

# Strategies for net zero: tensions between environmental and economic goals for smaller regions

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## › **Climate Change Act (2022)**

- Committed Northern Ireland to least 80% of electricity consumption is from renewable sources by 2030. By end of 2022 this number stood at 51% - mostly driven by onshore wind
- System must be diversified if the 80% goal is to be realised

## › **Pathway to net zero (2021)**

- Path to net zero should not only bring environmental benefits but also economic benefits.
- Growing the Low Carbon and Renewable Energy Economy (LCREE) a key object with the goal of growing the sectors turnover to £2billion by 2030

## › **Offshore Renewable Energy Action Plan (2023)**

- Sets roadmap for 1GW of offshore wind capacity to be realised by 2030



# Offshore wind and economic growth

- Offshore wind farms are large investments projects which require 100s million/ billions pounds of investment. Will play a significant part in environmental goals but economic goals less certain.
- Many of the components, particularly offshore, are specialised.
  - Does an economy the size of Northern Ireland have this expertise?
  - Is it worth investing in upskill ?
  - What about prices?
- The idea of local content – the goods and services bought within the local area – is important. The larger the local content the greater the expected economic benefit.
  - UK has a 60% local content target for offshore wind
  - What is reasonable for Northern Ireland ?



# Objective

- Analyse the potential offshore wind supply chain in Northern Ireland and model economic benefits related to the investment in these industries with the construction of 1W of wind.
- *Part 1- Current economic structure*
  - Simple employment analysis
  - Location quotient analysis
  - Backward linkage analysis
- *Part 2 – Future impacts*
  - CGE modelling of investment in key industries



# Simple employment analysis

**Industries linked to the offshore wind activities where NI has higher concentration of employment than GB countries.**

- **Manufacture of metal structures and parts of structures**
- **Engineering activities and related technical consultancy**
- **Freight transport by road; Construction of other civil engineering projects; NEC**
- **Other research and experimental development on natural sciences and engineering**
- **Wholesale of mining, construction and civil engineering machinery**

**Industries linked to the offshore wind activities where NI has significantly lower concentration of employment than GB countries.**

- **Manufacture of other electronic and electric wires and cables**
- **Repair of machinery**
- **Repair of electrical equipment**
- **Manufacture of bearings, gears, gearing and driving elements**
- **Sea and coastal freight water transport**
- **Specialised design activities**
- **Other construction installation**
- **Technical testing and analysis**
- **Other specialised construction activities Not elsewhere classified**
- **Other professional, scientific and technical activities Not elsewhere classified**



# Location quotient analysis

- Location quotients are one of the most common methods found in the literature to describe the industrial specialisation of a region. Can be estimated using BRES data

$$SLQ_i^R = \frac{\text{FTE employment of industry } i \text{ in region } R / \text{FTE employment in region } R}{\text{FTE employment of industry } i \text{ in national economy} / \text{FTE employment output in economy}}$$

- In this case R is Northern Ireland (or one of the three countries in GB).
- If  $SLQ > 1$  then region Northern Ireland is **more** specialised in industry I than the UK
- If  $SLQ < 1$  then region Northern Ireland is **less** specialised in industry I than the UK



# Location quotient analysis

Industries in NI linked to offshore wind activities with high specification (SLQ >1)	NI SLQ	Industries in NI linked to offshore wind activities with little specification (SLQ <1)	NI SLQ
Manufacture of structural metal products	25.0	Manufacture of wiring and wiring devices	0.0
Manufacture of other special-purpose machinery	22.3	Technical testing and analysis	0.1
Construction of other civil engineering projects	15.5	Sea and coastal freight water transport	0.6
Manufacture of other general-purpose machinery	8.7	Architectural and engineering activities and related technical consultancy	0.7
Treatment and coating of metals; machining	8.1	Specialised design activities	0.9
Manufacture of other electrical equipment	6.6		
Freight transport by road and removal services	6.2		
Other professional, scientific and technical activities Not elsewhere classified	6.1		
Development of building projects	4.7		
Wholesale of other machinery, equipment and supplies	4.2		
Manufacture of other fabricated metal products	3.1		
Electric power generation, transmission and distribution	2.8		
Other specialised construction activities Not elsewhere classified	1.7		



# Backward linkage analysis

- Backward linkages are the ‘supply-chain’ linkages of an industry. Industries with larger backward linkages are more interconnected to the local economy. Thus investment will have larger ‘knock-on’ effects.
- Calculate the backward linkages of the Northern Ireland 63 industry Input Output tables.

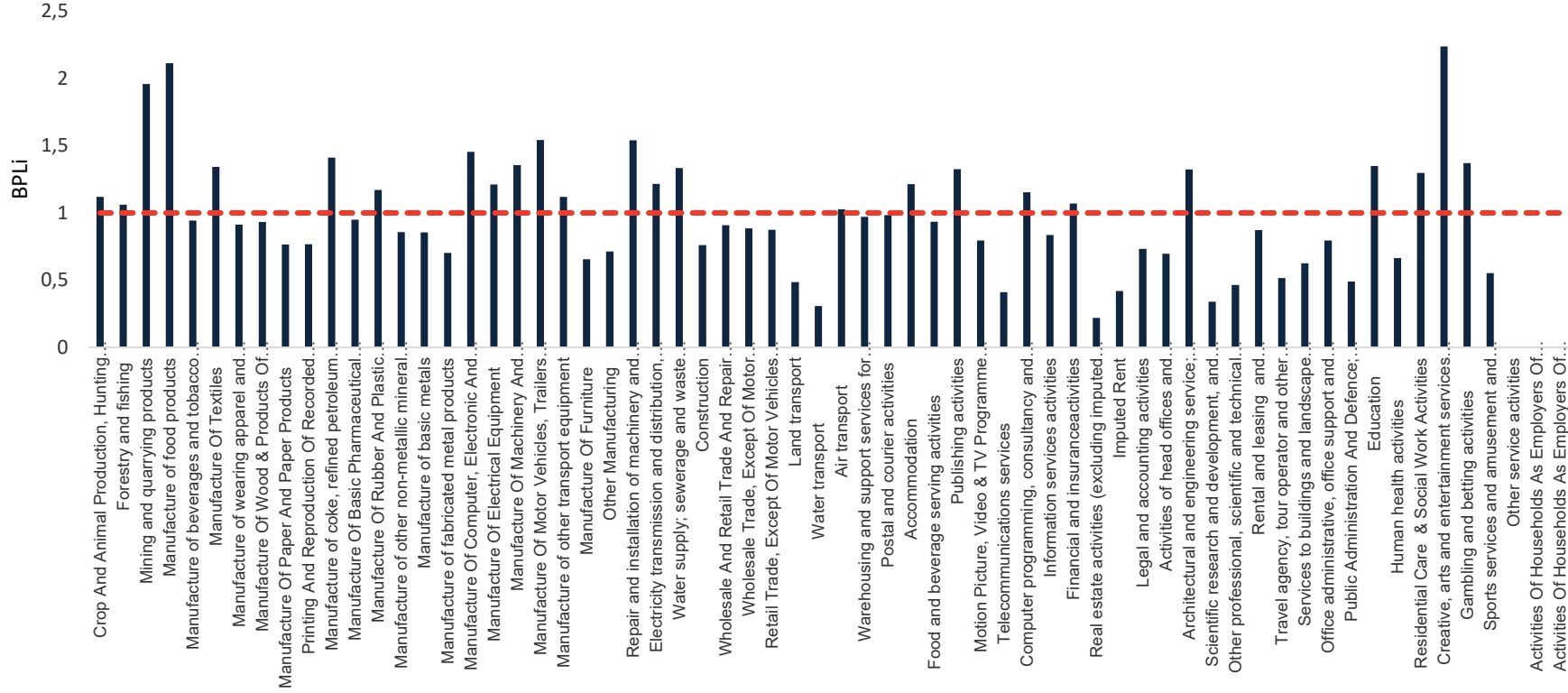
- $$BPLi_j = \left[ \frac{\frac{1}{n} \sum_{i=1}^n L_{ij}}{\frac{1}{n^2} \sum_{i,j=1}^n L_{ij}} \right]$$

- n is the number of industries (63), and  $L_{i,j}$  are the values found within the Leontief inverse matrix, calculated from the Northern Ireland IOT.
- $BPLi_j > 1$  **higher** than average linkages;  $BPLi_j < 1$  means **lower** than average linkages;





# Backward linkage analysis





# Key offshore wind industries

- Analysis revealed four key area for the Northern Ireland offshore wind supply chain
- **Foundations:** Industries linked to metal structures have high SLQ. NI industries already operating in Global offshore wind supply chain
- **Electrical manufacturing:** Linked industries have high SLQ and backward linkages. Although limited due to the specialisation of offshore wind. Onshore electricals only
- **Construction:** Construction of onshore components which are not too specialised.
- **Ports:** Pivotal in the O&M of offshore wind farms. Belfast and satellite ports expected to be base for NI farms



# Modelling - AMOSNI

- A multi-sectoral, multi-period modelling framework to investigate the impacts of ‘shocks’ to a baseline economy – including changes in policy;
- Range of labour market closures
- Investment and consumption typically reflect intertemporal optimisation;
- Demands (and supplies) – including trade flows – responsive to relative prices;
- Period-by-period dynamics and/or short/long-run equilibria can give dynamics of adjustments;
- Particular strength in modelling impacts from “micro” to “macro”.



# Results – foundations – 1GW to 2030

	Low content-80%	Medium Content-90%	High content-100%
<i>Gross Value Added (£m)</i>	168.8	189.9	211.1
<i>Employment (FTE)</i>	3,435	3,864	4,293
<i>Direct (FTE)</i>	1,744	1,962	2,179
<i>In-Direct (FTE)</i>	1,691	1,902	2,114
<i>Investment (£m)</i>	224	252	280



# Results – Electrical and construction

## *Electrical Manufacturing*

	Low Content – 80% cable protection; 40% onshore substation	Medium Content – 90% cable protection; 50% onshore substation	High Content – 100% cable protection; 60% onshore substation
GVA (£m)	9.13	11.24	13.35
Employment (FTE)	127	157	186
Investment (£m)	10.40	12.80	15.20

## *Construction*

	Low Content -80% onshore components	Medium Content-90% onshore components	High Content -100% onshore components
GVA (£m)	21.78	24.51	27.23
Employment (FTE)	446	501	557
Investment (£m)	24.00	27.00	30.00

# Results – Ports

	Low Content - 40% O&M; 80% logistics	Medium Content - 50% O&M; 90% logistics	High Content -60% O&M; 100% logistics
GVA (Yearly average) (£m)	28.73	35.69	42.64
Employment (Yearly average)(FTE)	832	1,034	1,235
Investment (yearly average) (£m)	31.16	38.71	46.25
GVA (Cumulative)(£m)	718.23	892.14	1,066.05
Employment (Cumulative) (FTE years)	20,803	25,841	30,878



# Findings

- Analysis of the current structure of the economy determined four key areas for the development of offshore wind in Northern Ireland: Fabrication of foundations; Electrical manufacturing; Construction & Ports.
- Fabrication of foundations has the largest impact related to the construction of wind farms.
- Foundations is also a key area where expertise in Northern Ireland could be exported to offshore windfarms worldwide, bringing extra economic benefits over an extended period of time.
- Investment in ports linked to the O&M of the offshore wind farms has a large economic impact lasting over extended period of time.
- Does offshore wind produce the necessary economic benefits ?

QUESTIONS?





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