Client: Greenseas Resources Ltd.

A Market Assessment Report for UK Seaweed Trends

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INTRODUCTION

Greenseas Resources Ltd. was established in 2016 with the aim of developing a sustainable business based in Pembrokeshire focussed on the management and commercial farming of seaweed.

Over the next 6 months GreenSeas aims to explore market opportunities and identify those that it will inititally focus on. A key part of this process will be confirming the commercial viability of the potential applications and routes to market.

GreenSeas hopes that the growth of a seaweed industry in Wales can have a positive socio-economic impact on coastal communities in providing employment opportunities and inward investment.

GreenSeas has been established to do the following:

1. to own and operate seaweed farms around the UK
2. to be a supplier of seaweed and its derivatives – raw and processed
3. to operate across a number of markets - Food, Biotech, Energy, Environment
4. to build a sustainable, profitable business
5. to be one of the leading seaweed mariculture businesses in Europe

The approach that GreenSeas will be taking to developing its business is based on the following:

- Multiple income streams - GreenSeas believes that setting up projects so that they have more than one income stream will ensure the economic viability of projects (e.g. earning credits for bioremediation and having a feedstock for energy production.
- Broad business base - GreenSeas believes that operating across more than one market will make the business more robust and resistant to changes in any one market.
- Added value - GreenSeas believes that there are opportunities to add value through carrying out primary processing that will further improve the economic viability of projects, e.g. vacuum packing raw seaweed for use in restaurants, producing alginate high value precursors for the emerging bio-plastics industry.

The purpose of this Market Assessment is to assess and quantify the current, and potential future, demand for seaweed and its derivatives.

The focus of the research needs to be on the following species:

- Kelps (Kombu, sea veg / extracts): Laminaria digitatum, Laminaria hyperborea Laminaria saccharina/Saccorhiza polyschide
- Brown seaweeds: Ascophyllum nodosum, Himanthalia elongata (Sea spaghetti), Fucus species - serratus
- Red seaweeds (Salads, condiments and even bacon replacement / extracts for food industry): Palmaria palmata (Dulse), Chondrus crispus
- Green Seaweeds: Ulva/Enteromorpha.

RESEARCH STRUCTURE

Our secondary research findings shall be presented in line with the following themes:

The Local Market: What opportunities are there for seaweed produce in Wales. Who are the people to approach and what prices can be expected?

The Ethnic Market: What challenges and opportunities are in supplying the ethnic food market? Identification of main consumer countries overseas and ethnic niche markets in the UK.

The Nutrition Market: Are there opportunities to market seaweed as a sports / nutrition / specialist dietary product.

UK Hospitality Trade: What are the formats and species required by the restaurant trade?

Our primary research will be presented in the final section of the report, with details of the research methodology used.

The primary research will be presented as industry level information, maintaining the confidentiality of those who responded directly to the study who released confidential information with regard to their interests in the seaweed sector, both currently and with regard to future interest.

SECONDARY RESEARCH

An overview - The European Market

To meet the client's requirement of identifying opportunities we have included an additional section on the European Market. The information presented in this section comes from The European Market for Sea Vegetables, The Organic Monitor 2015.
Source:
http://www.bim.ie/media/bim/content/publications/The,European,Market,for,Sea,Vegetables,-,2015.pdf

The European market for sea vegetables was estimated at about EUR 24 million at wholesale value in 2013. France has the largest consumer market, followed by the UK, Germany and Spain; these four countries comprise almost 80% of European revenues.

Table One

The European Sea Vegetables Market

The Largest Country Markets for Sea Vegetables, 2013

Selected species (Tonnes)

Country	Dulse	Kombu	Total
France	63	19	82
UK	3	8	11
Germany	0	3	12
Spain	2	5	7
Others	2	15	17
	70	50	129

Source: The European Market for Sea Vegetables, Organic Monitor 2015 (Fig. 1)

The market for sea vegetables is growing by about 7-10% per annum, and is projected to continue to grow at this rate in the coming years. Traditionally, most demand was from catering & foodservice companies that mainly used nori, wakame and kombu in Japanese and Asian cuisine.

Although demand continues to rise from this sector, the retail market and food processors are also becoming important. Nori is becoming available in retailers across Europe, whilst a growing number of food processors are using sea vegetables.

About 472 tonnes of sea vegetables was sold in 2013. About a quarter of the market is supplied by European producers, mainly based in France and Spain. Many companies are vertically integrated, involved in collecting and drying seaweeds, processing, as well as making finished products. The largest companies in Europe are:

- Aqua B
- Les Ouessantines
- Setalg
- Sarl Biocean
- Algamar
- Porto Muinos.

Nori is the dominant product, with 288 tonnes, comprising 61% of total sales volume. Almost all nori is imported into Europe; Japan, China and South Korea are the main country sources. It is estimated that just 3 tonnes of nori was produced in Europe in 2013. The **UK** has the largest market for nori, partly because of high demand from food processors and catering and foodservice (CFS) operators that make ethic foods.

The major factors that are driving growth in the European sea vegetables market are:

- **The Catering & Foodservice (CFS)** sector continues to generate high demand for sea vegetables, especially nori. Over half of all sales volumes go to this sector, with most going to producers of Asian foods like sushi and miso soup. Some retailers, such as the French hypermarket chain Auchan, have also started to buy nori to make fresh sushi in their stores.
- A growing number of **food processors** are using sea vegetables in their products. Apart from applications in Asian foods, sea vegetables are finding new applications in European cuisine. For example, French companies are making rillettes, pâtés and seaweed pasta. Seaweed mustard is also present in some countries. Manufacturers of European food products tend to prefer European sources of sea vegetables.
- Sea vegetables are making inroads in European retailers. **Retail penetration** is increasing in specialist retailers, whilst some mainstream retailers are also introducing these products. Most demand is from organic food shops and health food retailers, with some offering a range of sea vegetable products. Supermarkets and hypermarkets tend to have just nori in their stores.
- Consumption of sea vegetables is rising as consumers become more aware of their **health and nutritional benefits**. Sea vegetables are important source of

> protein and vitamins, such as vitamins A, C, E, B1, B2, B6, and B12. Sea vegetables are also rich in iron, magnesium, potassium, boron, silica, selenium and chromium. According to the University of Glasgow, sea vegetables are a rich source of iodine and could provide a solution to iodine deficiency.

Appendix One presents the key findings from a study of the Global Commercial Seaweed market.

The Local Market

Probably the most authoritative study (Seaweed in the UK and Abroad, Cefas, April 2016) states there are no comprehensive estimates of seaweed production in the UK.
Source:
https://www.gov.uk/government/publications/the-seaweed-industry-in-the-uk-and-abroad

However, in 2013, seaweed production from wild harvest in the UK was estimated to be around 2,000 – 3,000 dry tonnes with unknown quantities of subtidal kelp and storm-cast seaweeds also collected.

According to the authors of the report, there are also no recent estimates of the wild seaweed standing stock of the UK, nor of the potential algal stock that could be sustainably harvested, with the exception of *Ascophyylum nodoscum* (brown seaweed) stocks in the Outer Hebrides with 60,700 tonnes available.

With regard to aquaculture, there are **35** countries in the world that farm marine aquatic plants. However, just **7** (China, Indonesia, Philippines, South Korea, North Korea, Japan and Malaysia) account for **99.3%** of the world production. Seaweed aquaculture is currently limited in the UK and existing pilot seaweed farms remain in research and development status - Northern Ireland (Queen's University, Belfast), Scotland (SAMS), Shetlands (University of Highlands and Islands) and, from this year (2016), Wales (Swansea University).

The majority of UK seaweed-related businesses produce seaweeds for:

- food ("sea vegetables")
- condiments
- cosmetics

and to a lesser extent for:

- animal feed and supplements
- chemicals (hydrocolloids)
- fertilizers
- neutraceuticals (e.g. nutrients and dietary supplements)
- bioremediation, or biofuel production, although this is still at developmental stage.

Web-based searches identified **27** seaweed-related businesses in the UK, **16** of which use seaweed harvested in the UK:

Table Two

16 UK companies using seaweeds from the UK

Name	No. staff	Products
Mara Seaweed	<50	Condiments
Seagreens	51-200	Condiments
Atlantic Kelp Co.	<10	Condiments
Pembrokeshire Beach Food Company	<20	Food products & condiments
Marine Biopolymers	-	Chemicals
Hebridean Seaweed Co.	<10	Animal feed, chemicals, cosmetics, nutraceutical
Just Seaweed	<10	Food products & cosmetics
Cornish Seaweed Co.	<10	Food (dry) & condiments
Viking Fish Farm	10-50	Knowledge industry/hatchery
Böd Ayre Products	<10	Food, condiments, animal feed, fertilizers
Kilmacolmloch Developments	10-50	Bioenergy
Irish Seaweeds	-	Food, cosmetics, nutraceutical
Seaweed Organics	-	Cosmetics
Orkney Seaweed Co.	-	Fertilizers
Neo Argo	<10	Biotechnologies
Uist Asco	-	Fertilisers, animal feed, chemicals

Source: Seaweed in the UK and Abroad, Cefas, April 2016
https://www.gov.uk/government/publications/the-seaweed-industry-in-the-uk-and-abroad

Currently UK capacity for seaweed production is 'positioned' between the 'added value commodities' and 'speciality products' with values between £1-1,000/kg.

Production of fuels, energy, feed and bioremediation require big volumes of algae but the economical return for the biomass is small around <£1/kg.

Contrarily, when algal components are used in speciality products, nutraceuticals and cosmeceuticals, the value of algal biomass become substantially higher at £2,000/kg, up to >£5,000/kg for special applications

Table Three presents a current (June 2017) UK retail price comparison for a selection of seaweed varieties.

Table Three

UK Retail Prices for selected seaweed varieties

€ June 2017

Edible Seaweed (powdered/dried)	Price / 40g	Price / 6 x 40g	Price / 1 kilo
Dulse	4	21	49
Kombu	4	21	40
Carragheen (Chondrus crispus)	4	21	58
Sea Spaghetti	4	21	49
Ulva Sprialis	4.50	21	N/A

Source: www.seaweedproducts.ie

Whilst we are not able to source official figures regarding the size and nature of the market for seaweed in Wales there is anecdotal evidence to suggest that seaweed is now on the culinary 'map'. Both Pembrokeshire Beach Food Company and Selwyn's Seafoods have innovated with regard to the use of seaweed within the condiment and snack market.

Source: http://www.independent.co.uk/life-style/food-and-drink/seaweed-to-success-reinvigorating-the-british-seaweed-industry-a7419236.html

Leslie A. Parsons (Burry Port) Ltd, for example, is a major manufacturer of Laverbread. They sell direct from their website and a case of 10 tins is priced at £17.00.

In addition to Laverbread, they produce and sell a range of products and we have estimated their total turnover (i.e. including Laverbread and their other products) for the financial year ending 12/2015 to be some £32.8m (this is based on their Debtors' figures reported to Companies House of £2.7m and an assumption they grant 30 days to their trade customers).

Dà Mhìle an independent, award-winning farmhouse distillery based in Ceredigion, West Wales uses "a selection of organic seaweed from the Newquay coast of West Wales and the West coast of Ireland" to produce Dà Mhìle Seaweed Gin. Launched on St David's Day 2014, it retails at £30 for a 70cl bottle. The company's website also makes reference to the company teaming up with other Welsh food producers such as Afan Vale Chocolates to produce "epic truffles".

Source: http://www.damhile.co.uk/

We can also use trends in the Republic of Ireland as a useful indicator for the sector. According to the Sea Change Strategy (2006), the Irish seaweed production and processing sector will be worth €30 million per annum by 2020 (Source: Irish Sea Fisheries Board).

Source:https://www.marine.ie/Home/site-area/news-events/press-releases/sea-change-strategy-launched-marine-institute-galway

Palmaria palmata is considered a food delicacy and most of the national production is sold and consumed domestically (16-30 tonnes), The combined requirement for Palmaria and Laminaria in Ireland is 1,500-2,000 tonnes of product. Dried and packaged bulk Palmaria makes of the order of €16-€19/kg while Laminaria typically makes €10-€16/kg for bulk quantities.

Ireland is trading on its 'clean green' image. Seaweed is used in spas and in cosmetics. New food products can be marketed using the promise of the 'Ireland Brand'. This brand stands for provenance, truth, good value and quality. Ireland has a great number of good restaurants, farmer's markets and established export markets for seafood products, which can be capitalised on by innovative thinking.

In Ireland, the dominant market for edible seaweed is the domestic food market; much of the edible seaweed produced in Ireland is sold directly to health-food stores, specialist retailers and supermarkets.

Irish artisanal brewers are also using seaweed to create innovative new ales. In 2016, Dungarvan Brewing company launched "Dungarvan Seaweed Saison - with added dillisk "working the seaweed into a saison, using the salinity of the seaweed as the souring often present in a saison". The dry ale retails at €4 for a 500ml bottle.

Source: http://dungarvanbrewingcompany.com/our-beers/seaweed-saison/

A relatively small proportion of national production is being exported to the United Kingdom, mostly as bulk consignments. Very few value-added, branded products are being sold abroad. This sector is liable to periodic fluctuations in the supply of raw materials, mainly as a result of periods of consistently poor weather conditions or low recruitment and growth of seaweed.

The Ethnic Market

The UK has the largest market for nori, partly because of high demand from food processors and catering and foodservice (CFS) operators that make ethic foods. The total European market for nori was 288 tonnes, but it is estimated that just 3 tonnes of nori was produced in Europe in 2013.

Source:
http://www.bim.ie/media/bim/content/publications/The,European,Market,for,Sea,Vegetables,-,2015.pdf

The Cefas report (see reference above) cites China, Japan and the Philippines as the largest world consumers of seaweed as food. In Europe, a market analysis conducted by Organic Monitor (see reference above) in 2014 indicated that the wholesale value for sea vegetables was approximately €24 million (in 2013), with France being the largest consumer market.

European producers (mainly from France and Spain) supply 25% of the market, however nori, the dominant product, is almost entirely imported into Europe.

[In addition to the above, the reader is referred to the Hospitality section below]

The Nutrition Market

The Cefas report (see reference above) identified neutraceuticals (e.g. nutrients and dietary supplements) as an important output for seaweed.

According to the Organic Monitor (see reference above), one of the main factors driving growth in the European sea vegetables market is demand from organic food shops and health food retailers, with some offering a range of sea vegetable products.

Consumption of sea vegetables is rising as consumers become more aware of their health and nutritional benefits. Sea vegetables are an important source of protein and vitamins and rich in minerals.

According to the University of Glasgow, sea vegetables are a rich source of iodine and could provide a solution to iodine deficiency. Mannitol (extracted from seaweeds) is a less calorific alternative to normal sugar as a sweetener (Mouritsen 2013 sourced in the Cefas report).

Seaweeds can be used dry, as an ingredient or sprinkled on top, or rehydrated and added to soups, stews, eggs, stir-fries – even sweet dishes like brownies can get the seaweed ‘treatment’.

According to researchers at Newcastle University, the alginate found in seaweed reduces the uptake of fat in the body with hopes that seaweed could be an important tool in the fight against obesity.

Kombu seaweed is also being used to help reduce stroke attacks. A recent article by the Enterprise Department at Greater Birmingham Chambers of Commerce cites a West Midlands business which is importing thousands of tins of Kombu seaweed a month from the Far East to the UK and marketing the product as a substitute for table salt. Kombu apparently contains 92% less sodium than table salt. They have 500 retailers and distribute their product via pharmaceuticals and health food wholesalers.

They aim to boost sales to 10,000 – 15,000 tins a month. They have a corporate partnership deal with the national charity Blood Pressure UK to raise the profile of Kombu seaweed and to publicise their product.

Table Four presents a list of leading UK suppliers of sea vegetables.

Table Four

UK Leading Suppliers of Sea Vegetables, 2014

Name	Company details	Company info
Tazaki	Imports Asian Foods to UK	Tazaki Foods is the leading importer and wholesaler of traditional Japanese and East Asian food products in Europe. It has dried nori, wakame and kombu sea vegetables, as well as a range of finished products containing sea vegetables. The company supplies sea vegetables to Japanese restaurants, other foodservice establishments, and retailers throughout Europe. It markets nori sheets under the Yutaka brand, mainly in supermarkets and hypermarkets. In the UK, Yutaka products are in ASDA, Tesco, Morrisons and Sainsbury`s.
JK Foods	Imports ethnic foods to UK	JFC International Europe Group is a member of Japan-based the Kikkoman Group. It is the leading distributor of Japanese foods in Europe, with operations in Germany, United Kingdom, France, Sweden and Norway. It supplies dried wakame, kombu and nori; it also has a wide range of finished products that contain sea vegetables. JFC mainly supplies sea vegetables to restaurants, catering companies, and other foodservice establishments. It also supplies nori sheets to the retail market. They are marketed under the Nagai brand in Tesco stores, and Miyako brand in the German Metro Cash & Carry chain. A part of the Hyperama Group, JK Foods is one of the leading importers of Asian foods in the UK. It is the exclusive distributor of the Tiger Tiger brand of ethnic foods. The brand has nori sheets imported from China. About half its products go to the CFS sector and half to retailers.
Clearspring	Specialises in Japanese health foods	Specialises in Japanese and organic foods for specialist retailers. The London-based company has about 180 products, with many marketed under the Clearspring brand. Its sea vegetable range comprises nori, dulse, wakame and kombu. It also markets noodles, seasonings, tofu, tea, miso soup, rice cakes, crackers and related products. Its sea vegetables are marketed in Waitrose, as well as organic food shops and health food retailers.
Blue Dragon	Supplies to mainstream retailers	A British company that specialises in Asian food products. It imports nori sheets from China and markets them under the Blue Dragon brand. The products are mainly in mainstream retailers; they include Waitrose and Morrisons in the UK, Carrefour in Belgium, Dansk Supermarket in Denmark, Coop Butiker & Stormarknader and CityGross in Sweden, Kesko in Finland, and Rema 1000 in Norway.

Source: http://www.bim.ie/media/bim/content/publications/The,European,Market,for,Sea,Vegetables,-,2015.pdf

UK Hospitality Trade

It is estimated that there are some 9.8k Indian restaurants in the UK with a sales pa of some £3.2 bn. In addition, there are a further 7k Chinese restaurants (and 16k takeaway outlets) in the UK with a sales pa of some £3 bn (restaurants = £1.7 bn).

After that, the numbers of ethnic restaurants by ethnicity decreases rapidly. 'Menu' magazine has estimated there are around 600 Thai restaurants throughout Britain, 550 Greek, 380 Tex Mex/Caribbean, about 150 Turkish and around 100 Malaysian or Indonesian (71% of which are in London).

Source: https://www.thecaterer.com/articles/301079/market-snapshot-ethnic-food

The Office for National Statistics (ONS) in its Family Spending in the UK: financial year ending March 2016 stated:

- Average weekly household spending remained level at £528.90 in the financial year ending 2016, coinciding with a slowdown in consumer confidence
- Low-income households continued to spend a higher proportion of their expenditure on food and energy when compared with households with a higher income
- UK households spent more than **£45.00** a week on restaurants and hotels for the first time in 5 years.

Source:
https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/bulletins/familyspendingintheuk/financialyearendingmarch2016

There is no definitive information in the public domain regarding seaweed usage in restaurants in the UK. However, we do have some anecdotal evidence:

"A seashore superfood is becoming the must-have ingredient for chefs in restaurants up and down the country. Man has been eating seaweed for centuries and it has remained hugely popular across parts of Asia.

But despite the UK's abundant coastline, only a tiny fraction of the eight million tonnes harvested worldwide each year is grown or eaten here, even though some species contain more calcium than milk and more iron than beef.

Case Study – Cornish Seaweed Company

Cornish Seaweed Company are making the most of what the sea has to offer.

Tim Van Berkel and his partner were granted a licence to harvest seaweed on the west coast of Cornwall by the Crown Estate two years ago. Now they cut 1,000kg of it a month before washing it, drying it and packaging it ready for sale.

Their seaweed has become a crucial part of the menu at a new contemporary fish and chip restaurant called Hook which has just opened up in Camden, north London. Chef Simon Whiteside serves it as a side salad, pickle and also as a seaweed salt to season every dish.

He said: "It's such an under-used ingredient so it's really nice to show new ways of using it and seeing how fresh and vibrant it can actually be and not something that's there when the tide goes out."

At Jamie Oliver's Fifteen restaurant in Cornwall head chef Andy Appleton has been experimenting with seaweed for the past year. One recipe involves cooking the seaweed known as sea spaghetti with pasta and seafood.

Source: http://news.sky.com/story/seaweed-is-the-uks-hot-new-restaurant-dish-10385025

Finally, in this section, a Report by Fairfax Meadow in 2015 suggested that the main trends in eating out were:

- Snacking & sharing – smaller meals, Spanish style dining, etc
- Gluten free and other Free From foods – diners reporting food intolerances is rising
- Street food – a different delivery, encourages experimentation.

They go on to say that the drivers for these trends are:

- People are hungry for new experiences
- Moving away from comfort foods associated with the recession
- Younger consumers with increased exposure to TV chefs and experimental cooking
- Lower price point for street food means less risk and encourages trail and experimentation

Source; http://fairfaxmeadow.com/wp-content/uploads/2015/01/Food-Trends-2015.pdf

PRIMARY RESEARCH

Methodology

As part of the study, primary research was undertaken with identified businesses operating within the food sector. Identification of these businesses was achieved through a mix of desktop research and existing contacts within the industry of Greenseas Resources Ltd. and CamNesa Ltd.

Primary research in the form of telephone and face-to-face interviews were conducted with key contacts in the sector throughout the UK. This research was conducted using a Directed Discussion Guide to ensure key subject areas were investigated to inform the recommendations sought as part of the study.

The study methodology and discussion guides were focused on identifying trends within the sector, focusing on the growth of the seaweed sector, product formats and potential for gathered and grown seaweed species in the marketplace. A particular focus was on the importance of species and identifiers such as sustainability and provenance and how important this was to buyers.

The final respondent list included 32 companies who were contacted by CamNesa for the primary research phase of the study. These businesses ranged from large food service businesses within the UK who sell multiple formats of seaweed products within their range, to smaller speciality businesses and specialist dedicated seaweed suppliers to the consumer.

Framing the Primary Research Findings

- From those respondents with a range of seaweed products within their offer, there was a slight increase in the volumes of products being sold across species.

- A level of confidence was found amongst seaweed sellers within the sector with regard to the potential of the market for further growth across formats (dry / wet processed and added value)

- A number of respondents who currently have no seaweed products within their ranges, demonstrated an intent to research the sector further and would seek partnerships with growers to develop this product line within their businesses

- Provenance was less important to the larger scale sellers of seaweed products, but sustainability was of importance. Of the larger scale businesses selling seaweed in the sector, sourcing of raw material was predominantly from outside of the UK.

- Provenance was of importance to the respondents operating smaller businesses, with sustainability also being a key purchasing consideration.

- One respondent from the added value food sector demonstrated interest in the integration of seaweed into product lines

- There was specific interest in the development of relationships with seaweed growers with reference to the potential for contract growing.

Respondent Businesses

32 businesses within the UK and overseas were targeted for interview via directed discussion document. These businesses were selected due to existing knowledge of their trading within the sector through the secondary research element of this study and also via the desk research and existing contacts of Greenseas Resources Ltd.

The majority of the respondent businesses operate in the seafood sector, where sales of seaweed form a small, but important part of a wider product range. Other respondents were from the speciality sector, again with a seaweed element forming part of a wider offer as well as dedicated seaweed businesses operating in the health and nutrition market.

One of the key findings of the study has been the diversity of businesses involved in the seaweed sector, with a number of Asian food service and wholesale businesses within the UK supplying a large customer base. Businesses also ranged in size broadly from micro businesses through to PLC's and multinationals with interest in the sector.

Volumes and Requirements

Respondents indicated a broad range of requirements for seaweed, across a range of species including:

- Seaweed (non-edible for decorative purposes only)
- Seaweed edible
- Dulse
- Haricots de Mer
- Kombu
- Sea Lettuce
- Nori
- Purslane
- Wakame

Of interest to this study was the wide range of formats and buying requirements / specifications of buyers of seaweed ranging from branded packed product from 100 gram weights through to raw unprocessed seaweed in bulk.

There were also offers of mix seaweed, where such product lines were offered in a range of mixes to the customer and weights. We would note that such mixes are presented in both wet and dry formats.

Of particular interest was the organic offer of seaweeds. We have not been able to validate the certification standard of these organic seaweeds, but it is of interest that a market exists for organic seaweed products in volume.

When questioned with regard to sourcing of seaweed, respondents were guarded with regards to product sourcing. This could demonstrate competition for product within the sector or close affiliation to suppliers. There was no correlation of non-response from business type across the respondents and therefore we can only make the assumptions stated.

Sourcing Policies

As part of the research, we sought the views of respondents with regard to sourcing policies and in particular those relating to provenance, sustainability, impact on the environment and continuity of supply.

Quality of the seaweed species sourced was a key issue for processors, alongside continuity of supply. The ability to receive quantities of seaweed product of a set specification for onward processing was an important factor for those involved in the added value sector, alongside the ability to purchase such products at the correct price to allow for further added value processing.

When undertaking the desk research into the businesses prior to being interviewed, the commitment to sustainability was apparent across respondents regardless of the size of the business. Sustainability is a major component of purchasing decisions within any seafood businesses and as seaweed forms part of the product range of the majority of businesses who responded to this survey, the commitments carry through.

Within a small number of businesses, particularly those who can be identified as operating within the speciality food sector, provenance was an important factor in purchasing decisions. This was also the case for some dedicated seaweed processors, but as previously mentioned, quality of product and continuity of supply remained paramount.

One area within the scope of study was the sourcing of seaweed from hand gathering and farmed sources. As previously identified, sustainable sourcing policies were employed by a number of businesses in the sourcing of primary product, although we were unable to ascertain the full extent of buying patterns between hand gathered wild seaweed and seaweed farmed or co-farmed with other marine species such as mussels.

It was apparent that a great volume of seaweed is sourced from outside of Wales and indeed the UK, with the reasons cited within this section for these purchasing decisions. France, the Far East, China and Japan were stated sources of product by respondents, but detail with regard to volumes was withheld due to confidentiality issues.

To summarise on this section, as with other food products, there are differences in sourcing characteristics of seaweed in accordance with the positioning of the product and its end use. Provenance is important to the speciality sector, where sales volumes are lower, whereas it is less so for those operating larger businesses where seaweed constitutes part of a much wider product range.

Impact on the environment from traditional methods of hand gathering of wild seaweed species was not considered to be an issue, but the concept of seaweed farming in Wales or the UK was one that was felt could be explored and is covered in the next and final section of the report.

Innovation and Growth

Respondents were asked during interview with regard to their views with regard to innovation in the use of seaweeds. A number of respondents were very positive with regard to the potential to innovate in the sector, from the perspective of using seaweeds as ingredients, as well as the developing new seaweed based product lines.

From the responses provided and the confidential information received from which we can provide an industry level view, there is confidence and indeed evidence that the seaweed sector is growing, but only at a small percentage per annum. We were able to identify interest from respondents in the food sector engage in innovation activity related to potential contract growing for single or multiple species of seaweed.

There was also interest in engaging in new product development within the mainstream food sector in relation to the integration of seaweed into retail food products. This would require further research and development to understand the tangible benefits of such activity that would cover issues such as colour taint from seaweed as well as being able to withstand shelf life testing when integrated into products as well as meeting retailer technical requirements.

At this stage of the research, the development of further relationships with seaweed growers in Wales would be open for further scoping and development to gain a greater understanding of the benefits of partnering and innovating.

One of the concerns with regard to potential growth of the sector in Wales through mariculture rather than hand harvesting for wild seaweeds was the cost of production in comparison to other parts of the developing world where seaweed farming supports a great number of small holder farmers in countries such as Indonesia.[1]

Further research on the opportunities for collaboration and indeed the cost of sales is needed to further engage exploring the opportunities for UK grown seaweed and its use within the food sector in its broadest sense.

[1] http://theblueeconomychallenge.com/seaweed-aquaculture-in-the-tropics-an-innovation-platform-for-the-blue-economy/

KEY FINDINGS

Below, we summarise the findings in this study against the defined outputs:

The Local Market:

What opportunities are there for seaweed produce in Wales?

Laverbread, made from purple laver (classified as red alga), is an obvious opportunity and Leslie A. Parsons (Burry Port) Ltd is a major manufacturer. A more innovative use of seaweed is in the production of niche beverages such as organics gins and artisanal ales. Brown seaweed is a common ingredient in many Asian cuisines and is eaten raw, cooked, or pickled. There is a strong Asian hospitality sector in Wales, mainly based on the Chinese culture. Red seaweed is high in vitamins and protein and is easily grown; for example, nori cultivation in Japan. Green seaweed too is used in cooking in the Far East, but has a wide range of uses. Given the nature of the Welsh market the real answer to this question would need to come from further primary research.

Who are the people to approach and what prices can be expected?

Table Two lists 16 companies that use seaweed from the UK. Contrarily, when algal components are used in speciality products, nutraceuticals and cosmeceuticals, the value of algal biomass become substantially higher at £2,000/kg, up to >£5,000/kg for special applications. Table Four presents a list of the UK leading suppliers of sea vegetables. Table Three presents the UK retail prices (NB not manufacturers' prices) for selected seaweed species in € as of June 2017.

The Ethnic Market:

What challenges and opportunities are there in supplying the ethnic food market?

The main opportunity is that the Asia Pacific market accounts for the majority of the global seaweed market (Appendix One). In addition, seaweed consumption for food processors and catering and foodservice (CFS) operators and the hospitality sectors in Europe also cater for Asian tastes both for their expatriate communities and for the indigenous populations.

Identification of main consumer countries overseas and ethnic niche markets in the UK?

In Europe these would be France then Germany and Spain. In Asia these would be China and the Pacific Rim. It should be noted that these are established markets that offer real barriers to entry (even before the outcome of the Brexit negotiations) and it would be advisable for the client to look at this issue in terms of strategic positioning.

The Nutrition Market:

Are there opportunities to market seaweed as a sports / nutrition / specialist dietary product?

Seaweed is well documented to have strong health benefits and one of the main factors driving growth in the European sea vegetables market is demand from organic food shops and health food retailers, with some offering a range of sea vegetable products. Sea vegetables are an important source of protein and vitamins and rich in minerals and could also provide a solution to iodine deficiency. Newcastle University discovered the alginate found in seaweed reduces the uptake of fat in the body with hopes that seaweed could be an important tool in the fight against obesity.

Also, Kombu seaweed is being used to help reduce stroke attacks.

UK Hospitality Trade:

What are the formats and species required by the restaurant trade?

Anecdotal evidence suggests that various varieties of seaweed are used as ingredients in dishes in both ethnic restaurants (e.g. Chinese and Japanese) and 'modern fine dining' establishments, particularly in the major conurbations in the UK. Also, seaweed is used as a condiment. Nori is a good example of a seaweed variety used in ethnic cooking. Marcus Harrison of the Wild Food School says badderlocks/dabberlocks, tangle, sugar kelp, sea spaghetti, dulse, laver, sea lettuce, gutweed and carrageen, or Irish moss, are all good for consumption. A major factor in this area is the interest that diners have in experimenting with new ingredients and the enthusiasm that chefs have for creating new and exiting dishes with previously little known ingredients. There is some evidence that both diners and chefs are becoming more adventurous, and chefs (often led by the TV celebrity chefs) are embracing this trend.

SUMMARY

The results of the primary and secondary research within the scope of the project has found there to be interest in the growing of seaweed within the UK market so service a broad customer base from small speciality producers through to large food service businesses.

Sales of seaweed products within the food sector are increasing, but there are opportunities for this to grow further, potentially within the volume speciality sectors such as vegetarian ready meal market place. We have identified that further research and development need to be undertaken to ensure compatibility of seaweed products within other foods, particularly where seaweed is being used as an ingredient.

In parallel with realising these opportunities, there needs to be a greater understanding of the formats of seaweed required by the end customer and how additional processing will affect the cost of production. It appears that for certain products, quality and sustainability of production or harvesting are important factors for buyers alongside price.

When considering these factors, opportunities for collaboration in supply chain development should not be overlooked, with particular reference to processes that require energy. In particular, waste heat from commercial biomass operations could be used for drying processes and should be considered against buying requirements for sustainability and environmental factors.

In essence, the study has found opportunities to develop further that need to be investigated and qualified, particularly with regard to partnership and collaborative working to move forward with investment in the seaweed growing sector.

APPENDIX ONE

Global Commercial seaweed market

The following are the key findings from a study by Grand View Research Inc.:

1. The global commercial seaweeds market was valued at USD 10.31 billion in 2015 and is expected to reach USD 22.13 billion by 2024, growing at a CAGR (compound annual growth rate) of 8.9% from 2016 to 2024

2. Red seaweed emerged as the leading product segment and accounted for 52.5% of total market revenue in 2015. Red seaweeds are also projected to grow at the highest CAGR on account of its functional qualities, easy accessibility, and its application in almost all industrial sectors.

3. Most of the commercial seaweeds are consumed in liquid form, and the segment accounted for 52.0% of total market revenue in 2015. The demand for seaweeds in the form of liquid is projected to grow on account of its ease of application and its growing industrial demand.

4. Human consumption emerged as the leading application segment and accounted for 81% of total revenue in 2015. The segment is also expected to witness the highest growth of 9.0% over the forecast period.

5. Asia Pacific dominated the commercial seaweed market with demand share exceeding 80% in 2015. The growing demand for seaweeds in the food, cosmetics, medicine, fertilizers, and animal feed sector is anticipated to drive the market demand over the forecast period. Asia Pacific is also expected to witness the highest growth of 9.0% over the forecast period.

6. Some leading companies operating in the commercial seaweeds market include Cargill, Inc., E.I. Du Pontde Nemours and Company, Roullier Group, Biostadt India Limited, Compo GmbH& Co. KG, Acadian Seaplants Limited, Gelymar SA, BrandT, Seasol International Pty. Ltd., and CP Kelco.

Source:
http://www.prnewswire.com/news-releases/commercial-seaweed-market-to-reach-2213-billion-by-2024-grand-view-research-inc-589705231.html