RIGHT

RIGHT SKILLS FOR THE RIGHT FUTURE

Regional Report on the Energy and Blue Sectors

Fife Council

Interreg North Sea Region RIGHT
European Regional Development Fund
EUROPEAN UNION

RIGHT
RIGHT SKILLS FOR THE RIGHT FUTURE

Content

RIGHT
RIGHT SKILLS FOR THE RIGHT FUTURE

0.0 Acknowledgments

The follwing report has been completed thanks to the valuable contributions with input of experts from within Fife Council as well as a range of partner organisations and industry. For parts 1A and 1B, Expertise was sought in terms of local policy, statstics, education, economic deveopment, skills development and policy analysis in order to ensure that this phase, WP3, mapping the skills gap/building the knowledge base is an accurate reflection of the Region and its capacity for blue growth.

For part 2, an analysis of SME innovation capacity and needs. Five different companies, one of which is a larger employer but was included due to the importance of the growing aquaculture sector were interviewed and the findings are compiled within.

The RIGHT project would like to thank our colleagues who provided insight and expertise that greatly assisted the research, although they may not agree with all the interpretations/conclusions of this paper.

- Iain Shirlaw – Economic Adviser, Fife Council, CLIPPER
- Maciej Dokurno – Lead Officer Employability, Fife Council
- Lucinda Mcallister- Service Manager Employability, Fife Council
- Brian O'Donnell – Development Officer, DYW, Fife Council
- Gordon Mole – Interim Chief Officer, Enterprise and Employability, Fife Council
- John McFarlane – Employer Engagement Coordinator, Fife Council.
- Pamela Stevenson – Lead Officer Enterprise and Business Development, Fife Council
- Karen Ritchie – Demonstration Centre Manager, Bright Green Hydrogen
- Dale Harris – Chief Executive. ATL Turbine Services
- Donald Waring – Learning and Development Manager, MOWI
- Mark Cameron – Managing Director, Coorstek
- Erin Todd – Managing Director, Todd Fishtech
- Alison Laughlin- Economy Adviser, Fife Council
- Emma McGeough- Economy Adviser, Fife Council
- Jennifer Adamson – Policy and Partnerships Coordinator, Aquaculture Innovation Centre
- June Gallacher – Relationship Accounts Executive, Skills Development Scotland
- Gordon McIntosh – IT Instructor, Fife council

1.0 Introduction

The following report presents findings for Fife Region for the North Sea Region Interreg project: RIGHT Skills for The Right future. The report has been completed as part of work package 3 – Mapping the skills gap and building a knowledge base and the findings will be used to shape the next phase of the project, Work package 4 Bridging the skills gap with pilots.

Fife is one of 8 North Sea Region partners undertaking the task and all 8 reports will be collated into a unitary transnational report that will be shared among all partners. It is split into 4 main sections:

1. A Socio Economic and Research and Development profile based on statistical information from a variety of information sources.
2. A SWOT analysis of the regions innovation Ecosystem based on 1-1 discussions with a range of experts, professionals, desk-based research and policy analysis.
3. An analysis of blue and Energy sector SME's – (2 from each) obtained from a series of qualitative interviews with each organisation providing insight into Innovation capacity and needs. One larger employer, MOWI also provided valuable skills insight into the needs of the growing aquaculture industry in Scotland.
4. A Job Forecasting Excel exercise (JOE) completed utilising methodology and templated provided by the University of Hanze in Groningen. Unfortunately, only one of the participant SME's were able to complete the JOE by the report deadline.

The results from parts 1 and 2 and the findings from the SME interviews, part 3 are presented in section 2 and the key conclusions drawn from these are presented in section 3 of the report.

Section 4 of the report is an overall discussion of the findings drawn from research completed in parts 1-4 above.

Section 5: Inputs for new strategy and policy for skills education and SME innovation – Potential inputs for skills pilots following on from the conclusions drawn from the research.

2.0 Highlights of the Analysis

2.1Part 1.A: Socio economic and R+D profiling

GENERAL INFORMATION ABOUT THE REGION

Fife has a coast line over 117 miles long. Over history this has accommodated industries related to transportation, trading, fishing, Naval defence and leisure activities. The dockyard and mining related activities were the foundation of heavy engineering and manufacturing.
As Scotland's traditional shipbuilding, coal and heavy engineering declined a wave of inward investment in electronics flowed in the 1960s and 70s. This then ebbed as manufacturers sought opportunities in the Far East for lower costs base. With the discovery of North Sea oil, the engineering heritage offered an attractive skills base which encouraged companies to establish oil and gas manufacturing. North Sea production has peaked and activity declined with lower oil prices and many oil fields moving toward cessation of production.

Babcock, as a key driver of the local economy is the operator of the Rosyth dockyard which continues in Naval construction and has an active programme of diversification into offshore wind and decommissioning of nuclear and oil and gas structures. Nevertheless, Fife remains a major centre of manufacturing in Scotland and there is a supply of high-quality skills and considerable investment in equipment. More recently one of the areas of growth has been associated with Low Carbon and sustainable energy. The extent to which this has in itself generated new employment has been disappointingly slow and of a scale less than was previously predicted.

Fife is recognized in Scotland as one of the most supportive regions for activities related to sustainability and Offshore Renewable Energy activities. Fife has created the Energy Park Fife and the Fife Renewables Innovation Centre (FRIC) to act as focal points to attract and develop activities in this area. Recently the UK Offshore Renewable Energy catapult has set up in FRIC operating the world's largest open access wind turbine development activity.

INFRASTRUCTURE PROFILE

There are 28 ports and harbors in Fife with 4 major ports at Rosyth (x2), Burntisland and Methil. Heavy engineering and fabrication activity are based around the ports, mainly in south-west Fife where larger companies tend to be based. Their supply chains include specialist SMEs, some with highly advanced engineering skills tend to locate in Mid Fife with another SME cluster in North East Fife near to the University of St Andrews to the port activities in Dundee on the Firth of Tay.

Fife is well placed in terms of access to international airports at Edinburgh, and Glasgow, Dundee which are all within an hour's drive of most of the region. There is the smaller Fife airport at Glenrothes but is mainly used as a training/leisure facility. In terms of roads the west of Fife is intersected by the M90 motorway which connects with the A9(a major capital expenditure project is underway to dual the road all the way to Inverness) is a main link between North and South and the west. The other main connection, the A92 links this with Dundee and connecting routes to Aberdeen. There are several bridges, most recently the Queensferry Crossing was completed in 2018 improving links with Edinburgh the south and the west There are 2 rail bridges on the rivers Tay and Forth, with 2x road bridges over the Forth at South Queensferry and another 2 at Kincardine linking Fife to the west and Glasgow.

Although a peninsula Fife is well connected to the North, South and West and as such is often used as a commuter location, a strength but also a weakness in terms of retaining or attracting talent. It is worth mentioning that a potential weakness is the lack of a main road, or rail link to two of our major towns. St Andrews which is a cluster for blue growth R+D and this could be an inhibitor to growth. In a similar vein, Levenmouth is not connected by rail which is a major issue inhibiting growth in terms of rail freight and access to human capital. The area is isolated in comparison to the other large towns in Fife. Recently a local campaign to reconnect Levenmouth by rail has been successful and the link will be re-established in the next few years.

Digital connectivity in Fife is comparatively good compared to more rural regions with 98.4% of premises connected to high speed fiber broadband this is thanks in part due to The Scottish Government's Digital Scotland Superfast Broadband (DSSB) program.

EMPLOYMENT PROFILE

Fife has a total population of 371,400 and a working age population (16-64) of 232,500. Of this 176,700 are in employment giving a figure of 75.2% in employment which is slightly better than the Scottish average at 74.1%. The public sector is the main employer in the region employing approx. 25% of the total workforce. Other key sectors for employment are Wholesale Retail and Trade; Repair of Motor Vehicles and Motorcycles at 15.4%. In terms of GVA Manufacturing is the largest contributor accounting for 21% GVA to the Fife Economy.
In terms of qualifications 44.0% are qualified to NVQ level 4 and above. The time series data shows that the percentage of those qualified to NVQ level 4 and above has grown from 26.8% in 2004.

EDUCATION PROFILE

Current School roll data shows that we have a total school population of 49660 with 20484 currently in secondary education and 29,176 in primary. Economic Inactivity data enables us to establish that there are at present 14,600 in further and higher education. Of the working population, as identified above 22% (Scottish government data from 2013 is the most recent data) of the Fife workforce are educated to degree level with 44% educated to NVQ level; 4 and above. Recently through Developing the Young Workforce (DYW) and other employability initiatives there has been a much closer alignment between business and education and we are striving to forge strategic partnerships between every school and local employers ensuring those exiting secondary education are work ready and equipped with skills to Meet the needs of industry.

RIGHT
RIGHT SKILLS FOR THE RIGHT FUTURE

RESEARCH AND INNOVATION PROFILE

The table below shows that there has been a steady increase in R+D spending by private business up to 2017. Some of the data is not available at the Fife level.

Source of R&D funding - Fife	**2017**	**2016**	**2015**	**2014**	**2013**
Total Government spend on R&D in region Not available at a Fife level – figures for Scotland given in table below					
% of national R&D spend Not available at a Fife level – figures for Scotland given in table below					
Private sector spend on R&D in region* (£millions)	£29.4m	£30m	£24.3 m	£23.2m	£27.2m
% of national R&D spend by businesses* - % of Scottish spend	3.4%	2.3%	2.5%	2.8%	2.4%
Total EU R&D funding coming into the region Don't have access to this figure					
EU R&D funding as % of EU funding nationally					

Source of R&D funding - Scotland	**2017**	**2016**	**2015**	**2014**	**2013**
Total Government spend on R&D in Scotland**	£171m	£162m	£155m	£154m	£156m
% of national/UK Government R&D spend **	7.8%	7.5%	7.4%	7.0%	6.7%
Private sector spend on R&D in Scotland* (£ millions)	£1,247 m	£1,075 m	£953m	£957m	£801m
% of national/UK R&D spend by businesses*	5.3%	4.8%	4.5%	4.8%	4.3%
Total EU R&D funding coming into the region Don't have access to this figure					
EU R&D funding as % of EU funding nationally					

Interreg North Sea Region RIGHT European Regional Development Fund
EUROPEAN UNION

RIGHT
RIGHT SKILLS FOR THE RIGHT FUTURE

2.2 Part 1B: SWOT Analyses of Regional Innovation Ecosystem

2.3 Highlights of the SWOT Analysis

Below are some key highlights drawn from the Swot analysis the full analysis can be found below on page 10-36.

STRENGTHS:	WEAKNESSES
• Strong maritime heritage in subsea, Oil and Gas, manufacturing and capability to support Energy transition. • Good support in place for offshore wind and proximity to sites. Presence of Fife Renewables innovation Centre FRIC and the presence of ORE catapult at the site. • Well embedded employability and skills support through Opportunities Fife Partnership. Strong focus on skills, inclusive and sustainable growth at the local level. • Developing the young workforce, DYW creating strategic partnerships between education, industry and government. Creation of apprenticeship family which aims to meet recruitment challenges in key sectors. Flagship national policy. • Culture of enterprise being embedded into primary and secondary education promoting enterprise and entrepreneurship. Fife recent award winner for most enterprising place in Britain. • Good alignment of policy locally and nationally in terms of Blue growth. Many of the key sectors for Fife and Scotland are relevant to blue growth. Food and drink, tourism, engineering and renewables are all priority sectors for the region, so funding and support are available.	• Poor industrial stock which may be unsuitable for growth in the blue sector. Much of which may need replaced, updated or renewed. • Poor In terms of triple helix, considerable work to be done to improve strategic collaboration between stakeholders. • Good science and R+D environment but poor collaboration at a local level. Not many examples of this at present. • No advanced tech centres, they are all based in cities. Though are accessible due to good connectivity. • Relatively low rate of business led R+D tends to be HQ based and no major Headquarters in Fife for blue sector companies, particularly the larger ones. • Hour Glass distribution of company size, some very large any very small but few mid-sized SME's. • Retention of graduates, people being drawn to work in cities. Figures are currently unknown, but this has been known to be a problem for some time. • Clusters tend to be smaller and not mature, not large enough to have significant impact. Critical mass of participants not reached.

Interreg North Sea Region RIGHT European Regional Development Fund
EUROPEAN UNION

OPPORTUNITIES	THREATS
• Fife Well placed to become a Hub for blue growth in the Region, proximity to offshore wind sites, strong engineering heritage. • Opportunity to for better collaboration, amongst clusters and networks of SME's -identified by CLIPPER as a weakness. A lot of good work going on but is happening in silos. • Opportunity to use blue growth, sustainability to meet some current challenges -Uptake of girls into STEM which could help meet some potential labor shortages in STEM sectors. • A lot of support available in terms of startups and innovation funding, presence of innovation centers, though none are in Fife. Opportunity for a more streamlined and less time-consuming mechanism for access. • No one arm of government responsible for blue growth. Cuts across a few institutions, Marine Scotland, Crown estate, transport Scotland which can lead to a confusing landscape, better alignment of key priorities. • Better collaboration between industries and different sectors. Could help drive more innovation and creativity. Lateral thinking that can be required for innovation. Opportunity to develop business clusters further.	• Ageing workforce and large skills replacement demand in multiple sectors though this has been recognized and work is ongoing to meet these challenges. • Potential inability to cope with pace of change of digitization. There is a distinct lack of Software developers, data scientists. • Competition from overseas, Neart na Gaoithe wind turbine jackets to be constructed in Indonesia rather than Methil. • Brexit and uncertainty over key blue sector industries having a negative impact in terms of trade, investment, growth and supply of foreign workers and academics. • Continued threats to public sector finance 10 years of austerity, lack of people to support industry and collaborative projects.

RIGHT
RIGHT SKILLS FOR THE RIGHT FUTURE

THEME – TECHNOLOGY ORIENTATION

How would you describe the technological orientation of the region?

Overview:	Traditional Skillset in Heavy engineering and manufacturing, historic mining skills base, proximity to North Sea Oil and Gas and Deepwater ports x4 fabrication and shipbuilding around Burntisland and Rosyth. High tech specialisms in subsea, TechnipFMC, Oceaneering. High tech electronics specialisms and considerable supply chain supporting. Efforts to aid energy transition. Recent cluster of Fintech SME's. Strong research environment with MASTS based at university of St Andrews and proximity to major Scottish Universities.
Strengths - Capacities & capabilities	Strong engineering base and diversity of companies in supply chain. Capacity to support energy transition and decommissioning of Oil +Gas. Fife energy park, FRIC and presence of ORE catapult centre to support transition. Proximity to offshore wind sites and Oil and Gas for decommissioning
Weaknesses - Issues that need to be addressed	Low level of collaboration between Universities and SME's at a local level. Interface established to assist with this. High tech electronics R+D but low level of collaboration due to nature of industries, Babcock, Raytheon, Thornton Thomasseti. lots of work happening in silos- better connectivity between business and academia. No advanced tech centers, all based in cities out with the region..
Opportunities - Potential for innovation/S3 focus	Opportunity for growth in subsea exploration, shipbuilding, autonomous vessels and sensor systems. Better applications of technology and research – more commercialization of research. Better collaboration strengthening and creation of clusters and networks. Alignment of policy, education and SMEs. STEM and culture of enterprise well embedded into the curriculum from primary age upwards. DYW providing an interface between education, business and policy, forming strategic partnerships Major data centre to be built in Glenrothes could attract growth and attract talent.

Interreg North Sea Region RIGHT European Regional Development Fund
EUROPEAN UNION

Threats - Constraints to be addressed	Brexit, continued low investment, loss of overseas workers, changes to trading rules and tariffs, lack of access to markets. Age demographic of workforce, future skills shortages across various sectors, low uptake of women in STEM subjects Digitization and the lack of data skills and software engineers to facilitate rate of transition Shortage of teachers. Relatively poor industrial stock may.

THEME – REGIONAL ATTRACTIVENESS

How attractive is the region to/for?

	Strengths - Capacities & capabilities	**Weaknesses** - Issues that need to be addressed	**Opportunities** - Potential for innovation/S3 focus	**Threats** - Constraints to be addressed
Investors	Presence of Global international companies, Babcock, TechnipFMC, Oceaneering, N.O.V. Very strong base in Engineering and manufacturing. Good breadth in supply chain. Special grant status may assist in attracting investment. Proximity to airports, geographic location is central with much of Scotlland and the rest of the UK accesible from fife. People, local authoity and Scottish enterprise work closely to attract investment.	Good but not the best at celebrating success, more work could be done to identify positive role models. Poor industrial stock may put investors off. Road and rail network, Levenmouth and St Andrews not connected by a rail linlk or major road.	Good Engineering skills base, highly skilled workforce in engineering. High level of support available in the blue economy from Scottish enterprise, Highland and Islands enterprise. The Scottish Funding council and Locally from Business gateway and the local authority. TALGO investment to create opportunity in supply chain, cluster approach could enhance growth.	Brexit, is causing low confidence in investors, markets are going soft. International competition BiFab , Jackets to be constructed in Indonesia. May be attracted to other regions of Scotland, the UK and Europe.

Researchers	Within 1 hour drive from 6 major universities. Good work life balance, green spaces, picturesque costal villages and proximity to highlands. Strong research cluster around the university of St Andrews -MASTS.	Retention of graduates is poor (figure unknown) they are often drawn to cites or to England. Most R+D centralised and not in Fife particularly for larger companies. Most innovation centres situated out with Fife, all the national innovation centres are out with but are accesible fairly quickly and easily.	Better marketing of business. Better opportunities for commercialisation ofd research. Closer working with MASTS at ST Andrews.	Brexit may reduce the attractiveness to overseas researchers.
Innovators	ORE cataput situated at FRIC, Hydrogen Office in fife Energy park, Methil. Innovation centres established, Scottish Marine Aquaculture centre, Censis, OGiC, IBiolC all of which are relevant to the Blue and energy sectors though none are in fife.	Low level of collaboration on a local level. Difficulty for SME innovators to break into traditional markets – Fishing	R+D largely customer driven, this was cited by most of the SME's interviewd. Policy changes likely to further drive R+D and innovation particularly in terms of energy transition but also ble growth. Better collaboration and strengthening of R+D clusters presents a good opportunity. Simplification of time-consuming application process when applyimg for funding.	Rate of change in Energy transition may slow innovation Lack of risk capital
Inventors	Support, facilities and resources available via innovation centres,	Lack of trust between SME's and Universities, scale mismatch. Previous negative experiences.		Drawn elsewhere, cities, larger population centres.
Entrepreneurs	Good range of support available to startups, incubation centres	Survival rate pof startups lower than Scottish average.	Potential for a strongly embedded culture of enterprise fife education. Grass roots	

	and enterprise hub established to enable and support startups. Culture of enterprise in education -award winning region for most Enterprising place in Britain, 2018. A lot of work being done in this area, partnership between fife Council and Buisness gateway to promote the 'Be your own boss campaign'.	Lack of confidence in young people may result in them being less likely to start a business of their ow. . Areas of depravation people less likely to take risks and start a business – You cant be what you cant see.	approach from primary age upwards. Strengthening of link between business and education. Partnerships being nurtured through DYW and Culture of enterprise teams.	
Multinationals	Good high tech skills base in engineering and manufacturing and electronics can attract investment, TALGO example. Geogrpahic location, proximity to ports and harbours and airports. Location to North sea presents opportunities for Oil and gas, decommisioning and Offshore wind.	No Major head offices in Fife. R+D centres located out with Fife. Other locations may be more suitable geographically, depending on the nature of the business.	Opportunity for Fife to become a centre h well placed to become a hub for blue growth.	Uncertainty over Brexit, competition from other regions, countries. Ageing workforce may see replacement demand for highly skilled engineering jobs could see a strength become a weakness.
Indigenous enterprises	Fishing community in NE Fife. Tourism priority growth area. Tourism, Golf and Tourism in St Andrews.		Potential for significant growth in the Tourism industry in line with local and national gov policy.	
ICT Professionals	Fintech consortium, cluster to support growth in this specific area of ICT cluster of business.	Overall shortage of software developers, data scientists and ICT professionals.	Data centre to be constructed in Glenrothes could increase capacity and attract talent and investment.	Potential to inhibit growth due to lack of professionals.

	growth of vocational pathways into the profession via Foundation, Modern and Graduate apprenticeships could attract more people to the industry.			Lack of computing teachers in secondary education is a local and a national problem.

THEME – POLICY

What is the basis of policy in the region for RTD, innovation, enterprise and entrepreneurship? What is the effectiveness of these policies?

Research and Technological Development (RTD), Innovation, Enterprise & Entrepreneurship

	Strengths - Capacities & capabilities	**Weaknesses** - Issues that need to be addressed	**Opportunities** - Potential for innovation/S3 focus	**Threats** - Constraints to be addressed
RTD	Good support for RTD via innovation centres. Innovation centres established for key industry sectors, notably offshore wind, Oil and Gas and aquaculture FRIC, OGIC and Scottish Aquaculture centre respectively. Uk gov industrial strategy has set out a target tio increase RTD funding to 2.4% of GDP	No one arm of government is responsible for policy. Split between marine Scotland, Crown estates, transport scotland, fishieries. Is fragmented and priorities are unclear. Lack of collaboration between industries. Poor sharing of knowledge and expertrise due to nature of companies eg, defence Also, competition between companies can inhibit collaboration..	More support to SME's in terms of accessing funding and navigating the complex map of funding streams.	Inability to apply research in business. SME interviews highlight that most RTD is customer driven. Reactive rather than proactive. Brexit causing lower risk capital could lead to a decrease in RTD spends.

Innovation	Strong focus on skills in region. Growth of the apprenticeship family and voacational routes into employment . Focus on inclusive growth at local and national levels, Fair4Fife and Fifes economic strategy 2017-2027	Recognition that key sectors such as engineering has an ageing workforce - less likely to drive innovation.	Better allignnment of skills and experience to encourage innovation. - Apprenticeship family promoting innovation- work placement element. Better cross sectoral collaboration in terms of RTD.	
Enterprise	Culture of enterprise embedded into education from primary upwards. Lots of funding available for startups Fife priority to promote enterprise and entrepreneaurship, Well established industry led programmes in education such as Ratheyon quadopter challenge. Enterprise skills becoming embedded into mainstream education via Culture of enterprise work and DYW.		More policies and educational programmes focused at entrepreneurial skills. More embedding of enterprise education int the cirriculum, this is happening locally through DYW and Culture of Entrerprise but could become a feature in the national Cirriculum for Excellence.	
Entrepreneurship	Priority to promote entrepreneaurship at Scottish gov and Uk gov level. Good level of funding and support available through business gateway fife and Fife economy partnership for startups.	Areas of depravation less likely to encorage business startups and can also effect survuival rates of those that do. Startups at a lower rate than UK average.		

	A few inncubator centres such as the Enterprise Hub to assist businesses with affordable office space with good connectivity.			

THEME – TRIPLE HELIX

How would you define the level of engagement between the Triple (Quadruple) helix partners in the region?

	Strengths - Capacities & capabilities	**Weaknesses** - Issues that need to be addressed	**Opportunities** - Potential for innovation/S3 focus	**Threats** - Constraints to be addressed
Government → Industry	Good capability to support research and innovation via newly established innovation centres, FRIC, OGIC, Aquaculture innovation centres in line with supporting growth. Fife Council has a top 200 relationship management sytem to support and assist in developmet of key comapnies in line with key growth secrtors and the economuic strategy.	No one arm of government responsible for blue growth. SIpit across various Marine Scotland, crown estate, Transport scotland, Fisheries	Scotland's economic strategy identifies 6 key growth sectors. 3 of which are in the blue sector, Energy, Food and drink, Sustainable tourism. Opportunity to capatilise on funding and infrastructure projects resulting this. At the local government level Fife's economic strategy identifies food and drink, Engineering and Tourism as key growth sectors and have associated action plans to supporrt and enable growth.	Changing priorities resulting in reduced funding as seen with Bright geen hydrogen who have seen a reduction in funding due to a move to other types of renewables electric vs hydrogen. Change in government priorites may see a shift away from renewables alltogether though much less likely in the Scottish context than in the UK overall. At the local level, lack of investment in industrial sock and facilities

				could inhibit growth.
University (HEI) → Industry	Interface was established in 2005, as a central hub connecting organisations from a wide variety of national and international industries to Scotland's 23 higher education and research institutes. It aims to simplify businesses experience of working with academia while encouraging innovation and entrepreneurshp. Scottish Oceans institute St Andrews university (SOI) is an interdisciplinary research institute studying the marine environment located on University of St Andrews campus. The University aims to become UK's first carbon neutral institution of its kind in the UK. The Marine Alliance for Science and Technology for Scotland (MASTS) is a research pooling initiative, funded	Whilst there is a wealth of good reseasrch going on, application in industry, particularly in relation to SME's is still limited. Smaller SME's in particular can be reticant about collaborationg with HEI due to mismatches in scale and concerns around ownership. One of the SME's interviewed said they would not collaborate on research projects due to previous negative experiences.	Opportunities for further collaboration between strong research community, MASTS in ST Andrews and Institute of aquaculture at Stirling Uni. Recently demonstarted a good collaboration on sea lice control in aquaculture. Better sharing of academic materials and resources as this can be costly for smaller SME's and can inhibit innovation. Strengthening of industry clusters and academic partnerships. Better cross collaboration between sectors and scientific disciplines.	Pace of change, lack of skills and people to enable growth, retention of graduates and skilled workers attracted to more urban centres may inhibit growth. This may be a particular issue taking consideration of the high replacement demand in certain sectors, particularly engineering where there is an ageing workforce.

	by the Scottish Funding Council (SFC) whose Directorate is based at SOI. Also, within SOI, The Sea Mammal Research Unit (SMRU) is one of the foremost institutions carrying out research on marine mammals in the World including the impact on such populations from offshore marine energies. In 2009 the Fife Economy Partnership outlined a vision to make Fife a centre of excellence in Renewable Energy. Energy Park Fife at Methil docks, a joint venture between Scottish Enterprise and Fife Council, is specifically mentioned in the National Renewable Infrastructure plan.			
Government →University (HEI)	Government has plans to widen access to university which could lead to more graduates from deprived areas. - Contextualised recruitment. Innovation centres provide	At the local level, collaboration between government and Universities is limited though this is improving through growth of clusters and innovation centres.	Allignment of funding and educational programmes specific to blue growth suce as the RIGHT project. Increse in graduate apprenticeships benefiting industry in upskilling staff	Lack of stratefgic planning between the two on terms of blue growth could result in a mismatch between graduates and opprtunities resulting in labour market shortages.

	opportunities for graduates. and better application of research. Strong commitment from government to invest in research and innovation across many parts of the blue sector. Priority to support universities in terms of ineternationalisation.		Work based learning project opportunities.	

THEME – ENTREPRENEURIAL ENVIRONMENT

Describe the region's entrepreneurial environment.

	Strengths - Capacities & capabilities	**Weaknesses** - Issues that need to be addressed	**Opportunities** - Potential for innovation/S3 focus	**Threats** - Constraints to be addressed
Overview	Fife's business base has grown steadily since 2014 to a high of 10,295 with an average of 273 startups Per annumn over the period. The survival rate of businesses is in line with scottish average 93.8% - 1 Year and 62%, 3 years. There is a good range of support and funding available to SME's and startups, primarly done through business gateway, Scottish	Areas of depravatuion lead to reduced confidence in terms of starting up a business. Pockets of low economic activity may also impact on the the entreprenearuial environment. Number of startups is still lower than national average. Complex mechanisms to access support and funding, often considered too time consuming for startups and smaller	Better celebration of sucesses and positive role models. Opportunity to simplify access to support and funding. A portal of sorts to ease the process and signpost clients to the most releavant support mechanism. This may increase survival rate. Growth of sustainable social enterprises may attract a different type of entrepreneaur and encourgae more startups. Culture of enterprise work promoting throughout education.	Continued depravation and low economic activity can be an inhibitor for business but also may lead to continued low confidence for entrepreneaurs. Work to embed culture of enterprise does not have a significant or quick enough impact. Time delay between education and this translating into entrepreneaurial activity.

	enterprise and the scottish funding council. Funding is more abundant in areas in line with key growth sectors, a number of which are blue economy or support sectotrs, a key strength. Culture of enterprise well embedded into education with 147 businesses supporting educational programmes in school. Establishment of inncubator centres such as the enterprise Hub giving access to good resources for business.	SME's. Semi Rural county with no major cities, entrepreneaurs may be attracted to larger population centres. Continued Public sector cuts and reductions in staff may reduce capacity to support.	Opportunity for more professional ansd scirentific startup enterprises specific to blue growth. Presence of Scottish Oceans Institute, Masts and ore catapult in fife should encourage more startups once commercialisation improves in line with aims of clusters.	
Ease of starting a business in the region	Difficult to say, though good support available via innovation and inncubation centres . Rate of startups very close to national avaerage.	Survival rate slightly lower than national average, 3 years 62.0% vs 62.1% nationally. Again, complex maze of support mechanisms and funding can confuse the landscape.	Opportunity to provide a more streamlined and less time consuming processes for accesing funding for example, a portal to direct users to the correct funding and support. Potential for a digital solution.	Starups not getting access top the most appropriate support mechanisms may lead to increased rate of failure.
Enterprise supports available for start-ups	A good range of support and funding are availabale to encourgage startups. Delivered mainly by Business gateway fife which acts a front line service, Fife Council and the Fife economy partnership (FEP). Good levels of collaboration via	Difficult for SME's and startups to keep abreast of new funding initatives, could lead to missed opportunities	More cases studies and positive examples specific to Blue growth. Potential for tie in's with local food and drink action plan and for tourism. Continued embedding of culture of enterprise into education and growth of social enterprises creating a healthy entrepreneurial environment.	Loss of access to EU funding, special grant status as a result of Brexit, may lead to less support being available.

	FEP amngst stakeholders. Blue sector well positioned in terms of local and national giov priorities, funding and support are better than other sectors.			
Enterprise supports available for growth	Good funding available to support growth, particuilarly ine terms of the blue economy. Scottish ERDF operating plan aims to support SME's capacity to grow into regional, national and international markets in addition to increase business led. innovation. Support is mainly delivered, in this context from Scottish enterprise (SE), The recently established Scottish Investment bank, the scottish co-investment fund,. The national renewables infrastructure fund (NRIF), Renewable energy investment dund,(REIF), Resource efficent scotland , SMART Scotland and the Scottish gov SME holding fund. Blue growth a prority for local and national governments.	Again this can be complex and time consuming for SME's to navigate. Scottish Enterprise tends to support larger SME's.	Opportunity for upskilling SME's in terms of funding, bid writing etc, inablity to compete with larger SME's or even universities and academic institutes. Simplifying of funding streams and support mechanisms available to SME's looking to grow. Accessing funding can be beurucratic and can put off some companies from seeking support.	Mismatch between scottish and eu gov Energy priorities, Nuclear vs renewable. Low levels of risk capital available to some SME's.

THEME: ENTREPRENEURIAL ENVIRONMENT (2 OF 3)

	Strengths - Capacities & capabilities	**Weaknesses** - Issues that need to be addressed	**Opportunities** - Potential for innovation/S3 focus	**Threats** - Constraints to be addressed
Enterprise support available for internationalisation	Scottish ERDF operating plan aims to support SME's with internationalisation a priority. SE or Highlands and Isalands Enterprise (HIE) being the main supports in this area. Blue growth is a central government priority for internationalisation particularly in terms of Food and drink, renewables and tourism.	Infrastruicture in rural areas may cause issues for businesses seeking to break into international markets.	Growth of clusters some of which are very new, Forth and Tay offshore clusters could better support businesses specifically in internationalisation.	Missing out on opportunities due to not being able to access support. Loss of funding sources due to Brexit. Lack of undertsnding of international markets. Loss of business confideince in this area due to Brexit and uncertainty.

RIGHT
RIGHT SKILLS FOR THE RIGHT FUTURE

THEME: ENTREPRENEURIAL ENVIRONMENT (3 OF 3)

	Strengths - Capacities & capabilities	**Weaknesses** - Issues that need to be addressed	**Opportunities** - Potential for innovation/S3 focus	**Threats** - Constraints to be addressed
Entrepreneurship education at primary level	Culture of enterprise framework becoming well embedded into primary education. Partnership approach between Fife council economic development, Developing the young workforce, the business community and third sector partners in order to achieve goals. Well established programmes run in primaries such as Ratheyon quadcopter challenge, meet the business (manufacturing, food&drink), 3D printing projects and industry 4.0 challenge.	There is recognition that there is a long standing attiudinal barrier that prevents entreprenearship. The COE frameork was launched to change this. Education is very slow to adopt to change for a number of reasons. The cirriculum for excellence does not identify entrepreneurship as a priority, a change here could see a bigger impact and greater buy in from subject teachers.	Opportunity to more robustly embed culture of enterprise into both primarty and secondary education. Opportunity to increase the number of interactions between the business community and education. This is happening natuarally as a consequnce of the DYW project.	Lack of buy in from teachers who may fail to see the value in enterprise education vs more traditional disciplines.
Entrepreneurship education at second level	Similarly. the partnership with DYW is promoting entrepreneaurship in education. Well established programmes run in parnership with Young enterprise Scotland, the social enterprise academy run programmes in all 18 of our high schools. In addition the enterprise game is open to all	Teachers are under a lot of pressure, teacher shortages in certain areas put pressure on an already demanding system. Incentives that are not linked to cirruculum or attainment incentives may not recieve priority. Shortage of computing/iT	Opportunity to better align enterprise programmes in the context of blue growth. Potential for incentives or blue growth specific projects such such as industry 4.0 challenge. Oportunity to embed enterprise into the cirriculum.	Exisiting attitudinal barriers are not overcome and programmes not translating to entrepreneurship. Lack of buy in from teachers who may not see the value vs more traditional subjects.

Interreg North Sea Region RIGHT European Regional Development Fund
EUROPEAN UNION

	secondary students and sucessful programmes such as Tycoon teens 4tofortune are available to all students. Various funding incentives for students to start social eneterprise projects, Young enterprise Scotland, Social eneterprise academy. Enterprise education avaialable to teachers and educators, led by Economic development.	teachers may lead to a skills gap in this area which could inhibit digital enterpreneaurs.	Opportunity to connect more business and enterpreneaurs to education through continuation of DYW. Use of platform such as Founders4schools.	
Entrepreneurship education at higher level	Culture of enterprise (COE) action plan sets up a priority to ensure enterprise and employability are embedded into mainstream course delivery. Partnership with Fife college, Economic, development, business gateway and local employers to extend Be Your Own Boss programme.	In terms of University there is little focus on entrepreneaurship outwith business disciplines.	Potential for supplementary courses, modules in entrpreneurship specific to blue growth. Better understanding of the labour market, growth areas and opprtunities for entrepreneurship. Better support for graduates seeking to start a business.	Loss of the best graduates to more urban centres.
Entrepreneurship education for entrepreneurs	Business Gateway pre start campaign set up to encourage more start ups. Targeted support available to encorage more female entrepreneurs and those over 50. Lots of advice and support available	Smaller enterprises in particular may not have the time to access training and development opportunities as day to day operations take priority.	Creation of more enterprise Hubs to ensure more coverage throughout Fife. Relatively complex map of support available. Better signposting and referal system could improve access to training and development opportunities.	Not celebrating the sucesses efffectively enough may discourage other enterprises from seeking support.

	from Fife Economy Partnership. Local priority to promote enterepreneaurship. Excellent facilities for trainig at the enterprsise Hub. Good range of support avaiable in terms of supporting businesses in digitisation. Local work complimented by work of national innovation centres.		Opportunity to digitise training courses may make it easier for entreprenurs to find the time to develop their skills.	

THEME – INNOVATION ECOSYSTEM

How would you describe the region's innovation ecosystem?

	Strengths - Capacities & capabilities	**Weaknesses** - Issues that need to be addressed	**Opportunities** - Potential for innovation/S3 focus	**Threats** - Constraints to be addressed
Overview	Good environment to enable innovation. Very strong Research community with MASTS and Scottish oceans institute based at the university of St andrews. Presence of Fife energy park and ORE cataput based at Fife Renewables and Innovation centre (FRIC). Fife well placed to become a hub and centre of excelence for renewables. Blue growth a priority locally and nationally specifically in terms	In terms of SME's most R+D is customer driven. Still to see better applications of research into commercialisation. Not much evidence of this at present Business clusters are not mature and have not reached 'critical mass' required to have significant impact. For example, Forth and tay offhsore cluster is only newly established. Allignment of research and industry could be better.	Oportunities to grow and strengthen clusters and to make Fife a natonal hub for blue growth. Growth of clusters and innovation centres. More examples of real world applications of R+D. Using examples such as ORE catapult. Triple helix approcah to encourage more innovation, stronger partnerships between all levels of education, industry and government.	Smaller SME's in particular may find it difficult to acess funding for R+D. They may not recognise what they are doing is R+D and fail to claim tax or funding incentives. Some SME's reticant about collaborationg with Universities due to scale mismatches.

	of renewables, Food and drink and tourism. A number of existing plans to enable blue growth and development, such as culture of enterprise framework, food and drink action plan, tourism action plan. Strategic industy partnerships being forged with education through DYW, Foundation apprenticeships and Culture of enterprise work, providing contextualised learning and working towards combating future skills mismatches by directly influencing the cirriculum. .		Continuation of graduate apprenticeship programme will lead to innovation via work based learning.	
What is/are the mechanisms for doing research in the region?	Good research community. Scottish Oceans institute, MASTS based at St Andrews. Ore cataput have presence at Fife Renewables innovation centre in Fife energy park. Capacity to support SME's in innovation and with academic collaboration. Interface is an intermediay connecting academia to	Access to academic materials and resources can be costly for SME's. None of the national innovation centres are based in Fife.	Better focus via clusters to allingn research with industry requirements. Develop effective signposting and referral protocol to ensure Fife businesses have clear access to sources of knowledge transfer and R&D both within the region, and within the wider HE sector through the national interface project.	Loss of acess to European funding for blue growth projects.

	industry for R+D, well established.			
What is the commercialisation process for research in the region?	ORE catapult has strategy to assit SME's with commercialisation. Shared test facilities for R+D collaborations and partnership approach. Assitance to SME's in accesing funding, shared test facilities . Some good case studies of support and collaborations. Collaboration with innovation centres and SME's, Scottish aquaculture innovation centres, OGIC, FRIC, CENSIS. Fastblade facility relatively close to region, partnership with Edinburgh Uni and Babcock	Only FRIC is in Fife. Not a great deal of examples of commercialisation other than Ore cataput and Scottish aquaculture innovation centre.	Better undertsanding of clusters and opportunities for collaboration and support in commercialisation.	
How easy is it for industry to engage with research centres?	Good due to presence of innovation centres for blue economy SME's.	SME's potentially unaware of presence of research centres and what support they can offer.	Opportunity for SME's to better capitalise on research in terms of innovation, commercialisation and internationalisation. Opportunity for academia to better understand needs of industry.	Continued complex map of support. SME's may not know where to start looking.

THEME – CLUSTERS AND NETWORKS

Describe the clusters and specifically energy/blue sector/maritime clusters in the region

	Strengths - Capacities & capabilities	**Weaknesses** - Issues that need to be addressed	**Opportunities** - Potential for innovation/S3 focus	**Threats** - Constraints to be addressed
Level of cooperation between cluster participants	Scottish maritime cluster established in 2018. Forth and tay offshore cluster esablished in 2018. SMAS -Scottish Manufactory Advice service supports the manufacturing base in terms of growth, funding and digital transition. Scottish aquaculture innovation centre. MASTS -based at st andres university.	Maturity of clusters is comparably low. CLIPPER identified this as an area of weakness. Coperation between clusters is not great, clusters can compete More work to be done to build and strengthen the triple helix. Better involvement and collaboration amongst stakeholders. Recognised that clusters need to reach a critical mass of participant organisations to become truly effective.	Opportunity for growth of Scottish maritime and Forth and Tay offshore alliance Opportunity for opportunity for better collaborations between stakeholders and better alignment between R+D. and insudtry to enable growth. Opportunity to join up clusters where mutal benefits for example Scottish Maritime cluster and MASTS. Opoortunity for a cross industry blue growth cluster.	Clusters fail to have the desired impact and fail to reach numbers needed to make them sucessful enough to add value to their membership. Competition between clusters or participants may inhibit collaboration.
Level of Internationalisation of cluster participants	Some large organisations involved in clusters, Babcock for Scottish maritime cluster and EDF and SSE for Forth and Tay offshore cluster.	Low level of internationalisation in terms of SME's. Often difficult for SME's to break into international markets.	Opportunity for emergant and established clusters to become support mechanisms for supporting internationalisation. Opportunity for pooling and sharing of resources amongst cluster participants, multinationals can support SME's and those in the value and supply chain.	Brexit and the uncertainty over trade rules is causing a fear factor and may make SME's less likely or less willing to attempt to break into international markets.

Level of integration of the cluster within the regional innovation system	Currently a weakness though the climate for integration into the ecosystem is good for Fife. Key sectors such as renewables, engineering and food and drink are likely to provide ongoing support for integrating blue growth clusters into the overall innovation ecosystem.	Relatively weak, the Blue growth clusters are reatively young.	Opportunity for Blue growth to become'keystone' sectors for growth in Fife. Opportunity for clusters to become central forum allingning academia, industry and policy.	Clusters failing as they are seen to be inneffective. Changing government prorities at the local level may see a shift away from blue growth or renewables.

THEME: CLUSTERS AND NETWORKS

	Strengths - Capacities & capabilities	**Weaknesses** - Issues that need to be addressed	**Opportunities** - Potential for innovation/S3 focus	**Threats** - Constraints to be addressed
Support from government	Blue growth is high on the government agenda both locally and nationally. Suppport for SME's via scottish enterprise, the scottish funding council, skills development scotland.	No one arm of government responsble for blue growth, split between various institutions with differing priorities. Marine Scotland, Crown estate, Transport Scotland, Scottish enterprise, Highlands and islands enterprise.	Opportunity or collaboration between different industry clusters, potential support from government to encourage collabration.	Inability for clusters to access government funding to keep operational. Potential for loss of access to European funding and collaboations.
Network participants	The 2 main clusters that exist in the blue sector are relatively small but comprising larger SME's and multinationals and government and public bodies. The academic cluster, MASTS	Size of the 2 specifically blue growth industry clusters are relatively small Clusters are new and are and do not represent the full range of businesses, they need to grow to	Potential for cross cluster collaboration to encourage innovation and sharing of best practices. For example, finding talent, energy efficency etc. Cross cluster	Unwillingness to share resources, experience and risk due to competition amongst participants.

	comrprises 17 different universties and research bodies into a single organisation. Is well established with a good degree of international collaboration in terms of research.	be more representative. Academia needs to be involved to enable more applications of research in industry and better synergies between industry and academia.	collaboration, involvment of innovation centres and academic clusters such as MASTS within the industry clusters. Opportunity to raise awareness of and better marketing the succeses of the clusters.	
Internationalisation of the networks in the region	MASTS well established in terms of international collaboration for research projects. Priority of all clusters to support businesses in terms of internationalisation.		Blue growth clusters are not active in the international sense.	Brexit

THEME – RESEARCH AND TECHNOLOGICAL DEVELOPMENT (RTD) / INNOVATION FUNDING
Describe the funding measures that support RTD in the region?

	Strengths - Capacities & capabilities	**Weaknesses** - Issues that need to be addressed	**Opportunities** - Potential for innovation/S3 focus	**Threats** - Constraints to be addressed
Funding Instruments available for entrepreneurs	Funding for entrepreneurs and startups mainly delivered via business gateway in partnership with Economic development. A range of programmes and finance entrepreneurs, start up loans of up to 25k. Expert advice given by specialists to assist businesses with finding and accesing the best source of funding. Ability to signpost to other incentives such as, youth business scotland programme, womens entrepreneur networks, Disabled entrepreneurs network. DSL business finance - additional loans of up to 30,000 for start ups. Non profit business lender providing cheap finance to thise that may find it difficult obtaining loans from banks.	Knowledge and awareness of the support mechanisms is not comprehensive. New startups may struggle unessearily as they are not tapping into funding that could be useful.	Opportunity to better market the succeses of business support to encourage more uptake of support. Opportunity to grow the number of business startups. Opportunity to improve survival rate of new enterprises.	Not enough funding or funding too limited, particularly for those requiring high levels of technology or expertise.

	Peer to peer crowd funding initaitaives has grown over the years. BloomVC offers a platform to support busineses in crowdfunding campaigs. Funding for social enterprise startups (young people) via social enterprise academy.			
Funding Instruments available to support ICT businesses	Digital boost - Business Gateway Fife offeres 1-1 support for businesses wishing to increase digital presence. Fintech consortium established to meet common skills challenges in regions' strong financial technologies sector. Datalab innovation centre established to support growth and innovation in data science and artificial inteligence. Cutrrently running The Blue Growth data challenge competition aimed at how data can create innvation in marine science/the marine environment.	Knowledge and awre ness of funding, support mechanisms and innovation/incubator centres could be better. Skills gap in ICT, currently a lack of software developers and data scientists nationwide. More funding and early interventions promoting these fields in schools. Currently engagements between ICT firms and education is the lowest amongst all the industry sectors. Also a relativelky low ICT business base within the region so not many examples of businesses who have sucessfully utilised funding and support. Good facilities available for ICT firms such as the eneterptridse Hub which gives access to high speed broadband and shared ICT facilities.	Opportunity to better promote ICT discipolines in education through increasing business enagegement programmes such as the hackathon. More funding incentives to get people into the industry. More funding to get ICT teachers into the industry, current shortage in ICT teachers nationwide. Opportunity for businesses ad SME's to capitaliuse on benefits of Blockchain, reduced costs increased security, more transparaency etc.	Lack of people with the skills to meet the needs of tranistion particularly in manaufactring as it moves to more automated processes.

Funding Instruments available to support incubators/accelerator programmes	A number of inncubator and accelerators based in Scotland. FRIC -based in energy park fife, ORE catapult also based at energy park. A number o private and public incubators in the east of scotland.	Most of the oil and gas incubators are based in NE Scotland. Nother than FRIC there are none in Fife though a good number are accesible fairy easily and not a significant Barrier to fife businesses.		
Current tax incentives to support R&D, ICT R&D, other R&D…	SME R+D tax relief available to SME's that meet the criteria. SME's contracted to larger businesses can claim R+D taxation credit up to 12% R+D expendature.	Some SME's do not reconise what they are doing qualifies as R+D or for R+D tax relief. R+D rates are lower than the UK average. Taxation is reserved to the UK government this does not allow for localised flexibility to change. incentives to meet local or even national priorities.	Opportunity for further devolution of taxation.	Differing priorities of Scottish and UK gov in relation to blue growth, For example renewables.
Describe the availability and accessibility to regional, national and European funding for RTD	Good support available in terms of accessing funding for SME's. In the blue sector there is a good range of funding and support mechanisms and correlation with key growth sectors, locally and nationally (Scotland) are likely to add to this over time. A numberr of low carbon and energy transition funding incentives available to SME's	Difficulty, bereucracy and time consuming nature of accesing funding a longstanding issue for SME's. Time constraints, priorittisation of day to day activities limit R+D funding. Rates of funding are lower than other 'regions of the UK'. Gross expendature on RTD in Scotland is lower than the UK average 1.63% of GDP vs 1.69% (UK) and 1.96% (EU)and 2.37% (OECD) figures from 2017.	Growth of R+D spend from SME's (has incresed slowly but steadily since 200. Better more streamlined mechanisms for accesing may assist in continuting the trend. Better relationships between industry,academic institutions and Non Departmentral government bodies, opportunity for clusters and networks to provide a focus.	Future participation in ETC in jepordy due to brexit, although there is a comitment from the scottish government. we are reliant on the UK government passing bill and who knows what those guys are up to. Continued spending cuts in public bodies leading to lower levels of business support as authorities prioritise statutory obligations.

	Currently able to participate in ETC funding streams such as Interreg and Horizon, Scottish government commitment to comtinued participation in ETC programmes – draft bill going to UK government to ensure fututre commitment.		Better awareness amongst industry of support clusters and networks leading to easier access to funding.	

THEME – SMART SPECIALISATIONS

1.What are the Regions Smart specializations?

There is currently no smart specialization strategy for Fife though there are a number of priority sectors and corresponding action plans either in place or being developed to support this. Fife's economic strategy 2017-2027 sets out 4 key priorities:

- Achieving fairer, more inclusive growth.
- Increasing investment in Fife's business infrastructure.
- Improving business growth through increased internationalisation, sales and exports.
- Fostering a culture of innovation and enterprise.

In addition, and perhaps more relevant to Blue growth is there are several action plans to support the overall growth plan. The Culture of Enterprise action plan, a Food and drink sector action plan and a tourism plan, all of which are priority sectors for growth both locally and nationally.

In terms of Energy, Fife has an excellent opportunity for smart specializations in both Renewables and decommissioning of Oil and gas. The Fife energy park is situated in Methil and our one, solely blue economy innovation centre, Fife Renewables and Innovation Centre (FRIC) is based there as are ORE catapult. The regions proximity to the planned offshore wind sites and the traditional skills base in heavy engineering would lend itself well to a strategy being developed in this area.

Although not directly relevant to blue growth Fife has recently established a Fintech consortium due to the presence of a cluster of Financial technologies companies in the regions. The Fintech consortium is focused on looking at skills and works and is a relatively new cluster linking the business community, Fife college and the local authority. The model is something I am considering developing for blue growth.

2. How are the Smart specializations developed?

In terms of the above, plans are developed in partnership with the local authority, the business community and educators.

3. What is the sustainability of these smart specializations?

Plans are sustainable in the sense that they have support at national government level as these fit in with the governments own priority key growth sectors.

4. What smart specializations should the region focus on in the future?

- Renewables.
- Data skills and Software engineering.
- Enterprise.
- Engineering and Manufacturing

5. Why these Smart Specializations?

- **Renewables**. – The region is well placed to capitalize on the growth of business and jobs in this area. Three of the Five planned offshore wind sites are close to Fife. Also, strong engineering and manufacturing heritage, strong supply chain and the presence of companies with existing expertise such as Burntisland fabrications.
- **ICT data and software skills.** – It is widely accepted that there is a shortage of skills in these areas across all sectors. There is likely to be competition for graduates in this area and there is an absolute requirement to encourage more people into the industry. In terms of manufacturing these skills are likely to be required to enable the transition to more digitized processes and there is a risk that a lack of people could inhibit growth in this area. This is being looked at by the Fintech consortium.
- **Enterprise.** – It is required that in order to overcome the cultural and attitudinal barriers that inhibit entrepreneurs from starting new businesses. Business start up rates are still comparatively low so work needs to continue in this area and be developed further.
- **Engineering**. – Engineering and manufacturing are key sectors in terms of employment and will continue to be so.

6. What are the Strengths, weaknesses opportunities and Threats?

Strengths: There is good alignment of policy nationally and locally in terms of the priority growth sectors with corresponding action plans to develop these areas. Some of which could become smart specialization strategies.

Weaknesses: There is no Smart specialization strategy, there could be much better levels of collaboration between government, industry and academia although there are some good examples such as the fintech consortium.

Opportunities: there is scope for much better collaboration whether in industry clusters or in terms of the triple helix stakeholders, this is crucial to make any smart specialization strategy effective.

Threats: Ongoing fragmented silo approach and lack of collaboration between academia and government.

2.3 Part 2: SME Innovation Capacity and Needs

TOPIC- DEFINING COMPANIES

In total 5 companies were interviewed for the report 2 were chosen for their work in the energy sector and 2 for the wider blue sector. In addition, MOWI were consulted due to the importance of Aquaculture to the blue sector in the region and the presence of a large production facility in Rosyth. All of the companies are actively engaging with education but none can be described as being involved in a cluster and this presents an opportunity for improving collaboration.

Companies:

[1] Todd Fishtech – Manufacture of Lobster and shellfish transportation and storage.

[2] Coorstek – Manufacture of ceramics – Blue growth supply chain in energy and vehicles.

[3] ATL Turbine Services – Gas turbine component repair and manufacture - Energy.

[4] Bright Green Hydrogen – Environmental education and consultancy.

[5] MOWI – marine aquaculture.

COMPILATION OF SME INTERVIEWS

Format: compilation of SME interviews			
Topic	**Question**	**Sub-question/ detail**	**Answers**
Defining who you are	What is your core activity in blue innovation ?	Details of business	**Type of Business:** 23.490 Manufacture of other ceramic products [2] 28.93 Manufacture of machinery for food, beverage and tobacco production [1] 72.190 Other research and experimental development on natural sciences and engineering. [1] 71.129 Other technical consultancy activities [1], [4] 28.110 Manufacture of engines and turbines, except aircraft, vehicle and cycle engines [3] **Size of staff:** 5 [1], [4] 77 [3]

			79 [2]
		Geographic Scope	Local: [1], [2], [3], [4] Regional: [1], [2], [3], [4] International: [1], [2], [3]
		Type of energy innovation	Product innovation: [1], [2], [3], [4]
			Process innovation: [1], [2]
			Service innovation: [1], [2], [3], [4]
			Other: Digital marketing, [3]
		Details of blue/energy innovation	[1]) Change of processes and material used due to supplier going bust, cost company 60K and almost caused the business to fail. Had to completely change business model from fiberglass polypropylene plastic. First company in the UK to use Cobex plastic and welder [1] [2] Complying with ISO 14001 standard, educating staff in energy management, complying with audits. Several on-site developments: kiln neutralization for best use of energy, scrap ceramics sed in roads reducing landfill, in house recycling of packaging, sensor lighting. [2] [3] Looking at energy usage, on site incinerator, run a steam pipe from Michelin to reuse waste heat. [3] Energy costs [2], [3] very high cost 30k per month. [3] [4] Nothing specific to energy innovation, business is more focused at demonstrating technologies and educating. [4]
	Who is involved in blue/ energy innovation ?	Inside company	[1] All staff are involved in innovation process, the company recognizes the importance of this as they feel they need to do it to, 'stop becoming board' Also important for all to be involved so the staff feel valued partners in the business. [1] Company also feel it is important to innovate to make good use of R+D tax credits. [1] All staff within company are involved. [1], [2], [4] [2] Ultimate responsibility with the plant leader and the environmental management team. [2] Driven by engineering team. [3] Customer demand and expectations [1], [2], [3], [4]
		Outside company	[1] Customers often drive innovation example given of customer challenge regarding waste water, the company developed a technology to filter and re-use waste water from lorries assisting the company in waste management, saving time and reducing costs

			Customer feedback and testing of products regularly drives innovation and changes to processes [1] Occasionally suppliers ask for small changes to be made [1]. [2] Customer expectations and the desire to be seen to neighbor. [2] Environmental policy, Energy costs [1], [2],[3], [4]. [4] PHD, Students on placement from local universities often assist in projects.[4].
Defining urgent challenges	What are 3 urgent challenges your company is facing?		[1] Brexit and the unknown. 95% of Shellfish is sold to the EU. Potential trade tariffs, export delays and other uncertainties is already affecting sales. [1] Breaking into traditional male dominated industry is difficult, fishing industry is slow to change. There is a culture of, 'always been that way' so can be difficult to convince to buy new innovative products. [1] Big 5 fish merchants buy all shellfish at a low price, price for fisherman has not risen in 20 years though the cost of the end product has tripled in the same time. Dominate the market. Larger enterprises dominate smaller and emergent enterprises and show a preference for low cost, low tech solutions. [1] Small size of enterprise, lack of people power and time to develop new products. Lack of time to travel for trade shows, travel is expensive. Day to day business often takes precedent.[1], [4] [2] Brexit and the lack of clarity, markets are going soft. [1], [2], [3], [4] Rising utility costs are a challenge for the business, lack of power. [2], [3] Controlling waste, rising costs but seeking smart solutions [2] [3] *Skills and recruitment. Base skills are lacking in candidates particularly in Engineering and machining. [2], [3]* *Niche local provider, no similar companies locally, there is a big training requirement.* [3] *Training when on the job is a challenge.* *Rising energy costs, there was a 25% increase on previous contract. [2], [3]* [4] *The company has lots of technology, hydrogen vehicles, re-fuelers, and hydrogen storage equipment. They very costly to upkeep and it doesn't seem to be a priority for the Scottish government in terms of funding as other forms of renewables, other than hydrogen are being favored. [4]*

			Existing grant funding does not cover the cost of running and maintaining the equipment. [4] School budget pressures, although programmes are very successful, they come at a cost and this discourages schools. Is having an impact on business and are struggling to break even now. [4]
	What possible solutions for the challenges?		[1] Brexit – not much that can be done other than to plan and prepare as best as possible for any disruptions. Difficulties down to lack of people power and lack of time - effects planning. [1] Have to be more patient and accept that the business is not growing as quickly as would have liked. Finding new ways and methods to market products. Tailoring marketing campaigns to a bigger range of audiences. Seeing an increase in female customers for the first time in 20 years. [1] [2] Clarity on future trading terms, business has already been affected by softening of the markets. [1], [2], [3], [4] Something done at policy level to support businesses with energy costs and reducing energy demands. [2], [3] Currently working with customers on process innovation to reduce the need for high firing aimed at. reducing energy usages. Work with customers to develop leaner and more efficient processes, [2], [3] [3] Engaging with education to and DYW to attract and upskill candidates with real world business experience. [2], [3] Better internal training processes and opportunities, better upskilling of existing staff. [1]. [3] Agencies to assist in recruiting graduates. [3] [4] More support from government, Local, national, European in terms of funding, particularly for equipment upkeep and maintenance. Creating better links with education, getting them to see the value in training, working more closely with DYW. [1], [2], [3], [4] Assistance in costs with supporting education, more funding available to schools for programmes in energy transition/ renewables. [4]
Defining path dependency	Which 3 factors, e.g. historical, geographical, cultural aspects,		[1] Cultural: male dominated, family run businesses that dominate the fishing industry, difficult to sell products as decision is in the hands of one person. [1] Geography: can be a challenge; majority of customers are not local and are based in the Highlands and Islands. [1] Geography; the Scottish brand is very important to the organization [1]

	are important for your business?		[2] Location in Fife as a gateway to Europe. Acts as an enabler between the US and Europe. [2], [3] Traditional skills base, engineering, manufacturing and available people. [2], [3] Ageing workforce and potential skills shortages, replacement demand. [2], [3] [3] Historical buy over of wood group -legacy of previous business. [3] No geographical connection, majority of aerospace industry in the midlands. [3] No pressure to move good logistics and a good experienced workforce.[3] [4] Located due to position in Fife energy park. Cheap and affordable brownfields site. [4] A good location for a wind turbine. [4] Located in area of depravation, Company ethos to give something back to local communities. [4]
	Which 3 factors are limiting your success?		[1] Lack of local manufacturers for plastic, are having to buy from out with the region. Higher costs. [1] Missing out on funding support due to split nature of business, is neither solely a food and drink or a manufacturing business. [1] Staff, time, facilities. Ideally would require new premises, currently unable to find existing facilities are expensive and poor quality. [1], [4] [2] Bridging the skills gap the company has an ongoing requirement for skills in engineering, design, Quality standards, they find it difficult to recruit, particularly young people. [1] [2], [3] Logistics is currently a strength but could become a weakness very quickly. [2]. [3] Brexit is a huge threat to operations due to US>UK>EU enabler. [1], [2], [3], [4] [3] Extended time to recruit and train staff is an ongoing pressure. It took 5 months to recruit a welder. [3] Down time caused by client delays, could work more closely to streamline process. [3] No other similar local industries, distance from networks. [3] [4] Money -Cashflow is an issue and is affecting capacity, have recently been unable to replace staff due to poor cashflow. [4] Staffing, finding the right person. Requirement for someone who understands hydrogen fuel cells and can also work with

			schools. Requires a very specific type of person that can do both. [1], [2], [3] [4] Changing government priorities, there seems to be a move away from hydrogen power to electric vehicles. [4] Pace of change slower than expected, lack of jobs created locally in renewables to date. [4]
Defining Future Strategies	How are you preparing for the future?		[1] Upskilling and training staff are very important. R+D is crucial to the business. They are constantly creating and improving products. [1], [3] Own professional development to improve skills and productivity. Working with supports such as Business gateway and Fife Chamber of commerce to upskill as a managing director. [1] [2] Looking into emerging markets. Opportunity to expand in Renewables, offshore wind, autonomous ships and vehicles. [1], [2], [3], [4] Have an ageing workforce, Skills gap is being addressed – Working closely with schools and colleges, working with Career Ready mentoring, Investors in Young People, Developing the young workforce. Utilizing Foundation apprenticeships, Modern apprenticeships and graduate apprenticeships. [2], [3] Company policy to work more closely with customers with customer being involved and driving innovation.[1], [2], [3] [3] Brexit – are paying close attention to development. It is currently the biggest unknown and the biggest threat to growth. [1], [2], [3] Opex and capex plan to upgrade machinery and increase capacity. [3] Investing in training people, working more closely with schools, colleges and universities [1], [2], [3], [4]
	What is needed to be competitive for the future?	New competences (training)	[1] Staff, marine biology struggle finding, training and recruiting staff, particularly young staff and graduates who, from experience don't seem to have the correct work ethic. [1], [2], [3], [4], [5] Training available to SME's in tendering, more 1-1 support around this. Would enable them to compete with larger enterprises, universities and research institutions. [1], [4] Mentoring for Managing Directors of smaller SME's could be beneficial. [1] [4] [2] Skills requirement in Engineering, design, Quality standards. [2], [3] Closer links with Universities, colleges and schools. There is a need to attract talent. [2]

			[3] People growth -internal, new processes and equipment. More supervisors to assist in growth. [3] Engineering and machining skills, new candidates with base skills [2], [3] [4] Training in digital marketing and communications. [4] Ability to widen scope and educate more young people. [4] Training/ assistance in accessing different funding streams. [1], [4]
		Research & innovation	[1] All in house, previous negative experiences in working with universities. Issues over intellectual property and projects being delayed. [1] Cost to access to scientific literature and journals is a challenge in this area and puts them at a competitive disadvantage. [1] Time, is always a challenge due to small size of the business. [1], [4] [2] Better collaboration [2], [3], [4] Most R+D driven centrally, research centre in Uden, usually on a cost led basis, drive the solution. [2] [3]. [3] Don't do a huge amount of R+D [3], [4] Mostly customer driven, work with clients. [2] No dedicated R+D engineers [3] [4] PHD student placements, company uses most years. [4] Hydrogen modelling, improved storage systems. [4] More funding to allocate time to R+D and to keep abreast of developments.[1], [3], [4]
		Additional finance	[1] Currently doing ok, cash positive. Are re-investing in order to grow. [1] Finance is a worry due to potential challenges, Brexit. [1], [4] Requirement for business to grow to remain sustainable. [1] [4] [2] Training support for new and existing staff, have recently made good use of foundation and modern apprenticeship programmes, a continuation of funding would help. [2] [3] Assistance with energy costs, lack of cheap power. Potential for more low carbon, energy efficiency. [2], [3]. [3] No – In a very healthy position as company has grown significantly over the past 3 years. [3] Account managed and well supported by Scottish Enterprise [3]

			[4] More funding available to schools [4] More government funding and grants to support activity. [1], [4] Business sponsorships, difficult in the challenging climate. [4]
		New networks & collaborations	[1] Actively seeking out new partnerships and collaborations. Open to collaborating with RIGHT project. [1], [2], [3], [4] Close partnerships with local schools and colleges. Work with DYW, Opportunities fife and Culture of Enterprise program. [1], [2], [3], [4] Business networks, industry networks, use of social media [1], [4] [2] Stronger networks, locally nationally and internationally Better collaboration across the board with business networks academics, schools, colleges and research and development – triple – helix. [2] [3] Account managed by Scottish enterprise. Joined Scottish Engineering this year. [3] Call on specialist help when needed, use of consultants. Working to develop stronger networks in the supply chain. Stronger relationships with clients. [1], [2], [3] Work with local chamber of commerce. [1], [3] [4] Better clusters of businesses, more of a range of clusters and partners within. Opportunity to share experiences and best practices. [2], [3], [4] Fife education network has provided a platform to showcase good work and learn from other partners -best practices. [4] Continued work with partners such as DYW Fife, STEAM Fife, building a continuum of participation. [1], [2], [3], [4]
Defining direction	Which developments seem promising for your company ?		[1] Offshore renewables present a potential opportunity, opportunity to harvest shellfish at offshore wind sites being explored. [1], [2], [3] New tools and technologies to assist in production, potential for automation. [1], [2], [3] Move to land-based aquaculture presents a number of opportunities for applications of technologies. [1] [2] Growth of wind power presents a good opportunity, there are big and growing markets with an existing customer base. [1], [2], [3], [4] There is a good opportunity to grow with customers, this is a company vision. [3] Potential for new opportunities, for example driverless ships and vehicles present potential emerging markets. [1] [2], [3], [4] [3] Energy efficiency, Energy reviews and drive for more efficient processes. [3]

			Business has grown in Gas fired power stations, potential threat due to energy transition, will see less work in UK and more overseas. [3] [4] Rising energy costs, government priorities customer and public expectations is likely to see a continued growth in renewables [4] Close-proximity to offshore wind sites should present a number of opportunities, new networks, new partners and skills requirement. [4] Potential for hydrogen into existing gas networks. SGN are currently looking at this. [4]
	Which developments are inevitable for your company?		[1] Growth is inevitable and is required for sustainability. [1], [3] More local produce likely to cause a growth in business. [1] [2] Increased work for autonomous vehicles and new processes [2]. Expansion of renewables, more work in this market. [1], [2], [4]. Leaner more energy efficient processes, less waste. [1], [2], [3], [4]. [3] Growth is inevitable due to work in an end of life cycle environment, component repair and replacement. [3] As new technology arrives need to prepare and update processes, products. There is a need to be mindful of change. [2], [3]. Replacement demand of staff in Engineering though are engaging in process. [2], [3]. [4] Increased flexibility in multiple areas. Must adapt to changing markets and changing local and national government priorities. [4] Need to invest in new technology and new stock to keep up to date with advancements and stay relevant. [3], [4] Balance between not for profit and commercial, potentially becoming more commercial to open up new markets. [4]
Leveraging innovation potential	Are you considering exploiting new ventures?	New markets	[1], [2], [3], [4]
		New technologies	[1], [2], [3], [4]
		New products	[1], [2], [3], [4]
		New partners	[1], [2], [3], [4]
		Other…?	[4] commercialization
	Who is driving or	Customers	[1], [2], [3], [4]
		R&D	[1], [2], [3],

Defining innovation steering	pushing innovation ?	Policy	[2],[4]
		Other?	[1] The team, seeking solutions and knowledge transfers from other sectors and industries, applying ideas from elsewhere.[1] imitations to the above due to size and staffing [1], [4]
Defining emergent patterns	What is significantly different in the last three years?	New partnerships & collaborations	[1] Stopped academic collaborations completely due to previous experience. [1] [1] Worked closely with local authority, employability [1], [3] [2] Yes - working more closely earlier in cycle, building closer partnerships. [1], [2], [3] Working much more closely with education, forging partnerships with local schools and fife college. Efforts to improve age diversity of workforce. [1], [2], [3], [4] Strengthening business clusters, strengthening links with triple helix. [2] [3] Working with Sottish Engineering, Scottish Enterprise and Chamber of commerce, working more closely with clients and supply chain network. [2] [3]
		Scope (local, regional, EU, international, etc.)	[1] Have grown export base to much further afield clients in the EU and the US [1], [3] [2] Export business has grown significantly. Growth in client base in both sides of business, aerospace and industrial power, £297,000 in 15/16 -£2.2 Million in 2018. [2] Exploring new geographical areas. [1], [3] [4] Reduction in staff is limiting this, would like to branch out more nationally but can't at present due to lack of people. Most work is done locally. [1], [4]
		New (digital) communications	[1] Social media presence and large presence on social media. Attempt to be industry influencers and show industry in a positive light, [1], [4] [4] Lack of skills in this area, would like to develop a communication strategy but feel is lacking in skills, possible training requirement. [4] Looking at different demographics for marketing, widening scope. [4]
		Knowledge sources and sharing	[1] Not at present due to previous experiences. Open to working in clusters and networks for future sharing. [1], [2], [3], [4]. [2] Better collaboration between plants and integration of regional R+D facilities. [3] [3] Working much more closely with client engineering teams. Better interaction, discussion and knowledge sharing. [1], [2], [3] Integrated partnership with client's quarterly business meetings. Can offer improved solutions. [3].

			[4] Previous bad experiences local college/university [1], [4] Risk of collaborating due to size of organization, fear of being swallowed up, previous bad experience. [1], [4]
		Innovation processes and solutions	[1] New processes in response to customer challenges, wastewater Product aftercare. [1], [4] Move towards more manufacturing focus. [1] [2] Drive for greater energy efficiency [2], [3] Working more closely with customers. Get products to market quicker, improving competitive advantage [1], [2], [3], [4] [3] New Hydrogen cleaning capability, more effective way of cleaning products [3] [4] Only in terms of creating new and revising learning materials, feedback from customers and in line with guidance documents. For example, the career education standards, Curriculum for excellence. [4]

3.0 Key Conclusions of Parts 1-3

From the research carried out in parts 1-3; WP3 -Mapping the skills gap and building a knowledge base of the report we can draw some key findings that are summarised below. The finding from parts 1-3 of the report will be used to form a basis for the development of the skills pilots for WP4 – Bridging the skills gap with pilots.

POLICY- Although the Fife Region does not have a smart specialisation strategy there is what could be described as a perfect storm in terms of policy, both locally and nationally which could aid the region in terms of blue growth. Scotland's economic strategy 2007, sets out 6 key growth sectors, Food & Drink (including agriculture & fisheries), Sustainable Tourism, Energy (including renewables), Financial & Business Services, Life Sciences and Creative Industries (including digital). The first 3 of these are directly relevant to blue growth and this presents a range of funding opportunities and supports for SME's and researchers in the sectors. To help achieve the key goals of, inclusive growth, internationalisation, innovation and investment, Eight national innovation centres have been established via the Scottish funding council although none are in Fife they are easily accessible due to the central belt location. Of these, The Oil and gas innovation centre OGIC, The Scottish Aquaculture Innovation Centre, The Industrial biotechnology, IBioIC and the Data lab can all act as supports for companies seeking to grow and innovate in these sectors.

Whilst this is the case there is no one arm of Government responsible for marine planning and this can lead to a confusing and fragmented landscape. The Crown Estate, Marine Scotland and Transport Scotland have different remits and priorities and alignment of these in the context of blue growth could be beneficial.

In the Fife context, Fife's economic strategy 2017-2027 mirrors the Scotland strategy in terms of the 4 main priorities and the key sectors with the addition of manufacturing and engineering due to Fife's strong engineering base and heritage. This means similar supports are available or likely to become available in Fife to support growth and or sustainability particularly in the Manufacturing Supply Chain, decommissioning and skills transfer to Renewables. Fife Energy Park was established in Fife in 2011 to act as Hub attracting investment for Renewables. This has led to a small cluster of energy SME's establishing and the establishment of the UK's national innovation centre, ORE catapult on site. Due to the above and the proximity of 3 of Scotland's 4 planned offshore wind sites. Fife would be well placed to develop a smart specialisation strategy around wave, tidal and wind energy.

CLUSTERS- There are 2 clusters that operate in the Fife region that are relevant to blue growth. Both of which are relatively new and require further development.

- The Scottish maritime cluster was established in 2018 and is chaired by Babcock who are based at the port of Rosyth. It sets out 5 main strategic levers for growth, commercial shipping, naval/military contracts, business support activities, maritime legislation and education and training.
- The Forth and Tay offshore cluster was established in summer 2019 and is a partnership involving 6 local authorities and is supported by EDF renewables, Scottish southern electric SSE. Redrock Power and Scottish Enterprise. The cluster sets out 6 strategic priorities; Attracting and retaining investment in renewables, Developing the local supply chain, maximising supply chain and employment opportunities, increasing internationalisation opportunities and investment in value added infrastructure.

Both clusters have been approached as part of the research in sections 1-3 and only the Scottish Maritime cluster were in a position where they were able to provide input although they are open to future collaborations. This presents a good opportunity for the RIGHT project to aid these clusters in Development particularly in terms of WP4 and skills pilots and it is an intention for at least one of the project pilots to link in and assist in cluster development. An intention would be to strengthen these and improve connectivity of the triple helix ideally bringing in the research community, MASTS from the university of St Andrews. This could lead to more structured R+D and better commercialisation and applications of the research and technology as local examples are limited at present.

SKILLS GAP AND REPLACEMENT DEMAND- All 4 of the SME's interviewed identified at least one or more existing skills gap and spoke of entry level candidates lacking core skills such as communication and work ethic. This tallies with existing knowledge and labour market research conducted as part of the Developing the Young Workforce project in Fife. For the two engineering/manufacturing SME's interviewed identified core engineering skills as lacking and recognised the importance of engaging with education early to mitigate this.

It is widely known that there will be a significant replacement demand in Engineering even though there will be a move to digitisation and leaner processes there is still likely to be a large demand for new entrants to the profession as the existing workforce retires. It is hoped that the growth of the apprenticeship family and growth of vocational routes into employment will go some way to overcome this issue.

It is also widely known that there is a shortage of ICT professionals, data scientists and software engineers though this is not unique to Fife or even Scotland. This presents a challenge for companies who are looking to modernise who may lack the skills to cope with the pace of change. There is a significant risk of competition for workers in these sectors and from other sectors. Lloyds Bank for example are seeking to recruit 5000 software engineers over the next few years and many companies are struggling to recruit at present. This has become apparent through our work in Fife with the Fintech Consortium. Upskilling of existing staff could be a potential solution to this and many companies are making use of the fully funded Graduate apprenticeships for this reason.

For the 2 food production companies interviewed they spoke of similar challenges in terms of work ethic even for those entering at graduate level but spoke of a shortage of marine biologists with MOWI stating this was a real inhibitor for growth and are now recruiting graduates from other disciplines. All of the companies interviewed spoke of an increasing requirement for flexibility and multi skilled transferability in current and future workforces.

BREXIT – All the companies spoke of the challenges around Brexit and that the lack of clarity around future trading terms that are either causing problems at present, or are highly likely to cause problems. For the 2 engineering companies, both export internationally and they spoke of the 'gateway to Europe' as being key to their business. The risk to this was a real and apparent concern. It was also mentioned that this was causing issues in terms of lowering investment, being more difficult to recruit from EU countries and was causing an overall softening of markets.

For the 2 food production companies Brexit was also a concern in that 75% of fish or shellfish is exported to the EU so there were several concerns around this. At the point of writing there is no more information in terms of the UK position within the EU so it is highly likely that this remains to be a concern for all the companies interviewed.

R&D + INNOVATION FUNDING. The Fife average for R+D spend is slightly lower than the national average but as a total of R+D spend there has been a steady increase since 2013. Three of the Five companies interviewed said that they did not do a lot of R+D on site and as with innovation was mainly reactive to customer demand. The smaller SME's stated that they had issues regarding time constraints for applying for funding and there was consensus that the processes were overly complex and bureaucratic, often day to day business took priority. For one of the SME's interviewed, innovation was central to what they do and they were very active when seeking out funding streams. There was still a recognition that this was complex, time consuming and a simplification of this or an upskilling in this area would be a benefit. In order of fit with local, national and European priorities a focused support for SME's to access funding in terms of internationalisation would be pertinent, particularly for smaller SME's seeking to grow or break into new markets. This is also an area that is likely to benefit from a strengthening of the triple helix and better connectivity of the research community and the business community. It is likely that cluster development will become a focus for at least one of the skills pilots proposed by the project.

4.0 Discussion of the Findings

It is apparent through the research carried out in sections 1-3 of the report that Fife has excellent long-term growth potential in both the Blue and Energy sectors down to three key factors;

- Geography – We are well placed in terms of proximity to 3 of the 4 planned offshore wind sites, have good port facilities and access to major cities and airports as well as Fife energy park in Methil.

- Skills – our engineering heritage and the presence of high-tech engineering firms such as Babcock, Oceaneering and TechnipFMC means we have a good skill base of engineers that could enable a skills transfer to renewables and oil and gas decommissioning. There is a big effort nationally to create more vocational routes into employment utilising labour market data on future skills demand. Secondary school level foundation apprenticeships have been created in 12 key frameworks. The aim is to better match candidates exiting education with the needs of the local labour market. Developing the young workforce is creating strategic partnerships between education and local employers further enable this skills matchup by enabling businesses to directly influence the curriculum. In addition, there is a strong culture of enterprise being imbedded in the region's education from primary through secondary. Fife won the commons BEIS award for the most enterprise place in Britain in 2018.

- Policy – At the local level 4 of the key sectors for growth fit into the wider blue economy, Tourism, food and Drink, renewables and Engineering. This should assist greatly in gathering support and cooperation from partner organisations as well as opening funding opportunities. This has become apparent by the emergence of the Forth and Tay offshore cluster

As such, Fife is well positioned to become a National Hub for blue Growth and this could become part of a smart specialisation strategy for the Region. The research has been useful and should go some way to providing an evidence base to be used in further discussions within the authority, with partners and stakeholders around this.

It is worth mentioning that the research has not been without its limitations. We have a relatively small sample size of SME's and were one short of our target of 6. A number of the target companies either did

not respond or did not have the time to contribute. With research being carried out over the summer holidays, staff shortages were a bigger issue than anticipated. Whilst this is the case, it does not rule out the possibility of future collaborations with the RIGHT project or involvement in any pilots. It is the intention of the project to extend the offer of collaboration going forward. The offer of participating in WP4 pilots should provide a platform to aid in this.

The SME interviews and SWOT analysis have provided us with a very valuable insight into the challenges and inhibitors to growth for SMEs in the region and much of which tallies with what we already know. There is enough commonality, as outlined in the section above that can be drawn from the research allows us to recommend four skills pilots. Each pilot is aimed at overcoming a specific barrier to growth and each are outlined in the section below.

5.0 Inputs for new Strategy and policy for Skills Education and SME innovation.

Work package 3 has been very useful in helping us establish and further evidence common challenges for SME's seeking to grow in the Blue and energy sectors and this enables us to make four recommendations for pilots in the next phase; WP4 'Bridging the skills gap with pilots'. Below the 4 proposals are summarised and will be developed further as the project progresses. Consultation with stakeholders and participants will remain a priority throughout.

POTENTIAL PILOT 1- BLUE GROWTH SKILLS CONSORTIUM – The establishment of a blue growth skills consortium. Ideally a cross sectoral group bringing together all partners within the triple helix; employers, policy makers academia and cluster representatives with the overall aim of meeting the skills and growth challenges for SME's in the wider blue and energy sectors. The intention would be for the group to share best practices, resources and create bespoke educational programmes and academies aimed at meeting immediate recruitment challenges with SME's being front and center of the group. Adopting the methodology already in place with the Fintech consortium this could provide a range of opportunities including marketing, the creation of academies and could assist in attracting inward investments in the sector.

POTENTIAL PILOT 2 – CLUSTER DEVELOPMENT PROGRAMMES/WORKSHOPS Link in with 2 blue growth clusters and CLIPPER – Connect partners within the local authority, industry and education to increase levels of collaboration with other ongoing ETC project, CLIPPER. The RIGHT project compliments the findings within this and adds more detailed analysis into the challenges for growth. Perhaps more importantly, the research has enabled us to identify the key strengths of the region which provides us good focus on where we should 'double down' on our strengths. By establishing a link with CLIPPER and the Scottish maritime cluster we could improve levels of collaboration across the board and assist in the overall development and sustainability of the cluster.

POTENTIAL PILOT 3 – TRAINING PROGRAMMES/DISTANCE LEARNING/MODULAR TO SUPPORT SME'S ACCESSING FUNDING FOR INTERNATIONALIZATION – A common theme throughout the research was that for SME's accessing funding for innovation and R+D was both time consuming, too difficult and overly complex. Commonly, companies could not find the time to either do the research or upskill their staff in this area. In order to meet this challenge a distance learning program to support SME's who are looking to break into new markets internationally could be created. The added benefit to this is that it fits well with local, national and European priorities for supporting SME's in internationalization. The intention would be to approach specialists in this area, most likely from Business gateway about the creation of materials or the adaptation of existing materials to fit with the blue growth agenda.

POTENTIAL PILOT 4 – PRE-FOUNDATION/ MODERN APPRENTICESHIP – ENGINEERING/MANUFACTURING CORE SKILLS – potential bridging course SCQF level 4 or 5 – bridge the gap and match the supply and the demand – Both the manufacturing companies stated that they lacked entry level candidates with core engineering skills and were struggling to recruit for basic positions. On the other hand, we have a pool of people who could be suitable for these roles but have been unsuccessful throughout education in meeting the criteria -NEETS. In addition, the existing school and post school level apprenticeships are very prescriptive in terms of qualification requirements with mathematics being the biggest barrier for candidates. The creation of an industry led bridging course involving work placements could open these opportunities to a new pool of candidates. This may be the most ambitious of the pilots as it may

underestimate the academic requirements of studying apprenticeship framework though the pilot nature of the project gives an opportunity to try something different which if successful could have a significant impact in terms of meeting recruitment challenges and meeting objectives of inclusive growth in the Region. Successful candidates could then articulate onto further learning and development in other funded apprenticeship frameworks. There is also scope for using other existing funding streams such as Fife Job Contract, and Employability fund to supplement this increasing the attractiveness whilst reducing risk to employers.

6.0 Appendix

6.1 Part 1A: Socioeconomic and R&D Profile

Geographic location of region: East central Scotland, peninsula bordered by the River Tay in the North and the River Forth in the South.

Population: 371,410[1] Area of region: 1325 km2

Governance of region – Fife Council is responsible for the whole region as the regional authority. The Scottish Government are responsible for allocating budget that is received from Westminster as a block grant and have responsibility for powers that have been devolved from the UK government in Westminster. Most areas of policy are driven by the Scottish government with the following; Constitutional Affairs, Defence, Foreign Affairs, Central Economic Policy, Social Security and immigration reserved to the UK government. The local authority is split into 22 wards each with 4 councilors. At present there is no clear majority in the administration with the Scottish national Party holding the most seats (29) followed by the Labour party (24), the conservatives (15) and the liberal Democrats (7). As such there is currently a co-leadership between the SNP and Labour.

STRUCTURE OF REGION

(For example, number of sub-regions/counties, number of large urban areas, whether the region is predominantly urban/rural, industrial/agricultural/public sector oriented)

- Fife region is the third largest local authority in Scotland after Glasgow and Edinburgh but unlike the others has no major cities. There are 3 large main towns, Kirkcaldy (49,460), Dunfermline (50,380) and Glenrothes (39,277) with the historic University town of St Andrews (16,801) in the North east. For administration the region is split into 7 area committees, City of Dunfermline, North East, Cowdenbeath, Levenmouth, South and west Fife, North east Fife Glenrothes and Kirkcaldy though is run by the unitary local authority, Fife council.

There are 28 ports and harbors in Fife with 4 major ports at Rosyth (x2), Burntisland and Methil. Heavy engineering and fabrication activity are based around the ports, mainly in south-west Fife where larger companies tend to be based. Their supply chains include specialist SMEs, some with highly advanced engineering skills tend to locate in Mid Fife with another SME cluster in North East Fife near to the University of St Andrews to the port activities in Dundee on the Firth of Tay.

Fife is well placed in terms of access to international airports at Edinburgh, and Glasgow, Dundee which are all within an hour's drive of most of the region. There is the smaller Fife airport at Glenore's but is mainly used as a training/leisure facility.

In terms of roads the west of fife is intersected by the M90 motorway which connects with the A9(a major capital expenditure project is underway to dual the road all the way to Inverness) is a main link between North and South and the west. The other main connection, the A92 links this with Dundee and connecting routes to Aberdeen. There are several bridges, most recently the Queensferry Crossing was completed in 2018 improving links with Edinburgh the south and the west There are 2 rail bridges at the on the river Tay and forth, with 2x road bridges at the Forth at south Queensferry and another 2 at Kincardine linking Fife to the west and Glasgow. Although a peninsula Fife is well connected to the North, South and West and as such is often used as a commuter location, a strength but also a weakness in terms of retaining or attracting talent. It is worth mentioning that a potential weakness is the lack of a main road, or rail link to two of our major towns, ST Andrews which is a cluster for blue growth R+D, could be an inhibitor to growth. In a similar vein, Levenmouth is not connected by rail which is a major issue inhibiting growth in terms of rail freight and access to human capital. The area is isolated in comparison to the other large towns in fife.

Digital connectivity in Fife is comparatively good compared to more rural regions with 98.4% of premised connected to high speed fiber broadband this is thanks in part due to The Scottish Government's Digital Scotland Superfast Broadband (DSSB) program.

HOUSEHOLD AND AGE DISTRIBUTION PROFILE

Household expenditure as % of national average: _____

Household income as % of national average: _____

Gross average weekly pay in 2018 in Fife was £543.40 which was 96.6% of the Scottish average weekly pay (£562.70) and 95.1% of the GB average (£571.10) – Source: ONS Annual Survey of Hours and Earnings – resident analysis.

Age distribution	**< 15**	**16-24**	**25-44**	**45-64**	**65 +**
Male	33,029	20,652	42,162	50,734	33,735
Female	31,304	20,624	44,624	53,689	40,857

NB – note slightly different age bands. Source: ONS Population Estimates 2018

EMPLOYMENT PROFILE

Total population in employment: 171, 200 (72.5%)[2]

Participation rates in employment: 74%

Male: 89,000 (80.5%)[2] Female 82,200 (70.2%)[2]

EMPLOYMENT BY SECTOR

Sector	**~~% Regional~~ GVA at basic prices £M (total GVA =£4,738.5m, excluding financial sector, parts of agriculture & public sector)**	**% of total employment**	**Comment, e.g. targeted growth sector (S3)**
Public Administration & Defence (not including education)	Not available	12,000[3] **8.8%**	
Energy (including renewables) ~~– traditional~~	£516.6m (energy including renewables)[4]	1,500[5] **0.8%**	Energy (including renewables) is a Scottish Government & Fife Growth Sector
Energy – new			
Maritime			Don't know how to define this?
Manufacturing	£1,141.9m (24%)	15,000[3] **11%**	Fife Key Sector
Agriculture (crop & animal production, hunting & related service activities)	Not available	2,500[3] **1.8%**	
Agri. Food (Food & drink, excluding agriculture)	£288.4m[4]	5,000[5] **2.9%**	Scottish Government & Fife Growth Sector

[2] Source: ONS Annual Population Survey, Employment Rate, Jan 2018-Dec 2018

[3] Source: ONS Business Register & Employment Survey 2017

[4] Source: Growth sector statistics 2016 – approximate gross value added at basic prices (£millions)

[5] Source: Growth Sector statistics 2017

Healthcare Human Health & Social Work Activities		19,000[3] **14.0%**	
Tourism	£221.0m[4]	11,000[5] **6.4%**	Scottish Government & Fife Growth Sector
Services – Financial& Business Services (excluding finance & insurance activities)	£272.3m[4]	10,000[5] **5.8%**	Scottish Government & Fife Growth Sector
Services – Creative industry	£888.4m[4]	3,075[5] **1.8%**	Scottish Government & Fife Growth Sector
Other (specify)			
Other (specify)			

NUMBERS EMPLOYED BY QUALIFICATION LEVEL:

Not sure if/where we can get this information. All I can source is the proportion of people in employment in Fife with an NVQ4+ qualification (HND, Degree and/or Higher Degree) which in 2018 was 47.8% (Source: ONS Annual Population Survey)

Degree	Masters	PhD	Professional Qualifications

Retention rates of graduates in region: Unknown but know to be poor with graduates pulled to larger population areas or England

EDUCATION PROFILE

Total population in education: 128, 672

Percentage Full-time_____Part-Time_____

Participation rates in education: _____

Male: _____Female _____

NUMBER OF STUDENTS BY LEVEL:

Primary	Secondary	Tertiary	Vocational	Further education
58,145[6]	40,698[6]	22,000		7829

Of all school leavers in Fife, 92.4% achieved a positive destination in 2017/18[7]. Further to this, in Fife 90.1% of 16-19-year olds were actively participating with an organisation for the purpose of learning, training, or work in 2018[8]

DROPOUT RATES BY LEVEL:

Primary	Secondary	Tertiary	Vocational	Further education

NUMBER OF HIGHER EDUCATION INSTITUTIONS:

University		Institute of Technology		Technological University		Other
Public	Private	Public	Private	Public	Private	
0	1	0	0	0	0	

NUMBER OF RESEARCH CENTRES:

Public	**Private**
1	2

[6] Source: Scottish Government, School Leaver Pupil Numbers by Stage 2018
[7] Source: Scottish Government Leaver Attainment and Destinations 2017/18
[8] Source: Skills Development Scotland, Annual Participation Measure for 16-19 year olds in Scotland, 2018

NUMBER OF INCUBATION CENTRES:

Public	Private
2	2

INDUSTRY STOCK:

~~MNEs~~* Large (250+ employees)	SMEs (10-249 employees)	Micro (0-9 employees)
35	1,135	8,560

*Don't have access to figures for the number of Multi-National Enterprises so have given data for large companies (those that employ at least 250 employee) Source: UK Business Counts 2018

In 2018, there were 220 foreign-owned enterprises in Fife, supporting 15,220 jobs according to Businesses in Scotland 2018 (Scottish Government.

INDUSTRY STOCK BY SECTOR:

Sector	~~MNE~~* Large (250+ employees)	SME (10-249 employees)	Micro (0-9 employees)	Comment
Energy (traditional & new?)		15	655	Using Scottish Government Growth Sector Definition of 'Energy (including renewables)'
Maritime				Don't know how should be defined?
Manufacturing	5	150	640	Can't separate heavy and light engineering, so just given figures

				for all manufacturing
Manufacturing – heavy engineering				
Manufacturing – light engineering				
Agriculture	0	40	495	(not including forestry and fishing)
Agri. Food	0	55	590	Figures given for Food & Drink using Scottish Government Growth Sector Definition of the Sector. Includes agriculture
ICT	0	25	510	
Healthcare/Pharmed	5	90	100	Figures given for health & social care
Tourism	0	185	615	Using Scottish Government definition of 'Sustainable Tourism (Tourism Related Industries)
Services – Financial & Insurance Services	0	5	115	Financial & Insurance Services
Services - Creative industry				Can get this but will take me a while to download – let me know if it's important
Other (specify)				
Other (specify)				

*Don't have access to figures for the number of Multi-National Enterprises so have given data for large companies (those that employ at least 250 employee)

Source: UK Business Counts 2018

RIGHT
RIGHT SKILLS FOR THE RIGHT FUTURE

R&D INVESTMENT:

Source of R&D funding - Fife	2017	2016	2015	2014	2013
Total Government spend on R&D in region Not available at a Fife level – figures for Scotland given in table below					
% of national R&D spend Not available at a Fife level – figures for Scotland given in table below					
Private sector spend on R&D in region* (£millions)	£29.4m	£30m	£24.3 m	£23.2m	£27.2m
% of national R&D spend by businesses* - % of Scottish spend	3.4%	2.3%	2.5%	2.8%	2.4%
Total EU R&D funding coming into the region Don't have access to this figure					
EU R&D funding as % of EU funding nationally					

Source of R&D funding - Scotland	2017	2016	2015	2014	2013
Total Government spend on R&D in Scotland**	£171m	£162m	£155m	£154m	£156m
% of national/UK Government R&D spend **	7.8%	7.5%	7.4%	7.0%	6.7%
Private sector spend on R&D in Scotland* (£ millions)	£1,247 m	£1,075 m	£953m	£957m	£801m
% of national/UK R&D spend by businesses*	5.3%	4.8%	4.5%	4.8%	4.3%
Total EU R&D funding coming into the region Don't have access to this figure					
EU R&D funding as % of EU funding nationally					

Sources:
*Business Enterprise Research & Development (BERD) Scotland 2017, Scottish Government
** Gross Expenditure on Research & Development Scotland (GERD) 2017, Scottish Government

Interreg North Sea Region RIGHT European Regional Development Fund
EUROPEAN UNION

6.2 SME Company interviews

Company Interview Todd Fishtech:

Topic	Question	Sub-question/detail	Answers
Defining who you are	What is your core activity in blue innovation?	• Details of business	Type of Business: Manufacturing, Food and Drink Size of staff: 5 Other: …
		• Geographic Scope	Local: Yes Regional: Yes International: Yes *Operate all over the UK, work with some clients in Europe also have clients in California.*
		• Type of energy innovation	Product innovation: Yes - *continuous 3-4 products in development at any one time.* Process innovation: Yes – *new materials used in manufacturing process* Service innovation: Yes -*marketing in what is a very traditional industry, have put a huge effort into marketing, the use of social media, vlogs, blogs and their website. They actively try to become social media influencers and represent industry in the press.* *Have also put a lot of effort into the aftercare of their products, all products come with an aftercare warranty, there are 6 options, most are free. They have also developed a training manual for clients. This is very important as 1/3 of their business comes through word of mouth.* Other
		Details of blue innovation	1. *Change of processes and material used due to supplier going bust, cost company 60K and almost caused the business to fail. Had to completely change business model from fiberglass polypropylene plastic.* 2. *First company in the UK to use Cobex plastic and welder*

	Who is involved in blue innovation?	• Inside company	1. *All staff are involved in innovation process, the company recognizes the importance of this as they feel they need to do it to, 'stop becoming board'* 2. *Also important for all to be involved so the staff feel valued partners in the business.* 3. *Company also feel it is important to innovate to make good use of R+D tax credits.*
		• Outside company	1. *Customers often drive innovation example given of customer challenge regarding waste water, the company developed a technology to filter and re-use waste water from lorries assisting the company in waste management, saving time and reducing costs* 1. *Also, customer feedback and testing of products regularly drives innovation and changes to processes* 2. *Occasionally suppliers ask for small changes to be made.*
Defining urgent challenges	What are 3 urgent challenges your company is facing?		1. *Brexit and the unknown. 95% of Shellfish is sold to the EU. Potential trade tariffs, export delays and other uncertainties is already affecting sales.* 2. *Breaking into traditional male dominated industry is difficult, fishing industry is slow to change. There is a culture of, 'always been that way' so can be difficult to convince to buy new innovative products.* *Big 5 fish merchants buy all shellfish at a low price, price for fisherman has not risen in 20 years though the cost of the end product has tripled in the same time. Dominate the market. Larger enterprises dominate smaller and emergent enterprises and show*

			a preference for low cost, low tech solutions. 3. *Small size of enterprise, lack of people power and time to develop new products. Lack of time to travel for trade shows, travel is expensive. Day to day business often takes precedent.*
	What possible solutions for the challenges?		1. *Brexit – not much that can be done other than to plan and prepare as best as possible for any disruptions. Difficulties down to lack of people power and lack of time -effects planning.* 2. *Have to be more patient and accept that the business is not growing as quickly as would have liked. Finding new ways and methods to market products. Tailoring marketing campaigns to a bigger range of audiences. Seeing an increase in female customers for the first time in 20 years.*
Defining path dependency	Which 3 factors, e.g. historical, geographical, cultural aspects, are important for your business?		1. *Traditional, male dominated, family run businesses that dominate the fishing industry, difficult to sell products as decision is in the hands of one person.* 2. *Geography can be a challenge; majority of customers are not local and are based in the Highlands and Islands.* 3. Geography; the Scottish brand is very important to the organization
	Which 3 factors are limiting your success?		1. *Lack of local manufacturers for plastic, are having to buy from out with the region. Higher costs.* 2. Missing out on funding support due to split nature of business, is neither solely a food and drink or a manufacturing business. 3. *Staff, time, facilities. Ideally would require new premises,*

			currently unable to find existing facilities are expensive and poor quality.
Defining future strategies	How are you preparing for the future?		1. *Upskilling and training staff are very important. R+D is crucial to the business. They are constantly creating and improving products.* 2. *Own professional development to improve skills and productivity. Working with supports such as Business gateway and Fife Chamber of commerce to upskill as a managing director.*
	What is needed to be competitive for the future?	• New competences (training)	1. *Staff, marine biology struggle finding, training and recruiting staff, particularly young staff and graduates who, from experience don't seem to have the correct work ethic.* 2. *Training available to SME's in tendering, more 1-1 support around this. Would enable them to compete with larger enterprises, universities and research institutions.* 3. *Mentoring for Managing Directors of smaller SME's could be beneficial.*
		• Research & innovation	1. *All in house, previous negative experiences in working with universities. Issues over intellectual property and projects being delayed.* 2. *Cost to access to scientific literature and journals is a challenge in this area and puts them at a competitive disadvantage.* 3. *Time, is always a challenge due to small size of the business.*
		• Additional finance	1. *Currently doing ok, cash positive. Are re-investing in order to grow.* 2. *Finance is a worry due to potential challenges, Brexit.* 3. *Requirement for business to grow to remain sustainable.*

		• New networks & collaborations	1. *Actively seeking out new partnerships and collaborations. Open to collaborating with RIGHT project.* 2. *Close partnerships with local schools and colleges. Work with DYW, Opportunities fife and Culture of Enterprise program.* 3. *Business networks, industry networks, use of social media*
Defining direction	Which developments seem promising for your company?		1. *Offshore renewables present a potential opportunity, opportunity to harvest shellfish at offshore wind sites being explored.* 2. *New tools and technologies to assist in production, potential for automation.* 3. *Move to land-based aquaculture presents a number of opportunities for applications of technologies.*
	Which developments are inevitable for your company?		1. *Growth is inevitable and is required for sustainability.* 2. *More local produce likely to cause a growth in business.*
Leveraging innovation potential	Are you considering exploiting new ventures?	• New markets	Yes
		• New technologies	Yes – Have to keep up to speed on developments in technology and marine science.
		• New products	Yes – *constantly developing new products.*
		• New partners	Yes - *but reticent about collaborations*
		• Other…?	1.
Defining innovation steering	Who is driving or pushing innovation?	• Customers	• Yes
		• R&D	• Yes – *but not for the sake of it*
		• Policy	• *No*
		• Other?	• *The team, seeking solutions and knowledge transfers from other sectors and industries, applying ideas from elsewhere.*
Defining emergent patterns	What is significantly different in the	• New partnerships &	1. *Stopped academic collaborations completely due to previous experience.*

	last three years?	collaborations	2. Worked closely with local authority, employability
		• Scope (local, regional, EU, international, etc.)	1. *Have grown export base to much further afield clients in the EU and the US*
		• New (digital) communications	1. *Social media presence and large presence on social media. Attempt to be industry influencers and show industry in a positive light,* 2. …
		• Knowledge sources and sharing	1. *Not at present due to previous experiences* 2. *Open to working in clusters and networks for future sharing.*
		• Innovation processes and solutions	1. *New processes in response to customer challenges, wastewater* 2. *Product aftercare.* 3. *Move towards more manufacturing focus.*

COMPANY INTERVIEW -COORSTEK

Topic	**Question**	**Sub-question/detail**	**Answers**
Defining who you are	What is your core activity in blue economy or energy innovation?	• Details of business	Type of Business: *Manufacturing, Ceramics, automotive, marine, offshore wind, semi-conductors* Size of staff: 79 Other:
		• Geographic Scope	Local: *Yes* Regional: *Yes* International: *Yes*
		• Type of energy innovation	Product innovation: Yes – *Mainly in response to customer specifications.*

			Process innovation: *Yes -Fairly standard new equipment and machinery.* Service innovation: *Yes – Reducing time to market, reducing lead times.* Other
		Details of energy innovation	1. *Complying with ISO 14001 standard, educating staff in energy management, complying with audits.* 2. *Several on-site developments kiln neutralization for best use of energy, scrap ceramics sed in roads reducing landfill, in house recycling of packaging, sensor lighting.*
	Who is involved in energy innovation?	• Inside company	1. *All staff within company are trained.* 2. *Ultimate responsibility with the plant leader and the environmental management team.*
		• Outside company	1. *Customer expectations and the desire to be seen to be a good neighbor.* 2. *Environmental policy, Energy costs*
Defining urgent challenges	What are 3 urgent challenges your company is facing?		1. *Brexit and the lack of clarity, markets are going soft.* 2. *Rising utility costs are a challenge for the business, lack of power.* 3. *Controlling waste, rising costs but seeking smart solutions.*
	What possible solutions for the challenges?		1. *Clarity on future trading terms, business has already been affected by softening of the markets.* 2. *Something done at policy level to support businesses with energy costs and reducing energy demands.* 3. *Currently working with customers on process innovation to reduce the need for high firing aimed at.* reducing energy usages. *Work with customers to develop leaner and more efficient processes,*

Defining path dependency	Which 3 factors, e.g. historical, geographical, cultural aspects, are important for your business?		1. *Location in Fife as a gateway to Europe. Acts as an enabler between the US and Europe* 2. *Traditional skills base, engineering, manufacturing and available people.* 3. *Ageing workforce and potential skills shortages, replacement demand.*
	Which 3 factors are limiting your success?		1. *Bridging the skills gap the company has an ongoing requirement for skills in engineering, design, Quality standards, they find it difficult to recruit, particularly young people.* 2. *Logistics is currently a strength but could become a weakness very quickly.* 3. *Brexit is a huge threat to operations due to US>UK>EU enabler.*
Defining future strategies	How are you preparing for the future?		1. *Looking into emerging markets. Opportunity to expand in Renewables, offshore wind, autonomous ships and vehicles.* 2. *Have an ageing workforce, the skills gap is being – Working closely with schools and colleges, working with Career Ready mentoring, Investors in Young People, Developing the young workforce. Utilizing Foundation apprenticeships, Modern apprenticeships and graduate apprenticeships.* 3. *Company policy to work more closely with customers with customer being involved and driving innovation.*
	What is needed to be competitive for the future?	• New competences (training)	1. *Skills requirement in Engineering, design, Quality standards.* 2. *Closer links with Universities, colleges and schools. There is a need to attract talent.*
		• Research & innovation	1. *Better collaboration* 2. *Most R+D driven centrally, research Centre in Uden, usually*

			on a cost led basis, drive the solution.
		• Additional finance	1. *Training support for new and existing staff, have recently made good use of foundation and modern apprenticeship programmes, a continuation of funding would help.* 2. *Assistance with energy costs, lack of cheap power. Potential for more low carbon, energy efficiency.* 3. …
		• New networks & collaborations	1. *Stronger networks, locally nationally and internationally* 2. *Better collaboration across the board with business networks academics, schools, colleges and research and development – triple - helix.*
Defining direction	Which developments in energy transition seem promising for your company?		1. *Growth of wind power presents a good opportunity, there are big and growing markets with an existing customer base.* 2. *There is a good opportunity to grow with customers, this is a company vision.* 3. *Potential for new opportunities, for example driverless ships and vehicles present potential emerging markets.*
	Which developments are inevitable for your company?		1. *Increased work for autonomous vehicles and new processes* 2. *Expansion of renewables, more work in this market.* 3. *Leaner more energy efficient processes, less waste.*
Leveraging innovation potential	Are you considering exploiting new ventures?	• New markets	Yes
		• New technologies	Yes – *Process changed to be more energy efficient.*
		• New products	Yes -*Innovate with customers to get products to market quicker.*
		• New partners	Yes – *Open to new networks and collaborations.*
		• Other…?	1. *Plant and equipment, leaner processes.*
		• Customers	• Yes
		• R&D	• Yes – *Mostly from centre in Uden*

Defining innovation steering	Who is driving or pushing innovation?	• Policy	• Yes – *Energy costs, sustainability, training support.*
		• …?	• Yes/No
Defining emergent patterns	Efforts	• New partnerships & collaborations	1. *Yes - working more closely earlier in cycle, building closer partnerships.* 2. *Working much more closely with education, forging partnerships with local schools and fife college. Efforts to improve age diversity of workforce.* 3. *Strengthening business clusters, strengthening links with triple helix.*
		• Scope (local, regional, EU, international, etc.)	1. *Not changes in the last 3 years.*
		• New (digital) communications	1. *Currently working on a communications strategy, looking at better digital comms, internal -own health and safety video, digital training and e-learning.*
		• Knowledge sources and sharing	3. *Better collaboration between plants and integration of regional R+D facilities.*
		• Innovation processes and solutions	1. *Drive for greater energy efficiency* 2. *Working more closely with customers. Get products to market quicker, improving competitive advantage.*

COMPANY INTERVIEW: ATL TURBINE SERVICES

Topic	Question	Sub-question/detail	Answers
Defining who you are	What is your core activity in blue economy or energy innovation?	• Details of business	Type of Business: *Gas Turbine Component repair.* Size of staff: *77*
		• Geographic Scope	Local: *Yes* Regional: *Yes*

			International: *Yes*
		• Type of energy innovation	Product innovation: *Yes* Process innovation: *No* Service innovation: *Yes – Customer care a central vision.* Other: *More structured comms.*
		Details of energy innovation	1. *Looking at energy usage, on site incinerator, run a steam pipe from Michelin to reuse waste heat.* 2. *Energy costs very high cost 30k per month.*
	Who is involved in energy innovation?	• Inside company	1. *Driven by engineering team.* 2. *Customer demand and expectations.*
		• Outside company	1. *Have not made use of consultants to date.* 2. …
Defining urgent challenges	What are 3 urgent challenges your company is facing?		1. *Skills and recruitment. Base skills are lacking in candidates particularly in Engineering and machining.* 2. *Niche local provider, no similar companies locally, there is a big training requirement. Training when on the job is a challenge.* 3. *Rising energy costs, there was a 25% increase on previous contract.*
	What possible solutions for the challenges?		1. *Engaging with education to and DYW to attract and upskill candidates with real world business experience.* 2. *Better internal training processes and opportunities, better upskilling of existing staff.* 3. *Agencies to assist in recruiting graduates.*
Defining path dependency	Which 3 factors, e.g. historical, geographical, cultural aspects, are important for your business?		1. *Historical buy over of wood group -legacy of previous business.* 2. *No geographical connection, majority of aerospace industry in the midlands.* 3. *No pressure to move good logistics and a good experienced workforce.*

	Which 3 factors are limiting your success?		1. *Extended time to recruit and train staff is an ongoing pressure. It took 5 months to recruit a welder.* 2. *Down time caused by client delays, could work more closely to streamline process.* 3. *No other similar local industries, distance from networks.*
Defining future strategies	How are you preparing for the future?		1. *Brexit – are paying close attention to development. It is currently the biggest unknown and the biggest threat to growth.* 2. *Opex and capex plan to upgrade machinery and increase capacity.* 3. *Investing in training people, working more closely with schools, colleges and universities.*
	What is needed to be competitive for the future?	• New competences (training)	1. *People growth -internal, new processes and equipment* 2. *More supervisors to assist in growth.* 3. *Engineering and machining skills, new candidates with base skills.*
		• Research & innovation	1. *Don't do a huge amount of R+D* 2. *Mostly customer driven, work with clients.* 3. *No dedicated R+D engineers.*
		• Additional finance	1. *No – In a very healthy position as company has grown significantly over the past 3 years.* 2. *Account managed and well supported by Scottish Enterprise*
		• New networks & collaborations	1. *Account managed by Scottish enterprise. Joined Scottish Engineering this year.* 2. *Call on specialist help when needed, use of consultants.* 3. *Working to develop stronger networks in the supply chain. Stronger relationships with clients.* 4. *Work with local chamber of commerce.*
Defining direction	Which developments in energy transition		1. *Energy efficiency, Energy reviews and drive for more efficient processes.*

	seem promising for your company?		2. *Business has grown in Gas fired power stations, potential threat due to energy transition, will see less work in UK and more overseas.*
	Which developments are inevitable for your company?		1. *Growth is inevitable due to work in an end of life cycle environment, component repair and replacement.* 2. *As new technology arrives need to prepare and update processes, products. There is a need to be mindful of change.* 3. *Replacement demand of staff in Engineering though are engaging in process.*
Leveraging innovation potential	Are you considering exploiting new ventures?	• New markets	Yes – *Growing into other export markets. International sales manager tasked at finding new geographical areas, new markets.*
		• New technologies	Yes – *Be mindful of new developments no overnight game changer in what we do at present.*
		• New products	Yes -*Will come through speaking to clients, being specific and targeted. Fill existing capacity with tech, smart technologies.*
		• New partners	Yes – *In terms of supply chain. Use of local partners as much as possible, Plasma powders example.*
		• Other…?	1. … 2. …?
Defining innovation steering	Who is driving or pushing innovation?	• Customers	• *Yes*
		• R&D	• Yes- *Sometimes in industrial power side, customer driven.*
		• Policy	• No – *rarely a driver for innovation*.
		• …?	•
Defining emergent patterns c	What is significantly different in the last three years?	• New partnerships & collaborations	1. *Working with Sottish Engineering, Scottish Enterprise and Chamber of commerce, working more closely with clients and supply chain network.* 2. *Working more closely with education, schools and colleges*.
		• Scope (local, regional, EU,	1. *Export business has grown significantly. Growth in client base in both sides of business,*

		international , etc.)	*aerospace and industrial power, £297,000 in 15/16 -£2.2 Million in 2018.* 2. *Exploring new geographical areas.*
		• New (digital) communications	1. *Client management, working more closely with clients.* 2. …
		• Knowledge sources and sharing	1. *Working much more closely with client engineering teams. Better interaction, discussion and knowledge sharing.* 2. *Integrated partnership with client's quarterly business meetings. Can offer improved solutions.*
		• Innovation processes and solutions	1. *New Hydrogen cleaning capability, more effective way of cleaning products.* 2. *Efficiency, turnaround time and quickness to market has improved. Success has been down to being reliable and predictable.*

COMPANY INTERVIEW: BRIGHT GREEN HYDROGEN

Topic	**Question**	**Sub-question/detail**	**Answers**
Defining who you are	What is your core activity in energy innovation?	• Details of business	Type of Business: *Nonprofit SME focused at education and consultancy and training renewables* Size of staff: *5* Other: …
		• Geographic Scope	Local: *Yes* Regional: *Yes* International: *No*
		• Type of energy innovation	Product innovation: Yes- *Unique control system developed for managing turbine,* Process innovation: *No* Service innovation: Yes – *Have recently developed several new educational programmes for schools, colleges, community groups and universities* Other: ….

		Details of energy innovation	1. *Nothing specific to energy innovation, business is more focused at demonstrating technologies and educating*
	Who is involved in energy innovation?	• Inside company	1. *All staff within the organization.*
		• Outside company	1. *PHD, Students on placement from local universities often assist in projects.*
Defining urgent challenges	What are 3 urgent challenges your company is facing?		1. *The company has lots of technology, hydrogen vehicles, re-fuelers, and hydrogen storage equipment. They very costly to upkeep and it doesn't seem to be a priority for the Scottish government in terms of funding as other forms of renewables, other than hydrogen are being favored.* 2. *Existing grant funding does not cover the cost of running and maintaining the equipment.* 3. *School budget pressures, although programmes are very successful, they come at a cost and this discourages schools. Is having an impact on business and are struggling to break even now.*
	What possible solutions for the challenges?		1. *More support from government, Local, national, European in terms of funding, particularly for equipment upkeep and maintenance.* 2. *Creating better links with education, getting them to see the value in training, working more closely with DYW.* 3. *Assistance in costs with supporting education, more funding available to schools for programmes in energy transition/ renewables.*
Defining path	Which 3 factors, e.g. historical, geographical,		1. *Located due to position in Fife energy park. Cheap and affordable brownfields site.*

dependency	cultural aspects, are important for your business?		2. *A good location for a wind turbine.* 1. *Located in area of depravation, Company ethos to give something back to local communities.*
	Which 3 factors are limiting your success?		1. *Money -Cashflow is an issue and is affecting capacity, have recently been unable to replace staff due to poor cashflow.* 2. *Staffing, finding the right person. Requirement for someone who understands hydrogen fuel cells and can also work with schools. Requires a very specific type of person that can do both.* 3. *Changing government priorities, there seems to be a move away from hydrogen power to electric vehicles.* 4. *Pace of change slower than expected, lack of jobs created locally in renewables to date.*
Defining future strategies	How are you preparing for the future?		1. *Constantly upskilling staff. Attending training and courses, developing a communications strategy, increasing social media presence* 2. *Tailoring learning materials in consultation with educators to establish priorities and ensure learning materials are relevant to that.*
	What is needed to be competitive for the future?	• New competences (training)	1. *As above, training in digital marketing and communications.* 2. *Ability to widen scope and educate more young people.* 3. *Training/ assistance in accessing different funding streams.*
		• Research & innovation	1. *PHD student placements, company uses these most years.* 2. *Hydrogen modelling, improved storage systems.* 3. *More funding to allocate time to R+D and to keep abreast of developments.*
		• Additional finance	1. *More funding available to schools*

			2. *More government funding and grants to support activity.* 3. *Business sponsorships, difficult in the challenging climate.*
		• New networks & collaborations	1. *Better clusters of businesses, more of a range of clusters and partners within. Opportunity to share experiences and best practices.* 2. *Fife education network has provided a platform to showcase good work and learn from other partners -best practices* 3. *Continued work with partners such as DYW Fife, STEAM Fife, building a continuum of participation.*
Defining direction	Which developments in energy transition seem promising for your company?		1. *Rising energy costs, government priorities customer and public expectations is likely to see a continued growth in renewables* 2. *Close-proximity to offshore wind sites should present a number of opportunities, new networks, new partners and skills requirement.* 3. *Potential for hydrogen into existing gas networks. SGN are currently looking at this.*
	Which developments are inevitable for your company?		1. *Increased flexibility in multiple areas. Must adapt to changing markets and changing local and national government priorities.* 2. *Need to invest in new technology and new stock to keep up to date with advancements and stay relevant.* 3. *Balance between not for profit and commercial, potentially becoming more commercial to open up new markets.*
Leveraging innovation potential	Are you considering exploiting new ventures?	• New markets	Yes – *Yes exploring more commercial activity. Potential move away from nonprofit model*
		• New technologies	Yes – *In line with developments in hydrogen technology, branching into other types of renewables.*

		• New products	Yes – *Constantly developing new learning materials in consultation with educators.*
		• New partners	Yes – *New partners in education and government, new networks*
		• Other…?	1. *All of the above are limited by current financial and staffing challenges.*
Defining innovation steering	Who is driving or pushing innovation?	• Customers	• *Yes – Programmes are developed to meet customer needs.*
		• R&D	• No
		• Policy	• Yes – *Hydrogen becoming less of a priority is driving company to look at new markets.*
		• …?	• Yes/No
Defining emergent patterns	What is significantly different in the last three years?	• New partnerships & collaborations	1. *ETP -energy technology partnership, ae working with to look at future skills demands in sector.* 2. *Working much more closely with education, STEAM Fife, DYW and Fife college*
		• Scope (local, regional, EU, international, etc.)	1. *Reduction in staff is limiting this, would like to branch out more nationally but can't at present due to lack of people. Most work is done locally.*
		• New (digital) communications	1. *Lack of skills in this area, would like to develop a communication strategy but feel are lacking in skills, possible training requirement.* 2. *Looking at different demographics for marketing, widening scope.*
		• Knowledge sources and sharing	1. *Previous bad experiences with learning, materials being plagiarized, local college* 2. *Risk of collaborating due to size of organization, fear of being swallowed up, previous bad experience with college.*
		• Innovation processes and solutions	1. *Only in terms of creating new and revising learning materials, feedback from customers and in line with guidance documents. E.G career education standards, Curriculum for excellence.*