ARMS INDUSTRY IN THE CLYDE & RENEWABLE ENERGY OPTIONS

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CAMPAIGN AGAINST ARMS TRADE

FINDINGS

The Clyde could be the global leader in wave, and possibly tidal stream, technology, because of its location and also the engineering skills and infrastructure that already exist through the various arms and engineering companies operating in the region.

Many of the companies making arms in the Clyde region also already make, or have the potential to make, vital parts for developing the wave power industry.

The several thousand jobs that could be created in the wave and tidal industries in the Clyde would more than offset job losses from reducing UK military spending and enforcing stricter controls on arms exports.

If wave and tidal become more mature technologies, there is far bigger potential. The Carbon Trust estimates that the UK could capture 22% of the marine power market between 2010 and 2050, which could be worth a cumulative £76 billion.

The UK and Scottish governments should act urgently to get wave technology moving forward through the £200 million investment needed, and to target this at the Clyde region. This is half the cost of one of the Type 26 Frigates being built on the Clyde, and would create far more potential for jobs and exports.

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1 SUMMARY

Through looking at individual businesses, we estimate that just over 6,000 people are employed in the 'arms industry' in the Clyde region. In addition, 4,500 MoD personnel work at the Faslane nuclear missile base. Of the arms industry jobs, most of the work is currently supplying the UK military, with an estimated just over 500 jobs dependent on arms exports. The general trend is for arms jobs to decline, with the one exception being that the UK Navy is moving more of its nuclear powered (but not nuclear weaponed) submarines to Faslane, increasing jobs there.

The Clyde region is a centre for the renewable energy industry in Scotland. Just over 2,000 people were employed in the industry in Glasgow in 2013, primarily in the development, maintenance and management of onshore wind farms and small-scale renewables. Offshore wind farms are primarily being built off the east coast as it has fewer waves, and so has easier construction conditions. Even there, the parts for offshore wind turbines are made in Denmark and Germany after they moved faster on wind technology.

The west coast of Scotland is by far the best site for wave technology in the UK. There are also tidal range options. Many of the companies making arms in the Clyde region also already make, or have the potential to make, vital parts for developing the wave power industry:

- James Fisher Defence has worked with Ocean Flow Energy on building a tidal power prototype at its test facility on the Clyde. Managing Director of JFD Ben Sharples says "We have an extremely well-equipped engineering resource here on the Clyde that is ideally located for those engaged in marine renewable projects in UK, Irish and near-continental European waters."[1]
- Link Cable Assemblies already supplies high voltage cables, control and instrumentation to renewable energy projects.
- BAE has worked with Aquamarine Power on building a test wave machine.
- Teledyne supplies electronic equipment including to the power industry and in ocean research.

An estimate made for the Scottish government in 2011 concluded that wave and tidal power could provide 5,300 new jobs by 2020. The skills needed would be mainly those of "engineers (especially civil, marine, engineering,

1 James Fisher Defence, 8.11.2012 (bit.ly/1XnZarC)

Wave & tidal power could provide 5,300 new jobs by 2020

Wello has been testing a full scale wave energy converter, the Penguin, in Orkney since 2012. (Picture by Wello)

structural and mechanical), leadership and management, project managers, welders, turbine technicians and divers." Most of these are skills already present in the arms industry in the Clyde.

However, wave power development in particular is struggling at the moment. For example, Aquamarine Power has financial difficulties and has retreated back to a skeleton staff. Both wave and tidal power are risk industries. Some private speculators are willing to take on high risks, but only with the prospect of fast returns. Marine renewable energy is high risk, and large returns will only become available over a significant amount of time.

There is therefore a strong case for direct government investment in wave and tidal power, so long as this is done in such a way that the public benefit from the returns in the future. The Offshore Renewable Energy Catapult estimated in late 2014 that wave power needed investment of £200 million to move designs towards further commercialisation, and then further investment to fund the first wave farms. This is half the cost to the government of one Type 26 Frigate being built on the Clyde.

The Clyde is the perfect place to be the global leader in wave, and possibly tidal stream technology, because of its location and also the engineering skills and infrastructure that already exist through the various arms and engineering companies operating in the region. Whilst the UK is particularly well placed to use tidal as well as wave technology, globally, wave will be the much more important source of energy.

The several thousand jobs that could be created in the wave and tidal industries in the Clyde would more than offset job losses from reducing UK military spending and enforcing stricter controls on arms exports. But if wave and tidal become more mature technologies, there is far bigger potential. Globally, it has been estimated that there could be 240GW of marine power by 2050, with about 75% coming from wave power. The Carbon Trust estimates that the UK could capture 22% of this market between 2010 and 2050, which would be worth a cumulative £76 billion.

The UK and Scottish governments should act urgently to get wave technology moving forward through the £200 million investment needed, and to target this at the Clyde region. As well as providing the UK with renewable energy and increased energy security, the UK, and the Clyde in particular, could become the world leader in wave power.

The Clyde region already has a good supply of skills, with 3% of employers reporting that they have skills shortage vacancies, less than the average for Scotland. Engineering is the third most popular subject in Clyde area universities, with 8,000 students in 2012/13. However, the region has higher unemployment than both Scotland and the rest of the UK, with 3.5% of the work force in much of the region claiming job seekers allowance, and around 9% unemployed; rates which are up to 60% higher than for Scotland and double those for the UK as a whole.

The current prospect is that the Clyde will continue to lose jobs in manufacturing, agriculture, mining, public administration, education and 'defence'. Health and social work, professional services and construction are expected to be growth areas. Developing more renewable energy jobs, particularly in the actual development and engineering of equipment, could provide more balance to this picture, creating highly-skilled engineering jobs to compensate for those lost in manufacturing and the arms trade.

2 ARMS INDUSTRY EMPLOYMENT

We have identified just over 6,000 jobs in the 'arms industry' in the Clyde. Of these, 2,250 are at the Faslane nuclear missile base, working for contractors such as Babcock in supplying engineering services on long-term contracts. There are a further 4,550 MoD personnel working at Faslane. Of the other jobs, just over 500 are likely to be dependent on arms exports, though jobs with BAE Systems at its naval dockyards will become dependent on securing export contracts for destroyers and frigates over time.

The main types of work are engineering and administration. Specific details are provided in the profiles of the companies below.

Summary of job numbers in 'arms industry' in the Clyde region

	UK arms	Arms exports
BAE	2,800 ↓	0[2]
Faslane, including Coulport[3] but excluding MoD employees	2,250 ↑	0
Thales Optronics	340 ↓	230 ↓
Teledyne	75 ?	75 ?
James Fisher Defence	50 ?	100 ?
Missiles and Batteries Ltd	0	80 ?
Castle Precision Engineering Services[4]	30 ?	30 ?
QinetiQ	50 ?	0
Link Cable Assemblies	10 ?	10 ?
Wartsila Propulsion	15 ?	0
Digital Barriers	10 ?	5 ?
Clyde Space	0	5 ?
Total	5,630	535

(↓ = likely to be falling, ↑ = likely to be increasing, ? = estimate)

2 But BAE are trying to sell the Type 45 Destroyer and Type 26 Frigate overseas, and they will need export orders to replace current MoD contracts.

3 MoD, 28.9.2014 (bit.ly/1TbSwUM)

4 We have estimated with some basis that there are 60 people employed in arms, and have a further unsupported estimate that these are split between UK sales and exports (or parts for arms which are ultimately exported).

2.1 BAE Systems

BAE Systems has two shipyards on the Clyde: Govan and Scotstoun, with 2,800 employees as of early 2013.[5] The shipyards played a major role in building six Type 45 Destroyers for the UK Navy, all of which have been finished. BAE has been trying to sell more of these ships to other countries, primarily Saudi Arabia, but has failed so far.

Govan has been building parts for the two aircraft carriers (which are being assembled at Rosyth on the Forth).[6] Most of this work is reported to be complete and some workers have already been transferred over to Rosyth.[7] Scotstoun is designing the Type 26 Frigate. Under current plans, construction on the first of these will begin in 2016 with the first one completed by the early 2020s. The 2015 Strategic Defence Review reduced the number of ships to be built from 13 to 8.[8]

There was therefore a potential gap in construction work being carried out at the two shipyards. The government filled this gap for BAE by ordering three offshore patrol vessels.[9]

BAE was considering closing Govan and undertaking all of the work on the Type 26 Frigates at Scotstoun. The GMB argued against Govan being closed, saying it has more potential to be used to build civilian ships.[10] Both shipyards are now to stay open.

BAE and the UK are also trying to sell the frigates to other countries, including Brazil, India, Malaysia and Australia, though, if successful, some of the work may be undertaken outside the Clyde / UK.

In the past few years, with the Type 45 Destroyer and Aircraft Carrier work being completed, employment at Govan and Scotstoun has been cut from 3,200 jobs to an anticipated 2,400.[11]

BAE also has a small test facility for munitions – possibly small arms, artillery and missiles – at Bishopton.[12] Currently this appears to employ few people. Bishopton was once an ammunition production site. It employed 2,000 people in 1984, 600 in 1993 and effectively zero today. BAE is trying to get much of the land it owns converted into housing.

In 2010, the Technology Strategy Board, a UK government quango, gave a £450,000 grant to Aquamarine Power and BAE to help develop wave power designs. BAE engineers helped design the "intelligent diagnostic system and remote ballasting mechanism" for the wave power machine.[13] This probably contributed towards Aquamarine's Oyster 800 near-shore test wave machine off the coast of Orkney. Aquamarine power gained planning permission for full wave farms to be built off the coasts of Lewis and Orkney. However, in November 2015 Aquamarine announced that it had ceased trading.[14]

Apparently, BAE has also worked on designing the electrical distribution system for the Whitelee wind farm,[15] as well as creating a system to prevent it interrupting radar systems at airports.

2.2 Faslane / Babcock

Faslane employs 6,800 people,[16] and is claimed by Babcock to be the largest single-site employer in Scotland. Of these, 4,550 are employed by the Ministry of Defence and are mainly Royal Navy personnel. The other 2,250

5 Scottish Affairs Committee, 20.1.2013 (bit.ly/1IdbAvz)

6 Scottish Affairs Committee, 20.1.2013 (bit.ly/1IdbAvz)

7 Naval-technology.com, 26.5.2014 (bit.ly/1lfwKUL)

8 BBC, 23.11.2015 (bbc.in/1I7YWTO)

9 Naval-technology.com, 26.5.2014 (bit.ly/1lfwKUL)

10 Naval-technology.com, 26.5.2014 (bit.ly/1lfwKUL)

11 BBC, 7.11.2013, (bbc.in/1SZoCCE)

12 ikei & industriaAll, Study on the Perspectives of the European Land Armament Sector, 14.12.2012 (bit.ly/1NbvU6b)

13 Aquamarine Power (bit.ly/1lGVaHg)

14 Aquamarine Power (bit.ly/1P5FFoH)

15 Aquamarine Power (bit.ly/1lGVaHg)

16 MoD, 28.9.2014 (bit.ly/1TbSwUM)

are contracted. In 2012, the government signed a 15-year contract with ABL Alliance (a consortium of AWE, Babcock and Lockheed Martin) to provide this work,[17] primarily maintaining the Trident submarines and missiles. 1,600 work for Babcock.[18] As well as the Trident submarines, Faslane is a base for nuclear-powered submarines and some patrol boats.[19] Philip Hammond claims a further 1,500 jobs will be 'created' at Faslane (but presumably lost from somewhere else) when other nuclear-powered submarines move there.

The annual running costs of Trident are between £2 billion and £2.4 billion a year.[20] Clearly, if a decision was taken to end the Trident nuclear programme, other public sector jobs could be created to replace those lost, with a fraction of the money saved from ending Trident.

An analysis of the HMNB Clyde jobs that specifically rely on Trident has been provided by the Scottish Trades Union Congress and Scottish CND.[21]

2.3 Castle Precision Engineering Services (South Glasgow)

Castle makes parts for aircraft, radars, 'counter measures', missiles, lasers and torpedoes.[22] Arms is one of six areas it works in, the others being Aerospace, Electronic, Petrochemical, Energy and Automotive. The company has 160 employees, and most recently has been making a loss. The "bulk" of its work is said to come from aerospace and arms. Jobs are in management, administration or skilled engineering. It may be reasonable to estimate that around 1/3 of jobs are dependent on arms, which would be under 60.

The energy work Castle has done has been on nuclear power plants,[23] though presumably there is some scope for them to become suppliers to renewable energy industries.

17 MoD, 27.12.2012 (bit.ly/1xj8fVJ)

18 1,400 directly for Babcock, 200 are seconded from the Royal Navy

19 MoD, HMNB Clyde website (bit.ly/1HjZJRB)

20 Full Fact, What is the cost of running Trident? (bit.ly/1Bu3dr4)

21 Scottish Trades Union Congress & Scottish CND, Trident & Jobs: the case for a Scottish Defence Diversification Agency, April 2015 (bit.ly/1NQXtOg)

22 Castle Precision Engineering, Defence (bit.ly/1PWUad4)

23 Castle Precision Engineering, Energy (bit.ly/1lH2zGs)

The Offshore Renewable Energy Catapult estimated in late 2014 that wave power needed investment of £200 million to move designs towards further commercialisation, and then further investment to fund the first wave farms. This is half the cost to the government of one Type 26 Frigate being built on the Clyde.

2.4 Clyde Space

Clyde Space makes parts for satellites, particularly solar panels and associated power equipment. It supplies military and civilian national space agencies, as well as commercial and educational projects.[24] There are currently 20 employees, 14 engineers and 3 'production technicians'.[25] Almost all the work is done for export.[26]

Presumably the number of people working on products for military use varies with orders. We have not been able to find any basis to estimate the proportion of work which is for arms, so will estimate one-quarter.

The company itself is focussed on providing power in space, so does not fit with being involved in solar projects on Earth. But there is clearly room for civilian space expansion. And presumably the kind of engineering skills required for power in space can be transferred to other forms of power work.

2.5 Digital Barriers

Digital Barriers makes surveillance technologies. The company is headquartered in London, but has its 'Advanced Technologies' division in Glasgow. This part of the company specialises in 'sensors and transmission'.[27] Three-quarters of their revenue comes from the UK, primarily through contracts with the Home Office and the Ministry of Defence. The largest export market is the US. They are trying to expand into South Korea, Japan, Singapore, Malaysia, Indonesia, Hong Kong, Australia, Qatar, the United Arab Emirates, Turkey and Nigeria.

Overall the company employs 150 people.[28] It is not clear how many in Glasgow. If each of the company's offices were equal in size, 20 people would be employed in Glasgow. If we assume half of the UK work and all the export work is arms, this would mean 10–15 people were employed in arms in the Glasgow office.

2.6 James Fisher Defence

James Fisher Defence designs, constructs and operates submarines, including rescue submarines, primarily for the military. It has supplied submarines to 22 Navies.[29] Whilst there is some civilian work, the vast majority is for the UK and other Navies.

James Fisher Defence has already started working on tidal energy, assembling the power train for Ocean Flow Energy's tidal power prototype, installed off the south coast of Kintyre in 2014.[30] The company says its workshops on the Clyde provide an "engineering and fabrication environment, capable of building and servicing the most complex of subsea equipment. An ideal resource for marine renewable energy developers". Managing Director Ben Sharples says "We have an extremely well-equipped engineering resource here on the Clyde that is ideally located for those engaged in marine renewable projects in UK, Irish and near-continental European waters."[31]

There is surprisingly little information available on the number of employees. There are probably somewhere between 50 and 200 employees, who will mostly be in Inchinnan on the Clyde.

24 Greenland, S. & C. Clark, Cubesat Platforms as an on-orbit technology validation and verification vehicle, 31 May – 4 June 2010 (bit.ly/1Oqi9Qe)

25 Clyde Space, Enabling technologies for downstream services, 2012 (bit.ly/1QFPnhB)

26 95% of orders are from outside the UK (Clyde Space, Overview) (clyde-space.com/about_us)

27 Talent Scotland, Digital Barriers (bit.ly/1NpLkpr)

28 FT.com, Digital Barriers PLC, accessed 24.11.2015 (on.ft.com/1NpLNYy)

29 James Fisher Defence (jfdefence.com/company/about/careers.php)

30 James Fisher Defence, 8.11.2012 (bit.ly/1XnZarC)

31 James Fisher Defence, 8.11.2012 (bit.ly/1XnZarC)

The annual running costs of Trident are between £2 billion and £2.4 billion a year. Clearly, if a decision was taken to end the Trident nuclear programme, other public sector jobs could be created to replace those lost, with a fraction of the money saved from ending Trident.

2.7 Link Cable Assemblies

Link Cable Assemblies "manufacture and import cable assemblies, control panels and associated electronic components".[32] Their military use includes communications, satellites and vehicles. Military is one of 10 markets for its products (though one of three specialist markets). One of the other 10 is renewable energy, where it supplies "control and instrumentation" and high voltage cables. It is based in Bellshill Industrial Estate, east of Glasgow.

Link employs 70 people.[33] If one-third of its business depended on military contracts, this would be around 20 people. There are clear opportunities for work to be shifted and expanded further into renewable energy cabling and electronics if there was more demand for this.

2.8 Missiles and Space Batteries

MSB is part of the ASB group and makes batteries for use in missiles and military aircraft. It is based in Coatbridge, east of Glasgow. It employs around 80 people.[34] There is little information available about the company. It may be that the kind of engineering needed in making the batteries could be transferred to researching the energy storage that would be needed for an electricity system heavily based on variable renewable power, but this is purely speculation.

2.9 QinetiQ

QinetiQ employs 30 people at Douglas Pier on Loch Goil, running a noise test facility for navy ships, submarines and torpedoes.[35] It also runs facilities at MoD Rosneath and MoD Barons Point. It appears that these change the electromagnetic signal of submarines and ship hulls coming in and out of Faslane, in order to try to avoid detection. There are no stated numbers for how many people work there, but they are probably small.

QinetiQ also has an office in one floor of an MoD building in Glasgow. This seems to be the office base for engineers working on the Douglas Pier, Rosneath and Barons Point facilities.[36]

32 Link Cable Assemblies (bit.ly/1lHctb9)

33 Link Cable Assemblies (bit.ly/1lHctb9)

34 Manta Media (bit.ly/1NpSfz1)

35 Scottish CND, Douglas Pier, Loch Goil (bit.ly/1SZL8Lu) & Secret Scotland wiki, Loch Goil Noise Range (bit.ly/1Xodh06)

36 Linkedin, QinetiQ job description (bit.ly/1QFXOto)

2.10 Sarkar Defence Solutions

Sarkar Defence Solutions has been making body armour and shields. However, it is currently in liquidation.[37] The company was employing 30 staff.[38]

37 Companies House (bit.ly/1N5Rbd7)

38 Guardian, 24.10.2014 (bit.ly/1tyENwN)

2.11 Teledyne Technologis

Teledyne's Head Office in Europe is in Cumbernauld. As of 2011, Teledyne employed 200 people in Scotland. Not all of these will be in the Clyde; the company has operations in Aberdeen as well.

Globally, Teledyne supplies arms markets as well as oil and gas exploration, ocean research, environmental monitoring, electronics, factory automation and medical imaging.[39]

39 Teledyne Technologies (teledyne.com/aboutus/aboutus.asp)

As well as head office administrative functions for operations elsewhere in Europe, some of which will be for arms, the Cumbernauld office works on:

- "commercial avionics systems" – the collection and monitoring of data from military and civilian aircraft
- relays and electronics – various electronics parts for military and civilian uses

Given their background, a large amount of Teledyne's work is currently likely to be for military uses. We have estimated 75 jobs in UK arms and 75 in arms for export.

2.12 Thales

Thales' factory in Glasgow manufactures optronics – night vision equipment – and is part of the Land and Joint Systems Division of Thales. Thales Optronics employs 570 people in Glasgow (in 2013, down from 630 in 2012).[40] The MoD is one of Thales Optronics' main customers and it exports to a large number of countries including the US, Australia, Canada, Norway and Sweden.[41] In 2007 exports accounted for 25% of Thales Optronics sales, though this is likely to have grown since.[42]

40 Herald Scotland, 16.8.2012 (bit.ly/1ShHWLg) & Herald Scotland, 4.10.2013 (bit.ly/1Oe4flW)

41 Herald Scotland, 16.8.2012 (bit.ly/1ShHWLg)

42 Thales UK, evidence to Scottish Affairs Committe, January 2008 (bit.ly/1P6k6nQ)

In 2008, 30% of the employees in Glasgow were "engineers and scientists".[43] Presumably the remaining 70% work in administration and assembly work and are not deemed qualified enough to count as engineers or scientists.

43 Thales UK, evidence to Scottish Affairs Committe, January 2008 (bit.ly/1P6k6nQ)

2.13 Wartsila

Wartsila employs 30 people in its workshop at Inchinnan, Renfrewshire, repairing ship propellers (the company Wartsila took over in 2007 just did repairs rather than construction, and there is no evidence of expansion since).[44] Presumably it conducts work on both civilian and military vessels, and any expansion in ships using the Clyde to work on wave and tidal power would lead to an increase in work for it.

44 Companies House, Wartsila UK (bit.ly/1P6lE1k)

3 RENEWABLE ENERGY POTENTIAL IN SCOTLAND AND THE CLYDE REGION

The Scottish government has a target of generating the equivalent of 100% of Scottish electricity consumption from renewables by 2020. Between 2008 and 2014, Scottish renewable energy generation increased from 22% of consumption to 50%. Under the 100% plan the target had been to reach 50% by 2015, so was achieved one year early.[45]

In 2013 it was estimated that there were 11,500 renewable energy jobs already in Scotland, with 2,100 in Glasgow.[46] The Scottish Renewable Energy Association is the industry body for renewable energy companies. A review of its membership shows that companies in the Clyde region primarily work in the development, maintenance and management of onshore wind farms and small scale renewables.

In 2011, the Scottish government claimed that by 2020 renewables could be supporting a further 40,000 directly-related jobs and many other indirect jobs.[47] The main skills requirements expected for these jobs were "engineers (especially civil, marine, engineering, structural and mechanical), leadership and management, project managers, welders, turbine technicians and divers." It was expected that the jobs would be filled by people moving from other sectors, and from unemployment into employment.

Estimate of increases in renewable sector jobs in Scotland made in 2011[48]

	Possible job increases 2011–2020
Offshore wind	Up to 28,000
Wave and tidal	5,300
Onshore wind	1,650+
Renewable heat	1,350
Hydro	Up to 1,400
Microgeneration	~ 2,000

45 Scottish Government, 26.3.2015 (bit.ly/1HLsMs5)

46 Scottish Renewables, 14.1.2014 (bit.ly/1TcHGOu)

47 The Scottish Government, 2020 Routemap for Renewable Energy in Scotland, 2011 (bit.ly/1lLT88L)

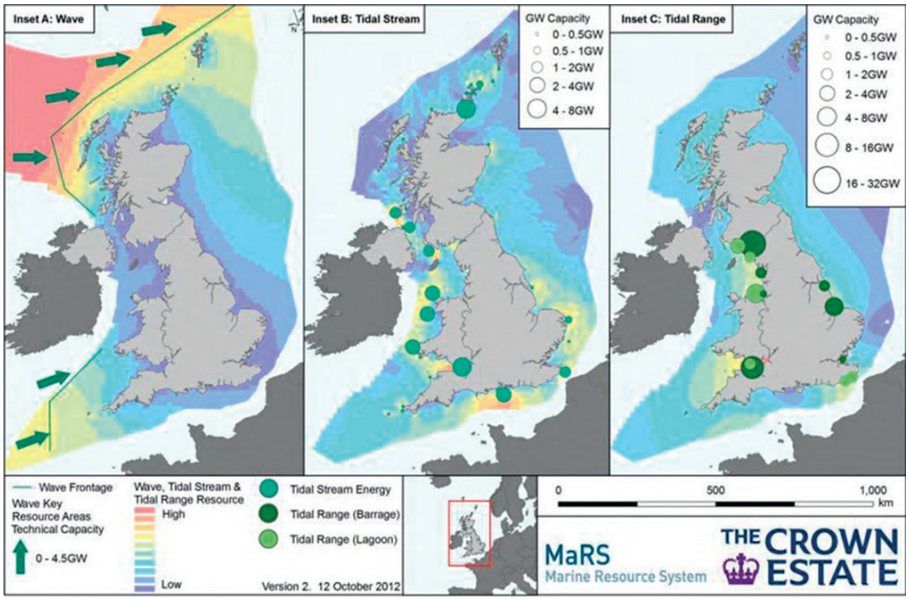
48 The Scottish Government, 2020 Routemap for Renewable Energy in Scotland, 2011, p.48 (bit.ly/1lLT88L)

3.1 Renewables on the West Coast of Scotland

Much of the offshore wind development currently taking place in Scotland is off the east coast, in the Firth of Forth and the Moray Firth.[49] The only offshore wind project planned for the West Coast was off the west coast of Islay, but in March 2014 SSE put any investment in the project "on hold for the foreseeable future" citing that it would not receive enough government subsidy.[50]

Whilst the west coast of Scotland has some of the highest wind speeds in Europe,[51] it is thought to be more difficult to build offshore wind farms there than off the east coast, because of the stronger waves. Therefore, current investment in offshore wind is focussed primarily off the east coast.

The west coast of Scotland has the best wave power potential, specifically beyond the western isles round to Orkney and Shetland. The other area in the UK with potential for wave power is off the west coast of Cornwall. There is potential for tidal stream off the coast of Islay and Kintyre, as well as the Pentland Firth between Orkney and the mainland, which has the largest potential for tidal stream energy anywhere in the world. Tidal range jobs are much less likely to be created in the Clyde, with the nearest potential site the Solway estuary (see maps from the Crown Estate[52] below).



Globally, it has been estimated that there could be 240GW of marine power by 2050, with about 75% coming from wave power. The Carbon Trust estimates that the UK could capture 22% of this market between 2010 and 2050, which would be worth a cumulative £76 billion.

49 Offshore Wind Scotland, interactive map (bit.ly/1LBbaPR)

50 forargyll.com, 2013 (bit.ly/1Oivg7S)

51 DB Climate Change Advisors, UK Offshore Wind: Opportunity, Costs & Financing, Nov 2011, p.16 (bit.ly/1qY6Wy0)

52 Crown Estate, UK Wave and Tidal Key Resource Areas Project, October 2012, p.9 (bit.ly/1BJ0bBG)

There are concerns that the wave and tidal sectors are "on the brink of floundering" in the UK after the collapse of Pelamis Wave Power and with Aquamarine Power having ceased trading.

Whilst Denmark and Germany already lead the world in manufacturing onshore and offshore wind turbines (despite the UK accounting for half of offshore wind installed capacity), there is clearly no leader yet in wave or tidal power because it has not been 'commercialised'.

Globally, it has been estimated that there could be 240GW of marine power capacity deployed by 2050, with about 75% coming from wave power.[53] The Carbon Trust estimates that the UK could capture 22% of this market between 2010 and 2050, which would be worth a cumulative £76 billion.[54]

Currently, the two main sites for testing wave and tidal technology in the UK are the European Marine Energy Centre in Orkney and Wave Hub off the north coast of Cornwall.

3.2 Wave

Wave power is currently viewed as high risk. One reason given for the lack of investment by private companies is that companies of the type that are willing to take on such risks – venture capital – do so based on the hope of high rewards relatively quickly. However, the returns from investment in wave power will be much further in the future.

The Offshore Renewable Energy Catapult estimated in late 2014 that wave power needed investment of £200 million to move designs towards further commercialisation, then further investment to fund the first wave farms.[55] Public investment is clearly needed, but it should be made in such a way that the public owns the rewards from investment as well as taking on the risks.

Each Type 26 Frigate was expected to cost £250 to £350 million.[56] However, recent reports suggest a cost twice that.[57] The initial investment needed in wave power now could be more than funded simply by reducing the number of frigates from 8 to 7, concentrating the investment in the Clyde region, and creating far more potential for jobs and exports than the building of another frigate. Furthermore, because interest on UK government debt is at record lows, if £200 million of investment in wave was funded through borrowing, it would actually cost the government less than £5 million a year.[58]

3.3 Tidal

Tidal power is more developed than wave power. MeyGen is currently building the first tidal stream farm (rather than simply a test site) in the Pentland Firth. Whilst it is small (just 6MW) they hope to eventually expand to 398MW.[59] MeyGen is based in Edinburgh, whilst the onshore construction of the equipment appears to be being done by ABB in Stafford.

53 Offshore Renewable Energy Catapult, Financing solutions for wave and tidal energy, 27.11.2014, p.4 (bit.ly/1zvgd1g)

54 Carbon Trust, Accelerating Marine Energy, The Potential for Cost Reduction, July 2011, p.58 (bit.ly/1qJ4tqt)

55 Offshore Renewable Energy Catapult, Financing solutions for wave and tidal energy, 27.11.2014 (bit.ly/1zvgd1g)

56 Naval-technology.com, Type 26 GCS Programme (bit.ly/1NefU3q)

57 Defense News, 25.9.2015 (bit.ly/1SmmQvc)

58 The government can currently borrow for 30 years at an annual interest rate of 2.28%

59 MeyGen, Autumn 2015 Project Update (bit.ly/1FxsmnG)

4 EMPLOYMENT AND SKILLS

The Clyde region has higher unemployment than both the average for Scotland and the UK. Between 3.5 and 4 per cent of the eligible population in Glasgow and West Dunbartonshire claim job seekers allowance, 60% more than the average for Scotland, and almost double the average for the UK. Rates are not quite as high for Inverclyde and Renfrewshire, but still well above the averages. Under the International Labour Organization measure, actual unemployment in Glasgow is around 9%, and probably averages around 8% for the Clyde region.

Unemployment in Scotland, June 2015[60]

Region	JSA claimants, %	ILO unemployment, %
Glasgow	3.5 - 4	9.4
West Dunbartonshire	3.5 – 4	9.4
Inverclyde	2.7 – 3.1	7.2
Renfrewshire	2.7 – 3.1	7.2
East Renfrewshire	0.5 – 0.9	1.3
Scotland	2.2	5.9
UK	1.8[61]	5.5

Three per cent of employers in the Clyde say that they have a "skills shortage vacancy", slightly less than the average for Scotland of 4%. In total, 'hard to fill' vacancies account for less than 1% of the work force in the Clyde.[62]

Over the past decade the Clyde has been losing jobs in skilled trades (down 9% between 2005 and 2013), administrative and secretarial (down 15%) and operatives (down 28%). The main areas in which jobs have been increasing are professionals (up 23%) and caring, leisure and other services (up 12%).[63]

The Clyde is home to a relatively high proportion of people in their 20s and early 30s compared to the Scottish population as a whole, and has proportionately fewer residents over the age of 60. Since 2008, a greater proportion of school leavers have been staying in education, potentially increasing the future skills base of the region. The current qualification levels in the Clyde are virtually the same as the average for Scotland. In Clyde area universities, engineering is the third most popular subject, with 8,000 students in 2012/13. Around 50% of graduates from Clyde area universities are working in the region six months after graduation, the vast majority in professional, associate professional or technical jobs.[64]

The current prospect is that the Clyde will continue to lose jobs in manufacturing, agriculture, mining, public administration, education and 'defence'. Health and social work, professional services and construction are expected to be growth areas.[65]

60 Skills Development Scotland, Monthly Unemployment Update, June 2015

61 Manchester City Council, Jobseekers Allowance claiment statistics (bit.ly/1Xiu8GY)

62 Skills Development Scotland, Regional Skills Assessment: Glasgow & Clyde Valley, Nov 2014, p.67 (bit.ly/1jlpk0I)

63 Skills Development Scotland, Regional Skills Assessment: Glasgow & Clyde Valley, Nov 2014, p.29 (bit.ly/1jlpk0I)

64 Skills Development Scotland, Regional Skills Assessment: Glasgow & Clyde Valley, Nov 2014 (bit.ly/1jlpk0I)

65 Skills Development Scotland, Regional Skills Assessment: Glasgow & Clyde Valley, Nov 2014, p.76 (bit.ly/1jlpk0I)

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