



This is an extract from the *full report* – for the complete document, please find it under the full document sections on the website.

Carbon Appraisal

Table 11- Carbon Appraisal for Each Element

Element		Shetland	Aberdeen	Greater Carbon Cost
Decommissioning		N/A	Decommissioning of O&G rig	Aberdeen
Foundation		Concrete pad foundations	N/A (Existing)	Shetland
Roads		Subbase, base course, surface course, asphalt road layer	N/A (Existing)	Shetland
Platforms		-	4 steel platforms	Aberdeen
Transmission	Cable	350km 2GW HVDC cable from Shetland Island to Peterhead	57km 2GW HVDC cable from Buzzard to Peterhead	Shetland
Connection	Helipad	With	With	-
	Dock	400m ² concrete harbour wall	Ship mooring infrastructure	Shetland
Renewable Infrastructure*	Wind turbine	100 5MW horizontal axis three bladed wind turbines	300 8.5MW horizontal axis three bladed wind turbines	Aberdeen
	Wind turbine foundation	Gravity base structure and jacket structure with pin piles	Gravity base structure and jacket structure with pin piles	-
	Inter-array cabling for wind turbine	20MW each string (connecting 4 turbines), total of 6 cables	34MW each string (connecting 4 turbines), total of 40 - 70 cables	Aberdeen
	Tidal turbine	With	Without	Shetland
	Substation	AC offshore substation platform (100m x 100m x 60m) with foundation	AC offshore substation platform (100m x 100m x 60m) with foundation	-
Energy storage		Hydrogen production plant with lesser storage	Hydrogen production plant with larger storage	Aberdeen
Infrastructure**		Prefabricated welfare building-one bathroom, staff room area, sink, office room, small medical room	Prefabricated welfare building-one bathroom, staff room area, sink, office room, small medical room	-
Flare Boom		With	With	-
Flood protection		With	With	-

*The carbon cost for the windfarms is greater for Aberdeen due to the assumed greater number of windfarms planned in this area. However, this will not be considered as a negative aspect in terms of carbon cost due to the returned benefit.

**The onshore infrastructure on mainland Scotland for connections to the National Grid and hydrogen conversion will be the same for both Aberdeen and Shetland, therefore this has been considered as a negligible factor in the carbon appraisal.

Table 12- Transportation Carbon Appraisal

Element/Materials	Shetland		Aberdeen		Greater Carbon Cost
	Distance		Distance		
	Car/Van/Lorry (km)	Boat (km)	Car/Van/Lorry (km)	Boat (km)	
Decommissioning	N/A	N/A	0	100km	Aberdeen
Foundations (Concrete)	42km	2.4km	N/A	N/A	Shetland
Road (Subbase, base course, surface course, asphalt road layer)	177km	230km	N/A	N/A	Shetland
Platforms	N/A	N/A	0	100km	Aberdeen
Cables	705km	230km	486km	100km	Shetland (longer cable)
Substation	0	400km	0	400km	-
Helipad Materials	177km	230km	N/A	N/A	Shetland
Dock Materials	42km	2.4km	N/A	N/A	Shetland
Wind Turbine Infrastructure	855km	230km	644km	100km	Aberdeen
Tidal Turbine Infrastructure	404km	230km	N/A	N/A	Shetland
Hydrogen Production Plant	550km	400km	550km	400km	-
Prefabricated Welfare Building	354km	230km	N/A	N/A	Shetland
Flood Protection Materials	42km	2.4km	N/A	N/A	Shetland

*Assumed 230km to and from Thurso to Shetland

**Assumed 100km to and from Aberdeen Harbour to Buzzard Platform

After speaking to industry professionals with carbon costing expertise, the chosen method to assess the carbon impact of both the Aberdeen and Shetland energy island proposal was to do a high-level overview of which would have the greater embodied carbon. The amount of components/volume of materials for each section was assessed, along with the estimated distance to transport these.

This method was advised as the aim of this project is to appraise both options, not to provide a detailed design of each. Therefore, there would be many assumptions needed to use an industry standard carbon calculating tool. This would not provide an accurate representation of the embodied carbon anticipated for each option. Additionally, the utilisation of emerging technology throughout both proposals would result in a difficulty in anticipating the resulting embodied carbon.

The distances used were collated from estimating the supply location for each component, and the closest port or harbour for the ships to leave from to transport to the island. Some components are transported from overseas or can be transported from Aberdeen/Shetland directly to the island, resulting the transport on land by lorry/car being 0km.

Based on the tables above, Aberdeen has five areas which have a higher carbon cost. Shetland also has five areas which score highest in terms of carbon cost, and Shetland will have the greater carbon cost for the transportation of materials and components. Overall, this suggests that Shetland has the greater carbon cost from the high-level appraisal carried out.