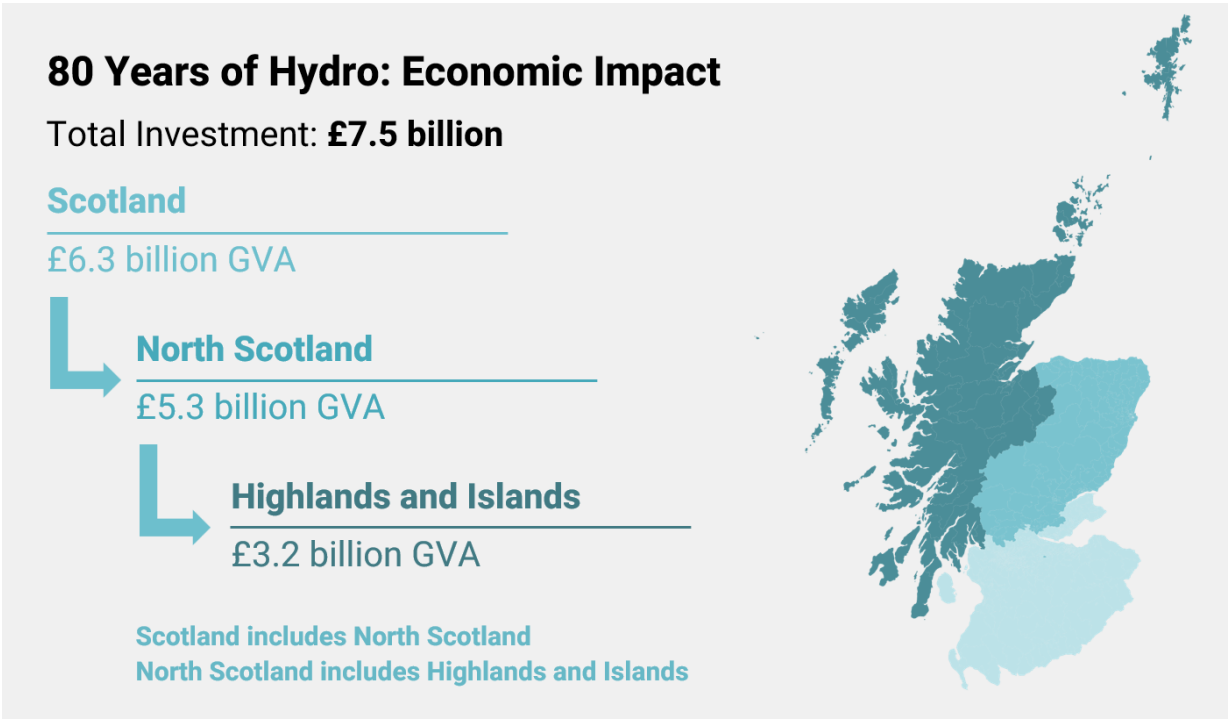
Hydro – Powering socio-economic impacts in the past, present and future

Over 80 years, NoSHEB and its successors have supported transformational impacts across the North of Scotland through their hydro-electric schemes

The North of Scotland Hydro-Electric Board (NoSHEB), the precursor to SSE, was founded by the Hydro-Electric Development (Scotland) Act in 1943. It was responsible for the development of the hydro potential of the Highlands as well as the transmission and distribution of electricity in the North of Scotland. This included delivering power to many areas that had no electricity.

Its establishment marked a pivotal moment in the history of hydro-electric power generation in Scotland and facilitated substantial economic and social progress in the Highlands. This included creating employment and providing the foundation for regional civil engineering companies which are still active today as well as boosting social connectivity in the Highlands, supporting the tourism sector and providing access to electricity for businesses and communities.



In 1948, 'Power from the Glens – Neart nan Gleann' brought electricity to the Highlands for the first time

From its inception NoSHEB undertook a massive programme of construction, beginning with the identification of potential sites for hydro-electric development in the Highlands.

The Loch Sloy hydro-electric scheme, approved in 1945, involved the construction of three dams and three power stations, including Sloy Power Station, **Scotland's largest conventional hydro-power facility.** In the 1950s, the Tummel hydro scheme which included nine dams and eight power stations in the River Tummel catchment added 148MW of hydro-electric generation capacity. Cruachan Power Station was constructed in the 1960s and was the largest pumped storage facility NoSHEB developed. Built 1km inside Ben Cruachan, it was a major civil engineering task requiring employment of 4,000 men at its peak, who were later nicknamed the 'Tunnel Tigers'.

In addition to large-scale projects, several small and medium-sized developments were undertaken. These projects encompassed the construction of significant dams and power stations, which now serve as the cornerstones of SSE's existing hydro-electric schemes. Notable examples include the construction of Invergarry Power Station and Clunie dam in 1956, integral components of the Glen Affric scheme, as well as Fasnakyle Power Station and Mullardoch dam in 1951.

Throughout its history NoSHEB and its successors have **continued to invest in maintaining and refurbishing its hydro schemes,** with a recent series of investments to increase the capacity of existing schemes. In 2009, the 100MW Glendoe hydro scheme in the Great Glen became operational, the largest hydro scheme constructed in the Highlands since the 1950s.

Hydro replanting: A new lease of life for 90-year-old Tummel Bridge Power Station

Originally commissioned in 1933, Tummel Bridge Power Station recently passed its 90th year in operation as one of the first large scale hydro sites in Scotland.

With the goal of continuing the operation of the power station for generations to come, SSE Renewables completed a £50 million investment that saw the plant reopen with new, more efficient turbines, increasing generation capacity from 34MW to 40MW during optimum conditions.

The two-year refurbishment campaign helped support the Scottish regional supply chain and local job creation. During construction, the delivery of the works programme supported around 65 roles at peak, many of which were local contractors in the Highlands.

Harnessing the Highlands' hydro potential generated significant economic impacts

The construction of the hydro-electric schemes required substantial investment and created economic opportunities for workers in the Highlands and across Scotland. Whilst many of the workers on the schemes came from Europe, the supply chains were predominantly Scottish, providing a significant boost to local industry and jobs.

Between 1943 and 1965, **NoSHEB invested a total of £5.6 billion in hydro generation** (in 2023 prices**)**. This generated an economic impact of £2.7 billion Gross Value Added (GVA) in the Highlands and Islands, £4.5 billion GVA in North Scotland and £5.2 billion GVA in Scotland. During this time, NoSHEB supported an average of **5,519 jobs** annually in the Highlands and Islands**, 9,127 jobs** in North Scotland, and **10,580 jobs** in Scotland[1]. This employment included everything from surveying, building roads and other infrastructure, civil engineering, pouring concrete and installing machinery and equipment. Many of these were highly skilled and demanding jobs, which had applications in other areas of construction, such as road and bridge building, and engineering.

Over 80 years, the **total capital investment in hydro was £7.5 billion**, generating an economic impact across Scotland of £6.3 billion GVA. As well as the initial investment in the hydro schemes, this includes routine maintenance and refurbishment, the development of Foyers Pumped Storage Hydro in the early 1970s and new hydro power in the 2000s, such as the 100MW development of Glendoe Power Station. There have also been substantial additional economic impacts from the operation, transmission, and distribution of hydropower.

The schemes provided the basis for further growth

The schemes initially employed local people, providing them with opportunities that enabled them to remain in the Highlands. They also employed people from across Scotland, who went on to develop skills and expertise in the civil engineering sector, as well as prisoners of war and displaced people, who often remained and integrated into the community following the works. As an example, of the 1,739 people employed on the Glen Affric scheme towards the end of 1949 around 80% were from Scotland, with the other 20% from elsewhere.

The civil engineering required by the schemes supported the growth of a number of Highland-based companies, such as Duncan Logan Construction which would go on to build the Tay Road Bridge and whose director founded Loganair, and RJ McLeod, which continues to work with SSE on renewable energy projects in the Highlands. Other companies included Balfour Beatty & Co, Edmund Nuttall & Sons and Hugh Leggat Ltd.

[1] This was based on total capital expenditure and in some cases direct employment, sourced from NoSHEB accounts for the period. Regional breakdowns were based on assumptions about where spending would take place. The economic impact was then based on historical information about turnover, GVA and employment for the relevant sectors, as well as using historical data on supply chain (indirect) and staff spending (induced) multipliers. Economic impacts have been adjusted for 2023 prices.

Hydro projects were the foundation for RJ McLeod

RJ McLeod, which currently operates from headquarters in the Highlands and near Glasgow, was founded in 1951 and grew its experience through work on hydro schemes such as Breadalbane, where it was involved in the tunnelling work. The company was recognised for offering highly competitive prices and for its Highland roots.

The company built on its hydro experience to expand into other sectors, such as road-building, general construction (including new towns such as Cumbernauld) and the oil and gas sector in the 1980s.

In recent years, the company has worked with SSE and other developers in the renewable energy sector, with expertise in undertaking complex civil engineering works. This has included Dunmaglass Wind Farm, Strathy North Wind Farm and Viking Wind Farm, which were developed and built by SSE Renewables. As of 2022, the company had a turnover of £192 million and had 473 employees.

The schemes had to overcome local opposition

Initially, many schemes attracted opposition from local landowners and county councils, on the basis that the construction and visual appearance of the dams would ruin the scenery and harm tourism in the Highlands.

To address these concerns, NoSHEB appointed an Amenities Committee and tailored designs of the schemes to minimise potential visual impacts. Later schemes did not receive the same opposition and hydro schemes are now often seen as an aesthetic contribution to the landscape.

Similarly, impacts on fish were a matter of concern from the outset, given the risk of physical harm and potential barriers to migration and the significance of fisheries to local communities. The Home Office Fisheries Committee was set up in 1944, and continued to operate for decades, with a focus on reducing the impact on fish stocks. They directly influenced the design and operation of assets, such as in the building of fish ladders at Pitlochry. Fisheries conservation remains a priority to the management of the hydro schemes; SSE Renewables was recently recognised at the Nature of Scotland Awards for its industry-leading mitigation work on smolt trapping at the River Tirry using pioneering methods to improve survival rates.

The Board's infrastructure investments increased connectivity and opened up the Highlands to the world

To facilitate the construction of the hydro-electric schemes, NoSHEB made investments to support its work and its workers.

Due to the difficult terrain and the need for heavy machinery, it built hundreds of miles of access roads that would provide the basis for connectivity in areas that had previously been difficult to access. This also supported the tourism sector – several villages were able to receive visitors for the first time and the Board built the road between Invergarry and Glen Moriston, one of the main tourist routes to Skye.

There was often limited accommodation available for workers in the local area and therefore NoSHEB undertook to build houses which are still in use today. By 1964, it had built **428 houses** across eight areas in its operational region, including Kilmorach, Struy, Deanie, Cannich, Tarbet, Pitlochry, Loch Gair, and Kilchrenan.

Electricity became widely available across the North of Scotland….

The investments of NoSHEB were designed to harness the hydro-electric potential of the Highlands and to create a more attractive and sustainable way of life that would reverse the long-term population decline. As a result, people in the Highlands were increasingly able to take part in the modern world.

Due to the extra cost of distributing electricity to rural areas, connecting many areas in the North of Scotland to the grid was considered uneconomic and five in six farms lacked access to electricity. The Board embarked on a substantial programme of investment to connect rural areas to the grid, **increasing the number of customers connected from 250,000 in 1950 to 422,000 in 1965**.

The relatively low cost of hydro generation was able to offset the high distribution costs, allowing remote communities to gain access to an affordable and sustainable means of electricity. Over the period from 1943 to 1965, **NoSHEB invested £2.4 billion in the development of this network**, adding 2,695 miles of transmission lines by 1975 and laying submarine cables which provided outlying island communities with electricity through the 1980s and 90s.

…and reshaped the economic and social life of the Highlands

Access to electricity has had far-reaching positive impacts on various aspects of rural life and economic development. Electricity **transformed the lives of people living in the North of Scotland** offering modern amenities like lighting, heating, cooking, washing machines, and television.

These modern conveniences, which were often sold by a network of stores owned by the Board, had particular benefits for women, who had significantly more leisure time and were freed from often exhausting manual labour. At the same time, electricity was adopted in businesses, activity centres, churches and other community facilities across the North of Scotland, changing the way people socialised and the nature of activities that took place.

The expansion of electricity access had transformative effects for a range of sectors from the agricultural sector, which introduced modern appliances like infrared heaters and electric driers, to the whisky sector, which was one of the biggest sources of industrial demand, and fish farming, which grew rapidly on the West Coast. It also paved the way for the expansion of the tourism sector in the Highlands, which had been limited by the lack of access to electricity. In 2017, the Pitlochry Dam Visitor Centre opened to showcase the rich hydro-electric history and receives about 130,000 visitors annually.

Hydro-electric power generation remains a catalyst for transformational change

Through its long-term vision, NoSHEB and its successors were able to address the challenges posed by the Highland's geography and turn it into an opportunity. The development of hydro power was instrumental in supporting NoSHEB's mission of expanding access to electricity to the most remote communities. It also provided the basis for further growth in areas like construction and tourism, with companies like RJ McLeod continuing to employ people across the Highlands today.

Following privatisation, the hydro-electric schemes also provided the basis for the success of Scottish Hydro-Electric in the 1990s and SSE today. The company has gone on to invest in new power generation technologies, such as onshore and offshore wind, and today is investing billions in Scottish energy. Its activities over decades, including building power generation assets and transmission and distribution infrastructure needed to connect them with consumers, created the backbone of the modern electricity system in the North of Scotland.

The SSE group continues to maintain and operate the hydro schemes that were started in 1943, and they continue to provide power from the glens to the national grid**. Over the next decades, SSE Renewables will continue to invest in hydro**, repowering existing facilities, building new generation capacity and developing new pumped storage hydro, which is expected to result in billions in investment. This represents the most significant expansion of hydro-electric power since the early days of hydro and will generate substantial economic impacts.

SSE Renewables' future plans include Coire Glas, a new pumped storage hydro scheme near Loch Lochy which would be the largest in the UK. It also includes the redevelopment of Sloy Power Station, first constructed by NoSHEB in 1945, as a pumped storage hydro project. The redevelopment will continue to generate local and national economic impacts through tendering to UK and Scottish-based contractors, supporting approximately 70 FTE jobs at peak of construction, while establishing a Community Benefit Fund.