British Hydropower Association

BHA ANNUAL CONFERENCE 2016

The Glasgow City Hotel
Cambridge Street, Glasgow, G2 3HN

8th – 9th November

CONFERENCE SPONSOR

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Networking Breaks

Conference Dinner

Conference Dinner Wine

Welcome to Glasgow

Glasgow is one of Europe's most vibrant and cosmopolitan cities, home to the art nouveau architectural treasures of Charles Rennie Mackintosh, and on the doorstep of Scotland's glorious countryside.

Glasgow is the gateway to Scotland's famous Highlands with the splendour of the Ayrshire coast, Loch Lomond and the Trossachs less than an hour's drive.

Contents

Getting Around

Glasgow is an easy city to find your way around. Built on a grid system, it is compact to navigate, either on foot or using public transport. SPT Travel Centres provide information about all types of travel in the area.

Walking: Download the Glasgow Walking App or ask the hotel reception for a city map.

Subway: The quickest and easiest way to get around the city centre and West End.

Train: Glasgow Central Station links Glasgow by rail to the South, with Glasgow Queen Street Station operating routes mainly to Edinburgh and the North.

Taxi: Glasgow Taxis' distinctive cabs can be flagged down on the street or booked by calling 0141 429 7070.

Bus: First Bus Glasgow operates over 100 routes across the city.

Bicycle: Nextbike has 400 bikes for hire in 43 locations, available 24/7.

Car Parks: There are several municipal car parks around the city, including one directly behind the conference venue, and the Glasgow City Hotel has 250 on-site parking spaces available at an additional charge.

Airport Transfers: There are regular airport shuttle buses running from a number of dedicated locations throughout the city.

WELCOME TO THE BHA ANNUAL CONFERENCE

A very warm welcome to the British Hydropower Association Annual Conference 2016. I am delighted that Paul Wheelhouse MSP, the Scottish Government's Minister for Business, Innovation and Energy will be addressing delegates in the opening session of conference on the morning of the 9th of November.

We are most grateful that he has agreed speak and let delegates know Scottish Government plans to support the sector in the years ahead.

This two-day event incorporates our comprehensive, diverse and stimulating conference programme with 32 high quality speakers covering the widest range of subjects that we've ever experienced at our annual conference. These include international hydropower, marine energy, storage in all its many forms, smart grid technology, innovation, maximising projects in a low subsidy world, shared ownership hydro projects as well as presentations from regulators SEPA, OFGEM and the Environment agency.

We have an excellent technical exhibition showcasing recent innovations and on the evening of the 8th of November, an enjoyable conference dinner, with ex-England and Lancashire cricketer, Graeme 'Foxy' Fowler, as our after dinner speaker. The dinner provides an informal opportunity to relax and network with delegates, colleagues and friends old and new.

The BHA Annual Conference represents the outstanding opportunity to meet and engage with industry professionals, conference speakers and practitioners to reflect on our future hydropower landscape.

As we approach the end of 2016, the BHA remains very much at the forefront of hydro in the UK, where we continue to represent our members' best interests in promoting and protecting hydropower for this and future generations.

Many thanks to all of you attending the conference – I look forward to meeting many of your over the course of the 2 days and as well at the conference dinner.

Simon Hamlyn, Chief Executive Officer, BHA

Conference Dinner

With Welcome Drinks Reception and guest speaker Graeme “Foxy” Fowler

Glasgow City Hotel

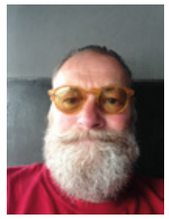
Tuesday 8th November

19:15hrs - Welcome Drinks in the conference foyer

20:00hrs - Conference Dinner

Dress code - informal

All attendees are invited to join us to relax and network with friends and colleagues. Check out the Guest List displayed at the conference registration desk during the day and at the Welcome Drinks Reception in the conference foyer to find out where you will be seated.



Our After Dinner Speaker Graeme (Foxy) Fowler opened the batting for Accrington Cricket Club at a very young age in the Lancashire leagues, soon attracting the attention of scouts at Lancashire County Cricket Club. He made his debut for Lancashire in 1979 and less than two years later Graeme won his first Test cap for England against Pakistan. He went on to play 21 Tests for England and 25 One-day Internationals, including the 1983 World Cup. Highlights of his international career was a century at Lord’s in 1984 against the mighty West Indian fast bowling attack and he was the first English batsman to score a double century (201) in India. A serious neck injury curtailed his England career, but he continued his first class career with Lancashire and then Durham. Foxy is a graduate of Durham University and with considerable vision and endeavour, he convinced the University to establish a Cricket Academy of Excellence to prepare talented students for a career in first class cricket and to manage and mentor them to balance their academic studies along with creating every opportunity to become a professional cricketer. The model was so successful that University Cricket Centre of Excellence departments were established at a number of universities, including Oxford and Cambridge, all supported by the England and Wales Cricket Board (ECB) and financially backed by the MCC. Graeme became a celebrated freelance broadcaster on Test Match Special, Sky TV and a much sought-after and highly entertaining after dinner speaker. He has written two books, “Fox on the Run” and “Absolutely Foxed”. The latter, published only this year, documents Graeme’s battle with mental health issues and depression. Absolutely Foxed has been widely acclaimed amongst sporting circles and mental health specialists. He also played drums with Elton John, but that is another story...

Conference Programme

Tuesday 8th November

08:00 – 10:00 Registration, Exhibition and Networking

10:00 – 11:00 SESSION ONE

CHAIR: Simon Hamlyn, CEO, BHA

In the opening session we will hear from the BHA CEO on the state of the Hydropower industry, plus there will be a few words from Pete Stubbs, CEO at 2am, our Conference Sponsor. The rest of the session will take a look at how tax efficiency of a hydro project can have a significant impact on the viability and payback of a scheme, Canyon Hydro will showcase a project with a range of unique challenges and design and Smartest Energy will provide a perspective on the future energy landscape and in particular the political, regulatory and market forces and effects.

- **Welcome and introduction** - *Simon Hamlyn and Pete Stubbs*
- **Raising awareness of capital allowances and the important role they play** - *David Henry, Henry Consulting:* Tax and capital allowance may not be the most glamorous subject but the tax efficiency of a hydro project can have a significant impact on the viability and payback of a scheme. David will discuss capital allowances and the important role they play.
- **Showcasing a U.S. project with unique challenges and design** - *Brett Bauer, Canyon Hydro:* The market for small hydro development in North America has several distinctions from that in the UK. Brett will briefly discuss how a project is developed in the USA and British Columbia. In the USA, the local power company is required to purchase the power, but the rate is not nationally fixed. In general, the purchase rate is 35-50% of the retail rate in that area. In British Columbia the utility is a quasi-government entity that extends semi-regular “calls for power”. This is an invitation to bid your production capability for whatever rate you determine is required. BC Hydro then takes the lowest suitable cost projects and awards contracts. The Tyson Creek project in BC, with 840m net head, has some particularly distinct features from projects in the UK. In this presentation, Brett will show a photographic progression of the project, with the intent to showcase a project with unique challenges and design for a hydro loving audience.
- **The Future Energy Landscape** - *Iain Robertson, SmartestEnergy:* Iain will give a short summary of some of the current and anticipated influencing factors on the electricity market for embedded hydro generation, including political, regulatory, economic and other market forces.

11:00 – 11:30 Exhibition and Networking Break

11:30 – 13:00 SESSION TWO

CHAIR: Adrian Loening, Mor Hydro

Energy storage is an exciting technological development that looks set to play a dramatically larger role in the UK electricity market, but only by understanding the market in depth will investors be able to identify the right opportunities. This session considers a range of storage considerations, from traditional pumped storage hydro through to non-traditional large-scale kinetic energy storage.

- **The benefits and barriers for pumped storage hydro in the UK** - *Paul Gardner, DVN GL:* This presentation reports the outcomes of work carried out by DNV GL for Scottish Renewables, funded by Scottish Government, SSE and ScottishPower, to identify the political and economic barriers facing pumped storage hydro in the UK, and to identify the important benefits the technology can bring to the GB electricity system. The report addresses the factors which differentiate pumped storage hydro from other forms of energy storage, and other sources of flexibility for the power system. It shows the critical importance of certainty in the future income streams for pumped storage, and the policy background, as for all long-term 'infrastructure-type' investments.
- **Large-scale kinetic energy storage** - *Ted Ridgeway-Watt, Teraloop:* A future energy mix with a strong component of variable renewable energy will require energy storage (EES) orders of magnitude above the current capacity. There is a huge opportunity for location-agnostic stationary storage extending beyond the range of batteries and complementing pumped hydro storage. Teraloop is developing large scale kinetic energy storage which uses magnetically levitated toroidal flywheels at hundred metre scales to store upwards of 100MW/100MWh. Working like a scaled up Formula 1 kinetic energy unit, it will be able to offer a fast response for primary and secondary frequency containment and store overnight wind power. Current projections put the cost of energy at one-fifth of lithium and competitive with PHS. Teraloop is currently raising funds to graduate from a laboratory proof of concept to an industrial prototype and is interested in meeting future collaborators, ranging from utilities and TSOs to high performance engineering companies.
- **The use of pumped storage in the UK** - *Grant Wilson, The University of Sheffield:* Grant will look into the use of pumped storage in the UK over the last 8 years and analyse whether the growth in renewables has had a measurable impact on the timing of pumped storage charging and discharging. The data for non-pumped storage hydro will also be analysed to see if any effect of the growth in renewable generation has had an impact too. The presentation will finish with a discussion of the seasonality of electricity, natural gas and liquid fuels in Great Britain, and the role of different types of storage now and in the future.
- **Electric cars and their role into the future for energy storage** - *Ian Cook, ICCL:* Ian will touch briefly on the history of electric cars, then move on to where we are today and their role in the future - not just for transport. A car's battery has a capacity of up to 100 kWhr, not an insignificant figure. Ian will talk about smartgrids and microgrids and how electric cars can be used for absorbing, storing and generating electricity for the benefit of the user and country's electricity system; the iPlayer/ITV Hub of electricity, it's called V2G (Vehicle to Grid). The UK is behind Europe, do we want to catch up, especially after Brexit? Finally, what other very significant issues can be addressed by electric cars?
- **The value of storage** - *Chris Elliott, Renewables First:* Hydro is the mature renewable technology that can be designed to provide storage of energy and which has a generation profile that matches demand well. However, the majority of FiT driven development has been based on pure RoR principles because the FiT value dominates the income, and this is not sensitive to seasons, time of day or the ability to generate on demand. The reduction in FiT will potentially increase the importance of these beneficial aspects of hydro generation, and the recently constructed fleet of small hydro plants include many which may be capable of increased energy capture and boosting output in premium times. This presentation looks at a potential site, its income from FiT and other elements, how these are derived, and how storage can increase the total income. It also proposes a solution to suggest a payback and we consider the upcoming pressures on the network infrastructure and anticipate future developments in flexibility needs.

13:00 – 14:15 Exhibition and Networking Lunch

14:15 - 15:40 SESSION THREE

CHAIR: Judith Patten MBE

Since medieval times, millers around the globe have harnessed the power of the tides. Tide mills once dotted the coasts of France, Portugal, Spain, Belgium, the Netherlands, Germany, Denmark, Canada, the United States and China. This session considers the wide range of tidal energy options, their types and scale and the many associated benefits of harnessing energy from the tides.

- **Hydropower goes marine** - *Prof. George Aggidis, Lancaster University:* Reviewing the development of marine energy and the operating conditions and suitability of hydro turbines (HT) for use as power take off options. Because of the intimate relationship between HT and application, it is not surprising that advances in the technical capabilities of HT have followed the developing needs of the users' processes. Increased working temperatures, pressures and resistance to corrosion are examples of how changes to the applications have driven HT technology. So are the requirements for simpler on-site maintenance, longer working lives, increased performance envelopes, increased efficiencies, triple regulation, reduced specialisation and particularly lower costs, which have all been driven by the need to meet users' needs in a competitive environment. HT as power take off options for marine energy extend the current applications envelope with innovative marinised solutions assisting emerging clean renewable energy sources.
- **Development of tidal lagoons in the UK** - *Ioan Jenkins, Tidal Lagoon Power:* At 320MW installed capacity, Swansea Bay Tidal Lagoon will be the largest marine energy development in the world. A £1billion infrastructure project developed by Tidal Lagoon Power Limited, it will have an entirely predictable 495GWh output each year of clean, green electricity and will power more than 155,000 homes for 120 years – that's about 11% of Wales' domestic electricity. This presentation will provide an update on the Tidal Lagoon Swansea Bay project and Tidal Lagoon Power's ambition for projects across the UK and internationally. This exciting project will develop a new energy sector and create a new supply chain with opportunities for exporting internationally to other tidal lagoon projects across the globe.
- ***The Wyre Eco-THEP*** - *Bob Long, Natural Energy Wyre:* Natural Energy Wyre Ltd is a front runner in being the first deliverable low-head hydro project in UK/Europe, employing variable head/speed technology at an affordable build cost. Bob will share their handling of problems on the journey to success, not least with funding issues that need addressing before the technology can be rolled out at other locations, highlighting the national importance of this power source and lack of government understanding and assistance.
- **UK tidal range; the road ahead** - *Bernard Kaufhold, Re-Imagine Energy:* With massive uncertainty in the UK at present, what is the future for tidal range projects? The Hendry Review, Brexit, the Paris Agreement – how will these and other factors influence the development of the sector. Can the UK afford to invest in tidal range – can it afford not to? This presentation will briefly look at the risks faced by project sponsors and opine on the sector's evolution through a series of observations.
- **Hydroelectricity generation and storage breakthrough update** - *Peter Tse, Coastal Protection Engineering:* Peter is working to progress his hydroelectricity generation and storage breakthrough, which will help reverse the impact of climate change by reducing carbon emissions, and by lowering the temperature of the ocean surface. His patented process uses a Seawater Exchange and Storage System (SESS) featuring both reversible and bi-directional turbines to generate AND store hydroelectricity enabling flexibility and reliability of supply. The SESS combines the existing technologies of pump storage hydro and gravitational force to produce energy which allows conventional hydro storage conversion losses to be recovered and exceeded. High tides mean it can generate and store even more energy but they are not essential. A number of SESS units can be joined together to create an Ecological Artificial Barrier Reef where coastal protection is needed. This safeguards the coastline from erosion and from the impact of extreme weather, as well as being a hub for a range of additional renewable energy technologies, including wind turbines and floating solar panels. It will also create and develop coastal communities, enabling them to grow their own produce, farm their own seafood, and will provide new jobs and a range of leisure opportunities.

15:40 – 16:10 Exhibition and Networking Break

16:10 – 17:40 SESSION FOUR

CHAIR: Kieron Hanson, Hydroplan

This session will consider the many environmental aspects associated with hydropower, the future of abstraction reform in England and the issues that will need to be addressed, and we will also be taking into account the regulatory framework presented through the work of OFGEM who will touch on new developments, including battery storage.

- **What can EIA in the UK learn from international EISA and vice versa? A comparative of UK and international environmental impact assessment, permitting and issues** - *Catherine Anderson, AECOM:* Hydropower around the world has many different forms and applications, whether it's run-of-river or pumped storage. Whatever form it takes, an important consideration in project development is the appropriate assessment of potential environmental effects on the location of deployment. Whilst there are many different scales of international hydropower projects, most approaches used in Environmental & Social Impact Assessment (ESIA) are the same as required for EIA in the UK – the developer still needs to undertake appropriate baseline surveys and consultation. International projects, however, will be on a wider geographical scale, have a greater emphasis on social issues as part of an integrated assessment as opposed through the consultation process in the UK, and are also subject to much stricter standards by international lenders. This presentation will focus on a comparison of the permitting and consenting regimes applicable to UK and international hydropower projects with consideration of the likely sources of funding and lenders requirements, as well as the requirements of applicable local legislation; and discuss examples of innovative approaches and techniques which are being developed on international projects which could be applicable to UK projects and vice versa.

- **Hydropower and environment; challenges for research and the industry** - *Paolo Perona, University of Edinburgh*: In the 21st century, humankind has begun to look to formerly unconsidered uses of its fresh water resource. For lands that are rich in water, e.g. the UK, climatic change scenarios, combined with environmental issues and increasing energy demand, may influence future water allocation policies. In this presentation, Paolo will show an engineering approach that helped to quantify the meaning of river ecosystem resilience to perturbation of the natural flow regime. He will discuss the effect of a changing hydrologic regime on the transient growth dynamic of riparian trees, and consider the results on the adaptation of the plant root architecture to the new regime, suggesting a mechanism by which riverine ecosystems could undergo catastrophic shifts towards new equilibrium states. He will also speculate the complex functioning and the environmental and societal significance of riverine ecosystems enforcing Dynamic Environmental Flow release policies as ecologically sustainable measures. This represents a key challenge for both scientists and stakeholders under a common sense of responsibility versus future generations. In the context of growing disequilibria between nature and increasing energy demand, he will conclude by commenting on the efficiency of such policies in reducing the cascade impact of water exploitation in mountain environments.

- **Regulation updates; Enforcement! Guidance! Charges!** - *Simon Pattullo, SEPA:* There have been changes recently to the legislation and governance surrounding the environmental aspects of hydropower. SEPA is in the process of revising its charging scheme, has been given new enforcement powers, and is in the final stages of producing their guidance for storage schemes. This presentation will introduce these changes.

- **Abstraction Reform** - *Ross Lowrie, Environment Agency:* Abstraction reform is coming and will involve a change in how licencing and regulation is undertaken in England and Wales. Ross will talk about the new approach, which seeks to improve demand management opportunities and better manage the river environment.

- **FiTs; new rules and new developments** - *Tim Simon, Ofgem:* Tim will look into the history of hydro under the FiT scheme, discuss recent developments to the scheme and touch on what the future holds for FiTs.

19:15 Conference Dinner

Pre-dinner Welcome Drinks Reception in the conference foyer, followed by the Conference Dinner in the Exhibition Hall

Wednesday 9th November

08:00 – 10:00 Registration, Exhibition and Networking

09:00 – 09:15 Keynote Address from The Minister

We are delighted to open the second day of conference with an address by Paul Wheelhouse, MSP, the Scottish Government Minister for Business, Innovation and Energy

09:15 – 10:40 SESSION FIVE

CHAIR: Prof George Aggidis, Lancaster University

This session includes an assessment of the implications of the requirements of the UK Reservoirs legislation for existing and proposed hydro schemes, the work of Scottish Water in managing their hydro assets in the most profitable manner, in particular how offsetting has driven the location of many of their small-scale hydro sites and how a stream-scale model can help to optimise ecological and economical water use in hydropower systems.

- **A stream-scale model to optimise ecological and economical water use in hydropower systems** - *Pierre Razurel, University of Edinburgh:* Environmental impacts associated with hydropower systems have been related to the perturbation of the natural flow regime within impounded river reach. The minimal flow release (MFR) policy, typically applied as an ecological measure, adversely affects the riparian ecosystem. In some countries (e.g. UK), proportional allocation rules have been applied aiming at mimic the natural flow variability. In a context in which the full hydropower potential might be reached in a few decades, a solution to optimize the water allocation seems essential. In this work, we propose a model which enables us to generate a wide range of non-proportional allocation rules and allows us to evaluate the associated benefits for a specific hydropower plant. The optimal policies can be identified on the efficiency plot resulting from numerical simulations. Non-proportional allocation is presented as a viable alternative to the proportional and MFR policies improving substantially economic and ecological efficiencies.

- **Operational issues; keeping hydro spinning at Scottish Water** - *Claire Chapman, Scottish Water:* Scottish Water is the government-owned water utility in Scotland. In 2010 the cost of power to Scottish Water was £38m, and by 2014/15 this had risen to £47m. This is a 20 % increase, and power is the single biggest non-salary cost in the business. To offset this cost, Scottish Water has invested heavily in small-scale renewable generation, with a key focus on small hydro. This presentation looks at the learning points from the installation of these technologies - their location, the benefits to the sites, and pitfalls. Scottish Water's maintenance regimes for the technologies will be reviewed, as will the site telemetry and communications set up. Scottish Water has an in-house team that monitor the generation of the installations as well as a maintenance and monitoring framework to ensure availability of the assets. With retro-installation costs of hydro much higher within the water industry, these developments would not have been possible without the presence of the Feed in Tariff in the UK. Offsetting is a big attraction, and this has driven the location of many of the sites. Looking to the future and the demise of the Feed in Tariff, Scottish Water is now looking towards developing private wires with locally established small scale renewable sites, to offset any industrial load that we have.

- **An innovative, ultra-low-head hydropower system** - *Dave Mann, Mann Power Consulting*

- **An introduction to UK Reservoirs legislation** - *Robert Mann, AECOM:* Robert will give a brief outline of the Reservoirs Act, as applicable in the UK, and some implications of the requirements of the legislation for existing and proposed hydro schemes.

- **Standing up against the UK Eel Regulations** - *Olly Paish, Derwent Hydroelectric Power Ltd:* The UK Government implemented the Eel Regulations in 2009 in response to the EU Eels Directive. Very little happened until, without consultation, the EA published their Eel Screening Guidance in 2012. Suddenly, existing and future low-head HEP schemes were being told to install 2mm, 3mm or 9mm screens to protect juvenile eels, despite no evidence of hydro-related detriment to this size of eel. This paper will report on the BHA's efforts to uncover the paper-thin evidence that the eel guidance was actually based on, the result of a recent successful appeal against 2mm screening, and future recommendations for hydro developers facing over-restrictive eel-screening demands.

10:40 – 11:10 Exhibition and Networking Break

11:10 – 12:40 SESSION SIX

CHAIR: David Henry, Henry Consulting

This session will deal with the wide range of financial considerations, including refinancing, the wholesale power market, the different PPA structures, the future of PPAs and storage, the best way to maximise hydro projects in a low-subsidy world.

- **Low subsidy support** - *Simon Morris, Ricardo:* Figures published by Ofgem in September 2016 show that since the reduction in the Feed in Tariff at the beginning of the year, there have been 3 hydropower projects of less than 5MW capacity that have pre-accredited potentially indicating that the Feed in Tariff is no longer an incentive for the development of small scale hydropower projects in the UK. Ricardo Energy & Environment has been working with a number of communities developing hydropower projects looking at innovative strategies that could make a project viable without incentive support, such as increasing output and value and decreasing costs. Simon will present the results of work completed supporting community projects in Scotland and Wales with a particular focus on options for increasing the value of energy produced and reducing finance costs.
- **Hydro; how to maximise your project in a world without subsidy** - *Sonya Bedford, Stephens Scown:* The Brexit vote has created many uncertainties for renewables, reaffirming the need for the sector to focus on a world without subsidy; a world where the early days of the Feed-in-Tariff and 20% rates of return on investment are long gone. The key question is: what will attract investors in this brave new world? The sector must play up its strengths. The longevity of hydro projects, with a lifespan of 75 years+ - up to three times that of a wind turbine - provides a very different investment opportunity and will appeal to investors looking to achieve a balanced risk portfolio. Such schemes offer long term, low risk financial returns that can be achieved without the need for subsidies. Crucially, to keep attracting investment, hydro projects must also maximise the price they are paid for the electricity they generate. We are actively working on this with clients through amalgamating the power from a group of projects to achieve a higher price, and selling the power locally through a direct wire agreement and achieving a higher price as a result.
- **Financing new hydro schemes** - *Dan Hird, Triodos:* Triodos Corporate Finance, a division of Triodos Bank, helps community organisations and community-focussed commercial organisations connect directly with investors to raise the finance required to construct new hydro schemes. In the past year, they have raised £5 million via four capital raisings to finance new hydro schemes that collectively generate 3.6 GWh of clean electricity each year.
- **Getting value from your hydro asset** - *Tom Matthews, Good Energ:* Recent policy changes continue to challenge the renewables industry. Now more than ever there is a need for generators to gain as much value from their asset as possible. Tom will cover how to manage the risk of the wholesale power market, the different PPA structures, the future of PPAs and storage.
- **Investment in small-scale hdyro; challenges and opportunities** - *James Abraham, Triple Point:* Over recent years, investing in hydroelectric projects was attractive for a number of compelling reasons. However, the deteriorating regulatory environment has reduced project returns and investor appetite. Despite this there remain many of the characteristics attractive to investors looking for predictable, long term returns. James will explore the options available to owners or developers of new and existing schemes and highlight where funders like Triple Point are looking to leverage experience in investing in the sector.

12:40 – 14:00 Exhibition and Networking Lunch

14:00 – 15:45 SESSION SEVEN

CHAIR: Simon Hamlyn, CEO, BHA

The closing session will take a look at international developments in hydropower, the opportunity to unlock powerful, long-term, recurring revenue streams and savings from the energy market for significant industrial and commercial energy users and as well the challenge of resolving future talent shortages in the international hydropower and renewables sector.

- **Developments in international hydro** - *Matt Crosher, Gilkes:* From Kendal to Africa and North America Matthew will present a brief overview of two recent Gilkes projects within water supply networks, and their unique challenges. The Si-Bo project in West Kenya, is using hydro power to deliver reliable clean water to a rural community in East Africa. The Farmers project upgraded an existing powerhouse, reduced the maintenance costs and increased energy output, for an irrigation district in Oregon, USA.
- **Capitalising on your energy assets to unlock maximum revenue for the hydro industry** - *Michael Phelan, Endeco Technologies:* In this presentation we will learn how the hydro industry is capitalising during an energy crisis whilst helping National Grid. As a National Grid Aggregator, Michael will be speaking about Endeco Technologies' future proof technology which connects high energy industrial users to the most lucrative revenue streams, currently generating £90,000 + / MW for their clients in partnership with National Grid.
- **Addressing hydropower talent shortages through a targeted approach** - *Clint Harrison, Taylor Hopkinson:* Resolving future talent shortages in the international hydropower and renewables sector will be an increasingly challenging prospect unless innovative training, development and search & selection programs are implemented by industry. The exponential development of hydropower and renewable energy projects in developed and emerging economies, along with a lagging development of new graduates and experienced engineering skill-sets, is creating critical knowledge gaps across the world. This, combined with the imminent retirement of the 'baby boomer' generation holding vast amounts of industry knowledge, creates significant challenges for knowledge transfer to the next generation of engineers. Key to resolving these issues will be identifying synergies across other sectors where talent can be acquired and rapidly developed to a 'fit for purpose' level. Creating strategic search and selection programs and proactivity targeting the desired talent base with a focused employer value proposition is a highly effective way to build critical talent streams rapidly within a business. In today's competitive talent environment, blue-sky thinking needs to be applied to ensure the best people are targeted, attracted and retained, which will ultimately ensure that younger talent is nurtured and developed within growing organisations.
- **Sustainable energy for an isolated grid In the Westfjord Peninsular of Iceland** - *Karl Henninger, Kössler:* The Icelandic utility Orkubú Westfjord realised a special project for stabilisation of the isolated grid in the north-western part of Iceland. The project has very special demands to the equipment supplier for covering the needs in this region, which is further out from the main urban areas in Iceland. These requirements have been described by the well-known Icelandic Consulting Company VERKIS in their Tender sent out to various bidders. The key demands are, for example, extremely sensitive frequency, very difficult ground conditions, extreme weather conditions, increased safety of the penstock, and high demand for the availability of the turbine. It is the aim of Kössler to present this project as reference for a concentration of technical demands in one project and the final solution for successful working equipment delivered by Kössler and its partners.
- **Shared ownership hydro projects** - *Anna Cameron, CMS Cameron McKenna:* Anna will give an outline of shared ownership hydro projects; the legislation and policy around the topic and the different models available to developers, highlighting the pros and cons of each.

Closing remarks - Simon Hamlyn, BHA

Conference Speakers

James Abraham
Investment Manager
Triple Point

James in an Investment Manager at Triple Point, where he has helped invest £38m into Hydroelectric projects in the North of Scotland. He graduated from the University of St Andrews with an MA (Hons) in Economics, and from Durham University with an MSc in Finance & Investment. After working as an economist for a consultancy, James joined the Investment Team at Triple Point and has managed a number of investments of debt and equity into renewable energy projects.

Prof. George Aggidis
Professor of Energy Engineering
Lancaster University

George is Professor of Energy Engineering at Lancaster University and Director of the Lancaster University Renewable Energy Group & Fluid Machinery Group. He leads the water renewables research activities of the Engineering department at Lancaster University, including generic and applied research on wave energy, tidal power and hydro power.

Catherine Anderson
EIA Associate Director
Aecom

Catherine is an EIA Associate Director with over 14 years experience in the environmental and energy sector, four of which were spent with Environment Agency Wales. She has project managed the 99MW Glyn Rhonwy pumped storage scheme (now submitted to the Secretary of State) in addition to other renewable energy projects in the UK and overseas. She is also the AECOM UK lead for renewable energy EIAs.

Brett Bauer
Vice-President of Engineering
Canyon Hydro

Brett Bauer is Vice-President and Head of Engineering at Canyon Industries Inc. He oversees the specification and design for all hydropower systems supplied by Canyon Industries, and actively manages projects as they move through production. He has been employed by Canyon Industries for more 22 years.

Sonya Bedford
Partner
Stephens Scown LLP

Sonya is a Partner with Stephens Scown solicitors; a Non-Executive Director at Regen SW; a Director at Exeter Community Energy; is on the board for the Sustainability Institute and the committee for her local branch of the Energy Institute. She is currently undertaking her MSc in Renewable Energy at the Centre for Alternative Technology. Sonya has been involved in a large number of hydro projects and has led a group of small scale hydro owners through funding and set up.

Anna Cameron
Associate
CMS Cameron McKenna LLP

Anna is an Associate in the Energy Team at CMS Cameron McKenna specialising in project financed renewable energy transactions, advising both lender and developer clients in securing development finance and long term funding, and guiding both parties through the due diligence process. Anna has significant project management and client interface skills having acted as legal lead on a number of project finance transactions across various technologies, including onshore wind, hydro, solar and biomass.

Claire Chapman
Renewable Asset Generation Manager
Scottish Water

Claire works within the Energy Team at Scottish Water and is responsible for optimising generation at the 50 plus renewable sites across the business. A key role is ensuring that the sites remain Ofgem-compliant and qualify for government tariffs. Claire has a background in environmental compliance and licencing, in the Water and Oil industry.

Ian Cook
Director
ICCL

Ian is a professional electrical power systems engineer who has been involved in hydro engineering for almost thirty years. He was Electrical Engineering Manager with First Hydro Company at Dinorwig and Ffestiniog Power Stations until twelve years ago. He is currently working as a Consultant in a project management role for multidiscipline hydropower projects. Ian's specialisms include high voltage electrical engineering - including hydropower stations and all aspects of the power systems connecting the stations to DNO and other grid systems, including Connection Agreements.

Matt Crosher
Sales Manager UK
Gilbert Gilkes & Gordon Ltd

After several years working in the water Industry and with an interest in renewable energy, Matthew became involved in hydro in 2004, working firstly with Gilbert Gilkes & Gordon of Kendal, and then as an independent consultant. In 2007 he returned to Gilkes as UK Sales Manager and has since then overseen, from conception to generation, over 200 projects in excess of 115 MW of installed capacity. He served on the BHA Council for 4 years, and has been a member of the Scottish Renewables Hydro Work Group. Matthew has recently completed an MBA at Lancaster University.

Chris Elliott
Senior Engineer
Renewables First

Chris has been active in designing and installing hydro plants in the UK for over a decade and is Director of companies owning and operating a handful of sites in SW England.

Paul Gardner
Global Segment Leader, Energy Storage
DNV GL

Paul Gardner trained as an Electrical Engineer and has worked in renewables since 1984. He led the electrical engineering group at Garrad Hassan, the world's largest independent technical advisor for renewables, now part of DNV GL, subsequently joining the Strategy and Policy Studies Group at DNV GL, providing strategic and market advice to government bodies, NGOs, established companies in the renewables industries and new entrants. Currently he is global Segment Leader for Energy Storage, responsible for co-ordinating DNV GL's activities in Energy Storage, including integration of renewable energies, electricity grid applications, distributed and isolated energy supply, heat, electric vehicles, and electric marine propulsion.

Simon Hamlyn
Chief Executive Officer
British Hydropower Association

Simon, who is a 3-Dimensional Designer by qualification, comes from a family of architects - both parents and his Grandfather.
Simon's career has embraced international branded drinks, hotels & leisure, electronic entertainment, magazine publishing, internet businesses and, over the past 12 years, consumer membership organisations. Simon is based in Bangor on Dee, just south of Chester, with two terriers and two young children. He enjoys, when time permits, a love of music, cricket, football, skiing, walking, running and game shooting.

Kieron Hanson
Managing Director
Hydroplan Ltd

Kieron Hanson is a hydraulic/ mechanical engineer with over 30 years' experience in small hydro and the early part of his career was spent as a turbine designer. He is the Founder and Managing Director of Hydroplan UK, responsible for all commercial aspects of the company as well as overseeing and advising on technical aspects of the mechanical and hydraulic design as well as construction and project management of hydro projects. A former chairman and CEO of the British Hydropower Association (BHA), Kieron has been a key member of the BHA for over 20 years.

Clint Harrison
Senior Consultant
Taylor Hopkinson

Clint holds a Bachelors Degree in Land Surveying from the University of Otago in New Zealand. He aquired industry experience in the land development and energy infrastructure sectors. Transitioning into recruitment in 2005 Clint has over 11 years of experience in challenging senior and executive level retained recruitment mandates across the energy and resources sectors.

Karl Henninger
Sales & Project Engineer
Kössler GmbH & Co KG

Karl Henninger joined Kössler in 1979 as designer for Hydro Turbines. In 1991 he became the Head of Production and Erection Services and finally found his profession in our Sales and Project Engineering Department since 1999. He has vast experience in project management of various hydropower plants worldwide and has successfully completed more than 40 hydropower contracts.

David J Henry BSc (Hons) MRICS
Director
Henry Consulting

David Henry is a chartered Quantity Surveyor specialising in providing capital allowances advice to commercial property owners. He established Henry Consulting in the autumn of 2011 following more than a decade working for a leading national capital allowances consultancy. David has worked on a range of hydro schemes including high-head run-of-river, dam storage and projects that use screw generators. In addition to hydro, he has prepared capital allowances claims across a broad cross-section of market sectors. Away from work, David is a keen hill walker and snowboards, and also has a passion for cars and motor sport.

Dan Hird
Head of the Corporate Finance Team
Triodos Bank

Dan is head of the Triodos corporate finance team, a division of Triodos Bank. His team helps social enterprises, charities, renewable energy projects and sustainable businesses connect directly with social investors to raise the finance required to grow and achieve sustainability. Since 2011, the team has raised £80 million for 25 clients from a wide range of investors and, in the past 18 months, has successfully raised £5 million to fund the construction of three new hydro schemes collectively generating 3.6 GWh of clean electricity annually.

Ioan Jenkins
Development Director
Tidal Lagoon Power

Ioan joined Tidal Lagoon Power in June 2013 and has since led the development of Swansea Bay Tidal Lagoon along with early scoping work in Colwyn Bay. He also has specific responsibility for the strategic development of a UK/Global supply chain valued at circa £850 million and leads the independent Wales Tidal Industry Advisory Group.

Bernard Kaufhold
Director
Re-Imagine Energy

Bernard has over 25 years' experience in the power sector as a strategist, financier, investor and developer. A former corporate financier with major investment banks, he has advised on transactions across the UK and Europe. As an investor and developer he has led major power projects from origination to close. With interests linked to the ocean, his experience provides him with a particular confidence in marine power.

Adrian Loening
Director
Mor Hydro

Adrian has worked in renewable energy since 1980 when he was a technician at the Edinburgh University Wave Power Research Group. He has an honours degree in Engineering Design and Appropriate Technology from the University of Warwick. Having worked in the fields of solar refrigeration and heating, and the landfill gas industry, he joined the hydro industry in 2006. He is currently the MD of Mór Hydro Ltd, a technical consultancy and project developer. The company currently owns (in JV) two hydro schemes in Scotland and has provided technical consultancy on more than 46 hydro projects. The company also provides technical due diligence services to major high street banks and supervises lender interests in micro-hydro schemes.

Bob Long
Chief Executive Officer
Natural Energy Wyre Ltd

Bob is an engineer specialising in thermal energy management. He has many years experience in delivering turnkey projects with economics and system simplicity at the fore. After many years owning businesses in Africa, he returned to his home town and realised the necessity for help with flood defence, power manufacture and economic and social uplift, by developing the one major asset - Tidal Power.

Ross Lowrie
Renewables Senior Advisor
Environment Agency

Ross has been involved in hydropower regulation with the EA for 6 years, working in Policy to advise on streamlining permitting and implementing the Area Account Manager role before joining Yorkshire & North East Region as Regional Hydropower Lead. He now leads the Head Office Renewables team, regulating hydropower, tidal power and heat pumps. He chairs the Hydropower Flows Panel, ensuring that the new hydropower flows guidance is implemented consistently across England. Ross joined the EA in 2004 and is based in Newcastle. He lives in rural Northumberland, only 3 miles from Cragside House, the home of domestic hydro-electric power.

Dave Mann
Managing Director
Mann Power Consulting Ltd

Dave is a Chartered Electrical Engineer with 25 years' experience in project managing complex field operations worldwide. In 2003, Dave finally took the opportunity to pursue a lifelong passion for the potential of hydropower and set up Mann Power Consulting Ltd in the UK. Mann Power Consulting Ltd is now the leading designer of the environmentally friendly Archimedean screw turbines in the UK, specialising in very low-head and 'difficult' sites, which previously may have been considered unsuitable for such applications. They have installed over 70 mini hydro systems across the country generating 5MW of clean electricity.

Robert Mann
Technical Director (Water)
AECOM

Robert is a Chartered Civil Engineer and an All Reservoirs Panel Engineer under the Reservoirs Act. He has 35 years experience in dams and reservoirs with Aecom and its predecessor companies in all parts of UK and overseas, mainly in Hong Kong. He has presented a number of papers and has been a member of various steering groups developing UK guidance documents on reservoirs.

Conference Speakers Continued...

Tom Matthews
Commercial Generation Manager
Good Energy

Tom has a deep understanding of the renewables industry. After studying energy engineering at the University of Birmingham, his focus moved to the wholesale energy market, arranging flexible power and gas trades for large blue chip and industrial energy consumers. He then moved into negotiating PPA contracts and now heads up Good Energy's Commercial Generation Team.

Simon Morris
Senior Consultant
Ricardo Energy & Environment

Simon is a senior renewable energy consultant at Ricardo Energy & Environment, with 15 years' experience in the energy sector. He leads a team of consultants covering a range of areas from policy work for Governments and local authorities, to project development work for public and private sector clients. Simon turned his focus to distributed generation and community scale projects including hydropower three years ago, leading the technical support provided by Ricardo Energy & Environment to the Community and Renewable Energy Scheme (CARES). This includes supporting communities through project development, securing finance and construction. He has worked with over 40 projects in that time.

Olly Paish
Mechanical and Hydraulic engineer

Oliver is a Mechanical and Hydraulic engineer with over 20 years' professional experience in the research, design, and project management of hydropower systems, in both the UK and developing countries. He has been a director at Derwent Hydro Developments Ltd since 2003, working on the consenting and detailed design of small-scale hydro schemes throughout the UK. He wrote the Guide to UK Mini-Hydro Developments available on the BHA web-site.

Judith Patten MBE
Project Director
All-Energy

Judith is the co-founder and Project Director of All-Energy, the UK's largest renewables show, held annually in Glasgow (10-11 May 2017). The conference is her particular responsibility and with ten parallel streams it sets out to cover all forms of renewable and sustainable energy (the BHA puts together the hydro session with the organisers) and energy efficiency/management, and it also has special sessions for community schemes and the farming/landowning community that are of particular interest to BHA members.

Simon Pattullo
Water Resources Specialist
SEPA

Although very youthful-looking, Simon has actually been working for SEPA for sixteen years. He's been a water resources specialist since 2008 and has dealt mainly with the hydropower sector since then. As a lead part of the erstwhile permitting team he oversaw the licensing of a significant number of applications in this sector, and he is now involved in their ongoing regulatory issues.

Prof. Dr Eng. Paolo Perona
Chair of Environmental Engineering
The University of Edinburgh, School of Engineering

Professor Perona's research is experimental and analytical, devoted to water and environmental processes understanding and related modeling using methods of time series analysis, stochastic processes, dynamical systems, rheology and fluid mechanics. Some recent studies include the active role of vegetation in river morphodynamics, plant root growth and mechanical anchoring, flow erosion and vegetation uprooting, snow processes and avalanche formation, water routing and the sustainability of water use for energy and food production in both humid and arid regions.

Michael Phelan MBA
Chief Executive Officer
Endeco

Michael has over 22 years' management experience in sales, marketing and product development in electronic and software companies targeting the energy sector. Prior to joining Endeco Technologies, Michael held positions at Philips, Microsol, PCAS and Dualog. He was responsible for developing European, Asian and American markets and OEMs, such as Invensys, Mitsubishi, Toshiba and Alstom. He has also facilitated several successful exits. Michael is a graduate of University College Dublin, where he obtained an MBA. He has led the development of market leading aggregated demand response, frequency response and smart tariff optimisation platforms for the Irish and UK markets.

Pierre Razurel
PhD Student
The University of Edinburgh, School of Engineering

Pierre Razurel started a PhD at the University of Edinburgh in February 2016. Supervised by the Professor Paolo Perona, the goal of his project is to develop a catchment-scale optimization model for planning small-hydropower design, location and operation. He received his Master's degree in Environmental Sciences and Engineering from the Swiss Federal Institute of Technology in Lausanne, in 2014.

Ted Ridgeway Watt
Chief Executive Officer
Teraloop Ltd

Ted Ridgway Watt is a founder of Teraloop and was appointed Chief Executive Officer in September 2014. Previous appointments have included senior technology strategy roles with government in the UK and Jersey. His background in electrical engineering and computational methods are useful for the role, despite dating back to the last millennium.

Iain Robertson
Generation Sales Manager
SmartesEnergy Ltd

Iain joined SmartestEnergy in 2008 and has been Generation Sales Manager since 2012. He leads the business development team handling the company's Power Purchase business, which includes some 3GW of embedded independent generation capacity throughout Great Britain. He has been a Scottish Renewables board member since March 2014. Iain has previously worked for ScottishPower and Contact Energy of New Zealand, and also spent 8 years in international development for the Universities of Dundee and Glasgow. He has a BEng (Hons) in Environmental Engineering and a Postgraduate Diploma in Energy Systems & the Environment from the University of Strathclyde, and a CIM Diploma in Marketing.

Tim Simon
ROO-FIT Accreditation Manager
Ofgem

Tim has worked on the Feed-in Tariff Scheme for three and a half years. While working across all the renewable technologies supported under the FiT scheme, he has dealt with a number of applications for complex and unique hydro developments. He has also worked on scheme development including many of changes brought into the scheme over the last few years.

Pete Stubbs
CEO
2AM Media

Pete, an old school designer at heart, started working at 2am about 165 years ago as a graphic designer. He loved the atmosphere and the environment so much that when the company was going up for sale, he knew he had to snap it up. Since then he's taken us from strength to strength, still getting stuck into every part of the design process, as well as meeting with clients old and new. Pete also heads up a number of other creative companies including a film marketing agency, and a clothing brand.

Peter Tse
CEO
Coastal Protection Engineering Ltd

Peter Tse of Coastal Protection Engineering Ltd has invented a way to generate and store renewable energy by harnessing the untapped potential of the ocean. Watching physicist, Professor Brian Cox, on television in 2011 got him thinking about our impact on the planet and about how he could make a positive contribution. He educated himself about climate change and set about finding a way to tackle it - coming up with a patented process that combines existing technologies in a new way three years later. A successful restaurant entrepreneur, Peter came to the UK from Hong Kong in 1992, and ended up staying. Growing up, he lived and worked on the family farm in a coastal area and it was this sustainable way of life that led him to where he is today.

Paul Wheelhouse MSP
Minister for Business, Innovation and Energy
Scottish Government

Born in Belfast in 1970, Paul was raised in Edinburgh. He has an honours degree in Economics from the University of Aberdeen and an MBA from University of Edinburgh. Paul is a professional economist and, since 1992, had specialised in higher and further education markets, policy evaluation and economic appraisal and impact assessment of capital projects. He previously held a number of roles in the Scottish Parliament and is SNP MSP for South Scotland. He has previously held posts in the Scottish Government as Minister for Environment and Climate Change and Minister for Community Safety & Legal Affairs. In May 2016 he was appointed Minister for Business, Innovation and Energy.

Grant Wilson
Research Associate
The University of Sheffield

Grant's current role as a Research Associate at the University of Sheffield is part of the www.scotproject.org team, which is a European project to accelerate the market development of the CO2-reuse sector. His research interests lie in whole energy systems analysis and more and more in the challenges in data collation and dissemination at different temporal and spatial levels of granularity.

British Hydropower Association

Annual Dinner

Grand Central Hotel, 99 Gordon St, Glasgow

Thursday 30th March 2017

We'd be delighted for you to join us at the 2017 BHA Annual Dinner, where we gather to celebrate the achievements and accomplishments in the hydropower sector over the course of the last year.

This event is a terrific opportunity to relax with friends and colleagues, entertain clients, reward staff and network with others working in the UK hydropower industry.

This unique hydropower event will take place at the historic Grand Central Hotel, located at the very heart of Glasgow's Style Mile.

Pre-dinner drinks will be served from 7pm, followed by an enchanting three-course meal in the Victoria and Regent Suite. There will also be an auction of lots in aid of a deserving cause selected by the BHA board.

Carriages are at 1am

Dress code: black tie or national dress

The prices, which include wine at your table, are as follows:

Individual (member) £115

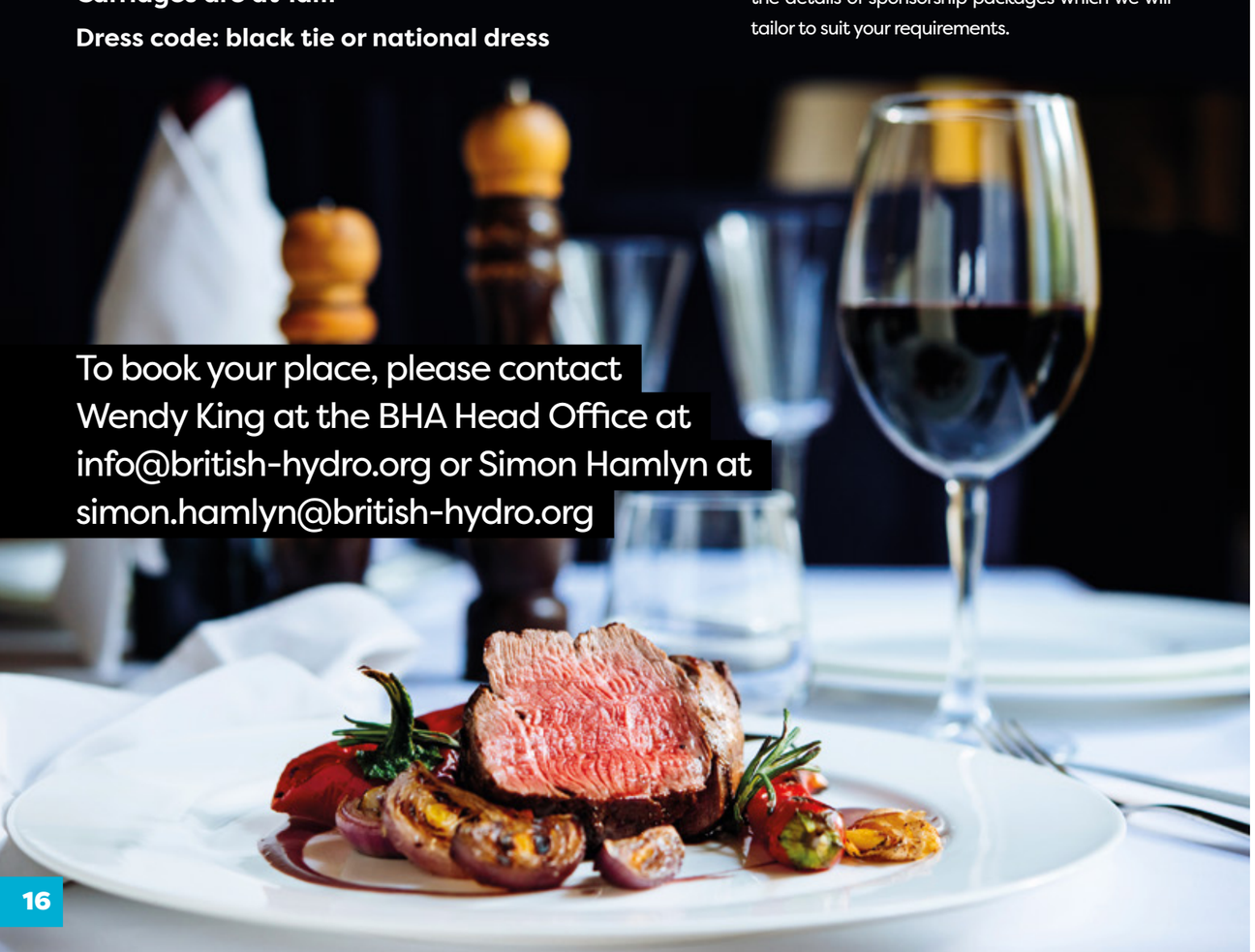
Individual (non-member) £130

Table of 10 (member) £1,100

Table of 10 (non-member) £1,250

All prices are exclusive of VAT.

Sponsorship opportunities are readily available to those wishing to raise their profile and support this prestigious event. Please contact BHA CEO Simon Hamlyn at simon.hamlyn@british-hydro.org for all the details of sponsorship packages which we will tailor to suit your requirements.



To book your place, please contact Wendy King at the BHA Head Office at info@british-hydro.org or Simon Hamlyn at simon.hamlyn@british-hydro.org

Exhibitor Guide

The combined features of AquaSpira CSR Pipes make them the ideal choice for Hydro Energy pipelines

- Smooth PE internal Bore
- Spigot & Socket, Push-Fit Joint - enables rapid installation to a consistent high standard, without any requirement for welding
- Short lengths available to facilitate necessary curves
- Wide range of diameters from 900mmØ – 2250mmØ
- Steel reinforced structure provides greater stiffness than plastic pipe
- External ribs lock in to surround material to ensure no risk of longitudinal movement
- Joints rated to 1.5 bar pressure
- AquaSpira pipes are ideally suited to Low Head, High Volume designs, or as a much more cost effective pipe solution for the upstream element of High Head, Low Volume designs.

Contact: Mark Stanway, Director, Aquaspira Ltd
T: 01282 608510
E: ms@aquaspira.com
W: www.aquaspira.com

Bruce Stevenson Insurance Brokers handles over 1.1GW of renewable energy projects in the UK.

Our success has been built on engagement with parties involved in the renewable energy sector including project developers, lenders, consultants, lawyers, manufacturers and industry bodies to ensure all risk exposures are identified and protected. That experience, combined with our bespoke policy cover and insurer relationships, has made us the Broker of Choice for the renewable energy sector. The past 9 years has seen £15M of claims payments made to our customers. Our journey began with hydro and it remains a key area of interest where we see opportunity for growth. Bruce Stevenson can offer BHA members exclusive discounts and incentives on their insurance offering.

Contact: Stuart MacLeod Cert CII, Account Executive, Bruce Stevenson Insurance Brokers
T: 0131 561 2418 / 07940 837526
E: stuart.macleod@brucestevenson.co.uk
W: www.brucestevenson.co.uk

D A MacDonald is a civil engineering company with a large modern fleet of plant, equipment and heavy goods vehicles, which are operated and maintained by ourselves.

Our contracts consist of works for private clients, local utilities and the local authority. This includes roadworks, drainage, concreting, masonry and emergency cover for electricity and water. Work for private clients has included three helicopter hangers. Since 2004, we have been involved in constructing many hydro schemes, and have become specialists in the installation of both large and small diameter pipelines.

The company has been registered and approved by Constructionline since June 2001 and Achilles Verify since 2006.

Contact: Donald MacDonald, Company Director, D A MacDonald Ltd, Site 13A Kilmory Industrial Estate, Lochgilphead, Argyll, PA31 8RR
T: 01546 603583
E: enquiries@damacdonald.co.uk
W: www.damacdonald.co.uk

Dyrhoff is a world leader in the design and supply of inflatable rubber dams and spillway gates.

Over the last 25 years the company has supplied over 100 systems across 4 continents. The company will have information on its latest hydropower projects, including new spillway gate projects in Italy and Eastern Europe, and Bridgestone rubber dam replacements in the USA and new rubber dam projects in Canada. Both inflatable rubber dams and spillway gates are particularly well suited to small hydro as they offer a useful degree of adjustability. The modular design of the spillway gates makes them well suited to long spans whilst their low maintenance requirements, low environmental impact and simple operation make them an attractive solution.

Contact: Don Mason, Dyrhoff Ltd, Unit 9, The Glenmore Centre, Shearway Business Park, Folkestone, Kent CT19 4RJ
T: +44 1303 275900
E: office@dyrhoff.co.uk
W: www.dyrhoff.com

Flowtite GRP pipes and fittings have been used in hydro schemes for over 40 years now. The Flowtite pipe system is the preferred choice for penstocks in Norway with more than 400 installed schemes.

Flowtite GRP pipes and fittings are highly engineered and manufactured using the continuous advancing mandrel process, which represents the state-of-the-art in GRP pipe production. This process allows the use of continuous glass fibre reinforcement in the circumferential direction for high hoop strength. For a pressure pipe or buried conduit the principal stress is in the circumferential direction. Incorporating continuous reinforcement in this direction yields a higher performing product at low cost. In addition, the manufacturing process introduces chopped discontinuous glass for axial reinforcement. In the core near the neutral axis, very fine and pure silica sand increases stiffness by adding extra thickness. Using this unrivalled technology developed by material experts, a very dense laminate is created that maximises the contribution from all basic raw materials.

Depending upon pressure ratings, Flowtite pipes and fittings are available as standard up to 32 bar working pressure, in diameters up to DN 3000 and in any lengths up to 12m. Every pressure pipe has been tested to twice its nominal pressure before leaving the factory. In addition, the mandrel manufacturing provides a very smooth inside surface with a low flow coefficient.

Contact: Kevin Jefferson, Business Development Manager UK & Ireland, Amiantit Pipe Systems, Amiantit Service GmbH, Am Fuchsloch 19, 04720 Mochau, Germany
T: 07834 869119 / 0141 889 1636
E: jeffersonk@amiantit.eu
W: www.amiantit.eu

Gilkes is an international company established in 1853 and now exporting to over 80 countries; offering complete water-to-wire solutions for hydroelectric developments.

Activities include design, manufacture, installation, testing, routine service and full plant modernisation & upgrade. Gilkes offers a range of hydroelectric turbines capable of generating up to 20MW from a single unit. The range includes Pelton, Francis and Turgo turbines, compact solutions for the 50kW to 100kW market, and a new streamline range designed for the sub-500kW market.

Gilkes also offers service packages with designated centres based in Fort William and Invergordon. Services include tailored long-term electro-mechanical service contracts, site surveys & condition assessment, breakdown service, control system upgrades & reprogramming, and replacement turbine components.

Come and have a chat with our sales team to discuss all your hydro requirements.

Contact: Matthew Crosher, UK Hydro Sales Manager, Gilbert Gilkes & Gordon Ltd, Canal Head North, Kendal, Cumbria LA9 7BZ
T: 01539 720028
E: m.crosher@gilkes.com
W: www.gilkesenergy.com

GUGLER Water Turbines GmbH is a family owned, Austrian based engineering and contracting company active in the small hydro sector for more than 90 years.

We design, manufacture, supply, install and commission – o n a turnkey basis (water to wire):

- all types of water turbines (Kaplan, Francis and Pelton) up to an output of 20 MW per unit
- all related electro-mechanical equipment such as generators, LV +MV switchgears, transformers, automation and control systems
- hydro-mechanical equipment such as trash rake, trash rake cleaning machines and gates

We have gained extensive experience in the execution of more than 1,000 projects of different sizes and all over the world.

Contact: GUGLER Water Turbines GmbH, Gewerbeweg 3, 4100 Goldwörth, Austria
T: +43 7234 83902
E: a.gugler@gugler.com
W: www.gugler.com

Houghton International specialises in the repair, maintenance and life extension of rotating electrical machines within the hydro sector. With over 30 years' multi industry experience, we offer planned maintenance and emergency repair both in house and in situ alongside specialist engineering support.

We offer a full turnkey maintenance and repair service and are also happy to work with in-house teams to support any rewind projects and supply coils as required in line with your own maintenance plans. We manufacture our own premium High Voltage coils, in our dedicated coil manufacturing facility in Newcastle upon Tyne, optimised for hydro applications – including HiFLEX, our innovative, fully cured, totally flexible insulation system.

Experienced in the Hydro sector we have worked on a range of projects including a complete rewind of a hydro generator in-situ in Norway to supplying a complete set of 256, 13,800 volt HiFLEX™ high voltage coils for a 6.8MW Hydro generator on site rewind in British Columbia, Canada.

Contact: Stuart Whitfield, Technical Account Manager
T: +44 (0)191 234 3000 / +44 (0)7932016263
E: stuart.whitfield@houghton-international.com
W: www.houghton-international.com

HYDROHROM Ltd. delivers the complete equipment for small hydropower plants:

- complete units with Kaplan, Francis or Pelton turbines, the electromechanical equipment with control units
- fine screen
- screen-cleaning machines
- slide or butterfly gates with electromechanical and manual actuators
- weir gates

The HYDROHROM Company supplies complete equipment and provides consultancy, design and assembly according to customers' specification.

Contact: Hydrohrom s.r.o., Strzenec 1, 257 41 Bystrice u Benesova, Czech Replublic
T: +420 317 793 773 / +420 774 484 925
E: info@hydrohrom.cz
W: www.hydrohrom.cz

Hydroplan is a leading UK hydropower consultancy specialising in the design, construction and project management of small to medium sized hydropower projects in the UK and internationally. Since being formed in 1990, Hydroplan has undertaken over 600 projects ranging from modifications to existing schemes to the full implementation of new schemes.

Hydroplan has a multi-disciplined team of skilled engineers and designers complemented by experts with diverse specialist skills and experience.

Our services include:

- Feasibilities: resource assessment, project costing and AAEP, scoping and screening, scheme optimisation
- Environmental & Consents: hydrology, flow gauging, LVIA/ZTV's, noise assessments, topographical and ecological surveys, fish pass & screen design
- Finance/Contracts: financial modelling, negotiation, contract preparation
- Design: Civil & Structural engineering, HV & Control specification, surge analysis, flood studies
- Project Management & Commissioning: Programme monitoring, financial control, cashflow analysis, contractor liaison, construction updates
- Due Diligence: Bank's Technical advisor, existing project valuation, dispute resolution
- Maintenance & Monitoring: Performance testing, monitoring, environment & regulatory compliance, operational management.

Contact: Audrey Jones, Hydroplan, Unit 12 Riverside Park, Station Road, Wimborne, Dorset, BH21 1QU
T: 01202 886622
E: info@hydroplan.co.uk
W: www.hydroplan.co.uk

The International Journal on Hydropower & Dams is a bi-monthly publication, read in more than 175 countries, dealing with all technical, environmental, social and economic aspects of hydro plants and multipurpose water resources development projects. It combines business news with state-of-the-art technology.

Each issue has a regional focus and technical themes of interest to engineers in all the related disciplines.

Our company also organises and hosts large international hydro conferences in Europe, Asia and Africa, where world experts and water resource professionals meet to address the challenges and opportunities faced by the industry around the world.

Contact: Aqua-Media International Ltd, PO Box 285, Wallington, Surrey SM6 6AN, UK.
T: 020 8773 7243
E: edit@hydropower-dams.com
W: www.hydropower-dams.com

Kössler a 100% subsidiary of Voith Hydro, is one of Europe's market leaders in the field of small hydropower. Our product range includes all kinds of Kaplan, Francis and Pelton turbines.

As far as Kaplan turbines are concerned, our Company specialises in the production of turbines with a runner diameter of up to 3.2m. Francis and Pelton turbines are manufactured up to an output of 15MW. All turbines are designed and manufactured in our factory and assembled and put into operation by our own engineers. Kössler designs, engineers, manufactures, supplies and services a full range of hydropower equipment for small hydropower plants. Our product range also includes turnkey installation of the complete E&M equipment or steel construction works. We are probably the only company in our industry that provides a service line which is open 7 days a week. Every year, around 100 employees design and manufacture about 40 to 45 new turbines, mainly for the European market, with an export rate of about 80%.

Kössler is certified according to the international quality standards ISO 9001 (quality assurance), ISO 14001 (environmental management) and BS OHSAS 18001 (work safety). The Company management focuses especially on assuring high quality standards, developing innovative and sustainable small hydropower products, as well as being a fair employer for everyone. We believe in long-term relationships with customers, business partners and employees.

Contact: Kössler GmbH & Co KG, St Georgener Haupstraße 122, A-3151 St Georgen am Steinfeld, Austria.
T: +43 (0)2742 885272
E: office@koessler.com
W: www.koessler.com

Technology, design and innovation are the defining features of Tesla's drive to accelerate the world's transition to sustainable energy. Both the Tesla Model S and Model X are 100% electric and set the new standard for technology, safety and performance.

When equipped with the 100kWh battery and ludicrous mode upgrade, Model S is the fastest accelerating production car on sale today, with a 0-60mph time of just 2.5 seconds. Model X in the same guise is not far off with a time of 2.9 seconds, making it the fastest accelerating SUV ever made. Alongside unprecedented safety testing scores, range of over 300 miles, touchscreen display and unique functionality including Autopilot, Model S and Model X deliver an uncompromised driving experience – all with zero emissions.

Contact: Scott Downie,
Tesla Motors Ltd
T: 0131 460 7426
E: sdownie@tesla.com
W: www.tesla.com

Following the success of the BHA Summer Forum in Telford, Turbiwatt is back in the UK. Specialist in design and manufacturing of low head turbines and Permanent Magnet generators, we will be showing two of our turbines on our stand, the Lynx and Leopard.

Our newest turbine in development, the Tigre, which was announced this summer is on track for a prototype in Spring 2017! Many projects are being studied in the UK since we first crossed the channel in May 2016. This new turbine will be our biggest turbines, designed for larger flows. Case studies and projects will give you an idea of the possibilities our turbines offer, notably untapped site that were previously considered unprofitable. The ultra-compact bulb turbines are integrated in existing sites, with no impact on the landscape or noise pollution.

Contact: Harry TERRY, Sales Manager,
TURBIWATT, 95 rue Michel Marion,
56850 CAUDAN
T: +33 (0) 290 749870 /
+33 (0) 779 871284
E: hterry@turbiwatt.com
W: www.turbiwatt.com

Since the end of the Sixties, ZECO has been offering products and solutions for the generation of hydroelectric power. ZECO produces Kaplan, Submerged Kaplan, Francis and Pelton turbines and is therefore capable of offering the right solution to produce electrical energy in power plants up to 10 MW, according to logistical and hydraulic conditions.

ZECO not only offers products, but thanks to the know-how provided by its in-house design and production structures, presents itself to customers as a single, mature and competent counterpart.

At ZECO, "The difference is inside".

Contact: Mattia Schiesaro, BD Manager, ZECO di Zerbaro & Costa & C. S.r.l. Via Astico, 52/C, 36030 Fara Vicentino (Vicenza), Italy
T: +39 0445 873456
E: sales@zeco.it
W: www.zeco.it

The British Hydropower Association (BHA) is the professional trade body representing the interests of the UK hydropower industry and its associated stakeholders at regional, national and global levels.

British Hydropower Association

Our vision

translates into the following aims and objectives:

- Effective lobbying and liaison with the national and devolved governments and other agencies
- Organising events and networking opportunities
- Technical, regulatory and political information source
- Developing export opportunities for the industry
- Supporting and providing guidance for members
- Promoting hydropower – increasing awareness of its quality and scope both at home and overseas

Hydropower is one of the most reliable and predictable - and least environmentally intrusive – of all renewable energies. We strive to ensure that its potential is realised.

Membership is open to commercial organisations of all sizes, as well as academia, charities, groups and individuals with an interest in hydropower. Our membership is diverse, covering all sized and types of hydropower. If you are interested in membership or would like

to know more about us, please visit www.british-hydro.org

Contact: British Hydropower Association,
Unit 6B, Manor Farm Business Centre,
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