An analysis of economic activity dependent on the Milford Haven Waterway

Milford Haven Port Authority

An analysis of economic activity dependent on the Milford Haven Waterway

February 2012

Final report:

Mr Alec Don
Chief Executive
Milford Haven Port Authority
Gorsewood Drive,
Milford Haven
SA73 3ER

From:
Cardiff University
Welsh Economy Research Unit
Cardiff Business School
Colum Drive
Cardiff, CF10 3EU

Prof. Max Munday
Email: mundaymc@cf.ac.uk
Tel: 02920 875089
www.weru.org.uk

Contents

Acknowledgement:

We are grateful to a number of firms in the Haven who provided information to assist with this analysis, and particularly to Valero, Murco, South Hook LNG, Dragon LNG, SemLogistics and Pembroke Power Station (RWE nPower) without whose assistance this project would not have been possible.

Research summary

This report was undertaken by the Welsh Economy Research Unit of Cardiff Business School for Milford Haven Port Authority during the period March to September 2011. The objectives of the project were to establish the level of local and then Welsh economic activity dependent on the Milford Haven Waterway. The report also examines the main challenges facing the main industrial firms operating at the Haven.

The report estimated that the industrial complex supported by the Waterway supported over 3,800 full time equivalent jobs (FTE), which was around 40% of total employment in the local economy surrounding the Haven, and around 7% of total Pembrokeshire employment. Much of Pembrokeshire's manufacturing base is in the local economy surrounding the Waterway.

By far the largest sector is energy (oil refining, gas processing and power generation). A significant proportion of the employees in the energy sector actually live in Pembrokeshire, spending incomes in the local economy. The gross remuneration associated with direct employment in the energy sector was in the order of £92m per annum. It is also estimated that the businesses and institutions dependent on the Waterway are directly associated with £323.7m of gross value added (GVA) (or around one fifth of the total GVA generated in the Pembrokeshire economy). Over 60% of this GVA is estimated to be generated in the energy sector. The report also finds that an overall total of 5,073 FTE jobs in Wales are directly and indirectly supported by activity dependent on the Milford Haven Waterway.

The report shows that the energy and port sector plays an important role in supporting employment directly and indirectly in Pembrokeshire and Wales. While this study has focused on local and regional effects it is noted that a recent report from the UK Petroleum Industries Association (2011) highlighted that for every job in the refining sector as many as seven jobs may be supported in the wider economy as a result of refinery purchases and employee spending.

The report shows that the oil and gas processing sector in the Haven and the developing power generation sector will play an important role in future UK energy security. Furthermore, the development of LNG infrastructure at the Port and the flexibility this provides has ramifications for the UK's ability to meet its carbon reduction targets under the Kyoto Protocol.

Despite an important economic contribution, elements of the energy complex at the Haven were shown to be under an increasing regulatory burden, with concerns that more complex planning procedures were making it more difficult for firms to invest profitably. International product prices, domestic demand and location specific environmental regulations are tightly connected to the future competitiveness of the Haven as an energy industry location. The prospects for firms linked to the energy sector around the Haven are then associated with these same factors, although also influenced by the future prospects at developing investment sites for renewables in the local economy, which potentially offer significant diversification opportunities.

1. Introduction

This research was commissioned by Milford Haven Port Authority during March 2011. The research examines the economic activity that is dependent on the Milford Haven Waterway and the presence of the Port infrastructure. This includes dependent employment in the local area of Milford Haven and Pembroke Dock, but also includes an estimate of the employment impacts in the wider economy of Wales.

The objectives of the research were to:

- Estimate the extent of direct local economic activity dependent on the Milford Haven Waterway and the existence of the Port.
- To establish the level of local employment which is indirectly associated with the presence of the Waterway, for example in suppliers to firms who are directly dependent on the Waterway.
- To examine the economic significance of the Milford Haven energy complex in the context of the Pembrokeshire and Welsh economies.
- To estimate the economic activity across the whole of Wales dependent on the Milford Haven industrial complex.
- To examine the contribution of Haven-facing facilities to the Welsh and UK energy grid, and the strategic role of the oil and gas processing sector in West Wales.
- To explore the challenges facing businesses at the Haven.

The remainder of the report is structured as follows.:

- The second section provides some context to the study, including a commentary on recent industrial growth at the Haven; the changing activity base of the Port; and the role of port infrastructure in regional economic development.
- The third section outlines the current activities of the Port.
- The fourth section provides an analysis of the local and regional economic activity that is dependent on the Milford Haven Waterway.
- The fifth section provides a review of the issues that were raised by surveyed businesses concerning factors that would affect future operational prospects in the Haven.
- The final section contains the research conclusions. The appendix to the report provides some further details of the economic model used to examine the Wales-wide effects of the energy complex at the Haven.

2. The economic impact of the Milford Haven: Context

This opening section provides some context for the analysis and considers the importance of examining the economic impact of the activities supported by the Milford Haven Waterway in general and the Port in particular.

2.1 The changing face of the processing sector

The area surrounding the Haven has, for many years, been the home of some of Wales' largest inward investing firms. The deep channel of the Milford Haven Waterway enabled access to large oil tankers and was crucial in the establishment of oil refineries and related facilities by:

- Esso - at a site near Herbrandston which opened in 1960 and closed in 1983 (now the site of the South Hook Liquefied Natural Gas development);
- British Petroleum - who built a deep-water terminal at Popton in 1960 and linked this by a pipe-line to their Llandarcy (Neath) refinery. Later, further land at Popton Fort was bought for the construction of a tank farm;
- Regent Oil Company (then Texaco, Chevron and from August 2011, Valero) on land next to Pembrokeshire Coast National Park, from 1964 to the present day;
- Gulf - who operated from a site at Waterston from 1968 to 1997 (parts of which have since been developed into the SemLogistics tank storage operation). Dragon LNG operates an LNG terminal and 48MW combined heat and power unit on part of the site and jetties;
- Amoco (Total, and now Murco) - from 1973 to the present day, at Robeston.

Over a period of over 50 years, the oil refining sector has built extensive linkages with businesses in Pembrokeshire and a wider set of Welsh firms. While the refineries themselves represent capital intensive process sectors, they support activity in a wide range of local industries. As a consequence, any changes in the capacity of the regional refining sector would have considerable indirect economic consequences. Indeed, so important is the contribution of the refineries to Welsh industrial output that even scheduled maintenance, and short run refinery outages, can affect the trend rate of growth in the Welsh index of production.

Joining the refining sector more recently have been two large investments to store and process incoming liquefied natural gas (LNG). The scale of the LNG development at the Haven is considerable. The two terminals are separately operated by South Hook LNG and Dragon LNG and make Milford Haven the largest LNG receiving terminal complex in Europe. Currently Milford Haven handles around £3billion worth of LNG per annum. The construction of the LNG import and storage facilities required that the two terminals at Milford Haven be connected to the UK gas grid, and with a need to also expand National Grid networks of high-pressure natural gas pipelines from Aberdulais (near Neath), through South Wales and onwards into Herefordshire and Gloucestershire. The pipeline from the Haven was one of the largest construction projects in Western Europe in the period 2006-2009.

The availability of a reliable, high-pressure supply of gas has attracted interest from a number of electricity generators. One of these, RWE nPower, has now developed a 2GW gas fired power station on the site of the former Pembroke Power Station. On completion, this will be one of the largest gas fired power stations in the UK. As a further example, the Valero refinery will be connected to the gas main from November and this is expected to significantly improve the productivity of the refinery.

For Wales (and the UK) the LNG investment, together with ongoing investments at the refineries, have occurred at a time when inward investment into Wales has been in short supply, and with the period 2005-2011 seeing a large number of manufacturing exits throughout Wales. Together, South Hook LNG and Dragon LNG, with the RWE nPower Pembroke Power Station represent an inward investment of close to £2.25bn. Without port infrastructure and services the presence of existing brownfield sites, jetties and overhead infrastructure, these investments would have been impossible. To put these figures into some context, in the whole period from 1984 to 2007 Wales attracted an estimated total of £13.6bn of capital investment from overseas firms, making the new investments a very major addition to the inward investment capital stock in Wales. In addition to these investments, National Grid invested around £750m to improve the gas pipeline from Milford Haven to the main UK gas grid.

Coupled with this economic contribution in direct and indirect terms are increasing pressures on the processing sector in the Haven. For the oil refiners, net margins will be squeezed as a result of EU environmental regulation (EU ETS III after 2013) and as a result of carbon floor pricing, demands for increasing energy efficiency from regulators, and containment requirements. Where companies become dependent on refining margins, these pressures are particularly acute. Set beside EU wide regulatory pressure are more local, environmental pressures and planning regulations which can make the UK a more expensive place to invest. Increasing regulation also affects the LNG infrastructure. Costs associated with EU ETS are a major issue for the LNG terminals and could affect their future competitiveness.

Notwithstanding, the energy hub in the Haven is of continued strategic importance to the UK as a whole and offers security and diversity of energy supply. Indeed the UK Petroleum Industries Association (2011) reports that there are now just eight major operating refineries in the UK, jointly supplying around 90% of the inland market demand for petroleum products. Two of these major refineries are at the Haven. In addition, the LNG infrastructures potentially provide for a quarter of UK gas demand. The RWE power station will offer 2GW of generation capacity using state-of-the-art technologies.

While port activity has centred on hydrocarbon processing, there is every prospect of Milford Haven playing a key role in low carbon energy sources, for example, Milford Haven Port Authority is examining whether the strategic Blackbridge site on the north of the Haven can support renewables development. Indeed DTZ (2011) examining the consequences of low carbon energy sources on Welsh ports concluded that Milford Haven was among ports that "appear to have the greatest competitive advantage in exploiting the opportunities from low carbon energy sectors". Already Milford Haven hosts one of the three tidal energy projects to reach proposal/planning stage in Wales. The Wave Dragon 7MW demonstrator near Milford Haven is expected to be tested for a 3-5 year period to gain operational experience and knowledge of its energy transfer capabilities. Exploring renewable energy prospects in Pembrokeshire WERU (2005) concluded that:

"The growth in renewable energies coupled with the area's environmental qualities make Pembrokeshire a potential exemplar for the pursuit of integrated and sustainable development. What is clear is

that considerable planning needs to take place now to ensure that the Pembrokeshire economy is less precariously balanced in the future and develops around more sustainable investment and employment. In particular, focused action is required on addressing the region's business infrastructure, skills and training and environmental challenges, and building strong networks around the LNG developments, the key ports and waterways, the Technium and the renewables sector and, not least, the communities of Pembrokeshire." P.13

2.2 Port activity and the Pembrokeshire economy

The industrial activity supported by the Waterway also needs to be understood in the context of the socio-economic needs of the Pembrokeshire and indeed the wider Welsh economy. The energy sector supports relatively high paid and highly skilled work both directly and indirectly through its purchasing linkages. Such high quality employment stands in contrast to the relatively poor performance of the Pembrokeshire economy in terms of selected income and earnings measures and a record of out-migration of younger people (Midmore and Thomas, 2006). It is estimated that gross value added per capita in the Pembrokeshire economy is around 40% below the UK average. The earnings characteristics of the energy complex around the Haven mean that its hypothetical removal would reduce this GVA per capita figure even more. Recent economic analyses of the county have highlighted:

- The Pembrokeshire economy has grown at a slower rate than the Welsh and UK economies over the recent past.
- Poor growth performance is linked to the county having higher specialisations in industries where productivity growth has been below national averages i.e. with relatively high amounts of employment in the non-market sector, and distribution, retail, hotels and catering.

Key challenges identified are to:

- increase the percentage of the resident population who actively contribute to economic development processes. Practically, this involves creating new opportunities for younger cohorts and reducing out-migration of young adults;
- attract new investment in manufacturing and services industries, and to develop functional and occupational depth within new and existing investments;
- reduce the reliance on the non-market sector for growth of employment and output with these sectors characterised by lower levels of productivity growth;
- establish gateways to economic opportunities across the economy, providing greater choices in employment opportunities for younger people to stay in the local area.

The Wales Spatial Plan (2008) reinforces these challenges:

"There is an urgent need to improve business performance and profitability. Claimants of unemployment-related benefits are below national levels but the proportion of families claiming tax credits is the highest in Wales. Unemployment rates have fallen well below national levels, reflecting the fact that a high number of workers rely on income from more than one part-time job, whilst seasonality and low levels of earnings have an impact on job security. Economic activity rates are improving, albeit that about a quarter of those eligible to work in the Area are not in employment and inactivity rates remain high in some pockets of urban deprivation within, for example, the towns of Milford Haven, Neyland, Pembroke, Pembroke Dock and Haverfordwest." p117

Table 2.1 Pembrokeshire economy: headlines Pembrokeshire

Population (2010)	117,100
GVA per capita (UK=100) 2008	c.60.0
Employment (2010)	51,900
Of which Manufacturing	*c. 3,200 (or 6.2%)*
Economic inactivity (2010)	28% (of resident population 16-64)
Gross weekly earnings (residence, 2010)	£465.90
Jobseekers Allowance claimants (March 2011)	3.6% (of resident population 16-64)

Source: NOMISWEB and STATWales

It is suggested that without the skilled employment opportunities provided by the firms on the Haven that Pembrokeshire's prospects would be far worse, and with the growth of inward investment in the Haven meeting key challenges highlighted in recent reports on prospects for the county. Indeed, the contribution of the Haven and its energy complex is specifically identified in the Wales Spatial Plan (2008)[1]:

"The Area is heavily reliant on a few major, predominantly public sector, employers, but is dominated by small and micro businesses, employing fewer than five people, and has a high proportion of self-employed people. The nationally important oil and gas sector is hugely significant to the economic prosperity of the Area as a whole and particularly the towns of Milford Haven and Pembroke Dock." p117

2.3 Welsh ports and economic development

The above commentary links to a debate on the role of Welsh ports in economic development processes. Potentially, ports are a driving force in the economy particularly through their role in transportation, as an industry location, and as a means of enhancing regional policy objectives. These issues were exemplified in the British Ports Association (2010) publication *Welsh Ports: Driving Growth* which showed the economic strengths of Welsh ports coupled to a need for policy in Wales to assist the market led industry.[2]

Port assets have a series of direct economic effects. For example, the port creates employment (for both port activities themselves, as well as industries located within the port's boundaries or its immediate hinterland specifically in order to utilise port facilities), generates incomes, and therefore contributes directly to regional gross value added. The management and operation of ports thus creates a series of demands for regionally produced goods and services, such that port output leads to additional outputs elsewhere in the regional value chain (indirect effects). Similarly, the employees of the Port and allied industrial complexes spend some proportion of their income in the economy which again creates demands, and supports value added and employment in other parts of the economy (induced effects).

The direct effects also feed into a series of other wider and less quantifiable, but no less important effects upon the regional economy. Ports support international or inter-regional trading activity, enabling regionally based and national firms to gain access to cheaper products, and profitable international markets. The Port might also have a role in improving the general location offer of a region, improving access to tourists and providing the physical conduit for the transfer of new technology and ideas.

[1] *http://wales.gov.uk/location/strategy/spatial/documents/wsp2008update/?lang=en*
[2] *See http://www.britishports.org.uk/regional/wales for further details*

At the same time, Bryan et al (2006) in *Maritime Policy and Management*[3] show that changes to the structure of Welsh industry have altered the demands placed on the regional port infrastructure. The decline of historically heavy users of port facilities, together with competition from other transport modes, and other ports, has reduced the amount of activity undertaken in many ports across Wales. Arguably, Milford Haven has been able to buck this trend, in part, with the presence of the refineries, serving to safeguard a relatively large amount of port activity.

Bryan et al (2006) also argued that the quality and commercial significance of port facilities has tended to be neglected in government sponsored marketing material designed to sell the commercial attractiveness of Wales, with a view to encouraging inward investment. They also argued that there were opportunities in Wales to better connect port infrastructure and allied development to strategic discussion of transport modes, and to more general economic development debates. The Welsh Affairs Committee completed an inquiry into Ports in Wales in 2010. This report argued that ports in Wales were underused and potentially could play a much stronger role in economic development processes. Recommendations from the Welsh Affairs Committee linked to Welsh ports facing the competing pressures of the market oriented policy approach of central government; and then the devolved policy powers vested in the Welsh Government relating to areas such as transport facilities, transport services, economic development and land use planning. Then the Welsh Affairs Committee recommended the need for a more coherent ports strategy unifying the responsibilities of the UK government on general port policy, set beside Welsh Government responsibilities on port operations. The Welsh Affairs Committee also pointed to an expanded role in renewables and improved cross-border connectivity.

There are several specific areas where Welsh ports offer economic development opportunities. Cruise shipping and associated tourism have already been recognised as a potential area to be exploited (Welsh Affairs Committee, 2010). Logistics and Short Sea Shipping continue to be an area where possibilities exist to enhance the economic benefits which could be extracted from Welsh ports. The development of transhipment services and short sea shipping activities and the utilisation of spare port capacity all offer possibilities in these areas.

However, Bryan et al (2006) point out that transport links to ports are a key developmental issue. For example, the capacity of key road links to the ports is below that necessary to provide a network that ensures road freight can reach the ports in an efficient way. Overall, these issues mean that their attractiveness for freight transport is reduced. Improvements to existing road infrastructure through the upgrading of existing road infrastructure and the development of new routes would go some way to mitigating these problems. Upgrading the rail network infrastructure would both contribute to the movement of goods to and from Welsh ports and also enhance their ability to compete in the wider UK markets.

A final key issue to note is that of strategic and land use planning. This has an impact on both the development of the ports themselves and the related transport infrastructure. Consideration of ports in the planning system needs to be viewed not only at a local level but also in a broader context. Bryan et al (2006) show that ports, as part of the wider freight supply chain, require strategic consideration within both the Welsh Government and UK Government. Land use planning should also consider the requirements for port activity both in the present and future. These issues are being brought into a sharper focus currently as the Welsh Government moves to establish Marine Conservation Zones by 2012[4] alongside an emerging Wales Marine Planning framework. It is unclear how the socio-economic dimension will be considered within emerging guidance.

2.4 Summary

In this section of the report it is demonstrated that the economic significance of activities dependent on the Milford Haven need to be understood in the context of:

- The changing face of industrial activity in the Haven, with recent development linked to LNG and with future developments potentially associated with renewable energy.
- The needs of the economy of Pembrokeshire which faces a series of socio-economic problems, and where the future evolution of the energy complex at the Haven is a key driver of future prospects.
- More general debate on the role of ports in Welsh economic development.
- Changing land/marine planning frameworks which could have a major role in shaping the activity undertaken around Welsh ports.

[3] *Bryan, J., Munday, M., Pickernell, D. and Roberts, A. (2006) "Assessing the economic significance of port activity: evidence from ABP operations in industrial South Wales, Maritime Policy and Management, 33, pp. 371-386*

[4] *See for further information http://wales.gov.uk/topics/environmentcountryside/consmanagement/marinefisheries/conservation/protected/conservationzones/project/?lang=en*

3. Milford Haven review of current activities

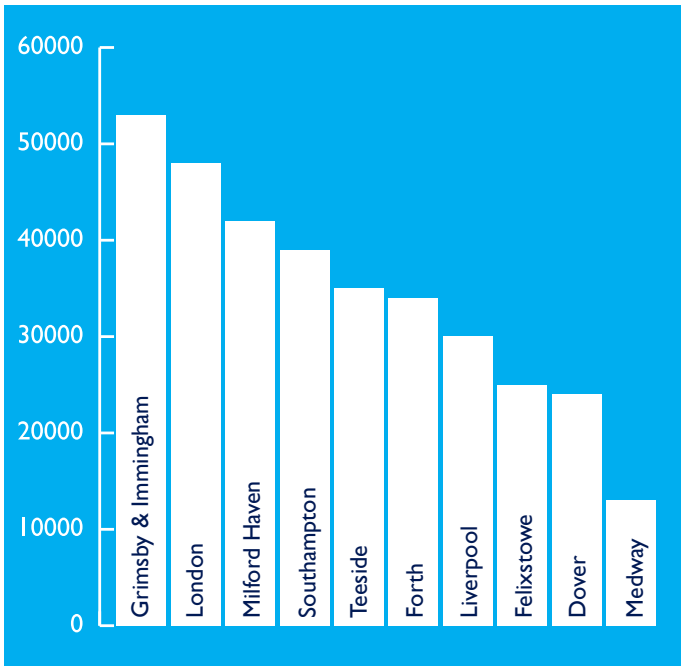
3.1 Introduction

This section of the report briefly reviews activities undertaken at the Haven. It begins with a review of the main cargoes dealt with by the port, before going on to consider different types of activity supported by the port facilities and the Haven Waterway itself.

3.2 Milford Haven: Traffic and Cargoes

Milford Haven (including Pembroke Dock) is the third largest port (see Figure 3.1) in the UK in terms of tonnes of cargo handled, with only London and Grimsby/Immingham handling a higher volume of cargoes. The Port, in 2010, handled around five times the freight of the next largest port in Wales, Port Talbot. In 2010 Milford Haven handled 8.4% of UK port cargoes.

Figure 3.1 Main UK Ports by Total Freight Handled 2010 (000 tonnes)



Source: DfT Port Statistics

Table 3.1 and Figure 3.2 provide a summary of foreign and domestic traffic through the port in 2010. The main cargo handled by Milford Haven is bulk fuels (around 98% of cargo handled in 2010 and comprising inputs for the main processing complex and inputs to tank storage). Together these comprised a cargo volume of nearly 42.0m tonnes in 2010.

Table 3.1 Milford Haven: Summary of foreign and domestic traffic (000s tonnes, 2010)

Cargo	000s tonnes
Liquefied gas	*10,504*
Crude oil	*14,073*
Oil products	*17,344*
All liquid bulk traffic	41,921
Other bulks	*50*
All bulk traffic	**41,971**
All other general cargo traffic	*19*
Road goods vehicles & unaccompanied road goods trailers	*797*
All traffic	**42,788**

Source: Milford Haven Port Authority, 2010

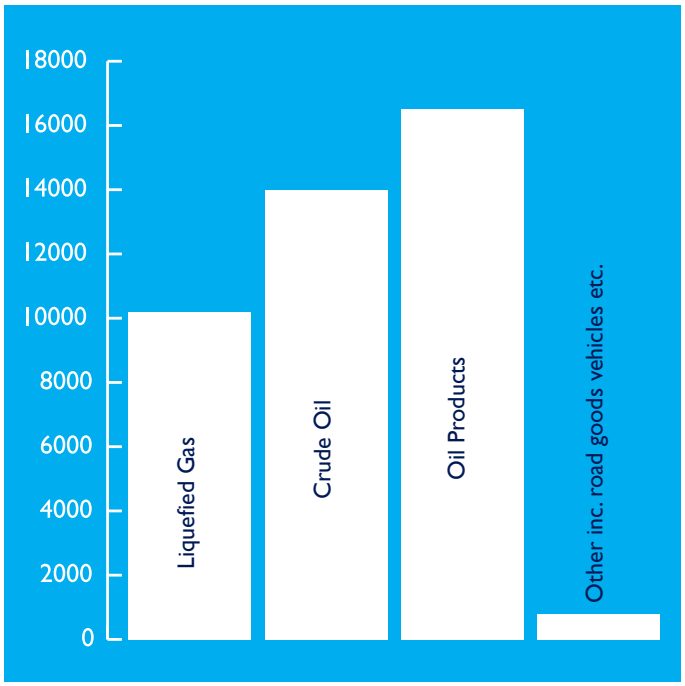
Milford Haven also has freight traffic using ferry facilities. In 2010, the Port handled 797,000 tonnes of goods, vehicle freight units and unaccompanied trailers. In 2010, it also handled 325,000 passenger movements to and from Ireland, and in 2009 handled 712,000 passenger vehicles (the latter is not shown in the table above).

Main incoming products are crude oil and oil products for the Chevron (Valero) and Murco refineries, and the SemLogistics tank storage facility at Waterston. SemLogistics accounts for around 25% of the UK's independent tank storage. The Port handled 14.1m tonnes of crude oil in 2010, and 17.3m tonnes of oil products. The refineries continue to represent a key element of the regional export base. Indeed one of the reasons why Welsh overseas exports were maintained during the global economic downturn was due to the maintenance of production levels at the Haven refineries (Welsh Economic Review, 2010). Indeed, in the analysis that follows later in this report, no account was taken of the shipping jobs sustained by the international trade of the port. These are supported as the refineries operate on the basis of importing crude oil. However, 75% of the finished product is re-exported by sea to European and US ports. This mode of transport has a lower environmental impact per tonne/mile than either road or rail transport.

Adding to the trade in oil products is a huge increase in the amount of liquefied natural gas being dealt with at Milford Haven. New terminal facilities operated by Dragon LNG and South Hook LNG came on stream during 2008-09. By the end of 2009 just over 4.4m tonnes of LNG were handled by the port. In 2010 this total reached over 10.5m tonnes and was around 50% of the total liquefied gas handled by all UK ports[5] (see also Section 4 of this report).

[5] *Department for Transport Port Statistics*
http://www.dft.gov.uk/statistics?orderby=title&post_type=table&s=port03

Figure 3.2 Milford Haven: Foreign and domestic traffic 2010, 000s tonnes



Source: As Table 3.1

3.3 Power generation sector

The power generation sector at the Haven largely comprises the development of the 2GW gas fired power station by RWE nPower. The rationale for this location was linked to the availability of gas supplies from the newly developed National Grid pipeline, but also with RWE nPower being able to take advantage of existing high capacity overhead power lines and grid infrastructure, minimising adverse environmental impacts of development.

The new 2GW power station is expected to be ready to generate electricity in the second half of 2011. It is also important to recognise that even with these developments there is still under utilised capacity on the grid connection such that the importance of the Haven as a UK energy hub could increase further.

3.4 Milford Haven Port Authority

Underlying all marine activity in the Haven is Milford Haven Port Authority (MHPA). Milford Haven is a trust port established by Acts of Parliament. These set out the powers of the Authority in relation to, for example, setting rules of navigation, directing ship movements, making charges and operating elements of port infrastructure and services, and supporting investment by stakeholders. MHPA trades as any other port but does not pay dividends, rather invests surpluses into improving port infrastructure and services, providing socio-economic and environmental benefits to Pembrokeshire. MHPA also has responsibility for ensuring the port operates safely and securely.

In 2010, MHPA had sales of £27.8m, with income coming largely from ship, passenger and goods dues,and from pilotage services. The Authority employed 208 people in 2010 with staff involved in activities including:

- Central port services
- Marine management
- Conservancy
- Pilotage
- Planning and port control
- Milford Docks and Marina
- Milford Haven Ship Repairers
- Pembroke Port and Pembroke Dock Ferry terminal
- Quayside Estates

In addition to the deep water port handling the large liquid bulks, MHPA develops activity at the short sea port. The short sea port at Milford is the largest fishing port in Wales and is estimated to have landed nearly 4,000 tonnes of fish in 2010. The Marina at Milford has 328 berths for leisure craft, and the Port also received four cruise ship calls in 2010 disembarking an estimated 2,000 visitors. Also here is Milford Haven Ship Repairers (part of MHPA). MHPA also provides commercial property and office space in Milford Haven and Pembroke Dock through Quayside Estates.

MHPA is promoting the Port as a clean energy hub. There is potential for the development of offshore wind turbine support facilities at the Port, and MHPA is also seeking to develop Pembroke Port as a centre for engineering skills linked to low carbon technology. Finally, MHPA is seeking to develop the 14ha Blackbridge site and adjacent land close to Dragon LNG with a vision that a low carbon energy project could be competitively placed there.

3.5 Supporting firms and institutions in the Haven

Supporting the main energy complex at the Haven are a large number of firms and institutions which are either linked to the main processors through supply chain links and subcontracts, or who support their operations indirectly. These might be classified into fairly broad groups as follows:

- Firms involved in providing engineering, installation and construction services. Among these are firms such as Port Engineering, Kingswood Engineering, Unit Engineering, Ledwood Mechanical Engineering, Austwells, Redhall Engineering, and Rhyal Engineering. Many of these firms have employees on the sites of the main processing firms such that they are almost indistinguishable from activity in the main energy complex;
- Firms providing what might broadly be referred to as transport services. This includes firms such as Svitzer Marine (towage, and shipping waste management services), Whitakers (Bunker storage), Irish Ferries and firms transporting fuel. This would also include smaller operations such as shipping agents and freight forwarders (for example, GAC, Cory, Graypen, Berger);
- Firms providing wholesaler services to industrial customers, and firms providing storage;
- Elements of the public and third sector that provide services to Haven users. This category would include elements of the police dealing with infrastructure security, the operations of the coastguard, the UK Borders Agency, local council officers involved with Port Health and Mission to Seafarers operations;
- Activities allied to fishing and fish processing. Activities include Oneida Viviers, and a small fish market in Milford Haven, and with some local employment on inshore and offshore fishing boats;
- Other firms providing professional and business services such as security, facilities management, environmental services;
- The above listing is by no means exhaustive but does provide an idea of activity types that are supported by the main industrial/energy complex in the Haven and the port infrastructure;

3.6 Tourism facing activity

In addition to the above are a large number of firms that serve local and tourism demands. It is difficult to estimate the total tourism spend that is levered by the presence of the Milford Haven Waterway itself. For Pembrokeshire as a whole the estimated spending of tourists was £544m in 2010, and with this connected to just over 4.2m visitors (see STEAM, 2010). There is no accurate way to apportioning this spend and visitation to the area surrounding the Haven. However, based upon activity in tourism facing sectors in the defined Haven area (see later section 4.2) compared to Pembrokeshire as a whole, a 5% share would be an approximation. Around the Haven, tourism spend supports local businesses such as Neyland Marina, Dale Sailing, Rudders Boatyard and Lawrenny Yacht Station. In addition, there are a number of visitor attractions facing the Milford Haven Waterway, both 'upstream' and 'downstream' of the main energy complex. Furthermore, spending supports employment in accommodation providers.

3.7. Other services provided by the Haven

The discussion in this section has focused on the economic activity supported by the Milford Haven. However, it is important to recognise that the Haven provides a level of welfare that is much more difficult to value. The Haven is an environmental resource that provides a series of service flows that are valued by local people and visitors. A more complete economic analysis would need, for example, to consider resource use values linked to consumptive and non-consumptive human interaction with the Haven Waterway. From the community perspective, direct use might encompass instances where people actually use the water courses for fishing; indirect use values might include where local people and visitors gain welfare by using services provided by the water resource; perhaps activities like bird watching. Non-use values are more complex and are associated with welfare gains attached to the fact that the resource is there and of good quality and available for use by future generations perhaps.

There has been significant activity in academia to quantify the contribution from services provided by environmental assets. In Wales, National Trust (2006)[6] reported that the marine and coastal environment supported over 92,000 jobs and generated £2.5bn of gross domestic product (GDP). However, this estimate would still come short of the full value of marine ecosystem services in Wales. This more complex valuation is beyond the scope of this report.

3.8 Conclusion

This section has summarised the wide array of activity associated with the Haven Waterway. The next section of the report seeks to quantify the economic activity dependent on the Waterway in terms of employment and gross value added supported.

[6] *National Trust (2006) Valuing our Environment: Economic impact of the Coastal and Marine Environment of Wales, see www.nationaltrust.org.uk/walespolicy*

4. The economic contribution of businesses supported by the Waterway

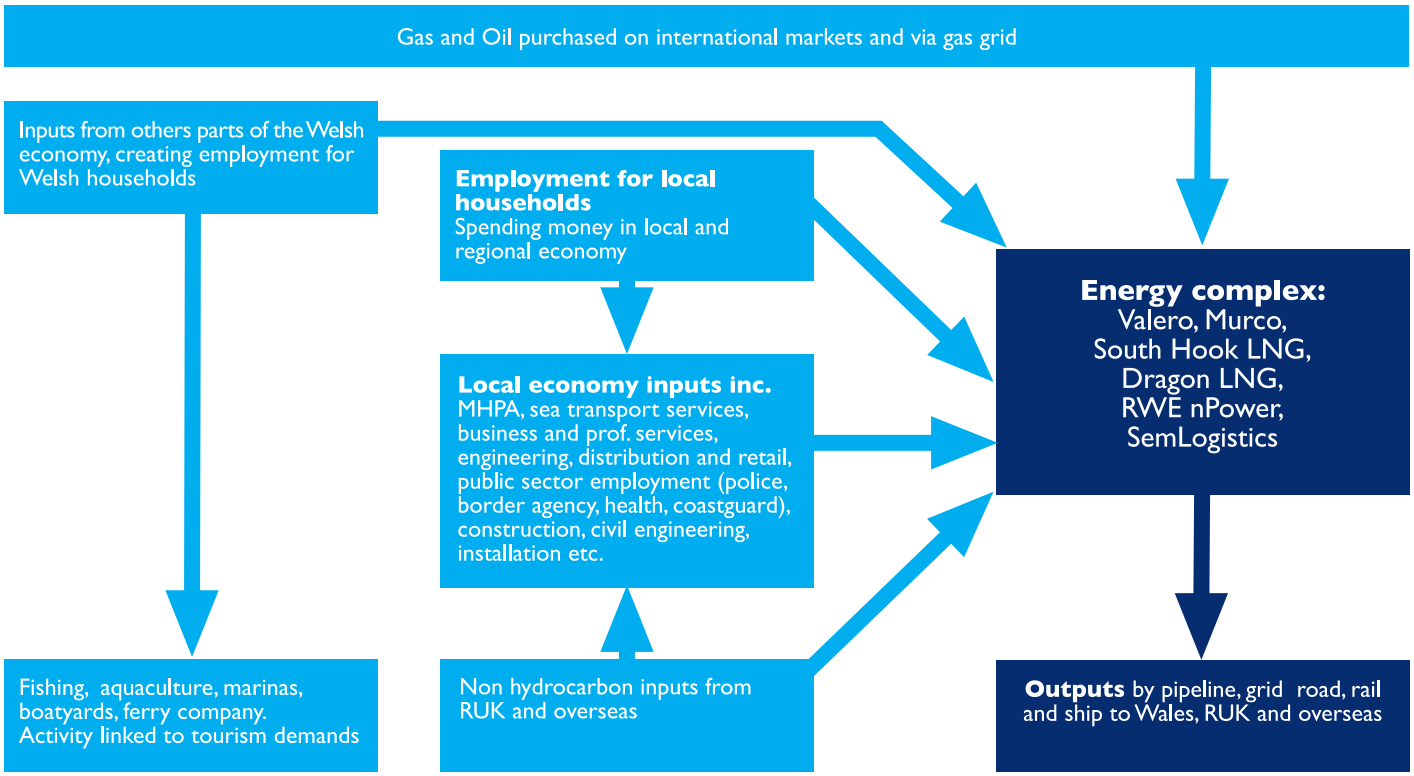
4.1. Introduction

There are a series of factors that need to be taken into account in estimating the amount of activity dependent on the Haven. The preceding chapter has shown that there are businesses operating in the Haven where the presence of the Waterway, port infrastructure and associated services were key elements in their location decision. Among the sectors represented in this category are the refineries, the LNG processors, tank storage facilities, ferry company etc. However, there are a number of activities tied more indirectly to the Haven. For example, serving the energy complex are a raft of engineering companies and other service providers close to the Haven. Indeed, to the casual observer it can be very difficult within elements of the main energy complex to differentiate subcontractors and supplier personnel from refinery and LNG personnel, with some activity virtually co-located.

In addition, there are a series of activities linked to the efficient management of the Port, including jobs in the public sector. Finally, there is activity that is connected to leisure use of the Haven, including retail outlets, marinas, boat/ship repair and shops. Figure 4.1 provides a simple mapping of activity directly and indirectly dependent on the Haven.

Clearly establishing what is and what is not dependent on the presence of the Waterway is open to interpretation. For example, the hypothetical removal of the Waterway and port facilities would signal an end to refining and LNG operations at the Port, and to marina based activity and the extensive sea transport services sector at the Haven. However, linked engineering firms will vary in their dependence on the Haven energy complex; with some more diversified than others with business in others parts of Wales, the UK and overseas. For these reasons, the analysis that follows can only provide estimates of economic activity dependent on the Haven, with an implicit assumption that key elements of the engineering subcontract base would be severely compromised should elements of the main energy complex be removed.

Figure 4.1 Summary Transactions Tracking of Firms and Institutions in the Haven



4.2 Data and methods

In gaining an estimate of employment supported by the Waterway, a number of resources were used.

First use was made of the Office for National Statistics *Annual Business Inquiry* to gain estimates of total local employment, and then to gain a first estimate of employment in industrial sectors directly and indirectly associated with the main energy complex and the Waterway. Some adjustments were necessary here to account self employment in selected sectors. Here the focus was on employment in Census wards close to the Waterway. It is accepted that there are some firms outside the immediate area of Pembroke Dock and Milford Haven that are dependent on the energy sectors close to the Waterway. However, the impact of the energy sector in supporting activity outside the local area was part of a wider analysis of regional activity supported by the Waterway (see later).

Second, more detailed economic information on selected firms around the Waterway was informed by Companies House records, within the Jordan's FAME database which was available from Cardiff University.

Third, the research was informed by a survey of firms and institutions in the Milford Haven and Pembroke Dock areas. This survey covered the main energy complex and a selection of other Waterway users, together with suppliers and subcontractors to the main energy complex. The survey derived information on:

- Employment (direct and where applicable in terms of average numbers of sub-contractors on sites through the year)
- Location of employees (i.e. whether in Pembrokeshire or further afield, and with this informing estimates of where earnings were spent in the first instance)
- Sales, earnings and operational spending
- Main categories of operational spending and extent to which key purchases were local, within the rest of Wales or elsewhere
- Key challenges facing businesses and institutions going forward (this providing information for section 5 of this report).

The survey was also supported by a series of more detailed interviews with the largest energy companies in the Haven.

The approach taken was to use information from the three sources to derive an estimate of full time equivalent employment in Census wards adjacent to the Haven[7]. The objective here was to gain an accurate a picture as possible of employment in the main energy complex and the tightly linked subcontracting and supply complex locally. This estimate then became the basis of further economic modelling described later in this chapter to examine the economic activity supported across Wales by activity in the Haven.

The analysis outlined above would still give a poor representation of economic activity supported by the Waterway. The main energy sector of the Haven undertakes a series of scheduled maintenance activities every few years which has the effect of increasing employment activity at what are essentially very capital intensive operations. In consequence, it is difficult to encompass an 'average' year of activity at the Haven. To account for this variability, some additional analysis is provided to reflect the economic effects associated with typical turnaround activity at the refineries and in the LNG processing sector. Of the major processors, only Murco was engaged in major maintenance activities during 2010.

In what follows, the analysis of employment and gross value added is based on the 2010 financial year[8].

4.3 Employment supported by the Haven

Table 4.1 shows estimated employment[9] supported by the Waterway in the local economy. Some of these sectors have been aggregated together to protect commercial confidentiality. Total employment supported is estimated to be 3,808 full time equivalents (FTEs). Within the reference wards total FTE employment is estimated to be around 9,300, meaning that around 40% of the employment in wards surrounding the Haven is directly and indirectly associated with the presence of the Waterway. For reference purposes, total employment in Pembrokeshire in 2010 was 51,900. However, an estimate of employee jobs in manufacturing in 2008 indicated around 3,200 people employed. The corollary here is that a considerable proportion of Pembrokeshire's remaining manufacturing base is in the local economy surrounding the Waterway.

The fishing and aquaculture sector is small in comparison to others but this does not include foreign crews on fishing boats regularly using port facilities.

By far the largest sector, as expected, is energy (oil refining, gas processing and power generation). This includes Valero, Murco, South Hook LNG and Dragon LNG. Also included here is employment in Pembroke Power Station. While the power station was not in operation at the time of the study fieldwork, the main operational staff were in place. However, the estimate does not include those involved with the construction of the power station prior to handover. The main employer on the power station site during construction was Alstom who had an estimated 2,000 people working on site at peak activity; for 2012 it is estimated that there could be around 100 construction contractors based at the site in addition to the operating team. Note the estimate in Table 4.1 for the oil, gas and power generation sector does not include subcontractors operating on the five main sites (see later).

The employment offered by these particular facilities is significant. Earning levels within the energy sector are well above local and Welsh averages. The refineries and LNG facilities demand a diverse range of skills. These are the types of relatively well paid high quality employment opportunities that have been in short supply in Pembrokeshire and indeed Wales as a whole. Furthermore, a significant proportion of the employees in the energy sector actually live in Pembrokeshire. The survey of the firms in this sector revealed that between 90% and 98% of their employees lived in the county. The gross remuneration associated with employment at these facilities was in the order of £92m per annum, with some proportion of this feeding through to household spending within the Pembrokeshire economy.

Table 4.1 reveals that the second largest sector in terms of employment is construction, machinery and equipment installation. In practice it can be difficult to differentiate employment in this sector from more mainstream manufacturing activity. For example, selected local firms represented here may perform manufacturing and installation. Importantly, much of the employment in this sector

[7] *These were Burton, Hundleton, Milford: Central, East, Hakin, Hubberston, North, West; Neyland East and West; Pembroke Dock: Central, Llanion, Pennar and Market and St Ishmaels.*

[8] *Different firms and institutions surveyed had different year ends for reporting purposes. For example the refineries and gas processing sector tends to report for a calendar year, whereas others report based on year ending April 2011.*

[9] *Note these figures include some self employment*

is supported by local demands placed by the oil and gas processing sector. Much the same conclusion would apply to the metal products sector, which is estimated to support 386 FTEs.

Another large sector is sea transport services. Included within this category is MHPA, but also firms providing sea borne services for the oil refineries and gas processing firms. This sector includes towage. It is accepted that identifying local employment supported in this sector is made difficult because some of the firms in sea transport services use foreign crews.

Table 4.1 also includes employment in non-market services linked to the Waterway. This includes the activities of HM Coastguard Agency, UK Borders Agency, Port Health, and Dyfed-Powys Police Marine Unit.

Table 4.1 Local jobs supported by the Milford Haven Waterway (2010)

Industry	FTE jobs	Share of total
Fishing, aquaculture, processing	88	2.3
Energy (oil refining, gas processing and power generation)	1173	30.8
Metal products, tanks, and machining	386	10.1
Repair, maintenance and building of ships etc	140	3.7
Construction, machinery and equipment installation	880	23.1
Wholesale (inc metals, fuels and equipment)	52	1.4
Road transport	12	0.3
Warehousing and storage (inc tank storage)	104	2.7
Sea transport services	389	10.2
Tourism-facing accommodation and restaurants etc	223	5.9
Engineering and testing services	90	2.4
Other services inc sewerage	60	1.6
Public administration and health	90	2.4
Tourist attractions & nature reserve activities	123	3.2
Total	**3,808**	**100.0**

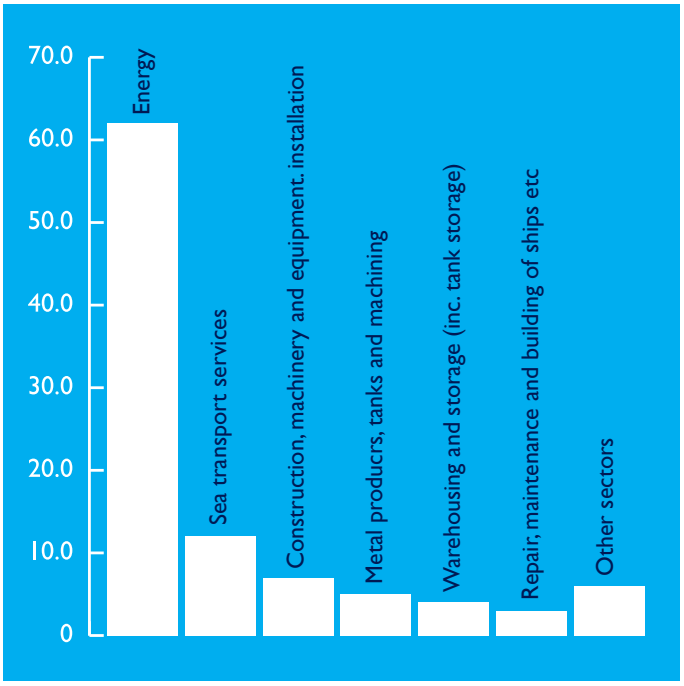
Note: employment column will not sum due to rounding up of FTE estimates for individual sectors. Employment also includes self employment here in selected sectors.

Finally, the table also provides an estimate of those employed within the tourism facing sector. It is estimated that around 346 people are supported by businesses which are directly tourism facing such as accommodation, restaurants and bars and tourist attractions. How far these jobs are contingent on the presence of the Waterway is open to question. There was no information available on the numbers of visitors that come to the area solely because of the presence of the Haven. Furthermore, tourists demand far more from the local economy than the products and services offered by accommodation providers and attractions. For this reason the estimates are considered to be conservative.

Clearly employment is just one means through which to understand the economic contribution of businesses and institutions that are dependent on the Waterway. It is estimated that the businesses and institutions covered above in Table 4.1 are directly associated with £323.7m of gross value added (this represents around one fifth of the total GVA generated in the Pembrokeshire economy – Pembrokeshire GVA based on latest available estimates for 2008 was around £1.46bn). For further reference, the last official estimate of Wales GVA for 2009 was in the order of £44.5bn.

Figure 4.2 shows which sectors contribute most to this gross value added total. While the energy sector contributes around one third of the local employment dependent on the Waterway, its contribution in terms of gross value added is far greater, approaching two-thirds. This larger relative contribution partly reflects the higher earnings in the processing sector. The second largest contributor in terms of GVA is the sea transport sector.

Figure 4.2 Contributions to value added of activity dependent on Waterway 2010 (%)



Note: total GVA estimated to be supported by firms and institutions represented in Figure 4.1 was £323.7m

4.4 Indirect effects - drivers

To provide a more rounded assessment of the contribution of businesses and institutions that were dependent on the Waterway on the wider Welsh economy, it was necessary to understand their local and Welsh purchasing patterns. While the analysis in the previous section enabled the identification of direct effects in the local economy, it could provide no indication of the supply chain effects linked to local business spending. For example, the spend of the refineries supports economic opportunities in both local and Welsh suppliers. Some of these suppliers are caught up in Table 4.1 above, in local engineering contracts etc. However, the refineries have links to companies outside of the local economy, and even their suppliers and subcontractors in the Pembroke Dock and Milford Haven areas spend monies in the local economy that support further economic output and employment. Furthermore, the employees of the businesses considered in Table 4.1 also spend money in the local economy that supports further regional economic output and jobs. These types of effects through the supply chain and household sector are termed indirect and induced effects respectively.

The magnitude of indirect effects is largely determined by how far firms in the Haven purchase goods and services in the Welsh economy as opposed to outside of Wales. Similar arguments apply to the employees of the Haven companies. This analysis requires care. For example, it was established earlier that the larger firms

in the Haven had employees who largely lived in Pembrokeshire. An employee of a refinery may spend within local shops and on local services and products. However, the majority of those products will have been made outside of the locality. In this case the retail 'margin' would be a local spend whereas the spending relating to the product itself would 'leak' out to the rest of the UK or overseas.

To examine these types of indirect and induced effects it was necessary to use an economic model of the Welsh economy (see Appendix 1 for further details). In using the Welsh Input-Output tables (which incorporate estimates of local spending patterns of defined industry groups/sectors) it was possible to provide a comprehensive assessment of the Haven-dependent firms' total multiplier effect in Wales. In undertaking this analysis impacts connected to construction activity (spending linked to turnarounds) were examined separately from general operational activity.

A further issue in the economic modelling was to avoid any double counting. For example, in Table 4.1 much of the employment in sectors such as metal products and engineering services is linked to the energy sector. Furthermore, firms encompassed within Table 4.1 also trade with one another. Then, in examining the multiplier effects of the energy sector, it was necessary to consider that many of the firms in Table 4.1 are already in the supply chain of the main energy industry complex at the Haven.

Given the significance of the energy sector in the Haven it is also worth reflecting on the key drivers of the Welsh multiplier effect. This is linked to the type of firms that the process sector purchases from in the region. Multiplier effects in the regional economy are then immediately constrained by the fact that the larger firms can only source certain goods and services in the Welsh economy, and in many cases with little prospect of import substitution. Some examples are illustrative. As part of the survey, the large processing firms were asked to list the five largest categories of operational spend, and the extent to which goods and services were purchased in Pembrokeshire, the rest of Wales, or outside of Wales and internationally.

For one processing firm its largest five categories of spending were fuel, electricity, catalyst, EU ETS and then contractors. In all but the contractors category, the majority of the spending was external to Wales. In the contracting category it was estimated that 25% of spending was in Pembrokeshire, a further 5% in the rest of Wales, and then 67% in the rest of the UK, and 3% overseas. However, even where contractor spending was outside of Wales, this firm believed that external contracts often involved local hires.

Firms differed in the categories of spend given, but another large processing firm had as its largest spend categories natural gas, subcontract services, subcontract labour, and catalyst. Once again the Welsh 'content' was largely in terms of contracts encompassing maintenance, mechanical and electrical services, rotating equipment services, tank cleaning, towage, security and catering.

Finally, another processor estimated that around 320 jobs were supported by its spend at Milford Haven and Pembroke Dock and with this, encompasses sea towing services, laboratory services, mechanical maintenance, inspection services, waste management, site security, site electrical maintenance, scaffolding and installation, cranes and lifting equipment, building work. This same company estimated that of its total operational spend (excluding imported hydrocarbons for processing), around 80% was in Pembrokeshire and Carmarthenshire.

Clearly, the potential for on-site subcontracting varies through each year. Each of the four firms in the main oil and gas processing sector were asked to estimate the average number of subcontractors on site during the last financial year, and this totalled 1,279 full time equivalents. Recall that the period of study involved one major maintenance and development outage at a refinery (Murco). The figure quoted above did not include those involved in this shutdown activity, but rather 'normal' operations. A corollary is that this figure would increase dramatically during a shutdown.

The conclusion from the above is that while the oil and gas processing sector purchases most of its raw inputs internationally, there are still a large number of purchases made in the local and wider Welsh economy. Then, every job supported directly in the oil and gas processing sector supports more in other parts of the Welsh economy through supply chain effects and then through additional household spending.

The pattern of local purchasing tends to be far stronger in those local firms that serve the oil and gas processing sector at the Haven. For example, one engineering firm in Pembroke Dock estimated that 90% of its operational spend was in terms of materials, subcontractors, plant hire, transport costs and insurance and with around 87% of this being purchased in the Pembrokeshire economy, and with a further 6% spent in other parts of Wales. Another engineering firm listed its main elements of operational spend as steel supplies, galvanisers, paints, craneage, and metal products, with all of these products purchased within Wales. This pattern was replicated in another engineering supplier which was able to source all of its plant, tarmac, concrete, quarry products and fuel purchases within Wales.

4.5 Welsh economy effects of activities supported by the Haven

The total economic impacts on the Welsh economy from activity summarised in Table 4.1 are summarised in Table 4.2. The total 3,808 jobs estimated to be dependent on the Haven are connected to a further 1,265 FTE jobs in Wales making an overall total of 5,073 FTE jobs in Wales directly and indirectly connected to the Milford Haven. There is an expectation that a proportion of the additional 1,265 FTE opportunities will be in Pembrokeshire, supported largely by the household spend of those directly connected to the Haven. Consequently, the direct estimate of 3,808 directly supported by the Haven in the immediate locality does not include a series of induced income effects levered by the associated household spend. Taking these into account would push the employment supported in Pembrokeshire by the Haven to well over 4,000 FTEs.

It is helpful here to distinguish the activity estimated to be supported by the Haven energy sector. While direct employment in the Haven in these firms was estimated at 1,173, these same firms also support a further 2,064 FTEs in the Welsh economy, many of these close to the Haven itself. Put another way, every direct job in the energy sector in the Haven supports a further 1.7 FTE jobs in the Welsh economy (an employment multiplier of 2.7).

Table 4.2 also provides a similar analysis for gross value added. From Table 4.1, economic activity dependent on the Haven was found to directly support an estimated £323.7m of GVA in 2010. This can be connected to a further £88.5m of GVA in the Welsh economy, giving an overall total of £412.2m of Welsh GVA supported. Separating out the effects of the energy sector shows that these firms alone supported £203.9m of GVA; taking into account the indirect effects brings this total to £316.3m. Put another way, every £1m of GVA generated in the energy sector in the Haven supports a further £0.55m of GVA in the Welsh economy.

Table 4.2 Total Welsh economy impacts associated with activity supported by the Haven

	FTE jobs		£m GVA
Direct jobs supported by the Haven	3,808	Direct GVA supported by the Haven	£323.7m
Total Welsh jobs supported by Haven	5,073	Total Welsh GVA supported by the Haven	£412.2m
Of which			
Direct jobs supported by the energy sector at the Haven	*1,173*	*Direct GVA supported by the energy sector at the Haven*	*£203.9m*
Total Welsh jobs supported by the energy sector at the Haven	*3,237*	*Total Welsh GVA supported by the energy sector at the Haven*	*£316.3m*

Table 4.2 shows that it is the energy sector that is central to economic impacts supported; one corollary here is that the loss of capacity and employment in the refining sector in Wales would have serious economic impacts both in Pembrokeshire and beyond.

4.6 Processing Turnaround: a scenario

As highlighted earlier in this section of the report, it is difficult to define a normal year of activity in the main energy complex at the Haven because of turnarounds. Clearly, the analysis of direct employment supported by the Haven includes activity in local firms supported by planned rounds of future maintenance activity. However, a major refinery turnaround can lever a huge increase in on-site activity. Typically, the oil and gas processing sector would treat a turnaround as capital rather than operational spend. During the survey for this research, it was possible to gain some insight into the additional employment levered during a typical turnaround but not the connected capital spend, as every turnaround would be different.

One refinery commented on the scale of activity as follows:

"At [refinery A] a shutdown would involve an additional 2,000 people, these are so big that there has to be coordination at a UK level."

This same firm estimated that while in a 'normal' year they could have an average of around 240 subcontractors per day on site, that in a shutdown year this would increase to 440 per day on the same basis, taking into account an intensive maintenance period averaged over the year. Another firm commented:

"Next year there is a major turnaround where there could be as many as 2,500 on site; there would be nationwide sourcing for these contracts."

At a third site, it was estimated that an 8 week outage would involve 100-200 extra people on the site.

Turnarounds in the processing sector may vary from 2-6 weeks and involve 24 hour 7 day working. While contractors on turnarounds are not on site for a whole year, it is possibly easier to think of what a typical refinery turnaround would mean in terms of an annual equivalent of full time employment. For example, a refinery turnaround taking 6 weeks and utilising an average of 2,000 people might be translated into around 230 FTE job years.

Were it assumed that a turnaround was similar in characteristics to an average Welsh construction project (with economic information here derived from the Welsh Input-Output tables), then each FTE supported would be associated with a further 0.47 jobs in the regional economy i.e. through supply chain spending and household effects. The total employment impact on Wales would be in the order of 338 annual FTE's. While a shutdown only occurs at intervals, the economic impacts of such a short term boost should be considered in addition to the direct and indirect impacts highlighted above.

4.7 Strategic issues

Much of this section of the report has focused on estimates of employment and GVA impact. However, there is value in assessing the wider strategic significance of the energy complex at the Haven, and the associated infrastructure comprising the port facilities, and then the gas pipeline linking the Port to the UK grid.

First, both the refineries and LNG processing sector are now an important component of UK energy security. For example, the strategic role of oil refining was noted in the Energy White Paper *Meeting the Energy Challenge* (2007)[10] which found that refining continues to add considerable value to the UK economy. In the long term, the output of the UK-based refinery sector has declined, with a series of closures including most recently, Gulf at Milford in 1997, Shell Haven on the Thames in 1998 and then Petroplus on Teeside in 2009. The UK refining sector faces reduced amounts of crude coming from the North Sea, coupled with increased costs of importing crude from further afield, and with imported crude and final products required to maintain UK supply. Then, as the UK refining sector has shrunk, the remaining Welsh refineries represent a larger share of UK refining capacity (around 20% of capacity in 2010). Importantly a key trend in the sector, is refineries becoming dependent on the refining margin alone i.e. the difference between the input crude price and the ex-refinery transfer price to the distribution sector. Structural change in the sector is far from over.

The ability to import LNG through Milford Haven and then through to the gas grid also has strategic ramifications for the UK. While gas demand from consumers, industry and the power generation sector has grown, there is a parallel requirement for

[10] *Energy White Paper: meeting the energy challenge, http://stats.bis.gov.uk/ewp/ewp_ch4.pdf*

an increase in gas imports as continental shelf production declines. The government Energy White Paper (2007) suggested that imports could need to meet an estimated 80% of domestic gas demand by 2020. In this context, the new LNG infrastructure in the Haven represents an important diversification of supply away from Norway and other parts of Europe, and with increasing concerns about supply security surrounding long distance international pipeline transfers. According to the White Paper:

"LNG will play an increasingly important part in the gas supply mix for both the UK and Europe, and could play a particularly important role in creating a global market for gas by linking the two largest consuming regions: Europe and North America. LNG can also enable gas importing countries to have more diverse gas supplies and import routes, thereby potentially increasing security of supply and competition. In addition, there are LNG import facilities being constructed in Milford Haven, which will further diversify the sources of gas used to supply the UK." p117

Table 4.3 Oil Refineries: Remaining Large Facilities in the UK Capacity m tonnes pa (2010)

Refinery	Distillation	Reforming	Cracking & Conversion
Stanlow – Shell UK	11.8	1.5	3.9
Fawley Exxon-Mobile	16.8	3.0	5.2
Coryton – Petroplus	8.8	1.8	3.4
Grangemouth – Ineos	9.8	2.0	3.3
Lindsey – Total	11.2	1.5	4.4
Pembroke – Chevron (Valero)	**10.1**	**1.5**	**6.1**
Milford Murco	**6.5**	**0.9**	**2.0**
Killingholm Conoco-Phillips	11.1	2.0	9.5
Total	**86.1**	**14.3**	**37.8**
Welsh capacity share (%)	**19.3%**	**16.8%**	**21.4%**

Source: Digest of UK Energy Statistics, 2011

Indeed, the White Paper highlighted a policy of increasing gas storage and import infrastructure by facilitating the construction of gas supply infrastructure both onshore and offshore, through reforms to the planning and licensing regime. The development of LNG infrastructure and the flexibility this provides also has ramifications for the UK's ability to meet its carbon reduction targets under Kyoto, with increases to gas power generation gradually replacing dependence in coal.

Something of the significance of the improvement to the UK supply side is summarised in Table 4.4, which shows LNG imports by UK terminal. The *Digest of UK Energy Statistics* (2011) reveals that the completion of the two facilities (Dragon LNG and South Hook LNG) and expansion of the Isle of Grain LNG facility meant that by 2010, LNG's share of total gas imports into the UK had increased to 35%, and that by September 2010 LNG imports exceeded pipeline imports for the first time. Out of the 203,789 GWh of LNG imported into the UK in 2010, over 70% was associated with the Milford Haven terminals. In context, it was estimated that in 2010 total UK demand for natural gas was 1,092,189 GWh.

South Hook LNG and Dragon LNG together offer energy diversity for the UK and a flexible delivery mode, being able to link into gas supplies from anywhere in the world. Furthermore, the presence of the two facilities levered the improvement to the national gas transmission system offering a 'west coast' supply point, and then the opportunity for a major gas fired power station further West in the UK than was possible before. One further implication of the improvement to the natural gas infrastructure is that it will provide the refineries with a cleaner fuel source, with the two refineries under pressure to use less fuel oil in response to tightening environmental regulations. The Valero refinery will be connected for the first time to the gas grid in November 2011. Finally, the establishment of the gas processing facilities has played a role in safeguarding Milford Haven's future as a major port.

Table 4.4 UK LNG Imports by terminal (GWh)

LNG imports via	2006	2007	2008	2009	2010
Dragon LNG				**10,034**	**19,097**
South Hook LNG				**49,249**	**124,922**
Isle of Grain	37,576	14,861	8,912	50,483	59,770
Teesside Gas Port		42		813	
Total	37,576	14,903	8,912	110,579	203,789

Source: Digest of UK Energy Statistics, 2011.

In summary, the combination of oil and gas processing at the Haven and potential economies of scale between the operations provides the UK with greater energy security. The Welsh Government is planning to have greater involvement in the development of energy policy. While there is continuing interest in the progress of renewables (progress in which Milford Haven Port potentially plays a major part) it is still important to highlight the high levels of capacity available at the Haven in conventional resources.

4.8 Conclusion

This section of the report has revealed that firms and institutions dependent on the Haven account for over 3,808 full time equivalent jobs in the local economy surrounding the Haven, and support over £320m of GVA. When the Wales-wide effects are taken into account, these totals grow to over 5,000 FTEs and over £400m of GVA. The section has shown that the energy complex in the Haven plays an important role in the Pembrokeshire, Wales and UK economy. Indeed, while this report shows that the energy and port sector plays an important role in supporting employment directly and indirectly in Pembrokeshire and Wales, a recent report from the UK Petroleum Industries Association highlighted that every job in the refining sector alone supported as many as seven jobs in the wider economy; as a result of refinery purchases and employee spending. The next section outlines challenges facing the main industries in the Haven.

5. Consultation

5.1 The consultation

The survey undertaken among the firms and institutions at the Haven had an open section where it was possible for respondents to comment on the main factors affecting their future economic prospects at the Haven. This section is also informed by a series of interviews that were undertaken with the largest firms at the Haven. The section is divided into two sub-sections with the first summarising the points made by the energy (oil and gas processing and power generation) sector, and then a summary of factors affecting future prospects of other firms in the Haven.

5.2 Energy (oil and gas processing and power generation)

This sector highlighted a series of macro/international and then more local issues affecting prospects. Firms in this broad sector are active in international markets and subject to global supply and demand pressures for resources. At the time of the survey, the refining sector was moving through a period of some uncertainty. In August 2011, ownership of the Chevron refinery near Pembroke changed, and in July 2010 Murphy Oil Corporation (Murco's US parent organisation) announced that it intended to exit refining and that it would seek buyers for the Milford Haven refinery. Consequently, with the trend towards new patterns of ownership, it was factors affecting refining margins which were particularly important to these firms, and with these partly a function of the extent of global recovery in the period to 2015. The refineries at the Haven also face additional capacity coming online from new refineries in the Middle East, China and India.

With these pressures, the main concerns raised by the respondents to the survey were in terms of regulations that increased the costs of UK operations. Specifically, this included EU legislation comprising a range of regulations surrounding air quality, climate legislation, waste regulation, and product (fuel) legislation. Factors noted by the refineries included:

- National Emissions Ceilings; Industrial emissions directive
- Renewables Directives
- Fuels Quality Directive, IMO Marpol Marine Fuel, Substances Directive
- Environmental Liability Directive, Soil Directive Disposal, Water Framework Directive.

After 2013, the EU ETS Phase III comes into operation which effectively reduces the net refining margin. While this applies to all EU refineries, there were concerns of additional costs involved in meeting UK only legislation, with the refining companies needing a level playing field with other EU competitors. One response to the survey noted:

"*EU legislation is increasingly complex and demanding which makes European refining less competitive, on top of which UK only legislation is having a major impact making the UK less competitive than Europe.*"

And another:

"Climate change legislation… much money goes into ETS and UK carbon reduction commitment. Problem is that some 'do' around the globe and some 'don't' so some competitors do not have to comply."

Of the more positive comments, the refineries noted the possibilities of using natural gas at their facilities, which was not possible prior to the introduction of new re-gasification infrastructure. Responses also highlighted the strong levels of support gained from local planning authorities.

For the LNG processing sector and power generation sector, key issues affecting prospects were similar in some respects to that of the refineries; with international prices and demand strength in the UK being critical. Factors mentioned as important to the scale of future operations at the Haven included:

- The strength of the UK gas market; and rate of depreciation in gas coming from the continental shelf;
- Longer term plans to increase nuclear capacity, with this potentially displacing the need for fossil fuels in power generation;
- The presence of "Black Swans" including the potential for shale gas in some UK locations;
- Emissions Trading Scheme and increasing green taxes; and with LNG ships having the flexibility to off load in the most competitive locations;
- How far lower cost gas availability attracts more energy intensive firms to the Haven, including additional power generation;
- Whether there are economic finds of gas in the Irish Sea, with the facilities at Milford Haven well placed to receive incoming gas from this source;
- Issues in gaining some key skills including project planners and managers, and with some suppliers to the sector also facing key skills shortages;
- The ability to meet future expansion plans without lengthy planning restrictions.

As expected with the LNG processors and power generation firms, operational prospects are tied to power markets and impact on the gas price, and in similarity to the refining sector, any changes to environmental regulations would have a major effect. Several respondents mentioned issues relating to planning and permits to operate. Where these firms had the capacity to extend local operations, there were concerns about how long planning permissions could take and the costs in going through the process. A particular concern was that the importance of Milford Haven as an energy hub did not appear to have been recognised when, in September 2011, the Welsh Government outlined those areas that would become Enterprise Zones.

Respondents were also mindful of how the concerns of local communities around the Haven affected longer term prospects. Each of the established firms in the energy sector has an extensive network of community and education linkages, and have also worked closely with organisations such as Pembrokeshire Coast National Park Authority in safeguarding natural assets in and around the Haven. However, there was an acknowledgement of the importance of safety in ensuring the future of operations on the Haven. This was not just in terms of site accidents and spills, but also issues such as road safety and traffic disruption during terminal developments and future expansions. According to one respondent:

"Safety, environment and reliability are the three cornerstones of our success, with bad performance in either of these areas then we will not survive long term as a viable business."

5.3 Other Haven companies

Other respondents to the survey were in very different sectors (see table 4.1 for a summary of the spread of sectors considered). This resulted in a very diverse range of factors viewed as being important to future prospects of operating in the Haven. It is difficult to group responses here without identifying individual companies, therefore, some of the recurring themes are highlighted.

A key concern for some respondents was the survival of the oil refining sector in the Haven. Changes in capacity in the sector were understood to be directly linked to the survival of many of the firms responding. Indeed, a critical issue for the local economy is how far suppliers and sub contractors to the refining complex have a diversified revenue base. The analysis in section 4 of this report pointed to a strong local dependence on the energy complex. Clearly, the growth of the LNG complex and the power station represents a potential diversification for some local suppliers and subcontracts, but further diversification of the energy complex at the Haven would seem to be critical for a number of suppliers and subcontractors.

A second concern related to the packaging of contracts and the ability of smaller local suppliers and subcontractors to meet the needs of the larger firms. In some cases, firms in the energy sector have worked to package some contracts to enable local firms to bid, particularly in terms of service contracts. However, some respondents were still concerned that some contracts are awarded externally without due consideration of local supply points. Prior to the development of the LNG facilities, there was an Energize programme in place in Pembrokeshire which tried to overcome information asymmetries between larger firms and smaller SME's in west Wales, and assist local firms to develop resources and capabilities to compete for contracts with larger energy-based firms. There would still seem to be value in these types of initiatives. Indeed, these types of concerns link to those voiced in the wider 'terminal community' about the supply side impacts of the LNG terminal development and allied projects, and the extent to which employment opportunities would be largely for in-migrants, and concerns on an increase in homelessness and house prices as a result of increased demand for housing (see Wakefield, 2005).

Amongst other Haven companies and institutions, concerns also arose about the extent of regulation (environmental regulations), and the costs and complexity of the planning process (a recurring theme). This issue was seen as compromising the location competitiveness of potential sites surrounding the Haven. However, issues concerning environmental regulation were having impacts on firms as diverse as those providing tank and bunker storage, short sea towage and shipping and ferry operators (regulations on sulphur content of marine fuels).

Different sets of factors affected prospects for firms that were dependent on the Waterway as an input. For example, for the fishing and process sector, key factors affecting prospects included, future accidents in the Haven, local supply of shellfish, the temperature of water in the Haven, and the build up of algae close to processing facilities.

Other factors listed by responding firms tended to be more parochial including:

- Continued use of the Port as a terminal for international shipping (i.e. in relation to health services and non-market sector employment)
- Local authority financial issues (i.e. in terms of safeguarding of non-market services provided to the Haven firms)
- The effects of the downturn on private and government spending on investment and maintenance
- Developing closer working relationships with the processing community and Milford Haven Port Authority
- Recovery of the Irish economy
- Stabilisation of fuel costs (i.e. for sea transport service providers).

5.4 Conclusions

The consultation brought forward a wide range of factors affecting different types of businesses around the Haven. The findings from the consultation link to factors important for the future growth of Milford Haven and Pembroke Dock economies. International product prices, domestic demand and location-specific environmental regulations are tightly connected to the ongoing competitiveness of the Haven as a site for the main energy complex. The prospects for linked firms around the Haven are then indirectly associated with these same factors, although also influenced by the future prospects at developing investment sites in the local economy which potentially offer further industrial diversification.

6 Conclusions

The report has revealed the significance of economic activity supported by the presence of the Waterway at Milford Haven. The report reveals that the presence of the Haven supports over 3,800 jobs and over £320m of GVA in the local economy, and then with further multiplier effects for the whole of the Welsh economy. The report has also shown that the Port and the energy complex are central to the hub of activity at the Haven. For Pembrokeshire, these facilities provide a large number of full time jobs and highly skilled occupations. The loss of any of these employment opportunities would be extremely difficult to replace in the current climate which has seen inward investment into Wales as a whole decrease sharply in recent years. However, the activity base at the Haven has been reinforced by inward investment by the gas processing sector and RWE npower, and with further investment expected in coming years as a result of further capital spending at the refineries. The area around the Haven has seen some of Wales' largest inward investments at a time when foreign direct investment into other parts of the Welsh economy has been greatly reduced.

Moreover, the energy industry in the Haven was instrumental in maintaining Welsh exports during the past recession. For example, the Welsh Index of Production reveals that at the end of 2009 the index of output in the oil processing and nuclear fuels sector (largely refining in the regional case) was 4.7% higher than it had been in 2006, while for all Welsh manufacturing the index value was 13.6% lower.[11]

It would be misleading, however, to focus on the contribution of firms around the Haven just in terms of employment and investment benchmarks. Academic interest in the activities of multinational firms in Wales has focused on the role of such firms in developing the local industry base. The knowledge and operational practices of the larger firms in an industrial complex spill over into local firms, increasing their productivity, and then potentially improving their prospects locally and nationally. Indeed, even where contracts are awarded outside of Wales for major projects in the Haven, there are opportunities for local firms to work with global leaders in engineering and to pick up on best practice. These types of effects are difficult to measure, but form one of the bases of government support to international investors in the regional economy.

In spite of all this, elements of the energy complex in the Haven have been shown to be vulnerable to international economic conditions on resource prices and evolving patterns of energy demands. Little can be done at a regional level to assist firms facing these types of pressures.

The consultation for this report revealed concerns by some of the larger employers in the Haven over the increasing burden of location-specific environmental regulation, and issues surrounding planning procedures for new developments around the Haven. This is a real area of concern with some respondents, questioning to what extent Wales is still an attractive place to invest. Other respondents reflected on the process of getting projects underway in the Haven, and noted that with the benefit of hindsight, selected projects would not have been undertaken. In this respect, one conclusion from this report would be that the Welsh Government needs to look carefully at the burden being placed on some of the largest inward investors in the principality and how far assistance can be targeted to support these firms. For international firms in the Haven, the process of devolution has complicated the investment process, partly because of the increase in the numbers of departments, regulators and third sector bodies involved, and with planning and regulatory frameworks part of the country risk assessment undertaken by firms during any large capital investment.

Of some concern is that the new economic strategy of the Welsh Government *Economic Renewal: A New Direction* (July 2010) suggests that a sector based approach is being adopted for targeting supports. Key sectors identified in this document include ICT, advanced materials and manufacturing, creative industries, life sciences, financial and professional services, and energy and the environment. The absence of the large processing sectors is of some concern given the acknowledged role of firms such as Dow Corning, Tata, Valero and Murco to the Welsh economy in terms of economic contribution but also skills development. Furthermore, the identified key sectors are poorly represented in Pembrokeshire. While Milford Haven Port Authority is working to develop low carbon and renewables investments at the Haven, the role of established energy industries in promoting advanced manufacturing in their supply chains, and promoting low carbon technology should not be ignored.

There is considerable opportunity for the Welsh Government to overtly recognise the Milford Haven Energy Hub as a key economic area where further inward investment and ease of operation is positively enabled.

[11] *http://www.statswales.wales.gov.uk/TableViewer/tableView.aspx?ReportId=22187*

Appendix 1: Welsh Input Output Tables

The analysis of indirect and induced effects in section 4 of this report has made use of economic data contained within the Welsh Input-Output Tables. The Welsh Input-output project as a whole has been in progress since 1993. Tables have been published for each of the years 1994 to 1996, and for 2000, 2003 and 2007. The 2003 Tables were supported by the Welsh Development Agency and Cardiff Business School, and their development and construction undertaken by members of the Welsh Economy Research Unit at Cardiff Business School. The construction of the 2007 tables was supported by Environment Agency Wales.

The Welsh Input-Output tables reveal the different industries that make up the Welsh economy, and show how they fit together in terms of their sales and purchasing patterns. Each industry in Wales relies to a greater or lesser extent on local, regional, national and then international markets. Each industry also uses labour inputs, and imports goods and services. The Input-Output tables then allow comparisons between industries in terms of their pattern of resource use, and the sectoral and geographical destinations of their outputs, including the level of export activity.

The Tables can be used to identify sectors which are important to the local economy by virtue of their spending, employment, exports, or local linkages and consequent economic activity supported directly and indirectly in the Welsh economy. Then the Input-Output framework should also be seen as a detailed statement of account, with tables allowing reconciliation of the supply of, and demand for, goods and services in Wales.

In this report the Input-Output tables were used, for example, to generate multipliers for the oil and gas processing sector.

For example, an increase in demand for the goods produced by the oil processing sector in Wales, would lead to an increase in the spending of the oil processing sector (direct effect). However, as the industry increases its spending, their suppliers in Wales will also have an increase in demands for their goods, and then also the suppliers to the suppliers experience extra demands, and so on (indirect effects). The shock of the increase in final demand ripples through the Welsh supply chain. Moreover, as a result of these supply chain effects, the level of income in the economy will increase, and a portion of this income will be spent on Welsh goods and services leading to further increases in demand. This is termed an induced income effect. The ratio of the direct, indirect and induced income effect to the direct effect is termed a multiplier. Multipliers can also be derived with regards to employment effects. Our multiplier estimates derive from the 2007 Input-Output tables; while these tables are now dated the multiplier values for large sectors of the Welsh economy do not tend to change markedly over these time periods.

Selected References

Bryan, J., Munday, M., Pickernell, D. and Roberts, A. (2006) "Assessing the economic significance of port activity: evidence from ABP operations in industrial South Wales, *Maritime Policy and Management*, 33, pp. 371-386

DTZ (2011) *Economic impact of low carbon energy on Welsh ports*, report for Economic Research Unit, Welsh Assembly Government, see http://wales.gov.uk/docs/caecd/research/110819lowcarbonen.pdf

Midmore, P. and Thomas, D. (2006) 'Regional self-reliance and economic development', *Local Economy,* vol. 21, no. 4, pp. 391 – 408.

National Trust (2006) *Valuing our Environment: Economic impact of the Coastal and Marine Environment of Wales*, see www.nationaltrust.org.uk/walespolicy

UK Business Innovation and Skills (2007) Energy White Paper: Meeting the Energy Challenge, section 4 on oil, coal and gas available online at http://stats.bis.gov.uk/ewp/ewp_ch4.pdf

UK Department of Energy and Climate Change, *Digest of UK Energy Statistics, 2011*, section on petroleum available at http://www.decc.gov.uk/assets/decc/11/stats/publications/dukes/2305-dukes-2011-chapter-3-petroleum.pdf

UK Petroleum Industries Association (2011) *Statistical review*, available online http://www.ukpia.com/publications.aspx

Wakefield K (2005) Social impacts of LNG, report for Pembrokeshire County Council, see http://www.google.co.uk/url?sa=t&source=web&cd=1&ved=0CB0QFjAA&url=http%3A%2F%2Fwww.pembrokeshire.gov.uk%2Fobjview.asp%3FLanguage%3D%26object_id%3D2743&ei=qI9wTujVHM2BhQfM86GuCQ&usg=AFQjCNGR83ApjXkWxZ-4xkpy6j0R57RTaw

Welsh Affairs Committee (2010) *Third Special Report Ports in Wales: Government Response to the Committee's Fifteenth Report of Session 2008–09*, available online at http://www.publications.parliament.uk/pa/cm200910/cmselect/cmwelaf/308/308.pdf

Welsh Assembly Government (2008) *People, Places, Futures: The Wales Spatial Plan 2008 Update*, available online at http://wales.gov.uk/location/strategy/spatial/documents/wsp2008update/?lang=en

Welsh Assembly Government (2010) *Economic renewal: A new direction*, available online at http://wales.gov.uk/docs/det/report/100705anewdirectionen.pdf

Welsh Economy Research Unit (2007) *Economy, Business Community and Futures,* report for Pembrokeshire Business Initiative, November.

Welsh Economy Research Unit (2010) *Input-output tables for 2007*. Available on request from Dr Calvin Jones, Cardiff Business School, Colum Drive, Cardiff. 2007 tables were developed with the support of Environment Agency Wales. See also http://www.cf.ac.uk/carbs/research/groups/weru/IO_2007_Final_30_6.pdf