Devonport: Trident alternatives

An overview of green employment potential

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The office of Molly Scott MEP

Devonport: Trident alternatives, an overview of green employment potential

A report by **CAG Consultants**

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CAG Consultants

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Foreword

The debate about the renewal of the UK's submarine-based Trident nuclear weapon system is of course a major ethical issue. Many, myself included, regard all such weapons of annihilation as immoral, militarily useless, and a breach of our obligations under the Nuclear Non-Proliferation Treaty.

But this report is not concerned so much with the ethics of Trident: it is about economics and goes to the heart of the type of economy and society (and environment) we want to create in the future. This study by researchers from CAG Consultants explores how we could convert jobs currently servicing our nuclear weapons programme in Plymouth into green jobs.

Some people, including some Trade Unions, argue that the UK's Trident nuclear weapons system helps sustain thousands of high-quality jobs in the UK, including at Devonport in Plymouth. But this report blows that argument clean out of the water by demonstrating that jobs linked with Trident are limited and can and should be replaced, using far less public money.

The life-time cost of Trident renewal could be as high as £200 billion. It is estimated that renewing Trident would safeguard just 11,500 civilian jobs in the UK as a whole, making them some of the most expensive jobs in the world. By contrast, for just a few hundred million pounds of public money, a significant number of green jobs can be created, supporting our transition to a sustainable future and giving our young people an inspiring work future they can believe in.

Most of the 2000 or so Devonport jobs and facilities are transferable between submarine and other work including work on surface warships, and even without Trident renewal, Devonport will need to be involved in nuclear submarine de-fuelling and decommissioning for some time to come.

So we can abandon Trident replacement while maintaining employment but start transferring investment and skills into socially useful and sustainable jobs, making use of all the fantastic skills and resources available at Devonport.

Creating new green jobs can be viewed as an act of peace whereas nuclear defence is an industry of war.

Molly Scott Cato MEP

Summary

This report looks at the available data on employment at Devonport, and specifically that related to Trident renewal, with a view to understanding the employment implications of not replacing the four nuclear-powered submarines that provide the UK's continuous at sea nuclear deterrent. Any such decision would need to come hand-in-hand with investment in support of alternatives – and this report examines the potential for renewable energy-based employment.

UK-based work to build, maintain and operate the new fleet of submarines will be spread across Barrow (submarine construction), Derby (nuclear reactor construction), Faslane (operations base) and Devonport (refit / maintenance). Decommissioning will likely take place at Devonport and Rosyth. Steel suppliers are unknown at this stage.

According to the government the cost of replacing all four submarines is currently (2015) estimated at £31 Billion with an extra £10 Billion contingency (an increase of £6 Billion on the previous 2011 estimate). Government estimates running costs at £2.3 Billion per year. Other estimates have put the lifetime cost – replacement plus running costs over an assumed lifetime – at between £176-205 Billion over 30 years.

Babcock Marine is the owner of maintenance facilities at Devonport and the prime contractor. Reported estimates vary for levels of employment at Devonport, but coalesce at around 4000-4500 for all of the activities there, which includes surface ship as well as submarine work. These numbers appear largely unaffected by defence cuts announced in 2010. There is only one estimate that we could find of employment linked to Trident renewal, namely work by the BASIC Trident Commission suggested a top end of 1590 jobs, and the same again for naval base suppliers – with the first jobs starting in 2037 or later. Numbers could be lower than this because the new class of submarines should not need refuelling.

Unions representing large numbers of defence workers – notably the GMB – are strongly in favour of Trident renewal, and argue passionately for the UK-wide, good quality jobs the investment would create. The Trades Union Congress, and in particular the Scottish Trades Union Congress (STUC) are strongly against Trident renewal, arguing equally passionately that Trident is not a jobs-rich investment programme, and that the money would be better spent supporting alternatives.

The BASIC Trident commission report noted that whilst Devonport is almost certainly going to secure maintenance work from Trident renewal, it is also wholly dependent on the MoD as a client. This is exposing to the MoD's and parliament's decision-making, and has opportunity costs for alternative work. The submarines offer "no obvious wider economic benefits in the form of exports and extensive technology spin-offs …" and require some specialist skills that cannot obviously be used elsewhere.

Renewable energy is a good example to use when looking at an alternative approach because it has the potential to utilise at least some of the maritime skills and facilities at Devonport. Furthermore, the wider South West region is home to some of the UK's leading renewable energy companies and specialists, from marine engineering to composites to research and development.

Plymouth City Council has been working hard to develop renewable energy opportunities at Devonport, for which the flagship project is re-development of a southern portion of the Yard (South Yard). Money from the "City Deal" with the government is paying for general site re-tasking and new office space, with revenues recycled to areas including dock-side. This is initially just 7.5ha of the 263 ha Devonport site.

At the same time Babcock has invested in renewables, successfully securing a number of manufacturing contracts for UK (north east and Sussex) offshore wind farm components. The South West has yet to benefit from these efforts, with the contracts being serviced from Rosyth.

It is not clear why further diversification cannot or has not involved Devonport facilities. Space may be an issue for some activities requiring extensive laydown areas, given how close the Yard is to the city, or the co-existence of nuclear and renewables activities may pose problems. However, we simply do not know. We could not find any renewables manufacture case studies for Devonport, although clearly given its heritage the potential is there.

Looking across the whole of the South West, according to Regen South West there were 12,800 people directly employed in renewable energy in 2015 in the area. There are multiple and diverse opportunities to secure renewables work, from project management to specialist research and development. In terms of value and jobs creation potential, component manufacture is the big hitter. Many regions are pursuing this prize, often with government support for industrial conversion of facilities, equipment and skills. In addition to Rosyth, successes include:

- Campbeltown, an ex RAF base now home to a wind turbine tower factory, employing 130-200 people.

- The Isle of Wight, manufacturing offshore wind turbine blades for Vestas with a workforce of around 800.

- The port of Hull, producing its first blades for Siemens later this year with an anticipated workforce of 1000.

- Nigg, Burntisland and Methil on the Scottish east coast, making subsea structures for offshore wind farms and bespoke marine energy devices.

It is not easy to secure renewables work. It is very competitive, requires work to understand the market and meet industry specifications and standards. Compared to direct, largely non-competitive award of government defence contracts it may seem a tall order. But it offers access to a market that is less and less politicised and more and more mainstream. It offers economic resilience in the form of multiple projects and multiple clients operating in a global marketplace (as opposed to one client in one marketplace). It can lever private sector investment in ageing facilities and neglected sites, and almost certainly create more jobs £ for £ than Trident renewal would. In the South West, renewable energy investment could create new jobs a good deal sooner than Trident renewal, given that the first jobs from renewal would not eventuate until 2037.

1 Introduction

1.1 Our brief

Although there are a range of views across Member States on nuclear disarmament, the European Union is increasingly engaging in the debate. At the Thessaloniki Summit of June 2003 the European Council explicitly adopted its first draft Strategy against the proliferation of Weapons of Mass Destruction (WMD) with an ultimate objective to, where possible, eliminate WMD such as nuclear weapons. In 2010 the EU established its own Non-Proliferation Consortium.

The Green Party is committed to nuclear disarmament and does not support renewal of the UK's Trident nuclear deterrent. Furthermore, it believes that the investment that would otherwise have paid for Trident renewal could instead, at least in part, support conversion of the military apparatus to peaceful applications. Specifically:

> "*An imaginative programme of arms conversion could use many of the skills and resources at present tied up in military industry, to create new jobs and produce socially useful products. Conversion would also free research and development expertise and capital. New renewable energy industries, for instance, could be set up in the same area and use the same skills and resources as the existing arms industries e.g. wave power (shipbuilding), wind power (aerospace) and tidal power (power engineering).*" [1]

A number of defence contractors and associated ports and facilities around the UK will secure work on the back of a decision to renew Trident. Alternative employment opportunities are naturally an important part of a non-renewal policy.

Molly Scott Cato of the Green Party is Member of the European Parliament (MEP) for South West England. She has asked CAG Consultants (CAG) to scope renewable energy-based alternatives to Trident-related jobs in and around the Devonport naval base in Plymouth. The focus on renewable energy is by way of an example of the potential for diversification at the yard.

CAG has looked at the potential for building a greener local economy, utilising existing skills, expertise and facilities as far as possible. Clearly this would not happen overnight, and would build on existing initiatives to promote the marine and renewable energy potential of the area. Such green jobs activity would clearly be boosted by investment released from cancelling Trident, if it were re-invested in the same area.

[1] The Green Party of England and Wales, "Peace and Defence." Policy, Green Party. https://policy.greenparty.org.uk/pd.html

1.2 This report

The material in this report is drawn from an extensive literature review covering:

- Trident renewal, and consequences for Devonport
- Employment and economic context in and around Plymouth
- Skills and facility conversion to renewable energy, with an emphasis on Devonport and comparable port / maritime applications
- Renewable energy supply chain work.

Following the literature review we reviewed our findings with a number of local experts, and gathered additional insight.

The report is structured as follows:

- **Section 1: Introduction**
  This section.
- **Section 2: Trident**
  Some background on renewal of the nuclear deterrent and involvement of key UK contractors, including those located at Devonport.
- **Section 3: Employment**
  Looking at the available data on employment at Devonport and the impact of Trident renewal.
- **Section 4: Alternatives, renewable energy**
  A review of the renewable energy sector and context in the South West, and UK-based case studies of industrial conversion to high value, manufacturing jobs in renewable energy.
- **Section 5: Comment and analysis**
  Bringing together main findings and providing some comment and analysis.
- **Section 6: References**
  List of sources of information used in production of this report.

2 Trident

2.1 Trident renewal[2]

"Trident" is the name for the UK's nuclear deterrent. It consists of four nuclear-powered submarines carrying long range Trident missiles equipped with nuclear warheads, which operate as Continuous At Sea Deterrence (CASD).

From 1969 to the early 1990s CASD consisted of four "Resolution class" submarines carrying the polaris nuclear missile system[3]. This was followed by the current "Vanguard class" of submarines carrying the trident nuclear missile system, the first of which came into service in December 1994 and the last (fourth) in February 2001.

The original intended lifespans for the Vanguard class of submarines was 25 years, implying the first replacement submarine would need to be operational by 2019. Following three lifetime extensions the first replacement is now planned for the early 2030s, giving a lifespan of 37-38 years.

According to the government the cost of replacing all four submarines is currently (2015) estimated at £31 Billion with an extra £10 Billion contingency (an increase of £6 Billion on the previous 2011 estimate). About £5 Billion of this will have been spent up to 2016, but the so-called "main gate" decision on allocating demonstration and manufacture spend has been green lighted by the July parliamentary vote in favour of renewal. Government estimates running costs at £2.3 Billion per year.

Other estimates have put the lifetime cost – replacement plus running costs over an assumed lifetime – at between £176-205 Billion over 30 years. The former estimate is from the Crispin Blunt MP based on defence spending of 2% of GDP per year and Trident costing 6% of the defence budget, the latter CND's latest estimates including infrastructure, security and decommissioning costs[4].

The submarines will be built at Barrow-in-Furness by BAE Systems.

Likely suppliers of steel for the submarines are varied and presently unclear, with press reports variously suggesting France[5], Dalzell[6] steel works in Motherwell and Sheffield (for pressure cylinders surrounding the submarine reactors).[7] When asked in a Parliamentary Question, the government simply stated that steel procurement was a matter for the prime contractor, BAE Systems[8].

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[2] This section draws heavily on: Claire Mills, "Replacing the UK's nuclear deterrent." Briefing paper number 7353, 8 March 2016. House of Commons Library.
[3] Successor submarine programme: factsheet. Updated 20 January 2016. https://www.gov.uk/government/publications/successor-submarine-programme-factsheet/successor-submarine-programme-factsheet
[4] "Trident replacement cost rises to £205 Billion." CND website. http://www.cnduk.org/index.php?option=com_k2&view=item&id=2447&Itemid=26
[5] "UK manufacturers unfazed by shrinking steel sector". October 25, 2015. Financial Times https://next.ft.com/content/32521d6e-7994-11e5-a95a-27d368e1ddf7
[6] "Tata plant closures trigger warning from UK Steel on manufacturing." 20th October 2015. https://www.theengineer.co.uk/tata-plant-closures-trigger-warning-from-uk-steel-on-manufacturing/
[7] "Steel deal with Chinese group blocked because of Trident link." January 20, 2016. https://next.ft.com/content/903a9d62-bf93-11e5-846f-79b0e3d20eaf
[8] Emily Thornberry, Shadow Secretary of State for Defence to Philip Dunne, Minister of State (Ministry of Defence) (Procurement). "Trident submarines: iron and steel". Ministry of Defence written question – answered on 18th April 2016. http://www.theyworkforyou.com/wrans/?id=2016-04-13.33828.h

The nuclear propulsion system will be supplied by Rolls Royce based in Derby.

In-service submarines are based at Faslane, where operational maintenance also takes place. Out-of-service maintenance and refit takes place at Devonport.

The Trident missiles are made and maintained in the US. The warheads are put together in Aldermaston and Burghfield and stored and maintained in Coulport. However, missile and warhead replacement is not part of "Trident renewal" (as currently being debated), which is focused on procuring four new submarines.

2.2 Refuelling

The Trident submarines are nuclear-fuelled. Prototype reactors for the propulsion system were being tested at Dounreay, but this site is now being decommissioned. Future systems will be designed based on computer modelling and component testing[9]. Of the four existing Vanguard submarines, one has been re-fuelled because of potential problems with the reactor design. A decision on re-fuelling the remaining three has yet to be made, but investment in facilities at Devonport and Derby have maintained the capability to refuel.

The successor Trident submarines will not – if all goes to plan – need to be refuelled, which will impact on the continuity of employment levels at Devonport over the submarines' lifetime[10].

2.3 Decommissioning

Decommissioned nuclear submarines are currently stored at Devonport and Rosyth. Reactor fuel and contaminated submarine parts need to be removed and the submarines dismantled. However dismantling of the submarines has stalled pending a nuclear waste solution, with a decision to store the waste at Capenhurst (holding, prior to long term disposal) only just announced[11]. A test dismantling of a nuclear submarine was due to take place this year at Rosyth. The project is complex in engineering terms, requiring amongst other things a special moveable steel construction (Reactor Access House) housing a crane and spanning an entire dock[12].

There are currently twelve nuclear submarines at Devonport, eight still fuelled. The expectation is that the submarines will be dismantled in-situ, taking several years for each submarine[13]. As and when they are decommissioned, the existing Trident fleet will also need to be dismantled, presumably at Devonport and Rosyth.

[9] "Submarine test reactor at Dounreay shut down for final time." 27 July 2015. http://www.nuclearinfo.org/article/other-uk-fleet/submarine-test-reactor-dounreay-shut-down-final-time
[10] Keith Hartley, 2012. "Defence-Industrial issues: employment, skills, technology and regional impacts". Discussion paper 2 of the BASIC Trident Commission. 21 March 2012. http://www.basicint.org/projects/2015/trident-commission
[11] "Capenhurst chosen to store nuclear submarine radioactive waste". BBC News. 8 July 2016. http://www.bbc.co.uk/news/uk-england-36750420
[12] "How Babcock plans to decommission UK nuclear submarines". Nuclear Engineering International. 14 February 2014. http://www.neimagazine.com/features/featurehow-babcock-plans-to-decommission-uk-nuclear-submarines-4177541/
[13] "Laid up nuclear submarines at Rosyth and Devonport cost £16M". BBC News. 3 June 2015. http://www.bbc.co.uk/news/uk-england-devon-32086030

2.4 HM Devonport

Plymouth docks – renamed Devonport – go back to the late 1600's, and were established to build, repair and maintain royal navy ships. Beginning at what is now the South Yard, the docks expanded northwards over the centuries. The last ship to be built at Devonport was in 1971.

The naval base is now home to seven navy frigates and most of its hydrographic surveying fleet. A 2009 review of the UK's three navy bases (Devonport, Portsmouth and Clyde) resulted in Devonport no longer housing nuclear-powered "attack" submarines or guided missile destroyer ships[14].

HM Devonport's maintenance facilities were privatised in 1993 and are currently operated by Babcock Marine, which is also the main MoD contractor at Devonport. Babcock undertakes nuclear refuelling and repair on the Royal Navy's nuclear submarines, which includes the Trident submarines. In 1997 the MoD funded an upgrade of refitting and refuelling facilities for the Vanguard class and the "attack" nuclear submarines, which were completed in 2004, and which costed around £933M[15].

[14] HMNB Devonport. Wikipedia. https://en.wikipedia.org/wiki/HMNB_Devonport
[15] National Audit Office, 2002. "Ministry of Defence. The construction of nuclear submarine facilities at Devonport." Report by the comptroller and auditor general. HC 90 Session 2002-2003: 6 December 2002. https://www.nao.org.uk/report/ministry-of-defence-the-construction-of-nuclear-submarine-facilities-at-devonport

3 Employment

3.1 Devonport

According to the Ministry of Defence, the HM Devonport "base" employs "2500 service personnel and civilians, supports around 400 local firms and generates around ten percent of Plymouth's income."[16] The Annual Business Guide for the Western Morning News reports that in 2015, the Dockyard and Babcock International combined employed 4498[17] making it the fourth largest employer in Devon and Cornwall (behind CDS superstores, Newcross health care and Viridor / South West Water).

A 2011 economic assessment of a Waste to Energy plant planned for the Devonport north yard states that "the Dockyard and Naval Base generate 13% of Plymouth's gross value added income" and that there are "4,036 personnel on ships and submarines which are based in Devonport" and "475 Naval service personnel …. in naval support together with 380 civilians." It says that "Babcock employs almost 4,300 people within Devonport Dockyard" and, "A further 7,000 jobs are dependent upon the Dockyard and Naval Base."[18]

Employment on all nuclear submarine work at Devonport (deterrent and attack submarines) has been estimated by the BASIC Trident Commission to be around 3000 (in 2011[10]). An additional 3000 was estimated for suppliers, location un-specified.

Despite defence cuts in 2010, which saw Devonport lose a number of its ships, these numbers do not seem to have changed significantly. There is a detailed socio-economic impact assessment of the Dockyard and naval base, undertaken around the time of the cuts, but the report has not been published and we have been unable to access it[19].

Although Devonport the base is a major employer, the Devonport ward of Plymouth is one of most deprived areas in the city.[20]

3.2 Plymouth

The population of Plymouth is 261,500 and of the South West nearly 5.5 million. (2014 data). The unemployment rate in Plymouth (6%) is higher than the national level (5.2%) but across the South West

[16] HMNB Devonport. HM Naval Base. Royal Navy website. http://www.royalnavy.mod.uk/devonport
[17] Annual Business Guide 2015, Western Morning News. http://www.westernmorningnews.co.uk/WMN-Annual-Business-Guide-2015/story-26820615-detail/story.html
[18] Scott Wilson, 2011. "MVV Environment Devonport Ltd. Energy from Waste Combined Heat and Power Facility. North Yard, Devonport." May 2011. The jobs numbers for Devonport in this report are attributed to a personal communication with the MOD.
[19] SERIO, Ekosgen, Paul Bishop and Dr Steven Brand, 2011. "Devonport Dockyard and Naval Base. Socioeconomic Impact Assessment". A collaboration between Plymouth University's SERIO, Ekosgen, CEMLEF's Professor Paul Bishop and Dr Steven Brand. http://www.serio.ac.uk/?p=4_1&iid=25
[20] Plymouth City Council, October 2006. "Plymouth Local Economic Development Strategy 2006 – 2021 & Beyond." (p24). http://www.plymouth.gov.uk/localeconomicstrategy

as a whole it is lower (3.9%)[21]. Wages are lower for people living in Plymouth than across the South West and both are lower than the national average.[22]

The number of employees working in Plymouth is shown below (i.e. working but not necessarily resident in Plymouth). Like the rest of the country Plymouth is a services-based economy, but it does provide higher than the national average level of manufacturing jobs. These are dominated by maritime-related manufacturing at Devonport. As well as jobs associated with navy activities, Princess yachts has recently located at Devonport south yard, making luxury yachts.

Sector	Plymouth (employees)	Plymouth (%)	South West (%)	GB (%)
primary services	100	0.1	0.3	0.4
energy and water	900	0.8	1.1	1.1
Manufacturing	13100	12.1	9.2	8.5
Construction	3900	3.6	4.8	4.5
services	89800	83.4	84.7	85.6

Table 1 Sectoral employment, Plymouth (2014)[23]

According to a 2010 study by Experian with the Financial Times, Plymouth is particularly vulnerable to public sector cuts – based on its high proportion of public sector jobs combined with low economic resilience[24].

Between 2011 and 2013, Plymouth City Council undertook a six monthly economic review. In March 2013 this reported a drop in full time public sector jobs and some growth in full time and part time private sector work. Job losses in manufacturing had not been completely re-balanced by gains in services. Barriers to growth in manufacturing were cited as regulation and skills shortages. Across Plymouth, Devonport ward has one of the highest rates of unemployment as well as long-term unemployed[25].

3.3 Trident implications

Clearly activities at Devonport are extremely important to the local and regional economy, and contribute to employment. There is no information on how far employees travel to work at the Devonport naval base. There is also no published information on how the workforce is deployed across activities at Devonport, nor on the skills breakdown.

Even without Trident renewal, Devonport will need to be involved in nuclear submarine de-fuelling and decommissioning for some time to come, and in so doing acquiring and retaining valuable knowledge-based expertise on nuclear decommissioning.

[21] ONS annual population survey. Summarised in “Labour market profile, Plymouth.” Nomis official labour market statistics. Profile created 20 April 2016.
[22] ONS annual survey of hours and earnings – resident analysis. Summarised in “Labour market profile, Plymouth.” Nomis official labour market statistics. Profile created 20 April 2016
[23] ONS Business Register and Employment Survey. summarised in “Labour market profile, Plymouth.” Nomis official labour market statistics. Profile created 20 April 2016.
[24] “Public sector axe falls heavily on the frail. Research ranks areas by business resilience”. Financial Times, September 30, 2010. https://next.ft.com/content/a90b5f9e-ccbd-11df-a1eb-00144feab49a
[25] Plymouth City Council, 2013. “Plymouth’s economic review”. Issue 3. March 2013. http://www.plymouth.gov.uk/economicintelligence

On renewal itself, the BASIC Trident commission is accompanied by a report on "employment, skills, technology and regional impacts" of Trident renewal[10]. It estimates that Trident renewal would create at additional 1590 jobs at Devonport and the same, 1590 for Devonport suppliers, starting in **2037**. These numbers are based on scaling from those already employed on submarine work at Devonport and it is not clear from where additional skilled personnel could be recruited. These numbers are upper bounds and:

> "*the assumption of constant employment at ….. Devonport is unlikely since the PWR3 nuclear reactor* [fuelling the new submarines] *will not need in-life refuelling*"

The timescale for ramping up this employment is unclear, and is presumably related to when any new submarines would require out-of-service refit and maintenance. During decommissioning Devonport will be one of two sites (Rosyth being the other) where reactor fuel is removed, contaminated submarine parts are removed and the submarines dismantled. This work can only proceed once a safe site for disposal is available, and there is a backlog of nuclear submarines at Devonport waiting to be dismantled.

The same BASIC report makes some observations about the economic features of a submarine-dependent economy, namely that: there is a single buyer for the submarines (the MoD) and high entry barriers for any potential new suppliers (i.e. little or no competition); nuclear-powered submarines offer

> "*no obvious wider economic benefits in the form of exports and extensive technology spin-offs to other products and to the rest of the economy*" and "*require specialised skills and facilities for their design, construction, maintenance and decommissioning. Some of these skills and facilities are specific to nuclear-powered submarines, with no alternative-use value*".

This puts existing suppliers and skills providers both at an advantage and disadvantage. It means that Devonport, alongside Rosyth, is almost certainly going to secure work from Trident renewal, but that it is also wholly dependent on the MoD, its timescales and politicised decision-making. There is also an opportunity cost of alternative work and investment required in re-training for certain skills that cannot be put to use elsewhere.

On Devonport specifically, the report says:

> "*Most of the staff and facilities are transferable between submarine and 'other work, where 'other work' includes work on surface warships and support with some commercial work. However, some staff and facilities are so highly specialised that they can be used only for submarine work*."

3.4 The unions

The GMB union says that it is "the union for defence workers" and is vocal in its strong support for Trident renewal. The Scottish GMB Secretary, speaking at a February 2016 GMB conference held on the Trident Successor programme in Newcastle, criticised both the new Labour Party leadership and

the SNP for its stance against Trident renewal. Referencing Trident construction (rather than maintenance at Devonport), he talks about defence jobs providing decent and stable wages[26].

The GMB Rosyth representative is quoted on diversification saying:

> "*Rosyth is trying to diversify, we are chasing oil and gas work as well as work in renewables, but it is tough. We are not going to take lectures in diversification from people who know nothing about our industry*."

The Trades Union (TUC) Congress and Scottish Trades Union Congress (STUC) is however against Trident renewal. The Plymouth TUC has emphasised the risks of undertaking nuclear decommissioning on the edge of a major city, contamination of the area and the need to import skilled workers from outside of Plymouth[27].

The STUC has a long-running campaign against Trident renewal. In March 2007[28] it published detailed analysis of Trident-related jobs and infrastructure in Scotland. It concluded that should Trident be cancelled defence job losses would be much lower than claimed by its proponents, and that Trident renewal would be at the expense of a higher number of public sector jobs.

In 2015 the STUC published another report advocating the establishment of a "Scottish Defence Diversification Agency." It highlights that under austerity, Trident renewal comes not only at the expense of public sector expenditure but at that of conventional defence expenditure and associated manufacturing jobs. It draws on case studies from the US to show that

> "*with early planning, adequate resources, workforce involvement and the political will, local communities can prosper after the closure of large military installations*."

This is echoed by the BASIC Trident commission work which states that:

> "*A decision not to replace Trident announced in, say, 2016, but to continue with the construction of the remaining Astute submarines …… allows ample time for governments to introduce appropriate adjustment policies for those towns and areas likely to be the losers from such a decision*."

[26] GMB Trident Successor programme conference. Thursday February 25, 2016. http://www.gmb.org.uk/newsroom/gmb-trident-successor-programme-conference The full conference can be viewed here: http://www.gmb.public-i.tv/core/portal/webcast_interactive/214197
[27] Plymouth Trades Union Council, "Why we say stop the dump" http://www.plymouth-tuc.co.uk/Website/Dump.html
[28] STUC, Scottish CND, 2007. "Cancelling Trident. The economic and employment consequences for Scotland." 11 March 2007. http://www.stuc.org.uk/files/STUC%20-%20CND%20Trident%20Report%202007/STUC-CND%20Trident%20Report.pdf

4 Alternatives – renewable energy

Renewable energy is the focus of the Green Party's alternative proposal, although it is of course not the only option for sustainable economic development. It serves as a good case study to work through what might be involved in re-tasking, re-training and generally diversifying employment opportunities. With the UK the global leader in offshore wind and at the forefront of the nascent wave and tidal energy industry, the potential is unarguably immense. But it is not just talk, the renewables industry is already delivering jobs in their thousands and providing the springboard for re-development of some of our ports and military bases.

4.1 South West Context

The South West is home to some of the UK's leading renewable energy companies and specialists. In fact, the region's specialisms are a testament to the potential for conventional industries to diversify and thrive in the renewable energy sphere.

Delabole in Cornwall hosted the UK's first commercial onshore wind farm, and today offers one of the UK's most innovative local supply tariffs with cheap energy for local residents. Bristol was the home for Concorde and a substantial manufacturing, research and development hub for British Aerospace. It has spawned multiple renewable engineering, manufacturing and consultancy businesses in renewable energy, utilising aerodynamics, materials and modelling expertise. The National Composites Centre in Bristol researches processes, manufacturing and applications of composites used widely in aerospace, renewable energy and maritime applications.

There has been a major drive to capitalise on the region's maritime pedigree, with academics, companies and enterprise agencies coming together under the nationally designated Marine Energy Park (MEP) umbrella from Bristol to Cornwall. Wave and floating offshore wind devices can be tested at Wave Hub off the north coast of Cornwall, and service infrastructure can use the region's ports and harbours. Falmouth Bay test site can accommodate up to three wave energy devices and the Crown Estate has designated a tidal energy test site off the coast of Lynmouth.

Specialist consultancies (Garrad Hassan, now DNV GL), developers (Wind Prospect), technology companies (Atlantis Resources, Mojo Maritime, Seatricity, Wavepower) energy suppliers (Good Energy), financiers (Triodos) and manufacturers (Pipex, fabricating composites in Plymouth) are all based in the area. According to Regen South West there were 12,800 people directly employed in renewable energy in 2015 in the area[29].

Just looking at the latest Regen South West supply chain directory[30], Plymouth-based companies alone can design and supply submersible vehicles for offshore survey / research (MSubs), supply surface workboats and barges (Autodynamic Positioning Services, Bridgend boat company, Howard Marine, James Fisher Rumic), engineer and project manage complex civil and electrical projects (AECOM, Lorne Stewart, Ryearch, E-tech Group), manufacture specialist hydraulic components for the marine environment (Kawakaski Precision Engineering), precision engineer metal pieces and components

[29] Regen SW. "South West Renewable Energy Progress Report 2015". https://www.regensw.co.uk/our-work/creating-a-positive-environment/1145-2/progress-report/
[30] Regen SW. "Marine Energy and Offshore Wind. South West company directory 2015". https://www.regensw.co.uk/our-work/offshore-renewables/offshore-supply-chain/

(Morris Engineering), manufacture composites marine bearings (H4 Marine), provide cable management and protection (HellermannTyton), and manufacture be-spoke composites structures for mooring, cabling and offshore platforms (Manuplas, Pipex).

Diversification is of course challenging, and especially so when moving from a non-competitive industry like defence to an exceptionally cost-conscious, globally competitive renewables industry. Onshore wind in particular is a mature and global industry with established and trusted supply chains, and competing regions and countries vying for local content. This is less so for the emerging wave and tidal sector which has been a key target for both the South West and the north of Scotland. Several device developers and marine support companies are based in the South West. The winning ticket would be local manufacture of devices to be deployed at the wavehub and tidal test centres.

Experience has shown that public support plays a vital role in funding specialist equipment and upgrading or purpose-building facilities, re-training staff, supporting modern skills in school leavers and providing tailored support to firms looking to break into a new industry (see Section 4.4). Clearly where there is a natural cross-over – for instance between oil and gas and offshore wind manufactured steel structures – this process will be eased, although still require focused effort and investment in time and equipment.

In common with other parts of the UK, the South West is working hard to secure "local content" and specifically to capture the value associated with construction and operations of large engineering projects (see Figure 2). This is the renewable energy jobs 'prize'.

4.2 Devonport

Devonport is a working port historically built for shipbuilding and now used primarily for support and maintenance of the British surface and nuclear-powered submarine fleet. It covers over 263 ha, has 14 dry docks and 25 tidal berths[31] (see Figure 1 overleaf).

There is work underway to identify where parts of the yard could be released from military use. A wedge-shaped 7.5 ha piece of the 34ha Southern part (South Yard) is already part of a Plymouth and South West Peninsula City Deal with government to create a Marine Industries Production Campus. This involves investment in the site to bring it up to a commercial specification. MoD-owned land is being transferred to the council at no cost[32], reflecting the fact that the site is currently a liability for the MoD. Seven hectares were sold to Princess Yachts in 2011,[33] who now employ around 2000 people[17].

South Yard is being developed for occupation in stages. Phase 1 involves construction of office and light industrial space, scheduled to be ready in 2017[34]. Phases 2 and 3 involve re-development of land adjoining Phase 1 and the dockside respectively.

[31] Cornwall Council, Plymouth City Council, Regen SW. January 2012. "South West Marine Energy Park Prospectus, 1st edition. Unlocking the potential of the global marine energy industry."
[32] Plymouth City Deal negotiating document – draft V4. Undated.
[33] Regen SW, 2015. "Marine Industries Demand Study Report." March 2015. For Plymouth City Council.
[34] Jones Lang La Salle, Plymouth City Council, Invest South West "Plymouth's South Yard. Marine Enterprise in the Ocean City". Promotional leaflet.

Figure 1 Map showing Devonport dockyard.
Contains OS data © Crown Copyright OS Streetview 04/2016

4.3 The opportunities

Figure 2 below shows the relative value in developing, building and operating an offshore wind farm, the numbers taken from supply chain work by BVG associates[35].

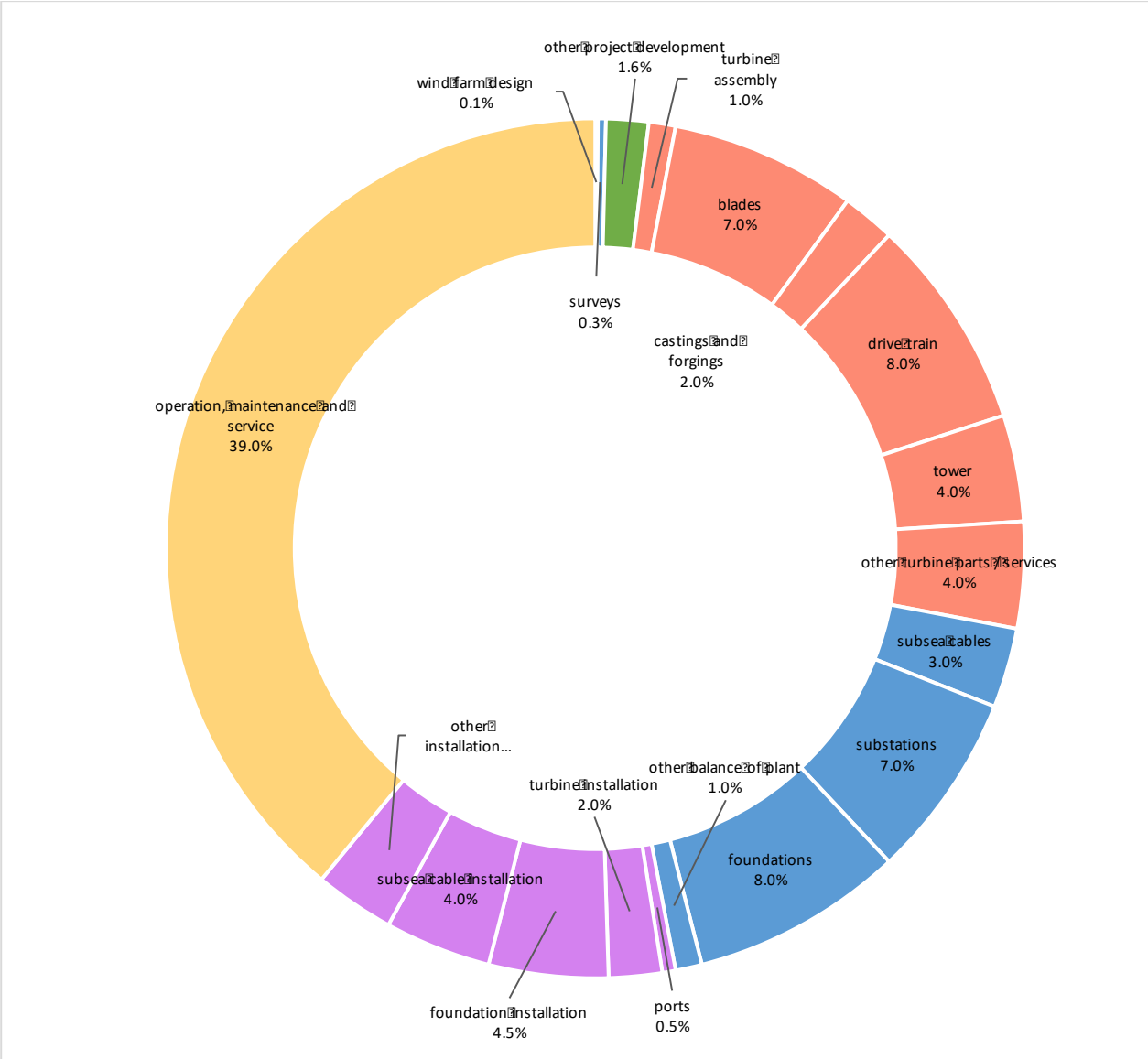

Figure 2 Cost breakdown, typical offshore wind farm

[35] BVG Associates, 2014. "UK offshore wind supply chain: capabilities and opportunities." For the Department of Business, Innovation and Skills. January 2014.

This illustrates the type of activities involved in an offshore wind farm. Early wave and tidal machines might instead require bespoke, specialised engineered structures, and be supported by higher levels of design and development work and operational support. However, they will still comprise the basic elements of development, device supply, balance of plant and operations and maintenance.

If we think about these opportunities in the context of Devonport, we might expect those most closely aligned with boat manufacturing, repair and maintenance to be relevant. So for example these could include installation and service vessels associated with offshore renewable structures.

The main high value opportunities are in manufacturing of device components and offshore support structures. A number of UK ports are looking at – and sometimes successfully securing – contracts associated with manufacture and assembly of the constituent parts of large offshore structures (see Section 4.4). This would typically require substantial flat lay-down areas and water deep enough to transport structures in and out of port.

Babcock markets its Appledore yard in North Devon as a facility for marine engineering work, alongside Rosyth in Scotland[36]. It is equipped for manufacturing with over 2 hectares of laydown area, warehouse and fabrication facilities[31]. Amongst other things it is one of a number of yards that has manufactured steel sections for surface warships being assembled at Rosyth. In the context of defence cuts, the Western Morning News has reported on diversification efforts at Babcock, saying that Scotland was the company's main focus for renewables, "with Plymouth and Appledore continuing to focus on repair and maintenance." [37] The same article quoted the GMB Union as saying:

> "*…it's very important for the business to diversify. Its main business will always be the bigger ships and submarines but, like anything in this life, when you have a crew of people there are peaks and troughs in the workload. It may be that boats are in for a year or two years now whereas when we had a bigger navy, it would be one in and one out"*.

It is not clear why further diversification cannot or has not involved Devonport facilities. Space may be an issue for some activities requiring extensive laydown areas, given how close the Yard is to the city, or the co-existence of nuclear and renewables activities may pose problems. However, we simply do not know. We could not find any renewables manufacture case studies for Devonport, although clearly given its heritage the potential is there.

4.4 Experiences elsewhere

Wind turbine blades – the Isle of Wight

Aerolaminates, in Southampton, was a company supplying wood epoxy composite blades in the UK in the 1990s. In 1998 it was acquired by NEG Micon, a Danish wind turbine manufacturer which in turn was acquired by Vestas in 2003. Under NEG-Micon, the company established a technology centre and factory on the Isle of Wight, with £2.5M of government support[38]. It employed around 500 - 600 staff[39]. However, by 2009 the factory's blades were all being shipped to the US market and the then Vestas owner closed down blade production in favour of establishing facilities closer to the American market. At

[36] "Marine facilities". Babcock International website. https://www.babcockinternational.com/Sectors/Marine/Marine-Facilities
[37] "Babcock still has full order book despite MoD cutbacks." Western Morning News, July 01, 2013. http://www.westernmorningnews.co.uk/babcock-order-book-despite-mod-cutbacks/story-19443480-detail/story.html
[38] "Isle of Wight hits stormy waters". BBC News. Friday 14 February 2013. http://news.bbc.co.uk/1/hi/business/2752341.stm
[39] Global Wind Turbine Services. Company foundation. GWTS website. http://www.gwts.co.uk/foundation.htm

around the same time the government provided £10M for offshore wind R&D on the island focused on the remaining technology centre[40]. Five years later in 2014, Vestas re-opened the manufacturing facility making larger blades which were designed and tested on the Isle of Wight, to supply UK offshore wind construction[41].

Wind turbine blades – Hull

Siemens is opening a new blade manufacturing plant, and a construction and assembly centre, at a port of Hull re-development called Green Port Hull. Across the two facilities Siemens is investing £160 million and Associated British Ports (ABP) is providing £150 million towards the port's development. This is expected to support some 1000 jobs across the sites plus jobs during construction.[42, 43] Construction is well underway and blade production is expected to start in autumn of this year. Initially blades will be supplied to UK offshore wind farms with orders already lodged from projects off the east of England. The site is also being sized to accommodate exports to other markets.

Green Port Hull itself is being developed and promoted by ABP, Hull City and East Riding Councils[44].

Wind turbine towers – Kintyre

In the early 2000's Vestas established a wind turbine towers factory at Macrihanish on the Mull of Kintrye, primarily to supply Scottish and UK onshore wind farms. It was supported by £9M of public investment. The Kintyre peninsula was a focus for the government and economic development agencies, Campbeltown's shipyard having closed in the 1980s and the military having pulled out of RAF Macrihanish in 1996.

The purpose-built wind tower facility, established on a section of the former airfield, became operational in 2002. It was sold to another Danish firm in 2009, but that went into administration. The plant and equipment were purchased by Wind Towers Scotland (WTS), which was majority-owned by SSE. Highlands and Islands Enterprise also have a stake. In April this year a South Korean firm, CS Wind, bought SSE's 80% stake.[45]

The factory employs 130 local people. CS Wind has plans to employ 70 more and is currently investing to expand production and provide for fabrication of wider-diameter offshore towers[46]. The facility rolls, paints and equips steel wind turbine tower sections which are then shipped out from Campbeltown harbour. In 2012 there was a community buy-out of the former airfield (for £1)[47].

Wind turbine towers – Liberty House steel plants, Lanarkshire

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[40] "Vestas closes wind turbine blade factory on Isle of Wight, UK". Renewable Energy Focus.com http://www.renewableenergyfocus.com/view/3342/vestas-closes-wind-turbine-blade-factory-on-isle-of-wight-uk/

[41] "Vestas announces return of Isle of Wight blade production". Isle of Wight country press online. http://www.iwcp.co.uk/news/news/vestas-announces-return-of-isle-of-wight-blade-production-68277.aspx

[42] "Siemens to build major offshore wind manufacturing site in the UK. 1000 new jobs to be created in Hull area". Siemens website. 14 November 2014. https://www.siemens.co.uk/en/news_press/index/news_archive/2014/major-uk-offshore-wind-manufacturing-site-to-be-built-by-siemens.htm

[43] "Siemens announces Green Port Hull improvements". Siemens website. 22 January 2015. https://www.siemens.co.uk/en/news_press/index/news_archive/2014/siemens-announces-green-port-hull-wind-manufacturing-site-improvements.htm

[44] Green Port Hull website. http://greenporthull.co.uk

[45] "SSE closes wind towers deal". SSE website. 01/04/2016. http://sse.com/newsandviews/allarticles/2016/04/sse-closes-wind-towers-deal/

[46] "Campbeltown wind turbine factory aims for £27 million expansion". Press and Journal, 6 July 2016. https://www.pressandjournal.co.uk/fp/business/north-of-scotland/966460/campbeltown-wind-turbine-factory-aims-for-27million-expansion/

[47] Small towns initiative. Campbeltown report. 16 April 2013. http://www.befs.org.uk/news/56/50/Scotland-s-small-towns-report-4-Campbeltown

Liberty House is re-opening mothballed former Tata steel plants at Dalzell and Clydebridge. Production will resume this September with wind turbine towers, rolled using equipment bought from a factory in Wales[48].

Offshore monopiles, jackets, wave and tidal devices – Scottish yards (oil and gas cross-over)
Heavy and be-spoke engineering of steel structures is a core capability of the oil and gas supply chain, and of the yards servicing the sector. A key area identified for diversification was offshore monopiles – essentially a large steel tube that is piled then grouted into the seabed.

There has been limited UK manufactured content for offshore monopiles – the 2004 Scroby Sands offshore wind farm ordered thirty monopiles from Cambrian Engineering at the Arnish Yard on Lewis (now owned by Burntisland fabrication) and Isleburn Mackay and MacLeod based at the Nigg yard (now part of the Global Energy Group). Both companies have gone on to secure orders from more specialist engineering in wave and tidal devices. Isleburn has played a major role in fabrication and assembly of an Atlantis Resources prototype machine, and an Ocean Power Technologies device. It fabricated the first Oyster device for Aquamarine and a tidal device for OpenHydro. It also assembled and erected two 5MW demonstrator offshore turbines for the Beatrice site[49].

In 2011 the Nigg yard secured £1.8M of Highlands and Islands funding to develop the site into a "multi-use modern energy park" and in 2012 a Nigg Skills Academy opened for training in renewables and oil and gas-related work.[50]

The Arnish Yard had been in receipt of HIE investment in steel rolling equipment, but has had mixed fortunes. The Yard did benefit from the planning authority for the Western Isles stipulating a high percentage of local manufactured content as a condition of planning consent, but a number of developments have stalled and not made it to construction.

Burntisland Fabrication – originally based in Fife at Burntisland and Methil but now also the facilities at Arnish – has gone on to fabricate jacket support structures for a number of offshore wind farms in the UK and further afield. It was also involved in the second Oyster tidal machine for Aquamarine and a tidal turbine for Hammerfest Strom.

Scottish Enterprise and Fife council have invested in the Methil yard to create "Energy Park Fife" which includes an ORE Catapult demonstration 7MW turbine (the world's most powerful turbine), and a "hydrogen office" (using hydrogen fuel converted from wind-generated electricity)[51].

Offshore substation platform – Babcock at Rosyth
Perhaps of particular interest in the Devonport context is Babcock's recent successes in securing orders for offshore wind farms. In its first order it will supply the jacket support structure and top-side platform for Rampion wind farm's offshore substation, from the Rosyth dockyard in Fife. Rampion is off the Sussex coast. The completion date is the end of 2016. On securing the order, Babcock noted

> "*the skill and capability of our teams working here, from design, manufacture and construction through to our support team…..The project will sustain over 100 positions at Rosyth and will have positive spin-offs for the wider supply chain in Scotland, as well as*

[48] "Dalzell and Clydebridge steel plants to make metal for wind turbine towers." BBC News, 16 June 2016. http://www.bbc.co.uk/news/uk-scotland-scotland-business-36548597
[49] Renewable Energy. Isleburn website. http://www.isleburn.com/renewable-energy
[50] Nigg fabrication yard. Highlands and Islands Enterprise website. http://www.hie.co.uk/regional-information/area-information/inner-moray-firth/projects/nigg-fabrication-yard.html
[51] Energy Park Fife. Invest in Fife website. http://www.investinfife.co.uk/content/energy-park-fife/

providing training and development opportunities in specialist skills and offshore renewable expertise at Rosyth[52]."

And more recently Babcock secured an order for Hornsea wind farm's offshore reactive compensation station off the Yorkshire coast. The station will be constructed at Rosyth[53]. Like Devonport, Rosyth is a naval base which will likely decommission nuclear submarines. Looking to the success of its neighbours at Methil and Burntisland, there has been investment in the dockyard by its owners as well as Scottish Enterprise and Fife council, to clean up and modernise former navy facilities and land[54].

[52] "Babcock wins wind farm contract". Dunfermline press. 9 June 2015. http://www.dunfermlinepress.com/news/13520106.Babcock_wins_wind_farm_contract/

[53] "DONG Energy awards multi-million pound contract to Babcock for the world's largest offshore wind farm". DONG Energy website. 18 May 2016. http://www.dongenergy.co.uk/news/press-releases/articles/dong-energy-awards-multi-million-pound-contract-to-babcock-for-world's-largest-offshore-wind-farm

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5 Comment and analysis

Clearly the Devonport naval base is a major employer in the South West region, providing skilled and relatively-well paid employment to around 2500 people, and more through local and national suppliers to the base. Most if not all of this employment is reliant on public sector defence contracts. The base undertakes maintenance and refit activities, and is or will be equipped to de-fuel and re-fuel nuclear submarines. It will also form the backbone of the decommissioning programme for a backlog of retired submarines. The clean-up work will continue irrespective of any decision to renew Trident.

Trident renewal will sustain or create up to around 1500 jobs at the base, although probably less as the new fleet will be designed so as to not require re-fuelling. Work on the new submarines won't start until the mid 2030s at the earliest. Unions representing large numbers of defence workers – notably the GMB – are strongly in favour of Trident renewal, and argue passionately for the UK-wide, good quality jobs the investment would create. The Trades Union Congress, and in particular the Scottish Trades Union Congress (STUC) are strongly against Trident renewal, arguing equally passionately that Trident is not a jobs-rich investment programme, and that the money would be better spent supporting alternatives.

Meanwhile jobs are already being created in the burgeoning renewable energy sector across the UK. Not only project management or investment jobs, but industrial manufacturing jobs in their hundreds and thousands, in re-developed ports and military bases, utilising our marine, aerospace and engineering heritage. This is perhaps a rather quiet turnaround in fortunes and it may take some people by surprise. There are examples like:

- Rosyth – like Devonport a naval base for nuclear submarine decommissioning – currently supplying offshore structures to two UK wind farms, sustaining 100 jobs.

- Campbeltown, an ex RAF base now home to a wind turbine tower factory, employing 130-200 people.

- The isle of Wight, manufacturing offshore wind turbine blades for Vestas with a workforce of around 800. The port of Hull, producing its first blades for Siemens later this year with an anticipated workforce of 1000.

- Nigg, Burntisland and Methil on the Scottish east coast, making subsea structures for offshore wind farms and be-spoke marine energy devices.

Naturally these wins are not available on a plate. It has required government planning and investment – for example in facilities, initially £9 Million at Campbeltown, £150 Million at Hull, around £12.5 Million on the Isle of Wight, and additional other support for local workforce re-training and support. However, this needs to be compared to nearly £1 Billion to upgrade Devonport facilities for re-fuelling the existing Trident fleet (which were designed not to be refuelled).

In the UK, there remains a pipeline of projects nearing construction and which will need operations and maintenance support over the next few decades. Changes to the market support regime for renewables have introduced some uncertainty, exacerbated by a change in government and a slow-down in award of new contracts. The industry remains confident it can operate under the new regime and, in the case of onshore wind, even develop subsidy-free projects. However, government commitment to the industry clearly goes a long way.

Furthermore, as the GMB has itself pointed out, it is not easy to secure renewables work. It is very competitive, requires work to understand the market and meet industry specifications and standards. Compared to direct, largely non-competitive award of government defence contracts it may seem a tall order. But it offers access to a market that is less and less politicised and more and more mainstream. It offers economic resilience in the form of multiple projects and multiple clients operating in a global marketplace (as opposed to one client in one marketplace). It can lever private sector investment in ageing facilities and neglected sites, and almost certainly create more jobs £ for £ than Trident renewal would. In the South West, renewable energy investment could create new jobs a good deal sooner than Trident renewal, given that the first jobs from renewal would not eventuate until 2037.

Wind power is now the leading new power source globally – in 2015 installed wind capacity beat all other new generation capacity. China alone built 31GW in 2015. The UK is the world's largest market for offshore wind, with 5GW of installed capacity by the end of 2015, 1.7GW more than the next highest, Germany[55]. The opportunities are immense, and growing.

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6.2 Acknowledgements

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