New Zealand Hydropower Conference 2024

10-11 April 2024
Hamilton

New Zealand Hydropower Group

Join us for this must attend event for all of those in the Hydropower industry! A great opportunity to celebrate all things hydro, hear from a great line up of speakers, presentations, exhibitors and enjoy networking.

The conference includes:

- a great line up of speakers
- exclusive site visit to Karapiro Hydropower Station
- opportunity to network with your peers and industry experts
- connect with exhibitors
- top it all off with dinner and tour of the world famous Hobbiton

CONFERENCE PROGRAMME

Wednesday 10 April

8 – 12pm	**Site Visit: Karapiro Hydropower Station** *Includes transport from central Hamilton and attendees will be dropped back to Claudelands venue.* ***Additional cost $40 + gst***
12.15pm	**Conference Start** **Registration's Open | Event Lunch Starts**
1.10 – 5.30pm	**Main Plenary** **Presentations**
5.30 – 6.30pm	**Networking Function**

Thursday 11 April

8am	**Registrations & Exhibition Area Open**
8.30 – 3pm	**Main Plenary** **Presentations**
3.30 – 10.15pm	**Tour & Dinner at Hobbiton** ***Additional cost $150 + gst***

Now is the time to make the most of the Early Bird Pricing Ends **8 March -** Register today! **CLICK HERE**

TICKET PRICES*

NZHG Member Conference Early Bird - includes Networking Function	$490
Non-member Conference Early bird - includes Networking Function	$540
NZHG Member Conference Standard - includes Networking Function	$540
Non-member Conference Standard - includes Networking Function	$590
Conference Dinner (11 April)	$150
Site Visit	$40

*All prices are excluding gst.

Overview of Presentations

- **Highbank Pump to Turbine Conversion Project** - Matt Springings & James Maunder, Manawa Energy
- **Aratiatia Rehabilitation – Erosion Resistant Low-Flow Turbine -** Paul Betschart, Mercury
- **The state of New Zealand dam safety practice in 2024: an overview of technical and regulatory changes for the hydropower sector** - Dr Kaley Crawford-Flett, NZSOLD
- **Battery of the Nation – Reimagining the 85-year-old Tarraleah Hydropower Scheme for a new electricity market -** Rik Van Der Kley & Jamie Campbell, Entura
- **Waipori Expansion Joint -** Lee Cameron, Re-Generate
- **Mechanical Seals -** Jorge Mellado, Chesterton
- **Assessing damage in hydroelectric equipment, minimizing refurbishment scopes, and extending asset -** Vitor De Sá Lopes Garcia, Quest Integrity NZL
- **Rugged, wireless, low-power devices for keeping tabs on your dams -** Philip Winter, Manawa Energy
- **"Hydro Power an inter-generational asset" - Challenges and Opportunities for hydro now and in the future -** Vince Hawksworth, Mercury
- **Dam Safety Improvements to an operating Hydro dam | Arnold River Scheme -** Robert Shelton, Manawa Energy & Thomas Fritz, Riley Consultants
- **On the Use of Partial Discharges as a Valuable Quality Control Test -** Werner Ladstaetter, ANDRTIZ
- **The Challenges of Promoting a 3MW run-of-river scheme -** John Duder, Independent Consultant
- **Comparison between eDNA and conventional methods for surveying freshwater fish populations on Guadalcanal, Solomon Islands -** Kristy Harrison, Stantec New Zealand
- **Radial Spillway Gate Trunnion Bearing Condition Assessment Investigation -** Philip Winter, Manawa Energy
- **Challenges of Developing and Constructing Small Hydropower Projects in Africa: Some Success Stories -** Bertrand Rochecouste Collet, Stantec Australia
- **Life extension of scroll case with 940mm long through-wall cracks -** Quinton Rowson, Re-Generate & Aaron Chinnery-Brown, ABC Engineering
- **Atiamuri Intake Gates: Unravelling the past to secure the future -** Matt Baird, Energetick
- **The green-green hills of the pumped hydro plant: How pumped hydro plants can be made more commercially viable and environmentally friendly** - Kris Moore, WSP

Presentations & Speaker Bio's

Highbank Pump to Turbine Conversion Project - **Matt Springings & James Maunder, Manawa Energy**

Presentation Summary:
The planned replacement of the Highbank pumping unit and its associated yearlong outage prompted Manawa Energy to investigate the potential conversion of the existing Highbank pumping station into a dual use pumping and generating station. This conversion is aimed to offset a percentage of lost revenue during the outage. The Highbank pumping station, commissioned in 2012, comprises six 1.55 MW induction motors, lifting six cubic meters per second of water up 100 m from the Rakaia River to the Rangitata irrigation race.

The first stage of the project involved the conversion of a single pump unit, serving as a proof of concept to determine the actual power output and assess the viability of the business case. This stage was successfully completed in September 2023, achieving an impressive 1 MW output. Building on this successful demonstration, Stage 2 of the project is scheduled for completion in July 2024, further advancing the conversion of the Highbank pumping station into a dual use pumping and generating station.

Speaker Bio:
Matt Sprigings, BE (Hons) Electrical and Electronic Engineering
Matt has worked in the generation industry for 9 years, with much of this time dealing with hydropower assets. His experience includes project management, contractor management, procurement, design, and asset management. Particular interests include transformers, switchgear and generators. Matt lives in Christchurch with his young family.

James Maunder, BE(Hons) Natural Resources Engineering
James has been working in hydro for 13 years, primarily in hydropower mechanical design and engineering roles, but with an emphasis on multidisciplinary knowledge and problem solving. Particular areas of expertise are turbine performance testing, model tests, Pelton turbines, and hydraulic transients.

Aratiatia Rehabilitation – Erosion Resistant Low-Flow Turbine - **Paul Betschart, Mercury**

Presentation Summary:
The Aratiatia hydroelectric power station was commissioned in 1964 and is the first generating station in the Waikato River cascade. This presentation outlines the rehabilitation works conducted on site between 2017 and 2020, including extensive replacement of the generators, the governors and the G1 turbine. Particular focus is given to the erosion control measures incorporated in the design of the new, low-flow G1 turbine to address the accelerated wear which results from an estimated 5-10T/hr of particulates passing through the station.

Speaker Bio:
Paul has been with Mighty River Power / Mercury since joining in 2008 as a Graduate Engineer. A Mechanical, Materials & Process Engineer by training, he was Technical Manager of the Aratiatia Rehabilitation Project from prior to contract award until final closeout. He is currently Technical Manager for the upcoming Maraetai 1 Rehabilitation Project.

The state of New Zealand dam safety practice in 2024: an overview of technical and regulatory changes for the hydropower sector - **Dr Kaley Crawford-Flett, NZSOLD**

Presentation Summary:
Kaley will present on the imminent Building (Dam Safety) Regulations set to be implemented in May 2024, alongside the latest updates to the NZSOLD New Zealand Dam Safety Guidelines. This presentation will summarise key updates made to the NZSOLD Guidelines in 2023 along with those in progress in 2024, detailing how these updates correspond with the upcoming regulations and contribute to the overarching goal of improving dam safety in New Zealand. With a focus on the hydropower sector, Kaley will offer a practical understanding of regulatory implications for dam owners and practitioners. The overarching goal of this presentation is to provide an overview of recent and ongoing changes in New Zealand dam safety practice, including regulatory and technical updates for the hydropower sector.

Speaker Bio:
Kaley is the Chair of the New Zealand Society on Large Dams (NZSOLD) and holds an Honorary Academic position within the Civil and Environmental Engineering Department at the University of Auckland.

Battery of the Nation – Reimagining the 85-year-old Tarraleah Hydropower Scheme for a new electricity market - **Rik Van Der Kley & Jamie Campbell, Entura**

Presentation Summary:
The Tarraleah Hydropower Scheme in central Tasmania is a 90MW scheme with 6 pelton turbines and an extensive headworks of over 20kms of canals, flumes, tunnels, headponds, pipelines and penstocks. The scheme was initially commissioned between 1938 and 1951. The station operates as a baseline station with 80% capacity factor, making operations highly inflexible. The age and location of hillside canal and penstocks requires significant investment and maintenance to continue safe operations, whilst the hydro-generating equipment requires replacement.

Work commenced in 2023 to construct a new intake and tunnel at Lake King William, replacing components of the existing headworks. Following this, the proposed scheme currently being developed involves a pressure tunnel and pipeline from Lake King William to a new power station site upstream of the existing power station. Australia's energy transformation requires flexible operations of the scheme with higher power output and lower capacity factors to support the increase in wind and solar energy in the market. The proposed scheme will double the current Tarraleah Hydropower Scheme output through higher head and flow and enable the dispatch of power in minutes, rather than hours. The existing large storage will provide the ability to maximise the value of energy, dispatching both on a daily cycle and maintain ability for maximum power on a weekly to monthly basis.

Speaker Bio:
Rik Van Der Kley is a Principal Hydropower Engineer with Entura and is involved with all aspects of hydro-power investigation, design, and implementation both in Australia and surrounding regions, including PNG, Solomon Islands and other Pacific islands. Rik has over 30 years of professional expertise in preparing feasibility studies, producing concept designs, and managing the detailed design and implementation of schemes for Hydro Tasmania and external clients. For the last 4 years, Rik has been studying the feasibility of redeveloping the 85-year-old Tarraleah scheme in central Tasmania.

Edward Snowball is a Senior Hydropower Engineer at Entura who is closely involved in all aspects of hydropower investigation and design for Hydro Tasmania's *Battery of the Nation* projects. With nearly a decade of professional experience in hydropower and dam projects, Edward has been working on the Tarraleah Redevelopment project since 2017 and is currently leading Hydro Tasmania's integrated engineering team on the Reference Design for the project.

Waipori Expansion Joint - **Lee Cameron, Re-Generate**

Presentation Summary:
Lee's presentation discusses the replacement of aging expansion bellows on the Waipori #4 penstock. It combines efforts from several key providers to provide a turnkey solution with a focus on the design methodology, manufacturability, and site installation.

Speaker Bio:
Dr Lee Cameron was born in Redhill, England in 1975 and has always had an interest in learning how things work. He studied BEng (Hons) Integrated Engineering at Cardiff University of Wales and went on to complete a PhD in Fuel Aerosol Explosion Studies in 1999. He has a broad background in hydro-mechanical systems and project management obtained via professional engagements in the aerospace, maritime and robotics industries. He has developed a strong interest in manufacturing technologies and enjoys being on site with the 'nuts and bolts' of engineering. Projects close to his heart include the design and testing of Airbus A380 undercarriage components and the design, installation, and commissioning of automated mooring systems at bulk handling, container and RoPax terminals around the world.

He is now applying himself in the hydro sector, having joined Re-Generate NZ in January 2021 as a Senior Mechanical Engineer/Project Engineer where he has worked on a number of diverse and interesting projects and now leads the Design Team from the Christchurch office. Memorable projects include ITR/ITP document management for the major

refurbishment works at Tuai power station and the topic of today's presentation: the Waipori Expansion Joint. Outside of work, Lee lives on a small lifestyle block with his wife and teenage sons. His interests include home renovations, tramping and playing squash.

Mechanical Seals - **Jorge Mellado, Chesterton**

Presentation Summary:
Mechanical seals may seem like a mysterious black box that only sealing experts can grasp. While there is some truth to this, their rising popularity in the last two decades has made many engineers and plant operators in the hydropower industry comfortable with their use. To demystify mechanical seals and boost knowledge in the hydropower sector, Chesterton is offering a lightning presentation. This session unveils the secrets behind mechanical seals and shares a case study showcasing their benefits, including both planned and pleasantly unexpected outcomes.

Speaker Bio:
Jorge has a background in Mechanical Engineering and has worked for Mechanical Seal companies for the last 29 years in various technical capacities. Jorge brings exceptional technical understanding to all aspects of seal design and applications. Residing in Perth, Australia, Jorge supports Chesterton Distributors around Australia, New Zealand, and recently, New Caledonia.

Assessing damage in hydroelectric equipment, minimizing refurbishment scopes, and extending asset - **Vitor De Sá Lopes Garcia, Quest Integrity NZL**

Presentation Summary:
Reliance on current hydropower plants is expected to increase, which will create several challenges for assets operating beyond their design life, including a significant increase in cycling frequency. Many components of aging power stations are being replaced. However, a complete replacement of the entire equipment is seldom feasible or even required. Rather, it is important to understand the active damage mechanisms to prioritize refurbishments. As the frequency and extent of the refurbishments has increased drastically over the past few years, there is a renewed interest in optimizing its scope. This work presents a compilation of engineering investigations on damage observed in aging components of hydropower stations which were planned for refurbishments or replacement.

The methods used for those investigations are presented. Alternatives and most recent developments in engineering methods for conducting such assessments will be discussed. The objective of the work presented is to open a discussion on how to assess the lifecycle of the hydropower equipment and how to extend their operational longevity with reduced cost and increased reliability due to the use of more advanced engineering methods.

Speaker Bio:
Vitor is a professional with 16 years of experience in structural analysis using the Finite Element Method to assess the integrity of equipment operating across diverse industries. Over the past eight years, he has focused on evaluating hydropower equipment. Using advanced fracture mechanics and fitness-for-service assessment methods, Vitor was able to safely extend the life of crucial components in numerous hydropower stations, and provide advice for inspection, monitoring, and mitigation of damage.

Rugged, wireless, low-power devices for keeping tabs on your dams - **Philip Winter, Manawa Energy**

Presentation Summary:
This presentation will discuss several applications for which Manawa Energy has been using remote sensing devices on our portfolio. The presentation will cover what the technology is and how it works, as well as three real-world use cases: Mangorei flashboard monitoring, Kuratau public safety and Kaimai monitoring and surveillance on conveyance.

Speaker Bio:
Philip is a dam safety engineer focused on flow control equipment at Manawa Energy in New Zealand. An electrical engineer,

graduating from the University of Auckland, he has previously worked in power distribution, and internationally in the automotive industry. He enjoys learning about new technologies and finding new ways to apply them.

Hydro Power an inter-generational asset" - Challenges and Opportunities for hydro now and in the future - **Vince Hawksworth, Mercury New Zealand**

Speaker Bio:
Vince joined Mercury in March 2020. Vince has considerable experience in the energy sector in both New Zealand and Australia. Most recently he was Chief Executive at Trustpower and prior to that, Chief Executive of Hydro Tasmania.

Vince qualified as a Mining Engineer, working in UK coal mines and has an MBA from the University of Waikato. Vince commenced his career in the New Zealand energy sector at the Huntly power station and led both the generation and retail divisions at Genesis Energy. He led the demerger of Tilt Renewables from Trustpower and later oversaw the acquisition of Tilt's New Zealand assets by Mercury.

Dam Safety Improvements to an operating Hydro dam | Arnold River Scheme - **Robert Shelton, Manawa Energy & Thomas Fritz, Riley Consultants**

Presentation Summary:
The Arnold dam was constructed in 1931; it has three sections, an earth embankment section, a central concrete gravity spillway section and a concrete arch section. In 1938, water level regulated spillway gates were added onto the concrete gravity section. A number of deficiencies were identified including leakage through the concrete core wall of the embankment dam, the concrete gravity has insufficient stability under seismic and flooding conditions and no ability the dewater the reservoir. A significant programme of works are underway to remedy the above deficiencies. This work includes installation of over 1.2km of piles and 1,000 m3 of reinforced concrete spillway strengthening.
The earth dam strengthening includes jet grout pile installation, phased construction works and installation of filters, drainage and rock-buttressing to the dam. The intake work includes refurbishment of and retrofitting modern seals to the three existing intake gates, fixing stainless steel guides to the existing static sealing faces, conversion of the gates to 'Fail Safe Close' capability, manufacture and installation of new intake screens and screen cleaner, power supply upgrade.

Speaker Bio:
Robert Shelton is a Senior Project Manager (PM) at Manawa Energy and their nominated PM for the Arnold Dam Strengthening works. Robert is a chartered Civil Engineer with over 30 years' experience in geotechnical, civil , hydroelectricity and infrastructure projects.

Thomas Fritz is a Principal Water Resources Engineer with Riley Consultants. Thomas has over 20 years' experience in project and programme management of civil construction projects; he used to be Trustpower's Lead Engineer Dam Safety & Water Resources and has been involved with the Arnold Upgrade Project since 2013.

On the Use of Partial Discharges as a Valuable Quality Control Test - **Werner Ladstaetter, ANDRTIZ**

Presentation Summary:
The efforts to use partial discharge (PD) to assess the condition and quality of modern high-voltage insulation used in rotating machines, such as hydro-generators, dates back more than 40 years in the industry. Even though, the question on how to use it in a meaningful way, is still surrounded by controversy. Despite common practices and advertisements, PD methods are not intended to be used as a mean to predict failure or to estimate the performance of HV components insulated with mica. When equipping HV rotating machines, the insulation is actually designed to operate under PD, making use of its mica content as a PD-resistant ingredient. Therefore, PD as a phenomenon is not unfamiliar to the components and, therefore, does not represent, by itself, a cause of failure.

Such fact has been demonstrated a number of times over decades using both at-site and laboratory experiments. In this context, the present work discloses how large and well-established manufacturers of hydro-generators in fact use PD at its maximum relevance, not as a "predictor parameter", but rather as a powerful quality control technique in the context of

large-scale production. From the creation of extensive PD databases up to the point of being able to establish meaningful pass-fail criteria for quality control, this work will present test details, real-life cases and share experiences with the ultimate goal of arguing that: (1) when properly used, PD is a valuable quality control parameter in the production of HV components, and (2) the pass-fail criteria to be used in any PD-based screening test, has to emerge from the manufacturer acquired data and not for arbitrary externally imposed limits.

Speaker Bio:
Werner Ladstaetter, MBA graduated in Electrical Engineering at the University in Graz, Austria. He worked several years for Alstom Power in Switzerland, where he started his career as an electrical design engineer and later signed responsible for stator design of turbogenerators. In 2005, he took over the responsibility of the R&D department of High Voltage insulation at Isovolta Group in Austria. In June 2011, Mr. Ladstaetter moved to ANDRITZ Hydro and was in charge of R&D hydro and turbogenerators in Weiz-Austria. In 2015, he took over the responsibility for engineering of hydro generators at CoC in the same company. With 1st of January 2020 Mr. Ladstaetter is global responsible for the Technology of Generators.

Since 2008, he is member of the IEC working group TC 2 / MT 10 for the "Qualification, Tests and Diagnostics of Winding Insulation Systems for Rotating Machines" and is project leader of the standard IEC 60034-18-32. He actively contributed to the new IEC standard 60034-33 for hydro generators, which was officially released in 2022 and is actively involving himself currently on the actual revision of the IEEE standard C50.12 for hydro generators. Werner Ladstaetter graduated with an MBA at the SMA in Vienna in 2012 with focus on Strategic Technology and Innovation Management.

The Challenges of Promoting a 3MW run-of-river scheme - **John Duder, Independent Consultant**

Presentation Summary:
The presentation will describe a feasibility study for a 3 MW run of river hydro station on the Wairua River in Northland. The scheme would develop 15m head over a basalt rapid and falls. A low weir would divert flow through an eel-excluding intake into a buried conduit to a powerhouse with Kaplan turbine. The concept utilises a good hydrological record and exposure of the basalt geology. Consultation is proceeding and the project is considered worthy of encouragement as potentially contributing to the renewable energy in Northland.

Speaker Bio:
John Duder has over 60 years' experience in investigation design and supervision of a range of hydro projects, dams, river controls and coastal engineering works He has worked in Nigeria Pakistan, Asia, Pacific islands, and throughout New Zealand.

Comparison between eDNA and conventional methods for surveying freshwater fish populations on Guadalcanal, Solomon Islands - **Kristy Harrison, Stantec New Zealand**

Presentation Summary:
Like many countries within the Indo-Pacific, the freshwater aquatic communities on Guadalcanal in the Solomon Islands have remained largely understudied despite the extensive river systems present on the island. This paper presents the results of the first aquatic eDNA study undertaken within the Solomon Islands. This eDNA data is discussed alongside the results gained from of two years of 'conventional' fish survey effort (electrofishing, snorkeling, and fixed-point underwater videography) within the Tina, Ngalimbiu, Sutukama, and Toni River catchments on Guadalcanal.

The use of relatively low-cost and user-friendly eDNA sampling has the potential to provide a wealth of information on previously understudied fish communities within the Indo-Pacific region, but challenges remain around the ability of the developing technology to differentiate between similar species and the level of knowledge required to correctly interpret results, particularly in areas where little research has previously been undertaken.

Speaker Bio:
Kristy Harrison is the Group Leader Environmental Science at Stantec. She has 19 years of experience in environmental and social management throughout New Zealand, Australia, and the Asia Pacific Region. She specialises in the assessment and management of major infrastructure and has worked on numerous hydropower projects from feasibility stage, due diligence,

design, construction to operation. She is well versed in the environmental and social issues inherent in these schemes and is highly skilled in the preparation and implementation of environmental and social impact assessments, management plans, biodiversity offsets, and related requirements to ensure that projects meet the needs of both people and the environment. In addition to her New Zealand projects, she regularly works internationally on infrastructure funded by the Asian Development Bank, World Bank Group, Department of Foreign Affairs and Trade etc.

Kristy is a Certified Environmental Practitioner (CEnvP), Member of the Environment Institute of Australia and New Zealand (MEIANZ), Deputy Chair of the Special Interest Section on Impact Assessment for EIANZ, and Trustee of the National Wetland Trust of New Zealand. She holds an MSc (Hons 1st) in Environmental Science and BSc in Biology and Geography from the University of Auckland.

Radial Spillway Gate Trunnion Bearing Condition Assessment Investigation - **Philip Winter, Manawa Energy**

Presentation Summary:
This presentation chronicles investigation activities conducted on one of the Matahina spillway gates to assess the condition of the gate's trunnion bearings. The presentation will review progressive investigation activities conducted over the course of several months and the outcomes of these investigations. For the investigations several tests were conducted – the testing methodologies, analysis approaches and practical considerations will be shared. Lessons learned regarding the approach taken will be discussed as well as how much each investigation helped clarify what the next steps should be.

Speaker Bio:
Philip is a dam safety engineer focused on flow control equipment at Manawa Energy in New Zealand. An electrical engineer, graduating from the University of Auckland, he has previously worked in power distribution, and internationally in the automotive industry. He enjoys learning about new technologies and finding new ways to apply them.

Challenges of Developing and Constructing Small Hydropower Projects in Africa: Some Success Stories - **Bertrand Rochecouste Collet, Stantec Australia**

Presentation Summary:
Having played a major role in the execution of 13 hydropower schemes in Africa and after conducting numerous bankable studies for large dams and hydropower projects and travelled 27 African countries, Bertrand will share his knowledge gained, lessons learnt and anecdotes with the hydropower group. Projects to be presented include Kashimbila (Nigeria), Sindila (UgandA), Ndugutu (Uganda), Nyamwamba II (Uganda), Ntaruka'A (Rwanda), Dama and Sigu (Burundi), Kawa, Dikolongo and Kambudji (DRC) as well as Bethlehem Hydros, Krusivallei, Stortemelk and Boston Hydro (South Africa).

Speaker Bio:
Bertrand has over two decades of experience in the field of dams and hydropower projects and is Stantec's Practice Leader in Australia for Hydropower. His global exposure covers the entire project lifecycle of greenfield dams and hydropower development from desktop studies and site identification, reconnaissance studies through to bankable feasibility studies, financial close and construction, commissioning as well as operations and performance review.

Bertrand has participated in many roles, from owner's engineer; lender's engineer; engineering/project manager in engineering, procurement, and construction management (EPCM), Design and Construction projects as well as EPC construction. This experience, together with his broad knowledge of project development and implementation, strongly reinforces the value of his contribution and advice to clients towards project success.

Life extension of scroll case with 940mm long through-wall cracks - **Quinton Rowson, Re-Generate & Aaron Chinnery-Brown, ABC Engineering**

Presentation Summary:
Presents the advanced Elastic-Plastic Fracture Mechanics assessment to obtain a life extension of a 1926 cast steel scroll case with 940mm long through-wall cracks. The flaw was quantified using the Total Focus Method (TFM) NDT technique for the

most accurate characterisation of cracks possible. A Level 3 Fitness For Service (FFS) assessment was completed based on the NDT data to API579-1 using the advance ductile instability analysis method (J-Integral Tearing Modulus method). The purpose of this advance Level 3 FFS assessment was due to failing a previous Level 2 assessment using lower bound material properties and conservative assumptions.

Using the ductile instability analysis method, the crack was incrementally grown with results plotted in the J-Integral Tearing Modulus plot in relation to the J-Integral resistance curve. The results demonstrated that any crack growth was not going to lead to unstable fast fracture, and that the damaged assessed in the scroll case had in excess of 50 years remaining life. This has allowed the operator to continue to run the generator, while a decision is made as to whether the unit is refurbished or replaced.

Speaker Bio:
Quinton Rowson, a Principal Engineer at Re-Generate and the Asset Integrity Team Leader. He has over 25 years' experience and has been working in the power generation industry since 2008. Since obtaining his bachelor's and master's degrees in mechanical engineering from Canterbury University, Quinton has worked in a range of industries including Power Generation (Hydro, Wind, Gas turbine, Steam turbine, Geothermal), Oil & Gas, Petrochemical, Aerospace, Automotive (domestic and heavy transport), engine development and Rail. His specialist skill sets in Fitness for Fitness for Service assessments (FFS), fracture mechanics, creep/fatigue, stress analysis, Finite Element Analysis (FEA), Computational Fluid Dynamics (CFD) and vibration/acoustic analysis have been developed during his time living and working in New Zealand, the Netherlands, the UK and Germany. Returning to New Zealand from Europe in 2018, Quinton settled just out of Christchurch and has been enjoying the range of domestic and international projects that Re-Generate has been able to take on, as a well-respected globally recognised and growing organisation.

Aaron Chinnery-Brown is a mechanical engineer specialising in hydro-electric turbines and their associated systems. His mechanical engineering career spans six years with Hydroworks, Re-Generate and Manawa Energy. Aaron has focused on design, analysis, and inspection of turbines and conveyance systems in hydro-electric schemes. He has been pivotal in various stages of project development, including planning, design, install, and commissioning. His earlier career as a commercial diver and in fabrication has endowed him with a unique perspective, enhancing his effectiveness in delivering engineering solutions in the hydro industry. Aaron currently works as an independent contractor, providing engineering and project management services.

Atiamuri Intake Gates: Unravelling the past to secure the future - **Matt Baird, Energetick**

Presentation Summary:
Atiamuri power station is the third hydroelectric power station on the Waikato River, commissioned in 1958. The nominally 20 tonne 7 x 6.2 m winch operated intake gates are of the upstream sealing Stoney roller type, designed and supplied by Ransomes and Rapier. Testing of the gates by Mercury encountered unexpectedly high hoist loads, forcing abandonment of testing, and prompted review of the gate design. Assessment required a variety of tasks to be undertaken encompassing site testing, videography, solid modelling, FEA, CFD, as well as classical analysis. The combination of assessment tools provided an exceptional insight into the gate performance. During the analysis, it became clear the original designers were still developing their understanding of gate behaviour, and modern tools and understanding were necessary to identify and comprehend performance and safety risks. The findings present a new insight which is relevant to gates of similar design.

Speaker Bio:
Matthew Baird operates as a chartered professional engineer working within the hydropower generation industry. With a career frequently returning to hydraulic gates, Matthew has operated across asset owners, contractors, and consultants within the energy industry.

The green-green hills of the pumped hydro plant: How pumped hydro plants can be made more commercially viable and environmentally friendly - **Kris Moore, WSP**

Presentation Summary:
The concept of pumped hydro energy storage (PHES) has been around for decades but is a fresh concept in New Zealand. To move to a fully renewable energy supply by 2050, the New Zealand Government has put significant financial and intellectual

investment into the introduction of PHES in New Zealand. This will be positive for the Nation's energy security. However, as great as the proposed PHES concepts (Onslow and Upper Moawhango) are, they focus primarily on achieving large scale dry weather energy security with a minimum of 1TWh electricity generation. This scale means that construction and environmental costs are high and many additional benefits that PHES environments can bring are left out of the discourse. This can discourage the public and alienate commercial energy generating entities from investing, leaving the costs up to the Government and the unwitting taxpayer.

This presentation will cover the many additional benefits of PHES environments, as well as discuss how commercial energy generating entities can be incorporated into the investment of PHES. Additionally, this presentation will provide an example of a PHES plant that can utilise these benefits, while being financially feasible to the Government and the commercial energy generating entities.

Speaker Bio:
Kris Moore - BSc/Ba, BEngTech (Civil), MDevStud.Kris is a Senior Engineer and Team Leader at WSP (Hamilton Water Team). Kris has experience working in all three of the civil water engineering industries. However, Kris's true passion is in pumped hydro. This was initiated while completing his thesis in the Bornean Jungle and witnessing poorly executed development projects (including mini hydro plants). After witnessing the issues caused by these projects, Kris continued his studies in Engineering so to one day engineer hydro plants that would benefit all and cause no additional harm to the environment and its people.

KNOW ANYONE WHO MIGHT LIKE TO ATTEND?

Share this fantastic opportunity to attend this popular conference far and wide!

Looking to book a team of 5 or more? Reach out and we can assist you with your group booking.
Email: nicola.green@engineeringnz.org

Register today! **CLICK HERE**