Valuing ESB's economic contribution to Ireland

Prepared for ESB

09 February 2024

ESB has a key role in Ireland's strategic energy cluster and contributes significantly to Ireland's overall economy

We have undertaken both a quantitative and qualitative assessment of ESB's economic contribution to Ireland, with our key findings highlighted below.

Quantitative findings

Total historic investment (2006-2022)

ESB is one of the largest investors in the state, with gross investment of approximately €14 billion across its energy and telecommunications businesses from 2006 to 2022.

Contribution to employment

Approximately 10,400 jobs were directly or indirectly supported by ESB in 2022, the equivalent of 0.5% of total Irish employment.

Gross Value Added* ("GVA")

In 2022, ESB's economic activities generated approximately €3.7 billion in value for the Irish economy, accounting for both direct and indirect GVA impacts.

Contribution to the Irish Exchequer

ESB generated approximately €1.0 billion in direct and indirect Exchequer contributions in 2022.

Qualitative findings

In addition to the benefits quantified above, as Ireland looks to capitalise on its natural resources, ESB can help drive a high-growth, high-value energy sector that can meet our domestic needs and support decarbonisation across Europe

In line with economic theory, a strategic cluster of firms in the energy sector can enhance sector development and maximise the potential economic benefits for Ireland

ESB has a critical role to play as an anchor firm in developing this strategic cluster given its ongoing contributions to:

- supply chain development;
- knowledge transfer within the sector; and
- skills development of the workforce.

* GVA is a commonly applied indicator of wealth creation which measures the value to the economy (or wealth generated) created by a company's activities.

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At a time of significant change in the energy sector, ESB has commissioned Frontier to assess its historical and ongoing contribution to the Irish economy

Throughout its history, ESB has undertaken significant capital investments in assets used for the generation, transmission, distribution and supply of electricity, as well as to carry fibre for telecommunications.

A range of factors – including geopolitical events and increasing demand – have put increasing pressure on the security, affordability and sustainability of the energy sector, while also creating opportunities for the sector to contribute meaningfully to decarbonisation.

At this time of significant change in the energy sector, ESB is therefore interested in assessing its historical and ongoing contribution to the Irish economy.

Frontier Economics has been commissioned to undertake this assessment, with our approach to doing so outlined on the following slide.

There are five elements to our approach for ESB's economic contribution to Ireland[1]

1. Scale of investment

First, we summarise ESB's historic investment in Ireland.

2. GVA contribution
3. Employment contribution
4. Exchequer contribution
   - Profit taxes
   - Payroll taxes
   - Other taxes
   - Dividends

We then consider ESB's contribution to:

- GVA: the added value generated in an economy by the production of goods and services, including product subsidies but prior to adding product taxes;
- employment: the number of jobs created or supported per annum; and
- the Exchequer: or the taxes paid as a result of ESB's activities.

For each of the three areas, we consider both the:

- Direct contribution, or the output, employment and taxes directly contributed to the Irish economy by ESB business units; and the
- Indirect contribution, or the additional economic impacts flowing from ESB's supply chain. In other words, as ESB increases its direct output, employment and tax contribution, there is also an increase in its suppliers' output, employment and tax contributions and so on down the supply chain.

Our quantitative assessment focuses solely on ESB's historic contribution, given the commercially sensitive nature of forecast data.

5. Wider contribution to the economy

- Recognising that ESB may bring benefits to the economy that are not easily quantified or included in above categories, the final stage of our assessment is a qualitative consideration of the wider value that ESB brings to the Irish economy.

1 We note that, throughout this report, all references to 'Ireland' refer to the Republic of Ireland, rather than to the island of Ireland.

The remainder of this report is structured as follows:

Section 2

- Provides an overview of the key results of our quantitative assessment, including ESB's:
  - capital investment;
  - GVA contribution;
  - employment contribution; and
  - Exchequer contribution.

Section 3

- Outlines ESB's wider contribution to the Irish economy, focusing on its ability to act as an anchor firm as the Irish energy sector continues to develop as a strategic cluster with significant future export potential.

Annexes

- Annex A: provides additional detail on our approach to calculating the indirect GVA, employment and Exchequer contribution impacts;
- Annex B: provides additional detail of our quantitative assessment results; and
- Annex C: provides additional detail on relevant economic theory.

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Since 2006[1], ESB has invested a total of €14 billion across its assets in the Irish electricity and telecommunications sectors

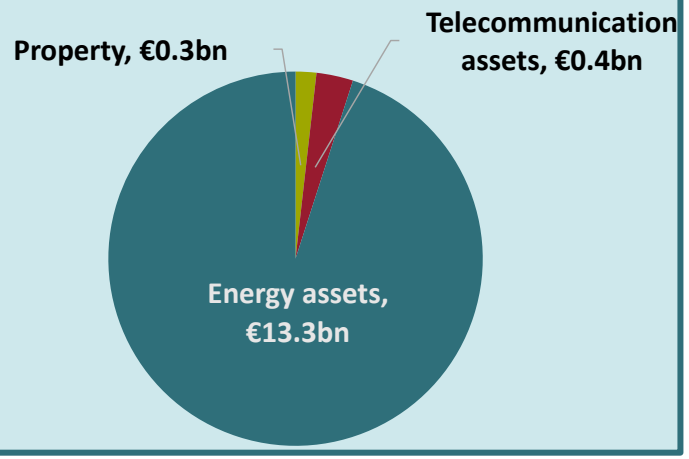
ESB is active in all stages of the Irish electricity supply chain, including generation, transmission, distribution, retail supply and the development public charging infrastructure.

ESB also acts as a wholesale telecommunications provider with a portfolio of over 400 telecommunications towers and sites in Ireland. These assets are used to provide transmission services for mobile and wireless operators, private companies and emergency services.

Investment area	Gross capex investment in €m (2006-2022)[2]
Networks[3]	10,718
Wind generation	998
Thermal generation	980
Hydro generation	214
Batteries and Synchronous Compensator	142
Solar generation	30
Miscellaneous[4]	134
SES and ecars	40
Telecoms	444
Property	250
Total	**13,982**

These figures include both direct investments in ESB units as well as ESB's proportion of joint venture (JV) investments in the respective investment areas.[5]

- In total, between 2006-2022, ESB invested approximately €14bn in electricity and telecommunications assets.
- This investment was primarily focused on energy sector assets.



1 We begin our assessment of investment in 2006, as this is the earliest year for which ESB could readily provide data in a comparable format.
2 Total investment values are shown in 2022 prices and relate to ESB's gross investment, or the value of investment prior to accounting for depreciation.
3 We note that the stated network investment for the years 2009 to 2017 is net of customer contributions for network connections, while it is gross of these contributions in all other years. This is consistent with the relevant international financial reporting standards in existence in each year. We note that this change in accounting treatment likely results in an understatement of ESB's network investment, relative to current accounting treatment.
4 Miscellaneous investment includes ESB's investment in IT and Trading Systems.
5 For JV investment, we present: i) ESB's share of the capex, where assets are operational; or ii) the value of ESB's equity investment or shareholder loan for pre-operational assets.

ESB's most significant capital investments relate to the generation, transmission and distribution of electricity

Investment area	Gross capex investment in €m (2006-2022)[1]
Networks[2]	10,718
Wind generation	998
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Property	250
Total	**13,982**

1 Total investment values are shown in 2022 prices and relate to ESB's gross investment, or the value of investment prior to accounting for depreciation. The reported investment figures include direct investments in ESB business units as well ESB's investments in joint ventures (JVs).
2 We note that the stated network investment for the years 2009 to 2017 is net of customer contributions for network connections, while it is gross of these contributions in all other years. This is consistent with the relevant international financial reporting standards in existence in each year.
3 Miscellaneous investment includes ESB's investment in IT and Trading Systems.

Key electricity sector investments:

- Energy generating assets have accounted for approximately 17% of ESB's investment in electricity assets from 2006 to 2022, with recent and future investment increasingly focused on renewable generating assets.
- ESB also invests significantly in the transmission and distribution networks in Ireland. Over the period from 2006 to 2022, ESB invested a total of €10.7 bn in the transmission and the distribution networks, accounting for approximately 81% of its investment in electricity assets.
- This network investment resulted in total net capital formation of €4.5bn. [4]
- Significant network investment is expected to continue in the future to support electrification and decarbonisation.

Key telecommunications sector investments:

- ESB's most significant investment in the telecommunications sector is the SIRO joint venture between ESB and Vodafone. This joint venture is aimed at building Ireland's first 100% fibre wholesale network with speeds up to 2 GB.[5]

4 Net capital formation refers to the value of the capital investment over the period after accounting for regulatory depreciation. It is calculated as the change in the regulatory asset base over the period.
5 SIRO website, 'Frequently Asked Questions', accessed November 2023.

ESB's total GVA contribution reached €3.7 billion in 2022 alone, representing a 20% increase in the last 5 years

- To **measure the economic contribution of ESB** to the Irish economy, we use **Gross Value Added** ("GVA"). GVA is a commonly applied indicator of wealth creation which measures the value to the economy (or wealth generated) created by a company's activities.[1]
- ESB's total GVA is composed of:
  - **direct GVA**[2], which measures the gross value generated directly from ESB's activities in Ireland, or the value of goods/services sold less the value of the inputs used in production; and
  - **indirect GVA**, which measures total GVA created in ESB's supply chain, which can be attributed to ESB's activities in Ireland.

Economic output of ESB

	2018	2019	2020	2021	2022
Direct GVA[3] (€m)	2,292	2,343	2,500	2,592	2,743
Indirect GVA[3] (€m)	783	801	855	886	938
Total GVA[3] (€m)	**3,075**	**3,144**	**3,355**	**3,477**	**3,681**

- As shown above, ESB generated approximately €2.7bn in direct GVA in 2022, accounting for approximately 0.6% of total Irish GVA and 34% of total GVA generated in the Irish energy and telecommunication sectors in 2022.
- ESB's direct contribution to Irish GVA has been relatively consistent over the years, equating to 0.6-0.8% of total Irish GVA in all years from 2018 – 2022.
- When considering ESB's combined direct and indirect GVA, we find that this accounts for approximately 0.8% of total Irish GVA in 2022.
- Over the same period, ESB's total estimated contribution to the Irish economy has increased by approximately 20%.

1 Another commonly used metric of the value of goods and services produced by an economy is the gross domestic product (GDP). GDP is primarily made up of GVA plus product taxes and less product subsidies, and is calculated at an economywide level, as tax and subsidy data is not available on a sector specific basis. For this reason, GVA is used when considering the value added to the economy at a more granular level.
2 Direct GVA, calculated as the sum of gross profits and payroll costs, is calculated in line with the CSO's definition, see here.
3 Note that the above GVA values are presented in nominal terms (i.e., not adjusted for inflation).

ESB's total employment contribution was estimated to be 10,417 FTEs in 2022, equivalent to 0.5% of total Irish employment in that year

ESB's total contribution to employment in Ireland is composed of:

- **direct employment**, which refers to the workforce directly employed by ESB's business units, as outlined in the table to the right; and
- **indirect employment**, which captures individuals employed in ESB's supply chain to produce the goods and services used as inputs into ESB's activities in Ireland.

ESB's contribution to Irish employment

	2018	2019	2020	2021	2022
Direct employment (FTE)	6,482	6,582	6,501	6,321	6,378
Indirect employment (FTE)	3,694	3,900	3,835	3,507	4,039
Total (FTE)	**10,176**	**10,482**	**10,335**	**9,828**	**10,417**

- In 2022, ESB's total employment contribution, accounting for both direct and indirect employment resulting from ESB's activities, contributed the equivalent of 0.5% of Irish employment.
- Over the past five years, ESB's total estimated employment contribution has increased by approximately 2%.

1 For more detail regarding ESB's direct employment contribution, please refer to Annex B

In 2022, ESB contributed €1 billion to the Irish Exchequer, through direct and indirect profit taxes, payroll taxes, other taxes and dividends

		Profit taxes	Payroll taxes	Other taxes	Dividends
ESB contributes to the Exchequer through its own taxes and dividends, as well as indirectly through taxes paid by the companies in its supply chain	Its **direct contribution**[1] includes:	Taxes paid on ESB's profits	Payroll taxes of employees directly employed by ESB (both employee and employer contribution)	Other taxes directly related to ESB's production (i.e., VAT, excise duties, motor taxes, and commercial rates)	Annual payments based on profits. As ESB is a state-owned company, this is a direct contribution to the Irish government
	Its **indirect contribution** includes:	Profit taxes paid by companies in ESB's supply chain	Payroll taxes of employees of the companies in ESB's supply chain (both employee and employer contribution)		

ESB's Exchequer contribution

	2018	2019	2020	2021	2022
Direct contribution[1] (€m)	576	605	650	763	853
Indirect contribution[1] (€m)	138	140	154	208	177
Total contribution[1] (€m)	**713**	**746**	**805**	**971**	**1,030**

- In 2022, ESB's total estimated contribution to the Irish Exchequer was over €1bn. This represents a 44% increase in the total (direct and indirect) Exchequer contribution over the past five years.

1 Note that the above values are presented in nominal terms (i.e., not adjusted for inflation).

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We consider that ESB is well placed to act as an anchor firm as the Irish energy sector transitions into a high-growth, export-oriented sector…

… supporting the Irish Government's ambitions in this area

Given Ireland's significant renewables potential, the energy sector constitutes an important economic opportunity...

- The Irish government has identified energy as a potential high-growth sector, including the export of renewable energy (e.g., wind and green hydrogen).[1]
- For example, Minister for the Environment Eamon Ryan stated Ireland will "transition to become a net energy exporter, making Ireland central to wider European energy plans."[2]

- Exporting excess wind generation will be facilitated by a multibillion-euro expansion of interconnectors with the UK and mainland Europe[2] to create the "necessary export opportunities to match the State's growing renewable energy generation capacity."[3]
- Further, Ireland's National Hydrogen Strategy outlines an ambition to generate and export green hydrogen using excess renewables. This is expected to bring economic benefits in the form of export revenues and high-skilled job creation.[4]

- Developing a strategic energy cluster – or a group of innovative and productive firms in the energy sector – will contribute to sector development and maximising the potential economic benefits.

- The development of an energy cluster can benefit from an anchor frontier firm which, due to its size and productivity, creates a favourable environment for developing others through its:
  - R&D;
  - skills development and
  - supply chain.

- Developing such a cluster also requires Ireland to attract new capital investment, attract new players into the market and grow indigenous businesses.
- This will be facilitated through the existence of:
  - strong supply chains;
  - knowledge spillovers; and
  - a skilled labour force.

1 Department of Enterprise, Trade and Employment and Grant Thornton, January 2023, "Development of an Evidence Base to Support the Development of a National Clustering Policy and Framework".
2 The Irish Times, August 2023, "Government must fund State agencies to help meet green energy planning, says industry group".
3 Government of Ireland, July 2023, "National Policy Statement: Electricity Interconnection".
4 Government of Ireland, July 2023, "National Hydrogen Strategy".

… with ESB, as an anchor firm in the developing strategic cluster, playing a key role in the sector's ongoing development

As a company of significant scale with a long track record of investment, ESB is contributing to the development and strengthening of a strategic cluster in the energy sector through:

1

Supply chain development

ESB's outsourcing model facilitates the development of robust supply chains which are then available support the wider cluster of firms.

2

Knowledge transfer through R&D and innovation

ESB's R&D and innovation partnerships support knowledge transfer, or spillovers, between ESB employees, its partners and the wider energy cluster.

3

Knowledge transfer through joint ventures

ESB's joint ventures facilitate knowledge transfer and reduce barriers to entry for new players into the Irish energy sector, supporting the expansion and resilience of the energy sector strategic cluster.

4

Human capital investment

ESB's ongoing investment in the skills and expertise of the current and future Irish workforce has spillover benefits for other firms in the strategic cluster.

We discuss these wider benefits, which encompass the variety of additional value that ESB creates for Ireland's economy, on the following slides[1], noting that there are clear overlaps and linkages between them.

1 Please see Annex C for further theoretical detail on strategic clusters and the benefits that knowledge transfer and human capital investment can bring.

ESB employs an outsourcing model across several specialised services and physical inputs…

ESB outsources a wide range of specialised services and inputs which support the delivery of its business units.

In a number of these areas, it is likely a key driver of these services in Ireland, such as:

- electrical and mechanical services; engineering contracting;
- civil and electrical contracting; and
- timber cutting contracting. [1, 2]

As one of the largest players in the Irish energy sector, ESB's procurement of these products and services has helped to create an **ecosystem of skilled providers that are available to support other companies in the energy sector,** which would not be the case if all services were delivered through in-house capabilities.

The availability of these providers prevents other new or existing companies from needing to have in-house expertise in these areas, likely **supporting sector access to the economies of scale** that are often associated with more specialised service providers and **reducing barriers to entry for potential new entrants**.

These efficiencies can contribute to the **competitiveness of the sector's exports**, in line with the Government ambition of increasing renewable energy exports.

On the following slide, we outline three examples of outsourcing relating to engineering, network infrastructure materials and customer services, including how this benefits other firms in the sector.

… helping to create strong supply chains and a talent pool available to support a wider industry

1 ESB website, "Procurement at ESB", accessed on 08/01/2024
2 ESB also procures services in a number of areas where it is unlikely a key procurer for these industries, such as advertising and public relations services; audit services; banking and financial services; building maintenance services; energy and general consulting services; IT consultants and contractors; and training services.

This supply chain development covers a range of areas, including engineering services, business support activities and construction materials

Example: engineering outsourcing

- ESB collaborates with Gaeltec Utilities Limited, provider of engineering contracting services. Most notably, Gaeltec Utilities has been commissioned on:
  - SIRO project[1]
  - Oweninny windfarm in Co Mayo[2]
- The work undertaken for ESB supports the existence of a skilled, domestic talent pool that is available to deliver engineering projects for other companies in the developing strategic cluster.

★ Example: customer services outsourcing

- In 2004, ESB's retail business unit, Electric Ireland, began a strategic partnership with Abtran, an Irish business process management company, which delivers customer service solutions to ESB customers nationwide.[3]
- Through the long-term procurement of these services, Abtran has likely developed enhanced knowledge of the energy sector, including evolving customer needs with the increase of smart technologies. This expertise is then available to be drawn upon by other firms requiring customer services in the strategic energy cluster.

Example: materials outsourcing

- To support its network reinforcement and other construction activities, ESB purchases the required material inputs from a range of suppliers.
- For example, in 2022, ESB Networks had an approved list of c. 60 unique, third-party suppliers from which it could source the required materials. [4]
- These third-party suppliers are then available to deliver for other energy firms undertaking construction activities in the sector.

1 Gaeltec, "SIRO- Wexford Fibre Broadband Network Installation", accessed on 08/01/2024
2 Gaeltec, "Gaeltec to build one of Ireland's largest onshore windfarms", accessed on 08/01/2024
3 ESB, 2019, "Electric Ireland awards Customer services Contract to Irish Company Abtran"; and ESB, "Terms and Conditions: Pre-qualification Approval for Supply of Home charge Point"
4 ESB Networks, "Approved Material Suppliers for LV, MV, 38kV, 110kV, 220kV, 400kV and Associated Works", November 2022.

ESB's R&D and innovation investment includes numerous collaborative partnerships, supporting knowledge transfer between ESB, its partners and the wider energy sector

- Central to its R&D and innovation strategy, **ESB has several long-term R&D partnerships** with Irish universities and technical colleges[1], as well as several national and international energy research groups[2].
- **These partnerships lead to knowledge and technology spillovers** between ESB, its partners and the wider energy sector, thereby strengthening the strategic cluster. [3]
- Below, we highlight four examples of projects undertaken through these partnerships.

Examples of R&D partnerships with higher education institutions

Hydrogen knowledge development and innovation

- ESB is installing a hydrogen electrolyser with TUD Blanchardstown which will help ESB, and the Irish energy sector more broadly, to understand how electrolysers work.
- ESB is also working with Trinity College to undertake geotechnical studies of depleted gas fields to assess whether these fields can be used for future hydrogen storage.

Assessing the impact of low-carbon technologies on network needs

- As part of a long-term partnership with the UCD Energy Institute, a UCD simulation model is being used to assess the impact of new technologies, such as e-cars and heat pumps, on the distribution network. The results are then used to shape its network plans and inform the future innovation research required.

Examples of R&D partnerships with energy research groups

Efficient wind generation development and operation

- In partnership with DCU, ESB is testing a proto-type of a wind turbine blade cleaning system that can be carried out from ground level using lasers. This has the potential to improve the efficiency with which ESB, and others operating in the industry, can maintain and operate its wind generation portfolio.
- ESB and MaREI are currently assessing options for offshore storage facilities to identify the most efficient approach for staging offshore wind turbine assembly.

Free Electrons open innovation programme

- ESB is a founding member of Free Electrons, which connects energy-related start-ups with experts in several leading energy utilities around the world[4].The innovative start-ups that are selected for the programme work alongside the utilities to pilot and commercially deploy new projects and products, including through facilitating investment opportunities, learning and development.

1 Partner universities and technical colleges include: Technological University Dublin (TUD), the Energy Institute at University College Dublin (UCD), University College Cork (UCC), University of Limerick (UL) and University of Galway (UCG).
2 Partner research groups include: the Electric Power Research Institute (EPRI), the Science Foundation Ireland Research Centre for Energy, Climate and Marine, coordinated by the Environmental Research Institute (MaREI) and the International Energy Research Centre (IERC).
3 See Annex C for additional details on the theory behind knowledge and technology spillovers improving innovation in strategic clusters.
4 Partners in Free Electrons include: American Electric Power (USA), China Light & Power (China), EDP (Portugal), E.On (Germany), Hydro Québec (Canada), & Origin Energy (Australia).

ESB's joint ventures may also facilitate knowledge transfer and reduce barriers to entry, thus supporting the expansion and resilience of the strategic cluster

As described in more detail on slides 9 and 10, since 2006, **ESB has invested a total of €13.3 billion in a range of energy assets in Ireland**. This investment includes **joint ventures ("JVs")** with domestic [1] and international [2] companies **in the energy sector of €256 million.**

Examples of ESB joint ventures

Partnering with global leaders of the offshore wind industry

- ESB entered a joint venture with Ørsted to jointly develop an offshore wind portfolio, with the potential to deliver up to 5 GW of renewable energy and complementary renewable hydrogen projects [3]

Leveraging the strength of domestic partners for onshore wind development

- ESB and Coillte entered a joint venture company, FuturEnergy Ireland, to develop more than 1GW of renewable energy capacity by 2030 [4]

Partnering with global leaders on energy storage projects

- ESB and dCarbonX – an affiliate of Snam, Europe's largest gas storage provider and gas infrastructure company – entered a joint venture agreement in 2021 to progress large-scale energy storage projects off the coast of Ireland. Specifically, they are focused on potential green hydrogen storage opportunities[5]
- More recently, in late 2023, Bord Gáis Energy, part of Centrica plc, joined ESB and dCarbonX in the development of the Kestrel Project, which is focussed on the development of decommissioned reservoirs at Kinsale Head gas field for storage of green hydrogen.

These joint ventures bring significant benefits to:

1 ESB and its partner companies

- **New market entry/ expansion**, e.g. through access to ESB's existing supply chain and physical infrastructure for partner companies (and vice versa).
- **Knowledge transfer** between partner companies and ESB.

2 The strategic cluster and wider economy

- **Economic benefits,** such as employment and increased inbound investment.
- International companies operating across jurisdictions bring **valuable learnings** and **new best practices.**

1 Such as Coillte, Bord na Mona, and Tipperary Energy Agency
2 Such as EDF Energy and Orsted
3 ESB Press Release, June 2023. "ESB and Ørsted enter partnership in landmark Irish Offshore offshore wind agreement".
4 FuturEnergy Ireland website, 'About Us'.
5 ESB Press Release, September 2022, "ESB and dCarbonX expand Irish offshore energy storage partnership".

ESB invests considerably in its current and future employees, thus developing the human capital of the Irish workforce to the benefit of the wider economy

Given the skilled nature of the work undertaken across ESB business units, it invests considerably in the aggregate skills and expertise of the current and future Irish workforce through direct investment in ESB employees, partnerships with other companies and wider sector training, with examples outlined below.

ESB apprenticeships

Engineering / Craft Apprenticeship Programmes

- Supports apprentices in starting their electrical and mechanical engineering career.
- At the end of the four-year programme, involving on-the-job training and classroom-based learning, apprentices obtain an internationally recognised QQI advanced level 6 Electrical trade certificate and BTEC (Level 3) Diploma in Mechanical or Electrical and Electronic Engineering.

Business Apprenticeship Programmes

ESB has three business apprenticeship programmes in place:

- IT apprenticeship, resulting in an Advanced Certificate in IT at the end of the two-year programme (NFQ level 6);
- Accounting Technician apprenticeship, resulting in a Level 6 QQI Advanced Certificate in Accounting at the end of the two-year programme; and
- Recruitment apprenticeship, resulting in a Level 8 BA Hons Degree in Recruitment Practice at the end of the three-year programme.

Training partnerships

- ESB partners with national business support agencies, such as **Skillnet Ireland** help to shape upskilling programmes for its employees and those in the wider sector.
- For example, ESB is a member of the Green Tech Skillnet[1], which provides individuals with electrical, mechanical or engineering backgrounds (both ESB employees and others) the opportunity to become certified Wind Turbine Technicians by taking part in technical training and an industry placement.

This investment contributes to the existence of a deep talent pool for the energy sector in Ireland, creating spillover benefits for other firms in the strategic energy cluster which can draw upon these resources.

1 The Green Tech Skillnet supports ESB, as well as other energy companies such as General Electric (GE), EDF Energy and Energia. (Skillnet website, 'Minister Harris launches Skillnet Ireland programme to tackle the staff shortage in the Wind Sector', accessed November 2023.)

ESB's development of the Moneypoint renewable hub demonstrates its role in the developing strategic energy cluster

The Moneypoint renewable hub currently being developed by ESB is one significant project that clearly shows the benefits of the emerging energy cluster and will support the energy sector in delivering on the Government's ambitions, as detailed below.

ESB are developing a green energy hub at Moneypoint to support the Government's net zero ambitions…

- In 2021 ESB announced the transformation of its Moneypoint site in County Clare into a green energy hub "in line with the Government's ambition of reaching net zero by 2050".[1]
- This multi-billion investment programme aims to deploy range of renewable technologies, with the capacity to power 1.6 million homes. The technologies developed, including a floating offshore windfarm of 1,400MW, €50m synchronous compensator capable of providing 4,000MWs of inertia, and green hydrogen production and storage, contribute to the wider Irish economy by facilitating the development of the energy cluster in Ireland.

…further developing green energy supply chains…

- The Moneypoint project's synchronous condenser – the first in Ireland the largest of its kind in the world – will provide electrical services to the electricity grid and enable higher volumes of renewable on the system.
- The engineering, procurement and construction of the synchronous compensator was awarded to Siemens Energy Ltd[2], a firm which is also able to support other firms operating in or looking to enter the Irish market.

…and facilitating knowledge transfer through R&D and JV partnerships.

- **R&D collaboration**: In 2023, ESB and Shannon Foynes Port announced a funding collaboration of €250k for a study with MaREI[2], which aims to examine the use of wet storage to support floating offshore wind projects such as those envisioned for Moneypoint. However, the benefits of this research will extend beyond Moneypoint, as they will "help the entire industry to better understand what is required for crucial wet storage facilities".[3]
- **Joint venture**: In 2022 ESB and dCarbonX[4] signed a JV to explore green hydrogen storage opportunities around proposed decarbonisation clusters, including Moneypoint.[5] Moneypoint's floating offshore wind farm therefore provides opportunity for the development of additional green technologies.

- Projects such as ESB's Moneypoint renewable hub place Ireland's energy sector at the forefront of innovation and technology deployment.
- Through strengthening supply chains and knowledge spillovers, ESB is supporting the growth of Ireland's strategic energy cluster.
- As the cluster deepens, it will promote further innovation, skills and technology development, increasing the productivity and resilience of the sector as it becomes increasingly export focused, in line with the Government's ambitions for the sector.

1 ESB, April 2021, "ESB Announces Green Atlantic at Moneypoint"
2 ESB, November 2022, "Minister Ryan welcomes ESB's €50m investment in Synchronous Compensator at Moneypoint"
3 World leading Science Foundation Ireland Research Centre at UCC
4 ESB, 2023, "ESB and Shannon Foynes Port announce support for floating offshore wind research at UCC"
5 Pioneering GoeEnergy company
6 Energy Storage News, September 2022, "ESB and dCarbonX explore green hydrogen storage sites off Irish coast"

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Calculating indirect GVA

- To estimate the indirect GVA resulting from ESB's activities in Ireland, we use a Type I GVA multiplier which estimates how a one-unit increase in direct GVA impacts the combined direct and indirect GVA in a sector.
- Industry-specific Type I GVA multipliers are published on the Central Statistics Office Ireland ("CSO") website. A multiplier for the energy sector of 1.18 has been used for this estimation. In other words, in our calculations, a €1 increase in the direct GVA leads to a €0.18 indirect GVA impact.

Calculating indirect employment

The CSO does not publish a Type I employment multiplier for the energy sector. We therefore implement the following steps to estimate ESB's indirect employment:

- **Step 1: Estimate ESB's indirect GVA on an annual basis**
  - For this step, we use our estimate of ESB's annual indirect GVA (see slide 25).

- **Step 2: Estimate the percentage of ESB's indirect GVA that relates to payroll costs**
  - Using publicly available data from the CSO, we calculate the percentage of GVA that relates to payroll costs for the energy sector in Ireland.
  - We then multiply these annual percentages by ESB's estimated indirect GVA to estimate the percentage of ESB's indirect GVA that relates to payroll costs.

- **Step 3: Estimate the number of employees that could reasonably be assumed to be associated with these payroll costs**
  - We then divide the annual results from Step 2 by the average payroll costs for an employee in the energy sector in Ireland to estimate ESB's indirect employment impact.

Calculating indirect corporation taxes

Indirect profit taxes paid by ESB are calculated as follows:

- **Step 1: Estimate ESB's indirect GVA on an annual basis**
  - For this step, we use our estimate of ESB's indirect GVA (see slide 25).

- **Step 2: Estimate the percentage of ESB's indirect GVA that relates to gross profit**
  - Using publicly available data from the CSO, we estimate the annual percentage of GVA that relates to gross profit in the energy sector in Ireland.
  - We then multiply these annual percentages by ESB's annual indirect GVA to estimate the percentage of ESB's indirect GVA that relates to gross profit.

- **Step 3: Estimate the percentage of gross profit that is the profit tax base**
  - Using publicly available data from the CSO, we estimate the ratio of chargeable profits to gross trading profits over the period.
  - We then multiply this percentage by the results of Step 2 above to obtain the proportion of ESB profits that are subject to profit tax.

- **Step 4: Estimate the amount of profit tax**
  - As a final step, we multiply the results from Step 3 by the corporate tax rate.

Calculating indirect payroll taxes

We have estimated ESB's indirect payroll contribution as follows:

- **Step 1: Estimate ESB's indirect GVA on an annual basis**
  - For this step, we use our estimate of ESB's annual indirect GVA (see slide 25).

- **Step 2: Estimate the percentage of ESB's indirect GVA that relates to payroll costs**
  - Using publicly available data from the CSO, we calculate the percentage of GVA that relates to payroll costs for the energy sector in Ireland.
  - We then multiply these annual percentages by ESB's estimated indirect GVA to estimate the percentage of ESB's indirect GVA that relates to payroll costs.

- **Step 3: Estimate the percentage of payroll costs that relate to taxes**
  - We then calculate the percentage of wages that relate to income and social security taxes. According to our estimates, taxes represent approximately 43% of gross pay.
  - We then multiply this percentage by the annual values obtained in Step 2 above to estimate ESB's payroll tax contribution from its indirect activities in Ireland.

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ESB's direct employment contribution (FTE) by business unit, 2018-2022

	2018	2019	2020	2021	2022
ESB Networks	3,440	3,490	3,436	3,339	3,376
Generation and Trading	874	796	677	576	593
Customer Solutions (excl. Telecoms)	395	457	479	472	434
Telecoms	35	35	34	37	36
Engineering and Major Projects	741	791	781	799	813
Enterprise Services	701	796	891	900	922
Corporate Centre	178	138	137	138	145
Strategy, Innovation and Transformation	117	77	66	60	60
Total direct employment	**6,482**	**6,582**	**6,501**	**6,321**	**6,378**

- In 2022, ESB employed a total of 6,378 employees, of which 6,342 were employed in ESB's electricity[1] business units and 36 in its telecoms business unit.
- ESB has remained a significant employer in Ireland over the past five years. The number of ESB's employees remaining relatively consistent, equating to 0.3-0.4% of total Irish employment in all years from 2018 – 2022.

1 For simplicity, we have assumed that all employees not specifically labelled as telecoms employees were employed in ESB's electricity sector business units.

ESB's direct contribution to the Irish Exchequer, 2018-2022

	2018	2019	2020	2021	2022
Profit taxes* (€m)	47	39	51	63	111
Payroll taxes* (€m)	179	184	186	190	205
Other taxes* (€m)	315	339	363	429	412
Dividends* (€m)	35	43	50	81	126
Total contribution* (€m)	**576**	**605**	**650**	**763**	**853**

- In 2022, ESB's total estimated direct corporation tax contribution to the Irish Exchequer amounted to €111m, representing a 135% over the past five years.
- In 2022, ESB paid a total of €205 million in payroll taxes, representing a 14% increase over the past five years.
- ESB's total contribution from 'other taxes' paid to the Irish Exchequer in 2022 was €412 million. The value of 'other taxes' has increased by 31% over the past five years.
- Dividends paid by ESB have been steadily increasing in nominal terms, reaching €126 million in 2022. This is approximately a 264% increase over the past five years.

* Note that the above values are presented in nominal terms (i.e., not adjusted for inflation).

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Additional economic theory of strategic clusters and frontier firms

As highlighted on slide 16, developing a strategic energy cluster will contribute to sector development and maximising the potential economic benefits

Economic literature suggests that **strategic clusters** – or groups of firms organised around areas of existing strengths and capabilities [1] – are important **drivers of innovation and productivity in small economies**, both within their own sector and also in adjacent areas. As clusters deepen, they can **promote knowledge transfer, skills development, and the resilience of the sector.**

The development of strategic clusters can benefit from an anchor frontier firm which creates a favourable environment for the development of others through its R&D, skills development and supply chain

- **The term 'frontier firms' refers to companies that are drivers of productivity performance**. These firms can push forward the 'productivity frontier', which is the theoretical maximum output that can be produced by an economy, sector or firm based on the inputs available. In other words, where the productivity frontier is the "sum of all existing best practices at any given time"[2], frontier firms are those that have the scale, resources and expertise to innovate and contribute to the development of new best practices which enable more output to be delivered for a given set of inputs.
- The **importance of frontier firms is particularly true for the productivity of small advanced economies**, like Ireland, where frontier firms tend to be in export-oriented sectors which are led by firms with both competitive advantage and access to scale.

1 Skilling, D. 2020, "Frontier firms: An international small advanced economy perspective - Prepared for the New Zealand Productivity Commission"..
2 Porter, M., 'What Is Strategy', Harvard Business Review Magazine, November-December 1996 issue.

Additional economic theory of knowledge and technology spillovers in strategic clusters

Below and on the following slide, we outline the theory behind how the development of a strategic cluster can benefit from knowledge and technology spillovers, resulting from ESB's R&D and innovation, and growth in human capital, resulting from ESB's investments in training and upskilling the labour force.

R&D and innovation collaborations will result in knowledge and technology spillovers…

By undertaking projects in collaboration with experts in other institutions:

- new and innovative ideas and best practices are identified, expanding the knowledge base of its own employees and those of its partners;
- technologies are developed which improve ESB's efficiency, and that of its partners, current and future operations or quality of products/services delivered; and
- knowledge is disseminated (via spillovers) across the energy sector in Ireland and abroad, (e.g., ESBN and partners publish project/research findings which are then discussed and adopted by peers; peers then build on this research – either domestically or in their own jurisdictions – contributing to broader improvements in the energy sector knowledge base).

Where partnerships involve international partners, this supports the transfer of existing technologies into Ireland, to the benefits of all companies in the local strategic cluster.

…which will help strengthen the strategic cluster and encourage further innovation.

- The knowledge and technology spillovers can lead to increased rates of innovation across the sector, as resources can focus on new R&D and innovation activity rather than duplicating the findings that are shared. Specifically, there is evidence that firms are more likely to innovate if located in a cluster of other innovative firms in its own sector where the potential for spillovers and stock of knowledge is high.[1] Given the scale of its R&D activities, ESB may be seen as an anchor firm for the cluster in this regard.
- Consistent innovation will push forward the productivity frontier in the Irish energy sector, increasing the international competitiveness of the strategic cluster in line with the Government's ambitions to develop a competitive, export-oriented energy sector.
- Additionally, this knowledge sharing is of increasing importance as the energy industry must work together, at pace, towards the common goal of decarbonisation.

1 Beaudry, C. and Breschi, S., 2002. "Are firms in clusters really more innovative?", Econ. Innov. New Techn., 2003, Vol. 12(4), pp. 325–342.

Additional economic theory of human capital in strategic clusters

It is widely recognised that **'human capital**', i.e. the "knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being"[1], **is a key determinant of economic productivity and output**[2].

Investments made to improve the knowledge and skills of the labour force therefore improve this key input and contribute to economic growth and productivity improvements.

Where firms invest in **upskilling their own employees** (e.g., through apprenticeships such as those offered by ESB, see slide 22) this **increases the capability of the wider sector workforce through labour mobility**.

Further, where firms invest in the training of the wider workforce rather than their own employees (e.g., through Skillnet Ireland as outlined on slide 22), this **ensures the specialised skills needed in the supply chain are immediately available**.

This human capital investment helps to **ensure that all firms in the strategic energy cluster have access to the skills and talent required** to operate, thus **reducing barriers to entry and supporting the development of new best practices** (pushing forward the productivity frontier in the sector).

1 Beaudry, C. and Breschi, S., 2002. "Are firms in clusters really more innovative?", Econ. Innov. New Techn., 2003, Vol. 12(4), pp. 325–342.
2 Alongside the physical inputs that are used to produce goods and services in an economy.