A new economic impact methodology for offshore wind

Dr Alun Roberts, Associate Director, BVG Associates

Steve Westbrook, Director of the Economic Intelligence Unit, University of the Highlands and Islands

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BVG Associates developed the local content methodology for UK offshore wind, working closely with industry and government. Together with the University of the Highlands and Islands, it has extended it to create a new tool for modelling the full range of economic impacts. The tool can be adapted for use in other industries and geographies.

Why demonstrate economic impacts?

There are many justifications for offshore wind projects, including:

- The moral (to meet climate change objectives)
- The practical (to increase security of supply)
- The financial (to reduce the cost of renewable energy), and
- The economic (to stimulate job creation).

In the political context, however, job creation can be the most visible effect.

Many industrial sectors publish employment impact figures. Often these are unrealistically high and lead to cynicism. If the offshore wind sector is to cultivate political support and play a responsible role in the wider energy debate, it needs to have a transparent and straightforward methodology that produces credible figures.

BVG Associates and the Economic Intelligence Unit at the University of the Highlands and Islands (UHI) have worked together to develop a method of modelling economic impacts for offshore wind that is more robust and more transparent to the industry lay-reader than existing economic analyses.

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A new model based on detailed industry knowledge

Conventional modelling of economic impacts for most industrial sectors relies on Government statistics. In the UK, for example, the Office of National Statistics (ONS) categorises certain industries using standard industry classification (SIC) codes to produce 'input-output' tables and other production and employment ratios.

Key findings

- The industry needs a robust but comprehensible way to demonstrate the economic benefits of renewable energy projects locally and nationally if it is to retain local and government support.
- Many "conventional" impact methodologies rely on information and data that are not suitable for new industries, such as offshore wind.
- By understanding the offshore wind supply chain in detail and applying economic and business rigour to that understanding, we have developed a benchmark standard in measuring local and national value added from offshore wind developments.
- It builds on BVG Associates's existing UK content methodology to derive measures for other economic indicators such as gross value added (GVA), full time equivalent (FTE) jobs and earnings.
- Our method can be applied to any level of geography – global, continental, country or region. It can be used to model the impacts of a single product or service, a set of projects, or the industry as a whole over a given period. It can also be applied to different industries, provided sufficient knowledge is available.
- The method uses a transparent set of assumptions that can be easily validated, building confidence in the data.

SIC code data can be appropriate for traditional industries at a national level. The development of new SIC codes for a maturing sector, however, takes time. This means that conventional economic analyses of offshore wind need to map existing SIC data onto offshore wind activities. Analyses using SIC codes also have to rely on generalised data. For example, generalised 'input-output' data tables show that the demand for steel in the UK has a substantial impact on UK economic activity in steel production. This is not the case in offshore wind, as the generalised data fails to reflect that the UK has little capacity to produce the type of steel used for offshore wind turbine towers and monopile foundations (see Box 1).

Offshore wind is ideally suited to a more robust approach that considers current and future capability of local supply chains because:

- Projects tend be large and have distinct procurement processes from one another, and
- Projects tend to use comparable technologies and share supply chains.

It therefore enables a realistic analysis of the local, regional and national content of projects even where there are gaps in the data.

What does local content mean?

The offshore wind industry is unique in having a formal UK content reporting framework.[1] BVGA developed the methodology adopted by industry and government through the Offshore Wind Industry Council, and a key part of this is a definition of local content, which is:

The aggregated local value generated at each tier of the supply chain.[2]

UK offshore wind farm owners have committed to submit details of the UK content of each wind farm once it has reached final investment decision (FID). In compiling their data, wind farm owners will have asked all their suppliers with contracts greater than £10 million to provide a UK content estimate.

Our definition of "content", which can relate to the local, regional or national supply chain, differs from the term "content" when used to identify where the companies that obtain the main contracts that together comprise the costs of a development are located. This original definition of "content" does not recognise that the principal contractors on a project will "import" some (or many) of their supplies and services.

BVGA's calculation method for UK content is the key building block in this new approach to economic impact modelling, and is already being used by the offshore wind industry, thereby minimising the additional analysis required.

"… it is better to seek to understand the supply chain than to model it using misleading generalised data"

[1] *Methodology for measuring the UK content of UK offshore wind farms*, BVG Associates for the Offshore Wind Programme Board, May 2015. Available online at www.renewableuk.com/general/custom.asp?page=UKcontent. Last accessed October 2016

[2] *Before assessing induced impacts.*

Box 1: Value added and job creation from UK-manufactured towers

The table below shows the activity breakdown for a tower manufacture and the SIC codes that most closely match each activity. With a conventional approach using data from the Office of National Statistics, the manufacture of towers in the UK for a 500MW wind farm (60 to 70 towers) would create 633 direct and indirect full time equivalent job years (FTE years).

Feedback from Scottish manufacturer CS Wind UK suggests that it would employ about 240 direct FTEs with to achieve a theoretical annual capacity of 100 offshore towers, and this closely matches our forecast calculated using our innovative new model, based on a UK content of about 40%. All models by definition are only representation of the real world but our method can be easily updated to include new industry data as it becomes available. It therefore becomes ever more accurate with time.

The difference between the methods is that the conventional approach uses SIC code multipliers that are based on data that shows that the UK produces much of the steel it uses domestically. The UK does not, however, currently produce steel plate of the thickness and size that is suitable for offshore wind turbine towers; most of it is produced in Austria and Germany. For our method, knowing the offshore wind supply chain enables us to calculate a more accurate estimate of the value added and job creation than the use of generalised SIC code data. Our approach enables the forecasting of direct employment, visible at UK suppliers active in offshore wind.

Activity	Standard industry classification (SIC) code and description
Steel plate	SIC codes 24.1-24.3: Manufacture of basic iron and steel
Flanges	SIC code 25OTHER: Manufacture of fabricated metal products
Coatings	SIC code 20.3: Manufacture of paints, varnishes and similar coatings, printing ink and mastics
Internals	SIC code 25OTHER: Manufacture of fabricated metal products
Equipment (asset depreciation)	SIC code 28: Manufacture of machinery and equipment
Transport	SIC codes 49.3-49.5: Land transport services and transport services via pipelines, excluding rail transport
Labour and overheads	SIC codes 24.1-24.3: Manufacture of fabricated metal products

GVA and other measures of value added

Gross value-added (GVA) is one of the most widely used measures of economic impact. The UK Office of National Statistics defines GVA as:

"income generated by resident individuals or corporations in the production of goods and services."[3]

In economic impact terminology, total GVA comprises direct, indirect and induced impacts for a sector such as offshore wind, where:

- Direct relates to work undertaken by a contractor's own staff in the impact area
- Indirect relates to employment generated by the purchase of supplies and services by the contractor in the impact area
- Induced is generated by the spending in the impact area by direct and indirect employees from their additional income (and from locally retained profits). Induced impacts can also be generated where contractors not based in an area and their staff spend their own money in the area where on-site for a period (for example, on overnight accommodation).

GVA is a national concept; although annual GVA figures for the UK are also disaggregated by Governments by region as a proxy for where this national annual total originates.

From local content to GVA

In quantifying "local content", using our definition, we capture (without excessive collation and analysis of small transactions), impacts that accrue in an area from employment (gross earnings plus employers' pension contributions), self-employed profit, and use of buildings, plant and equipment. These generate local value added when the investment was undertaken, and profit as a return on risk and investment that stays in the area.

Local content, as we have defined it, is therefore equivalent to combined direct and indirect GVA.

Figure 1 shows the principle at work. A tier 1 contract worth £100 million can be divided into profit (including a return on previous relevant capital investment), labour and supply chain costs. Each of these may accrue within an impact area or elsewhere. At this tier, local profit and earnings from employment (in this example £30 million – the combined tier 1 blue bars) can be "banked" as local GVA. We then turn our attention to the £20 million that has been spent on local supply chain at tier 2 level. Again, we bank the local profit and earnings before looking further at tier 3 local spend; and so on. In theory, the process can continue until the final tier of the supply chain is reached, but in practice, before this is reached the sums become insignificant, as Figure 1 shows.

In this example, of the £100 million, £40 million (or 40%; the blue bars for tiers 1 to 5) is local direct and indirect GVA; that is local content as we have defined it.

In the example, none of the non-local supply chain has its own local supply chain – although this is possible.

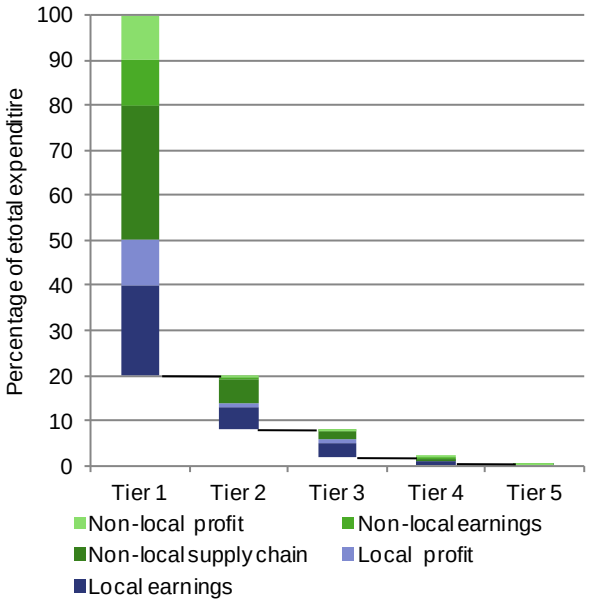

Figure 1 Local content methodology. The blue bars (local profit and local earnings) show the local content from direct and indirect GVA.

This example relates to a capital development project (which could span several years, including the R&D and planning phases before the component manufacturing and construction phases). The same methodology can also be applied to operations and maintenance, which will generate annual impacts for 20 or more years.

Induced impacts

Induced impacts are less tangible than the direct and indirect benefits and as a result some prefer to omit them from their analysis.

Our UK content methodology captures direct and indirect GVA. To calculate induced GVA, we need induced multipliers. Here, appropriate generalised national, regional or local ratios are used – taking into account the relatively high earnings associated with the direct and indirect employment. This is a valid approach because individuals' expenditure patterns are unlikely to differ between sectors.

[3] www.ons.gov.uk/economy/grossvalueaddedgva/qmis/regionalgrossvalueaddedincomeapproachqmi

From GVA to jobs

GVA is the aggregate of labour costs and operational profits (with depreciation added back). We can therefore model full time equivalent (FTE) employment from GVA, provided we understand some key variables. In our economic impact methodology, employment impacts are calculated using the following equation:

$$FTE_a = \frac{(GVA - M)}{Y_a + W_a}$$

Where:

FTE_a = Annual FTE employment

GVA = Gross value added (£ or other currency)

M = Total operating margin (£ or other currency)

Y_a = Average annual wage (£ or other currency), and

W_a = Non-wage average annual cost of employment (£ or other currency).

To make robust assessments, therefore, we consider each major component in the offshore wind supply chain and estimate typical salary levels, costs of employment and profit margins, bringing together BVGA's specific sector knowledge and data that has been collected by the UHI's Economic Intelligence Unit. This data can be adjusted to reflect current or likely future trends.

Earnings

Offshore wind salaries are typically higher than the average salaries found in generic tables, and the number of FTEs alone does not fully demonstrate the value of offshore wind to the economy.

It is useful for a well paying sector such as offshore wind to demonstrate earnings impacts per FTE as well as employment and GVA. This is particularly important for those local economies where earnings are currently not increasing faster than inflation.

Gross earnings can also be calculated as:

$$E_a = Y_a \times FTE_a$$

Where E_a = gross annual earnings.

As a refinement, it is possible to split earnings from employment into that received by people working in an area they live in, and that received by people who are temporarily in the area to carry out the work.

Conclusion

This paper has been focused on the impacts from investments in offshore wind and the method applied first to UK regions. There is no obstacle, however, to its application in other sectors and other territories.

The great advantage of the approach presented here is that it takes the mystique out of economic analyses and creates a method that can be led by industry experts with input from economists. Until now, economic analyses have been impenetrable to the layman and excessively difficult to compare. Here, the inputs and outputs are comprehensible to the industry in question, meaning that any surprising outputs can be easily explored. Our economic impact methodology identifies visible, tangible jobs that can be associated with specific facilities, which is important in helping politicians understand the impacts of investments.

Overall, the result will be greater confidence in the data that is published and better evidence-based policy.

Contact

For more information, relevant case studies and customer references please contact:

Alun Roberts aer**@bvgassociates.com**
Tel: +44 1793 799063 **www.bvgassociates.com**
The Blackthorn Centre, Purton Road, Swindon, SN6 6HY
The Boathouse, Silversands, Aberdour, Fife KY3 0TZ, UK

Steve Westbrook **steve.westbrook@uhi.ac.uk**
Tel: +44 1667 455308
Economic Intelligence Unit, University of the Highlands and Islands, Inverness IV3 5SQ