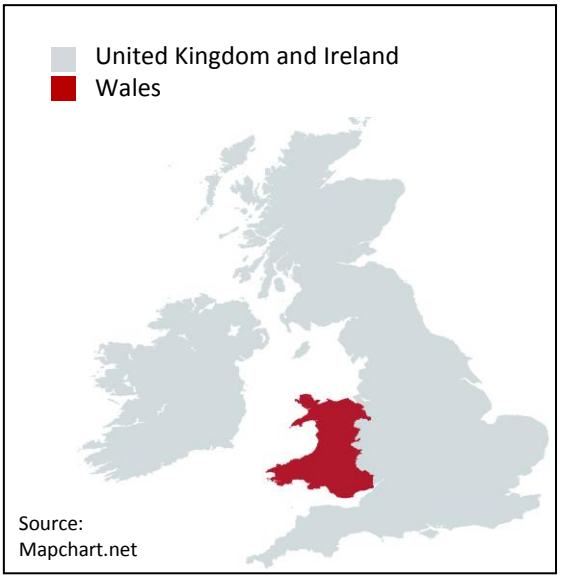
Case study: Welsh coal-exit –

A policy package for regional economic regeneration

Ana Marques, September 2019



Abstract

Wales is known for the historical importance of coal mining. The strike of 1984-85 and the program of abrupt UK mine-closures announced in 1992 are probably the most well-known events in the downsizing of coal mining. In fact, this activity experienced a long decline for nearly one century, from over 290 thousand workers in the 1920s to less than 500 in 2016.

This case study identifies the main reasons and circumstances of this decline and compiles a list of policy measures and programmes that have been implemented since as early as the 1930s to mitigate the economic impacts of coal mining contraction.

Benefiting from the extensive and holistic package of policies documented, the Welsh regional economy overall has recovered, demonstrating that it is possible to reconstruct the social and economic fabric of a region historically dependent on coal.

Building on extensive literature review and historic data series analysis, success factors and weaknesses are identified. Important lessons are drawn from the experience of Wales, in the context of the United Kingdom (UK), which may be of interest for other coal regions in transition. In order to facilitate experience-sharing, the conclusions are formulated along some of the main questions that active coal-mining regions are facing today.

1. Relevance

The Industrial Revolution brought unprecedented human development. Coal helped to operate this transformation. However, burning coal produces health-damaging air pollutants and climate-damaging greenhouse gases. In 2016, the Paris Agreement entered into force, ratified by 176 countries. Fulfilling the Paris Agreement means that 80-90% of coal reserves worldwide cannot be exploited [UNEP, 2017]. In parallel, renewable energy is becoming increasingly competitive, most noticeably in the wholesale electricity market. Some coal fired power plants cannot compete and no longer operate the number of hours needed to ensure their profitability. They are at risk of becoming stranded assets. Not surprisingly, in 2016, for the fifth consecutive year, global investment in new renewable power capacity was double the investment in fossil fuel generating capacity, reaching USD 249.8 billion [GSR2017, REN21]. In this global context, it is plausible that additional regions will exit from coal.

While the coal phase-out will deliver climate and air quality benefits at global-scale, coal-mining regions will face hardships. Although each coal-mining region and community is unique, they have also many similarities particularly regarding the challenges faced, such as generally low skilled workforce. The experience of Wales offers valuable learnings on how to restructure the regional economic fabric towards a more prosperous and healthy future.

2. The growth and decline of coal mining in Wales

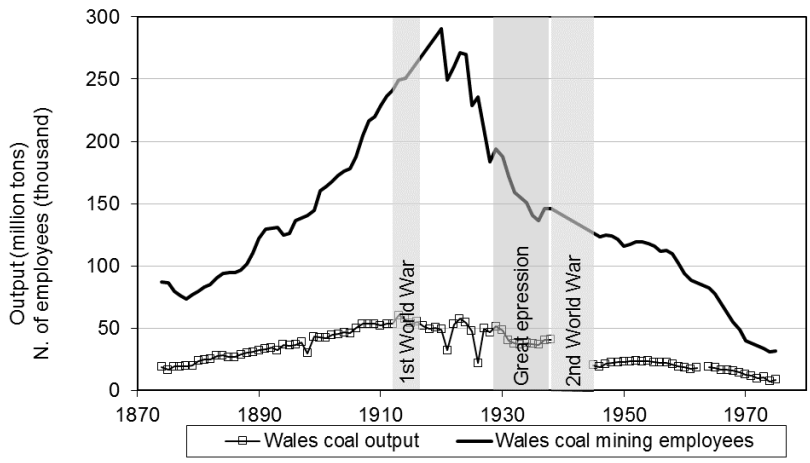


Figure 1 – Coal mining in Wales (1874-1975)
Data source: UK Data Archive, 2002 and 2004. See notes in Sourcebook

Between the emergence of the Welsh coal mining industry in the 19th century and its ongoing phase-out, it faced a succession of prosperity and decline periods (Figure 1), which suggests a **persistent vulnerability of the coal economy** to changes in the macro-economy and evolving trade-, energy- and environmental-policies.

Multiple factors contributed to this, including:

- coal mining employment and coal production levels are highly correlated and they are exposed to **fluctuations in coal price and demand**;
- mining communities relied on **coal as main economic activity** (Figure 2);
- coal mining tends to attract **low skilled workers**, which for facing the risks and dangers of the profession tend to earn a higher pay than other manual workers, having difficulty in finding alternative employment in times of decline.

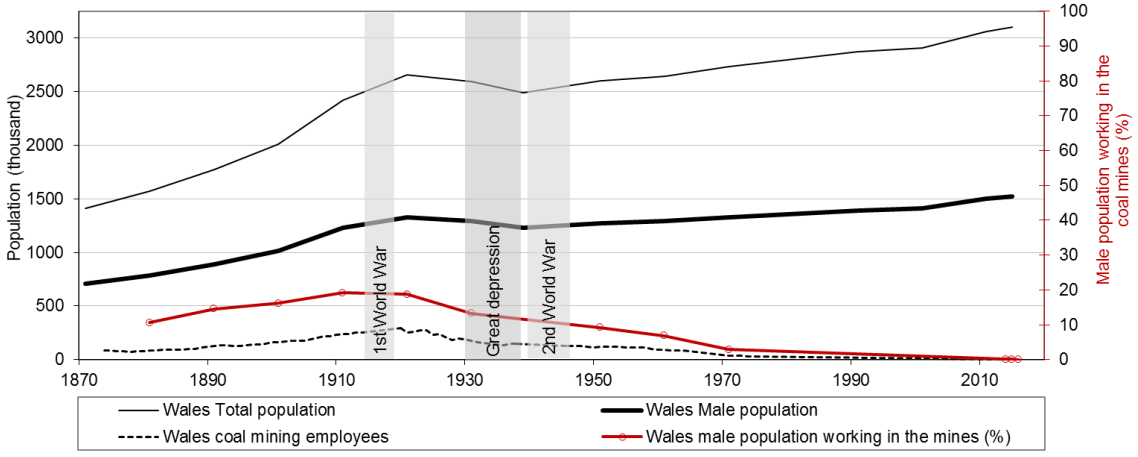


Figure 2 – Weight of coal employment (1874-2016) Data source: UK Data Archive, 2002 and 2004.

The coalfields of Wales initially attracted workers between 1851 and 1911. Coal mining became very important for the economy - **in** the 1910s **nearly 20% of Wales' entire male population worked in the coal mines** (Figure 2; coal mining was a male profession). The Welsh annual coal output peaked at 60 million tons by 1913, and employment peaked at 290 thousand miners at the end of the First World War (Figure 1). Between 1913 and 1930, Wales' coal production corresponded to 20-22% of the UK's total, decreasing to 12% or less after the Second World War [raw data: UK Data Archive, 2002 and UK BEIS, 2017c].

Miners worked in dangerous conditions, risking injury, mining-related diseases and death. The workforce unionized seeking higher wages and improved safety. From the early 20th century, miners' strikes led to violent battles with the police. Wales' context was strongly marked by the social and political movement that emerged.

This class struggle was felt until the 1980s and was often accompanied by political efforts to limit **union activism**, as the strikes threatened energy security. The **national strike** held in 1984-1985, as others before, led to **confrontations and violence** between miners and the police. [Merrill and Kitson, 2017]

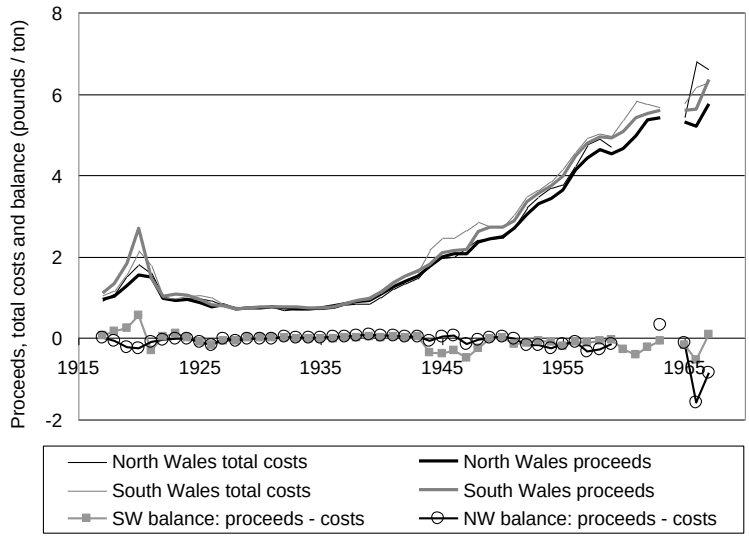


Figure 3 – Coal mining in Wales: historic proceeds, total costs and balance (1917-1967) Data source: UK Data Archive, 2002 and 2004.

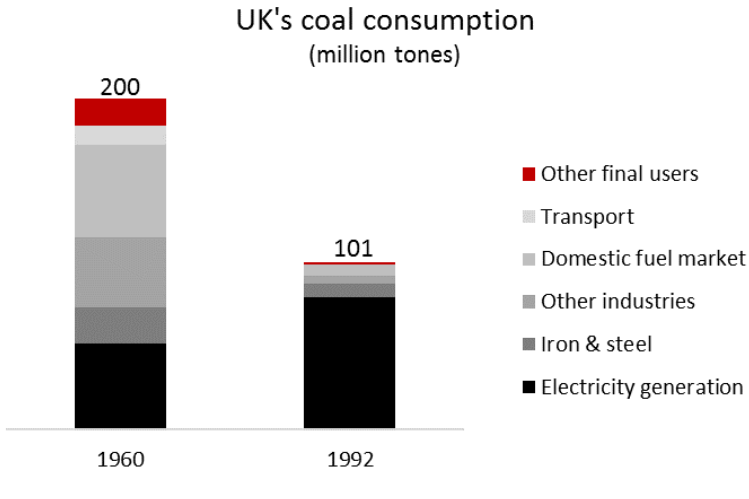


Figure 4 – Coal industry became dependent on electricity generation Data source: UK DTI, 1993.

As coal seams became more difficult to explore, production became increasingly **costly** and **uneconomic** (Figure 3). Reflecting this situation and a change in political ideology, the UK coal mining industry was **nationalised** in 1946.

The **Clean Air legislation** was established in 1956 and the UK's domestic **coal demand continued to decrease** throughout the 2nd half of the 20th century.

By the 1960s, the coal industry was becoming dependent on the also state-owned electricity generation industry – both sectors were largely protected from competition. By 1992, 79% of the coal consumed in the UK was used for electricity generation (Figure 4) [UK DTI, 1993].

In the period 1985-1992, British coal remained 50-100% more expensive than **imported coal** on a per energy unit basis (British coal had less energy and more sulphur per tonne) [UK DTI, 1993].

In the 1990s, electricity generation was privatised and EC rules were reviewed to allow the use of gas for electricity generation, significantly decreasing coal demand.

The **inability of the domestic coal industry to compete with imported coal** was observed in other European countries as well. The coal industry became heavily **dependent on public grants and support.** Between 1979-1992, the nationalised Coal industry received nearly 18 billion pounds in **assistance** [UK DTI, 1993].

The Welsh coal industry lost more than 75 thousand jobs between 1947 and 1969 (Figure 1) and the number of collieries in Wales decreased from 155 in 1953 to 44 in 1975 [UK Data Archive, 2004], despite the nationalization. In 1992, British Coal announced a program to close 31 of its remaining pits. In 1994 the British Coal Corporation's **debt was written-off** and its assets were privatized.

Employment in the Welsh coalfields decreased from over 32 000 deep mining jobs in 1975 to approximately 400 jobs in 2016 [UK BEIS, 2017]. The closure of collieries had severe impacts on mining communities, which tend to persist, particularly in more remote areas.

The UK **continues to provide support to the coal industry**, for example through the capacity mechanism introduced in 2014 to ensure security of electricity supply [Burg and Runkel, 2017].

Air pollution and climate change awareness

In 2005, the Stern Review concluded that **early climate action makes economic sense**. The International Monetary Fund estimated that, in 2015, the post-tax subsidies to coal in the UK, mostly corresponding to **externalities from local air pollution and global warming**, amounted to USD 28.62 billions (nominal), corresponding to nearly 1% of the GDP or USD 441 per capita per year [IMF, 2015]. Aberthaw coal-fired power station alone represented 37% of Welsh power sector greenhouse gas emissions in 2016 [Welsh Government, 2018f]. The UK's remaining fleet of coal power stations is relatively inefficient and would need substantial spending to remain in operation. In December 2016 the UK government **set the end of unabated coal** for 2025 [UK BEIS, 2016].

3. Fostering regional economic regeneration

The short-term response of the UK government to the abrupt loss of employment from coal mine closures in the 1980-1990s, recognizing the serious socio-economic impacts of pit closures and the concentration of redundancies in particular localities, consisted of **subsidies to sustain the coal mining industry** until privatization, thus enabling **phasing of mine-closures**, and a **package of measures to assist coal mining communities**, including **welfare payments** [UK DTI, 1993].

In a wider perspective, actions taken by government to address the socio-economic consequences of the coal industry's contraction and contribution to the economic restructuring and regeneration of Wales date as far back as the 1930s and continue until today. **Industrial, planning and employment policies** for regional regeneration have been corner stones of UK's policy to tackle unemployment from the downsizing of the coal industry throughout most of the 20th century. **Subsidies** were provided for capital, equipment, labour and buildings to **attract investment** to the target regeneration areas, and were most effective when channeled through dedicated policy delivery instruments.

Table 1 provides a shortlist of measures implemented by the UK Government (highlighted in grey), the European Union (blue) and the Welsh Government[1] (orange) – [adapted from Merrill and Kitson, 2017 and T.Casey, 2002; other sources indicated where applicable]. The measures compiled are very diverse. In addition to those already mentioned above, include also **investment in land reclamation and industrial infrastructure**, **retraining** of former miners and **tailored social programmes** for coal mining communities, among others.

[1] The Welsh Assembly was established in 1998, after which the devolution of certain powers to the region began. The Welsh Government has no direct legal authority over the coal industry policy and operations, other than a *de facto* veto power over licensing of new coal-mining operations [Wales Act 2017].

Table1 – Shortlist of measures to promote Wales' economic recovery during coal mining decline

Year	Policy / Scheme	Gov.	Main objective	Results / Learnings / Remarks
1934	Industrial Transfer Board	UK (Labour)	Retraining, grants and loans for miners wishing to relocate	Migration depleted the social capital necessary for renewal. It was clear that the industrial base needed to be revitalized.
1934	Special Areas Act	UK (Labour)	Improve infrastructure and encourage industry	For areas affected by decline of traditional industries (coal, steel, etc.).
1938	Nationalisation of coal resources	UK (Conser.)	Rationalisation of coal mining works [Gill, 2019]	Government and mine owners agreed on company mergers of contiguous mines.
1947	Industrial Development Certificate (IDC)	UK (Labour)	Favoured areas of higher unemployment	For any new factory covering above 5,000 square feet. The process was cumbersome and ineffective for regional development.
1960 - 1963	Local Employment Act	UK (Conser-vative)	Stimulate private investment in industry	Building grants of 25% and cash grants of 10% for machinery. First direct employment policy.
60s–70s	National Plan	UK (Labour)	Stimulate private investment in industry and employment	Tax incentives, subsidies and grants to support new and relocating firms.
1966	Industrial Development Act	UK (Labour)	Stimulate private investment	Extended regional development aid. Investment grants up to 40%.
1967 -68	Special Development Areas	UK (Labour)	Promoted development and subsidized labour	Mainly for declining mining regions. Building grant up to 35%. Subsidy up to 3 £/week/employee.
1969	Community Development Project Program.	UK (Labour)	Promote development by supporting poor communities	Concluded that local poverty was determined by macroeconomic factors.
1974 - 1976	Early retirement & improved pensions for coal miners and mobility policy	UK (Labour)	Reduce coal price, decrease excess staff. Retain younger men and give mobility to families [Gill, 2019]	When a pit closed, miners not accepting redundancy were placed in other pits (overstaff). Allowed families to move from the valleys to areas with alternative jobs.
1976 - 1992	Welsh Development Agency (WDA)	UK (Labour)	Promote economic regeneration, industrial competitiveness, employment	Recognized success. Only supported competitive businesses that could provide stable employment and 15% return on investment.
1992	Assistance package for Welsh coalfield communities (£43 million)	UK (Conser-vative)	Develop new employment opportunities on pit closure areas	Included a program for training, counselling and job finding, a Coalfield Area Fund, access to European Structural Funds, new Enterprise Areas and inward investment promotion. [UK DTI, 1993]
1992 - 1993	Redundancy terms for lost jobs of mine closures	UK (Conser-vative)	Compensation for lost job due to mine closures	Miners received on average £23 000 for 15 years service and white collar staff £27 000. Around 9500 workers accepted these terms [UK DTI, 1993]
2000 - 2016	European Regional Development Fund (ERDF) & European Social Fund (ESF) [Welsh Gov, 2016]	EU, UK, Wales	Fund projects to stimulate business activity and create jobs (ERDF) and training (ESF)	€4.04 billion in 2000 - 2013 [Wales Audit Office, 2014]. In 2007-2016, the funds created 36,970 jobs and 11,925 businesses, assisted 18,645 enterprises, helped 72,700 into work and 56,055 into further learning.

Year	Policy / Scheme	Gov.	Main objective	Results / Learnings / Remarks
Ongoing	Measures on Youth education and skills	Welsh	Counter child poverty and poor educational performance	Provision of pre-school, improved teaching, and young people mentoring and engagement
	Jobs Growth Wales	Welsh	Employment & tackle poverty	Six-month placement with firms at minimum wage.
	Public procurement policies	Welsh	Local sourcing supports small and medium-sized enterprises	Public authorities are often the largest budget holders within their jurisdiction.
	Public sector employment	Welsh	Tackle unemployment and poverty	Public sector employment, as percentage of total employment: Wales 27.6%, UK 21.6% [StatsWales]

Source: adapted from Merrill and Kitson, 2017 and T.Casey, 2002; other sources indicated where applicable.

It is difficult to determine the effectiveness of many of the national and regional policies implemented for economic development and renewal, partially because of some spatial/temporal overlaps and the efforts/ data needed to carry out such evaluations, but mostly because of the coal industry's interdependency with other sectors of the economy. The relation with the coal-consumer sectors has already been highlighted (Figure 4). Also important is the interaction of the different sectors in the labour market, which may result in surplus, or scarcity, of suitable workers.

Figure 5 shows the changing importance a few of the male occupations in Wales between 1911 and 1971. Mining and quarrying and agriculture exhibit very significant decreasing trends while other sectors grew, such as metal manufacturing and engineering. Observing the historic time series, the decades of the **1950s and 1960s** are very interesting in the perspective of a coal phase-out transition: although coal mining jobs decreased by over 68 thousand posts between 1951 and 1969, from around 117 thousand to 49 thousand (Figure 1), the unemployment rate never rose above 4% in that period (Figure 6), as **jobs created in other sectors were able to absorb workers in large numbers**. In the 1970s-1980s, employment declined in additional sectors, with a generalized economic crisis.

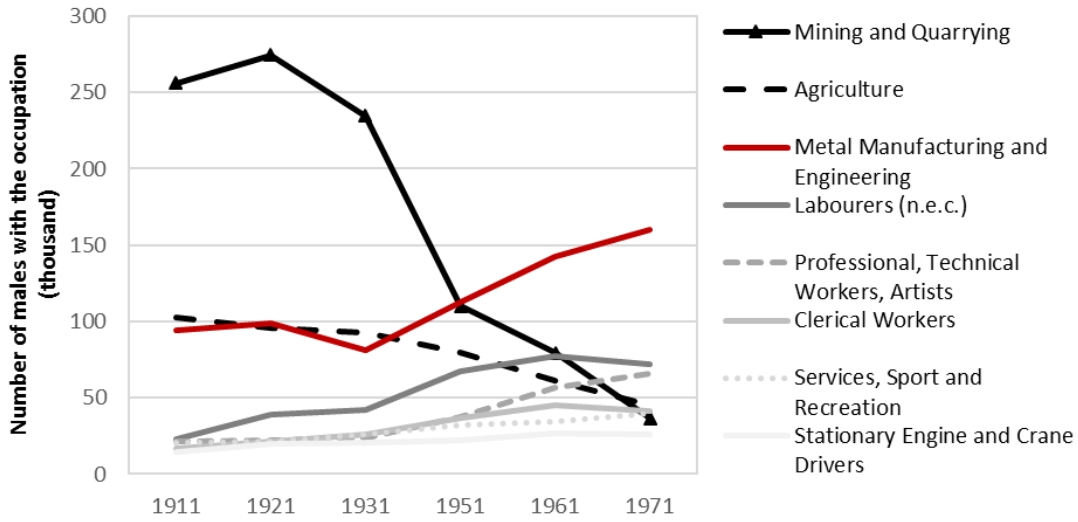


Figure 5 - Labour in Wales: shortlist of male occupations (1911-1971)
Data Source: UK data Archive, 2002b.

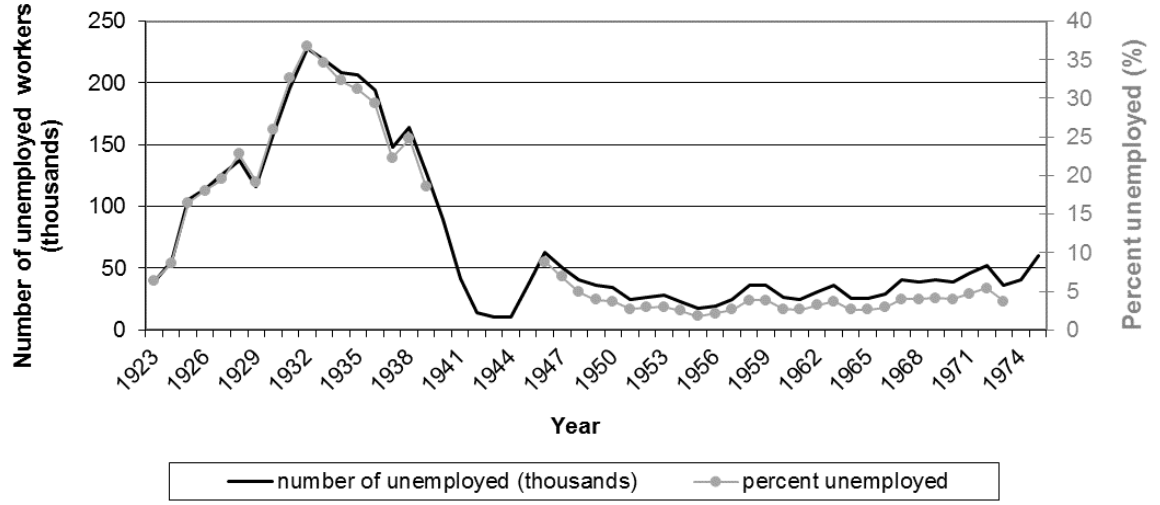


Figure 6 - Wales historic unemployment 1923-1975 (annual average values)
Data Source: UK data Archive, 2004.

Although a comprehensive assessment of the effectiveness of the policies listed in Table 1 is beyond the scope of this study, the table includes a brief summary of the available results. The channeling of **public funding** for the Welsh economic recovery from European Funds (ERDF and ESF) are highlighted. It is also worth taking a few moments to look into the Welsh Development Agency in more detail.

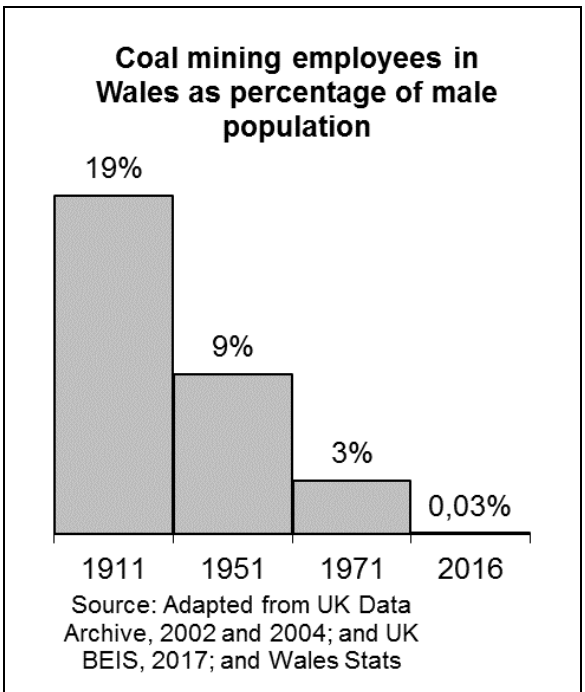


Figure 7 – Change in weight of coal mining jobs in Wales over one century

Welsh Development Agency (WDA): a successful delivery-instrument of regional development policies (1976-1992)

Between 1983 and 1991, the WDA attracted **inward private investment** which amounted to more than £4 billion. The investors included Sony and Align-Rite (to Bridgend), Bosch (to Cardiff), and Hitachi (to Hirwaun), numerous companies in the automotive components sector - Ford, Toyota, Rover, Jaguar, Mercedes and BMW, and companies in the electronics sector such as Panasonic (WDA, 1991 in [Merrill and Kitson, 2017]). The WDA also attracted the maintenance facilities of British Airways to Cardiff Airport and supported Admiral Insurance Public Limited Company to locate in Wales.

Land reclamation and infrastructure development, particularly roads and telecommunications**,** is a condition to attract inward investment. In the first three years of operation, WDA spent 17% of its budget on land reclamation of former collieries and 72% on industrial sites and infrastructure.

[adapted from Merrill and Kitson, 2017]

Renewable energy: a new chapter in the transition

In 2017, the share of electricity generated from renewable sources in Wales reached 20%, showing a growing trend. In terms of installed capacity, wind is at the lead with 1753MW out of the 3098MW total electricity generation capacity from renewable sources in Wales [UK BEIS, 2018c]. Although good progress is being made, challenges to the deployment of renewable energy in Wales include planning and development barriers, grid connection limitations and financial risk [IWA, 2017].

Important long-term foundations are being laid-down to further enhance the use of renewable energy in Wales, including development of supportive planning and legal frameworks, building local capacities through Wales' Universities and business centers, and enable participation by local communities and businesses.

In addition, the Welsh Government procured 100% renewable electricity for use in public services since April 2017 (50% of which is generated in Wales).

By 2030, the Welsh Government proposes to generate 70% of Wales' electricity consumption from renewable sources and to have 1 GW of locally owned renewable electricity generation capacity [Welsh Government, 2018f].

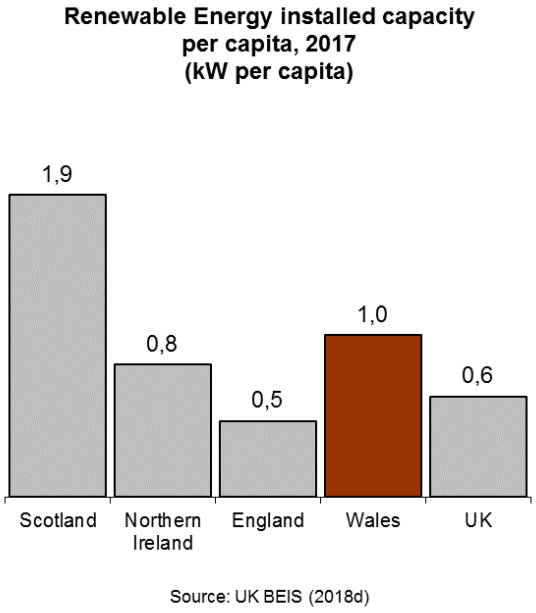


Figure 8 – Renewable energy installed capacity per capita in UK Countries

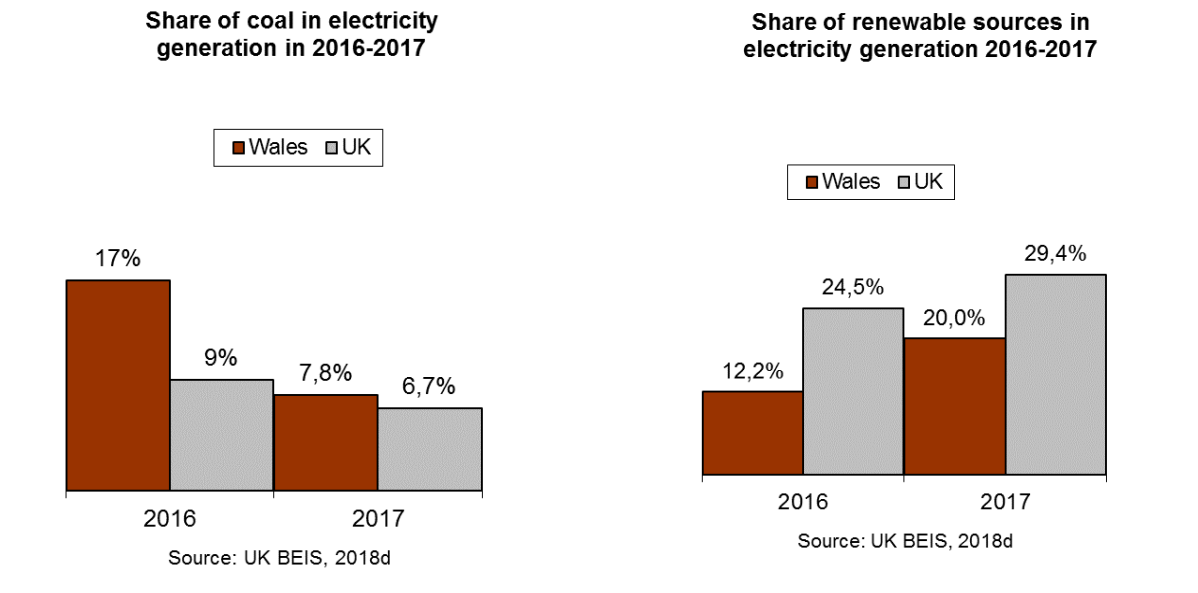


Figure 9 – Share of coal and renewable energy sources in electricity generation in Wales and the UK

4. Socio-economic recovery and enduring challenges

Past and ongoing efforts have contributed to the **restructuring and regeneration of the economic fabric** of Wales in the wake of coal mining decline. Outmigration was successfully counter-acted and the population grew continuously since the 1950s (Figure 1, in section 2). The last two decades show **new job creation** - workplace employment in Wales grew by 152 900 jobs between 2001 and 2015 - and continuously **increasing wealth generation** (Figure 10) [StatsWales].

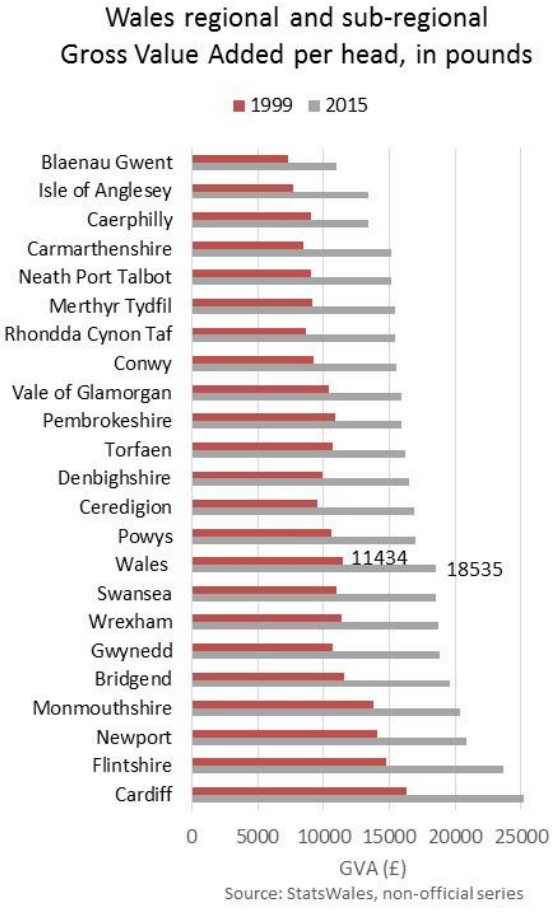


Figure 10 - Gross value added per capita

Nevertheless, several weak aspects remain, including below average performance on regional indicators, such as the unemployment rate, and geographic asymmetries that show that the former coalfields continue to be disadvantaged (Figure 13).

Wales has the **highest unemployment rate** among UK Countries (Figure 11), at 8.2% in 2013 [ONS, 2013] and the largest percentage of disabled and work limiting disabled (Figure 12), at 14.3% in 2012/13 [ONS, 2013], which likely includes **"hidden unemployment"**, i.e. low-skilled workers encouraged to exit the labour market by the benefits system and scarce employment opportunities. Social welfare support remains important for coalfield communities. Between 2008 and 2016, the Welsh Government's **expenditure on social services** increased by 28% posing a challenge in the context of budget restrictions.

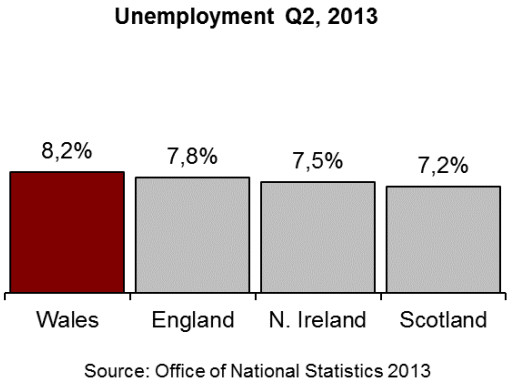


Figure 11 – Unemployment Q2, 2013

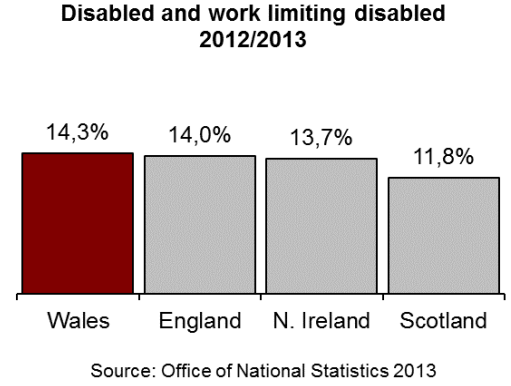


Figure 12 -Disabled and work limiting disabled

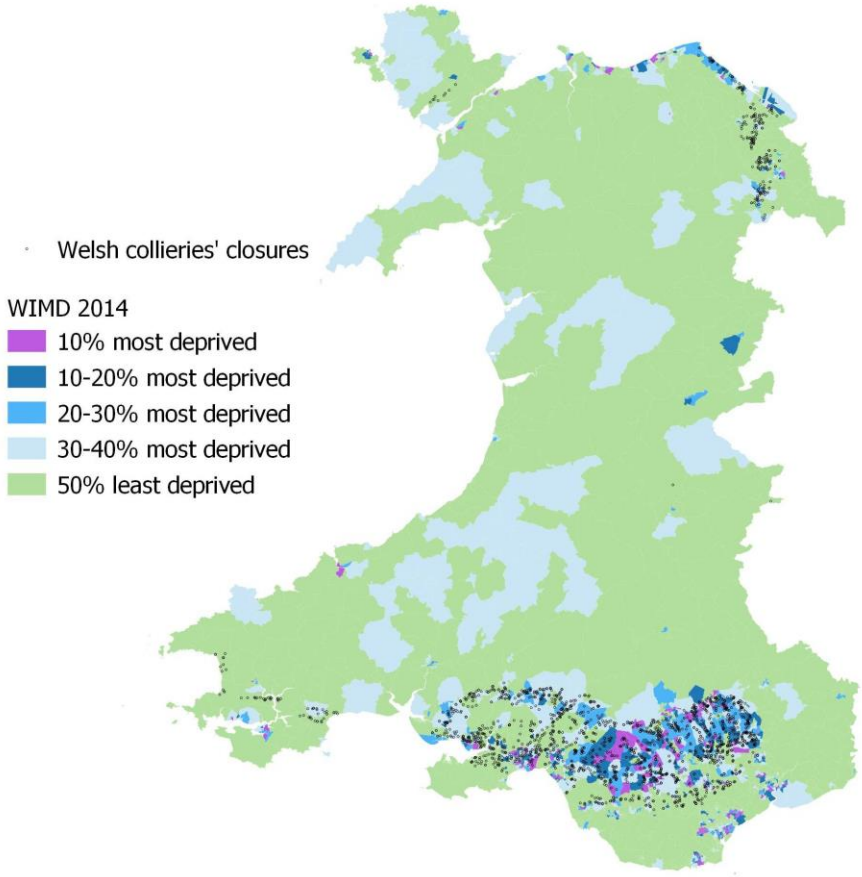


Figure 13 - Welsh Index of Multiple Deprivation[2] (WIMD) 2014 areas and location of historic collieries

Data sources: WIMD 2014 Lower Super Output Areas Map (July 2015 revision) in Geographic Information System file (Welsh Government, 2016c); Collieries closure (1947-2013) map in Google Earth format (Northern Mine Research Society, 2018)

[2] Deprivation is defined as the lack of access to opportunities and resources. The **Welsh Index of Multiple Deprivation** was developed to measure relative deprivation in Wales, considering employment, income, education, health, safety, physical environment, access to services and housing. [Welsh Government, 2016c].

There is **uneven geographic distribution of the job opportunities** in Wales, with the largest proportion of new positions being located in Cardiff (28%) (StatsWales, 2018). Between 2005 and 2017, the employment rate remained systematically lower in the main mining areas, namely South Wales and West Wales and the Valleys (StatsWales, 2018). One of the main **challenges** to inward investment and job creation is the rugged **topography** of the coal mining “Valleys".

The average **wealth generated per person remains lower in the coalfields**, such as in Blaenau Gwent, Caerphilly, Neath Port Talbot, Merthyr Tydfil, Rhondda Cynon Taf and Torfaen (Figure 10) [StatsWales].

Overall, Wales has the **lowest regional gross value added (GVA) per capita** among UK countries, reaching £19140 in 2016 and having remained at around 73 per cent of the UK average between 1999 and 2016 [Office for National Statistics, 2016].

5. Conclusions

Although coal mining was historically such an important activity in Wales, overall the region was successful in **diversifying** economic activities and **retaining the workforce** for its **economic renewal**. This section is structured along some of the key questions that the coal regions in transition face today, to better facilitate knowledge-sharing.

When did the coal mining downsizing start?

The Welsh coal mining industry experienced a **long decline** since the 1920-30s due to multiple reasons such as diminishing demand, legal constraints on air pollution, inability to compete with imported coal prices and concerns with the stability and security of supply. Coal mining **unprofitability** was reported around 1946, the time at which the industry was **nationalized**. The **periods of accelerated job loss** in coal mining occurred during the Great Depression, during the 1960s and during the crisis of the 1980s. The use of industrial policies to indirectly address coal-mining unemployment and urban redevelopment dates as far back as the 1930s-1940s but it was only in the 1960s that they were directly used to attract private investment and create employment, which contributed to **higher diversification of the economy** in Wales. In the 1970s and early 80s, a **more holistic approach was taken to the regional economic regeneration of Wales**, which was instrumental in further diversifying the economy of the region and enabling further investments, as discussed next.

The hardships caused by the abrupt downsizing of the coal industry during times of generalized economic recession is more severe than if done progressively while creating other job opportunities. This is shown by the **prosperity climate experienced in the 1960s** despite the cut of 53 000 jobs in Welsh coal mining [UK Data Archive, 2004] – Figures 5 and 6. Investment in manufacturing and steel enabled the total population of Wales to grow by 3.3% [Davies, 1990] and kept the unemployment rate between 2.6 and 4.1% [UK Data Archive, 2002b] (Figure 6). On the contrary, the **economic recession of the 1970s-80s** affected all sectors of the economy. Between January 1976 and September 1982 unemployment rates in Wales rose above 8% [adapted from Merrill and Kitson, 2017].

When planning for the transition it is important to consider not only the direct coal mining employment but also to do a wider **coal value chain analysis** to anticipate the full impacts of the "coal exit" on the economy.

How was an alternative economic model for the region developed to create new jobs?

Wales successfully retained the social capital necessary for its economic regeneration by creating **alternative employment** opportunities, most notably in steel-works and manufacturing in the 1960s and in electronics and the automotive sectors in the 1980s-90s. Main success factors identified:

- **Spatial planning and industrial policies** created **incentives** to inward investment on business development and job creation, while addressing **infrastructure** gaps and **land reclamation** of derelict colliery sites.
- a **dedicated delivery structure** led the implementation of regeneration policies and attracted inward investment.
- a **loan facility for local small and medium size enterprises** supported the development of local value chains to help retain wealth in the region.
- **higher education and research institutions** foster **innovation** and prepare the **workforce** for the modern markets.

Knowledge-based industries are currently recognized as an important factor to reduce risks and increase economic resilience. Renewable energy's potential to attract investment has also been recognized. The legal frameworks are evolving to enable and incentivise local participation and ownership, which can increase local and regional value retention.

Which weaknesses / threats were identified?

Lack of dialogue with mining communities over the process was the major weakness. The Welsh case suggests that a partisan bipolarization on the coal economic issues may stand in the way of a consensual transition with changing policies between Conservative and Labor Governments (Table 1). Nationalization of coal mining and electricity generation industries delays recognition and acceptance of the long-term decline of the coal industry and further commits public funds to subsidize it. Transitions that are occurring elsewhere show, that it is important to **inform and engage social partners, affected workforce and communities** in a constructive dialogue to support the necessary economic transformation in a climate of social cohesion, working together to develop a **viable vision for the future economic prosperity**.

How was the transition financed when the coal industry was facing insolvency?

In Wales, in the context of the UK's transition, this was done by strategically **channeling public funds and support and leveraging private investment**, including through the mobilization of national and European funds. **Public procurement** policies are also used to stimulate the local economy. Public sector procurement spend in Wales is approximately £6bn per year [Welsh Government, 2018f].

Although a comprehensive identification of the amounts spent goes beyond the scope of this work, the spending identified includes:

- 1960-70s **Tax incentives, subsidies and grants** for new and relocating firms
- 1992, **regional and training policies** for Welsh pit closure areas (£43 million) [UK DTI, 1993]
- 1992-93, **redundancy terms** for jobs lost with mine closures in the UK (£226 million)
- 1981-84 EU funded **loan facility for small enterprises** in Wales (£5 million in 3 years)
- 2000-16 **EU funding** £5.3 billion to support development of most deprived Welsh communities.

The Welsh Government's annual budget is also an important source, with Wales being the UK Country which spends the highest share of its budget on social protection: 46% in 2016 [HM Treasury, 2017].

Even if the renewal of the regional economy comes at a high price, it should be noted that keeping the coal industry "alive" through **public spending is also very costly**, possibly more, and with less positive future perspectives. Here are a few examples:

- 1979-1992, the National Coal Board/British Coal Corporation received nearly 18 billion pounds in public **grants** [UK DTI, 1993]
- 1990, British Coal secured 3-year **contracts for electricity generation** above market prices estimated to be more than £2 billion passed through to captive customers [Pearson and Watson, 2012]
- 2007-08, the UK provided £ 1.8 million Coal Investment Aid [OECD, 2018]
- 2015-16, under the **UK capacity mechanism**, bilaterally agreed contracts worth £114 million were awarded to two coal power plants, and for 2017, coal-fired power plants won contracts worth £128 million [Burg and Runkel, 2017].

How are the coal industry brownfields and other legacy problems being dealt with?

During the privatisation of the coal industry in the 1990s, the obligation for restoration of the coalfields, and corresponding financial responsibility, was transferred from the UK Government to the private Coal Companies. However, this mechanism failed as companies under financial pressure did not make funds available for restoration, despite the contractual requirement, thus placing a heavy financial burden on the State. Subsequently, private operators seeking planning permission for new open pit mines should provide financial guarantees for site regeneration,

such as a bond, to the satisfaction of planning authorities [Welsh Government, 2009].

The UK Coal Authority manages the coal mining legacy problems, including mine water pollution and subsidence damage claims which are not the responsibility of licensed coal mine operators. The bill is paid through grants to the UK Coal Authority. In 2016-17 the liabilities amounted to £3 billion [UKCA, 2017].

How are negative impacts of mine closures on local communities being mitigated?

The end of mining left former mining communities impoverished and disadvantaged (Figure 13). The **diversification of economic** activities is essential to increase resilience of communities to global economic pressures. Mining communities are not equipped to make this transition; it requires **governmental policies and delivery instruments** as shown in Chapter 3.

It is difficult to determine the extent to which local circumstances in Wales' coalfields were improved by the different national and regional policies for economic development and renewal. The effort required goes well beyond the scope of this study. Nevertheless, based on the analysis of the available literature, the main measures identified for mitigating the social and economic impacts of the abrupt downsizing of the UK coal industry in the 1980s are:

- Redundancy payments and early retirement **welfare** (1974-76/92-93);
- Miners' mobility at pit closure allowed families to relocate (1974-75);
- Continued State support to allow for **phased** mine closures, in parallel with **employment policies**.

It is essential to make an **objective assessment of the strengths and weaknesses** of the region and individual sites. Difficulties in attracting investment to the remote Valleys' communities suggest, rugged topography, poor access and lack of critical mass impede the establishment of large industry.

The skills that former miners possess will likely not be adequate to re-enter the market and seize new employment opportunities. Former mining communities benefited from measures to support **retraining and business creation**. However, the economic renewal of the mining communities remains a challenge, particularly of the smaller and more remote ones. **Programs tailored to these communities**, building local, strengths and resources, promoting engagement and local ownership, are essential to mitigate poverty and long-lasting disadvantage. The Welsh Government's program Vibrant and Viable Places, for example, supports the refurbishment of town centres by local authorities, creating local jobs for manual labour and bringing multiple benefits to the local economy.

Is it important to set time bound targets?

The future of the coal industry should be seen in the context of the wider **energy policy**. The UK and Welsh governments have defined multiple policy objectives, namely energy security, affordability and climate protection which must be considered in long-term planning. It is not always possible to avoid **tension and trade-offs between policy objectives**, and this is perhaps the biggest challenge for policy makers. **Clear time-bound targets** guide long-term planning and drive investment in lower-carbon generation technologies, such as UK's end date for unabated coal power generation [UK BEIS, 2016] and the Welsh Government's renewable energy targets [Welsh Government, 2018f].

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Map of Wales, United Kingdom and Ireland – mapchart.net. WIMD 2014 Lower Super Output Areas Map (July 2015 revision) – Welsh Government, 2016. Collieries closure map (1947-2013) – Northern Mine Research Society, 2018.

Author: Ana Marques, independent Consultant and Researcher on Environment, Climate and Sustainable Energy. Contact: info@seize-the-potential.net.