British Hydropower Association

* The leading trade membership association that solely represents the interests of the UK hydropower industry (from micro to large scale)
* Operates in the UK and overseas
* Has approaching 200 members
* Membership is open to any organisation or individual with an interest or involvement in hydropower

British Hydropower Association

* Ownership - The BHA belongs to the members and our activities are aimed towards promoting their interests
* Diverse range - from one-man independent operators to large utilities, including owner/operators, developers, consultants, manufacturers, suppliers, contractors, legal organisations, insurers and financiers
* Scales/size - From micro and small run-of-river projects, to large schemes involving reservoirs and dams, pumped storage stations, and wave and tidal projects using hydropower technology
* Reach - Some BHA members operate in overseas markets, exporting their goods and services on a global scale.

Role of the BHA

* Effective lobbying of government, regulators and other agencies/NGOs
* Liaison with and monitoring of government, regulators and other agencies/NGOs
* Co-ordination of events and creation of marketing and networking opportunities
* Providing a technical, regulatory and political information framework and source
* Promoting hydropower and increasing awareness of its quality and scope both at home and overseas

Hydropower - Context

* The fight against climate change has brought global incentives for renewable energy resulting in the growth of new hydropower projects and refurbishment and upgrade of existing ones over the last decade
* With this increase in activity, the sector has grown rapidly in every area.
* Manufacturers, consultants, contractors, grid companies and others, had to rapidly expand especially in manpower resource

Hydropower - Uniqueness

* The major single difference between hydropower and other forms of energy generation, is that generation has to be on a water source – be it river or tidal – not necessarily close to where the energy is to be consumed
* Hydropower is unique within renewable and non-renewable energy technologies in its diversity of project type and size and the effect of varying heads of water

Hydropower - Types

* Run-of-river - a simple diversion of a stream or river taking a proportion of the water flow to a water turbine driving a mechanical device (e.g. sawmill) or electrical generator. Water is then returned to the river

* Storage - a river valley is dammed inundating the upstream section. The water turbine and generator is located beneath the downstream wall of the dam or within the dam itself. The water is therefore stored and can be used when energy is required

Hydropower types

* Pumped storage - energy is generated when water is released from an upstream reservoir. The discharged water is kept in a lower reservoir and is pumped back to the upper reservoir.
* But a net user of energy allowing for sudden and controlled releases of energy
* Tidal range - hydropower technology is used in tidal range (or lagoon or barrage) projects where high tide water is used and captured and then released at low tides. This is predictable energy production since tide frequency and heights are accurately known

Small scale hydropower

Intake - 100kW run of river scheme
Ardgour, Scottish Highlands

Intake – 800kW hydro scheme,
Achnasheen, Scottish Highlands

Laying pipeline - Merk hydro
1 MW scheme, Argyll & Bute

100kW UK manufactured turbine – Ardnamurchan, Scotland

Power House – Maldie 4 MW storage scheme,
Sutherland, Scottish Highlands

Size of hydropower projects

* There are many views on the size banding for hydro projects. The following is the generally accepted capacity ranges in the United Kingdom -

* Pico hydro 1 to 10kW
  (kW = kilowatt = 1000 watts)
* Micro hydro 10 to 100kW
* Mini hydro 100kW to 5MW
  (MW = megawatt = 1000 kW)
* Small hydro 5MW to 20MW
* Medium hydro 20MW to 100MW
* Large hydro above 100MW

Reasons for these bands

* Technology changes and ability to employ “do-it-yourself” civil construction (pico and micro)
* Capacities at which there are significant income band changes in the Feed-in Tariff mechanism (pico, micro and mini)
* A government–held (and false) belief that hydropower above a certain capacity is no longer a sustainable and renewable form of energy (medium and large)

Hydropower characteristics

* Provides a valuable contribution to achieving UK government renewables targets and climate change goals
* Supports UK businesses and communities
* The Feed-in Tariff scheme has been hugely positive for the hydro sector, attracting investment and stimulating businesses throughout the country
* Generates significant environmental and economic benefits

Hydropower characteristics

* Hydropower currently represents 9.2% of all renewables generation in the UK with over 1,718MW of installed capacity
* The introduction of the Feed-in Tariff [FiT] has led to a total of 65.5MW of new small-scale hydro since 2010
* Studies suggest that there is still potential for further small- scale hydro to deliver over 1,000MW of new schemes in Scotland alone

Why so special?

* Least environmentally intrusive of all renewables technologies
* Well-established, reliable and proven technology
* Long-term generation way beyond the subsidy period
* Most schemes have a 50-year design life which, with refurbishment, means 80+ years of operation and therefore the lowest lifetime cost to the consumer
* Over 50% of the cost of a new scheme is in civil construction which is procured within the UK and often within the local community

Hydropower challenges

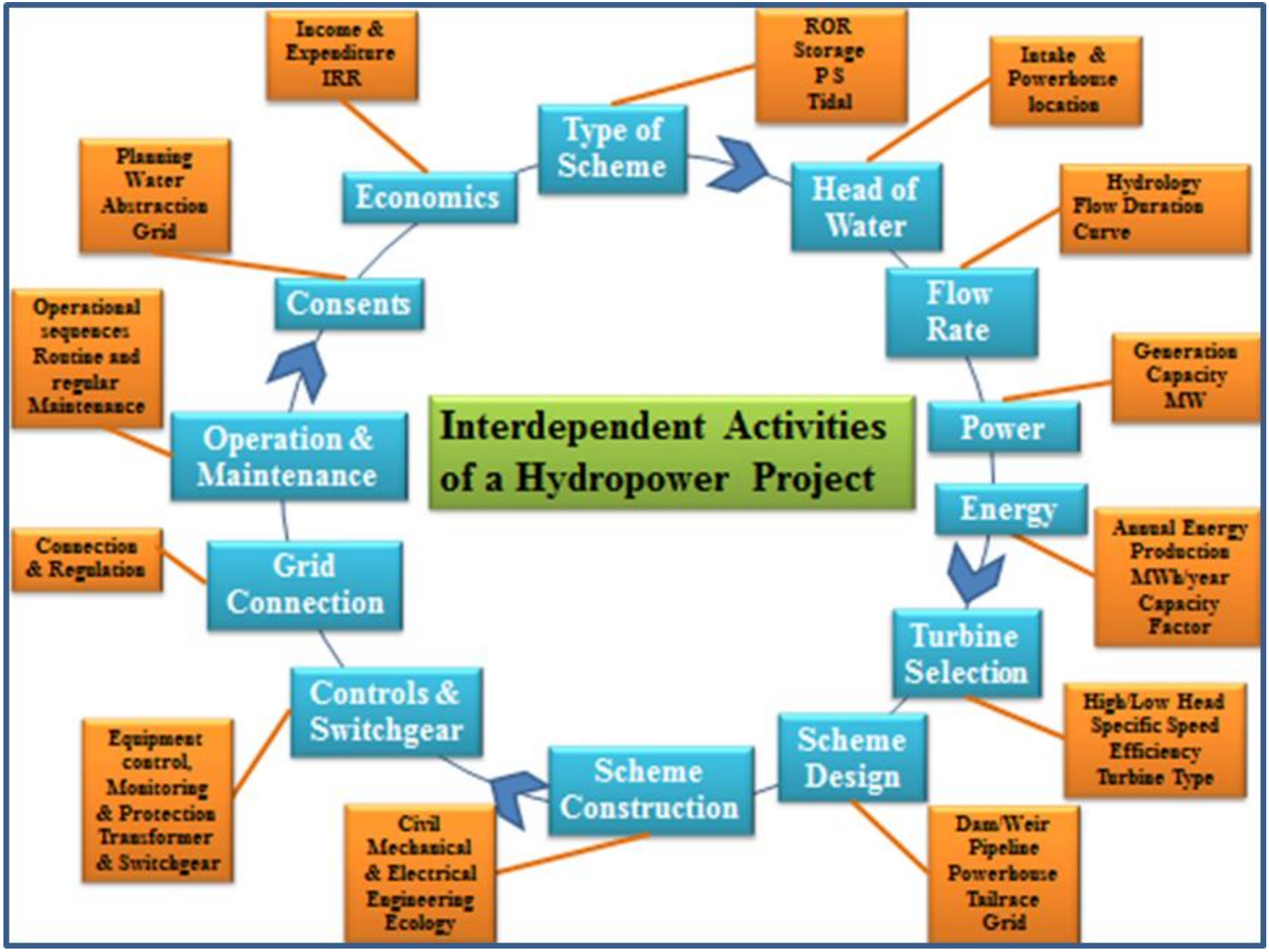
* Significantly more complex to develop and construct than the other technologies
* Regulation – hydropower requires not just planning permission, but also a water abstraction licence
* Equipment – hydropower requires significant infrastructure including intakes, pipelines, powerhouses and tailraces, as well as access tracks

Hydropower challenges

* Bespoke design – each scheme is site specific and therefore needs to be individually designed to maximise the energy opportunity and minimise the environmental impact

* Location – hydropower schemes require ‘works in rivers’ often in remote mountainous areas

* Time – because of all these differences it takes much longer to develop and then construct the scheme


Interdependent Activities of a Hydropower Project
Type of Scheme
ROR
Storage
PS
Tidal
Head of Water
Intake & Powerhouse location
Flow Rate
Hydrology Flow Duration Curve
Power
Generation Capacity MW
Energy
Annual Energy Production MWh/year Capacity Factor
Turbine Selection
High/Low Head Specific Speed Efficiency Turbine Type
Scheme Design
Dam/Weir Pipeline Powerhouse Tailrace Grid
Scheme Construction
Civil Mechanical & Electrical Engineering Ecology
Controls & Switchgear
Equipment control, Monitoring & Protection Transformer & Switchgear
Grid Connection
Connection & Regulation
Operation & Maintenance
Operational sequences Routine and regular Maintenance
Consents
Planning Water Abstraction Grid
Economics
Income & Expenditure IRR

But there is opportunity

* For Local Authorities, if the conditions are available, use hydropower to….

* Generate your own electricity
* Offset costs
* Stimulate economic activity
* Provide a legacy/Public utility
* Promote sustainable renewable energy
* Benefit from a long-term energy asset

Opportunity….

* There will be suitable sites within local authorities
* There are good examples including, Glasgow, Cardiff, Durham, Nottingham…. others being planned
* There are developers on hand to assist
* There are financiers keen to invest
* There is the BHA to provide support and guidance….