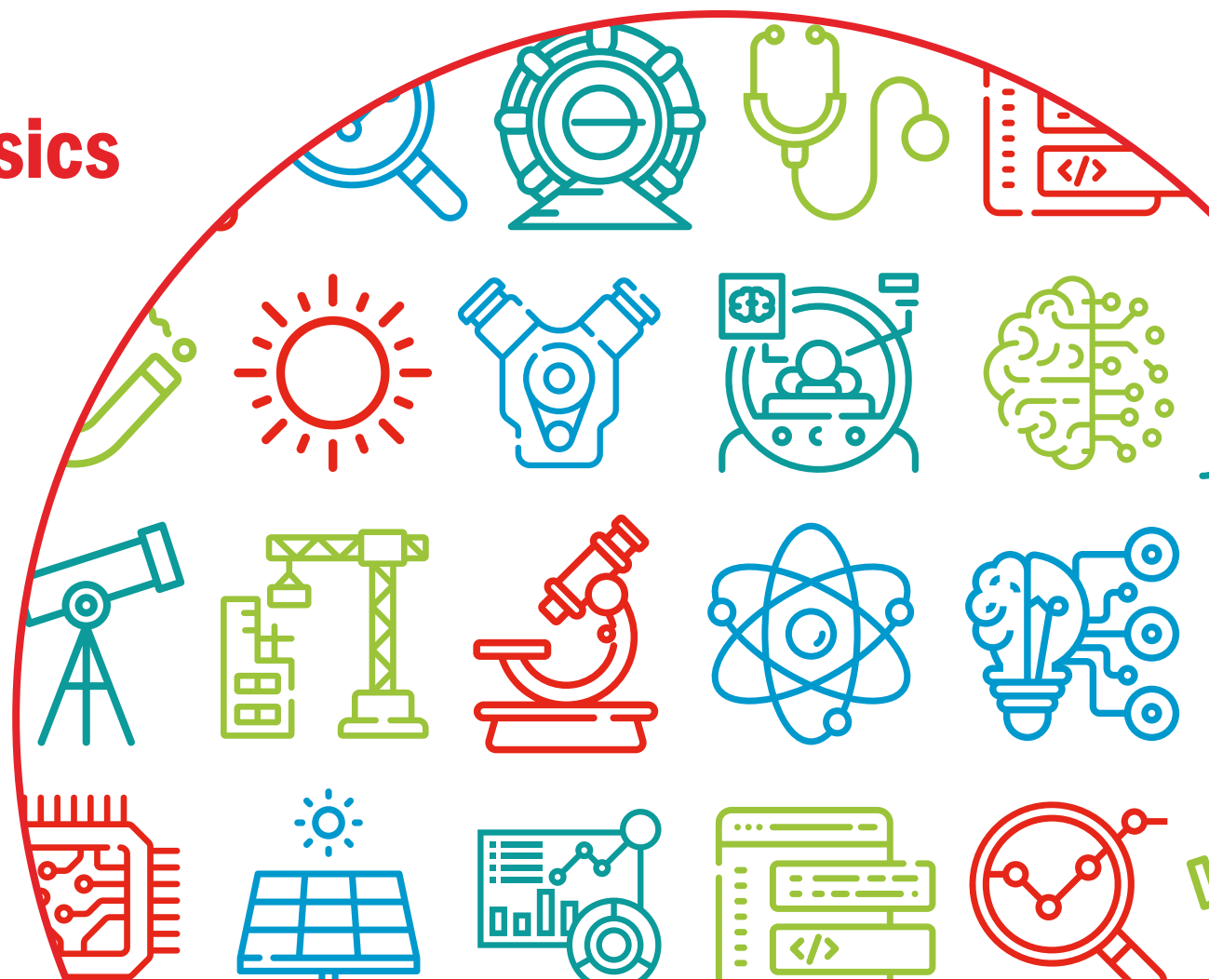


The contribution of physics to the Irish economy

Executive summary



Physics is a foundation stone for the Irish economy and the industries which use physics are both important and highly productive. Physics-based industries (PBIs) employ more than 190,000 full time equivalent (FTE) employees nationwide, and contribute 9% of national gross domestic product (GDP). Labour productivity in the sector is strong at €149,000 per worker, per year.

A project commissioned by the Institute of Physics (IOP) and conducted by the Centre for Economics and Business Research (CEBR) shows the performance and growth of the sector between 2010-2019. Read the full report at <https://www.iop.org/strategy/productivity-programme/physics-and-economy>.

What is the physics sector?

Physics-based industries (PBIs) are industries whose enterprises demonstrate...

- A)** ongoing research and development (R&D) which consistently makes use of physics knowledge (and the R&D activity can be expected to significantly affect the fortunes of businesses within the industry), or
- B)** those where underlying technology supporting the industry requires significant physics knowledge for continued operation.

The largest parts of the physics sector are Physics Manufacturing (which includes, but is not limited to, the production of a wide range of goods, from fibre optic cables to aircraft and medical equipment to support civil and defence objectives) and Physics Science and Technology, which includes, but is not limited to, technical testing and analysis and practical scientific consultancy. Physics machine services and sales, along with medical equipment sales, represent downstream servicing and sales of the goods physics manufacturing creates. The energy, oil and gas extraction and telecoms industries are major standalone industries with physics at their heart.

In 2019...

*All figures are rounded.

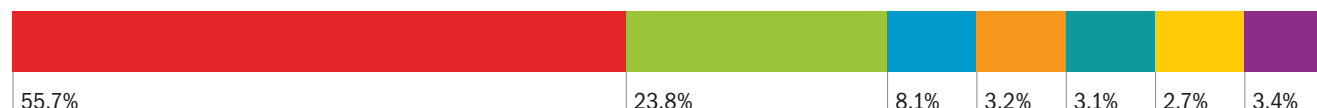
Employment - Full time equivalents (FTEs - thousands)

Total: **195.60**



Number of enterprises

Total: **20,242**



Gross added value - GVA (€bn)

Total: **29.08**

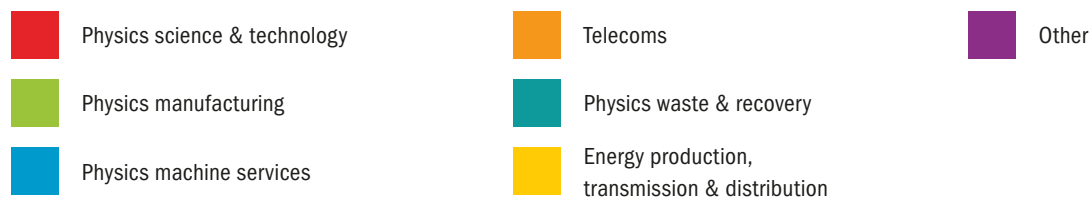


Turnover - (€bn)

Total: **80.39**



Industry



The physics sector is a significant contributor to the Irish economy

In 2019...

GVA contribution

€29bn

The physics sector directly generated €29bn Gross Value Added (GVA), 9% of total Irish Gross domestic product (GDP).

Physics manufacturing

This is largely contributed by Physics Manufacturing – which produced nearly €18bn in GVA, **62% of the total GVA**.

Sectoral comparison

In 2018, the physics sector generated nearly three times the GVA of the Construction (€8bn), Transport and Storage (€7bn), and Retail (€8bn) sectors.



Compared to the UK, the Irish physics sector performed better than PBIs in Northern Ireland, and similar to PBIs in England and Wales:

- UK (£229 - 11%)
- Irish total (€29bn - 9%)



Breakdown of UK

English PBIs contributed £190bn in GVA – 10% of total English GDP.
Scottish PBIs contributed £28bn in GVA – 17% of the total Scottish GDP.

Welsh PBIs contributed £7.3bn in GVA – 10% of total Welsh GDP.
Northern Irish PBIs contributed £3.5bn in GVA – 7% of total Northern Irish GDP.

Turnover

€80bn

The physics sector generated **€80 billion** in turnover.

Sectoral comparison

In 2018, this figure (€80bn) was more than 2.5 times greater than construction (€29bn), more than three times greater than Transport and Storage (€24bn), and double that of Retail (€40bn).

Compared to the UK, the Irish physics sector generated a much higher turnover than PBIs in Wales and Northern Ireland.

- UK (£634bn)
- Irish total (€80bn)



Breakdown of UK

- English PBIs generated £533bn in turnover.
- Scottish PBIs generated £64bn in turnover.
- Welsh PBIs generated £26.7bn in turnover.
- Northern Irish PBIs generated £10bn in turnover.

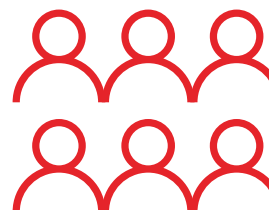
Labour productivity

Labour productivity sat at

€149,000

per worker, per year, higher than

€147,000



Across the decade...

GVA contribution

GVA rose by **33%** (from **€21bn to €29bn**). This is a higher growth rate than seen in the Transport and Storage sector (17% from €6bn to €7bn) and in the Retail sector (14% from €7bn to €8bn).

33%



Turnover

Irish PBIs experienced an increase of **€16 billion** in turnover; **26%** in total across the decade.

26%



Labour productivity

Labour productivity decreased by **1.5%** from **€151,000 to €149,000**.

-1.5%



The physics sector has a large number of enterprises

In 2019...

There were around 20,000 physics enterprises operating in Ireland.

This represents 7% of all Irish enterprises.

The majority of physics businesses are SMEs (98%), which employ a maximum of 9 people.



■ **93% (18,873)** of enterprises were categorised as micro companies.

■ **5% (1,082)** of enterprises were small (10-49 employees).

■ **2% (287)** were medium (50-249 employees) or large (250+).

The size of PBLs is similar to the broader Irish average. By comparison, in the wider economy...

- **92%** of firms are micro enterprises.
- **7%** are small.
- The remaining **1%** are medium or large.

Across the decade...

This is an **18%** growth from the number operating in 2010. This is a substantially lower growth rate than in the UK – **46%**, suggesting more could be done to stimulate the PBL sector in Ireland.

Northern Ireland had a total of

5,285

businesses in the physics sector
(7% of all Northern Irish enterprises)

Ireland had a total of

19,994

businesses in the physics sector
(7% of all Irish enterprises)

Wales had a total of

12,170

businesses in the physics sector
(12% of all Welsh enterprises)

Scotland had a total of

27,235

businesses in the physics sector
(15% of all Scottish enterprises)

England had a total of

305,445

businesses in the physics sector
(13% of all English enterprises)

The physics sector is a significant employer in Ireland

In 2019...

Total employment

The sector directly employed:

195,602 FTEs

This accounted for **9% of total Irish employment**.

National breakdown

Compared to the UK, the Irish physics sector employed a similar number of FTEs as were employed in Scotland, and a larger number than in Wales and Northern Ireland.

- Scottish PBIs directly employed 220,000 FTEs– 10% of total Scottish employment.
- English PBIs directly employed 2,338m FTEs– 10% of total English employment.
- Welsh PBIs directly employed 113,138 FTEs– 10% of total Welsh employment.
- Northern Irish PBIs directly employed 48,842 FTEs – 7% of total Northern Irish employment.



Across the decade...

Employment in the Irish physics sector grew by **41%**, a figure much higher than the UK average of **13%**.



This shows that, despite lagging behind the UK's growth rate of enterprise numbers, the existing PBIs scaled-up at a higher rate in terms of staffing numbers.

Sectoral comparison

This (**41%**) is a stronger growth figure than seen in Irish Construction.

Between 2010-2018:

- Employment increased in the construction sector by just **26%**, from around **107,000** to **153,000**.

Compensation of employees

On average, employee compensation was:

€59,000

Sectoral comparison

This is a strong figure compared to other sectors;



National breakdown

Compared to the UK, the Irish physics sector had a similar level of employee compensation as in England and Scotland.

- Scottish PBIs had a total £10.4bn employee compensation - £47,000 per FTE worker on average.
- English PBIs had a total of £98bn employee compensation - £41,990 per FTE worker on average.
- Welsh PBIs had a total of £4.1bn employee compensation - £36,089 per FTE worker on average.
- Northern Irish PBIs had a total of £1.7bn employee compensation - £34,791 per FTE worker on average.



Across the decade...

Total compensation of employees (COE) grew by 40% across the decade, from **€8.3bn** to **€11.8bn**. This was a higher growth rate than seen in the UK – which had **31%** growth in COE across the decade.

However, this is a lower growth rate relative to employment, meaning average compensation per FTE worker decreased slightly over the period from **€59,400** to **€59,000**.

Sectoral comparison

This contrasts to the UK's nations, where COE grew across the decade:

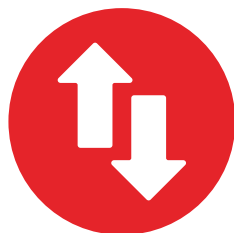
- Average English COE/FTE increased from £36,103 to £41,990 (16% across the decade).
- Average Scottish COE/FTE increased from £43,000 to £47,000 (9% across the decade).
- Average Welsh COE/FTE increased from £27,711 to £36,089 (30% across the decade).
- Average Northern Irish COE/FTE increased from £29,304 to £34,791 (19% across the decade).

The Physics Sector represents two fifths of all R&D taking place in Ireland

Total value

In 2019, the value of R&D spending reached nearly:

€1.4 billion

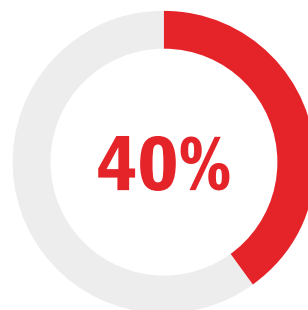


However, overall, R&D expenditure decreased by **4.9%** (or **€0.07 billion**) between 2010 and 2019. In 2010, R&D expenditure was around €1.49 billion.

More information and the methodology

The Institute of Physics (IOP) worked with the Centre of Economic and Business Research (CEBR) to quantify the contribution of Physics-Based Industries (PBIs) between 2010-2019 across the Irish economy. For the full findings and methodology, see <https://www.iop.org/sites/default/files/2022-01/Physics-and-the-Economy-Ireland.pdf>.

Total share



Despite contributing just under **9% of national GVA**, PBI investment in R&D comprises more than **40% of total R&D in Ireland**.



R&D is heavily dominated by the Physics Manufacturing sub-sector, which accounted for **74% of all expenditure on average over the decade**.



This share has been declining significantly since 2010, when **PBI R&D was 80% of total R&D in the Republic of Ireland**. However, this is as other sectors have significantly increased their R&D investment, as opposed to declining PBI R&D.

The Institute of Physics (IOP) is the professional body and learned society for physics in the UK and Ireland. It seeks to raise public awareness and understanding of physics, inspire people to develop their knowledge, understanding and enjoyment of physics and support the development of a diverse and inclusive physics community. As a charity, it has a mission to ensure that physics delivers on its exceptional potential to benefit society.



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