

Human Innovation - A Thought Leadership Series

Part 2 - A Brief History of Innovation in the Electricity Sector

A founding core value we have a passion for demonstrating at ITP Energised is technology enabled innovation. As well as recently launching our new digitally enabled consulting and digital products platform “[The Net Zero Accelerator®](#)” we have developed an eight-part thought leadership series on human innovation.











In the first part of the series, we identified the key periods of discovery in human civilisation and that this culture of innovation has been steeped in our history, dating back at least some 2.4 million years. This provides us with hope as we tackle the sustainability era of current times. The next part in the series focuses on the history of innovation in the electricity sector.



Our history in electricity sector innovation goes back some 270 years

The history of innovation in the electricity sector is important to understand, as electricity consumption is highly positively correlated to country Gross Domestic Product (GDP) and therefore provides an essential link to human prosperity and consequently human welfare and choices. The infographic on the next page illustrates the innovation timeline in the electricity sector:

A brief history of innovation in the electricity sector

	In 1752 Benjamin Franklin discovers electricity in his famous kite experiment. He attaches a key to a kite string during a storm proving that static electricity and lightning were the same thing.
	In 1831 Michael Faraday passes a magnet through a copper wire producing an electric current. This principle forms the basis for generators (where motion is converted into electricity) and motors (where electricity is converted into motion). This innovation forms the basis for modern power plants today.
	In 1879 Thomas Edison's contribution to innovation was the creation of the electric light bulb. Gas lighting became obsolete, and Edison went into mass manufacture to bring modern lighting to America.
	Around the 1880s coal was first used to generate electricity for homes and factories.
	In 1881, the first power grid was developed in the UK town of Godalming in Surrey. The electricity was used for street lighting and powered by water wheels, the world's first hydroelectric power scheme.
	As early as 1887 the world's first wind turbine producing electricity was built in Kincardineshire, Scotland by Professor James Blyth of Anderson's College, Glasgow (now Strathclyde University). He also offered the excess electricity to the people of the town but was refused on the grounds of being the "work of the devil." Charles Brush in the US was conducting similar developments in winter that year and is largely credited with this accolade; although it was actually the Scotsman, Blyth. Poul La Cour is also a pioneer of wind turbines in the 1890s which generated electricity to produce the first green hydrogen.
	In competition to Thomas Edison, in the 1880s George Westinghouse developed alternating current (AC) rather than direct current (DC) technology which can transport electricity over longer distances and can be more readily stepped up/down in voltage levels. In 1896 Westinghouse built the first 20-mile AC line connecting Niagara Falls to Buffalo in New York.
	In the early 1890s Samuel Insull saw an opportunity to develop efficiencies in production and consumption by consolidating smaller generators into larger ones built by General Electric. Economic innovation also took place with a business model that charged an additional fee during peak periods which is a basis for time of use tariffs available today.
	As early as the 1900s wind and hydro were in more mainstream use. In the 1930s the Hoover dam kick-started hydropower and it was in the 1940s for grid connected wind power of megawatt scale.
	In the late 1920s regulated utilities were born, after the post war Great Depression led to the distrust of private utilities, who many believed were charging too much for power. This gave rise to these publicly owned regulated utilities to remove the potential abuse of monopoly power.

Conclusions

Much of the innovation in the electricity sector happened well over a century ago including green hydrogen production from renewables in the 1890s, renewables generation in 1887, DC and AC grids in the 1890s, thermal generation in the 1880s that balanced electricity at source; even business model innovation of peak demand tariffs happened in the 1890s with the option of surplus electricity supply traded to peers identified as a route to market in 1881.

This highlights that the original blueprint hasn't actually departed materially from the age of its original discovery. But changes are now rapidly evolving within an era of accelerated net zero and ESG capital. We look forward to both disruptive and incremental innovation to shake up this industry to solve the serious challenges of the net zero era of sustainability.