

Hydropower engineers: what's next?

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New Zealand has an important legacy in hydropower, but with little recent large scale hydropower development, how can we ensure expertise in this sector into the future?

New Zealand has a long and proud history in hydropower, going back to the 1880s when the first schemes were built in Central Otago, to significant developments throughout the South Island in the 1960s and 1970s. This major programme of consistent large-scale development resulted in a highly competent, experienced workforce across all engineering disciplines within the field of hydropower. This legacy was then exported all over the world. However, with little large-scale hydropower development here since the construction of the Clyde Dam in the 1980s, how will New Zealand make sure the next generation of Kiwi-trained hydropower engineers are given the same opportunities as previous generations?

My hydropower training in the United Kingdom (UK) coincided with the Renewable Obligation Certificates (or ROCs) and the UK Government Feed-in Tariff for renewables which stimulated the development of new projects. From no development in the 1990s, suddenly there was a burst of activity in all renewables, particularly small hydro. This gave me, as a young civil engineer, the opportunity to learn at the start of my career, taking jobs from feasibility to design and construction.

Looming skills shortage?

New Zealand has had no such stimulus, and projects have had to be funded

purely on the revenue, ie standing on their own feet. This, combined with the challenges of consenting large water infrastructure projects, has made the development of new projects almost too hard and risky. Larger schemes have continually been looked at, such as Project Aqua, the Wairau Hydro Scheme, Arnold Power Station, Mokihinui Hydro and Project Rockwater, but these ultimately never made it past feasibility. This lack of development has resulted in an extensive skills gap in this sector. This continues to worsen as more principal-level engineers retire with fewer seniors around to replace them and ultimately train up the next generation. The industry potentially faces a large drop off and skill shortage, which could take years to fill if succession planning isn't implemented now. This is not just a New Zealand problem, it's reflected globally.

Potential industry stimulation

There's light at the end of the tunnel for hydropower engineers wishing to practise in New Zealand. The government's recent commitment to a 100 percent renewable energy generation and Net Zero Carbon targets to meet the Paris Agreement could see the industry stimulated. The most obvious focus is the Lake Onslow pumped hydro scheme, which would be one of the largest "batteries" in the world in its scale of stored energy. This would be the largest infrastructure project of its type undertaken in New Zealand. It would stimulate jobs and experience that New Zealand engineers have had to predominately seek overseas over the past

30 years. A project such as this, delivered by New Zealanders in New Zealand, would be instrumental in developing the next hydropower engineers and provide an opportunity to again sell New Zealand expertise to the world.

However, it isn't just about building "mega" projects. To meet the 100 percent renewable target, more intermittent renewables, such as using wind, will need to be constructed, increasing the need for highly flexible, fast-responding power generation sources, of which hydropower is perfect. As has been seen in North America and Europe, where they have installed large numbers of wind and solar farms over the past 15 years, having hydropower operate differently than originally designed has opened up opportunities for refurbishment. This will also be required in New Zealand's hydropower fleet.

We are fortunate to have fantastic resources and higher education facilities that produce high-calibre students with the background needed for hydropower engineering, from hydrologists to electrical, mechanical, geological and civil engineers, to name a few. It's also essential we share learnings across disciplines, so we've established the Hydropower Technical Interest Group as a forum to share knowledge, experience and learnings, maximising the opportunity for a "green recovery" from Covid-19.

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