

THE PRE-HISTORY OF THE SHANNON SCHEME

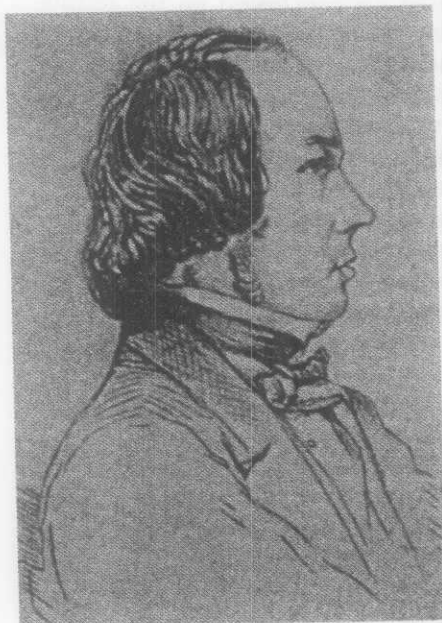
Far from being a technological wilderness, Ireland in 1925 was already at the cutting edge of electrical technology. Paul Duffy outlines the untold story.

In 1793–4 *Anthologia Hibernica* published a series of letters by 'Mentor' on the philosophy of nature, covering a wide range of mathematical and scientific topics. Letter eighteen in October 1794 dealt with the nature and properties of magnetism. This was followed in November by one on electricity in which 'Mentor' described what he

called a 'battery'. It was, in fact, an early generator. The machine illustrated the basic principles of generation, transmission, insulation, storage (battery) and transformation or magnification of the current generated. It predated Nicholas Callan's self-excited dynamo by 40 years. Callan was professor of Mathematics and Natural Philosophy at Maynooth, where his experiments were conducted between 1826 and 1864. His most significant work was in the construction of induction coils and electromagnets.

He developed new batteries and invented an electric motor in 1838. This self-exciting dynamo was further developed by Siemens, who produced a generator in 1866. This major advance led to the realisation that large-scale electrical generation was possible. It fell to another Irishman, Charles Parsons, and his work on steam turbines to turn possibility into reality. Without Parsons's work the development of modern electric supply systems could not have taken place.

Above: Detail from *Wagon Train at Ardnacrusha* by Seán Keating. (Electricity Supply Board)



Early proposals for the development of the Shannon

At a lecture in Dublin in 1844 Robert Kane put forward the proposal that the lower Shannon should become the industrial heartland of Ireland because of the abundance of hydropower available between Killaloe and Limerick. In that same year he published *Industrial resources of Ireland*, in which he assessed the available hydropower of the lower Shannon at 350 horsepower per foot of fall. As the river falls through 97 feet between Killaloe and Limerick, his estimate of the total power available from the river was 33,950 horsepower (25,300KW). The catastrophe of the Great Famine pushed Kane's work into the background and no serious scientific consideration seems to have been given to his ideas on hydropower. In 1875, during a miners' strike in England, an anonymous article appeared in *The Engineer* entitled 'Water in aid of steam power', claiming that 14,000 horsepower (10,500KW) could be generated if less than half the fall in the river between Killaloe and Limerick was harnessed. It further advocated that English industrialists should consider relocating to the region if they considered themselves too heavily dependent on coal as a power source.

In 1901 a private bill, the Shannon Water and Electric Power Act, proposed diverting water from the Shannon into a headrace canal to a location near Doonass, where a sin-

gle abrupt fall could be created. A power station was to be constructed at this point and the spent water was to be conveyed back to the Shannon by a tailrace. Fishery interests had opposed the bill at committee stage and as a result restrictions were placed on the amount of water that could be drawn from the river to feed the power station. The quantity of water reserved for the river channel was to vary according to the seasons. This in effect killed the scheme as it meant that an auxiliary coal-fired station would have to be built alongside the hydro station. In 1902 F.J. Dick proposed building a hydro station in the riverbed to harness the abrupt drop of 17 feet at the Doonass Falls. Dick based his design on his own calculations of the river flow at Killaloe over the preceding 25 years. Another proposal was to harness Lough Derg as a gigantic storage reservoir by raising the weir at Killaloe by from four to five feet and building a power station there. However, the problems of consequential flooding did not appear to have been considered and the proposals came to naught. Seán Wall, commander of the IRA's East Limerick brigade, was elected chairman of Limerick County Council in 1920. He insisted that the council carry out a survey of the river to see whether its waterpower potential could be realised. He was killed in action at Annacarty in May 1921 and the survey proposals were abandoned.

Investigations into the Shannon

Aside from Wall's abortive survey and F.J. Dick's calculations on river flow at Killaloe, two major investigations into the river's potential were carried out. During the First World War coal, along with many other essentials, was rationed. The British Board of Trade set up a committee to investigate the waterpower resources of Britain. A separate subcommittee under the chairmanship of Sir John Pursar Griffith enquired into the situation in Ireland and came down in favour of a proposal made in 1905 by Theodore Stevens to harness the Shannon.

Stevens proposed the erection of four power stations in the riverbed at selected locations between Killaloe and Limerick. The benefit of this

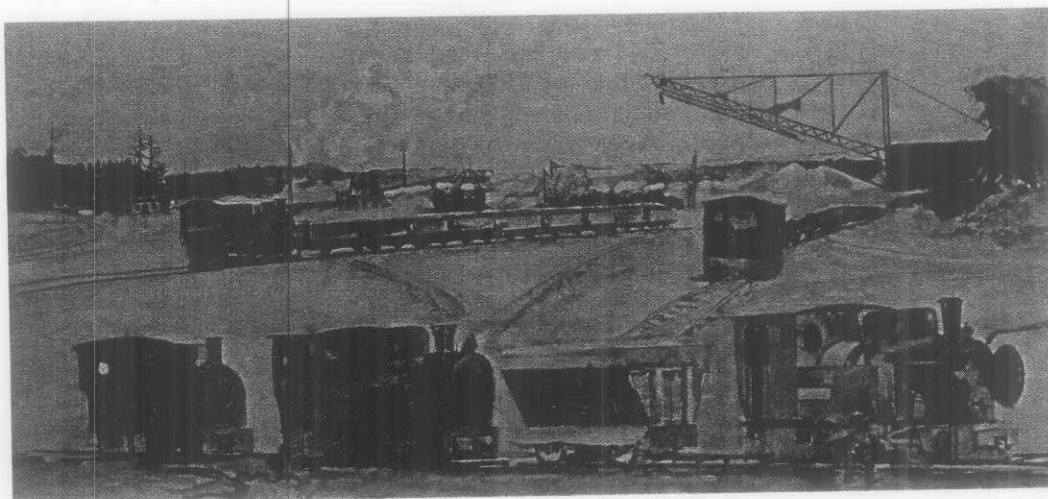
plan, it was argued, was that the river could be harnessed in stages, thus spreading the costs over a period of years. The drawback was that electrification of the country could only take place on a piecemeal basis. The Stevens proposal was costed at slightly in excess of £2.6 million. The first Dáil set up its own committee to investigate the waterpower resources of Ireland under the chairmanship of Hugh Ryan. The report, published in January 1922, gave a summary of Stevens's proposal but did not endorse it. The committee's conclusion was that 'any scheme for the development of the Shannon will depend mainly on the storage which can be got, and consequently the cost of that storage'. This articulates clearly the problem to be overcome if the Shannon was to be harnessed. Storage of water by reservoirs or maintaining a specific level of water within the lakes on the river system was essential if the flow of water was to be regulated. For a hydroelectric station to work continuously and efficiently a controlled and regular supply of feed water is essential, hence the need to establish the storage requirements. The storage requirements for a possible Shannon scheme could not be established without detailed and accurate records of flow measurement for the river. With the publication of John Chaloner Smith's paper on the average volume of flow from large catchment areas in Ireland in 1921 this major lacuna was filled. The way was now clear for someone to design a workable Shannon hydroelectric scheme.

Thomas J. McLaughlin

Thomas J. McLaughlin was born in Drogheda in 1896. Educated at the Christian Brothers' school in Syne Street and at University College Dublin, he was very competitive as a student and had little interest in non-academic pursuits. Accounts of his political views vary from 'intensely nationalistic' to being 'in sympathy with Sinn Féin in a detached sort of way'. He did make friends with a

Above left: In 1844 Robert Kane put forward the proposal that the lower Shannon should become the industrial heartland of Ireland because of the abundance of hydropower available between Killaloe and Limerick.

(Dublin University Magazine, May 1849)



Siemens. They were given permission to develop their proposals for the electrification of the Free State. The fact that they had their proposals completed in detail, with costings of the project, by 1 September 1924 is indicative of the very large amount of preparatory work that had been completed prior to McLaughlin's first meeting with Cosgrove. The plans and costings had to be submitted to an international committee of experts, whose findings were to be binding. It is a measure of McLaughlin's standing with Siemens that the company agreed to bear all their own costs if the proposal was turned down.

Opposition

When the government published details of the 26 January meeting protests began, intensifying after the international committee of experts submitted its report on the proposal, subsequently published as a government white paper. Whilst the Institution of Civil Engineers objected to the method of selecting Siemens it did not, *per se*, object to the scheme itself. However, the Irish Centre for Electrical Engineers did, as its membership was drawn from those engineers working for the many local electricity concerns around the country. The proprietors of these undertakings, along with their allies, the coal-importers and merchants, orchestrated a campaign of opposition through various chambers of commerce. Sir John Pursar Griffith, a leading engineer who had invested heavily in preparing a proposal to develop the hydropower of the Liffey, objected vigorously and published two pamphlets attacking the scheme. Laurence J. Kettle, the chief electrical engineer for

Dublin Corporation, also condemned the scheme. He too had designs on a hydro scheme for the Liffey to augment the Corporation's coal-fired station at Pigeon House. Not to be outdone, the Dublin United Tramways had their own proposals for the Liffey (the Liffey now has three hydro stations, all built by the ESB).

Kettle came up with an interesting proposition in light of recent developments in the ESB. He proposed that the scheme be limited to generation and grid distribution only; electricity would then be sold on to the various local undertakings. This, of course, would have copper-fastened Dublin Corporation's grip on the capital's supply system and was rejected. Kettle's idea finds an echo in Mary O'Rourke's division of the ESB into two bodies, one for generating, the other for grid distribution. Interestingly, the various gas companies did not mount a cohesive campaign against the proposal. They had, of course, faced competition from local electric companies for the supply of lighting for many years. Possibly they did not view the national electrification plan as a major threat since people would still rely on gas for cooking.

During the Dáil debates it was hinted that financial institutions were going to be reluctant to invest in the scheme. McGilligan had at least one offer from a foreign investment house and so had no worries on this score. It would appear that the necessary finances were put in place over a civilised cup of tea in Cruise's Hotel, Limerick. Neither Joseph Brennan nor J.J. McElligott, the two most senior officials in the Department of Finance, were aware of the government's commitment to the Shannon scheme and their ministers' approval of

Above: Detail from *Railway Yard at Ardnacrusha* by Seán Keating. (Electricity Supply Board)

this. When they found out, they were, naturally, furious.

The Shannon Electricity Bill was introduced in the Dáil on 1 May 1925 and after acrimonious debate was passed on 25 June. On 13 August the contract with Siemens was signed, and work began on the Shannon scheme immediately thereafter.

Epilogue

The Shannon scheme was officially opened by W.T. Cosgrove on 29 July 1929, over 75 years ago, and was generating electricity by October. It was completed on time, with an overrun of £150,000 on the initial contract price of £5.2 million. The Electricity Supply Board (ESB) was set up, by statute, in 1927 in the face of major opposition to 'creeping socialism by the back door'. Its remit was to take over and run the state's electricity supply. It is doubtful whether the Shannon scheme would ever have been built had McGilligan tried to introduce his national electrical authority first. ■

Paul Duffy is a Chartered Fellow of the Institution of Engineers of Ireland.

Further reading

- P. Duffy, *Ardnacrusha—birthplace of the E.S.B.* (Dublin, 1990).
- M. Manning and M. McDowell, *Electricity supply in Ireland—the history of the E.S.B.* (Dublin, 1984).
- G. O'Beirne, *Siemens in Ireland 1925–2000* (Dublin, 2000).