



RIGHT
RIGHT SKILLS FOR
THE RIGHT FUTURE

Regional RIGHT Report on Energy Sector Groningen

WP3 – Mapping the Skills Gap / Building a Knowledge Base

B. Fokkens, R. Wolters, A. Manickam & H. van Lieshout



Content

1.	Introduction	2
2.	Highlights of the regional analysis	3
3.	Highlights of the SME interviews	10
4.	Conclusions of SME interviews	15



1. Introduction

This report consists of two parts and describes the highlights of the investigations carried out in the Province of Groningen as part of the Right Project to understand the Regional Innovation Ecosystem in the region. The first part focusses on the socio-economic and R&D profile (Part 1A) and a SWOT analysis on salient aspects related to Regional Innovation Ecosystems (Part 1B). The second part (Part 2) focuses on the SME innovation capacity and needs, and presents the highlights of 6 interviews with SMEs in the region.

The RIGHT project, an Interreg North Sea Program, will contribute to territorial growth in the North Sea Region by connecting smart specialisation strategies to human capital and the skills of the workforce by defining existing and potential regional growth sectors and sub-sectors.

2. Highlights of the regional analysis

Part 1A: Socioeconomic and R&D Profile

Groningen is one of 12 Dutch provinces, located in the Northern Netherlands and relatively sparsely populated. It has a surface of 2,960 km² (70% is agricultural land), which is roughly 9% of the total Dutch area, and has one city, its capital Groningen. The province has 583,581 inhabitants (Eurostat, 2018), which is 3.4% of total Dutch population. The regional governance is Province of Groningen, with 12 communities as local governance.

Furthermore, several collaborations between the northern provinces exist. Since 1992 the provinces Groningen, Friesland and Drenthe have combined their resources in Northern Netherlands Provinces (SNN) to strengthen the regional economy by pursuing joint policies and negotiation with national and European government on common Northern interests. As part of the SNN the Northern Innovation Agenda 2014-2020 unites the provinces of Drenthe, Friesland and Groningen in their efforts to translate the strategy put forward by the Research and Innovation Strategy for Smart Specialisation (RIS3) into a detailed policy agenda, which is then operationalized through the EFRO Northern Netherlands Operational program. In addition to this, the four large cities within the region - Leeuwarden, Groningen, Assen, and Emmen - collaborate as NG4, and SNN cooperates with NOM, a regional investment and development company seeking to stimulate employment and the economy in the North.

Regarding infrastructure, Groningen has a good internet connectivity with high speed broadband and 4G mobile reception in most areas, although coverage may be slower in rural and remote places. Groningen is also a pilot area for testing 5G. The province of Groningen is very accessible:

- by private transport (motorways and secondary roads) and public transport (trains, buses, trams);
- by boat/ship (seaport Eemshaven, small international harbour)
- By plane (airport Eelde/ Groningen, small international airport);

Groningen is a college / education town. It has 2 universities: Hanzehogeschool Groningen for applied sciences (29.338 students) and Rijksuniversiteit Groningen (31.257, students). There are four vocational education schools, with a joint total of 26.091 students.

The knowledge base in energy and life sciences is manifested in the Energy Academy, various institutes at University Medical Centre Groningen (UMCG), the Centre of Applied Research and Innovation (Care Rehabilitation, Education & Sport), and the Institute for life sciences and Technology. Energy Academy Europe brings Groningen University and the Hanze University of Applied Sciences together with the Energy Delta Institute and the Energy College. The Energy Academy focuses on research and education in the field of energy. EnTranCe, an energy field lab with facilities, technology and the best possible network to develop plans is at the Hanzehogeschool Groningen and one of many parts of the Energy Academy, which has the ambition to become an international centre of excellence in energy education, research and innovation.

The province of Groningen has an economic landscape consisting mainly of SMEs, around 95% of the companies. The 134 large firms are primarily situated in industry, the public sector and health.



RIGHT
RIGHT SKILLS FOR
THE RIGHT FUTURE

Major sectors in Groningen in terms of production are industry, business services, mineral extraction (gas!) and information and communication (CBS Stat line). Total population in employment is 285.245. Sectors with highest levels of employment are (1) health care (20%), (2) trade (15%), (3) business services (7%) (4) industry (10%) and (5) education (9%) (LISA, 2018).

Among the regional strengths of the three Northern provinces' (Groningen, Friesland, and Drenthe), energy and life sciences are most prominently represented in Groningen. Major companies in energy are Gasunie (gas transport and infrastructure) and GasTerra (gas trading). After Leiden and Amsterdam, Groningen yields the third position as city in the biotech field in terms of number of companies, highly educated employees, and turnover of "dedicated" life sciences companies (knowledge intensive, specialized companies, highly active in R&D, outcomes of which are both used internally as well as sold for use in external processes, products and/or services).

Groningen has a relatively low research and development intensity compared to other Dutch provinces and public expenditures dominate Groningen's R&D efforts. Provincial strengths are energy and life sciences. The natural gas extraction in Groningen and resulting earthquakes are currently a prominent policy issue.

Part 1B: SWOT Analyses of Regional Innovation Ecosystem

THEME – TECHNOLOGY ORIENTATION

The technological orientation in in mainly focused on: manufacturing, ICT, Health, Energy transition, Chemical industry, Process technology and Agro-food. Strengths are for example: a high productivity, strong innovation eco-system, strong research base, cooperation between triple-helix partners, flexibility, readiness to change and a growing start-up scene (primarily in ICT).

The energy transition towards renewable energy and the development of 5G are opportunities. The region is attractive for new technology roll-outs, Sea water and physical space is available, and there is great potential for data hubs in the Eems harbour (Eemshaven).

Issues that need to be addressed or so-called weaknesses are the lack of company headquarters and therefore R&D. Groningen exists on mainly SME (about 95%). Another issue is the existing skills-gap between the demand of companies and what can be offered. The potential labour force is declining due to demographic developments. The transition from Gas to non-gas can lead to a loss of jobs.

THEME – REGIONAL ATTRACTIVENESS

The region is considered attractive in terms of natural resources, which would create a viable energy sector. There is ample wind, water and land. There is a lot of knowledge in the Gas-sector, which can be used to make the transition toward renewable energy. Besides that, Groningen is (in relative terms) the biggest student cities of the Netherlands, it has a strong research base with the Hanzehogeschool, RUG and UMCG. Therefore, the region is attractive for investors and researchers. With recent key companies moving here such as Google and IBM and a strong developing start-up scene there is strong ICT base in the city/ region. Groningen is centrally located between Germany and the 'Randstad', the price of land is relatively low and there is enough space to invest. Issues are the lack of personnel, education level of the labour force (skills-gap), and the connectivity to Randstad could be better.

THEME – POLICY

In the Netherlands innovation policy is primarily the responsibility of the national government. Research & development support on firm level is based on generic instruments like tax benefits (WBSO). Programmatic innovation in public-private partnerships is key in the 'top sector' policy, aiming at improving competitiveness of nine designated industries. Finally, research subsidies are being managed by NWO, the Dutch organization for scientific and applied research.

Regional economic policy has always called for close cooperation between the three levels of formal government: local, provincial and national. One shape this cooperation has taken, are five regional development agencies covering eight Dutch provinces. Both national government and provinces are shareholders in their RDA.

Since 2010 the involvement of the national government in regional economic policy was gradually phased out and formally handed over to the provinces. Innovation policy was absorbed into the national 'top sectors' approach and is based on making use of existing strengths instead of trying to develop lagging regions. Triple helix consortia have been put in place for the high priority sectors included in the top sectors policy. This policy is inextricably linked to regions as spatial distribution of companies is often based on proximity to other companies (e.g. in the supply chain) and certain regional expertise or specialization. This means that regional economic and industrial policy to an increasing extent became a responsibility of the provinces. The province has experienced a gradual return to the idea of the region as innovator and financier of innovation in recent years. The 'MKB Innovation Stimulerend Topsectoren (MIT)', of which 50% of the budget is provided by the national government and 50% by the province, is a good example of this shared responsibility. At the regional level, innovation policy is not linked to the 'top sector' policy, but focuses on tackling a subset of 'societal challenges'

The transition from natural gas to more renewable energy (RE) is a regional choice as is the emerging digital sector as an important focus sector. Both the presence of Eems harbour and ample higher education students contributed to the latter development and helped attract Google and IBM.

Potential threats are:

- Capacity problems: there are bottlenecks due to fragmented policy dimensions (e.g.: policy for generating power and policy for transmission and storage are not always compatible).
- Growing resistance among a part of the population to climate change mitigation works against energy transition developments.
- A challenge in resources allocation: conflicting policy directions may hinder development/choices.

THEME – TRIPLE HELIX

The collaboration between government and business and education is increasingly taking shape. In this way, investment agendas are drawn up (e.g. for hydrogen) and knowledge is valorised better. In addition, various centres are set up to, for example, promote the intake of students in technology. The transition of old to new energy offers many opportunities for innovation. A remaining weakness is the involvement of SMEs; and knowledge is not always accessible.



Regarding civil society, there are many local initiatives in the field of energy. Due to the earthquakes in the outlying area, there is currently little trust in the government. Decision-making can sometimes take a long time when it comes to various initiatives; the Dutch policy culture of ample field consultations and consensus-building ('polderen') is not always effective in this sense.

THEME – ENTREPRENEURIAL ENVIRONMENT

The region Groningen has several opportunities that provides assistance or financial resources to start a business or support a company in their growth (through the regional development agency NOM). But the financial support and long-term support for start-ups and growth are clearly insufficient. Most funds are temporary. A potential for innovation or economic development is the recently started program NPG.

Entrepreneurship education has been expanded in initial education, starting in higher education, with Hanzehogeschool and RUG cooperating in this field. There are now several programs/ initiatives on each education level that contribute to an entrepreneurial environment. For example:

- Primary level: EBG ICT program
- Secondary level: Ondernemersacademie
- Higher level: Start-up City (part of the Marian van Os Centre of Expertise on Entrepreneurship)

Besides these education-based programs, the employers' association VNO-NCW runs a mutual coaching program: 'ondernemer coacht ondernemer'.

A weakness is that not all schools are participating, and a threat is continuation of funding, as most programs started on temporary funding.

THEME – INNOVATION ECOSYSTEM

The knowledge base in energy and life sciences is manifested in the Energy Academy, various institutes at University Medical Centre Groningen (UMCG), the Centre of Applied Research and Innovation (Care Rehabilitation, Education & Sport), and the Institute for life sciences and Technology. The region has a strong base of cooperation in the Energy sector including: Centre of Expertise Energy (including living lab EnTranCe), New Energy Coalition (containing the Energy Academy Europe), Energy College, Groningen Seaports, Hydro-green. Energy Academy Europe (EAE) brings Groningen University and the Hanze University of Applied Sciences. The New Energy Coalition combines Energy Valley (a previous network organisation for the energy transition), EAE and the Energy Delta Institute with other partners (such as the Energy College). New Energy Coalition is a knowledge and network organisation striving for a sustainable world by boosting the acceleration of the energy transition. The EAE focuses on research and education in the field of energy and has the ambition to become an international centre of excellence in energy education, research and innovation. Included in the EAE is, EnTranCe is an energy field lab at the Hanzehogeschool Groningen with facilities, technology and the best possible network to stimulate the energy transition.

The region has developed specialist knowledge on the biology of ageing through the European Research Institute for the Biology of Aging (ERIBA) and 'Lifelines', a program that for research purposes collects high quantities of data from citizens' body fluids and organic materials. Another important public research institute is TNO-ICT, which has co-locations in Groningen, Enschede (province of Overijssel), and Delft (province of Zuid-Holland).



One of the leading public-private partnerships in Groningen is Energy Valley, which functions as a foundation with over 200 members (research institutes, companies, and government). Its ambition is to make the region an internationally renowned energy hub. It does this by working together in research and innovation, among other areas. Recently, it has consolidated its activities in the New Energy Coalition, together with those of the foundations Energy Academy Europe and the Energy Delta Institute. New Energy Coalition is a knowledge and network organisation striving for a sustainable world by boosting the acceleration of the energy transition. This system transformation requires business enterprises, (knowledge) institutes and policy makers to innovate in close collaboration in order to achieve breakthroughs in technology and knowledge, in economic and societal implementations and in people's mind set and behaviour. As a catalyst, New Energy Coalition drives innovation and education by bringing together knowledge, policy and entrepreneurship.

It's still a challenge (for SME's) to convert this knowledge into business.

THEME – CLUSTERS AND NETWORKS

The region has a strong base of clusters in the energy and energy sub-sectors. For example, Centre of Expertise Energy (including EnTranCe), New Energy Coalition (containing the Energy Academy Europe), Energy College, Groningen Seaports, Hydro-green. Connecting to SMEs remains a challenge whilst connecting to large corporations is easier. In addition, there is potential for more collaborations within and beyond energy and energy sub-sectors in relation to the clusters and networks.

THEME – REGIONAL TECHNOLOGICAL DEVELOPMENT (RTD) / INNOVATION FUNDING

The region has a wide range of schemes available: see 123subsidies.nl. Instruments are sometimes complicated and difficult to access for SMEs. Roll-out funding could be enhanced. In addition, life-long learning as part or RTD roll-out could be considered. A lack of sense of urgency for the need to transition to new jobs / capacity building by businesses is a concern.

THEME – SMART SPECIALISATIONS

The Research and Innovation Strategy for Smart Specialization, RIS3, denotes the strategy for 2014-2020 for the Northern Netherlands, which contributes to the long-term goals of Europe. The strategy aims to stimulate research for realizing innovations and stimulating entrepreneurship. This should contribute to higher economic growth in the Northern Netherlands. The four major societal challenges that are tackled with RIS3 are: Health, demography and well-being; Food security, sustainable agriculture and bio-economy; Certain, clean and efficient energy; Clean, safe water supply.

When we look at the future, the North-Netherlands sees trends as an opportunity and wants to help shape the sustainability, digitization and transition challenges that this entails throughout society (transitions from linear to circular economy, from traditional industry to industry 4.0, transitions in agriculture, care, energy). The North-Netherlands wants to make a meaningful contribution to building a society that is future-proof in several respects through close cooperation within the region and beyond with European partners. Future-proof is understood in a both an economic and social sense through a) commitment to the



economical use of (raw) materials, water and air and limiting CO2 emissions b) capitalizing on the opportunities of the digital revolution and c) allowing all citizens to participate and benefit (so socially inclusive). We aim for a viable region through commitment to sustainable development. We want to close cycles and take steps towards a circular economy where people, planet and profit go hand in hand.

How are we going to do it? In the quadruple helix (companies, governments, knowledge institutions and social organizations), we work on social and technological innovations on social challenges. We work in living labs in our cities, across borders from sectors as well as from companies, knowledge institutions, social organizations and governments. We experiment in test installations and then scale up to have an effect. We innovate socially, invest in people through ongoing training and involve citizens and social organizations closely. We do this to ensure that we make maximum use of the human potential in our region, give citizens tools to influence their own future and to allow innovations to land in society. We also innovate in very innovative ways such as putting innovative applications into practice at cultural festivals (e.g. Innofest, winner of the European Enterprise Promotion Award).

The three Ps of people, planet and profit are reflected in our approach. We are simultaneously working on transition and circularity in three related domains: natural environment, economy and socio-cultural.

- **Natural environment:** More sustainable use of our natural capital (planet)
- **Economy:** Transition in and crossovers between economic sectors (profit)
- **Socio-cultural:** Optimal development and utilization of our human capital both individually and in our cooperation (people). This is about inclusive development, education, empowerment, sense of community, how we do things (tacit knowledge).

We distinguish ourselves through the connection or crossovers between these three domains. By investing in these three domains at the same time, we try to maximize the effect.

THEME – LABOUR MARKET

The working population in Groningen consists of 385,000 people, 23,000 of them are receiving unemployment benefits. 'Werk in Zicht' is the most important collaboration on the labour market and consists of regional and local governments, social security agency UWV and educational institutions.

The aim is to create a good connection between supply and demand on the labour market.

An important condition for economic growth is a well-qualified workforce. The transitions that we are facing also require a workforce that is able to adapt and move with the ever-changing demands placed on employees. In view of the demographic developments (less youth, more older people) and, in addition, a robust group at the bottom of the labour market, investments in training are necessary. Initiatives in this area are already under way in the Northern context and will be fully committed in the coming years. In collaboration with / between triple helix the ambition is:

- Contributing to the **implementation of (training) activities in the context of lifelong development** and solving shortages in the labour market. Education, training and development must be optimally available for the different target groups (workers, job changers, job seekers, drop-outs,



self-employed people without employees) and bottlenecks due to barriers in regulations, target groups and between sectors must be solved as much as possible.

- Contribute to the **learning culture of companies** in the region. Investing in staff development must be a normal part of business operations for all employers. To this end, the HRM function within smaller SMEs in the Northern Netherlands, among other things, must be strengthened.
- Contribute to the **(individual) learning culture of workers and job seekers** in the region. Investing in the development of own (changing) skills must be a normal part of the career of employees;

In addition, together with the educational / knowledge institutions, the ambition is to strengthen the structure of employment and to help improve the match between supply and demand in various ways (from work to work, from unemployment to work and from school to work). To achieve this, we as a province (in collaboration with our partners) are investing in a **training fund for workers and job seekers**. Realization must take place via the NPG.

3. Highlights of the SME interviews

This part of the regional report reports key findings of the investigation carried out on 6 SMEs mainly in the Province of Groningen as part of the RIGHT Work Package 3 activities. The objective of the investigation was to identify the innovation capacities, challenges and opportunities of SMEs in the energy sector in the region. The SMEs were from a wide range of energy businesses reflecting the diversity of the 'energy sector'. This investigation is part of the RIGHT project's broader exploration of the regional innovation ecosystems of the 7 regions cooperating in the project..

The report describes the key findings of the SME interviews to uncover developments, challenges and opportunities to support SME innovation capacities in the Province of Groningen.

The next section describes the highlights of the findings including information on the SMEs and their activities in energy innovation, challenges and possible solutions,

SMEs and their defining features

The SMEs interviewed were identified initially by experts and others through the snowball method. The SMEs were also chosen to cover a range of energy businesses that were contributing to the energy transition (fossil-based energy sources to more sustainable energy sources). These included businesses involved in value chains of small and large windmill production, solar panels, hydrogen and storage systems, installation and services related to customized clean energy solutions. One of the SMEs is actively collaborating with other SMEs to develop infrastructure and value chains for hydrogen-based mobility solutions for commercial and non-commercial markets.

The size of the SMEs varies from 4-90 people. These include family and sole proprietorships with vested interests in the local region, and often connected to networks of entrepreneurs with similar vested interests to the region. These SMEs were focused on local and regional markets with two thirds working in international markets.

SMEs and innovation

All SMEs indicated that that innovation was an important part of their current business activities, particularly product and service innovations (5 of the 6). Process innovation was less relevant to most of those interviewed due to the nature of their core activities. The main exception was where SME focus on greening the existing value chain in which case innovation was a key focus. Examples of the types of innovation are

- developing integrated product and service packages;
- new business services for the growing renewable energy solutions and electric vehicles markets, including the need for charging solutions;
- improving efficiency and self-sufficiency of solar and wind energy solutions for small- and large-scale systems;
- scalable and efficient surplus energy solutions, including data based and new fuel cell technologies;
- introduction of AI and new IT based innovations;



- transport and distribution aspects of energy systems as focus of innovation;
- developing new infrastructures for electric vehicle charging, energy sharing systems, H₂ fuelled vehicles;
- cost reduction focus to accelerate market adaptation of new services, products related to clean energy solutions;
- R&D for customized solutions, specifically related to integration of 'old' and 'new' energy systems;
- creating new green energy chains for transport and mobility.

The SMEs' sources of innovation included their own staff, often engineers or experts, sometimes a designated (R&D) team. The owners were very often part of the innovation drive and team. Sources outside the business included supply chain and project partners, research and educational institutes including students doing assignments/theses, customers where customized services are offered, and leading or dominant stakeholders in energy sector (Gasunie, Henk Lagerwey); Cooperation projects were mentioned by a few SMEs as being pivotal to include new or other technologies in their innovations.

When asked about who was driving innovation, customers were the most common (4 of 6) with a note that rising energy prices were an underlying reason. Policy and self were important for 2 SMEs whilst R&D was significant for one and partly for a second. Student projects were driving innovation for one SME that works closely with higher educational institutes.

SMEs and urgent challenges and possible solutions

The SMEs indicated significant challenges that related to the changing energy systems that were driven by sustainability and policy directions, presence of old and new infrastructures/systems, new technology and market developments. These shifts meant new personnel and, or new knowledge were urgently needed to keep with up developments. Technology was not only a driver but also offered solutions to changing needs.

One specific challenge related to the changing energy sector was a need for new regulations, including safety and common standards in emerging energy solutions and systems was stressed by all SMEs. Policy needs to offer clear framework conditions and boundaries on new developments.

Another urgent challenge expressed by the SMEs (4 of 6) was access to finance. Pre-financing and co-financing of investments for up-scaling, technology rollout, knowledge developments, participating in projects etcetera were seen as critical for business developments and energy innovations. A related issue was costs of new energy products and services for the end-user but also costs of investments for up-scaling and modernizing production processes and facilities (4 of 6). A variety of new investors, financial arrangements and models were mentioned as potential solutions:

- better credit access for SME investments and growth;
- loans, subsidies, fiscal incentives for end-users, especially early adopters;
- institutional investors as new credit sources;
- new business models.

Another challenge has to do with limitations of current systems and knowledge. The urgent need for new knowledge and technology in energy transition needed new types of collaborations, with universities, educational institutes, new partners specialized in other disciplines (IT, big data, A.I., robotics, etc.), other sectors (IT, automotive industry, battery sector), with government for clarity on framework and regulatory

conditions, perhaps funding, and with vocational and higher education institutes and research centres for schooling and innovation needs.

EU projects provided opportunities for collaborations that supported innovation capacity building through new networks and knowledge developments even as new opportunities for collaboration with research centres were increasing which were important for solving the knowledge need (2 SMEs) and often, innovative solutions through student projects.

There were also various solutions and strategies identified by the different SMEs which reflected the diversity of their business scope, scale, ambitions and capacities:

- Exploring new international markets (4) and new business models for emerging markets (1).
- Lobby for recognition of sustainable product and value chains and the need to offer support/exceptions (2).
- Lean and efficient production processes and systems, includes automation, energy and materials efficiency and improvements (5).
- New collaborations and partners (3).
- New skills and training, more innovation/R&D (6).

SMEs and competitiveness

New competences are needed in the areas of:

- Technology developments and skills training. Examples:
 - smart grids;
 - automation (industry 4.0) of production processes
 - just-in-time/lean production;
 - certification if enforced (by regulation);
 - clean technology.
- Communication with local governments (lobby),
- Systems integration of new value chains into existing markets/chains (H₂ in mobility/transport).

Research & Innovation needs are related to:

- energy storage – battery;
- smart grids, including off-grid;
- minimizing maintenance of solar panels, wind turbines;
- lean/automated production lines (customized);
- possibility for pilots to generate new knowledge;
- innovation-to-commercialization (close to market) projects: proof of concept; demonstration projects.

Additional funding is needed for:

- up-scaling production and modernization;
- investments for product innovations and new product developments and for demo projects in energy efficiency (timing is critical – momentum is now with Paris accord);
- hedge risks (of raw materials costs);
- financing for customers building owners, real estate developers, etc.;

- company and consortium – investments/up-scaling;
- capacity building.

New Networks and Collaborations are needed for:

- Development of integrated services/solutions, new products, knowledge, value chains:
 - cooperation with other firms, including competitors if needed;
 - better connections to educational institutions and research centres.
- Re-training, new skills and new personnel:
 - better relations with MBO (vocational institutes) .
- International markets:
 - access to new markets, knowledge of local contexts and viable business models, distribution networks, and integrated solutions for local need e.g. off-grid solutions for water saving products.

Another important aspect is leveraging the momentum: there is an urgent need for new solutions (pilots, rollouts of successful innovation, etc.) as electric and hybrid cars market is taking off.

New opportunities and limitations

All SMEs interviewed considered exploiting new ventures through new markets, new technologies and new partners. New products were mentioned by most (5 of 6). Connecting to citizen initiatives was seen to be an important part of their CSR outreach for one SME to gain support and accept new energy solutions. A different reason to connect to others (end-users) was for product and service development, mentioned by one of the SMEs.

When asked about inevitable developments impacting their business, various limitations were revisited:

- Lack of supportive regulations for energy innovation (e.g., no distinction in new innovative products).
- Changes in regulations demand certification, qualified personnel.
- Lack of financing.
- Lack of personnel.
- Negative public opinion about wind mills on land.
- Privacy regulations impede data driven innovations (e.g. smart management systems).

One SME addressed the push to move to low and no gas/fossil-based products and the need to seize hydrogen developments as being a necessary step.

SMEs' developments in the last 3 years

The main change for the SMEs in the last three years is the change in scope for all SMEs. This took different forms:

- Changes in Geographical scope:
 - local/regional to national (2);
 - regional to international (5):
 - due to on-line launch (new Belgian customers);

- social media exposure;
- re-location of production facilities to harbour;
- contact through Brussels for African market.
- From limited to more energy areas and/or more integrated offers, through:
 - greater focus on innovation and potential of new market and technology developments (e-mobility, Hydrogen, 'greening', e-commerce, IT);
 - new and more partners;
 - new collaborations: joint ventures, projects;
 - professionalization of business;
 - new suppliers.
- New communication leading to changes:
 - more engagement with local and other governments (2);
 - social and national media (1);
 - international customers through e-commerce.

The increased focus on innovation and the need to develop knowledge/competences to keep ahead of and/or respond to technology and regulation changes was described by all SMEs. The SMEs indicated they had become more focused on dealing with the changing energy market and had responded to the change, but there were differences in innovation processes and solutions:

- more qualified staff/management; certification norms; more quality driven (1);
- new location for production was realized and preparing for automated production (1);
- sustainability became important to business, so product/services were adapted or created (6);
- more students and collaborations were leveraged to meet knowledge and innovation needs and new product developments (6).

The final comments from SMEs on how things had changed for them in the last three years described how their businesses became more systematic and professional in dealing with the changing energy landscape. The sense of urgency for exploring new innovative solutions was present in most of the SMEs (5), with three of the SMEs feeling the need to lead change in their domain shaping their outcomes and future strategies.

4. Conclusions of SME interviews

The interviews reflected the changing energy market and the challenges and opportunities presented to these SMEs. These businesses were focused on innovations to be exploited to meet the needs of this changing sector. The main challenges faced by the SMEs were financing investments for growth, innovation and capacity building. There was also a plea for supportive framework conditions in terms of regulations for new technology and business developments in a fast-changing energy sector that connected to sustainability and globalization developments. In addition, they suggested varied financial instruments to help overcome systems and knowledge developments focused on sustainable futures. And finally, the need for qualified personnel and development of new knowledge were seen to be major challenges to be resolved, which in turn drove SMEs to seek closer connection to educational and research institutes and new partnerships. The way forward for some SMEs was to focus on innovation as a core business strategy. But the challenges to move ahead need to be addressed, and SMEs feel that policy has an important part to play in supporting the change that is needed.