REPORT

Welsh Electricity Independence

Executive Summary

This analysis examines the changing landscape of Welsh electricity generation and supply over the past two decades, assessing Wales's energy independence and the evolution of its power sector relative to other UK nations. The analysis reveals that:

- **Welsh net electricity exports have collapsed**, from a peak of over 21 TWh in 2016 to near zero in 2024. Wales was a net importer from England for the first time last year.
- **Electricity generation has fallen by almost 50% from its 2016 peak**, as growth in renewable capacity has not kept pace with the drop in generation from coal and nuclear. Gas now accounts for 58% of Welsh generation - a greater share than any other UK nation - leaving Welsh generators and their downstream customers across the UK heavily exposed to volatile international fossil fuel markets.
- **Wales has fallen behind on decarbonisation.** Power sector emissions intensity has fallen 39% since 2004, lagging England's 69% and Scotland's 89%. Welsh electricity is now 58% more carbon-intensive than the UK average.
- **Renewable generation has grown nearly eightfold** since 2004, now covering around a third of Welsh electricity needs. However, growth has stalled since 2019, and Wales's renewable planning pipeline, while substantial, is smaller and less developed than those of England and Scotland.
- **Electricity demand is expected to at least double** as heat, transport and industry electrify. At current buildout rates, renewables' share of Welsh generation will fall rather than rise.

- **Delivering on and expanding the renewable capacity pipeline,** including 875 MW of offshore wind from the recent AR7 CfD round, is critical to deliver on Wales's decarbonisation commitments and avoid falling further behind and meeting its growing demand for electricity.

Introduction

From the industrial revolution onwards, Wales has played an outsized role in powering the nations and regions of the UK. But the country's failure to keep pace with the renewables transition now leaves it in danger of becoming dependent on England and Scotland for electricity for the first time, new analysis has found.

This report uses the Department for Energy Security and Net Zero's datasets to chart historical trends in Wales's electricity generation between 2004 and 2024[1].

It finds that Wales - like the other nations of the United Kingdom – has made significant progress in scaling up its renewables sector and decarbonising its power supply. However, this growth is failing to keep pace with the decline in non-renewable energy sources or with the growing demand for electricity driven by the electrification of industry, home heating, and transport. It has also found that Wales's planning pipeline is substantially less developed than those in England and Scotland. As a result, Wales's capacity to meet its electricity needs from domestic sources is declining – with 2024 marking the first year in which the country imported power from the rest of the UK. After decades in which the country has been a net exporter of electricity, Wales is falling behind England and Scotland and is now on course to become dependent on imported electricity for the first time.

Without ambitious action to grow its share of homegrown renewables, renewables' share of the electricity mix forecast to fall on current buildout rates. Meanwhile, Wales's dependence on gas is forecast to grow, leaving it highly exposed to price volatility in global fossil fuel markets – even as the conflict in

[1] https://www.gov.uk/government/statistics/energy-trends-december-2025-special-feature-article-electricity-generation-and-supply-in-scotland-wales-northern-ireland-and-england-2020-to-20

the Middle East raises concerns about a replay of the 2021/2022 energy crisis, which had direct economic costs to the Welsh economy of £5.6 billion.[2]

For policymakers in Wales, the country faces a clear choice: either to invest in its renewable resources to rebuild generation capacity and energy independence or to accept growing reliance on imported gas and English electricity – with all the costs, volatility and lost economic opportunity that that entails.

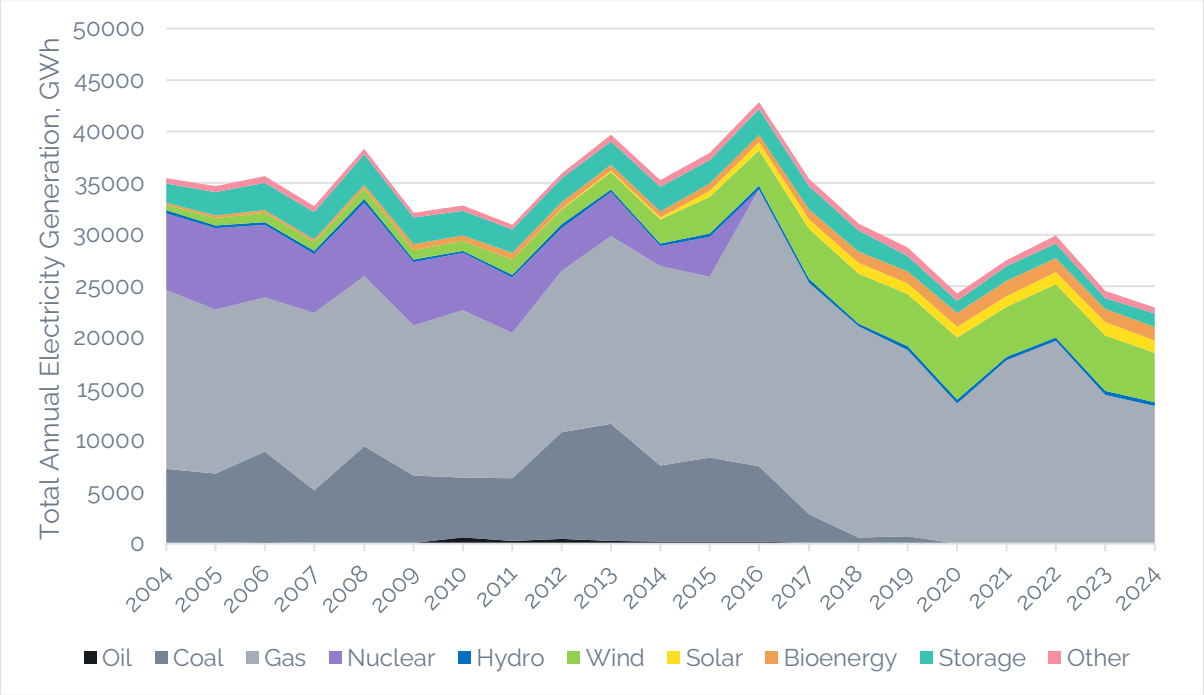
Welsh Electricity Generation

Welsh Electricity generation has witnessed transformative shifts over the last two decades. In the early 2000s, Welsh generators produced around 35TWh each year, with over 90% of this coming from Gas (49%), Coal (20%) and Nuclear (21%). The closure of Wylfa in 2016, followed by Aberthaw in 2020 saw the respective ends of Welsh nuclear and coal fired generation, though in the case of Wylfa this is unlikely to be permanent.

Wind and Solar have seen significant growth, but the overall picture of Welsh power generation is one of decline; in the past decade total output has fallen almost 50% from its peak. Wales now generates 58% of its total power output from gas, a greater proportion than any other UK nation.

[2] https://eciu.net/media/press-releases/eight-in-ten-voters-identify-energy-costs-as-top-concern-while-analysis-finds-the-last-crisis-cost-wales-nearly-6-billion

Chart 1: Wales' electricity generation mix, 2004-2024



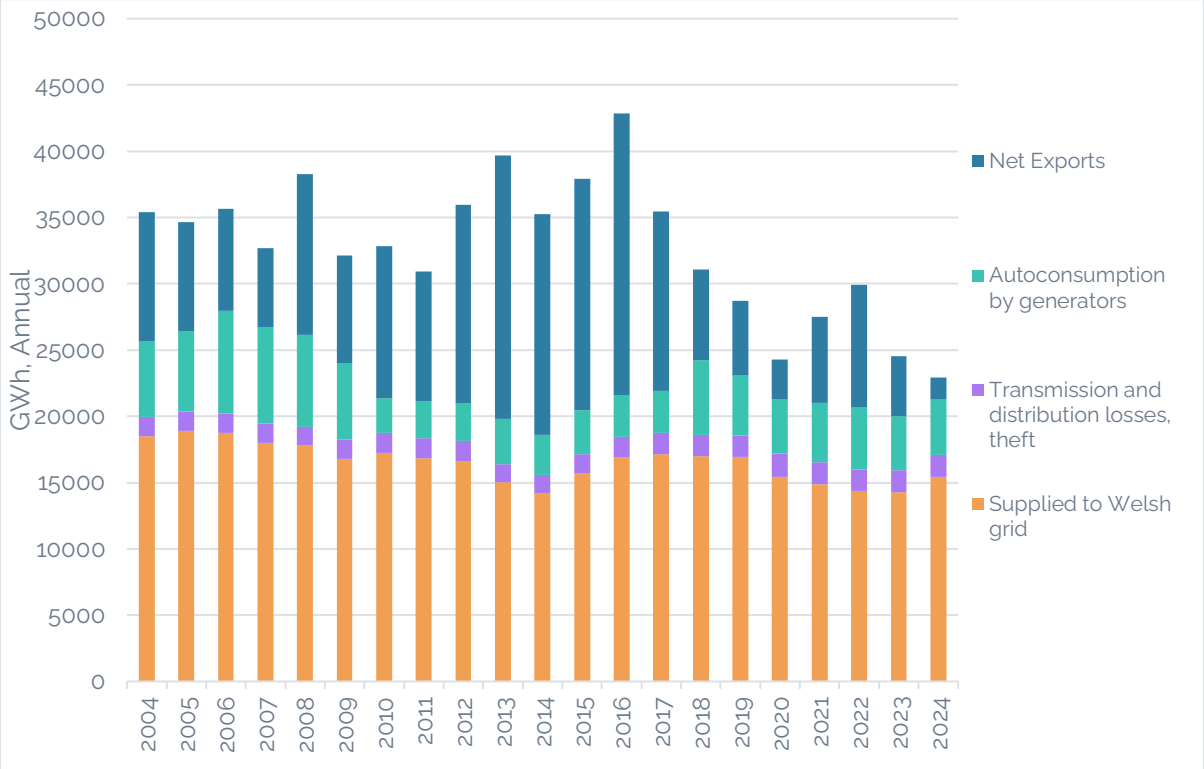
Declining surplus, falling exports and rising energy dependence

Throughout the first two decades of the 21st century, Wales has consistently produced a significant surplus of electricity beyond its own domestic consumption needs. Overall demand from Welsh consumers has fallen slightly over the period, though this trend is expected to reverse as electrification of transport and industry gathers pace.

Historically, this surplus has been exported. The ability to export via interconnectors to Ireland began in 2012, and was expanded in 2025. Flows across these links have oscillated: Welsh net exports to the EU were positive through the first few years of operation, marginally negative through most of the period 2016-2022, and have now shifted back towards a small net export. Net flows to England have historically been much larger, running at an average of over 10 TWh annually for the ten years from 2004, rising to a peak of 21.6 TWh in 2016, over 50% of total Welsh generation that year.

Since 2016 however, net power exports from Wales have completely collapsed. In 2024, Wales was a net importer of electricity from England for the first time, and overall exports only remained narrowly positive thanks to outflows via the Ireland interconnectors. This rapid turnaround has happened despite England's overall import dependency rising over the same period; England now imports over 25% of its annual consumption, but it is Scottish wind power and European interconnectors which now make up this shortfall.

Chart 2: Total Welsh Electricity Supply, 2004-2024



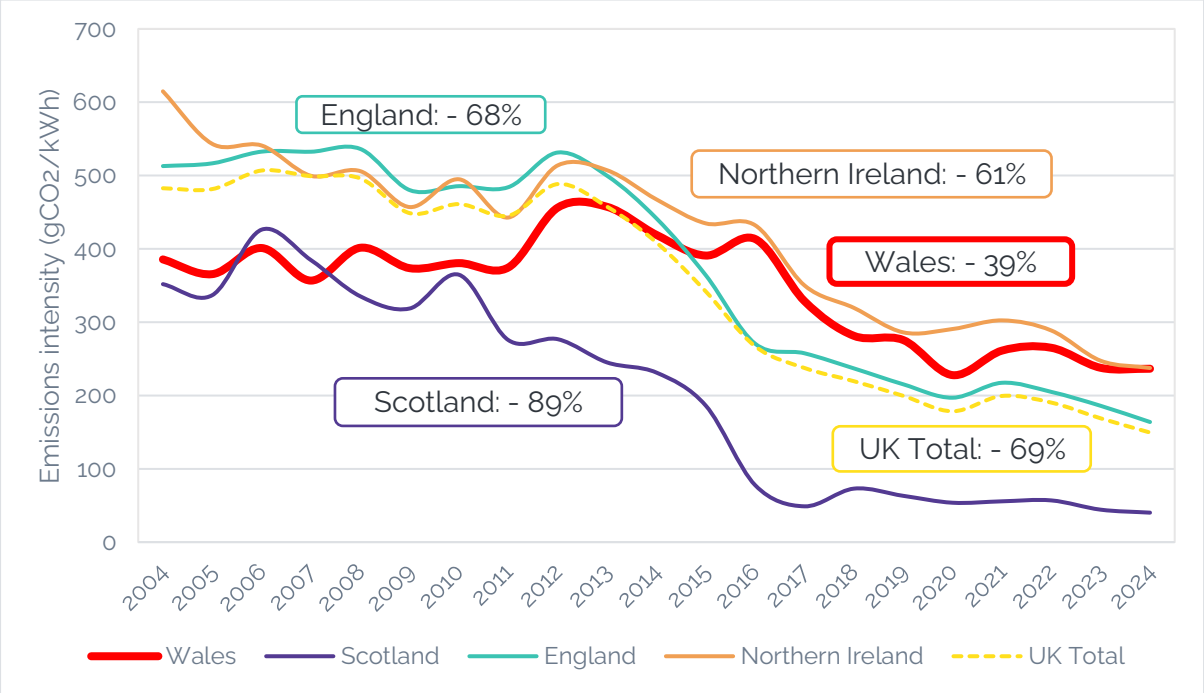
After accounting for losses and self-consumption by power generators, Welsh coverage of its own electricity needs (the ratio of total available electricity to domestic consumption) was 1.5 in 2004, rose to around 2.3 in the mid-2010s, and has since fallen to just 1.1 in 2024.

Decarbonisation

The decarbonisation of the UK's electricity grid has been rapid, driven by the growth of renewables and the closure of the UK's coal-fired generation capacity, with the final coal power station ending generation in 2024. While all nations have made deep cuts to power generation emissions, the transition has not been consistent across the UK. Chart 3, below, shows the average annual carbon intensity of electricity generation across the UK nations between 2004 and 2024.[3] Overall UK power sector emissions intensity is down 69%, with England's cuts broadly matching these. Scotland has made the deepest cuts with an 89% reduction, while Wales lags behind the other UK nations, with a fall of 39%.

[3] We calculate overall generation CO_2 intensity using average UK power sector carbon intensity figures by fuel from Staffell (2017), in line with the methodology used by GridCarbon and NESO. Total generation values are weighted by intensity values to produce an overall figure for generation intensity, expressed in CO_2/kWh. As we are comparing generation rather than consumption figures, we do not adjust for the carbon intensity of power delivered via interconnectors, or account for system losses,

Chart 3: Emissions Intensity of UK Nations' Electricity Generation, 2004-2024



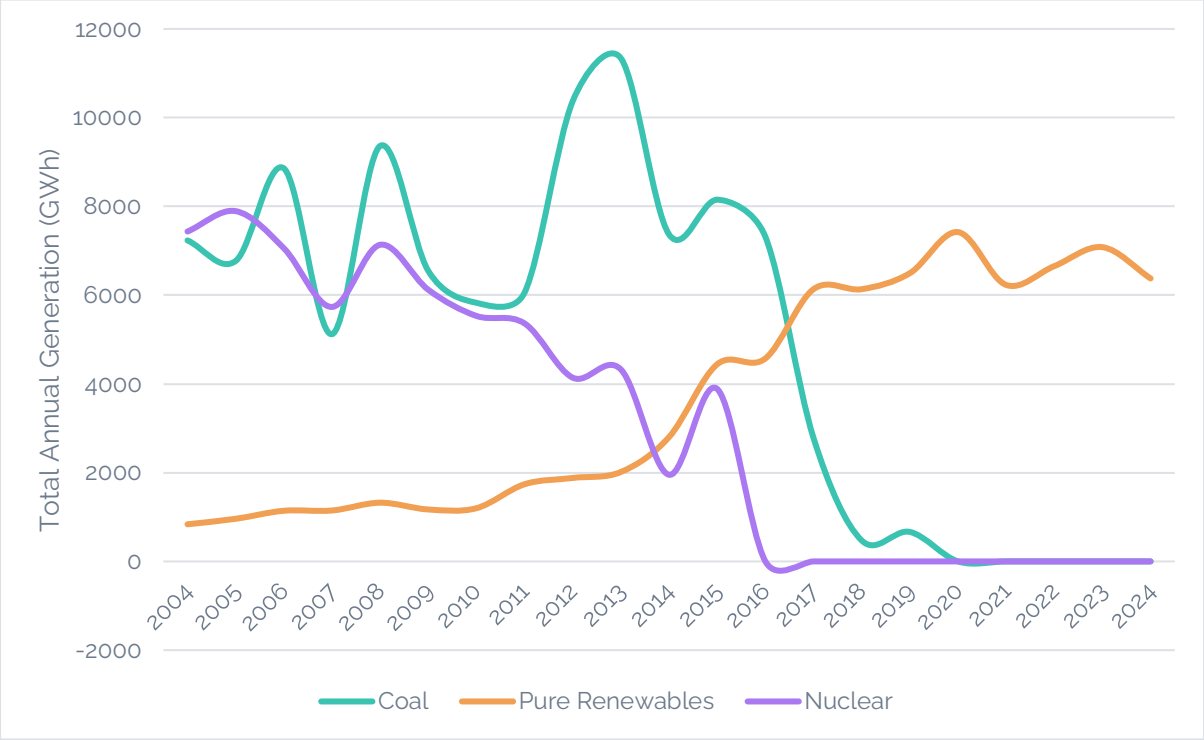
While a 39% fall in emissions intensity is undoubtedly an achievement, the result of Wales having made smaller reductions compared to other UK nations is that whereas in 2004 its emissions intensity was well below the UK average and only just above that of Scotland, it has now been leapfrogged by England and trails all parts of the UK with the exception of Northern Ireland. Power sector emissions in 2024 sat at 237g/kWh, almost 58% higher than the UK average and almost 6 times those of Scotland.

Growth in renewables

Welsh generation from renewables that use no fuels - Wind, Hydro, Marine and Solar – has grown rapidly over the last two decades, from 800GWh in 2004 to well over 6000GWh – similar to Wales's coal or nuclear generation prior to their decline. Well over half of this comes from wind, with solar having also grown sharply after generation began in 2010. As outlined above, Wales remains – just – an electricity exporter. Without these renewables, Wales would either have to import over 40% of its annual electricity from England or Ireland to meet demand or rely on gas-fired generation instead - which would leave power sector emissions intensity almost 50% higher than they are today.

Over the past 10 years, Wind generation has grown at an average annualised growth rate of 8%, slightly below the UK average of 10%, while solar output has grown at 18% - well above the average across UK nations of 13%. However, as Chart 4 demonstrates, this growth has seen a significant slowdown, which much of the growth occurring in the first half of the last decade and more or less flatlining since 2019.

Chart 4: Welsh annual generation from coal, nuclear and renewables



Where Wales performs well compared to other UK nations is in renewable generation as a share of overall domestic consumption. After accounting for losses and autogeneration by power producers, Welsh renewables generated 31% of Wales' electricity needs in 2024, down from a high of 35% the previous year. This is in line with the UK average and ahead of England's 23%, though still a fraction of Scotland, whose renewable generation after losses covers well over 100% of its annual domestic requirement.

Looking forwards

Expected demand growth

The electrification of heat and transport will drive a significant increase in electricity use in the coming decades. The CCC's balanced pathway anticipates a doubling of electricity demand by 2050,[4] while modelling by Energy Systems Catapult on behalf of the Welsh government indicates a potential tripling by that date in a scenario where industrial hydrogen production is maximised.[5]

[4] https://www.theccc.org.uk/publication/the-seventh-carbon-budget/

[5] https://www.gov.wales/sites/default/files/publications/2023-07/future-energy-grids-for-wales-insights-report.pdf

Broader industrial electrification will also play a role: steelmaking in Port Talbot is currently transitioning to electric arc furnaces, data centre and tech manufacturing is seeing rapid expansion in South Wales, and strategic planning for the decarbonisation of the North East Wales industrial cluster forecasts a doubling of electricity demand by the mid 2030s.[6] Based on recent slow growth rates of renewable generation in Wales, this sort of demand growth would instead see renewables' share of generation falling significantly, and Welsh progress slip further behind other UK nations. The likelihood is that this shortfall would ned to be met with additional gas generation, not only increasing emissions from the Welsh power sector, but requiring costly gas imports and leaving Welsh consumers exposed to future price shocks from volatile global fossil fuel markets.

Planned generation capacity expansion

To meet rising demand and regain its position as a power exporter while staying on track to meet its clean energy targets, Wales will need to rapidly expand its renewable generation capacity. Data from the Renewable Energy Planning Database (REPD)[7] indicates that the pipeline of planned projects is robust: 2.5GW of capacity of renewables that use no fuels is consented and either awaiting or under construction, which would represent an 86% increase on existing operational capacity if delivered in full. This includes 875MW of offshore wind approved during the recent AR7 Contracts for Difference (CfD) auction round, which will more than double Wales's existing offshore wind capacity.

While substantial, Wales's planning pipeline is less well developed than those in England and Scotland: both have consented pipelines of around 160% of existing generation capacity.

Nuclear generation is also set to return to Anglesey, with the closed Wylfa site having been selected to host the UK's first Small Modular Reactors (SMRs). Three reactors with total initial capacity of around 1.5GW are currently planned, but are not expected to connect to the grid until the mid-2030s.

Outlook: Wales must keep building out renewables

Wales's planned generation pipeline is encouraging, but it remains less well developed than those of England and Scotland, both of which have consented capacity equivalent to around 160% of existing generation. If Wales fails to match this pace, as electricity demand rises with electrification, renewables' share of Welsh generation will *fall* rather than rise. Wales has already lost most of its export surplus, while England imports over a quarter of its electricity - a market which a better-resourced Wales could be capturing. Expansion of non-renewable generation capacity in Wales presents an alternative route, but new nuclear capacity is the best part of a decade away at a minimum, and new gas

[6] https://nziw.wales/app/uploads/2025/04/NEWID-Cluster-Plan-FULL-REPORT.pdf

[7] https://www.gov.uk/government/publications/renewable-energy-planning-database-monthly-extract

generation would not only represent a backwards step in environmental terms but also carries significant economic risk, as illustrated by the price shocks experienced during recent years.

With 58% of Welsh electricity now generated from gas, Wales's generation mix is more exposed to international fossil fuel markets than at any point in recent decades. The risks of this dependency, combined with the structural role of gas in setting GB wholesale electricity prices via the marginal pricing mechanism,[8] were seen in the huge increases in electricity prices during the energy crisis sparked by Russia's invasion of Ukraine. Between 2021 and 2024, UK gas generators saw their input fuel costs more than double, costing an additional £27bn above the pre-crisis baseline.[9] Continued Welsh reliance on gas generation means that some £4bn of this total spike will have fallen on Welsh plants. Ongoing instability across the Middle East and shifting US energy policy continue to inject volatility into global LNG markets, pushing prices up for generators and gas consumers; domestic energy costs are already predicted to rise by up to 10% as a result of the Iran war.[10] Investing in the rapid expansion of Welsh renewable capacity is a direct hedge against price instability which lowers risk for consumers and businesses both in Wales across the UK.

Every megawatt-hour Wales does not generate itself must come from somewhere else - either gas purchased on international markets, or electricity generated in England or Ireland. Neither option keeps value in Wales. Domestically-generated renewable power, by contrast, circulates money through Welsh communities: in land rents, business rates, supply chain jobs, and community benefit funds.

[8] The Role of Natural Gas in Electricity Prices in Europe (UCL, 2023)

[9] For methodology see ECIU's previous analysis: The Cost of the Fossil Fuel Crisis in the UK (ECIU, 2005)

[10] Cornwall Insight, 2026