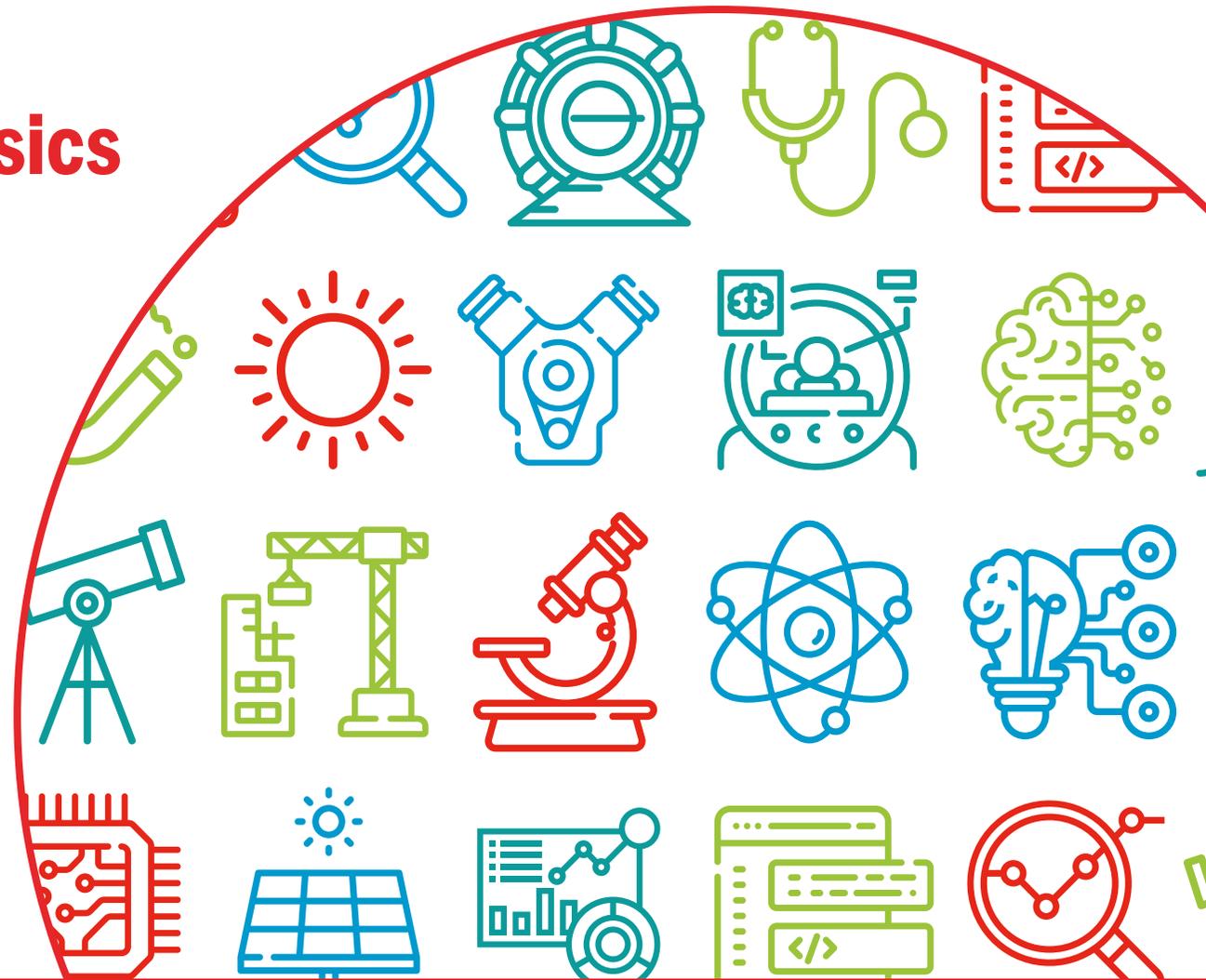


The contribution of physics to the Welsh economy

Executive summary



Physics is a foundation stone for the Welsh economy and the industries which use physics are both important and highly productive. In Wales, physics-based industries (PBIs) employ more than 113,100 full time equivalent (FTE) employees nationwide and contribute 10% of national gross domestic product (GDP). Labour productivity in the sector sits at £64,828 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:

- A)** demonstrate 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)** 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: **113.1**



Number of enterprises (thousands)

Total: **12,170**



Gross value added - GVA (£bn)

Total: **7.3**

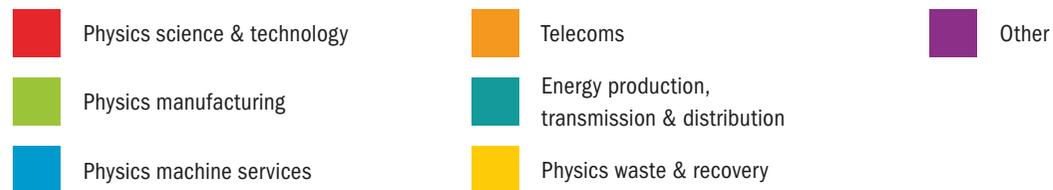


Turnover (£bn)

Total: **26.7**



Industry



The physics sector is highly productive and a significant contributor to the Welsh economy

In 2019...

GVA contribution

£7.3bn

The physics sector directly generated £7.3bn Gross Value Added (GVA), 10% of total Welsh GDP.

National breakdown

Welsh PBI GVA contribution is consistent with that in England and Northern Ireland:

- English PBIs contributed £190bn in GVA - 10% of total English GDP.
- Scottish PBIs contributed £28bn in GVA - 17% of total Scottish GDP.
- Welsh PBIs contributed £7.3bn in GVA - 10% of total Welsh GDP.

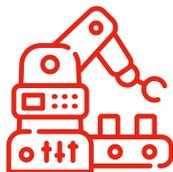
- Northern Irish based PBIs contributed £3.5bn in GVA - 7% of total Northern Irish GDP.

UK Total: **£229bn** - 11%



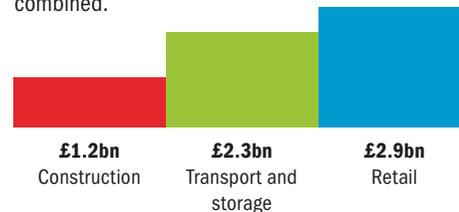
Spotlight on industry

The biggest PBI sub-sector was physics manufacturing, which contributed £3.4bn in GVA, followed by physics science & technology (£1.1bn), telecoms (£0.99bn) and energy production, transmission & distribution (£0.96bn).



Sectoral comparison

The physics sector generated more annual GVA than the Construction (£1.2bn), Transport and Storage (£2.3bn), and Retail (£2.9bn) sectors combined.



Turnover

£26.7bn

The physics sector generated £26.7bn in turnover.

National breakdown

This figure is greater than turnover in Northern Ireland, but lags behind Scotland and England.

- 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.

UK Total: **£634bn**



Spotlight on industry

The sector with the greatest turnover is physics manufacturing (£15.5bn), with a 57% share of turnover across the decade. This is followed by energy production, transmission and distribution (£4.8bn).

Sectoral comparison

- PBI turnover (£26.7bn) is more than three times the combined turnover of the construction (£2.9bn) and transport and storage (£5.1bn) sectors.
- PBIs have double the turnover of the retail sector (£13bn).

Labour productivity

£64,828

Labour productivity sat at £64,828 per worker, per year.

This is the lowest of the UK nations.

- Scotland - £129,000
- England - £81,300
- Northern Ireland - £71,966



The physics sector has a large number of enterprises

In 2019...

There were **12,170 physics enterprises operating in Wales** – **12% of all Welsh enterprises**.

The majority of physics enterprises are SMEs (99%), which employ a maximum of 9 people. This is in line with trends across the wider UK physics sector.



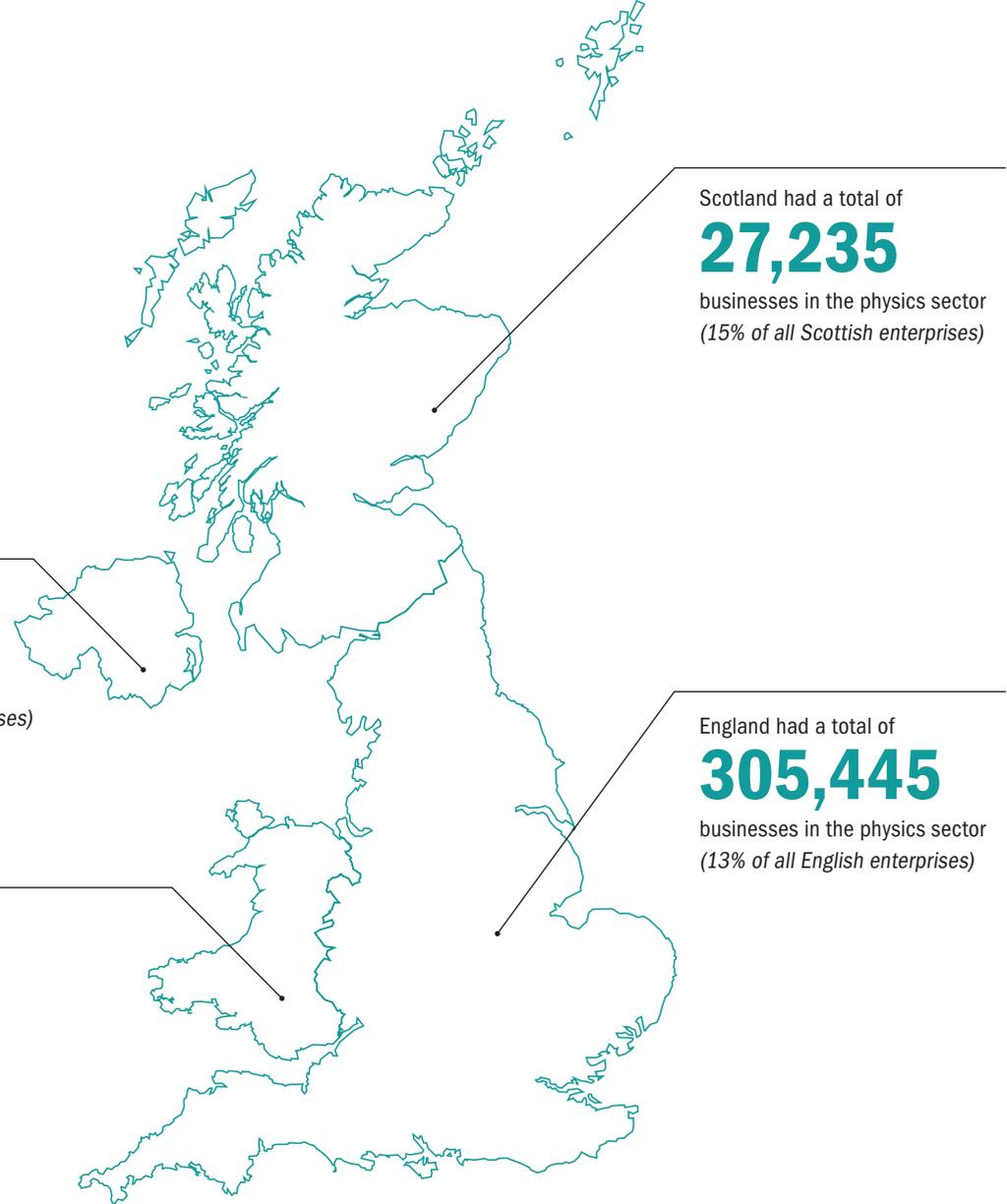
- 92% (11,185) of enterprises were categorised as micro companies.
- 7% (800) of enterprises were small (10-49 employees).
- 1% (180) were medium (50-249 employees) or large (250+).

Sectoral comparison:

The size of physics sector enterprises is similar to the wider Welsh average.

By comparison, in the wider Welsh economy...

- 89% of firms are micro enterprises.
- 9% are small.
- The remaining 2% are medium or large.



The physics sector is a significant employer in Wales

In 2019...

Total employment

113,100 FTEs

The sector directly employed more than **113,100 FTEs**.
This accounted for **10% of total Welsh employment**.



National breakdown

These figures are consistent with the other UK nations:

- English PBIs directly employed 2.338m FTEs
- 10% of total English employment.
- Scottish PBIs directly employed 220,000 FTEs
- 10% of total Scottish 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.



Compensation of employees

£36,089

Average employee compensation.



Sectoral comparison

This is a strong figure compared to the retail sector (£17,162 on average), and is similar to the Transport and Storage sector (£35,810).

National breakdown

Employee compensation in Wales lags behind that in England and Scotland:

- English PBIs had a total of £98bn employee compensation - £41,990 per FTE worker on average.
- Scottish PBIs had a total £10.4bn employee compensation - £47,000 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.



The physics sector grew across the decade

Between 2010-2019...

GVA

20%

GVA contributed by Welsh PBIs rose by 20%. This is similar to growth in England, and much higher than seen in Scotland.

- The GVA generated by English PBIs grew by 23%
- The GVA generated by Scottish PBIs grew by 0.5%
- The GVA generated by Welsh PBIs grew by 20%
- The GVA generated by Northern Irish PBIs grew by 47%



Turnover

36%

Welsh PBIs experienced a turnover growth of 36%, from £19.6bn in 2010.

This is a greater rise than the UK-wide PBI turnover growth rate (24%).



Labour productivity

10%

Labour productivity increased by 10% across the decade from £58,855 to £64,828.



Number of enterprises

47%

The number of physics enterprises grew by 47%.



Employment

8%

Employment in the physics sector grew by 8%.



Compensation of employees

£4.083bn

Compensation of employees (COE) grew by 41% across the decade, from £2.896bn to **£4.083bn**.

This was a much higher growth rate compared to employment, meaning that average employee compensation increased by 30% (from £27,729 to £36,089).



Compared to other nations

- 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).



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 Welsh economy. For the full findings and methodology, see <https://www.iop.org/sites/default/files/2022-01/Physics-and-the-Economy-Wales.pdf>.

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.

The Institute of Physics is a charity registered in England and Wales (no. 293851) and Scotland (no. SC040092).