional planning and general coordination of regional development programs related to national and EU structural funds.	www.pohjois-karjala.fi
Siun SOTE	New regional administration coalition for social and health care services, starting in 2017	www.siunsote.fi
The Centre for Economic Development, Transport and the Environment (ELY)	Responsible for the regional implementation and development tasks of the central government: business and industry, labour force, competence and cultural activities; transport and infrastructure; environment and natural resources	https://www.ely-keskus.fi
The Finnish Forest Centre	State-funded organisation covering the whole country, tasked with promoting forestry and related livelihoods, advising landowners on how to care for and benefit from their forests and the ecosystems therein, collecting and sharing data related to Finland's forests and enforcing forestry legislation.	http://www.metsakeskus.fi
Education & research		
Karelia University of Applied Sciences	Offer practical, working-life higher education and applied research and development activities for supporting regional development and business.	http://www.karelia.fi
University of Eastern Finland (UEF)	Multidisciplinary academic university with strong emphasis on bioeconomy (e.g. department of Forest Sciences).	http://www.uef.fi

Organisation	Main role	Contact
Natural Resources Institute Finland (Luke)	National research institute providing multi-disciplinary research. Strategy aims for solutions towards the sustainable development of the Finnish bioeconomy and the promotion of new biobased businesses. Also carries out statutory government work as monitoring natural resources, storing genetic resources and producing Finland's official food and natural resource statistics.	http://www.luke.fi
European Forest Institute (EFI)	Conduct research and provide policy support on issues related to forests at European level.	http://www.efi.int
Finnish Environment Institute (SYKE)	State owned research institute and a centre for environmental expertise. SYKE forms part of Finland's national environmental administration.	http://www.syke.fi
North Karelia municipal education and training consortium (PKKY)	Provides qualified vocational education in the county of North Karelia, e.g. in the field of natural resources.	http://www.pkky.fi
Third sector & NGOs		
ProAgria North Karelia	A Finnish expert organization providing an extensive network of specialists and a wide range of services to rural entrepreneurs.	https://pohjois-karjala.proagria.fi/
Finnish forest owners' associations (MHY)	Interest groups for Finnish forest owners at local level.	http://www.mhy.fi/pohjois-karjala
ENO Programme	A global virtual school and network for sustainable development, started from North Karelia.	http://www.enoprogramme.org/
North Karelia Biosphere Reserve	Creates regional sustainable development solutions for better economy and the environment.	http://www.kareliabiosphere.fi/

What is the role of educational organizations in the region?

North Karelia has relatively high number of students compared to the size of the region. Region has two universities, vocational education, several upper secondary schools, folk high schools and other organisations. Basically, a North Karelian young is able to qualify from pre-school until a doctor within the region in several study fields especially related to bioeconomy sector. All main educational institutes (Table 2) offer studies related to management of natural resources. University of Eastern Finland provides academic education and research e.g. in forestry, and Karelia University of Applied Sciences' role is to provide more applied and practical education, research and development work. Universities have a strategic cooperation in development of the regional competences. In addition, Karelia has strategic cooperation with the North Karelia municipal education and training consortium (PKKY), which is the main provider of vocational training in the region. Bioeconomy is not yet a name of any degrees available in North Karelia, but development work towards such initiatives is intense.

Expectations for the future experts – businesses' perspectives to educational development

Several workshops, interviews and discussions have taken place within the past year aiming to find out the key competences related to bioeconomy in the future (Figure 5). The scope of the questioning has been in the next decade, whereupon our present and future students will be professionals in the working life. Following issues have been raised up during the survey:

- Borders between business sectors will dissipate. A word for bioeconomy will also disappear as bioeconomy will be standard economy. Thus, occupational structures and professions will also be reshaped in rapidly increasing pace.
- Digitalization and robotics will revolute the professions.
- Specific deep knowledge will be required in more specified sectors of business; on the other hand, in every sector a general knowledge of bioeconomy processes will be required.
- Knowledge on renewable energy production and other industrial bioprocesses, possibilities for industrial symbioses, life cycle analysis and principles of circular economy will be key aspects of a successful professional.
- As a basis for the deep specialisation, strong knowledge on natural sciences (chemistry, physics, biology, etc.) and engineering will be needed.
- Understanding of the principles of sustainable development, ethics and environmental philosophy will help to understand the entity.
- On the other hand, future workers will need multidisciplinary basic skills: business and economics, communication and marketing, digital tools, law, service design and product development, multicultural skills, and management and leadership, among others.
- Improving the general working life skills will be also required, as ability of life-long learning being one of the most important of those.

Figure 5. Future competences listed in ProAgria North Karelia workshop in September 2016. The size of the words is based on the frequency of words mentioned.

FACTS AND FIGURES

Table 2. North Karelia region facts and figures.

Indicator	Figure (2014)	Indicator	Figure (2014)
Land covered by urbanized areas	0.99 % (214 km^2)	**NACE structure of companies in the region**	11 663 (TOTAL)
Population density	9.3 inhabitants /km^2	A Agriculture, forestry, fishery	4013 (34.4 %)
Population density in urban areas	548.94 inhabitants /km^2 (year 2015)	B Mining	40 (0.3 %)

Indicator	Figure (2014)	Indicator	Figure (2014)
Households connected to public sewerage systems	70.3 %	C Industry	739 (6.3 %)
Energy sources	Renewables 64 %	D Electricity, gas, heating, cooling	40 (0.3 %)
Wood energy	51 %	E Water, sewage, waste & waste water management, environmental cleaning	81 (0.7 %)
Renewable electricity	11 %	F Construction	1057 (9.1 %)
Other renewables	2 %	G Retail; motor vehicle repair	1463 (12.5 %)
Non-renewable electricity	13 %	H Transport, logistics and storage	695 (6.0 %)
Motor oil	3 %	I Accommodation and restaurants	371 (3.2 %)
Transportation	9 %	J Information and communication	155 (1.3 %)
Peat	4 %	K Funding and insurances	139 (1.2 %)
Fossil oil for heating	5 %	L Real estates	532 (4.6 %)
Heating pumps	2 %	M Professional, Scientific and Technical sectors	663 (5.7 %)
Operating profit of reg. budget	N/A	N Administration and management	381 (3.3 %)
No. of entrepreneurs (including farmers; 2013)	7 730	P Education	64 (0.5 %)
No. of entrepreneurs per 1000 inhabitants (2013)	46.7	Q Health care and social	590 (5.1 %)
Structure of companies according the number of employees (2013)	10 841 (TOTAL)	R Arts, recreation	101 (0.9 %)
< 10 employees	10 152 (93.6 %)	S Other services	536 (4.6 %)
10-49 employees	600 (5.5 %)	X Sector unknown	3 (0.03 %)
50-249 employees	85 (0.8 %)	**Population by sex**	
> 250 employees	4 (0.04 %)	Male	82 178 (49.7 %)
Household income by net money income per person	16 822 €	Female	83 080 (50.3 %)
Inflation (national level)	1.0 %	Population education structure (university degree)	24.2 %
Unemployment rate	10.4 %	Participation in regional elections (average of all municipalities; 2012)	55.4 %
GDP per capita	28 835 €	Women elected to regional government (municipalities; 2012)	35.8 %
Average gross monthly wages	2 990 €	**Abandoned buildings**	

Indicator	Figure (2014)	Indicator	Figure (2014)
Commuting to work or school (2013)	16 582 (26.9 %)	Actively inhabited	82 412 (88.5 %)
Employment in economic sectors		Not actively inhabited	10 669 (11.5 %)
Primary production	6.9 %	**Household ownership types**	
Processing	22.2 %	Owned house /flat	55 802 (68.0 %)
Services	69.9 %	Rented house /flat	24 291 (29.6 %)
No. of inhabitants	165 258	Right of residence apartment	312 (0.4 %)
Population by age		Other /unknown	1715 (2.1 %)
0-14	24 219 (14.7 %)	No. of household users (inhabitants)	161 868 (97.9 % of all inhabitants)
15-64	103 417 (62.6 %)	Relative migration balance (between countries)	+437 (2.6 persons /1000 inhabitants)
65+	37 622 (22.8 %)	Number of foreigners	2.3 %
Presence of sources of pollution in the area	Traffic, mining, agriculture, pulp mill, landfills		
Localities with worse ambient air	On average, the air quality is excellent. With difficult weather conditions in winter /spring time the urban air quality can weaken to the level of the Central European urban air quality.		
Sources: Regional Council of North Karelia, Statistics Finland, Finnish Environment Institute, YKR (follow up system of urban sprawl) ; collated by Aila Tahvanainen, RCNK			

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North Savo Finland

Kuopio, Norh Savo, Finland.
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4 North Savo Region, Finland

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SUMMARY

Figure 1. Location of the North Savo Region. Source: maps.google.com).

There are lots of bioeconomy related activities in North Savo Region. The existing natural resources and the structure of businesses enable the sustainable bioeconomy development activities. Regional plans, strategies and reports show several bioeconomy priorities and innovation spearheads such as wood and bioprosessing, primary production and foodstuff, environmental health, biotechnology, energy, water and air and also mineral reserves. The North Savo region and its' bioeconomy has several strengths and opportunities like wide variety of natural resources, food and water safety, clean environment, strong companies and organisations within impact in bioeconomy, strong research and education and also willingness to develop and tradition to cooperate. The North Savo region has also strong bioeconomy education in higher and vocational level. The applicant can study bioeconomy in foodstuff and biotechnology, nature and environment, agriculture, forestry, gardening, rural entrepreneurship including equine studies, institutional catering, biosciences, environmental technology and nourishment. Thus, North Savo region has strong bioeconomy now and in the future.

North Savo SWOT analysis

North Savo SWOT analysis (see figure 1) is based on the hard data indicators (see table 1) and the discussion between the ERDI Savonia team experts.

Strengths	Weaknesses
- Wide variety of natural resources - Several global companies - Highly educated labor for companies - Good possibilites to study - Good research networks - Multidiciplinary economic sectors - Wide range of sports and cultural activities - Advanced information technology - Food and water safety - Good edutational system	- Young people moving away - Unemployed youth and dropouts from society - Poor public transportation - Uneven distribution of the population and services - Lack of professional profile labor for some sectors - Generation changes in companies (retiring process)
Opportunities	**Threats**
- Utilization of natural resources (e.g. blue and green bioeconomy) - Wider research and innovation activities - Growth and internationalization of SMEs - New business setups for youth - Nature and agrotourism - Nature, attitude and culture of local people	- Ageing of the population - Low migration motivation - Climate change - Global market trends (e.g. Russian banes) - Long distances

Figure 1. SWOT analysis for North Savo Region

REGIONAL SCOPE TO BIOECONOMY

What is bioeconomy in North Savo

There are lots of bioeconomy related activities in North Savo Region. The existing natural resources and the structure of businesses enable the sustainable bioeconomy development activities. The main bioeconomy related research areas are wood and metal industry, environmental health research, biotechnology, energy, information technology, agriculture, agrobiotechnology and tourism. North Savo region has also good possibilities for multipolar and self-sufficient energy production due to the local energy resources and entrepreneurship. (Lundgren, Malaska 2014)

The climate program 2025 of Savo region formulates the vision until the year 2025 as follows (Mörsky, Paunola-Ontto-Suuronen 2013, 4):

Savo region is an expert on renewable energy and climate technology. Our strength is in bioenergy knowledge, sustainable use of natural resources and lifestyle which takes the specialties of the area into account. We will conform to climate change by preparing ourselves to the expected changes in weather conditions. We also aim to restrain the climate changes by decreasing the emissions with innovative actions and procedures.

What are the regional goals for development?

The Smart Specialization strategy for North Savo Region includes five different innovation priorities (Figure 2) from which Wood and bioprocessing, Foodstuff with Water and air are closely bioeconomy related. The bioeconomy related development objectives focus on new wood products, production and construction, productivity and production of dairy farming, functional food industry and several Water and air related objectives.

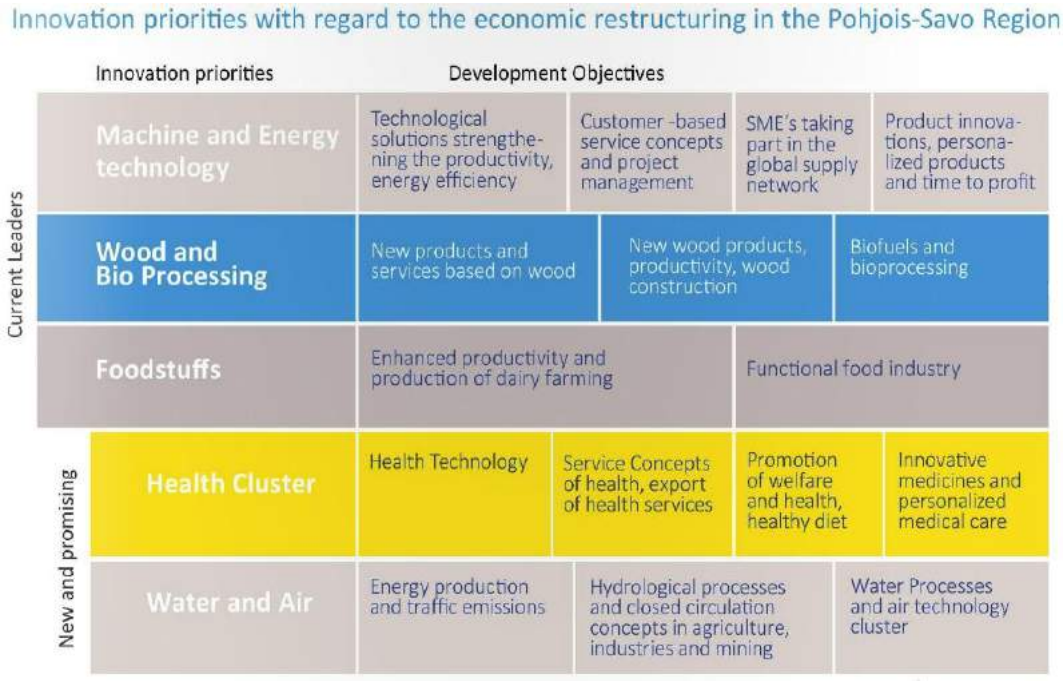

Figure 2. The Smart Specialization strategy of North Savo Region, Finland (North Savo Regional Council 2014)

The North Savo Centre for Economic Development, Transport and the Environment and the North Savo Regional Council have prepared a program for the natural resources economy. The program consists of five innovation spearheads: 1) Wood and bioprocessing, 2) Primary production and foodstuff, 3) Cleaning processes for water and air, 4) Mineral reserves and 5) Energy and branch currents. (North Savo Regional Council 2014)

The bioeconomy experts of North Savo project has listed the following development objectives for bioeconomy (Lundgren, Malaska 2014):

- New ways of utilizing wood as raw material and energy source
- More efficient use of dairy manure
- The recycling and utilization of organic material as energy and basis for biomaterial
- Renewable energy sources for the use of residential areas
- New model for agriculture based businesses
- Increasing the use of renewable energy sources in agriculture
- Enhancing the local food markets

The climate program identifies the following bioeconomy related actions and spearhead projects (Mörsky 2013):

- Wood will be refined to new products and energy
- Non-recyclable waste will be used in energy production
- The use of wind and solar energy, geothermal and air-sourced heating will be advanced
- The energy use of farm and companies will be more effective
- Cleantech cluster will be created
- The renewal of buildings will focus on energy efficiency

Regional strategy and policy in short

The North Savo Regional Council program for the year 2030 presents four lines of action. The Renewal of the economy focuses on forest industry, the competitiveness of machine and energy industry, strong health cluster and food production. The sufficiency and competence of labour includes the education supporting labour markets, the growth of Kuopio area, lengthening the careers, enhancing the migration to the region. The Welfare services and welfare concentrate on the lifestyle and the prevention of area's typical diseases, the co-operation between municipalities, companies and NGO's in providing the health services and building up strong social and healthcare service providers. The functioning and economic structure of municipalities and service providers include attractive and sustainable regional structure, accessibility and good traffic connections and also functionality of the traffic system. (North Savo Regional Council 2014)

REGIONAL SWOT ANALYSIS IN BIOECONOMY

The regional SWOT analysis (see figure 3) is based on the workshop of North Savo region bioeconomy experts held in the city of Kuopio the 4th of December 2016. Finalisation of the SWOT has been done by the ERDI Savonia team.

Strengths	Weaknesses
-Natural resources are close, plenty of biomasses -Clean environment -Diverse know-how environment -Strong livestock economy -Strong companies and organisations within impact in bioeconomy -Willingness to develop and tradition to cooperate	- Logistical challenges due to long distances and farm field structure - Lack of courage and creativity - Actors are incoherent and lack of deeper discussion around bioeconomy - Lack of feasibility study about bioeconomy of the region - Understanding the variety of bioeconomy - Sharing the responsibilities among the actors within bioeconomy sector
Opportunities	**Threats**
- Strong research and education to more efficient use - Digitalization - Internationalization - New bioeconomy opportunities and utilization smart specialization - Growth of the farm size, more space in the country side - Waste utilization and bioprocessing - Development of new products - Climate change	- Implementation of bbureaucracy - Climate change - -Variation in climate competitiveness conditions - Unpredictability of the subsidy policy - Abandonment of the countryside, ageing of farm owners

Figure 3. SWOT analysis for Bioeconomy in North Savo Region

REGIONAL KEY PLAYERS

Who are the key players and what are their roles?

North Savo region has several organisations dealing with bioeconomy. The list of bioeconomy related organisations is in the Table 1.

Table 1. Bioeconomy related organisations in North Savo Region.

Organisation	Main role	Contact
Business sector		
Regional Development Company SavoGrow Ltd.	Regional business policy and development, business counselling, marketing of the region	http://www.savogrow.fi/
Regional Development Company Navitas Ltd.	Regional business policy and development, business counselling, marketing of the region	http://www.navitas.fi/
Valio Ltd	Market leader in all key dairy product groups in Finland and a world class pioneer in the development of innovative products and technologies that increase well-being. Plant in Lapinlahti and jam factory in Suonenjoki	http://www.valio.com

Organisation	Main role	Contact
Co-operative dairy Maitomaa	Processes raw milk into cottage cheese, butter, milk and UHT-products in Suonenjoki	http://maitomaa.fi/
Olvi Ltd	Finnish beverage company that has produced beverages for 136 years in Iisalmi	http://www.olvi.fi
State Forest Enterprise	Provides natural resources sector services to a diverse customer base, from private individuals to major companies. Operations are based on the knowledgeable and co-operative use of state land and water areas.	http://www.metsa.fi
Ponsse Plc	One of the world's leading manufacturers of forest machines. It specialises in the production, sales and maintenance of forest machines designed for the cut-to-length method and in the related information systems.	http://www.ponsse.com
Amec Foster Wheeler	Develops efficient and environment-saving energy solutions for power plant boilers, industrial boilers and their maintenance.	http://www.amecfw.com/
ANDRITZ Oy	A global supplier of evaporation plants and recovery boilers for the pulp industry as well as biomass boilers and gasification plants for energy production	http://www.andritz.com/
Riikinvoima	Municipal citizen waste of Eastern and Central Finland and Kainuu region will be processed to energy, district heat and electricity at Riikinvoima Ekovoimalaitos in Leppävirta. The waste will be utilized in a safe, effective and environmentally friendly way.	http://riikinvoima.fi/briefly-in-english
Finnpulp	Finnpulp Oy is planning to build a world-scale softwood pulp mill in Kuopio.	http://www.finnpulp.fi
Administration		
Regional Council of North Savo	Politically guided, regional municipal coalition for the development and interest supervision in the region. Responsible for regional planning and general coordination of regional development programs related to national and EU structural funds.	http://pohjois-savo.fi
The Centre for Economic Development, Transport and the Environment (ELY)	Responsible for the regional implementation and development tasks of the central government: business and industry, labour force, competence and cultural activities; transport and infrastructure; environment and natural resources	https://www.ely-keskus.fi
The Finnish Forest Centre	State-funded organisation covering the whole country, tasked with promoting forestry and related livelihoods, advising landowners on how to care for and benefit from their forests and the ecosystems therein, collecting and sharing data	http://www.metsakeskus.fi

Organisation	Main role	Contact
	related to Finland's forests and enforcing forestry legislation.	
Education & research		
Savonia University of Applied Sciences	Offer practical, working-life higher education and applied research and development activities for supporting regional development and business.	http://www.savonia.fi
University of Eastern Finland (UEF)	Multidisciplinary academic university with strong emphasis on bioeconomy (e.g. department of Forest Sciences).	http://www.uef.fi
Savo Vocational and Adult College	Provides qualified vocational education in the county of North Savo, e.g. in the field of natural resources.	http://www.sakky.fi
Ylä-Savo Municipal Federation of Education Ylä-Savo, Ylä-Savo Vocational College	Provides qualified vocational education in the county of North Savo, e.g. in the field of natural resources.	http://www.ysao.fi
Natural Resources Institute Finland (Luke)	National research institute providing multi-disciplinary research. Strategy aims for solutions towards the sustainable development of the Finnish bioeconomy and the promotion of new biobased businesses. Also carries out statutory government work as monitoring natural resources, storing genetic resources and producing Finland's official food and natural resource statistics.	http://www.luke.fi
Finnish Environment Institute (SYKE)	State owned research institute and a centre for environmental expertise. SYKE forms part of Finland's national environmental administration.	http://www.syke.fi
Finnish Food Safety Authority	Aim at ensuring food safety, promoting animal health and welfare, and developing the prerequisites for plant and animal production, and plant health.	https://www.evira.fi
The National Institute for Health and Welfare (THL)	A research and development institute under the Finnish Ministry of Social Affairs and Health. THL seeks to serve the broader society in addition to the scientific community, actors in the field and decision-makers in central government and municipalities. The aim is to promote health and welfare in Finland.	https://www.thl.fi/
VTT Technical Research Centre of Finland	Leading research and technology company in the Nordic countries	http://www.vttresearch.com/
GTK The Geological Survey of Finland	Research group specializing in mining environments in Kuopio. An expert in the environmental aspects of mining spoil, the modelling of the drift pattern of water and pollutants, geochemical risk assessments of the soil and sediments and geochemical passive water purification methods	http://en.gtk.fi/

Organisation	Main role	Contact
Finnish meteorological institute	Studies in particular atmospheric fine particles and their effects on climate and health.	http://en.ilmatieteenlaitos.fi/home
Third sector & NGOs		
ProAgria North Savo	A Finnish expert organization providing an extensive network of specialists and a wide range of services to rural entrepreneurs.	https://pohjois-savo.proagria.fi/
Finnish forest owners' associations (MHY)	Interest groups for Finnish forest owners at local level.	http://www.mhy.fi/pohjois-savo

What is the role of educational organisations in the region?

After graduation from primary and second elementary school applicants can study in North Savo area either in vocational schools, university of applied sciences or in academic university. These institutes have totally about 20 000 students. The division between organisations is presented in the table 3.

There are two vocational institutes in North Savo. Savo Vocational and Adult College offers bioeconomy related studies on foodstuff and biotechnology, nature and environment, agriculture, forestry, and gardening. Ylä-Savo Vocational College offers studies in rural entrepreneurship including equine studies and institutional catering. There are two Higher Educational Institutes (HEIS); University of Eastern Finland (UEF) and Savonia University of Applied Sciences. UEF offers bioeconomy related studies in environment, biosciences and forestry. Savonia has agriculture, environmental technology and nourishment in the bioeconomy portfolio.

Competences of the (HEI) graduates today

The competences of the HEI graduates are collected from the bioeconomy related curricula. The competences are divided as general and professional ones. Based on curricula the general competences are learning, ethical, working community, innovation and international competence. The professional bioeconomy related competences mentioned in the curricula are:

- Farm entrepreneurship
- Rural areas as operational environment
- Management of the rural enterprise
- Responsibility in food chain
- Mathematical and science
- Process management and planning
- EHQS (Environment, Health, Quality Safety)
- Environmental production and cost

Expectations for the future experts – businesses' perspectives to educational development

Savonia University of Applied Sciences organised a seminar and workshop for bioeconomy experts as a part of national HEI bioeconomy specialisation studies planning process. The workshop generated the following skills and knowledge of future bioeconomy experts:

- Management and leadership skills of people and networks
- Knowledge on branch currents of milk processing
- Specialised products such as berries, mushrooms and insects
- New ways to utilize wood as a product
- Networking skills
- Understanding and creation of the bioeconomy value chain
- Skills on commercialisation, marketing and funding
- Digitalisation, utilisation of the social media

Savonia and ProAgria North Savo has also performed bioeconomy expert interviews. Based on these events the main educational development issues are:

- Have to agree what is bio economy
- Project leading and networking skills
- Business know-how; new markets, export, marketing
- Profitability, investments and funding
- Understanding customers, cooperation, consumer service
- Digitalisation
- Legislation
- Process-know-how
- Ecological, economic, social and cultural understanding, developing of profitability, functionality, recycling, immaterial values, GreenCare
- Biogas production, biomass use, waste water purification, biogas and liquid fuel production for energy
- Profitable food production and new materials for food, for example insects
- Sorting and separation
- Basic knowledge of excavating, working layer and filter-beds
- Compost stabilising and handling of organic waste.

FACTS AND FIGURES

Table 3. North Savo region facts and figures.

Indicator	Figure (2014)	Indicator	Figure (2014)
Land covered by urbanized areas	1.40 % (285 km^2)	**NACE structure of companies in the region**	17 852 (TOTAL)
Population density	14.8 inhabitants /km2	A Agriculture, forestry, fishery	5935
Population density in urban areas	646 inhabitants /km2	B Mining	83
		C Industry	1 022

Indicator	Figure (2014)	Indicator	Figure (2014)
Households connected to public sewerage systems	?	D Electricity, gas, heating, cooling	54
Energy sources	Renewables 50 %	E Water, sewage, waste & waste water management, environmental cleaning	138
Wood energy	35 %		
Renewable electricity	9 %		
Non-renewable electricity	20 %	F Construction	1 538
Motor oil	5 %	G Retail; motor vehicle repair	2 350
Transportation	14 %	H Transport, logistics and storage	1 081
Peat	7 %		
Fossil oil for heating	4 %	I Accommodation and restaurants	577
Other renewables	4 %		
Heating pumps	2 %	J Information and communication	255
Operating profit of reg. budget	-		
No. of entrepreneurs including farmers	14674	K Funding and insurances	270
		L Real estates	876
No. of entrepreneurs per 1000 inhabitants	59.0	M Professional, Scientific and Technical sectors	1 077
Structure of companies according the number of employees	17199 (TOTAL)	N Administration and management	589
		P Education	129
< 10 employees	16 085	Q Health care and social	913
10-49 employees	967	R Arts, recreation	159
50-249 employees	138	S Other services	804
> 250 employees	9	X Sector unknown	2
Household income by net money income per person	17592	**Population by sex**	
		Male	122775 (49.4 %)
Inflation (national level)	1.0%	Female	125632 (50.6 %)
Unemployment rate	8.6 %	**Population education structure**	
GDP per capita	30 452 €	(university degree)	26.2 %
Average gross monthly wages	3 114 €	Participation in regional elections	55.6 %
Commuting to work or school	23 421		
Employment in economic sectors		Women elected to regional government (municipalities; 2012)	37.9 %
Primary production	3.7 %		

Indicator	Figure (2014)	Indicator	Figure (2014)
Processing	20.7 %	**Abandoned buildings**	
Services	74.6%	Actively inhabited	122453 (89.5 %)
No. of inhabitants	248407	Not actively inhabited	14391 (10.5 %)
Population by age		**Household ownership types**	
0-14	37586	Owned house /flat	81057
15-64	154353	Rented house /flat	37680
65+	56190	Right of residence apartment	932
Number of foreigners	1,8 %		
Relative migration balance (between countries)	581 2.3 persons/ 1000 inhabitants)	Other /unknown	2474
		No. of household users (inhabitants)	243201 (97.9 % of all inhabitants)
Presence of sources of pollution in the area	Traffic, mining, agriculture, pulp mill, landfills		
Localities with worse ambient air	-		
Sources: Regional Council of North Savo, Statistics Finland, Finnish Environment Institute			

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Győr-Moson-Sopron County Hungary

Győr, Hungary
Photo: Thistle Ferret. CC BY-NC-SA 2.0 license.

5 Győr-Moson-Sopron County, Hungary

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SUMMARY

Figure 1. Location of Győr-Moson-Sopron-County. Source: maps.google.com.

Győr-Moson-Sopron county has new opportunities in international cooperation since the borders opened up due to the Schengen treaty. All possibilities are available for building up the biological based bioeconomy, as the agricultural land in the county is above the country average, forested areas are average, and even though the soil properties differ in the region, the yield of the most important cereals are above the country average. The economical possibilities are

strengthening by international cooperation. The location (west part of the country) of the county as well as the ease of border crossing created such processes that investment of large companies in the county is difficult. Lack of well-educated workforce and high percent of international commuters are creating difficulties for the county. The short distance of the borders and the outstanding nature brings tourists form the country as well as from abroad. The opportunities are not fully utilized in the region concerning ecotourism possibilities; therefore, development is required in order to increase the income of the county.

REGIONAL SWOT ANALYSIS FOR GYŐR-MOSON-SOPRON COUNTY

The Regional SWOT analysis of the Győr-Moson-Sopron County has been divided into 7 main spheres:

- geographical, environmental and cultural issues,
- social issues,
- education,
- health issues,
- economic issues,
- infrastructure,
- energy and environment.
-

Strengths		Weaknesses	
Geographical, environmental and cultural issues			
Favourable geographical location (BP-VIE-BRA innovation triangle)	Good, quality soil in the Kisalföld area (alluvial soils)	Southern part of the region is peripheral	Conflict between natural conservation and tourism is still not solved
Valuable natural and world heritage sites, national park, nature conservation areas	Water and subsurface geothermal water is available throughout the county	Southern part of the county ins missing a centre.	The development is concentrated along the national highway.
Social issues			
Increasing population (positive migration balance)	Well educated workforce	Aging index is higher than in other regions of the country	Differences in the educational and required expertise
Very low unemployment rate (compared to the country or EU)	Many possibilities for employment (SME or Multinational companies)	Possibilities for part time work is lower than needed	Internal periphery unemployment rate is higher that the regional
Education			
Quality secondary education	Increasing number of students in the secondary school and in higher education	Educational institutions are concentrated in Győr	Lack of quality IT education

Health issues			
Life time expectancy is higher than the country average	Emergency services are available within 20 minutes	Higher percentage of asthma than country average	Increasing drug usage, high percentage of overweight people
Economic issues			
GDP is above country average	Knowledge-based cooperation between universities and companies	Traditional textile and food industry lost its weight	Weak research and innovation capacity
Percentage of external capital investment is high	Presence of leading automotive companies	Still weak cooperation chains between multinational and local companies	Lack of educated workforce in certain sectors
High number of enterprises	Diverse touristic values (cities, towns natural and cultural world heritage)	Agricultural potentials (bio farming and wine making are behind the possibilities	Profitability of tourism industry is lower than the possibilities
Infrastructure			
Developed rail, highway, waterways in the east-west direction	Developing logistic bases (RO-LA and RO-RO)	Overwhelmed highways, less developed local roads	Number of border crossing points are still limited
Well-developed cycling routes connecting to the international routes	Developing local airport (Győr-Pér)	Background infrastructure for cycling is limited.	Public transport within and out of the region is not sufficient
Energy and environment			
Favourable situation in renewable energy utilization. (water, wind, geothermal, solar, biomass, bioethanol)	International grid is crossing the ragion (electricity line and gas pipelines), which can be used directly.	Research and development on renewables are not sufficient	Lack of regional energetics policy.
Decreasing pollution (noise)	Most significant drinking water base	Increasing air pollution due to transit traffic	Agglomeration areas are building up quickly.

Oppurtunities		Threats	
Geographical, environmental and cultural issues			
Good geographical location in the border of the three countries	Multi-lingual inhabitants near the border	Overwhelming east-west transportation	Secondary role in the Adriatic-Baltic route
Social issues			
High incomes for the people working in Austria	Cross border cooperation's	Incoming migration changes the local values	Aging, emigration from the region

Education			
Development of secondary educational institutions	Strong higher educational institutions with research, development and innovation	Educational institutions are not able to follow the requirements	Practical secondary education for the tradesman falls in quality
Health issues			
Development of further health services for foreigners	Structural reorganization of the hospitals and health services	Parallel health services in the relatively small towns	With internal immigration hospitals will be overcrowded
Economic issues			
Organization of cross border supply chain management	Changing to innovation oriented economy from investment based one	Dependency on western European market and car industry	Dependency on the forint-euro exchange rate
High added value sector development	Cooperation between higher educational institutions and leading multinational companies	Lack of educated workforce withholds investment	Active workforce moves to abroad for higher incomes
Active tourism and wellness is increasing	Health and spa tourism is increasing with stronger low fare flight companies	SME's are unable to develop	Trends in tourism are changing
Infrastructure			
Logistic centres can increase the weight of the region	Internal cohesion increases regional business development	Increasing transit, overwhelmed motorways	EU founds are not utilizes based on the requirements of the region
Road infrastructure can be developed "freely" in the Schengen borders	Increasing willingness for using renewable energies	Investments in renewables are blocked by central government	Relative good economic situation of the region leads to less development founds
Energy and environment			
Revitalization of Szigetköz	Environmental technologies are developed	Increasing pollution due to increasing transit	Nature conservation authorities power weakens against economical needs

Figure 2. Thematic regional SWOT analysis

REGIONAL SCOPE TO BIOECONOMY

What is bioeconomy in our region?

Development of regional bioeconomy has great potentials due to the availability of the various biologically based raw materials. In Győr-Moson-Sopron county forested area of the county is about 20% which is similar to the country average. Forestry in larger areas is in connection to Bakony and Sopron mountain areas, as well as along the rivers flowing across the region. Forest industry is connected to the only forestry higher education Institution University of West Hungary. Agriculture and food processing potentials are based on the 256 thousand hectares agricultural land. Cultivated area is 82% in the region, which is above the country average. The main agricultural plants are winter wheat, corn, sunflower, rapeseed and alfalfa. Average yield in the county is higher than the country average in winter wheat corn and alfalfa (5.2; 8.1 and 6.6 t/ha respectively) and slightly lower in sunflower and rapeseed (2.5 and 3 t/ha respectively).

Waste treatment compared to the country level is more developed, biological wastewater treatment is above 40%, solid waste is recycled and burned, however more than 60% of the solid waste is deposited. A regional waste deposition area is located near Jánossomorja. Energy production in the county is not separated from the national grid. High potentials are utilized in wind energy and biogas plants. Geothermal energy potentials are above the country average; however, electricity production is not possible from geothermal sources. Nature and ecosystem services are developed in Sopron mountains, various forms of ecotourism is available in the region, water related tourism is the Szigetköz is developing rapidly as the water level is normalized after the Bős-Gabcikovo power plant issues. Natural products in the region are based on food and beverage industry. Sopron and Pannonhalma wine regions are well known. Internationally recognized food companies such as CERES, PEZ and Heineken are located in the area.

What are the regional goals for development?

Regional goals for the development concerning bio economy are based on the aims of the county. According to a study concerning regional development in the county four goals appearing in development: to utilize the dynamic and innovative economy, to keep the skilled workforce in the region, to develop the already existing cross-border cooperation's and to utilize and protect the nature protection areas. The goals can be achieved by development of the internal transportation system, intensification of the organizing function of the cities and towns located in the county, and recognizing the potentials in the agricultural and forestry sector in the rural areas.

Regional strategy and policy in short

Regional strategy and policy is created by the county's local government. The policy is diverse according to the sub-regional location. The strategy and policy for the Mosonmagyaróvár sub-region includes development of economical and innovative environment, strengthen the touristic offers, develop public transport in the region and moderate the negative effect of suburbanization. In the centre of the county, the so called Győr sub-region the policy includes aims such as developing infrastructure for transportation, strengthen the economic potential, and develop quality of life in the settlements belonging to the sub-region and development of agglomeration institutions [URL[1]].

REGIONAL SWOT ANALYSIS ON BIOECONOMY

Strengths		Weaknesses	
Large agricultural land for food, feed and industrial raw material production	Long history for forestry and wood industry	Wastewater treatment is smaller villages (southern part of the region) are insufficient	Ageing population in the agricultural sector, technological disadvantages in innovative agriculture
Two higher educational institution dealing with agriculture and forestry	Open borders to Slovakia and Austria, easy access to two capitals	Slow adaption of renewable and energy effective technologies	Income level is well below compared to neighbouring regions causing migration from the region
Nature conservation areas are located in the area for ecotourism	Large potentials in renewable energy (wind, bio-, and geothermal)	Less developed services compared to the neighbouring regions	Complex bioeconomy approach is not reached in the region
Opportunities		Threats	
Skilled workforce, potential for green jobs	Increase the share of renewable energy	Power grid access and storage capacity is not sufficient for development of renewables	Increasing landuse for settlements, and related infrastructure
Good transportation system, international cooperation	Investment potentials in refined agricultural products	Educated people are migrating out from the region	Raw materials are transported out from the region
Eco-, wellness, health and agri- tourism	Automotive industry utilizes bio- based materials	Dependence on international trade, and automotive large companies	

Figure 3. Regional SWOT analysis on bioeconomy

REGIONAL KEY PLAYERS

In the institutional level Győr-Moson-Sopron County Local Government is responsible for the regional development in the county. In the NUTS II level West-Transdanubian Regional Development Agency Nonprofit Limited Liability Company is working on the regional development tasks, however the NUTS II level administrative region mostly is statistical.

Who are the key players and what are their roles?

Bioeconomy key players in the region are the producers of the biological based raw materials, and the industry using their products. In general, the engine of the economy in the county is the automotive industry. More than 80 % of the industrial production is coming from this business.

Rubber, plastics and construction materials industry also plays important role. Large and unique producers are located in the county such as SMR, BOS or UFM.

In the tourism industry domestic tourism is important, the main cities and large towns are interesting destination for both domestic and international tourism.

Food industry can be divided to food and brewery productions. In food production the main key players are in the bakery and pasta production business. “Lipóti” bakery and Ceres Sütőipari Plc, are well known countrywide and recognized in the neighbouring countries as well. Other companies, such as PEZ or HIPP are also located in the region. In the brewery industry Heineken Hungária Sörgyárak Plc is the largest, which is located in Sopron.

What is the role of educational organisations in the region?

Some secondary educational organizations in the region are among the top schools in Hungary. Higher educational institutions are playing important role in bioeconomy. Among others agricultural, food engineering, forestry and various engineering studies are offered within the county. International cooperation between the universities located in the region and foreign institutions creates the possibility for international studies. The demographic situation in the country forecasts less and less students, however the universities offer courses based on corresponding studies or e-learning in order to keep the potential students interested in life-long learning.

Scope of knowledge alliance development

Various small and medium size enterprises are focusing on the local food raw materials. Knowledge alliance and development is crucial for the local companies. Innovative business models are adapted to the region which shortens the supply chain and sells the locally produced goods within the region. On the other hand, regional and bioeconomical approach improvement is still needed, as the potentials in bioeconomy is still not utilized up to its possibilities. Development towards using biological based materials in the plastic industry has already started. Reorganization of the higher educational institutions in the region has led to a notable size university with wide scientific scope, and hopefully this widens the spectrum of the studies offered to the students.

Competences of the (HEI) graduates today

The two major higher educational institutions – University of West Hungary and Széchenyi István University – are closely related to the need of the local education.

University of West Hungary offers studies in forestry (as such the only one in the country), wood science and related studies. Széchenyi István University until the near past was focusing on engineering, economics and law; however regional studies were also available on the Kautz Gyula Faculty of Economics. Faculty of Agriculture and Food Sciences (located in Mosonmagyaróvár) have joined in 1st of January 2016 to the Institution, therefore agricultural and food engineering studies are also available in the region. As AUDI is located in the region high demand for well-educated engineers appears, also plastic industry has developed in the past couple of years. For the bioeconomy agronomists and mechanical engineers required, however agricultural studies seem to be less favourable in the new generations.

Expectations for the future experts - businesses' perspectives to educational development

Expectations for the future experts are twofold in the region. On one hand, local industry needs highly skilled engineers in the automotive industry as well as in the plastic industry. One of the future possibilities would be the development of bioplastic studies and industry in the region. On the other hand, biological raw material production (especially plant production) faces serious problems due to the ageing population. The potentials of plant production is favourable in the region, however skilled operators are missing from the sector. Offered courses and

specializations in the higher educations do not meet the market requirements. Therefore, the educational structure has to be reorganized.

FACTS AND FIGURES

Table 4. Region of Györ-Moson-Sopron County - Facts and figures

Basic facts	
Area [km²]	**4208**
Population	**450.000**
population density	**107**
Number of settlements /total/	**138**
Number of cities	**2**
Number of towns	**10**
Hard Indicators	**Year: 2014**
land covered by urbanized areas	1046.16 (24.86%)
population density	107
population density in urban areas	260
presence of sources of pollution in the area	-
localities with worse ambient air	-
% of households connected to public sewerage systems	88,1
% of different energy sources: /Data is for the whole country/	
% of different energy sources (Primer energy in TJ)	963 384
% of different energy sources (Primer energy, renewables)	86 562
% of different energy sources (Electricity fossil based) million kWh	29 371
Percentage of fossil in Electricity production	35,5
Percentage of nuclear in Electricity production	53,3
Percentage of renewables in Electricity production	10,7
Percentage of other in Electricity production	0,6
operating profit of reg. budget	-
No. of entrepreneurs	77 522
No. of entrepreneurs per 1000 inhabitants	172
NACE structure of companies in the region	-
structure of companies according the number of employees:	
Less than 50 persons	99%
50 – 249 persons	236
250 person and above	50
household income by net money income per person	157 880
inflation	99,8
unemployment rate	3,0
GDP	1836599
GDP per capita	4068

Basic facts	
average gross monthly wages	241039
commuting to work or school (abroad)	13464*
% / person employment in economic sectors	
Primary	42 / 50 325
Secondary	3,2 / 3 831
Tertiary	54,8 / 65 617
employment in economic sectors /Total/	100 / 119 773
no. of inhabitants	450318
relative migration balance (internal in the country)	2744
relative migration balance (international)	932
population by age (0-14 years)	64805
population by age (15-64 years)	311056
population by age (over 65 years)	74457
% of foreigners	1,5
population by sex (male)	217843
population by sex (female)	232475
population education structure (university degree) %	10
% participation in regional elections	-
% of women elected to regional government (authority)	14 % (3 out of 21)
% of abandoned buildings	-
household ownership types	-
no. of household users (inhabitants) per 100 house	237

- : No data available

*: data from 2011

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Nitra region Slovakia

Nitra, Slovakia.
Photo: Ivan Centéš. CC BY-NC-SA 2.0 license.

6 Nitra self-government region, Slovakia

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Miriam Bitterová, Eleonóra Marišová, SLOV-MART Ltd.

SUMMARY

Figure 1. Location of Nitriansky kraj. Source: maps.google.com

Nitra self-government region ("NSK"), stretches on area 6 343 km2, which seize 12,9% of the total area of Slovak republic. It is located in the southern part of Slovakia, bordering with Hungary. The total population of the region counts 684,922 inhabitants in 2015. However, the population has decreased, between 2004 – 2015, population drop by 3,4%. Main reasons are decreasing crude birth rate, interregional emigration to wealthier regions, etc.

Nitra region is considered as rural region. The regional population density is 107.8 people/km^2, almost in line with national level of 112,8 people/km^2 in 2015. However, the total built-up area of the territory of Nitra region stands at 38,3% of the total area of the region, above the national level at 30,7% of the total area.

In terms of economic development, region might be considered as medium developed. Regional GDP per capita was 12,027€ in current prices in 2014, slightly below the national GDP per capita, which stands at 13, 945€ in 2014. However, between the 2004 – 2014, the region made a significant shift in terms of development, regional GDP rose by 59,2%. Unemployment has remained a crucial regional problem. The Current unemployment rate stands at 9,71% in2015, slightly above the national level of unemployment level, at 10,63% in 2015. However, regional employment is distributed very unevenly. In terms of wages, regional average nominal wage was 829€ in 2014, which almost doubled compared to 2004, when it was 440€. However, it is below the national level of 907€ in 2014. Net income of the households also rose, currently it was 384,8€ in average in 2014, slightly above the national average, which stands at 378,4€ in 2014.

The employment structure of the population is diversified. The biggest share of the employees works in the manufacturing sector (29%), followed by the sector of whole and retail sales and other commerce services (14%). Sector of education and accommodation and catering employs both 9% of the workers. Transport and storage services employ 7% of the workers, followed by the healthcare (6%), agriculture and real estate (5%). Other sectors don´t exceed 4% share of workers.

REGIONAL SWOT ANALYSES

Part: Economics	
Strengths:	**Weaknesses:**
- Big companies with financial capital share (Germany, Japan, others...) - Strong position of the industrial and manufacturing sector (machinery, plastics, electrotechnical automotive, others...) - Private companies conducting to R&D, even on the field of the bioeconomy	- Low investment flow FDI comparing to neighbouring regions - Low added value of domestic companies - Weak R&D interconnections between the companies and universities or state research institutions
Opportunities:	**Threats:**
- Attractiveness of the region for new investors - Space for new investments (industrial parks)	- Uneven deployment of investment projects in the region - Low number of small and medium sized enterprises

Part: Natural conditions and geographical location of region	
Strengths:	**Weaknesses:**
- Stock of arable land, geothermal wells, underground water stocks - Proximity of capital region of Bratislava - Neighbouring capital region of Budapest (Hungary)	- Non-adequate used potential of natural resources, renewable resources - Low competitiveness of the Slovak agriculture
Opportunities:	**Threats:**
- Potential for development and use of natural renewable resources of energy, materials, etc...	- Pollution, presence of environmental hazards in region
Part: Infrastructure	
Strengths:	**Weaknesses:**
- High level of transport infrastructure (motorways, high speed railways) - Zones for Industries - High level of energy infrastructure (nuclear power plant – Mochovce)	- Uneven coverage of the region by the high – speed infrastructure - Obsolete and inefficient infrastructure
Opportunities:	**Threats:**
- Potential of use of renewable resources of energy (solar, wind, geothermal, biomass)	- Economic inefficiency and costs of renewable industry investments projects
Part: Human resources	
Strengths:	**Weaknesses:**
- Presence of HEI - Professional and vocational branches of education related to bioeconomy - Presence of university R&D on the field bioeconomics, bioenergy, machinery and natural science - Skilled labour stock	- Weak transfer of knowledges and skills from university to economics - Weak cooperation ties between the universities, enterprises and public research institutions - Brain drainage - High level of low skilled unemployed people
Opportunities:	**Threats:**
- Raising the share of graduate and tertiary level of education - Lifelong learning	- Deepening of brain drainage - Concentration and deconcentration of productive human resources from particular areas of the region

Figure 2. Regional analysis on Nitra region

REGIONAL SCOPE TO BIOECONOMY

Nitra-self-government region ("NSK"), based on its natural potential has generally very favourable conditions for establishing and developing bioeconomy embedded business almost in all sectors of national economics. Long-life history of agriculture, rural nature of the region and plentiful volume of renewable natural resources made from the region good base for natural

sciences, basic, experimental and applied R&D, and evenly enterprising in the sectors related to bioeconomics.

Science and research base of bioeconomy in NSK

Total expenditures on R&D in NSK (2014) was just 0,63% of regional GDP of NSK for 2014. Total volume of expenditures per capita was just 76,8€ in 2014. Main contributors to R&D in NSK is state and private companies. Public institutions (universities, regional research subsidies of ministries, Slovak academy of science) are focusing mainly on basic research and applied research. Public funding of the R&D becomes mainly from national subsidy schemes and European structural funds. State had contributed on R&D in NSK by 35,51% in 2015 from total volume of expenditures, followed by the external sources (European structural funds, others) by 39,43% and rest belongs on private expenditures by 25,06%.

From the point of view of the structure of expenditures for R&D (2015: 88,226,23.00€) prevails agricultural science (50%), followed by technical sciences (30%), social and economic sciences (9%), further 5% counts for biological sciences, 4% for human sciences and just 2% for medical science.

Total number of employees of R&D from all sectors of economy in NSK (2015) was 3,3 researchers per 1000 inhabitants. From the point of view of the structure of scientists applied for R&D (2015: 2934 persons) prevails scientists from the field of agriculture (28%), followed by the technology (27%), economics and sociology (20%), 10% for medicine and biology and 5% for humanology.

REGIONAL KEY PLAYERS

The base of R&D institutions in NSK is concentrated in few places over the region:

- Universities and research institutes – Šaľa, Komárno, Nové Zámky
- Corporate research centers – Levice, Šaľa, Topoľčany, Zlaté Moravce, Nitra, Komárno

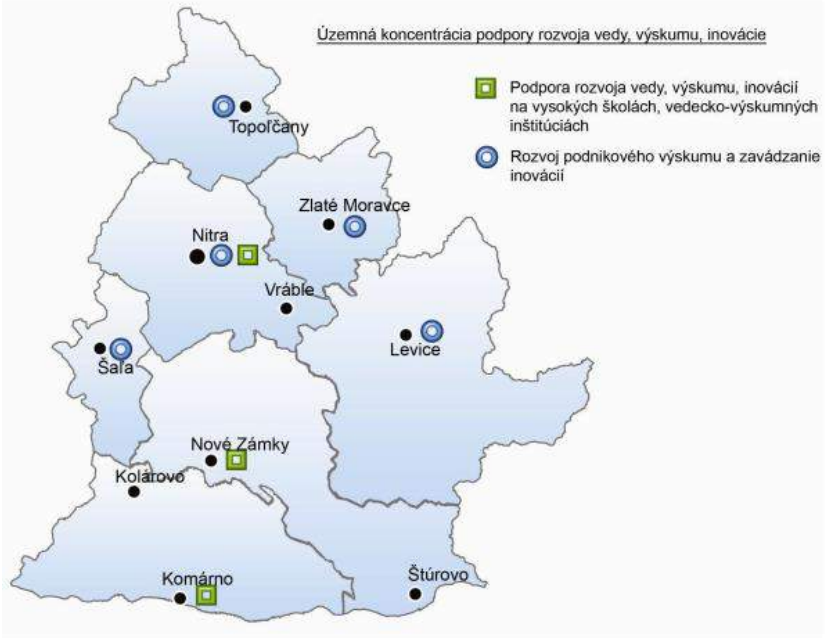

Figure 2. Territorial concentration of R&D in NSK - green square means public institution and blue round means private ones (Regional innovation strategy of NSK, 2012)

Within the territory of NSK, there are these universities:

- Slovak University of Agriculture - SUA (Nitra)
- University of Konstantin the Philosopher –UKF (Nitra)
- University of J. Seye (Komárno)

There are also some subsidiaries of other universities from Slovakia and Hungary. SUA is carrying capacity of education and scientific research in the field of agrobiology, agricultural economics, biotechnology and food resources. Science and innovation potential of above mentioned fields of the domain, recently has been fostered by the establishing international scientific research centre – Agrobiotech as a regional center for experimental, applied research and development in the field of agrobiotechnologies. Research centre "Agrobiotech" has four principal departments:

- Department of agrobiology
- Department of applied ecology and bioenergy
- Department of bioeconomics
- Department of biosystem engineering

Departments and laboratories of Agrobiotech centre are participating in domestic and international scientific and research project such as: 7th framework programme, Horizon 2020 among the best known and others.

University of Konstantin the Philosopher has the contribution to the natural sciences via the Faculty of Natural Sciences. An applied research unit within the faculty is a gemological laboratory interested on research of valuable minerals and metals.

University of J. Seye due to its relatively short history, did not yet join to experimental or applied research.

Beside the universities in NSK there are three main research institutes:

- Archeological Institute of Slovak Academy of Sciences
- Institute of Plant Genetics and Biotechnology
- Institute of Landscape Ecology

Institute of Plant Genetics and Biotechnology is devoted to actual topics of plant genetics and biotechnology. The Institute is specialized in the field of dendrology and functional plant genomics.

Institute of Landscape Ecology is focusing on the field ecology and landscape ecology. Basic landscape ecological research is devoted to environmental assessment of the territory, biotopes mapping and biomonitoring.

Table 1. Privat research institutes in the Nitrianský region:

Institution	Seat	Field of research
VUSAPL, plc.	Nitra	research in the field of technical sciences, namely, manufacturing of tools and machinery
Institute of renewable resources and energy, ltd.	Komárno	international research and development in the field of renewable resources of energy
BEL/NOVAMANN ltd.	Nové Zámky	devoted to testing products of the food industry, agriculture and drugs for medical purposes
Duslo, plc. (Šaľa)	Šaľa	company devoted to industrial research and development in the field of the organic and inorganic chemistry, rubber industry and others
SES, plc.	Tlmače	devoted to manufacturing and delivery of the generators for coal, oil, gas and biomass combustion based on energy efficiency and environmental sustainability
VÚEZ, plc.	Levice	focusing on experimental research in the field of thermal, mechanical, hydrostatical, acoustical and ecological features of constructions

Beside of the above mentioned private companies, there are also other companies focusing on other spheres of the research and development, mainly in the field of the automotive, electro-technical industry and machinery.

Other infrastructure of R&D institutions in NSK

In NSK there are also the clusters, like as purposeful associations of the companies.

Slovak Plastic Cluster (SPK) – cluster including cca 40 companies operating in the field of plastic design for industrial purposes.

Cluster Union of Slovakia (ÚKS) – already including 8 different clusters on a national level. Coordinates cooperation with high schools, technology and innovation transfer, international networking and others.

Natural places for performing R&D tasks of the companies are special delimited industrial zones, so called "industrial parks". In NSK there are several industrial zones located in five among seven districts.

Table 2. List of industrial parks located in NSK

District	Locality	Area total (ha)
Nitra	Nitra	80
	Čab	3
	Vráble	20
Levice	Levice	101
Šaľa	Diakovce	8,29
	Vlčany	5
Nové Zámky	Palárikovo	14,13
Komárno	Nesvady	17,87

Source: Self elaboration, http://www.priemyselneparkyslovenska.sk/sk/, 2016

Centers of excellence

Centers of excellence are high-tech centers focusing on R&D at international level. In most cases, there are only public ones.

Laboratory breeding, genetics and computational research of animal genetic resources (LAGEZ) - enhancing of capacities in the field of breeding of the livestock, regarding the animal welfare.

Centers of excellence of plant protection and agrobiodiversity usage (ECOVA) - research focusing on maintaining and use of biodiversity regarding the food security and organic production.

Regional strategy and policy for programming period 2014 – 2020

The global goal of the strategy focuses on increasing the competitiveness of the NSK in common European space, through promotion of sustainable growth of the economy, fostering the environment protection and raising living conditions of its citizens. Global goal of the strategy is subsequently splited into five partial areas.

Regional goals for the development

Table 3. Sector-regional goals in the Nitrianský region

I. Economics	Long run stable economic development based on diversified structure with the dominance high added value sectors using endogenous potential of the region.
II. Human resources	Long run balanced of the education level, accompanied by the employment growth regarding the marginalized social groups. Increasing the quality and availability of provided social services and healthcare.
III. Agriculture and rural development	Competitive agricultural and food sector based on the synergy of various types and forms of agricultural and food enterprises, providing innovative background for the countryside, contributing to employment growth and rural development
IV. Infrastructure	
Modernization and increasing of the security of the transport infrastructure within the European trans-network transport system. Improving of the accessibility of the municipalities, especially in rural areas. Building and modernization of informational and energetic infrastructure within the region	
V. Environment	
Sustainable development of the region via mitigation of negative effects on the environment, through the constructing and development of environmental infrastructure and enhancing of the environmental awareness among its citizens	

Education structure of Nitra self-government region

In education structure of the Nitra region dominates upper medium education level. The share of citizens with the basic education level (18%), apprenticeship education without GCE (16%), secondary vocational education without GCE (11%) makes total 45% of the total citizens. The share of citizens with full secondary vocational education with GCE (3%) and citizens with full secondary professional education with GCE (21%), citizens with general vocational education (5%) makes 29% of the total citizens. The share of citizens with university and higher degree represents 11,9%. In terms of educational structure of the university graduates dominate the social sciences (economics, law, sociology, psychology and pedagogy, others...) at 51% share. The share of technical sciences is 22% (metallurgy, machinery, chemistry, informatics, plastics and construction, others...). Agriculture and forestry represent a 12% share of graduates, 6% become for horticulture and landscape engineering and 4% become to natural sciences. Other sciences (military, culture and arts) don´t exceed 3% share. Approximately 13,9% of citizens are currently studying and 2,4% citizens were unable to detect their education level.

The Europe 2020 strategy highlights the key role of innovation in contributing to smart, sustainable and inclusive growth. Regions are important sites for innovation because of the opportunities they provide for interaction between businesses, public authorities and civil societies. This role has been highlighted in the agenda adopted by the Commission in September 2011 for the modernization of Europe's higher education systems. To answer the question „Why the universities are so important for the region? ", the national strategy of education has to take into account the contributions that universities can make: This can be broken down into four areas – business innovation which is closely linked, although not exclusively, to the research function of the university, human capital development linked to the teaching function and community development linked to the public service role of universities. The fourth area is the contribution of the university to the institutional capacity of the region through engagement of its management and members in local civil society. These are the four areas covered in the OECD reviews of the universities and regions. Where these four domains are integrated, the university can be seen to be occupying a "proactive" and not just "passive" role in the regional development process. (Connecting Universities to Regional Growth, 2011)

Slovak Republic, in order to meet The Europe 2020 strategy, adopted the Research and Innovation Strategy for Smart Specialization of the Slovak Republic (RIS 3). The Ministry of Economy in cooperation with the Ministry of Education, Science, Research and Sport prepared, as indicated above, research and innovation strategy for smart specialization SR (RIS3), approved by the Government at its meeting on 13. 11. 2013 Resolution no. 665/2013. In the creation RIS3 participated: the Government Office, representatives of business, academic and research sectors. RIS3 Framework represents a fundamental strategic document to support research and innovation in the next programming period 2014-2020 and is the basis for the development of operational programs. It is a key document, which focuses on sustainable economic growth and increased employment in Slovakia through targeted support of research and innovation and to achieve critical mass in each strategic priority while taking account of regional differences. (Research and Innovation Strategy for Smart Specialization of the Slovak Republic. 2013)

Scope of knowledge alliance development

The fact that the proportion of the biomass use in energy production in the agricultural sector in Slovakia was nearly negligible, has led the Slovak University of Agriculture (SUA) in Nitra to start dealing with the issues of renewable energy sources (RES). In 1995 the small group of scientists of SUA joined the preparation of a new international research project *Biogas-Technology for Regenerative Energy Supply in Eastern Europe* (Bulgaria, Slovakia, Ukraine) which was submitted and approved within the EU programme INCO-COPERNICUS under the registration number EU Joint Research Project – Inco-Copernicus N°. PL 962023 Regenerate. It has been intended as a demonstration facility to fulfil research and educational purposes.

The Biogas plant in Kolíňany was designed to process manure from 80 live-stock units and to a consequent cogenerative production of heat (45 kW_t) and electric power (22 kW_e) from the produced biogas. Although the Biogas plant in Kolíňany is operated on pure cattle manure, in frame of another international project the Slovak Agricultural University has started explorations of efficiency of various substrate types. The project is also a EU 5th Frame Programme project, entitled *Advanced prediction, monitoring and controlling of anaerobic digestion processes behaviour towards Biogas usage in Fuel Cells* (N°. NNE5-2001-00067). For its purposes, there was installed a pilot 5 m^3 fermenter at the Biogas plant and consequently three types of substrates will be used in it:

40 % cattle manure + 60 % energy plants,

40 % cattle manure + 60 % biological kitchen stuff,

40 % cattle manure + 60 % biological agricultural wastage (vegetable scraps, useless silage, etc.).

Figure 3. General view on the Biogas plant Kolíňany

Dry fermentation is a series of processes in which micro-organisms break down biodegradable material in the absence of oxygen. This dry fermentation process utilises renewable sources as a feedstock to produce a methane and carbon dioxide rich biogas suitable for energy production. The nutrient-rich solids left after digestion can be used as a fertiliser and compost. Almost any organic material can be processed with dry fermentation. This includes biodegradable waste materials such as waste paper, grass clippings, leftover food, sewage and animal waste. Anaerobic digestion has been manipulated by man for many years to treat sewage sludge (Hamzawi et al., 1998). Before anaerobic digestion, the organic material in the sludge also automatically decay due to the biological activities of the extensive existence of microorganisms in the sludge, producing offensive, odorous and reduced end products such as fatty acids, mercaptans and amines. After anaerobic digestion, the digestate consists of an odor free residue with appearance similar to peat. Methane produced by the anaerobic digestion process is a clean, carbon dioxide (CO_2) neutral and renewable energy that can be used to produce heat and electricity.

Furthermore, anaerobic digestion seems to be a very cost-effective method that makes it possible for sewage sludge to use farmland as a safe and permanent outlet destination with positive effect, i.e. the digestate, which has retained plant nutrients such as nitrogen (N) and phosphorus (P), can be recycled as fertilizer and soil conditioner back to the farmland and thus keeps these natural nutrients recycled within a closed loop ecosystem, and remains or improves the soil structure.

To testing suitability of various biomasses for dry fermentation purposes experimental equipment was designed by research workers of the Department of Regional BioEnergy at the Slovak University of Agriculture in Nitra.

The experiment was carried out from 10. 10. to 27. 10. 2013, i.e. its duration was 18 days. The tested substrate consists of 6 kg sorghum silage and 13 kg straw cattle manure from the previous cycle. Basic parameters of the used sorghum silage were: dry matter content 32.6 %, pH value 8.174. Percolate for biomass wetting was taken off from the biogas plant fermenter in volume of 10 litres and its parameters were: dry matter content 6.2 %, pH value 7.4, temperature 39.5° C. During the whole running of the experiment, mainly the biogas production ($l.h^{-1}$) and biogas composition were assessed.

“Dry” fermentation technology uses numerous waste streams, such as municipal solid waste and industrial food processing waste. In this way eliminates the need for movement of input and the addition of liquid. “Dry” fermentation technology has specific advantages over “wet” fermentation systems in many situations and provides customers with increased flexibility and profitability.

Expectations for the future experts – businesses perspectives to educational development

Survey in Nitra region business network:

Nitra region business network representatives met for the third time in first year of the ERDI project implementation for a specific reason - what to expect from university graduates. Initial discussions were marked by a clear theme - EU education and its pros and cons. The re-evaluation was that the current generation of university graduates is not as well prepared for the job (job or small trade business) as it would be desirable given the current practice and requirements of individual sectors. The aim of the evaluation of experiences with graduates is to set the expectations of the employers relating to educational profile of HEIs graduates to avoid major problems in practical life and suitable employment without undue fumbling and mistakes.

The advantages of university graduates, due to their education, were highlighted positively. Most good language training - English + another foreign language. Another example of graduates are solid computer skills. The theoretical technical training in the field of agriculture, food, forestry, the use of all types of bio-energy, rehabilitating troubled ecosystems, landscape architecture, agro-tourism, water management, recycling of raw materials, nature and quantity of similar activities that can be included in the bio-economy, was also on a track level. However, the graduates were not able to link the important work processes and habits to achieve their independence at work. Good overall adaptability and flexibility was shown, especially for those graduates who have already had some practical experience during studies

Given that university graduates want to work in position of middle management. They run into difficulties. The most repeated cons of hiring fresh graduates in the Nitra regional network of businesses meeting were - incomplete economic and planning skills, unsatisfactory and often poor personal and communication skills of managing people. In terms of technical and professional skills accusation was mostly a poor practical training so they need to spend a lot of time (sometimes years) with the incorporation of the necessary positions.

The employer expects of graduates as well as from schools in the first place such employees or business professionals (traders, etc.) who will be independent, hardworking, flexible, technically advanced for practical and theoretical site with good computer, economic-planning and language skills. Many business representatives also call for better preparedness in project management especially in terms of the use of challenges, projects and subsidy policy.

The main focus was that the HEIs must during studies provide appropriate practical examples and practices in selected educational establishments and institutions and allow students at least a few weeks per academic year under the guidance of experienced teachers directly in selected businesses. This way the students can try manuals, professional and technical work, design and partly also the supervising position.

Table 4. List of companies involved in the survey

Company	Address	Represented by
AGROMART	919 33 Trakovice č. d. 1	Ing. Marta Galgóciová
AGROBIOP	Žilinská cesta 626/60, 921 01 Piešťany	Ing. Karolína Demovičová
HYDROMART	919 33 Trakovice č. d. 1	Ing. Miroslav Šoky
Alternative Energy, s.r.o.	ul. SNP 157/29 956 18 Bošany	Ing. Dominika Filkornová
EMART, s.r.o.	919 33 Trakovice č. d. 1	Bc. Marek Holík

FACTS AND FIGURES

Table 5. Nitriansky region facts and figures.

Indicator	Figure (2014)	Indicator	Figure (2014)
Land covered by urbanized areas	38,3% (2410 km^2)	**NACE structure of companies in the region**	156 625 (TOTAL)
Population density	107,8 inhabitants /km^2	A Agriculture, forestry, fishery	7461 (5%)
Population density in urban areas	17799 inhabitants /km^2 (year 2015)	B Mining	90 (0.0005 %)
Households connected to public sewerage systems	90.6 % (2014)	C Industry	45 108 (29.8%)
Energy sources (SLOVKIA)		D Electricity, gas, heating, cooling	2965 (1.9 %)
Nuclear energy	57 %	E Water, sewage, waste & waste water management, environmental cleaning	3001 (3 %)
Hydropower	17 %	F Construction	7905 (5 %)
		G Retail; motor vehicle repair	21 479 (14 %)
Thermal energy	13 %	H Transport, logistics and storage	10 742(6.8 %)
Photovoltaic power	1%	I Accommodation and restaurants	1845 (1.1%)
		J Information and communication	1947 (1.2 %)
		K Funding and insurances	1526 (0.9 %)
Others (coal, gas, etc.)	12%	L Real estates	1878(1.1 %)
		M Professional, Scientific and Technical sectors	4603 (2.9 %)
Reg. budget balance	+7,594,423.10€ (2014)	N Administration and management	6143 (3.9 %)
No. of entrepreneurs (including farmers; 2015)	22 691	P Education	13327 (8.5 %)
No. of entrepreneurs per 1000 inhabitants (2015)	33.13	Q Health care and social	10030 (6.4 %)
Structure of companies according the number of employees (2015)	21154 (TOTAL)	R Arts, recreation	1948 (1.2 %)
n.a.	8 900 (42 %)	S Other services	1275 (0.8%)
0-49 employees	11852 (56 %)	O Public administration and defence	13 327 (8.5 %)
50-249 employees	340 (2 %)	**Population by sex**	
> 250 employees	6 (0.002 %)	Male	332 789(48.5 %)
Net Income of households	384 €	Female	351 233 (51.5 %)
Inflation (national level)	1.0 %	Population education structure (university degree)	11,9 %
Unemployment rate	9,71 %	Participation in regional elections (average of all municipalities; 2013)	17,91 %
GDP per capita	12 027 €	Women elected to regional government (municipalities; 2013)	11.5 %
Average gross monthly wages	829 €	**Abandoned buildings**	

Indicator	Figure (2014)	Indicator	Figure (2014)
Commuting to work or school (2011)	75 191 (21.9 %)	Actively inhabited	263 658 (87.8 %)
Employment in economic sectors (2014)		Not actively inhabited	30 844 (12.2 %)
Primary production	4.7 %	**Household ownership types**	
Processing	37.6 %	Owned house /flat	199 123 (86.0 %)
Services	57.5 %	Rented house /flat	4 630 (2%)
No. of actively working people	156 625	Cooperative	9 261 (4%)
Population by age		Other /unknown	18 515 (8 %)
0-14	91 359 (13.3 %)	No. of household users (inhabitants)	N/A
15-64	486 639 (71.1 %)	Crude migration balance (in promile)	-0.658 (2014)
65+	105 923 (15.6 %)	Number of foreigners	N/A
Presence of sources of pollution in the area	Traffic, agriculture, industry, landfills		
Localities with worse ambient air	On average, the environment is moderately strong encumbered. Most serious is an air pollution due to the presence of heavy industry and chemistry, also rivers are polluted. Agriculture land is also polluted due to intensive land cultivation.		
Sources: Slovak statistical office of Slovkia, www.susr.sk , Datacube, www.datacube.statistics.sk			

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Pardubice region, the Czech Republic

Meadow near Kladina, Pardubice Region
Photo: Klára Scholleová. CC BY-NC-SA 2.0 license.

7 Pardubice region, the Czech Republic

Martin Maštálka[1], **University of Pardubice**

SUMMARY

Figure 1. Location of Pardubický kraj. Source: maps.google.com

[1] *The author wishes to recognize the contribution of Zdeněk Matěja, Jan Mandys and Ivana Kraftová, from University of Pardubice and Kateřina Korejtková from the Local Action Group MAS Železnohorský region, who organized a surveys and meetings which produced information very useful for the preparation of this chapter.*

Area:	4.519 km^2
Population:	516.000 inhabitants
Population density:	114 inhabitants per km^2
Number of municipalities:	451, among these, there are 15 municipalities with extended powers and 26 municipalities with a delegated municipal office. There are 34 municipalities that are classified as towns
Capital of the Region:	Pardubice

The economy of the Region is based on industry and on commercial and public services. The structure of industrial production is different. General engineering is the strongest industry in the Region, followed by textiles, clothing and leather processing. No other Czech region has such a large chemical industry. The agricultural sector is also important. The total area of the region consists of agricultural land 60,75 %, forests 29 %, and water 1.35 %. Tourism sector is being recently actively developed too.

The economic prosperity of the Region is also influenced by the fact that the main European railway corridor runs through it and leads to Bratislava, Vienna, Budapest, Berlin and Hamburg. Air and river transport are also available. (Pardubický kraj, 2011)

In the Czech Republic, the region is set as a geographically defined community of citizens that has the right to self-government. It owns assets and has incomes stipulated by law and manages resources in terms stipulated by law. The region acts in its own name in legal relations and bears the responsibility which results from the given relations.

The region administers its matters independently. In case the region is entrusted by performance of state administration, regional bodies perform it as their delegated power.

The region is not subordinated to the governmental authorities in the area of independent competence. In carrying out its self-government, the region is bound only by the legal order, not by internal acts of the State. The State interference is possible only in case of break of constitutionality and legality.

Independent competence of the region is stipulated by the Act on Regions. Competencies of the region pursuant to the Act:

- management of the region,
- budget and final account of the region,
- legal entities of the region and organizational bodies of the region and participation of a region in legal entities,

- personnel and material expenses on operation of the regional office and special bodies of region, organization, management, personnel and material arrangement of a regional office,
- issuing generally binding regulations,
- submitting Bills to the Chamber of Deputies in compliance with law,
- submitting proposals to the Constitutional Court for the repeal of legislation if it is believed that such legislation is in contrary to the law,
- program of regional development,
- approval of planning and zoning documents for the territory of the region and publishing the binding parts thereof as regional legislation,
- cooperation with other regions, participation in cohesion regions,
- stipulation of the extent of basic transport services in the region,
- strategy of development of tourism industry,
- imposition of penalties in independent competence etc.

On the basis of special laws belong to independent competence of the region.

- strategy of care of historical monuments,
- preparation for emergency situations, participation in conduct of crisis situations,
- organizing secondary schools, technical training institutions and other types of schools,
- regional institutions of social care,
- establishment of healthcare institutions,
- strategy of waste management of the region,
- participation in proceedings and the environment impact assessment, elaboration of strategies for protection of nature, air, etc.

On the basis of special laws belong to delegated competence of the region:

- appellate proceeding in the first instance,
- control of performance of the state administration by municipal bodies and methodical assistance to municipalities,
- review of management of municipalities, if the municipality requires it,
- performance of supervision over legality in the state administration and self-government of municipalities,
- permissions to special use of roads of II. and III. Category,
- performance of state care for historical monuments,
- brokering of adoptions and foster care,
- decision-making on categorization of forests,
- decision-making in the area of hunting, giving permission to hunting, fishing, creation of fishing districts
- leading and elaboration of waste register, approving treatment eith hazardous substances,
- performance in the area of protection of nature, air, agricultural land resources,
- performance of the agenda of regional trade licensing offices etc. (Pardubický kraj, 2011).

Just like the other regions in the Czech Republic, the Pardubicky region is an industrial area. The regional GDP per capita is under the national average. The economy of the region is based on the secondary sector (industry, civil engineering). This was the sector where many large companies invested during last years. Together with industrial sector have grown the tertian

sector. Despite the very fertile soil in the Elbe-lowland the importance of the primary sector (agriculture, foresting and fishing) is decreasing.

The manufacturing industry, trade and conveyance are the main leader in the regional development. The manufacturing industry is focused to mechanical engineering, electrical engineering, chemistry and automotive industry. In compliance of the national development strategies, there is a significant growth of private RD companies or divisions which are supported by the only university in the region – University of Pardubice.

Although the world economic crises at the end of the first decade of the 3rd millennium affected also the Pardubicky region there is very good economic growth in the region nowadays. There is good potential for the further regional growth in RD sector and in the connection of the region to the national highway system

The Pardubicky region is very rich in the environmental sources and historical heritage. Despite this fact the region is not very successful in attracting visitors and is losing in competition to the neighbor regions. But the investment into this area and public support helps to improve the situation in the sector. There is improving offer of the accommodation capacities, increasing number tourist products and events that are able to to attract people outside the main tourist attractions.

The environment of the region is very varied and affected by the location of large industrial production, historical development and activities in agriculture. The location of the chemical industry and energetics in the area around the region capital Pardubice was the cause of the worse environmental situation. Historical development of the region and structural changes in the regional economy have caused the raise of the brownfield localities also in the centers of cities. The overall situation of the environment in regional is very good (outside the city of Pardubice).

REGIONAL SWOT ANALYSIS

Regional SWOT analysis is divided into four main areas: Society, Economy, Environment and space. Within each area there have been identified main strengthens, weaknesses opportunities and threats.

Society

Strengths	Weaknesses
- increasing number of inhabitants in most parts of the region, - agglomeration effects in the regional settlement agglomeration of Pardubice-Hradec Králové, - low level of crimes, - developing university (university of Pardubice), - low level of mortality (comp. to national average), - sufficient capacity of the health care facilities,	- deep regional disparities in age distribution of the population, - decreasing number of inhabitants in peripheral regions, - low level of high-educated inhabitants, - low salary level, - uneven spatial distribution of the health care services in peripheral regions, - deep regional disparities in the unemployment rate, - low number of pupils in technical high schools, - low offer of sport facilities,

- good accessibility to the capital (western part of the region), - national heritage (cultural monuments, UNESCO site, UNESCO event), - significant sport events in Pardubice, - sport-active inhabitants.	- low investment into the social infrastructure.
Opportunities	Threats
- EU funds, - cross-border cooperation with Poland.	- changes of legislation of social services, - raising unemployment (another global economy crises…), - decreasing number of doctor (emigration), - low support for sport on the state-level.

Economy

Strengths	Weaknesses
- attractiveness for foreign investors, - stabile and diversified industry base, - export-oriented regional economy, - availability of development spaces, - increasing number of entrepreneurs, - international railway corridors, - integrated regional transportation system, - fast development of IT and CT, - developing network of cycling paths as a safe alternative for commuting, - international airport in Pardubice, - development of R&D activities and infrastructure.	- uneven regional development (west-east gradient), - low entrepreneurs-activity, - low offer of touristic atractivities on national and international level, - low number of tourists, - no highways, - low quality of local roads, - low accessibility of peripheral regions, - temporary decreasing number of customer of the Pardubice airport, - low usage of brownfield-sites, - low employment in the service sector.
Opportunities	Threats
- investment into the technologies with higher added value, - strengthened linkages between science and practice, - increasing tourism, - increasing demand for Pardubice airport, - interest in traditional regional sport events (Velká Pardubická steeplechase, Zlatá přilba), - connection to built highways, - EU support for R&D, - EU support for traffic infrastructure.	- relocation of foreign investment, - postpone development of highway and railway networks, - successful development of competing airports, - another economic crises.

Environment

Strengths	Weaknesses
- high quality of environment in southern, eastern and northern parts of the region, - ample water sources, - good air quality in most parts of the region, - the Spa of Lázně Bohdaneč, - good passports of brownfield localities, - good access to public water supply (95,9% of inhabitants), - good coverage of the natural-gas supply for households, - regional self-sufficiency, - different raw materials, - high level of separated waste management, - integrated rescue service.	- landscape by the Labe river damaged by the intensive agriculture and industry, - pure air quality in the city of Pardubice, - low biodiversity in some areas, - low number of households connected to the waste-water treatment plants, - high level of garbage deposit in landfills, - low forest coverage (comp. to national average), - low share of environmental protected areas (comp. to national average).
Opportunities	**Threats**
- national support for landscape revitalization and rehabilitation, - EU support for infrastructure improvement (waste-water treatment plants, flood protection...), - international directive forcing further improvement and increasing efficiency of coil power plants, - national financial support for re-cultivation of landscape damaged by the human activities, - waste-recycling and efficient waste-use.	- no respect for the sustainable development in the legislation and economic environment of the Czech Republic, - un-coordinated intensive development in the agglomeration Pardubice-Hradec Králové (transport, suburbanization), - no regulation tools for greenfields development, - worse weather conditions (warming, floods, windstorms...), - landscape changes in case of building the Donau-Oder-Elbe channel.

Space

Strengths	Weaknesses
- good geographic location and intersection of important traffic directions, - regional spatial development plan, - wide range of concept development documents, - good relations to other regions, - high level of regional cooperation, high number of regional settlements ´ alliances, - very good regional integrated rescue system, - core agglomeration of Pardubice-Hradec Králové (cca 300 thousand inhabitants), - efficient usage of EU funds.	- high number of small villages (comp. to national average), - low level of accessibility to public services in peripheral regions, - low levels of some indicators comparing to national level (dwelling activity, entrepreneurs' activity...), - no success in support of economic activities in peripheral regions, - peripheral regions still influenced by the historical development (Sudeten – WWII).

Opportunities	Threats
- legislation reinforcement of regional bodies, - joining of strategic and spatial planning, - harmonization of national and regional aims and goals, - possible focus of the regional policy to settlements, - better support for underdeveloped regions from national and EU level, - strengthen of the role of LAC in the development of rural areas.	- decreasing support for the NUTS II region, - aims and goals inconsistency on the regional and national level, - Regional development plans occurred by unqualified external subjects.

Figure 1. Regional thematic SWOT analyse

REGIONAL SCOPE TO BIOECONOMY

What is bioeconomy in our region?

As it is mentioned in the other chapters, there is not the overall definition of the bioeconomy. The European Commission defines the bioeconomy as "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. Its sectors and industries have strong innovation potential due to their use of a wide range of sciences, enabling and industrial technologies, along with local and tacit knowledge." (European Commission, 2012). The Swedish research council for sustainable development have created a little bit wider definition: "A sustainable production of biomass to enable increased use within a number of different sectors of society. The objective is to reduce climate effects and the use of fossil-based raw materials. An increased added value for biomass materials, concomitant with a reduction in energy consumption and recovery of nutrients and energy as additional end products. The objective is to optimize the value and contribution of ecosystem services to the economy." (Skogs Industrierna, 2016)

For the purpose of this study there have been used the mix of several definitions: "Bioeconomy is a sustainable production of the goods regarding the needs of contemporary and future generations and minimizing negative impacts for the environment and society." This means that the bioeconomy is not only about the environmental-friendly production, sources protection, climate mitigation etc. but also about the regional embeddedness and regional social and economic relations.

What are the regional goals for development?

There have been established main regional aims on the basis of the regional data and thematic SWOT analysis. They are divided into four main groups. All of these groups are deeply specified In the Regional Development Strategy.

Table 1. Regional strategic goals of the Pardubický region

A.	High Quality Human Sources
	- improving conditions for the inhabitants´ life-cycle education and improving their employment, - good quality health and social services available for all inhabitants, - increase offer of organized and un-organized leisure time activities.
B.	Competitive Economy
	- achieve the GDP increase over national average, - strengthen R&D potential in the region and increase economic efficiency of the region, - efficient utilization of the regional potential of the development of sustainable tourism, - strengthen the utilization of regional geography, - guarantee transport services in all the region.
C.	Healthy Environment
	- guarantee sustainable spatial development and keep the traditional landscape in selected regions, - connect peripheral regions to the basic technical infrastructural and development of the complex water-treatment, - protect and increase quality of all components of the regional environment (especially in deprived parts of the region), - efficient inhabitants´ protection in case of extraordinary events and critical situations.
D.	Coordinated Regional Spatial Development
	- to coordinate development of the regional settlement´s system, decrease regional disparities by strengthening underdeveloped regions, - decrease regional socio-demographic disparities within the region, - encourage the partnership of the regional stakeholders and utilization of local potential for the sustainable development of the region, - more efficient drawing of subsidies.

Regional SWOT Analysis on Bioeconomy

Strengths	Weaknesses
- fertile soil in the western part of the region, - good local networks led by local action groups, - traditional social life in the countryside, - potential in the renewable energy, - knowledge about the potential climate changes - skilled workforce - good railway connection to the capital and to Europe-wide	- landscape by the labe river damaged by the intensive agriculture and industry, - low biodiversity in some areas, - high level of garbage deposit in landfills, - low forest coverage (comp. to national average), - economy focused to industry
Opportunities	**Threats**
- national support for landscape revitalization and rehabilitation, - EU support for infrastructure improvement (waste-water treatment plants, flood protection...),	- un-coordinated intensive development in the agglomeration Pardubice-Hradec Králové (transport, suburbanization), - no regulation tools for greenfields development,

- national financial support for re-cultivation of landscape damaged by the human activities, - waste-recycling and efficient waste-use - automotive industry utilizes bio based materials	- climate change - worse weather conditions (warming, floods, windstorms...), - emigration of the high educated people from the region - workforce structure that do not fulfill needs of the region

Figure 2. Regional SWOT analyse on Bioeconomy

REGIONAL KEY PLAYERS

The Pardubický region is responsible for the regional development on the institutional level. It si part of the NUTSII Severovýchod (Notrh-east) and therefore it cooperates on this level with two other regions – Liberecký and Královéhradecký.

The area by the regional capital Pardubice is a part of the wider agglomeration Hradec Králové Pardubice which is one of the main development areas in the Czech Republic with more than 300 thousand inhabitants. Therefore the wider regional cross-borders cooperation is necessary.

What is the role of educational organisations in the region?

The University of Pardubice is the only university in the region. It is now one of 26 public higher education institutions in the Czech Republic. As far as the number of students is concerned, the University belongs with ten thousand students to the middle-sized universities in the Czech Republic.

The University consists of seven faculties.

- Faculty of Chemical Technology,
- Faculty of Economics and Administration,
- Jan Perner Transport Faculty,
- Faculty of Arts and Philosophy,
- Faculty of Restoration,
- Faculty of Health Studies,
- Faculty of Electrical Engineering and Informatics

Students can choose from different Bachelor´s, follow-up Master´s and Doctoral degree programmes in following fields.

Natural and Technical Sciences focused on chemistry, chemical technology, biotechnology and biochemistry, electrical engineering, informatics, transport and communication technologies and material engineering. Social Sciences focused on economics and administration, philology, history, philosophy and sociology. Health Sciences including inter-disciplinary programmes. Arts in the field of historical preservation, art restoration, conservation techniques and technologies.

Apart from teaching, the University of Pardubice is also renowned for its numerous scientific and research activities which contribute to an excellent national and international reputation.

The numerous of specialized departments and other organizations, institutions and associations which have been operating at the university contribute to this fact.

In relation to the bioeconomy, the Faculty of Chemical Technology and Faculty of Electrical Engineering and Informatics would be involved in the further development. The special position has the Faculty Economics and Administration that cooperates with local and regional bodies involved in the regional and local development.

Scope of knowledge alliance development

As it was mentioned above the Pardubický region is historically the industrial region. There is very fertile soil in the western part of the region but in total the gross value added by the agriculture is less than 5% in the region. But the structure of the region brings wide potential for the implementation of the bioeconomy.

As the first step the bioeconomy would be focused to the countryside. There are local action groups in the region that unite farmers, co-operative farmers, local entrepreneurs, NGO´s, local governments and other bodies. They have built wide and strong network that could help spread the ideas of the bioeconomy.

Competences of the HEIs graduates today

The only higher education institution in the region is the University of Pardubice. The region has very good railway connection to the capital Prague and to the second largest city in the republic – Brno, which is traditional education center and contemporary national technological leader. Therefore, many students are leaving the region to study in these centers. At the University of Pardubice there is no faculty directly linked to the bioeconomy. However, the university explores this issues from different economic perspectives.

The analysis used for this study are based on the survey made in the region during the summer 2016. The respondents were divided into four main groups: entrepreneurs, local authorities (regional and municipal offices), students and universities (teachers, executive bodies). According to the economic structure of the region there were chosen 465 respondents who answered

The analysis in among the entrepreneurs was made on the qualitative basis. The questionnaires were filled with the entrepreneurs/companies chosen on the basis of their main focus/production and number of employees.

Expectations for the future experts - businesses' perspectives to educational development

The structure of the regional economy is historically strictly focused to the industry. The national development policy had been focused mainly to the industry and low level of the unemployment during the whole 20th century. Unfortunately the economy was focused to the rough production, not to innovation and development. It brings the whole country to the contemporary situation, when there is very low unemployment rate in the country but people work in not well-payed positions. This has affected the opinion of the local entrepreneurs to the HEI graduates. It could be summed up as “we do not need graduates, we need someone to work. This attitude could affect the future development of the whole society that could not be able to adopt and accept new challenges as bioecnomy, industry 4.0 etc.

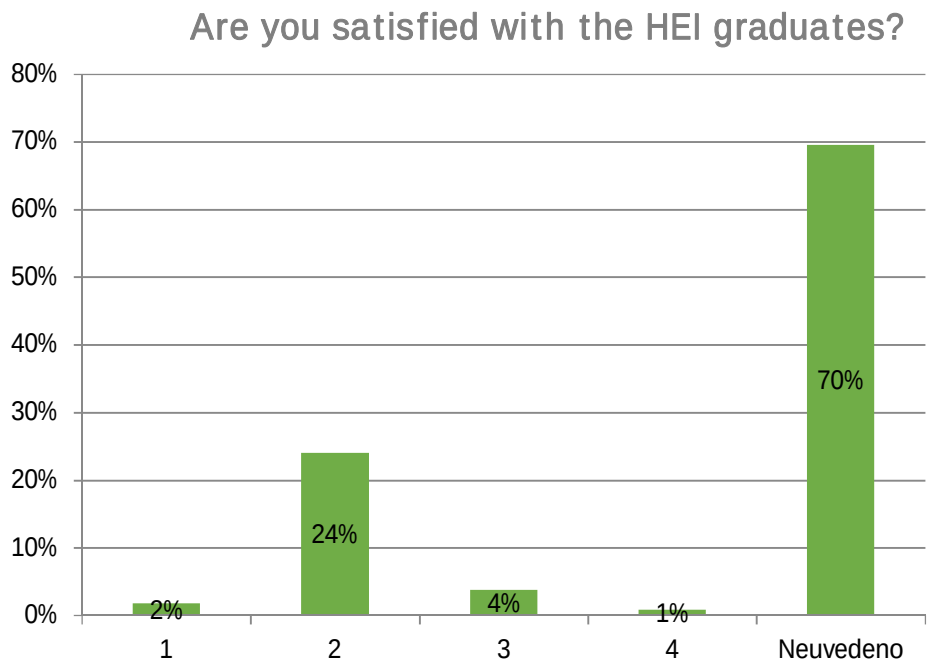

Figure 3. Are you satisfied with the HEI graduates?

1-very satisfied; 2 – satisfied; 3- not satisfied; very unsatisfied; Neuvedeno – not filled). Source – own research

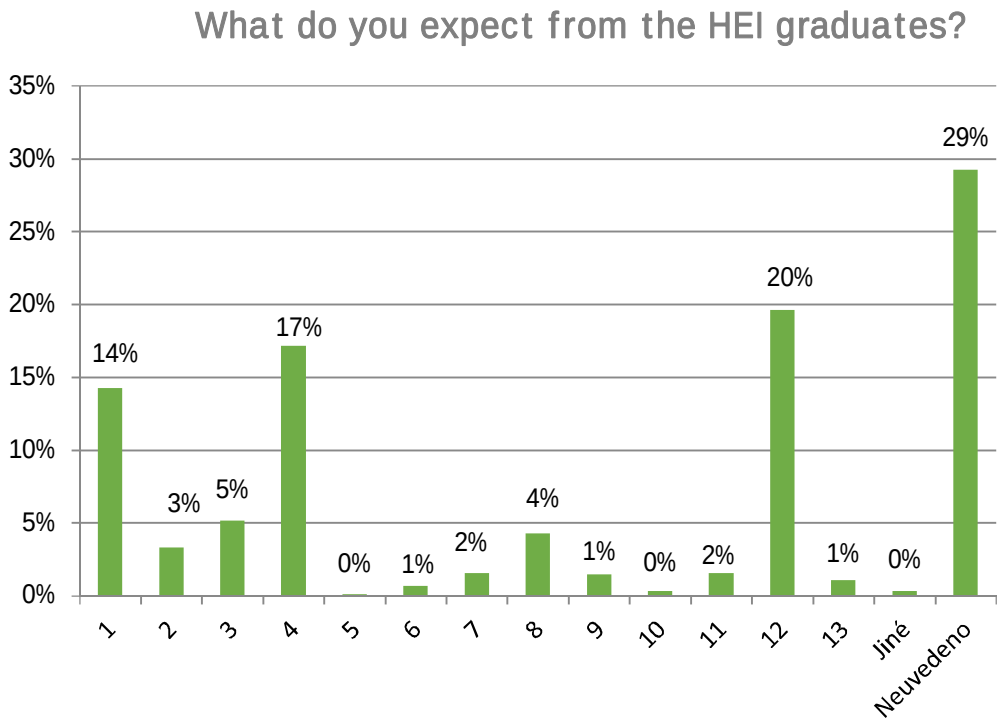

Figure 4. What do you expect from the HEI graduates?

1- Communication skills; 2 - Flexibility; 3 –Self-reliance, 4 – Diligence; 5 – Blamelessness; 6 – Presentability; 7 – Critical thinking; 8 – Foreign language skills; 9 – Economic skills (budget, financing); 10 – Personal skills; 11 – Planning skills; 12 – Technical skills; 13 – Office IT skills; Jiné – Others; Neuvedeno – Not filled; Source – own research

FACTS AND FIGURES

Table 2. Pardubický region – Facts and figures

Type	Area	Indicator	Level	2014	2015
envi	landuse	land covered by urbanized areas	CZ	12,35%	12,35%
	energy supply	% of different energy sources	Pce (total MWh)	1465,2	
			Pce (steam MWh)	1276,5	
			Pce (hydro MWh)	28,7	
			Pce (gas MWh)	50,2	
			Pce (wind MWh)	15,2	
			Pce (solar MWh)	94,7	
eco	regional entrepreneurship	No. of entrepreneurs	Pce (total)	116 363	117 554
			Pce (self-empl.)	81 402	82 485
		No. of entrepreneurs per 1000 inhabitants		15,76%	15,98%
	economy level	inflation	CZ	0,4	0,3
		unemployment rate	CZ	6,1	5,0
			Pce	6,22	5,14
		Gross Domestic Product in current prices	Pce (mil.CZK)	169049	
		Gross Domestic Product per capita	Pce (CZK)	327545	
		Gross Domestic Product in current prices	CZ (mil.CZK)	4260886	
		Gross Domestic Product per capita	CZ (CZK)	404843	
		% of Pce to CZ (per capita)	-	123,60%	
		average gross monthly wages	Pce (CZK)	22 268	
			Pce (EUR)	809	
			Pce (USD)	1 073	
	regional economy	% employment in economic sectors (primary…)	Pce (total)	246,5	250,7
			Pce (primar)	11,6	11,0
			Pce (secondary)	112,0	114,0
			Pce (tertial)	122,9	125,6
			Pce (% primar)	4,71%	4,40%
			Pce (% secondary)	45,44%	45,47%
			Pce (% terial)	49,85%	50,13%
soc	inhabitants	no. of inhabitants	Pce	516 372	516 149
		relative migration balance	Pce (přirozený př.)	0,6	-0,3
			Pce (přírůstek stěh.)	0,2	-0,2
		population by age	Pce (0-14)	78 671	79 315
			Pce (15-64)	344 618	341 189
			Pce (65+)	93 083	95 645

Type	Area	Indicator	Level	2014	2015
			Pce (0-14)	15,24%	15,37%
			Pce (15-64)	66,74%	66,10%
			Pce (65+)	18,03%	18,53%
		average age		41,7	41,9
		% of foreigners	Pce (foreign)	11 559	
			Pce (% frgnrs)	2,24%	0,00%
		population by sex	Pce (women)	261 235	260 990
			Pce (% wmn)	50,59%	50,56%

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New Brunswick Region, Canada

Swallow Tail Lighthouse - Grand Manan, New Brunswick, Canada
Photo: Shawn Harquail. CC BY-NC-SA 2.0 license.

8 New Brunswick Region, Canada

Pierre-Marcel Desjardins[2], Université de Moncton

SUMMARY

Figure 1. Location of New Brunswick. Source: maps.google.com

[2] *The author wishes to recognize the contribution of Jocelyne Landry and Serge Benoît, from the New Brunswick Community College, who organized a workshop which produced information very useful for the preparation of this chapter.*

For the purpose of our study, we used the whole province of New Brunswick as our reference because most of the pertinent data for 2014 was only available for the whole province. Furthermore, public policy at the local/regional level is mostly province-wide.

REGIONAL SWOT ANALYSIS

Strenghts	Weaknesses
- Resource and infrastructure - Market - New Brunswick has a small flexible bio economy community - Established research and development community - Location and transport. infrastructure available to serve major markets	- Lack of promotion and market understanding - Public policy - Limited combined business management and technical expertise - Limited access to financial support
Opportunities	**Threats**
- Available capacity - A "green field" opportunity - Government policy - Market - Demand for renewable energy sources	- Ageing population - Absence of defined public policy - Consumer awareness - Producer awareness/organization - Competition from other jurisdictions for human resources and capital - Protectionism

Figure 2. SWOT analysis of the strengths, opportunities, weaknesses and threats for the development of the Province of New Brunswick, in the context of the bio economy

REGIONAL SCOPE TO BIOECONOMY

What is bioeconomy in our region?

The concept of bioeconomy is not widely used in New Brunswick. The province nevertheless has a long history of economic activity in natural resource activities (Seagrave. 2015. 43). To try to measure the importance of the province's bioeconomy, we can refer to Imagenenation (2015), although it refers to a "bio-industry cluster", where are included plant/wood biosciences, marine biosciences, environmental biosciences and bio-medical science. For some (e.g. Seagrave. 2015) this in New Brunswick includes a cancer research centre in the definition of activities in the bioeconomy field, the definition thus including biotechnologies in general[3].

Imagenenation (2015) estimate that the cluster has "nearly 2,000 highly qualified employees; more than $110 million in economic activity, including $23 million in active projects; 122 patents, 210 products (102 in the pipeline); and a substantial non-patent intellectual property, such as plant varieties and fish brood stock." The authors add that "a broadened sector definition which included traditional sectors in the process of developing biosciences operations" generates twice the cited level of activity. The absence of a generally agreed definition of bioeconomy in the

[3] http://www.atlanticcancer.ca/index.php/en/

province thus leads some to include activities that fall outside our present definition. This being said, we find many examples for active firms involved in bioeconomy. Following are a few examples.

Groupe Savoie (Duval 2016, Levesque 2015a, 2015b; Savoie and Bossé 2016, Tice 2010) is a forestry company which has diversified in the bioeconomy. In 2010, it developed pellet production for heating. Today, it produces approximately 95,000 tons per year (Levesque 2015a, 2015b). In 2011, it created Biomass Solution Biomasse (BSB) in a joint venture with another New Brunswick company, Compact Appliances. It produces and sells a variety of heating systems for residential and industrial applications. The company has plans to develop new products, including biodiesel produced from sawdust generated by its plants (Steinbach. 2015)

Laforge Bioenvironmental[4] has eastern Canada's first commercial biogas production plan (Seagrave. 2015. 47; The Gaia Project. 2014. 5). It operates a "1.6 MWh anaerobic digester on a dairy farm with approximately 90 cows, and is fuelled by a combination of cow manure and organic waste from regional food processors converting it to electrical energy, heat and liquid organic fertilizer."

The Twin Rivers Paper Mill, in Edmundston, was producing, in 2014, electricity from biomass for 82% of its consumption[5]. This is the result of an allocation of crown forest biomass of a total of 1 276 000 m3 of biomass, starting in 2010, primarily for co-generation (Canadian Biomass. 2010; Roach and Berch. 2015. 95). Other facilities that were part of this allocation included AV Cell in Atholville, AV Nackawic, in Nackawic, and several JDI facilities (Scierie Grande Rivière, Lake Utopia, Deersdale and Grand Lake) (The Gaia Project. 2014. 5).

What are the regional goals for development?

The government of New Brunswick's goals for development are to achieve four objectives (Government of New Brunswick. 2016b. 3):

- "We want New Brunswick to be a place where people who work hard can get ahead.
- We want New Brunswick to be a place where entrepreneurial risk is rewarded by new wealth creation.
- We want New Brunswick to be a place where people, young and old, can build a happy and fulfilled lives; where families can thrive; and where new Canadians can prosper.
- We have proven we can compete and win in the global economy. There are examples all over the province of entrepreneurs who have built globally competitive businesses. We have attracted global companies to invest in our natural resource-based and our knowledge-based industries."

In these goals, we do not find explicitly mentioned sustainable development objectives. As we will see in the next section, this has repercussion on the regional strategy and policy – or lack of – for the development of the bioeconomy.

[4] http://www.chfourbiogas.com/laforge-bioenvironmental.html
[5] http://www.twinriverspaper.com/operations/edmundston-pulp-mill/

Regional strategy and policy in short

The economic development strategy of the government of New Brunswick has five pillars (Government of New Brunswick. 2016b. 1):

- "People – strengthen the provincial workforce
- Innovation – expand our capacity for innovation
- Capital – grow investment from the private sector
- Infrastructure – foster public and private sector investment in strategic infrastructure
- Agility – foster agility and nimbleness in the public sector and across our economy."

Although bioeconomy is not part of the province's strategy, some components are included. For example, new farmers (to replace farmers approaching retirement age), blueberry development, marijuana and maple syrup are identified as offering important opportunities (Government of New Brunswick. 2016b. 7-8). It is nevertheless surprising that we do not find the bioeconomy explicitly in the province's strategy (Atlantic Agri-Food Associates Inc. 2012). Seagrave (2015. 46), for example, argues that "although the bioscience industry in New Brunswick is gaining momentum, the economic return on investment and the environmental benefits are not fully appreciated by decision makers, despite the assets and opportunities we come by naturally." She adds: "It is time for New Brunswick to jump on board with the global bioeconomy movement, and pursue sustainable development as a driver for economic development and prosperity." Simpson (2015. 13) adds that "the New Brunswick government has been criticized for not promoting biomass heating opportunities at institutions such schools and hospitals, where carbon emission benefits could be achieved by replacing oil heat with biomass heat."

In the past, some elements of the bioeconomy (e.g. value-added food sector, bioscience) were explicitly part of the Government's economic development strategy (Government of New Brunswick 2012a, 2012b). That is not to say that these elements were completely eliminated from the present government policies. On the other hand, its absence from the document presenting the government's economic development strategy reflects the fact that it is not a priority.

Some existing regulations and policies, although absent from documents outlining the government's economic development priorities, are having an impact on the province's bioeconomy activities. For example, "under New Brunswick's Renewable Resources Regulation, NB Power (New Brunswick's Crown power corporation) must ensure that by 2020, 40% of the total in-province electricity sales are from renewable resources." (Simpson. 2015. 12). Biomass energy is considered, for this purpose, an acceptable source of energy. Also, New Brunswick was the first Canadian province to have a forest harvesting biomass policy (Roach and Berch. 2014. 93). This policy is not for the whole territory. It is only for crown land (publicly owned land), which represents 47% of forestland (Government of New Brunswick. 2008). The policy does not cover privately owned land. For crown land, it requires that "the biomass harvesting not reduce the predicted future growth of the harvested site, although it also recognizes that further research and analysis is necessary to fully understand the impacts of removing forest biomass on forest growth and ecological values." (Simpson. 2015. 12). In fact, the debate surrounding the use of crown land for economic activities does include sustainability concerns: "The future of Crown land forest must result in economic, environmental and social benefit to New Brunswick." (Government of New Brunswick. 2011. 20). That debate focusing on sustainability issues, we need to point out, is less about issues such as biomass energy production, but more about conserving segments of the forest, as we can see from the report of a task force on crown land use: "Although the task force was not drawn into the debate, its deliberations did coincide with an intense public

debate surrounding the percentage of Conservation forest within the overall Crown forest." (Government of New Brunswick. 2011. 9).

More recently, the provincial government has unveiled its climate change action plan (Government of New Brunswick. 2016a). Its foremost objective is to combat climate change by reducing GHG emissions (Government of New Brunswick. 2016a. 4). While not making any reference to the bioeconomy, the strategy does have some components which are relevant to it. For example, the plan includes "planning for an investing in new technologies that reduce pollution, such as smart grid and renewable electricity." (Government of New Brunswick. 2016a. 4). For education institutions, they will see support and strategic investments as capacity building, referring to "growing the strengths, skills, knowledge, competencies, and abilities of New Brunswickers to respond to climate change", is a key component of the strategy (Government of New Brunswick. 2016a. 6). As for the natural resources and agriculture sectors, the reference to their activities is less one of opportunity and more one of threat: sectors in "New Brunswick rely heavily on natural resources such as trees, water, land, fish and wildlife and our agricultural resources – all of which are influenced by climate. Our economy is therefore particularly vulnerable to climate change." (Government of New Brunswick. 2016a. 17). That being said, the strategy does point to some opportunities, as it aims to "create the conditions for growth and job creation in the areas of clean technology, products and services related to climate change in all sectors such as housing, forestry, manufacturing, energy efficiency, renewable energy, information technology and transportation." (Government of New Brunswick. 2016a. 20).

REGIONAL KEY PLAYERS

Who are the key players and what are their roles?

While the sector is still a small and growing sector, it has today many key players, ranging from private sector players to government departments and post-secondary education institutions. The difficulty in identifying key players is that the bioeconomy is not usually defined as such in New Brunswick. We thus present a list of actors in activities included in the bioeconomy.

Table 1. Summary of the key regional bioeconomy actors in the Province of New Brunswick

Organisation	Main role	Contact
Private Sector		
ACBC	The Atlantic Canada Bio-economy Council is a non-government, non-profit cooperative association that represents the growing bio-products industry within Atlantic Canada. Puts resources into driving economic development and creating job opportunities while supporting regional contribution to the Canadian clean technology community, which is providing a cleaner, greener economy and a steady, sustainable reduction in our carbon emissions.	http://www.goacbc.com/

Organisation	Main role	Contact
Public Administration		
New Brunswick Department of Energy and Resource Development	Government department	http://www.gnb.ca/Energy
New Brunswick Department of Agriculture, Aquaculture and Fisheries	Government department	http://www.gnb.ca/AgricultureAquacultureFisheries
New Brunswick Department of Post-Secondary Education and Labour	Government department	http://www.gnb.ca/post-secondary
Agriculture and Agri-Food Canada	Government department	http://www.agr.gc.ca/eng/science-and-innovation/research-centres/atlantic-provinces/fredericton-research-and-development-centre/?id=1180622499704
Fredericton Research and Development Centre	One of Agriculture and Agri-Food Canada's network of 20 research centres. The main focus of research conducted at the centre is in three areas: - Potato germplasm enhancement - Crop protection - Enhancing the environmental performance of potato production systems	http://www.agr.gc.ca/eng/science-and-innovation/research-centres/atlantic-provinces/fredericton-research-and-development-centre/?id=1180622499704
RPC	A research and technology organization (RTO), analytical chemistry and material-testing laboratories, comprehensive life science, forensic and biotech laboratories, world class fish health services, extensive prototype design, manufacture and testing services and a wide variety of pilot facilities for the development and improvement of industrial and environmental processes and products.	http://www.rpc.ca/english/index.html
NBPower	Electricity producing crown corporation	https://www.nbpower.com/Welcome.aspx
St. Andrews Biological Station	Scientific research is conducted on a number of themes including: Aquaculture, Biodiversity, Climate Change, Coastal Oceanography, Fisheries and Species at Risk.	http://www.mar.dfo-mpo.gc.ca/SABS/Home
Education		
New Brunswick Community Colleges	Teaching and research	http://www.nbcc.ca/
Eastern Canada Soil and Water Conservation Centre	Contributes to agro-industry innovation and sustainable development partnerships and professional collaborations with entrepreneurs and support agencies for the further development of the sector.	http://ccnb.ca/entrepreneurship-et-innovation/research-and-industrial-services/centres-and-specialized-services/ecswcc.aspx

Organisation	Main role	Contact
Biorefinery Technology Scale-Up Centre	The BTSC research team working at the Grand Falls site of the CCNB supports the industry in its bioproduct promotion efforts. The team uses microbial fermentation, enzymatic hydrolysis, bioseparation and chemical process technologies to produce high value-added industrial bioproducts (including bioethanol, biogas, biodiesel and alcoholic beverages) from forest, agricultural and marine biomasses as well as from industrial and municipal wastes	http://ccnb.ca/entrepreneurship-et-innovation/research-and-industrial-services/centres-and-specialized-services/btsc.aspx
Northern Hardwoods Research Institute	Encourage viable development of the hardwood resource and to support, through applied research activities, optimal development of our hardwood forests for the benefit of businesses and organizations working toward their development and use.	http://www.irfn-nhri.org/en/
Université de Moncton	Teaching and research	http://www.umoncton.ca/
Institut de recherche sur les zones côtières	The Institute encourages a multidisciplinary approach that focuses on three main areas of research: aquaculture, fishery and marine byproducts, and peat and peatlands. A fourth research orientation relating to the sustainable development of coastal zones is currently taking shape	http://www.irzc.umcs.ca/flash_content/anglais/index.html
University of New Brunswick	Teaching and research, including the Canadian BioEnergy Centre	http://www.unb.ca/ http://www.unb.ca/fredericton/forestry/wstc/cbec/
Mount Allison University	Teaching and research	https://www.mta.ca
St Thomas University	Teaching and research	http://w3.stu.ca/stu/
NGOs		
BioNB	NGO that promotes a supportive business environment for bioscience ventures through coaching, community building and advocacy.	http://bionb.org/
The Gaia Project	A charitable organization whose mission is to empower informed decisions about energy and its impact on the environment	http://thegaiaproject.ca/
Huntsman Marine Science Centre	A registered, private, not-for-profit research and science-based teaching institution located. Established in 1969 by a consortium of universities, government departments, and private sector interests	http://www.huntsmanmarine.ca/

What is the role of educational organisations in the region?

New Brunswick has several universities and a network of community colleges. These operate in either English or French and are located in all regions of the province. Some efforts are specific. For example, six bio-based research chairs were created in the past years. "These research chairs were designed to increase the research and development capacity of the sector and spur more support for the commercialization of these efforts." (Seagrave. 2015. 46).

The educational organisations are present in several bioeconomy initiatives. Two examples are *biorefining & bioprocessing* and *marine bioscience*[6]. In both cases, educational institutions are key stakeholders, with private sector and government actors. The contribution of educational organisations is thus diversified and very important. It goes from education and training to research and development (R&D).

Competencies for future players[7]

Competencies of the (HEI) graduates today

Several competencies are required. These are important as they influence the region's productivity. They range from general communications skills to creativity, ability to work in collaboration with others, self-discipline (including punctuality), understanding of different cultures to the sciences. Motivation and attitude is very important, including respect for others, willingness to ask question and also to use distance learning.

Having a workforce with these competencies is difficult, as many challenges exist. With an ageing workforce, skills transfer and mentoring are very important. This is even more important when many companies face a shortage of skilled labour.

Expectations for the future experts – businesses' perspectives to educational development

Through increased productivity resulting from improved skills, increased innovation and increased adaptability to change, an increase in the importance of the bioeconomy. This will result from greater and improved collaboration. This could take the form of visits by entrepreneurs in the classroom, being more responsive to market needs, the development of excellence centres, using real business cases in the classroom. Simply put, by increasing the links between businesses, students and teachers, educational institutions will be better tooled to support the development of the region's bioeconomy.

[6] http://bionb.org/sector-profiles/

[7] Information in this last section result from a meeting of the New Brunswick ERDI project advisory group in August 2016, as well as two one-on-one meetings with two members of the advisory group which were absent from the group meeting.

FACTS AND FIGURES

Table 2. New Brunswick region facts and figures

Indicator	Figure, for 2014 if not specified	Indicator	Figure, for 2014 if not specified
Land covered by urbanized areas (2006)	1,31%	GDP per capita	29 164€
Population density (2011)	10,5 inhabitants /km^2	Average gross monthly wages (2010)	2 112€
Population density in urban areas	N/A	**NAICS structure of companies in the region (2011)**	26 338 (TOTAL)
Households connected to public sewerage systems	N/A	11 - Agriculture, forestry, fishing and hunting (2011)	2 519 (9.6%)
Energy sources (turbines)		21 - Mining, quarrying, and oil and gas extraction (2011)	75 (0.3%)
Hydraulic	18,2%	22 - Utilities (2011)	44 (0.2%)
Wind power	4,8%	23 - Construction (2011)	3 059 (11.6%)
Conventional steam	33,4%	31-33 - Manufacturing (2011)	917 (3.5%)
Nuclear steam	33,0%	41 - Wholesale trade (2011)	1 153 (4.4%)
Internal combustion	0,1%	44-45 - Retail trade (2011)	3 641 (13.8%)
Combustion	10,5%	48-49 - Transportation and warehousing (2011)	1 377 (5.2%)
Operating profit of regional budget (million €[8]) (2014-15)	-256,3€	51 - Information and cultural industries (2011)	279 (1.1%)
Number of self-employed (2011)	29 510	52 - Finance and insurance (2011)	928 (3.5%)
Number of self-employed per 1000 inhabitants (2011)	40,1	53 - Real estate and rental and leasing (2011)	947 (3.6%)
Structure of companies according to the number of employees		54 - Professional, scientific and technical services (2011)	1 802 (6.8%)
<10 employees	19 645 (74.6%)	55 - Mgt of companies and enterprises (2011)	254 (1.0%)
10-49 employees	5 579 (21.2%)	56 - Administrative and support, waste mgt and remediation services (2011)	913 (3.5%)
50-249 employees	927 (3.5%)	61 - Educational services (2011)	242 (0.9%)
>250 employees	187 (0.7%)	62 - Health care and social assistance (2011)	2 977 (11.3%)
Household income by net money income per person (2010)	21 780€	71 - Arts, entertainment and recreation (2011)	404 (1.5%)
Inflation	2.0%	72 - Accommodation and food services (2011)	1 820 (6.9%)
Unemployment rate (2014)	9.9%	81 - Other services (except public administration) (2011)	2 662 (10.1%)
GDP (million €) (2014)	22 006€	91 - Public admin. (2011)	325 (1.2%)
Commuting to work or school	N/A	% participation in regional elections	64.65%

[8] Note convert annual dollar figures in euros, we used the exchange rate at the middle of the period.

Indicator	Figure, for 2014 if not specified	Indicator	Figure, for 2014 if not specified
Employment in economic sectors		% of women elected to regional government	16.3%
Primary (2011)	5.2%	% of abandoned buildings	N/A
Processing (2011)	16.1%	Household ownership types	
Services (2011)	78.7%	Owner (2011)	75.7%
Number of inhabitants (2011)	741 170	Renter (2011)	23.8%
Relative migration balance	N/A	Band housing (First Nations) (2011)	0.6%
Population by Age		Number of household users	N/A
0-14 (2011)	113 580 (15.1%)	% participation in regional elections	64.65%
15-64 (2011)	513 955 (68.4%)	% of women elected to regional government	16.3%
65+ (2011)	123 635 (16.5%)	% of abandoned buildings	N/A
% of foreigners (2011)	1.8%	Household ownership types	
Population by sex		Owner (2011)	75.7%
Male (2011)	366 435 (48.8%)	Renter (2011)	23.8%
Female (2011)	384 730 (51.2%)	Band housing (First Nations) (2011)	0.6%
Population education structure (15 years + with university degree) (2011)	15.4%	Number of household users	N/A

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North Brabant regions Netherlands

De Baan, North Brabant, Netherlands
Photo: grotevriendelijkereus. CC BY-NC-SA 2.0 license.

9 North Brabant regions, the Netherlands

Krista van Noppen, HAS University of Applied Sciences

Figure 1. Location of North Brabant. Source: maps.google.com

REGIONAL SCOPE TO BIO-ECONOMY

What is the bio-economy in our region?

The Biobased Economy is an economy that is no longer reliant on fossil resources for its energy and materials, relying on green resources, also known as biomass. The Province of North Brabant is stimulating the transition towards this new economy. Biomass is perfectly suited to replace fossil resources, particularly in applications in which carbon is essential such as materials, chemicals and fuels. For this process, the primary source of raw materials is derived from waste flows so that the Biobased Economy is not in competition with food production.

Many biobased developments are taking place in Brabant. This is no coincidence; the south-west of the Netherlands has traditionally been home to strong and innovative sectors such as the chemical and agrifood industries, making it ideally suited for pioneers in the Biobased Economy. The green transition of both agrifood and chemicals is a process that will take decades, but is taking off more rapidly in our region due to the special regional cooperation between business, government and knowledge institutes.

The 'green economy' contributes not only to a sustainable society but is also an important driver of employment and the knowledge economy in Brabant. Reason enough for the province to stimulate this transition, focusing on economic opportunities, development of innovative technology and campuses (Kwant, 2016).

What are the regional goals for development?

There are plenty of opportunities for the Biobased Economy in Brabant. It is no coincidence that over 120 successful projects are already underway, spread across several sites. These can be divided into two regions: South-West Netherlands (jointly with Zeeland and South-Holland) and Eastern Brabant (jointly with Limburg).

South-West Netherlands

South-West Netherlands has great potential for the Biobased Economy, with a strong agrichemical and chemical sector with an ideal position between the ports of Rotterdam and Antwerp. This is where the pioneers can come together. To stimulate collaboration, the Biobased Delta has been founded, a network involving business, government and knowledge institutes. Bringing them together increases the pace of innovation. Sharing knowledge and joint investment delivers concrete results. In the Biobased Delta foundation, multinationals, SME, development agencies, knowledge institutes and government agencies from Zeeland, North Brabant and South Holland are collaborating to accelerate the transition to the Biobased Economy. The foundation's board consists of people with their roots in industry (both agrichemical and chemical). The Supervisory Board is made up of senior representatives from the provinces, the business world and academia, with the majority being in the business world (8 out of 14). Active collaboration is not restricted to this region. The Biobased Delta is also working to accelerate the Biobased Economy with partners from other Dutch regions. For instance, in 2014 an action programme was initiated with the Brightlands Chemelot Campus in Limburg. The aim of this programme is to present a single face when applying for the European grant programmes INTERREG and OPZuid and also acting as a stepping stone to the Horizon2020 programme (Kwant, 2016).

Eastern Brabant

Biobased innovations are also underway in the east of Brabant, with economic opportunities available at the intersections between agriculture, food and technology. The livestock sector and

agriculture and horticulture produce many different waste flows that can be recycled as raw materials for industry, for example as biobased ingredients, nutrients and high-quality fuel sources. Creating connections with other sectors such as the high-tech, logistics and energy sectors, gives an extra impulse to sustainable production.

The province is stimulating the transition to an economy using green resources, providing capital and professional support for sustainable innovations, start-up enterprises and local initiatives. One example of the province's support is the Biobased Brabant fund, administered by the Brabant Development Agency (BOM) (Kwant, 2016).

Biobased Brabant Fund

The province is investing in green resources through the Biobased Brabant Fund. Many of the agrifood and chemical companies in Brabant are responding to the rapidly emerging global market for bioplastics, natural dies, natural packaging materials, drugs and a myriad of other products. However, since financial backers are not queuing up for biobased innovations, this fund enables new technologies to be brought to the market. Since 2012 the fund has supplied a total of 13 million euros in venture capital to enable business with marketable innovations in the areas of Biobased Economy (10 million euros) and water technology (3 million euros) to grow further.

Biobased Business Eastern Brabant

Although not formally part of the Biobased Delta, we will also make mention of the biobased initiatives in the Eastern Brabant region. Since 2012 the SME cluster Biobased Business Eastern Brabant (Bioboost) has been active, focusing on operational matters. At the intersections of the international Agricultural, Food and High Tech Top Sectors, they are working towards creating value by converting agri-food waste flows into energy, nutrients, ingredients and raw materials for the food and animal feed industry. The cluster is operating under North Brabant's Agrifood innovation agenda (see III. Regional strategy and policy in short). The partnership, with representatives from businesses, education and government, has an associated development service providing practical support to businesses. The collaborating partners are: Province of North Brabant, BOM, Agrifood Capital North-East Brabant, Peel Network, Food Tech Park Helmond, CoE BBE (Centre of Expertise Biobased Economy, Avans University of Applied Sciences), HAS University of Applied Sciences 's-Hertogenbosch, ZLTO, Aa & Maas and Dommel Water Authorities, Biotech Systems Platform (BSP), Chamber of Commerce and Helicon Colleges (upper secondary vocational colleges).

A total of 23 SME collaborative projects are already in development within the clusters of animal proteins, vegetable proteins, nutrients and high quality fuels/energy. As is the case in the Biobased Delta, there are triple helix projects working in parallel to develop top locations in Helmond (Food Tech Park- creating vegetable proteins from food waste flows), Son & Breugel (Darling Ingredients, animal protein), Boxtel (Greentech Park, creating value from biomass waste flows, fermentation, gasification and pyrolysis), Cuijk (biomass power plant) and Sterksel (Bio-park Brabant, manure conversion and the circular economy).

Funding is available through the EFRO and Interreg programmes, involving tens of millions of euros in the period 2014-2020. The result of the majority of these projects will be bio-energy, in accordance with the national vision. North Brabant is investing relatively heavily in nutrient recovery projects, fitting with investments in manure processing projects) (Kwant, 2016).

Regional strategy and policy in short

In addition to major changes in our economic surroundings, we are also affected by societal trends that we will have to withstand in the near future, in particular an aging population together with a future shrinking working population, as well as climate change and increasingly scarce resources. Thanks in part to powerful, coordinated efforts by the region, national government and the EU, in recent years existing economic clusters have been strengthened and several new clusters have been set in place. Progress has also been made in the eco-systems surrounding these clusters. Leading educational institutes have been attracted to Brabant, campuses and other modern working locations have been developed, we have invested in a robust market structure and an attractive business climate at national and international level.

At the same time, we can observe powerful economic developments in the surrounding European regions and globally, for instance in the BRIC countries. We cannot count on our current strong position. As a region, we have drawn up our vision: a strong foundation, on its way up to the top.

Here in Brabant, we have strong industrial DNA. The manufacturing and processing industries and the agri-industrial complex still form the beating heart of our economy and are at the core of our economic clusters. Our strategic location in Europe, close to the mainports and major population centres remains our trump card. The combination of our DNA and our strategic position in Europe provides the foundation of a strong economy so that, even in the future, the people of Brabant will not be left in the cold, creating an innovative economy able to make new connections with societal opportunities in the fields of smart mobility, sustainable energy, healthy aging and the Sustainable Agri-food supply chain. In short, a good foundation for working towards a 'smart economy' so that Brabant is able to really stand out in the years to come.

Brabant aims to use its knowledge, entrepreneurship and innovation to become part of the European top. However, if we want to achieve our ambitions, we will have to make major improvements. Coordinating with the various regions in Brabant, in the coming years we will have to capitalise and continue along the course we have already been following in recent years with our Dynamic Brabant programme. This approach is summed up as 'a strong foundation, on the way up to the top'.

We have developed a model for a coherent regional economic policy, based on a three-layered design. These layers are described as follows:

- Innovation with Top Sectors for societal challenges: together with the strong clusters in Brabant on our way up to the European top.
- A strong foundation: a number of issues simply have to be up to scratch: attention to encouraging entrepreneurship, a proactive labour market policy for the knowledge economy, creating space for business and industry and good accessibility.
- The wider ecosystem: non-economic developments that contribute to a good business climate in Brabant together with capitalising on opportunities, using an integrated approach to create connections between the economy and wider societal priorities. Internationalisation is a common thread for all the priorities and activities of the Economic Programme (Provincie Noord-Brabant, 2012).

The focus in the Economic Programme is mainly on those aspects that Brabant will need to concentrate on in the next few years to achieve the ambitions described in the Agenda for Brabant: on our way to the European top with our economic clusters. In the future, too, our

clusters will be the main vehicles for our innovative strength and new developments. As such, the province's economic policy for the coming years will concentrate on strengthening the international competitive position of a number of its strong clusters.

Complementary to this, a thriving countryside, good sports facilities and appealing nature and landscapes make a real contribution to turning Brabant's ambitions into reality as well as creating smart links between these elements of the broader ecosystem and added economic opportunities for innovative approaches and new business models (Provincie Noord-Brabant, 2012).

Area Agenda for Brabant

The Area Agenda for Brabant describes how the plans of different governmental organisations are coordinated with each other. This relates to issues such as spatial planning, urbanisation, employment, nature, traffic and transport. It is a joint agenda on behalf of national government, the Province of North Brabant, the five Brabant cities of Eindhoven, Breda, Tilburg, 's-Hertogenbosch and Helmond, SRE (the Cooperative Union for the Region of Eindhoven), the West-Brabant, Hart van Brabant and 5-Stars of North-East Brabant regions and the Brabant Water Authority. The Area Agenda describes their shared vision and ambitions for the long-term spatial development of Brabant (until approx. 2040).

The Area Agenda is the collaborative agenda of the partners, forming the foundation for the annual Administrative Consultation of the Multi-Year Programme for Infrastructure, Spatial Planning and Transport (BO MIRT). The agenda is furthermore used for the province's consultation with the 5 major cities (BrabantStad) and its regional spatial planning consultation (RRO). The latter takes pace with the cooperating municipalities in four regions within Brabant.

The Area Agenda is in line with the strategic Agenda for the BrabantStad intercity collaboration whose common ambition is to develop Brabant into an internationally-competitive knowledge and innovation region. Brainport Region Eindhoven, Maintenance Valley West- and Mid-Brabant, Logistics and Agri-food constitute the four principle challenges for Brabant. In addition, supporting areas have been designated that play a role in strengthening the mosaic that makes up Brabant: urbanisation and mobility, energy, water, nature & landscape and leisure (Provincie Noord-Brabant, 2012).

REGIONAL KEY PLAYERS

Who are the key players and what are their roles?

Table 1. Regional key players in the COROP region

Key player	Role(s)
Brabant Water Authority (Brabantse Waterschappen)	- Provide internships
Strong businesses	- Supply knowledge/expertise - Provide information for students - Provide internships - Carry out new projects
Regional networks (Brabantse Kempen)	- Informal and formal contact - Continuity
Agricultural businesses	- Research projects (practical experience) - Company visits/information
AgriFood Capital In 2020 North-east Brabant is a top region in Agri-food, a region with international allure, powers of attraction at national level and local forms of cooperation. Nowhere else is the agri-food cluster as complete nor of such a high quality as in North-east Brabant. The cluster is currently already responsible for 1.9 billion euros of added value and 20 % of the total employment.	- Major network partner, region recognised for its: 1: Excellent job market 2: Strong businesses and industry 3: Meaningful innovations 4: Good housing, living and working climate - Provide funding (or commission projects)

What is the role of educational organizations in the region?

There are a range of educational institutes in the North Brabant region. Their roles are described individually below.

Avans University of Applied Sciences

Avans University of Applied Sciences was created in 2004 by a merger between Brabant University of Applied Sciences and 's-Hertogenbosch University of Applied Sciences. The knowledge institutes already worked closely together under a single Board of Governors. This Board of Governors manages Avans University of Applied Sciences, with the Supervisory Board acting in a supervisory role and monitoring the policies of the Board of Governors.

The study programmes are divided over 20 academies including the University of Applied Sciences Avans-Fontys Faculty of Law (JHS). There are academies in sectors such as Economy and Business, Technology, Behaviour and Society, Health,

Science and IT, Art and Culture, Law and Administration, Teaching and Education, Earth and Environment and Language and Communication.

Avans has expertise centres and over 20 research lectureships; groups of researchers conducting practice-oriented research. It has six support units and two support offices providing support to the academies and the Board of Governors.

Avans has an employee representation structure that plays a crucial role at all levels of decision-making within the organisation (Avans Hogeschool, 2016).

NHTV Breda International University of Applied Sciences

NHTV Breda is a middle-sized, non-private institution for international higher professional level education with four sites in Breda, around 7,700 students from over 60 countries and almost 700 members of staff. NHTV offers higher education in the fields of Games & Media, Tourism, Hotel & Leisure, Facility Management, Logistics and the Built Environment.

In the professional field of tourism and leisure, academic Bachelor's programmes are also available. Pupils from pre-university secondary education (VWO) and upper secondary vocational education (MBO) have the option of a fast-track higher education Bachelor's. NHTV also provides more in-depth and broader honours tracks as well as Master's, training and courses for transfer students and professionals.

NHTV has a strong international orientation and the foundation of its teaching and knowledge is based on the themes of cross-cultural understanding, social responsibility, imagineering and entrepreneurial skills. The majority of the study programmes are taught in English. NHTV attracts lecturers from abroad and almost 13 % of the students also come from other countries. International business and international cooperation are covered in depth, from both the social and cultural perspective as well as the economic aspects. The cultural mix creates students who are open-minded, curious and understand the world. International recognition from organisations such as the UN World Tourism Organization, the World Leisure Organization and the International Facility Management Association highlight the quality of international teaching (NHTV Breda, 2016).

Design Academy Eindhoven

Design Academy Eindhoven specialises in design. It offers a four-year Bachelor's course and a two-year Master's course. It has an impressive, international team of tutors at its disposal and the quality of the designers they educate is very high. The DNA of Design Academy Eindhoven can be described as conceptual, authentic, creative, flexible, free, passionate and curious.

The world is changing rapidly, and the design profession is also changing with it. Design Academy Eindhoven considers educational innovation, the development of knowledge and research to be of paramount importance. This academy will therefore respond to and capitalise on the changes by embedding current themes and developments as effectively as possible in the curriculum and the organisation of the education it provides.

Design Academy Eindhoven is always looking for excellence and intends to be the most authentic, creative, and innovative academy in the world; a professional organisation and educational institution that produces top design talent(Design Academy Eindhoven, 2016).

HAS University of Applied Sciences Den Bosch

HAS University of Applied Sciences is the top higher education and expertise centre in the south of the Netherlands in the sectors of agribusiness, food and environment, with two sites, in Den Bosch and Venlo. It is a middle-sized university providing higher professional level education, with the dynamic triangle of students, lecturers and the business world taking a central role. Our core values are: committed, enterprising and unconventional. HAS focuses on three core activities: education, knowledge transfer and knowledge development.

HAS Training and Consultancy

HAS Training and Consultancy provides business services in the form of research, consultancy, education and training in the Agribusiness, Food business and Environment sector. In addition,

HAS Training and Consultancy carries out projects in the areas of: product and process development, quality and logistics, marketing, animal and vegetable production, environment, urban and regional development, management and organisation.

HAS University of Applied Sciences

HAS University of Applied Sciences has 3,000 fulltime students following Bachelors programmes in both English and Dutch. A further 300 students follow various company training courses provided by HAS Training and Consultancy.

We believe that constant encouragement and talent development makes a significant contribution to a strong agri-food sector and the living environment.

Mission

As the leading higher education and expertise centre in the south of the Netherlands in the field of agribusiness, food and environment, HAS University of Applied Sciences provides:

- specialist and comprehensive courses for students;
- the skilled higher education professionals they need for the sectors we serve;
- applied research and consultancy for business;
- practical training and courses for business professionals.

Vision

We build on our foundation:

- an enterprising, world-class university with a comprehensive programme in agribusiness, food and environment;
- an independent university that works actively with local business;
- our educational concept focuses on entrepreneurial study involving substantial cross-fertilisation with day-to-day business practice. We channel this cross-fertilisation professionally through the activities of HAS Training and Consultancy. These ties provide real-life experiences for our students and teachers as well as strong support for businesses in terms of innovation, development and life-long learning.

As an organisation, HAS owes its solid foundation to:

- motivated teams and enterprising professionals, leaving room for individual freedom and a strong sense of personal responsibility;
- our integrity: the quality of our courses and respect for our students are undisputed and are our first priority;
- a flat and lean organisational structure, in which everyone involved is focused on realising the HAS goals;
- a sound and healthy financial base, giving us the room to do business and initiate our own development.

(HAS Hogeschool, 2016)

Fontys University of Applied Sciences

Fontys provides education and research and as a broad university of applied sciences, it is the largest state-funded knowledge institute in the south of the Netherlands. By linking education and research to innovation processes in the region and beyond, Fontys aims to be one of the innovation motors for the region. Given its education and research in virtually all sectors of society, Fontys has a great impact.

As a result of its representation in key positions in practically every sector, everyone who lives and works in the south of the Netherlands comes into contact with Fontys, directly or indirectly. It educates large numbers of talented young adults for many professions. Once they have graduated, we meet them as colleagues, an internship supervisor, a partner in collaboration or research or as a professional seeking to increase their knowledge. Hence alumni are a very valuable asset for Fontys.

Given its diversity and the breadth of its disciplines, Fontys is the largest high quality university of applied sciences in the south of the Netherlands. It has set itself the task of continuing to develop the university as a regional knowledge institute.

Fontys participates in the following expertise centres:

- Automotive Centre of Expertise (ACE);
- High Tech Systems & Materials Centre of Expertise (HTSM);
- Logistics Knowledge Distribution Centre (KennisDC Logistiek);
- Health and Technology (EGT).

(Fontys, 2016)

Eindhoven University of Technology (TU/e)

Eindhoven University of Technology (TU/e) is a research university specialising in engineering science and technology. Our education, research and knowledge valorisation contributes to:

- science for society: solving major societal issues and the growth of prosperity and welfare by focusing on the Strategic Areas of Energy, Health and Smart Mobility;
- science for industry: developing technological innovations in collaboration with the business world;
- science for science: advancing engineering sciences by excellence in key research areas and renewal in education.

TU/e's mission is to train engineers, giving them a solid scientific grounding and in-depth knowledge as well as the competences they require to allow them to develop successfully in society and their professional positions.

With a view to the future, TU/e has initiated a major renewal of its education. The Bachelor and Masters study programmes will remain, but will become part of a Bachelor College and Graduate School. Students will be given more freedom with a choice of a broader programme of subjects related to society, or a more specialised science-based programme.

The university's high-quality research contributes to progress in engineering sciences and hence to the development of technological innovations. We focus on those subsectors where we can play a major role in the international scientific world. TU/e aims to provide meaningful impulses to the knowledge-intensive industries and other societal sectors making use of significant or rapidly-developing technological input.

TU/e deliberately focuses on knowledge valorisation. Research results are translated into successful innovations and act as the foundation for creating new products, processes and enterprises. We encourage students and members of staff to become entrepreneurs.

The TU/e presents itself as a leading international university specialising in engineering science and technology, offering excellent education and research. Hence it contributes to progress in the technical sciences, to the development of technological innovations and the growth of

prosperity and welfare in the local region (Technology & Innovation Hotspot Eindhoven) and beyond. (Technische Universiteit Eindhoven, 2016).

Tilburg University

Tilburg University educates students to become thinkers who do, but more than that, thinkers who do good. The labels knowledge, skills and character describe succinctly what makes Tilburg University so special. Students and graduates differentiate themselves from others by their own personal attitude of wanting to make a valuable contribution to our society.

Tilburg University therefore has a role in solving societal issues, especially by knowledge development and transfer and by bringing together people from different organisations and fields of expertise. For this reason, they invite business, other organisations, government agencies and citizens to work together to create new insights and valuable solutions for society. Tilburg University looks for these innovations using research, learning and understanding: Understanding Society.

Educational excellence, society-oriented with a strong campus spirit are key concepts for our teaching. The green campus provides a good basis for creating an international community where students and members of staff encourage and challenge each other and learn from each other. The university has a total of around 12,400 students, 1,600 of them international students. This includes approx. 6,400 bachelor students (in 21 bachelor programmes) and 4,600 master's students (in 48 master's programmes).

All research projects focus on current complex societal issues that require an integrated approach involving several academic disciplines. Tilburg University's disciplines are Economy, Law, Catholic Theology, Social and Behavioural Sciences and the Humanities.

Tilburg University's highly-qualified personnel produce top quality results. They stimulate connections and cross-disciplinary cooperation between people and teams and encourage quality and leadership as part of an effective organisation

(Tilburg University, 2016).

Scope of knowledge alliance development – SWOT

Innovation issues

A varied selection of interesting issues:

- Plants: research into climate-controlled rooms, new cultivation systems, sensor technology, chemical composition of the nutritional values of crops.
- Insects: research into protein production and edible insect farming (an expertise area has been developed on site).
- Landscape design: research into green gardens for the elderly, child-friendly planting, vandal-proof design, tree management and combining the functions of town and country.
- Landscape management: research into fertilising techniques in the countryside.
- Packaging technology: research into packaging, presentation, use of ingredients, increasing sustainability of current techniques.
- Social innovation: societal issues, sharing knowledge and hybrid learning (joint idea creation, virtual projects, global online learning.
- Technological innovation: research into technological developments.

- New business models (Agri-Food, living environment): one lectureship researching the agricultural transition and the process of new niches and earning models.

Lectureships

Lectureships are knowledge groups within universities of applied sciences that create connections between education, professional practice and practical research in areas that have a societal relevance. Most lectureships consist of a knowledge group, i.e. a group of lecturers and teaching researchers under the leadership of a professor. The lectureships have several general objectives:

- enhancement of external orientation;
- educational renewal;
- professionalization of lecturers;
- enhancement of knowledge development and dissemination of knowledge.

HAS University of Applied Sciences has 10 lectureships:

- Agri-Food Marketing Lectureship;
- Biomimicry Lectureship;
- Cooperative and Co-Creative Business Lectureship;
- Green Health Lectureship;
- Innovative Business in the Horse Sector Lectureship;
- Location Intelligence Lectureship;
- New Business Models Lectureship;
- Nutrition & Health Lectureship;
- New Cultivation Techniques Lectureship;
- Precision Livestock Farming Lectureship.

Table 2. Process oriented regional SWOT analyse.

Strengths	Weaknesses
1. Innovation issues (see Innovation Issues section) 2. Wide range of lectureships (see Lectureships section) 3. Visibility for innovative businesses	1. Lectureships are not supplied with maximum information or knowledge 2. Fragmentation of projects 3. Investment
Opportunities	**Threats**
1. Responding to current supply and demand from people in the professional field 2. Knowledge development in the region 3. Findability and visibility (at national level)	1. Not being allocated any more innovative projects 2. Innovations that do not take off 3. Lack of demand, excess supply

Table 3. Issue oriented regional SWOT analysis.

Strengths	Weaknesses
1. Existing strong networks 2. Supply of enough students 3. Supply of knowledge and expertise.	1. Reduced supervision and/or direction 2. Making and maintaining contacts (staying in the picture) 3. Takes a lot of energy and money
Opportunities	**Threats**
1. Easy to get input for questions from people in the profession and/or our network 2. Supply of internship and graduation placements 3. Supply of job vacancies in the professional field	1. Competition from other universities of applied sciences with the same range of expertise 2. Inability to supply the right expertise due to the number of changes in the professional field 3. Lack of supply/knowledge of lecturers

Competences of the (HEI) graduates today

Study: Spatial and Environmental Planning

In the Spatial and Environmental Planning study programme, a sustainable environment is central, viewed from the physical, ecological, social, spatial and economic perspectives. These aspects provide the context for the Spatial and Environmental Planning study programme. The skills and attitude of the programme are determined by the expectation that a starting professional should be innovative, creative, communicative, environmentally aware, entrepreneurial, with research and analytical skills.

The Spatial and Environmental Planning study programmes train their students for professions and jobs in a wide range of professional areas within the Spatial and Environmental Planning core subject areas. The study profile was designed in consultation with the Landscape & Environment Management programme at Inholland University of Applied Sciences as well as the National Council for the Study Programme Management of the Environment. This was done due to the similarity in subject matter and the fact that the Landscape & Environment Management programme evolved from a plan for the neutral conversion of a number of study programmes including Management of the Environment. Over the years these programmes have shifted towards putting more emphasis on the urban environment with a more economics-oriented perspective.

The Spatial and Environmental Planning study programme has ten core competencies that define in more concrete terms the study profile and the described body of knowledge and body of skills, hence forming the foundation for the various majors in the Spatial and Environmental Planning study programme.

1. Project-based and process-based work in a multidisciplinary environment.
2. Innovative, creative, cooperative and future-oriented work.
3. Verbal and visual communication with and toward target groups.
4. Designing and managing interactive processes.
5. Socially-responsible entrepreneurship (economy, marketing, experience, sustainability, ecology, new earning models).
6. Analysis of the current physical and ecological situation in an area.
7. Socio-economic analysis.

8. Make a sketch/design for refurbishment, use and management of an area.
9. Draw up policy recommendations and/or translate policy into concrete actions
10. Drawing up a plan/vision for an area.

These competencies provide a clear guideline for the design of our education provision: what are we training our students for and which situations do we have to prepare them for? It is clear that in a dynamic profession, certain skills cannot be adequately developed in a teaching environment and require practical experience, hence external projects play a crucial role in the curriculum of the Spatial and Environmental Planning study programme. (Opleidingsprofiel Management van de Leefomgeving, 2016).

The study profile drawn up for Spatial and Environmental Planning was presented to a broad range of people representative of the professional field to assess whether the defined professional profile is identifiable and current for them and if the defined competencies, Body of Knowledge and Body of Skills are identifiable and appropriate (Opleidingsprofiel Management van de Leefomgeving, 2016).

Study: International Food & Agribusiness

Focusing on the changing global food system, International Food & Agribusiness (IFA) offers an international learning environment in which students can develop into enterprising, innovative and inspirational professionals who are able to make a substantial contribution to practical and sustainable solutions for multidisciplinary issues at the crossroads between business, ideology and technological expertise (Qualifications International Food & Agribusiness, 2016).

Competencies

After completion of the IFA programme, the student is able to:

1. identify and tackle issues in international food chains, in the context of food security and with consideration for people, planet and profit;
2. analyse processes in food, animal and crop production, and contribute to a long-term and innovative sustainable approach;
3. identify opportunities and contribute to business development in developing as well as established economies.
4. provide advice on business issues in an organization in the global agri-food sector;
5. draw up and carry out multidisciplinary practical research related to current topics in the global food system;
6. identify, network with and motivate diverse stakeholders in the global food system;
7. critically self-reflect and assess others as well as external information, with the aim of forming a personal opinion;
8. manage projects, collaborate effectively and communicate in a multidisciplinary and intercultural context.

On the next page you can find two tables with the qualifications for the study.

Table 4. Qualifications IFA

Qualification	Level	Knowledge areas	Skills	Attitude and behaviour
Qualification 1: Identify and tackle issues in international food chains, in the context of food security and with consideration for people, planet and profit.	**Level 1** Student has an understanding of food security and the food chains considering people planet profit and has a working knowledge on main current issues in the global food system **Level 2** Student is able to identify issues in international food chains and contribute to a solution	- Food security - Social organizatio of production - Global developments - Food governance - Sustainable supply chain management - Sustainability concepts - Certification	- System thinking - Problem solving	- Value consciousness - Thinking in possibilities - Open minded - Open to other cultural perspectives
Qualification 2: Analyse processes in food, animal and crop production, and contribute to a long-term and innovative sustainable approach.	**Level 1** Student has a basic understanding of biobased economy and circular food production systems **Level 2** Student can interrelate knowledge of the three domains in complex global food systems and quantifying sustainability of innovations	- Maximizing sustainability - Basics of chemistry - Circular thinking and biobased economy - Statistics - Footprinting	- System analysis - Data collection and analysis - Identify problems and solutions - Calculation skills - Putting knowledge into practical context	- Cross-sectorial; eye for crossovers - Hands on mentality - Long term vision - Creative - Critical
Qualification 2A: Crop production	**Level 1** Student has a basic understanding of crop production systems **Level 2** Student is able to analyse and evaluate processes in crop production and contribute to innovations that promote more sustainable systems	- Crop production systems - Agro ecology - Crop physiology - Seed production - Basic crop agronomy		
Qualification 2B: Animal production	**Level 1** Student has a basic understanding of animal production systems **Level 2** Student is able to analyse and evaluate processes in animal production and contribute to innovations that contribute to more sustainable systems	- Animal production systems and chains - Feed production - Animal physiology - Basic animal breeding - Agro ecology - Basic animal agronomy		

Qualification	Level	Knowledge areas	Skills	Attitude and behaviour
Qualification 2C: Food	**Level 1** Student has a basic understanding of food processing and nutrition **Level 2** Student is able to analyse and evaluate processes in food processing and contribute to innovations that contribute to more sustainable systems	- Food processing - Nutrition - Quality, safety (including HACCP), integrity - Eating habits and cultures		
Qualification 3: Identify opportunities and contribute to business development in developing as well as established economies.	**Level 1** Student has a basic understanding of market development and trends in global economy **Level 2** Student is able to identify opportunities in markets in developing as well as established countries and with that is able to contribute to business development.	- Business economics - Country and sector analysis - Market/trends research - Business strategy - Statistics - New business models	- Commercial skills (convincing) - Benchmarking - Excel	- Professional - Representative - Strategic - Entrepreneurial - See opportunities
Qualification 4: Provide advice on business issues in an organization in the global agri-food sector	**Level 1** Student has a basic understanding of business administration and marketing **Level 2** Student is able to analyse organizations in the global agri-food sector and subsequently give advice for improvement in operational and strategic management.	- Economics - Business legislation - Organizational science - Marketing - Logistics - Finances/accounting - General Management - Business strategy	- Advisory/consultancy skills - Benchmarking	- Professional - Representative - Strategic

Study: Spatial and Environmental Planning

The Spatial and Environmental Planning study programme is divided into ten areas of expertise, each with specific related subjects (see table 3). Together these make up the Body of Knowledge. These areas of expertise are applicable to the areas that the various study programmes that form part of Spatial and Environmental Planning have in common. Due to the integral character of the Spatial and Environmental Planning study programme, in practice the areas of expertise are combined with each other.

By incorporating the context of the study programme in the body of knowledge, students are given a solid theoretical foundation. Combining attitude and behaviour with the body of knowledge in the form of the body of skills creates a description of the research capabilities that provide students with the capacities enabling them to contribute to the development of the profession (table 4). The combination of the specific areas of expertise (body of knowledge) with specific professional skills and professional attitude (body of skills) provides the foundation of professionalism (Opleidingsprofiel Management van de Leefomgeving, 2016).

Table 5. Body of knowledge of the Spatial and Environmental Planning study profile at the HAS university

Area of expertise	Subjects
Physical-ecological knowledge	landscape, nature, geology, soil, hydrology, cultural heritage, climate, ecology, environmental value, energy
Social-societal knowledge	demographics, social geography, cultural heritage, welfare, liveability, spatial and natural experience, health
Regional economy/entrepreneurship	food production, agriculture, recreation/tourism, earning models, ecosystem services, value of green areas, economy, marketing, energy
Spatial design	area analysis, sketch/design, designing, geographic information systems, multipurpose use of spaces, management, area planning and vision
Development	innovative thinking, innovation management, (regional) transition, identifying trends, creativity
Sustainability	sustainable solutions, sustainability models/principles, biobased economy/society
Administrative/legal/policy issues	laws & regulations, financial flows, politics, spatial planning policy, municipality, province, national, European, global
Process management	participation, actors, support, interactive planning processes
Project management	multidisciplinary, project planning, funding
Communication	consultancy, marketing, reporting, presentation

Table 6. Body of attitude/skills for the Spatial and Environmental Planning study programme at the HAS university

Attitude	Skills
Communicative	Verbal, written and digital presentation, consultancy, networking, marketing
Innovative/creative	Scenario-based thinking, innovative thinking, identifying trends, critical thinking
Environmentally aware	Stimulating interaction, creating support
Entrepreneurial	Mission/vision, internal and external analysis, SWOT, earning models, cost-benefit
Research skills	Designing research, methodologies, qualitative and quantitative research, wording of questions
Analytical	Skills in the field, computer skills (GIS, data banks and statistics)

Study: International Food & Agribusiness

1. Skills and personal characteristics are just as important as knowledge. The personal characteristics/skills that are relevant are: daring, persistence, curiosity, pragmatism, analytical, brave, hands-on, communication skills, entrepreneurial approach, able to cope with uncertainty, daring to take risks, idealistic, helicopter view, can be motivated, able to research systems, ability to handle big data, social media and ICT, 21st century integration skills.
2. Able to apply knowledge using the latest technologies.
3. The international focus in the sector is unique; this study programme is unique in the educational world.
4. Unique combination in this study programme (particularly biobased); the combination of affinity with the process, the technology and the market. This is a real unique selling point for graduates, providing market opportunities in this area.
5. IFA students are do-ers and get on with the job. They Interact, Interpret, Innovate and Inspire.

(Qualifications International Food & Agribusiness, 2016)

FACTS AND FIGURES

There is the specific situation in the regional specification in the region of the HAS Universtiy of Applied Science. The socio-geographic definition is therefore different from the other regional analysis in the ERDI Project. The region of areas around the HAS University has been defined as the NUTS III level areas of Midden-Noord Brabant, Noordoost-Brabant, Zuidoost-Noord Brabant and Noord-Limburg. The different level of the statistical date for the region caused inequality of the regional data. Therefore, the data of the COROP region are not a part of the analysis and are involved as the ANNEX 3. FACTS AND FIGURES – COROP NUTS III REGIONS - AREAS AROUND HAS UNIVERSITY OF APPLIED SCIENCES

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10 Conclusion

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The regional analyses *Perspectives on bioeconomy* has been worked out for providing thorough background material for the ERDI – Empowering regional Development and Innovations project. It helps to understand the situations in the partner regions and provides supporting documentation for the implementation of the other work packages as summarised briefly below.

Perspectives of bioeconomy offers a view to the possibilities of the partners regions in building significant knowledge alliances. All the European knowledge alliances work for following three main goals: 1. develop new, innovative approaches to teaching and learning; 2. stimulate entrepreneurship and entrepreneurial skills; and 3. facilitate exchange, flow and co-creation of knowledge.

ERDI knowledge alliance operates in all these fields. ERDI partners come from geographically, economically and socially varied mainly rural regions. This provides an opportunity for all the partners to learn from each other and to transfer knowledge and experiences within the network and more widely to find ways to boost the regional economies. The regions are economically and socially diverse and the main aim is to benefit and learn from the diversity and create new innovative approaches and tools to promote systematic and goal-orientated university-business co-operation. ERDI is finding ways really to make a change in the regions!

ERDI knowledge alliance increases the working life involvement in higher education, boosts the co-operation between higher education and businesses on regional, national and international levels and raises the quality and relevance of higher education boosting the graduate employability. In the field of innovative learning and teaching approaches ERDI consortium has created and further develops the ERDI course offering three 15 ECTS modules (Innovation Ecosystem, Environmental Management and Connect the dots training) also benefitting from this analyses. ERDI working life partners have an important and visible role in the process, as they have been involved in collecting this analyses, creating the programme, implementing the programme (as teaching experts and business excursion organisers) and even learning from the programme as learners in some of the

ERDI classes. During the ERDI course the students, teachers and business have worked together in regional business cases co-creating new knowledge, solutions and ideas. Furthermore, the working life partners offer training placements for the students in the Connect the dots module. Moreover, the guidance practises are developed and shared between the wlp and HEI colleagues to create a holistic chain to support students' learning.

In the field of stimulating entrepreneurship and entrepreneurial skills ERDI knowledge alliance has a visible impact, too, and this analyses has helped in the process design. The first module of the Bioeconomy HUB, Innovation Ecosystem (15 ECTS) explores and discusses the questions related to the strategic and regional co-operation and networking which boost and create profitable value chains. Furthermore, it challenges the students to create sustainable and innovative business ideas and to draft them further. The students (but also teachers with partners outside of HEIs) may even continue to an idea draft programme where the ideas can be developed further with a help of a business incubator. One of the work packages, business models and tools, is completely devoted into recognising and developing business ideas and models involving also the businesses. In its turn, ERDI knowledge alliance approach increases the students, staff members' and business partners engagement into entrepreneurial activities and raises the level of entrepreneurial knowledge and skills.

In the field of facilitating the exchange, flow and co-creation of knowledge, ERDI knowledge alliance is in the very core of the aim: the whole ERDI process relies on this principle. Iterative co-creation of knowledge, problem solving, idea generating, learning from self and other and sharing expertise and reflections are our way to work. Furthermore, ERDI develops practises and tools to involve and invite more team members and actors in the co-creation processes both on regional and international levels and spread the good practises wider. The work has started with this analyses but will continue further – all our achievement will be open for all in the end of the project.

You are welcome to join our innovative ERDI team – we'll continue the knowledge alliance development and are open for new members!

ANNEX 1. QUESTIONNAIRE SURVEY OF STUDENTS ON THEIR OPINIONS ON THE DEVELOPED CURRICULUM

(Pilot ERDI teaching program in Nitra, 2016)

Module 1. Course 1.1 Strategic Regional Planning

Would you be interested to take this course? Why?

- the interconnection of the bioeconomy, regional development and sustainable growth
- the knowledge from the project elaboration

Does the workload seem reasonable? If not why?

- Yes, as it allows the student to get familiar with the project management as well as bioeconomy
- ok

What is most interesting (appealing) for you?

- the interconnection of the project management and bioeceonomy itself
- the point of view of employability
- teamwork (different stakeholders, different opinions)

What would be the impact of such program in your career?

- my chances to get a job (lack of experts on the market)

What would you suggest for improvement of courses (additional topics) , more detailed descriptions

- little attention could be devoted to the financial management of the projects
- "games" and roleplays for students using real-life problems

Module 1. Course 1.2 Social and Environmental Infrastructure

Would you be interested to take this course? Why?

- analyzing and measuring the environmental and social issues
- ocusing on the social aspect (shall be taken into consideration)

Does the workload seem reasonable? If not why?

- sufficient for the theoretical base, but low in the case of contact hours
- for the project and independent studies, there might be needed some more time
- yes, especially the idea that 80% of the grade consists of student´s individual work

What is most interesting (appealing) for you?

- independent work (search for information needed to be done by myself)
- methods of obtaining data and utilizing them.

What would be the impact of such program in your career

- development of sills to work independently

What would you suggest for improvement of courses (additional topics) , more

detailed descriptions

- best practices of environmental issues solutions in regions
- stress on the "human element" to balance the work with databases and computer data, teamwork, workshops (frustration)

Module 1. Course 1.3 Sustainable and Innovative Business

Would you be interested to take this course? Why?

- lack of this subject in my studies, keen to learn about the new potentials of business
- private sector is very tempting to students

Does the workload seem reasonable? If not why?

- yes

What is most interesting (appealing) for you?

- learn about the behavior of business modes in the frame of bioeconomy potential
- the planed site visits (understanding the situation better by a real visit of a place)
- business plans and innovation platforms and their implementation in real life

What would be the impact of such program in your career?

- wider perspective and wider skills on functioning of different stakeholders in the area (not only public bodies but also the private once) with a focus on bioeconomy
- I could use the knowledge if I decided to start a business

What would you suggest for improvement of courses (additional topics), more detailed descriptions?

- the learning outcomes and specific skills of the course shall be more connected (The learning outcomes define the entrepreneurship, sustainable growth and business while the specific skills are also oriented on bioeconomy and green business. This could be a little bit confusing)
- Incorporation of the functioning business model from real life

Module 2. 2.1 Course: Social and Environmental Responsibility

Would you be interested to take this course? Why?

- visits to working-life partners so it will provide us with an opportunity to see the performance of real companies in practice as well as the case examples
- Yes, I support economic activity with the emphasis on preservation of environment

Does the workload seem reasonable? If not why?

- is not specified separately for this course

What is most interesting (appealing) for you?

- opportunity to apply environmental management expertise with local working-life partner
- The Green Office and cooperation with Karelia environmental program

What would be the impact of such program in your career?

- integration to research and innovation activities

What would you suggest for improvement of courses (additional topics), more detailed descriptions

- the process of course teaching the working life partners
- focusing on cooperation while conducting the business and finding the consensus between stakeholders: local population, businessmen, state authorities
- Roleplays and group work is the key

Module 2. 2.2 Course: Climate and Energy Planning

Would you be interested to take this course? Why?

- widen the scope of my education as the climate and energy planning
- finding way how to contribute to sustainable energy planning

Does the workload seem reasonable? If not why?

- is specified for the module only (some extra hours could be required due to the planned activities in cooperation with the stakeholders)

What is most interesting (appealing) for you?

- the interconnection with the practice in this course
- Practical implementation of the SEAP.

What would be the impact of such program in your career?

- "ability to attend local and regional planning and implementation activities and organize stakeholders meeting"

What would you suggest for improvement of courses (additional topics), more detailed descriptions

- oriented wider, not only on Joensuu city SEAP but other SEAPS too
- Practical examples of energy management on small scale level

Module 2. 2.3 Course: Environmental management projects

Would you be interested to take this course? Why?

- learning goal: applying of the environmental knowledge to practical assignments from working life partners

Does the workload seem reasonable? If not why?

- is specified for the module only

What is most interesting (appealing) for you?

- real assignments given by life partners
- involvement of meetings and project activities
- the recycling and waste management part
- the individiual specific expertise with enviromental aspect

What would be the impact of such program in your career?

- obtaining of knowledge from environmental project management
- I am a huge fan or recycling and wise waste management☺

What would you suggest for improvement of courses (additional topics), more detailed descriptions

- curriculum seems like summary of all courses – maybe better description could be required

ANNEX 2. DESCRIPTION OF REGIONS IN REGIONAL LANGUAGES

North Karelia Region, Finland

Uusiutuva ja hyvinvoiva Pohjois-Karjala on luonnonläheinen, vetovoimainen ja kansainvälinen rajamaakunta. Maakuntaohjelman keskeiset kärjet ovat Älykäs erikoistuminen, Öljyvapaa maakunta sekä Elinikäinen osallisuus. Pohjois-Karjalassa panostetaan valikoituihin tuotannollisiin aloihin. Erityisesti haetaan yritysten ja osaamisen kansainvälisen tason kilpailukykyä. Voimistuva biotalous ja ilmastonmuutoksen huomioiminen antaa hyvät mahdollisuudet Pohjois-Karjalassa resurssiviisaaseen toimintaan ja erityisesti metsäala on Pohjois-Karjalan talouden tukijalka. Metsäbiotaloudessa työskentelee maakunnassa yli 6 000 henkilöä ja liikevaihtoa alalla kertyy noin 1,7 miljardia euroa. Fossiilisista öljyistä vapaa maakunta on kova, mutta realistinen tavoite lähivuosikymmenille. Ikääntyvä väestörakenne on alueelle paitsi haaste myös mahdollisuus. Eri-ikäisten ihmisten aktivoinnilla halutaan maakunta koettavan kaikenikäisten kotimaakuntana.

North Savo Region, Finland

Pohjois-Savossa on paljon toimintaa biotalouden ympärillä. Olemassa olevat luonnonvarat ja yritystoiminnan rakenne mahdollistavat biotalouden kestävän kehittämisen. Aluekehittämisen suunnitelmat, strategiat ja raportit sisältävät useita biotalouden kehittämisen prioriteetteja ja keihäänkärkiä kuten puun- ja biojalostus, alkutuotanto ja elintarvikkeet, ympäristöterveys, bioteknologia, energia, vesi ja ilma sekä mineraalivarannot. Pohjois-Savolla on paljon vahvuuksia ja mahdollisuuksia biotaloudessa. Näitä ovat mm. laajat luonnonvarat, puhdas vesi, ruoka ja ilmasto, elinkelpoiset yritykset ja organisaatiot, vahva tutkimus ja koulutus sekä kehittämis- ja yhteistyöhalukkuus. Pohjois-Savossa on paljon biotalouteen liittyvää toisen ja korkean asteen koulutusta. Biotalouden koulutusta on tarjolla mm. seuraavilla aloilla: elintarvikkeet ja bioteknologia, luonto ja ympäristö, maatalous, metsä, puutarhanhoito, maaseutuyrittäjyys, hevostalous, catering, biotieteet sekä ympäristöteknologia ja ravitsemisala. Pohjois-Savossa on siis vahvaa biotalousosaamista nyt ja tulevaisuudessa.

Győr–Moson–Sopron County, Hungary

Győr-Moson-Sopron megye az európai határok megnyitásával új lehetőségeket kapott a nemzetközi kapcsolatok kiépítésére. A biológiai alapokon nyugvó gazdaság létrehozására minden lehetőség adott, hiszen mezőgazdasági területeinek aránya magas, az erdőterülete megegyezik az országos átlaggal, és bár szántóföldjain a talajok minősége változó, a legfontosabb gabonafélék termésátlaga meghaladja az országos átlagot. A jó közlekedési feltételekkel ellátott megyében, az országhatáron is átnyúló kapcsolatok erősítik a gazdasági lehetőségeket. A megye nyugati fekvése, valamint a határok átjárhatósága azonban mára már olyan folyamatokat is előidézett, amelyek megnehezítik a letelepedni kívánó tőkeerős vállalkozások befektetéseit. A szakképzett munkaerő hiánya, valamint az állandó ingázók magas aránya több szempontból is megterheli a megyét. A határ közelsége és a kíváló természeti környezet az országból, valamint a külföldről érkező turizmus kihasználásával további fejlődési valamint bevételi lehetőségeket hordoz magában.

Nitra self-government region, Slovakia

Nitriansky kraj a jeho metropola – starobylé mesto Nitra – zohrali v dejinách formovania slovenského národa, Slovenska, jeho kultúry, vzdelanosti, významnú úlohu.

Reliéf kraja je prevažne rovinatý a nižinný, prerušovaný pahorkatinami. Patrí k najteplejším oblastiam a najproduktívnejším poľnohospodárskym centrám Slovenskej republiky. Na severe sa krajom tiahne pohorie Tríbeč, severovýchod je lemovaný výbežkami Štiavnických vrchov a z časti Pohronským Inovcom. Najväčšiu časť ma juhovýchode a juhu zaberá kvalitná poľnohospodárska pôda Podunajskej nížiny s časťou Žitného ostrova - najväčší riečny ostrov Európy vytvorený medzi hlavným tokom Dunaja a Malým Dunajom s bohatými zásobami podzemných vôd).

Kraj, najmä jeho južné oblasti, sú bohaté na výskyt vodných a termálnych prameňov a preteká ním viacero riek – najdlhšia slovenská rieka Váh, Dunaj, Nitra, Hron, Ipeľ a Žitava.

Na západe susedí s Trnavským krajom, na severe s Trenčianskym a na východe s Banskobystrickým krajom.

Nitriansky kraj má rozlohu 6.343 km², čo je 12,9% z rozlohy SR, v ktorom sa nachádza 354 obcí, z ktorých 15 má štatút mesta. V mestách žije približne 48,5 % obyvateľov v kraji. (Nitriansky samosprávny kraj, 2016)

Pardubice Region, the Czech Republic

Pardubický kraj se nachází ve východní části Čech. Jako většina krajů České republiky je příhraničním regionem, i když velmi malým územím, kde na severu sousedí s Polskem. Z fyzickogeografického hlediska dominují v kraji horská pásma na jihu (Žďárské vrchy a Železné hory) a na severovýchodě (Orlické hory a masív Králického Sněžníku se stejnojmenným nejvyšším místem Pardubického kraje – 1424 m n. m.). Vedle toho se rozkládá v severozápadní části kraje i v rámci České republiky hospodářsky významná Polabská nížina s řekou Labe.

Správním centrem Pardubického kraje je desáté největší město ČR, město Pardubice (cca 90 tis. obyvatel). Na území kraje se nachází celkem 36 obcí se statutem města, město Pardubice je statutárním městem. Město Pardubice spolu s blízkými městy Hradec Králové a Chrudim tvoří napříč krajskými hranicemi hospodářsky velmi významnou městskou aglomeraci (rozvojový pól), a to i v rámci České republiky.

Hospodářský význam kraje vyjádřený přepočtenou hodnotou HDP na obyvatele v porovnání s ostatními kraji České republiky je spíše průměrný, v rámci regionu soudržnosti NUTS II Severovýchod je ale nejlepší. Hospodářský charakter kraje je určován zejména sektorem sekundárním (průmysl, stavebnictví) díky příchodu významných investic v poslední dekádě a sektorem terciárním (služby). I přes existenci úrodného Polabí primární sektor (zemědělství, rybářství, těžba) v průběhu let neustále ztrácí na významu. Hlavními hnacími odvětvími kraje jsou jednoznačně zpracovatelský průmysl (strojírenství, elektrotechnika, chemie, automobily), obchod a doprava a spoje. V posledních letech je také rozvoj podporován podnikovými inovacemi a výsledky vědy a výzkumu, čemuž napomáhá Univerzita Pardubice. Pozitivní vývoj hospodářství byl zbrzděn ekonomickou krizí hlavně v roce 2009, v následujících letech by již ale mělo dojít k oživení, i když k ne tak dramatickému. Velký význam nejen pro hospodářství kraje je spatřován v jeho dopravním napojení, a to na všechny druhy dopravy – nové napojení na dálniční síť, zkvalitňování

železničních koridorů, dokončení splavnosti Labe a rozvoj veřejného mezinárodního letiště Pardubice. Výše míry nezaměstnanosti v kraji kopíruje přibližně vývoj průměrné míry nezaměstnanosti v ČR.

Stav životního prostředí je v Pardubickém kraji velmi různorodý a je ovlivňován zejména umístěním významných průmyslových podniků, historickým vývojem a zemědělskou činností. Právě lokalizace energetického a chemického průmyslu zapříčinila v minulosti zhoršení životního prostředí v centrální části okresu Pardubice. Historický vývoj průmyslu se také projevuje ve výskytu lokalit brownfields (zejména intravilány měst). Díky CHKO Železné hory a Žďárské vrchy se jižní části kraje řadí mezi jedny z nejzdravějších oblastí v celé České republice. Obecně platí, že Pardubický kraj (vyjma největšího města Pardubice) má celkově příznivé životní prostředí (Program rozvoje Pardubického kraje. 2011. Krajský úřad Pardubického kraje)

New Brunswick Region, Canada

Ce chapitre présente la bioéconomie au Nouveau-Brunswick, une province canadienne. Le concept de bioéconomie n'est pas beaucoup utilisé au Nouveau-Brunswick, mais l'on trouve néanmoins une présence importante d'activités dans le secteur des ressources naturelles. Nous présentons un survol d'activités pouvant être associées à la bioéconomie dans la province. Au chapitre des objectifs de développement, l'on n'identifie pas spécifiquement le développement durable. Nonobstant de ce fait, il existe de nombreux joueurs actifs à ce chapitre et nous en présentons une liste au tableau 5. Il va de soi qu'à cet égard, les institutions d'éducation secondaire ont un rôle primordial à jouer. Pour conclure et permettre une analyse comparative des autres régions participant au projet, une série d'indicateurs socio-économique est présentée au tableau 6, page 75.

North Brabant regions, the Netherlands

Noord-Brabant grenst in het noorden aan de Nederlandse provincies Zuid-Holland en Gelderland. In het westen aan Zeeland, in het oosten aan Limburg en in het zuiden aan de Belgische provincies Antwerpen en Limburg. Noord-Brabant is een grote provincie, na Gelderland de grootste. Zij bezit logistiek een belangrijke, ook grensoverschrijdende doorgangsfunctie, zowel naar het zuiden als naar het oosten. Met een bevolkingsdichtheid van 501/km2 is Noord-Brabant bovengemiddeld verstedelijkt. In het midden is deze het grootst, waar de steden Breda, Tilburg, Eindhoven en 's-Hertogenbosch zich bevinden. In augustus 2015 telde de provincie zo'n 2.495.107 inwoners. Voor de rest is het een landelijke provincie. Zo vindt je er de nationale parken Loonse en Drunense Duinen, De Biesbosch en De Groote Peel. Ten zuiden van Eindhoven is De Kempen te vinden, met landerijen en bossen. Noord-Brabant is sinds 2017 verdeeld in 64 gemeenten, waarmee het de provincie is met de meeste gemeenten van Nederland.

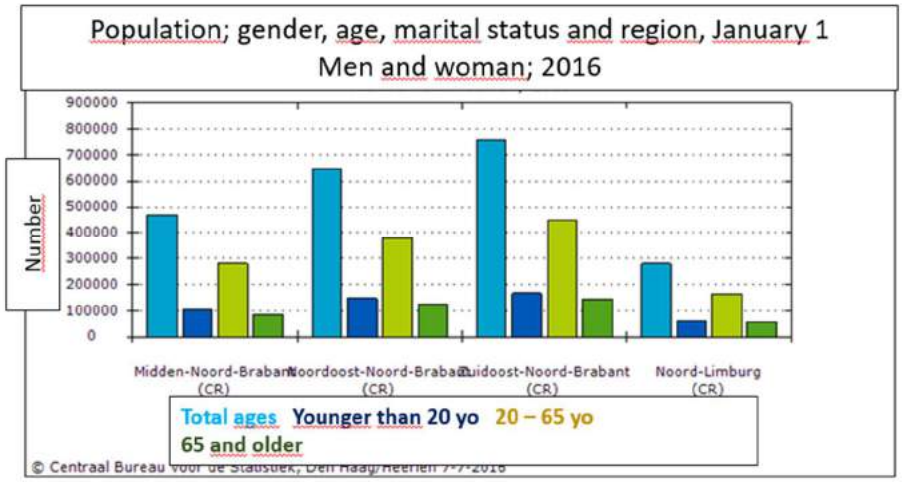
Ook het toerisme speelt in Noord-Brabant een belangrijke rol. Diverse steden en natuurgebieden hebben een goede toeristische infrastructuur en ook attractieparken als De Efteling en de Beekse Bergen trekken veel bezoekers. Door heel de provincie is een fietsroutenetwerk en een wandelroutenetwerk aangelegd.

In 2013 was Noord-Brabant verantwoordelijk voor 15% van het bruto binnenlands product van Nederland. Daarmee is het de derde grootste economie van Nederland op provinciaal niveau.

ANNEX 3. FACTS AND FIGURES – COROP NUTS III REGIONS - AREAS AROUND HAS UNIVERSITY OF APPLIED SCIENCES

Regions: Midden-Noord-Brabant, Noordoost-Brabant, Zuidoost-Noord-Brabant en Noord-Limburg

Population data.



		Onderwerpen	Bevolking naar geslacht		
			Mannen en vrouwen	Mannen	Vrouwen
Regio's	Perioden	Leeftijd	*aantal*		
Midden-Noord-Brabant (CR)	2016	Totaal leeftijden	469 184	233 884	235 300
		Jonger dan 20 jaar	103 621	53 085	50 536
		20 tot 65 jaar	279 939	141 421	138 518
		65 jaar of ouder	85 624	39 378	46 246
Noordoost-Noord-Brabant (CR)	2016	Totaal leeftijden	647 631	323 817	323 814
		Jonger dan 20 jaar	145 898	74 532	71 366
		20 tot 65 jaar	380 011	192 731	187 280
		65 jaar of ouder	121 722	56 554	65 168
Zuidoost-Noord-Brabant (CR)	2016	Totaal leeftijden	756 615	382 155	374 460
		Jonger dan 20 jaar	164 538	84 885	79 653
		20 tot 65 jaar	449 105	231 271	217 834
		65 jaar of ouder	142 972	65 999	76 973
Noord-Limburg (CR)	2016	Totaal leeftijden	279 971	140 552	139 419
		Jonger dan 20 jaar	59 486	30 418	29 068
		20 tot 65 jaar	163 923	83 732	80 191
		65 jaar of ouder	56 562	26 402	30 160

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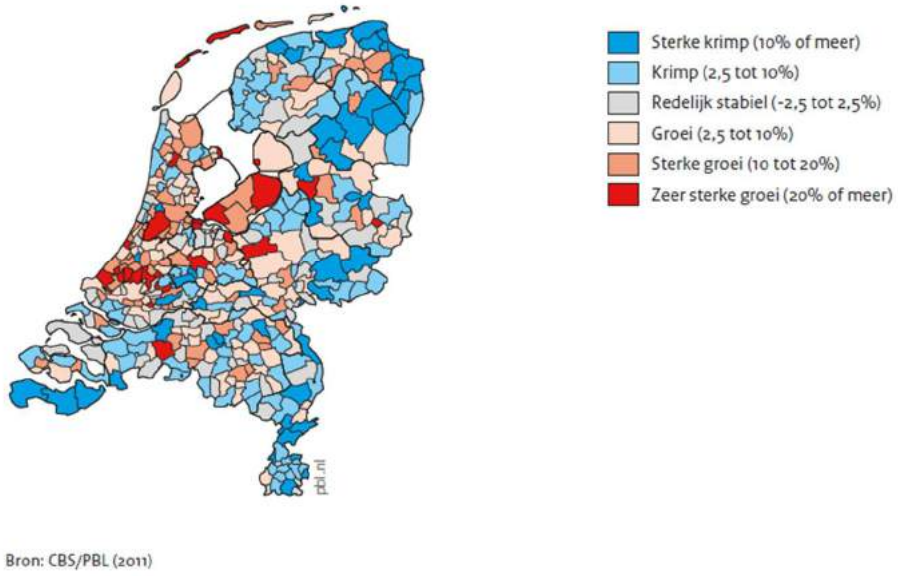
Population; key figures
20 September 2016

Subjects		Periods	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Pop.growth	Total populationgrowth	number	123 125	118 210	87 287	65 460	47 494	28 684	23 782	47 407	80 388	89 202	80 810	74 549	49 227	49 714	71 437
	Total populationgrowth, relative	per 1000 inhabitants	7,8	7,4	5,4	4,0	2,9	1,8	1,5	2,9	4,9	5,4	4,9	4,5	2,9	3,0	4,2
	Birth surplus	number	66 092	62 226	59 728	58 361	57 454	51 508	49 685	48 314	49 498	50 680	48 339	44 319	35 146	30 096	35 958
	Migration (incl. admintration)		53 873	50 838	24 332	-317	-16 216	-27 428	-31 320	-5 757	25 737	34 481	33 081	29 768	13 883	19 103	35 087

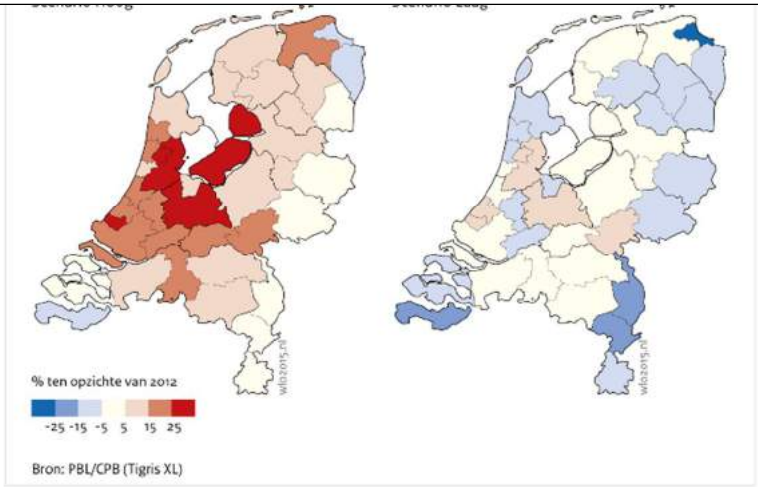
Populationdevelopment 2010- 2040 per council



Bron: CBS/PBL (2011)

Changes in population per COROP-area according to WLO-scenarios, 2012 – 2050

Scenario High Scenario Low

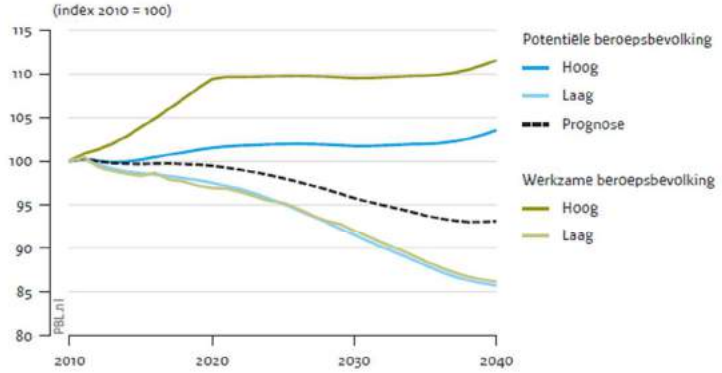


Bron: PBL/CPB (Tigris XL)

Regio's	Onderwerpen			Perioden	2010 april	2010 mei	2015 april*	2015 mei*	2016 april*	2016 mei*
Midden-Noord-Brabant (CR)	Bevolkingsontwikkeling	Bevolking aan het begin van de periode		*aantal*	457 842	457 846	466 965	467 041	469 581	469 527
		Levendgeborenen			389	420	333	391	390	398
		Overledenen			300	312	335	316	339	318
		Vestiging in de gemeente	Vestiging vanuit een andere gemeente		960	941	1 191	1 312	1 403	1 415
			Vestiging vanuit het buitenland		228	214	333	334	640	642
		Vertrek uit de gemeente	Vertrek naar een andere gemeente		1 079	1 112	1 208	1 271	1 841	1 714
			Vertrek naar buitenland	Vertrek naar buitenland inclusief adm...	194	246	238	229	307	232
		Bevolkingsgroei	Bevolkingsgroei		4	-95	76	221	-54	191
			Bevolkingsgroei, relatief	%	0,00	-0,02	0,02	0,05	-0,01	0,04
			Bevolkingsgroei sinds 1 januari	*aantal*	70	-25	358	579	313	504
		Bevolking aan het einde van de periode			457 846	457 751	467 041	467 262	469 527	469 718
Noordoost-Noord-Brabant (CR)	Bevolkingsontwikkeling	Bevolking aan het begin van de periode			637 584	637 744	645 748	645 952	648 332	648 747
		Levendgeborenen			523	550	472	470	490	525
		Overledenen			403	423	479	475	441	512
		Vestiging in de gemeente	Vestiging vanuit een andere gemeente		1 502	1 520	1 791	1 701	2 063	2 116
			Vestiging vanuit het buitenland		214	248	429	271	519	359
		Vertrek uit de gemeente	Vertrek naar een andere gemeente		1 495	1 494	1 800	1 664	1 864	1 877
			Vertrek naar buitenland	Vertrek naar buitenland inclusief adm...	181	174	209	231	352	295
		Bevolkingsgroei	Bevolkingsgroei		160	227	204	72	415	316
			Bevolkingsgroei, relatief	%	0,03	0,04	0,03	0,01	0,06	0,05
			Bevolkingsgroei sinds 1 januari	*aantal*	769	996	289	361	1 226	1 542
		Bevolking aan het einde van de periode			637 744	637 971	645 952	646 024	648 747	649 063
Zuidoost-Noord-Brabant (CR)	Bevolkingsontwikkeling	Bevolking aan het begin van de periode			735 914	736 141	753 464	753 635	757 563	757 789
		Levendgeborenen			595	633	569	603	537	628
		Overledenen			464	457	538	543	587	540
		Vestiging in de gemeente	Vestiging vanuit een andere gemeente		1 705	1 755	2 082	2 051	2 542	2 295
			Vestiging vanuit het buitenland		421	460	578	542	1 032	962
		Vertrek uit de gemeente	Vertrek naar een andere gemeente		1 695	1 814	1 935	1 991	2 758	2 521
			Vertrek naar buitenland	Vertrek naar buitenland inclusief adm...	335	271	585	544	540	508
		Bevolkingsgroei	Bevolkingsgroei		227	306	171	118	226	316
			Bevolkingsgroei, relatief	%	0,03	0,04	0,02	0,02	0,03	0,04
			Bevolkingsgroei sinds 1 januari	*aantal*	977	1 283	1 112	1 230	1 143	1 459
		Bevolking aan het einde van de periode			736 141	736 447	753 635	753 753	757 789	758 105
Noord-Limburg (CR)	Bevolkingsontwikkeling	Bevolking aan het begin van de periode			279 956	279 867	280 311	280 282	280 456	280 414
		Levendgeborenen			184	239	158	208	187	185
		Overledenen			198	189	227	204	202	218
		Vestiging in de gemeente	Vestiging vanuit een andere gemeente		432	447	523	469	524	684
			Vestiging vanuit het buitenland		120	109	203	179	168	178
		Vertrek uit de gemeente	Vertrek naar een andere gemeente		520	497	592	528	629	654
			Vertrek naar buitenland	Vertrek naar buitenland inclusief adm...	107	63	94	133	90	167
		Bevolkingsgroei	Bevolkingsgroei		-89	46	-29	-9	-42	8
			Bevolkingsgroei, relatief	%	-0,03	0,02	-0,01	0,00	-0,01	0,00
			Bevolkingsgroei sinds 1 januari	*aantal*	-170	-124	-270	-279	415	423
		Bevolking aan het einde van de periode			279 867	279 913	280 282	280 273	280 414	280 422

Business/economic activity

Size potential and employed proffesional population (prognosis and scenarios), 2010 - 2040



Bron: CBS (2010); PBL (2011)

Noot: Ontwikkeling werkzame beroepsbevolking niet voor prognose.

Gender and quantity of jobs + distance COROP areas

			Onderwerpen	Banen van werknemers				Afstand tussen woon- en werkgemeente			
			Werkregio's	Midden-Noord-Brabant (CR)	Noordoost-Noord-Brabant (CR)	Zuidoost-Noord-Brabant (CR)	Noord-Limburg (CR)	Midden-Noord-Brabant (CR)	Noordoost-Noord-Brabant (CR)	Zuidoost-Noord-Brabant (CR)	Noord-Limburg (CR)
Geslacht	Leeftijd	Woonregio's	Perioden	x 1 000				km			
Totaal mannen en vrouwen	Totaal leeftijd	Midden-Noord-Brabant (CR)	2013 december	140,9	15,2	13,1	0,7	3,0	21,5	30,6	69,9
			2014 december	142,8	15,5	12,4	0,5	2,9	21,3	29,7	68,8
		Noordoost-Noord-Brabant (CR)	2013 december	14,1	207,3	23,5	5,5	19,5	5,2	24,3	26,1
			2014 december	13,9	210,8	23,3	5,4	20,0	5,0	24,3	22,2
		Zuidoost-Noord-Brabant (CR)	2013 december	9,2	18,8	274,5	4,8	31,0	23,2	5,0	31,2
			2014 december	9,2	19,8	280,5	4,1	30,6	23,4	4,8	31,7
		Noord-Limburg (CR)	2013 december	0,5	6,5	8,2	94,9	74,6	24,7	35,8	3,9
			2014 december	0,5	6,4	8,6	96,7	74,0	23,3	35,2	3,7
Mannen	Totaal leeftijd	Midden-Noord-Brabant (CR)	2013 december	68,5	8,5	8,2	0,4	3,2	21,8	29,9	70,8
			2014 december	69,2	8,6	8,0	0,3	3,1	21,9	29,2	68,9
		Noordoost-Noord-Brabant (CR)	2013 december	7,4	102,4	14,4	3,1	19,5	5,5	24,6	26,6
			2014 december	7,3	104,2	14,0	3,0	19,7	5,3	24,7	23,1
		Zuidoost-Noord-Brabant (CR)	2013 december	4,7	11,0	143,1	2,8	31,0	24,0	5,5	31,9
			2014 december	4,8	11,5	145,4	2,5	31,1	24,1	5,2	32,4
		Noord-Limburg (CR)	2013 december	0,3	3,4	5,0	48,8	74,7	26,1	35,9	4,2
			2014 december	0,3	3,6	5,2	49,4	73,3	25,0	35,9	4,0
Vrouwen	Totaal leeftijd	Midden-Noord-Brabant (CR)	2013 december	72,4	6,7	4,9	0,3	2,9	21,1	31,6	68,9
			2014 december	73,6	6,9	4,4	0,2	2,8	20,5	30,4	68,8
		Noordoost-Noord-Brabant (CR)	2013 december	6,7	104,9	9,1	2,4	19,4	4,9	23,7	25,3
			2014 december	6,6	106,6	9,3	2,4	20,3	4,7	23,8	21,0
		Zuidoost-Noord-Brabant (CR)	2013 december	4,5	7,8	131,4	2,0	31,0	22,1	4,5	30,3
			2014 december	4,4	8,3	135,1	1,6	30,1	22,5	4,4	30,4
		Noord-Limburg (CR)	2013 december	0,2	3,1	3,2	46,1	74,6	23,1	35,6	3,5
			2014 december	0,2	2,8	3,4	47,3	74,7	21,2	34,1	3,4

Total of jobs + remote residential area Netherlands

	Onderwerpen	Banen van werknemers				Afstand tussen woon- en werkgemeente			
	Werkregio's	Midden-Noord-Brabant (CR)	Noordoost-Noord-Brabant (CR)	Zuidoost-Noord-Brabant (CR)	Noord-Limburg (CR)	Midden-Noord-Brabant (CR)	Noordoost-Noord-Brabant (CR)	Zuidoost-Noord-Brabant (CR)	Noord-Limburg (CR)
Woonregio's	Perioden	x 1 000				km			
Nederland	2012 december	209,5	299,4	370,5	123,3	18,2	12,9	15,7	11,2
	2013 december	203,1	294,4	361,1	126,8	18,8	14,1	15,8	16,3
	2014 december	206,6	295,5	366,6	122,9	17,5	13,3	15,1	12,4

Sectors

Perioden	2016*															
Regio's	Midden-Noord-Brabant (CR)								Noordoost-Noord-Brabant (CR)							
Onderwerpen	Vestigingsgrootte				Rechtsvorm				Vestigingsgrootte				Rechtsvorm			
	0 werkzame personen	1 werkzame persoon	2 tot 10 werkzame personen	10 of meer werkzame personen	Eenmanszaken	VOF, CV en maatschap	NV's en BV's	Overige rechtsvormen	0 werkzame personen	1 werkzame persoon	2 tot 10 werkzame personen	10 of meer werkzame personen	Eenmanszaken	VOF, CV en maatschap	NV's en BV's	Overige rechtsvormen
Bedrijfstakken/branches (SBI 2008)	aantal															
A Landbouw, bosbouw en visserij	15	965	790	55	730	910	175	5	40	2 185	1 740	75	1 525	2 000	515	5
B Delfstoffenwinning	0	0	0	0	0	0	0	0	0	5	0	0	0	0	5	0
C Industrie	150	1 345	615	335	1 065	255	1 105	20	220	1 880	825	445	1 540	415	1 385	25
D Energievoorziening	0	10	0	0	0	0	10	5	0	20	5	5	5	0	20	10
E Waterbedrijven en afvalbeheer	15	25	10	10	10	5	45	0	15	60	20	25	30	5	85	5
F Bouwnijverheid	100	3 735	680	170	3 475	375	835	10	190	6 535	1 270	305	5 970	805	1 500	20
G Handel	505	4 735	2 615	640	3 730	1 320	3 370	70	690	6 340	3 775	855	5 140	2 035	4 395	85
H Vervoer en opslag	50	555	355	125	435	270	375	5	80	650	315	165	575	215	405	20
I Horeca	55	550	635	130	605	485	265	15	90	860	985	180	880	775	435	20
J Informatie en communicatie	50	1 545	240	45	1 175	190	485	25	70	2 215	330	140	1 680	210	805	65
K Financiële dienstverlening	75	1 930	270	45	115	80	2 055	75	75	3 675	435	80	165	110	3 890	100
L Verhuur en handel van onroerend goed	40	490	140	20	150	125	370	40	40	725	220	30	250	200	505	60
M Specialistische zakelijke diensten	150	7 010	920	135	5 185	590	2 370	70	285	9 890	1 345	285	7 685	870	3 140	105
N Verhuur en overige zakelijke diensten	70	1 090	340	160	950	185	495	35	110	1 695	545	245	1 455	315	795	35
R Cultuur, sport en recreatie	35	2 235	245	50	1 930	190	175	265	65	2 705	390	75	2 230	290	295	425
S Overige dienstverlening	30	2 330	355	20	2 225	175	95	240	40	3 360	450	45	3 185	210	160	340
U Extraterritoriale organisaties	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Perioden	2016*															
Regio's	Zuidoost-Noord-Brabant (CR)								Noord-Limburg (CR)							
Onderwerpen	Vestigingsgrootte				Rechtsvorm				Vestigingsgrootte				Rechtsvorm			
	0 werkzame personen	1 werkzame persoon	2 tot 10 werkzame personen	10 of meer werkzame personen	Eenmanszaken	VOF, CV en maatschap	NV's en BV's	Overige rechtsvormen	0 werkzame personen	1 werkzame persoon	2 tot 10 werkzame personen	10 of meer werkzame personen	Eenmanszaken	VOF, CV en maatschap	NV's en BV's	Overige rechtsvormen
Bedrijfstakken/branches (SBI 2008)	aantal															
A Landbouw, bosbouw en visserij	45	1 735	1 640	65	1 250	1 765	460	5	60	980	1 085	165	845	975	460	5
B Delfstoffenwinning	0	5	0	0	5	0	5	0	0	5	0	0	0	0	10	0
C Industrie	235	2 185	1 055	665	1 775	515	1 820	35	85	670	355	255	585	175	605	10
D Energievoorziening	0	20	5	5	5	0	30	0	0	10	0	0	0	0	5	0
E Waterbedrijven en afvalbeheer	20	50	20	30	20	5	90	0	5	20	15	10	10	5	40	0
F Bouwnijverheid	185	6 115	1 090	260	5 565	755	1 320	15	60	1 425	370	70	1 320	230	370	5
G Handel	675	7 170	4 065	990	5 760	2 175	4 850	120	245	2 260	1 550	355	1 885	800	1 680	45
H Vervoer en opslag	85	780	335	100	660	250	465	10	35	250	150	135	190	85	275	15
I Horeca	100	1 035	1 195	215	1 065	945	510	20	35	415	535	100	430	435	210	10
J Informatie en communicatie	110	2 885	495	160	2 195	300	1 080	70	20	640	120	25	520	70	200	15
K Financiële dienstverlening	90	4 135	460	110	175	125	4 375	120	30	1 000	120	30	55	25	1 155	30
L Verhuur en handel van onroerend goed	55	760	260	35	270	205	565	70	10	210	70	5	90	40	150	15
M Specialistische zakelijke diensten	340	11 680	1 635	390	9 105	1 055	3 745	135	60	2 655	405	70	2 165	250	745	35
N Verhuur en overige zakelijke diensten	105	1 850	590	325	1 590	350	880	50	50	580	200	110	500	110	305	25
R Cultuur, sport en recreatie	25	2 905	400	65	2 405	320	250	410	15	910	170	20	695	105	105	210
S Overige dienstverlening	40	3 965	505	50	3 705	265	170	415	15	1 525	215	15	1 450	100	70	150
U Extraterritoriale organisaties	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

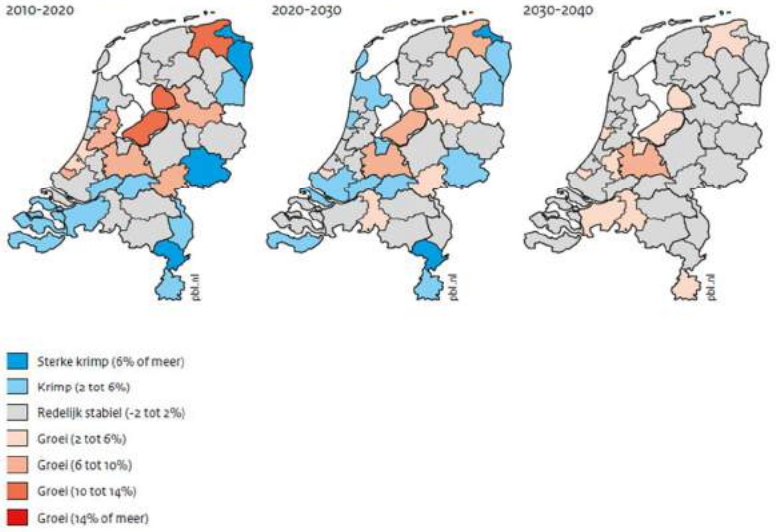
Income households

	Kenmerken van het huishouden	Totaal huishoudens											
	Populatie	Particuliere huishoudens incl. studenten						Particuliere huishoudens excl. studenten					
	Onderwerpen	Huishoudens met inkomen		Gemiddeld besteedbaar inkomen	Mediaan besteedbaar inkomen	Gemiddeld gestandaardiseerd inkomen	Mediaan gestandaardiseerd inkomen	Huishoudens met inkomen		Gemiddeld besteedbaar inkomen	Mediaan besteedbaar inkomen	Gemiddeld gestandaardiseerd inkomen	Mediaan gestandaardiseerd inkomen
Regio's	Perioden	Aantal huishoudens	Relatief aantal huishoudens					Aantal huishoudens	Relatief aantal huishoudens				
		x 1 000	%	*1 000 euro*				*x 1 000*	%	*1 000 euro*			
Midden-Noord-Brabant (CR)	2012	203,9	100,0	33,0	28,7	22,9	20,8	193,3	100,0	34,4	30,0	23,8	21,4
	2013	203,6	100,0	33,1	28,3	23,0	20,9	194,3	100,0	34,6	29,9	23,9	21,3
Noordoost-Noord-Brabant (CR)	2012	270,8	100,0	36,0	31,4	24,6	22,1	267,1	100,0	36,4	31,8	24,9	22,3
	2013	271,8	100,0	36,2	31,3	24,8	22,2	267,9	100,0	36,6	31,7	25,0	22,4
Zuidoost-Noord-Brabant (CR)	2012	328,3	100,0	34,4	29,8	24,0	21,5	319,2	100,0	35,2	30,4	24,5	21,9
	2013	330,5	100,0	34,6	29,6	24,2	21,6	321,1	100,0	35,4	30,3	24,6	22,0
Noord-Limburg (CR)	2012	119,2	100,0	33,8	30,0	23,2	21,1	118,4	100,0	34,0	30,1	23,3	21,1
	2013	119,3	100,0	33,9	29,9	23,4	21,2	118,5	100,0	34,1	30,1	23,5	21,3

Unemployment rate COROP-areas

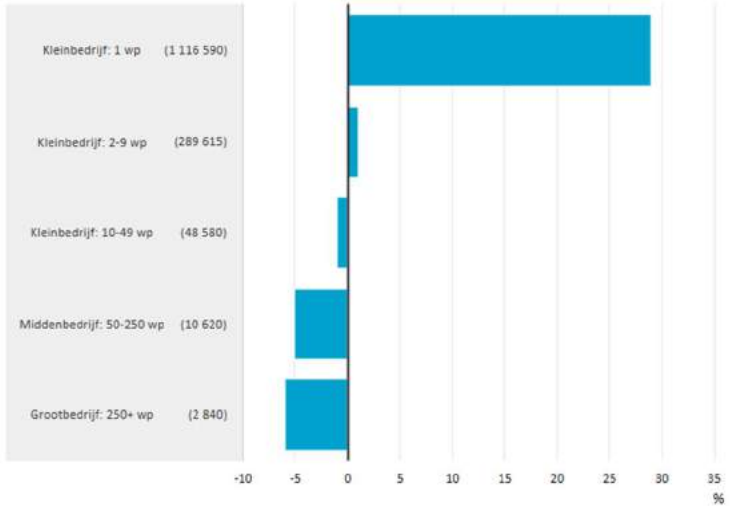
				Perioden	2015			
				Persoonskenmerken	Totaal			
Onderwerpen				Regio's	Midden-Noord-Brabant (CR)	Noordoost-Noord-Brabant (CR)	Zuidoost-Noord-Brabant (CR)	Noord-Limburg (CR)
Beroeps- en niet-beroepsbevolking				*x 1 000*	354	485	568	211
Beroepsbevolking	Beroepsbevolking				252	347	401	149
	Werkzame beroepsbevolking	Werkzame beroepsbevolking			235	326	374	139
		Positie in de werkkring	Werknemer		199	270	317	118
			Zelfstandige		36	56	58	21
		Beroepsniveau (ISCO)	Beroepsniveau 1		24	29	36	14
			Beroepsniveau 2		105	149	168	68
			Beroepsniveau 3		39	53	57	22
			Beroepsniveau 4		63	91	109	34
	Werkloze beroepsbevolking				17	21	27	9
	Werkloosheidspercentage			%	6,7	6,1	6,7	6,4
Niet-beroepsbevolking				*x 1 000*	102	139	167	62
Bruto arbeidsparticipatie				%	71,3	71,4	70,6	70,4
Netto arbeidsparticipatie					66,5	67,1	65,9	66,0

Development of potential professional population in Scenario High per COROP-area (from small shrinkage (6%) to large growth (14% or more)



Bron: PBL (2011)

Entrepreneurs Netherlands (2015): percentage change 2010 – 2015 (from small to large)



Bron: CBS

Education

Onderwerpen	Leerlingen/deelnemers/studenten							
Leeftijd	Leeftijd totaal							
Herkomstgroepering	Totaal herkomstgroepering							
Geslacht	Totaal mannen en vrouwen							
Perioden	2013/'14				2014/'15*			
Regio's	Midden-Noord-Brabant (CR)	Noordoost-Noord-Brabant (CR)	Zuidoost-Noord-Brabant (CR)	Noord-Limburg (CR)	Midden-Noord-Brabant (CR)	Noordoost-Noord-Brabant (CR)	Zuidoost-Noord-Brabant (CR)	Noord-Limburg (CR)
Onderwijssoort	*aantal*							
Totaal voortgezet onderwijs	26 393	39 779	42 276	16 360	26 758	39 796	42 687	16 302
Vo algemene leerjaren 1-3	11 751	16 429	17 836	6 793	11 789	16 322	17 922	6 827
Vwo 3-6	4 053	6 737	7 169	2 467	4 092	6 735	7 215	2 382
Havo 3-5	4 293	6 785	6 924	2 741	4 337	6 591	7 055	2 632
Vmbo theoretische-gemengde leerweg 3-4	3 371	4 691	5 247	1 959	3 597	4 858	5 305	2 011
Vmbo basis-kaderberoeps 3-4	2 433	3 935	4 133	1 987	2 431	4 073	4 256	2 030
Praktijkonderwijs	492	1 202	967	413	512	1 217	934	420
Vavo	361	397	521	167	424	406	606	173
Totaal middelbaar beroepsonderwijs	13 590	19 588	21 027	9 085	13 046	18 896	20 226	8 633
Mbo bol	9 689	14 078	15 412	6 920	9 921	14 338	15 593	7 004
Mbo bbl	3 901	5 510	5 615	2 165	3 125	4 558	4 633	1 629
Assistentopleiding (niveau 1)	577	565	566	193	368	338	405	155
Basisberoepsopleiding (niveau 2)	2 977	4 046	4 343	1 741	2 624	3 502	3 722	1 460
Vakopleiding (niveau 3)	3 016	5 024	4 986	3 087	2 918	4 913	4 869	2 675
Middenkaderopleiding (niveau 4a)	7 011	9 947	11 104	4 059	7 134	10 138	11 222	4 341
Specialistenopleiding (niveau 4b)	9	6	28	5	2	5	8	2
Hoger beroepsonderwijs	14 414	15 248	19 637	5 737	14 781	15 493	20 163	5 932
Wetenschappelijk onderwijs	8 059	3 702	8 673	1 304	7 626	3 551	9 142	1 244

Air pollution

	Onderwerpen	Mest- en mineralenproductie			Gebruik van mest en mineralen		Gebruiksnormen dierlijke mest		Benuttingsgraad mineralen	
		Mineralenuitscheiding			Gebruik mineralen		Plaatsingsruimte stikstof	Plaatsingsruimte fosfaat	Benuttingsgraad stikstof	Benuttingsgraad fosfaat
Regio's	Perioden	Stikstofuitscheiding	Stikstofproductie	Fosfaatuitscheiding	Stikstofgebruik op landbouwbedrijven	Fosfaatgebruik op landbouwbedrijven				
		1 000 kg							%	
Midden-Noord-Brabant (CR)	1995	27 600	23 170	9 110	20 290	7 780		7 190		108
	2000	18 000	15 250	6 360	13 150	5 080	20 710	5 140	63	99
	2005	15 040	12 890	5 390	11 470	4 510	16 030	4 140	72	109
	2013	15 290	13 500	5 380	9 370	3 410	8 650	3 030	108	113
	2014	15 650	13 770	5 530	8 940	3 100	7 970	3 070	112	101
Noordoost-Noord-Brabant (CR)	1995	59 740	48 630	21 140	32 710	13 480		9 920		136
	2000	48 680	39 930	18 430	29 000	11 390	34 270	8 510	85	134
	2005	41 420	34 510	15 860	25 690	9 880	26 140	6 860	98	144
	2013	42 170	36 830	15 720	18 050	6 240	14 560	5 070	124	123
	2014	42 070	36 720	15 810	18 710	6 200	13 390	5 100	140	122
Zuidoost-Noord-Brabant (CR)	1995	55 200	44 530	19 980	27 680	11 880		8 330		143
	2000	46 370	37 680	17 880	25 330	9 750	28 060	7 100	90	137
	2005	39 610	32 780	15 370	22 340	8 390	21 490	5 800	104	145
	2013	40 140	35 000	15 100	16 440	5 500	11 710	3 980	140	138
	2014	40 420	35 190	15 330	16 710	5 500	10 990	4 030	152	137
Noord-Limburg (CR)	1995	25 820	20 610	9 920	12 870	6 140		5 070		121
	2000	21 440	17 190	8 900	10 560	3 940	16 590	4 340	64	91
	2005	18 270	14 940	7 530	9 710	3 680	12 230	3 420	79	108
	2013	19 580	16 960	7 880	6 980	2 400	6 520	2 230	107	108
	2014	19 090	16 580	7 730	5 160	1 060	6 290	2 240	82	47

Live subjects in COROP-areas

		Onderwerpen	Totaal aantal particuliere huishoudens	Eigenaar-bewoner of huurder		Wijze huisvesting							
				Eigenaar-bewoner	Huurder	Eengezinswoning koop	Eengezinswoning huur	Meergezinswoning koop	Meergezinswoning huur	Bedrijfswoning	Wooneenheid	Bewoonde andere ruimte	Inwonend
Regio	Huishoudens	Perioden	*x 1 000*										
Midden-Noord-Brabant (CR)	Totaal huishoudens	2009	200	117	84	106	37	7	30	4	13	.	3
	Eenpersoonshuishoudens	2009	73	23	50	18	14	4	21	1	13	.	2
	Paar zonder kinderen	2009	62	43	19	39	11	3	8	1	.	.	.
	Paar met kinderen	2009	52	44	8	43	7	.	1	2	.	.	.
	Eenoudergezin	2009	12	5	7	5	5	.	2	.	.	.	.
	Overig huishouden	2009	1	1	1	1	.	.	.	.	.	.	.
Noordoost-Noord-Brabant (CR)	Totaal huishoudens	2009	265	166	99	148	55	10	38	8	4	.	2
	Eenpersoonshuishoudens	2009	78	27	51	21	19	5	26	2	3	.	2
	Paar zonder kinderen	2009	84	62	22	56	14	4	8	2	.	.	.
	Paar met kinderen	2009	85	68	17	64	15	.	2	4	.	.	.
	Eenoudergezin	2009	16	8	8	7	6	.	3	.	.	.	.
	Overig huishouden	2009	1	1	1	1	.	.	.	.	.	.	.
Zuidoost-Noord-Brabant (CR)	Totaal huishoudens	2009	318	193	125	171	70	15	43	7	11	1	1
	Eenpersoonshuishoudens	2009	103	38	65	29	24	8	30	1	10	.	1
	Paar zonder kinderen	2009	96	68	29	59	18	6	10	2	.	.	.
	Paar met kinderen	2009	96	80	17	76	15	1	1	3	.	.	.
	Eenoudergezin	2009	20	7	13	6	12	.	1	1	.	.	.
	Overig huishouden	2009	2	2	1	2	.	.	.	.	.	.	.
Noord-Limburg (CR)	Totaal huishoudens	2009	116	76	40	68	21	5	18	3	.	.	.
	Eenpersoonshuishoudens	2009	31	12	19	8	8	3	11	1	.	.	.
	Paar zonder kinderen	2009	43	33	10	30	5	2	5	1	.	.	.
	Paar met kinderen	2009	34	29	4	27	4	.	1	1	.	.	.
	Eenoudergezin	2009	8	2	6	2	4	.	2	.	.	.	.
	Overig huishouden	2009	1	.	1	.	1	.	.	.	.	.	.

			Onderwerpen	Totaal bewoonde woningen	Bewoonde eigen woningen	Bewoonde huurwoningen
						Bewoonde corporatiewoningen
			Herkomst	Totaal	Totaal	Totaal
			Huishoudens	Totaal	Totaal	Totaal
WOZ-waardeklassen	Bruto inkomen	Regio's	Perioden	*aantal*		
Totaal	Totaal	Midden-Noord-Brabant (CR)	2012	185 000	111 600	54 400
		Noordoost-Noord-Brabant (CR)	2012	253 300	159 200	69 200
		Zuidoost-Noord-Brabant (CR)	2012	303 500	181 400	89 300
		Noord-Limburg (CR)	2012	112 600	74 200	28 700
	Minder dan 20 000 euro	Midden-Noord-Brabant (CR)	2012	22 100	4 800	14 300
		Noordoost-Noord-Brabant (CR)	2012	24 400	6 000	15 200
		Zuidoost-Noord-Brabant (CR)	2012	33 500	7 100	21 400
		Noord-Limburg (CR)	2012	12 500	3 400	7 400
	20 000 tot 40 000 euro	Midden-Noord-Brabant (CR)	2012	50 200	20 600	23 800
		Noordoost-Noord-Brabant (CR)	2012	67 400	29 200	31 100
		Zuidoost-Noord-Brabant (CR)	2012	84 000	33 900	40 700
		Noord-Limburg (CR)	2012	32 200	14 800	14 000
	40 000 tot 60 000 euro	Midden-Noord-Brabant (CR)	2012	36 800	23 600	9 100
		Noordoost-Noord-Brabant (CR)	2012	50 700	32 700	12 800
		Zuidoost-Noord-Brabant (CR)	2012	61 700	39 400	15 700
		Noord-Limburg (CR)	2012	24 000	17 300	4 600
	60 000 tot 80 000 euro	Midden-Noord-Brabant (CR)	2012	30 100	23 100	4 400
		Noordoost-Noord-Brabant (CR)	2012	41 800	31 900	6 100
		Zuidoost-Noord-Brabant (CR)	2012	47 900	36 100	7 100
		Noord-Limburg (CR)	2012	19 100	16 100	1 800
	80 000 tot 100 000 euro	Midden-Noord-Brabant (CR)	2012	19 600	16 300	1 700
		Noordoost-Noord-Brabant (CR)	2012	28 200	23 400	2 500
		Zuidoost-Noord-Brabant (CR)	2012	31 500	25 900	2 700
		Noord-Limburg (CR)	2012	11 400	10 200	600
	100 000 euro en meer	Midden-Noord-Brabant (CR)	2012	25 600	22 700	1 100
		Noordoost-Noord-Brabant (CR)	2012	39 900	35 400	1 400
		Zuidoost-Noord-Brabant (CR)	2012	44 000	38 400	1 700
		Noord-Limburg (CR)	2012	13 100	12 200	300
	Onbekend	Midden-Noord-Brabant (CR)	2012	500	400	0
		Noordoost-Noord-Brabant (CR)	2012	800	600	0
		Zuidoost-Noord-Brabant (CR)	2012	900	700	100
		Noord-Limburg (CR)	2012	400	300	0

Vacant buildings

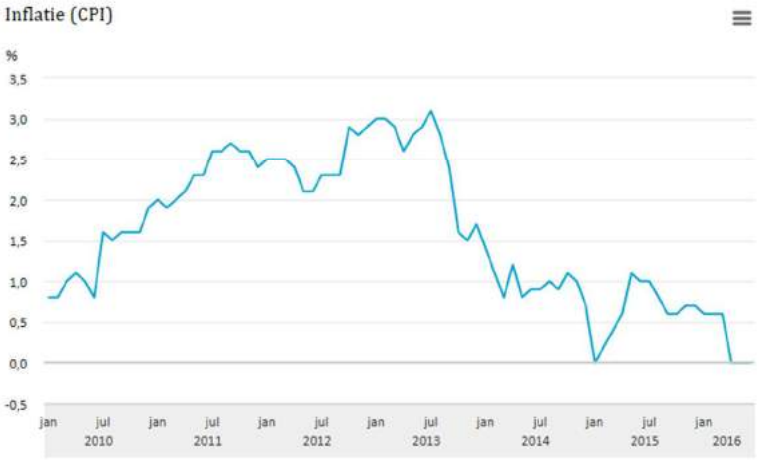
Tabel 8c
Aantal leegstaande woningen bouwjaar[1] 2010-2013 per eigendom uitgesplitst naar WOZ-waarde en COROP-gebied en de vier grote steden , 1 januari 2013[2)]

	Totaal	Eigendom					Huur					Onbekend
		WOZ-waarde in euro					WOZ-waarde in euro					
		minder dan 150 000	150 000 tot 200 000	200 000 tot 250 000	250 000 en meer	onbekend	minder dan 150 000	150 000 tot 200 000	200 000 tot 250 000	250 000 en meer	onbekend	
Totaal Nederland	25 186	1 723	913	841	2 060	219	4 550	2 359	2 497	3 584	1 365	5 075
Amsterdam	1 358	x	x	x	x	5	199	97	132	684	x	168
's-Gravenhage	1 178	x	x	x	88	0	102	97	52	160	263	367
Rotterdam	1 382	x	x	x	56	0	551	200	153	243	x	51
Utrecht	1 238	137	x	x	x	17	262	64	97	129	142	297
Oost-Groningen	86	11	10	5	5	0	5	11	16	5	5	13
Delfzijl en omgeving	49	0	0	0	0	0	0	0	0	0	10	32
Overig Groningen	345	14	13	10	15	0	74	38	42	72	16	53
Noord-Friesland	259	12	13	11	26	0	28	28	46	28	15	51
Zuidwest-Friesland	80	0	5	10	5	0	0	5	5	5	5	36
Zuidoost-Friesland	157	10	10	5	13	5	20	12	10	5	22	53
Noord-Drenthe	386	49	0	5	14	5	21	5	5	10	5	268
Zuidoost-Drenthe	361	14	5	10	10	0	123	20	5	13	41	118
Zuidwest-Drenthe	117	0	5	5	5	10	5	11	5	5	14	60
Noord-Overijssel	412	18	20	24	56	5	49	22	53	51	55	59
Zuidwest-Overijssel	132	0	5	0	11	0	0	10	19	5	0	77
Twente	776	48	14	24	55	16	112	119	126	99	46	117
Veluwe	1 030	61	46	62	110	5	140	101	66	133	62	243
Achterhoek	524	15	32	15	48	0	55	56	12	42	20	228
Arnhem/Nijmegen	701	55	24	16	44	5	226	42	63	32	51	145
Zuidwest-Gelderland	371	30	24	24	28	5	44	18	12	13	31	142
Utrecht	2 802	248	84	77	207	27	493	163	246	333	196	728
Kop van Noord-Holland	375	19	21	19	64	5	15	50	25	44	31	81
Alkmaar en omgeving	475	16	22	5	40	0	91	29	61	96	12	100
IJmond	224	30	5	5	5	12	36	5	10	5	74	37
Agglomeratie Haarlem	172	25	0	5	29	0	31	5	18	45	0	10
Zaanstreek	314	80	11	16	16	0	125	13	26	13	0	14
Groot-Amsterdam	2 027	162	83	17	102	5	249	159	185	790	33	240
Het Gooi en Vechtstreek	343	11	10	10	43	0	58	14	10	67	0	120
Agglomeratie Leiden en Bollenstreek	603	76	19	5	67	0	116	10	48	94	24	143
Agglomeratie 's-Gravenhage	1 717	66	16	24	125	5	243	157	125	252	285	420
Delft en Westland	402	51	22	16	30	11	78	45	25	24	5	94
Oost-Zuid-Holland	279	18	5	28	37	21	29	20	50	24	11	35
Groot-Rijnmond	2 641	96	79	106	179	19	631	460	416	408	44	203
Zuidoost-Zuid-Holland	587	97	17	23	37	10	178	27	38	83	10	71
Zeeuwsch-Vlaanderen	198	12	0	14	83	0	24	10	14	19	0	21
Overig Zeeland	563	35	16	10	79	0	179	47	39	94	10	55
West-Noord-Brabant	983	37	102	26	51	0	229	161	103	161	27	84
Midden-Noord-Brabant	582	76	13	21	48	17	172	32	50	67	14	72
Noordoost-Noord-Brabant	853	69	24	49	105	0	163	41	92	103	19	186
Zuidoost-Noord-Brabant	1 388	41	76	64	144	5	222	173	238	220	52	151
Noord-Limburg	359	19	10	5	31	0	51	42	30	28	51	91
Midden-Limburg	451	20	10	5	17	0	158	89	48	21	10	74
Zuid-Limburg	402	10	10	13	37	0	25	59	50	54	13	130

National inflation

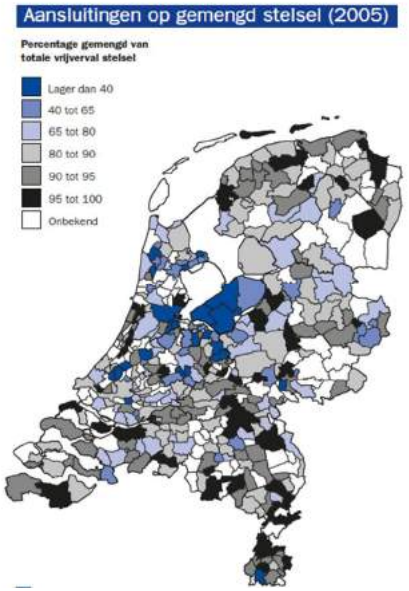
7-7-2016 / 06:30

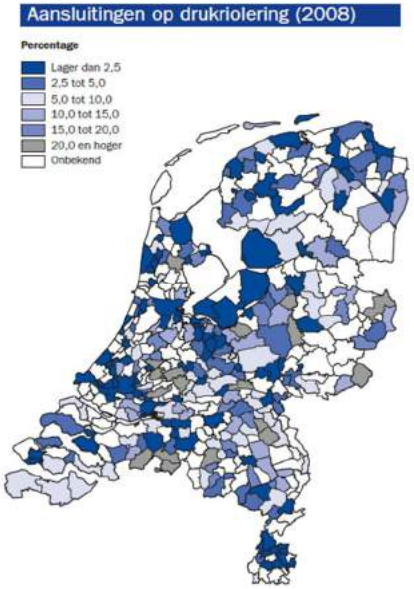
The inflation according to consumer-price index (CPI) was 0.0% in June (CBS, 2016). For the third month in a row, goods and services cost the same as the year before. In the first half year of 2016, the inflation was on average 0.3%.



Sewerage systems

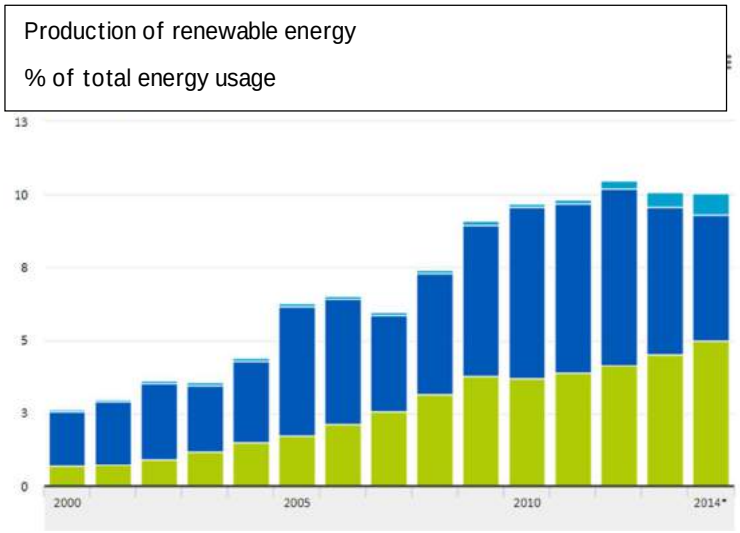
Number of connected households (2008).		
Type of sewer	Inhabitants	Percentage
Mixed sewer	11400000	69
Seprated sewer	3000000	18
Improved separated sewer	1350000	8,2
Pressure sewer	590000	3,6
Not connected to sewer (local treatment)	65000	0,4
Total in The Netherlands	16405000	100





Energy sources

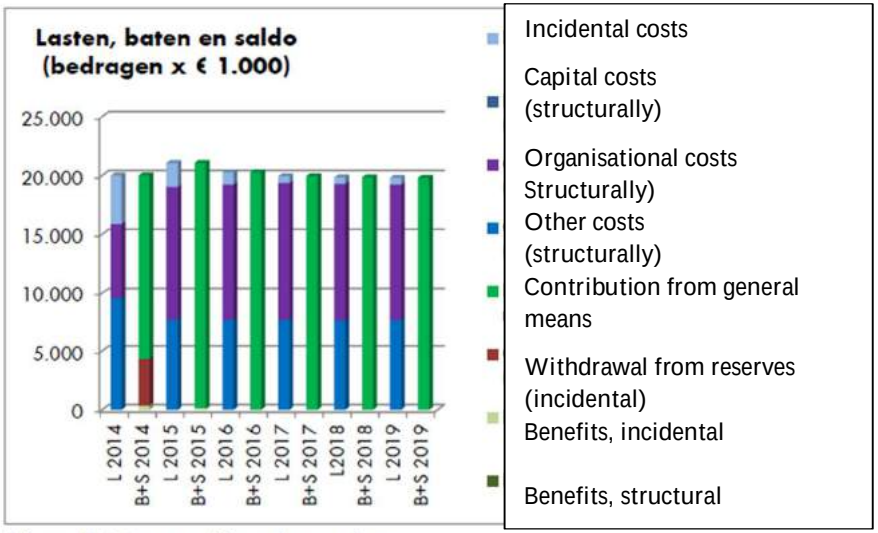
- Solar energy
- Windenergy
- Biomass
- Hydropower
- Geothermal
- Green energy
- Coal, oil and gas
- Nuclear enery



GDP per capita

For the Netherlands 48.222 ($)

Regional budget North-Brabant



L=lasten, B+S=Baten + saldo van baten en lasten

Information sheet of the regions (hard data from year 2014)

COROP regions : Middle-North-Brabant, North-East-North-Brabant, South-East-North-Brabant and North-Limb

	Hard indicators [NETHERLANDS]																					
		DATE																				
Type	Indicator	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	**2014**	2015	2016				
envi	land covered by urbanized areas	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
envi	population density	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	1.829.717	number			
envi	population density in urban areas	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
envi	presence of sources of polution in the area	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
envi	localities with worse ambient air	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
envi	% of households connected to public sewerage systems	x	x	x	x	x	x	x	x	16.405.000	x	x	x	x	x	x	x	x	number	Total Netherlands/Corop regions 10 tot 20%		
envi	% of different energy sources	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
eco	operating profit of reg. budget	x	x	x	x	x	x	x	x	x	x	x	x	x	x	20.000	21.000	20.000	€	Regional budget		
eco	No. of entrepreneurs	x	x	x	x	x	x	x	x	x	x	1.132.044	x	x	x	x	1.468.245	x	number			
eco	No. of entrepreneurs per 1000 inhabitants	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
eco	NACE structure of companies in the region	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
eco	structure of companies according the number of employees	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
eco	household income by net money income per person	x	x	x	x	x	x	x	x	x	x	x	x	34.300	344.500	x	x	x	€	Average disposable income COROP regions		
eco	inflation	x	x	x	x	x	x	x	x	x	x	0,8	2,4	2,2	3,1	0,9	1	0,3	%			
eco	unemployment rate	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	6,5	x	%			
eco	GDP, GDP per capita	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	48.222	$			
eco	average gross monthly wages	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	2.808	€	Average gross wage		
eco	commuting to work or school	x	x	x	x	x	x	x	x	x	x	x	x	14,5	16,3	14,6	x	x	km	Average COROP regions		
eco	% employment in economic sectors (primary...)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		Table sectors		
soc	no. of inhabitants	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	1.829.717	number	Total Corop regions		
soc	relative migration balance	53.873	50.838	24.332	-317	-16.216	-27.428	-31.320	-5.757	25.737	34.481	33.081	29.768	13.883	19.103	35.087	x	x	number	Total saldo Netherlands		
soc	population by age	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		Table population data		
soc	% of foreigners	x	x	x	x	x	x	x	x	x	x	x	x	x	x	21,9	22,1		%	Total % Netherlands		
soc	population by sex	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	2.153.401		1080.408 men / 1072.993 women		
soc	population education structure (university degree)	x	x	x	x	x	x	x	x	x	x	x	x	x	21.738	x	21.563	x	number	Total Corop regions/University		
soc	% participation in regional elections	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
soc	% of women elected to regional government (authority)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
soc	% of abandoned buildings	x	x	x	x	x	x	x	x	x	x	x	x	x	3.182	x	x	x	number	Total Corop regions		
soc	household ownership types	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		Table live		
soc	no. of household users (inhabitants)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		Table live		