

Scotland The Hydro Nation

4th Annual Report

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Further information on the issues raised in this report can be found at:

Scottish Government
www.gov.scot

Scottish Water
www.scottishwater.co.uk

Water Industry Commission for Scotland
www.watercommission.co.uk

Drinking Water Quality Regulator
www.dwqr.scot

Citizens Advice Scotland
www.cas.org.uk

Scottish Environment Protection Agency www.sepa.org.uk

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Scotland The Hydro Nation – Annual Report Our Water Economy Vision

Introduction by Roseanna Cunningham MSP, Cabinet Secretary for the Environment, Climate Change and Land Reform



I am very pleased to introduce this fourth annual report to the Scottish Parliament on progress against our innovative Hydro Nation agenda. Last year's report was the third and last required under statute, but I stated then that I believed these reports offer a very useful outline of the range of activity. It is therefore my intention that we continue to report in a similar way moving forward.

This year we have reached a key milestone in our Hydro Nation Scholar Programme as the first cohort of Scholars approach the completion of their PhD. studies. My congratulations go to them for their significant personal achievement in reaching this point. It is my firm hope and expectation that they will maintain strong links with the Hydro Nation agenda, and indeed Scotland, as they continue their journey to becoming the global water leaders of the future.

Looking forward, we are now moving to a more defined strategic programme of activity to deliver the Hydro Nation agenda. We will develop better alignment and consistency between the various strands of our international efforts including more actively-managed, networks across and between the academic and public sectors.

Supporting innovation in the sector remains a central plank of our approach so it is worth noting that the Hydro Nation Water Innovation Service (HNWIS) has now moved into the third and final year under the current contract arrangements and work has commenced to consider the structures needed to build on HNWIS' success and deliver improved support to this key sector.

Finally, as ever, I'd like to acknowledge the Hydro Nation Forum's help in providing helpful support and oversight of the Hydro Nation agenda including guidance and advice on priorities. Their contribution to the development of our water sector is greatly appreciated, and I thank them for their input.

The Hydro Nation – 4th Annual Report – Highlights

The Hydro Nation Forum continues to provide guidance and advice, and to track progress at its biannual meetings. With the Forum's help we continually review our overarching strategy across the four key interlinking themes set out below to ensure the Hydro Nation programme is fit for purpose, and is working to support the sector's needs.

The last year has seen considerable activity against each of the themes including the following highlighted examples:

National: Supporting Communities and Scotland's Water Economy



Two major projects to tackle flooding that has affected 47 properties in the Springburn area of Glasgow have been completed by Scottish Water. The projects, which involved a total investment of more than £16m, will reduce the risk of flooding which has affected 34 properties in the Elmvale Row area and 13 in the Avonspark

Street area nearby.

International: Utilising Our Expertise Abroad

Over the course of this year the **Water Industry Commission for Scotland (WICS)** has continued to develop a range of international links to learn from and share expertise on delivering effective regulation. WICS has worked closely with the OECD and the EU Structural Reform Support Service in support of the Romanian regulator.

Drawing on and tailoring Scottish Water's excellence in public-sector utility expertise, **Scottish Water International (SWI)** continued to be active across the world and has completed a major contract to help improve the efficiency and effectiveness of water services in the Canadian city of Calgary. The expertise SWI brought helped The City of Calgary in its on-going efforts to improve its business and demonstrate value to its citizens.

Knowledge: Expanding Perspectives



The Hydro Nation Scholars Programme goes from strength to strength. We currently have a cohort of 16 talented PhD scholars from Scotland and around the world studying a wide range of topics identified by a Steering Group drawn from Hydro Nation family including government, industry and the academic sector. Dr Christopher Schultz is the first Hydro Nation Scholar to complete his studies.

Scottish scientists joined forces with the first Hydro Nation International Fellow (Indian Institute of Science, Bangalore) to tackle **Nitrate Contamination of Groundwater**. The project is developing and testing predictive models of nitrate contamination of groundwater in the Berambadi catchment. The outcome is to better understand the sources, transport and fate of nitrate in groundwater and to identify potential options for managing and mitigating the risk of nitrate pollution.



Innovation: Developing New Technologies

The Hydro Nation Water Innovation Service (HNWIS) is making good progress in helping to bring new technologies to market. We have commenced the process with key stakeholders including Scottish Enterprise, Highlands and Islands Enterprise, Scottish Funding Council, SEPA and Scottish Water Horizons to develop an improved specification for the next iteration of the Service.

There has been good progress in relation to the Hydro Nation Development Centres which are now being utilised by companies referred through HNWIS and to test technologies that can help improve rural supply provision.

HYDRO NATION – NATIONAL: Supporting Communities and Scotland’s Water Economy

Our water sector, including Scottish Water, is worth an estimated £1.8 billion¹ per annum to the Scottish Economy. That value can be increased through our actions to improve Scotland’s capacity for innovative technological development; effective knowledge transfer across the industry; and ensuring focussed support for our water sector companies. We can also create value from our respected leadership in our unique governance of our water industry. We are also promoting the need for sustainable water efficiency measures.

Provision of high-quality rural services in remote or sparsely populated areas presents distinctive challenges in many parts of the world, including here at home. Scotland is developing innovative approaches to demonstrate our resilience to these challenges. Our work will capitalise on advances in technology; catchment management techniques; supporting Communities’ participation; raising quality standards & protecting the environment by supporting businesses to deliver within our valued sustainable service.

Key to our National Strategy is to ensure that, as the sector grows, we support local communities, businesses, and entrepreneurs to develop their own, and share in our, sustainable approach. Below are some examples of how we are delivering in practice.

Rural Service Provision for drinking & waste water

The rural provision workstreams have made strong progress both in terms of new research and policy development. The latest news is that we have installed a range of individual property or small community supply water treatment technologies at the Gorthleck innovation test centre for evaluation. This practical step will provide vital data to help us develop future options, both financial and technical, for supporting private and small rural public supplies. We are continuing to build our knowledge through new research of the key criteria that should be considered when looking at the impact of water supplies within rural communities again to better design and target new water infrastructure in rural areas. Work is also ongoing to consider the potential for new wastewater treatment approaches in rural areas.

¹ Figures from Simon Hallam (2014) Analysis of the Scottish Company Base and Market Opportunities: Low Carbon Heating & Cooling and Water Supply & Wastewater. A Final Report. Scottish Enterprise & Highlands and Islands Enterprise. Available at:
<http://www.evaluationsonline.org.uk/evaluations/Search.do?ui=basic&action=showPromoted&id=556>

Hydro Nation Commercial and Advisory Services

The **Hydro Nation Commercial** group was set up by the Scottish Government in November 2016 to explore the potential for better alignment and collaboration across key public sector partner organisations who are either actively providing, or have an interest in providing, commercial and advisory services linked to their responsibilities, skills and knowledge in respect of aspects of water resources, and consider the most appropriate structures to support their activity. The Group, which is chaired by Scottish Government, comprises Scottish Environment Protection Agency, Water Industry Commissioner for Scotland, Scottish Water International, Scottish Natural Heritage, Drinking Water Quality Regulator, The James Hutton Institute, Scottish Enterprise, Highlands and Islands Enterprise, Hydro Nation Water Innovation Service, Zero Waste Scotland and Forest Enterprise Scotland. Now identified as **Hydro Nation Commercial and Advisory Services** (HNCAS), this workstream is a central part of the Hydro Nation strategy to develop economic opportunities and support knowledge exchange.

Scottish Water: delivering for you

With more than 60,000 miles of pipes and 2,000 treatment works, Scottish Water supports communities the length and breadth of Scotland. In providing essential services to customers, Scottish Water recognises that its activities and operations can be visible in the communities it serves. That is why Scottish Water works very hard to ensure it is responsive and sensitive to the needs of its customers in communities - in every corner of Scotland. Scottish Water aims to ensure projects are delivered on time and on budget – leading to happier customers and building a legacy of future goodwill and trust.

Scottish Water's approach is to identify where, how and who the work needed in that community will impact on and ensure early notification/involvement with all those involved. Before it starts work, Scottish Water think about what it wants the community to look like when it leaves and understands how it wants people within the community to feel about Scottish Water. By involving those affected by work in the community at the earliest possible stage, it can find mutually acceptable solutions and build a shared understanding of the outcomes.

Scottish Water has been rolling out a suite of new community engagement materials and improved signage to highlight where it is carrying out work in the community. This is aimed at building customer recognition and trust.

Scottish Water identifies and promotes opportunities to show it is a good neighbour/member of the community through, for example, support for local

partnerships and initiatives, volunteering, education programme and community renewables initiatives. By ensuring that everything it does and everyone involved plays their part in creating a positive, long-lasting legacy from Scottish Water's work in Scotland's communities, it ensures communities are at the heart of its business.

Scottish Water aim to build goodwill and trust by minimising inconvenience when carrying out essential work and ultimately ensuring the benefits of the investment leaves a positive and long-lasting legacy in the community.

Scottish Water has signed up to the Social Impact Pledge, an initiative aimed at increasing the social impact of public sector organisations across Scotland. In the next six months, it will do at least three new things to improve social impact. Firstly, it has launched an Adopt a Beach Campaign, which encourages employee volunteers to help protect and enhance the environment by caring for Scotland's coastline. Secondly, the Cycle campaign, which encourages customers to play their part in preventing blocked drains and sewers, will focus on customers and communities where Scottish Water is building or upgrading wastewater infrastructure. Thirdly, Scottish Water will work with local communities to improve the visitor experience for those visiting the most popular reservoirs for recreational purposes.

Water Industry Commission for Scotland (WICS) – National efforts to support Hydro Nation and community focus for 2021-27 Strategic Review of Charges (SRC)

In its methodology for the 2021-27 SRC, WICS outlined its proposals to encourage a more community focused approach to customer involvement. In the 2021-27 SRC the Customer Forum will have a broader remit to reach out to communities across Scotland to understand their priorities and ensure their interests are represented in Scottish Water's Business Plan.

The OECD will conduct a peer review of the 2021-27 SRC, drawing upon best practice principles for effective water governance. The OECD will support the development of behavioural insights to be applied to the customer research and will review approaches to capital maintenance in other regulated industries. The peer review will provide other OECD Network of European Regulators (NER) members with a learning opportunity, promote internationally the Scottish model and contribute to improving WICS' regulatory approach in line with international best practice.

HYDRO NATION – INTERNATIONAL: UTILISING OUR EXPERTISE ABROAD

Hydro Nation International is designed to reach out to the world to share our academic excellence and expertise in water governance and water management technology and there is a strong International Development programme of activity under this part of the Hydro Nation strategy.

The Scottish Government has commissioned the James Hutton Institute / Scotland's Centre of Expertise for Waters (CREW) to develop Hydro Nation International and a detailed project outline has now been approved.

The HNI project aims build on the strengths of the CREW model and approach to bring better alignment and consistency between the various strands of international Hydro Nation activity including project management of international-facing collaborative research projects, delivering improved and more actively-managed networks across the academic sector, supporting commercial opportunities for the public sector being considered under Hydro Nation Commercial and helping to develop the role and profile of the UNESCO Category 2 Centre for Water Law, Policy and Science at Dundee University. Overall, the HNI approach is intended to provide greater coherence across Scotland's response to UN Global Goal 6 on Access to Water and Sanitation.

HNI will provide central co-ordination and project management support, and seek additional added value from these collective efforts by:

- Developing continuity through greater co-ordination of the various Hydro Nation contributors;
- Enhance the profile and significance of HNI;
- Underpinning the delivery of the Hydro Nation International Strategy agreed by the Hydro Nation Forum;
- Building on the process and operating procedures already established for CREW;
- Co-ordinating delivery and delivering project management of international projects supported by Hydro Nation;
- Ensuring that project outputs and outcomes of international significance are appropriately publicised;
- Considering future opportunities for wider alignment of Scotland's international delivery on water; and
- Encouraging and supporting the CREW network to align and respond to international opportunities for collective success.

We are committed to support work in **Malawi**, most importantly through the Hydro Nation programme's contribution to the **Climate Justice Fund**. We are working with the Government of Malawi, academic institutions and NGOs on water governance, policy exchange, water-resource mapping and refurbishment and water supply enhancement. Together, we aim to make (UN Sustainable Development Goal 6) access to water and sanitation a reality in Malawi.

We are pleased to report further progress with the **Malawi Water Futures Project** which is a key project. We are building on our successful Climate Justice Fund programme in Malawi which has already delivered real benefits to thousands of people by extending the scope to include water pump technology enhancement trials in country which will increase the efficiency of pumps. We are adding additional technical and project management support to the programme and will enhance the work on sustainable water management for both domestic and business users including around good water management to support Malawi's food export sector.



We are responding to the huge potential and need in **India** in relation to water resources by engaging with key Indian partners to introduce Hydro Nation and help build links between the scientific and research communities. Our objectives remain to address the Scottish Government's broad International Development Strategy and deliver against SDG6 with a view to tying in the provision

of other expert services or technology through engagement in projects and collaborative workshops including:

- Supporting a Ganga River Health Project led by the UNESCO Centre for Water Law, Policy and Science
- Supporting a Modular Rural Waste Water Treatment Project led by the James Hutton Institute
- Developing MoUs between Hydro Nation and CGanga and between Hydro Nation and the National Mission for Clean Ganga (NMCG)

In June 2017, the Scottish Government hosted and participated in the inaugural meeting of the UK Chapter of CGanga (Centre for Ganga River

Basin Management and Studies) at Scotland House in London. The meeting was chaired by the Indian High Commissioner to the UK, His Excellency H K Sinha, which gives a clear indication of the political importance India attaches to the Ganga clean-up effort.

Officials from the Scottish Government, SDI, Scottish Enterprise and CGanga are currently working with seven companies from across Scotland as well as Scottish Water International and Scottish Environment Protection Agency to assess their readiness to set up demonstrator technical projects to address some of the key water challenges of the River Ramganga, a tributary of the Ganges. Hydro Nation and SDI are supporting a mission to India in August to meet potential partners and assess potential sites. Thereafter, the companies will be invited to establish pilot projects in India to demonstrate how their technology can help CGanga in its long-term mission to clean up the river.



Scottish Water International (SWI) undertakes a diverse range of consultancy assignments around the world to help transform utilities. SWI uses an innovative model drawing expertise from the core

business creating value for the economy and developmental opportunities for staff. Examples of recent successes are set out below;

- **Qatar** - helping oversee the management of a 6-year Drainage Asset Management Programme, as sub-consultants to MWH Global, to transform drainage and waste water services, improving efficiency, levels of service and customer service.



Jenny Steele, SWI consultant outside the newly constructed Ashgal customer service building in Doha, Qatar where she has developed new customer processes and systems with client.



- **Ireland** – continuing to provide advice and support for the creation of Irish Water, Ireland’s new water utility, to help develop its operations and maintenance functions and support, as a subcontractor to EY, a major project to design and develop the Water Industry Operating Framework in Ireland.
- **Canada** – following the successful delivery of consultancy to support The City of Calgary to improve the efficiency and effectiveness of water services, SWI concluded a second assignment for the City of Calgary Water Resources Unit. The review evaluated three areas: service levels for wastewater, capital delivery, efficiency and effectiveness and data management/analytics and has identified potential savings of around \$15m.
- **Australia** – supporting SA Water, the utility serving the water and waste water needs of the state of South Australia, as sub-consultants to KBR, to build asset management capability, drive efficient capital investment delivery with a focus on customer service. SWI also worked with Water New South Wales' executive team to support them to drive effective and efficient water services in New South Wales.
- **England** – assisting the Market Operator Services Ltd (MOSL) in the planning for drafting of Codes associated with opening of the Retail Market in England.



In **Malawi**, around 1.7 million people do not have access to safe water. 10 million people do not have access to adequate sanitation and over 300,000 children under 5 die each year from diarrhoeal diseases caused by unsafe water and poor sanitation.

One of the key objectives of the Hydro Nation Strategy is to support international water aid. To this end, SWI has started to work with the Scottish Government and Strathclyde University to support their efforts in achieving **SDG 6** by 2030 in Malawi.



The approach that is being developed will improve the capability of the water supply assets by improving the data and asset register of all water access points through water point mapping. This will document the condition and location and will be the basis for best practice asset management to prioritise interventions and to target the funding of improvements.

Capacity building is also planned at all levels with the Scottish Government/ Strathclyde University supporting the Malawi Government, Scottish Water International supporting the water companies and charities such as WaterAid supporting the development of water and sanitation hygiene knowledge within the communities.



Ricky Grierson, Scottish Water employee, on recent WaterAid fundraisers visit.

The desire is to align the efforts of NGOs for maximum benefit and return for the communities of Malawi. This approach ensures a sustainable legacy with government policy supporting the Water Industry, the correct asset stock being established and maintained, capabilities developed at all levels in the water industry and community buy in to hygiene. With the basic need of

water being satisfied, communities can become better educated and time can be focussed on growing their economy.

HYDRO NATION – KNOWLEDGE: EXPANDING PERSPECTIVES

2 new scholars will join the Hydro Nation Scholars Programme (HNSP) at the start of this academic year bringing the total number of scholars to 16

- Sughayshinie Samba Sibam, Aberdeen - “Epidemiology of Private Drinking Water Supplies in Scotland
- Lucille Grout, Dundee - “Socio-Legal Responses to the Challenges of Contaminants of Emerging Concern”.

Our first cohort of Scholars have already, or are due to complete their studies in the coming few months - Christopher Schultz, Nazli Koseoglu, Ruby Moynihan, and Juan Carlos Sanchez).

The themes for 2018 Projects, agreed by the HNSP Executive Group and which have been included in the call for projects released in July 2017 are:

- **OPPORTUNITIES FOR CREATING VALUE IN THE WATER SECTOR THROUGH A CIRCULAR ECONOMY APPROACH.**
- **ADAPTIVE ENGINEERING SOLUTIONS TO WATER ABSTRACTION AND CONTROL FOR DEVELOPING COUNTRIES.**
- **WATER MANAGEMENT IN THE FOOD AND DRINK INDUSTRY.**
- **INNOVATIVE MONITORING AND FINANCIAL APPROACHES FOR THE IMPROVED MAINTENANCE OF WATER INFRASTRUCTURE ASSETS.**
- **ASSESSING THE FUTURE WATER LANDSCAPE OF SCOTLAND.**
- **ACHIEVING REGULATORY COMPLIANCE WITH LOW-COST, LOW-IMPACT RURAL PROVISION SOLUTIONS.**

Knowledge Sharing and Capacity Building Activity

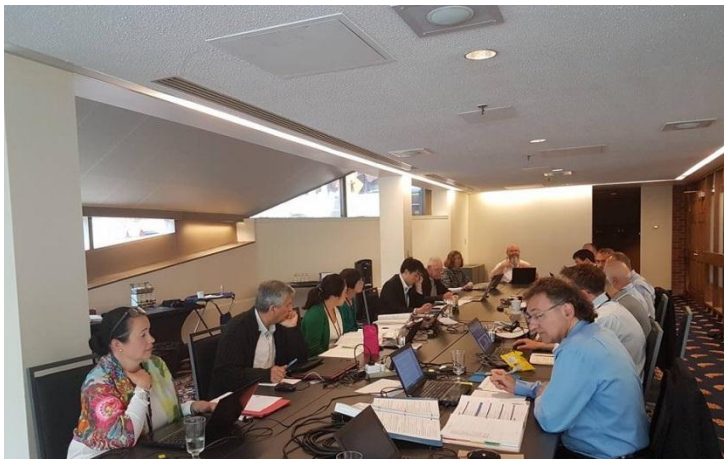
The Water Industry Commission Scotland (WICS) is working with the EU Commission to strengthen water regulation in Europe by supporting the National Regulator for Public Services for Romania. WICS has facilitated learning opportunities and study visits between the two regulatory offices. Alongside the Scottish Environment Protection Agency, WICS has delivered a bespoke workshop on economic regulation to the Georgian National Water Regulatory Commission.

WICS is sharing its knowledge in economic regulation and learning from other regulators within the European Water Regulators Network (WAREG). WICS has given presentations on its experience on incentive based regulation and customer engagement.

Further afield, WICS has supported South Australian Water and the Essential Services Commission of South Australia (ESCOSA) in developing a customer engagement model by sharing lessons learnt during the 2015-21 Strategic Review of Charges. WICS is also supporting the work of the OECD Water Governance Initiative and is a member and active contributor to the OECD's Network of Economic Regulators (NER). Alan Sutherland, Chief Executive of WICS, participated in an OECD NER sponsored mission to conduct a peer review of Mexico's energy regulated sector.

HYDRO NATION – INNOVATION: DEVELOPING NEW TECHNOLOGIES

Our Innovation strategy is designed to support Scottish businesses to bring new products to market through the **Hydro Nation Water Innovation Service (HNWIS)**, including provision of advice, research, and testing facilities to trial new products, as well certification and accreditation. This strategy links HNWIS into the support from SEPA in association with the James Hutton Institute in the development of water innovation through their work to support the European Commission **Environmental Technology Verification Standard (ETV)** and **International Organization for Standardization (ISO)** activities on ETV.



The International Working Group on ETV meeting in Halifax, Nova Scotia, June 2017; the James Hutton Institute were in attendance

This Innovation strategy is supported by SEPA in association with the James Hutton Institute in the development of water innovation through their work to support ETV and the International Organisation for Standardisation (ISO) activities on ETV. ETV is an important tool used to evaluate the claims of environmental technologies and enables

technology providers and innovators to independently demonstrate the value of their products. November 2016 saw the publication of ISO14034:2016, the ISO international Standard and this has now been adopted by the UK as BS:ISO14034:2016. There is a consultation on the adoption of the standard at the EU level and it is expected that the standard will be adopted by September 2017. SEPA, DEFRA and the James Hutton Institute are involved in ongoing work to develop an international technical report on the implementation of ISO14034:2016.

After three years of operation of The European Commission Environmental Technology Verification Pilot Programme a total of 17 verifications have been completed, 62 technologies have initiated the verification process and 175 applications have been submitted. The verifications have been issued in the three technology areas of the pilot Programme: 'Materials, Waste and Resources', 'Water Treatment and Monitoring', and 'Energy Technologies'. All ETV Verification Statements are registered and published on the European Commission website

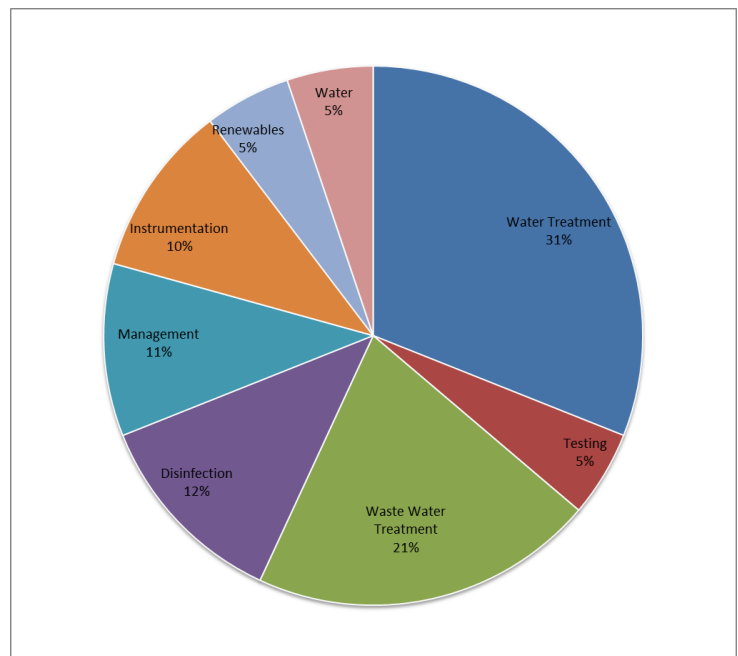
https://ec.europa.eu/environment/ecoap/etv/verified-technologies_en which allows stakeholders to check references relating to ETV verifications in a transparent process.

The ETV Pilot Programme has enabled a large-scale experiment of ETV in near-real conditions. On the basis of the upcoming evaluation, conclusions will be drawn on the potential of ETV in Europe and on the best way to mobilise it in an economically sustainable way. Different options for a possible ETV scheme will be considered together with improvements to the functioning of the ETV as operated under the Pilot Programme. To support the evaluation, an open public consultation will take place over a duration of minimum 12 weeks. The roadmap of ETV evaluation together with a consultation strategy will be published in the coming weeks on the website of DG Environment. The formal EU ETV evaluation will be completed in the Autumn 2017, with results available to the public.

HYDRO NATION WATER INNOVATION SERVICE (HNWIS): SUPPORTING INNOVATION

HNWIS has entered the final year of the current service contract. In Year 2, Quarter 2 HNWIS reported that the key target of Formally Engaging with 50 companies had already been achieved ahead of schedule.

Due to the unexpectedly high level of demand and subsequent number of applications from Scottish companies for assistance (128), the decision was taken in December 2016 to temporarily close the Service to new applicants until further notice. This is to ensure the main focus of activity is on the review and assessment of the customers currently within the Service and allow better identification of those who are likely to achieve the primary aim of getting new innovative products or services to market more quickly.



Engaged Companies sector breakdown



Hydro International successfully tested their Hydro-Brake Drop flow control in Scotland at Bo'ness Development Centre. **The challenge** was that Hydro International needed to validate existing design assumptions and to extend the design range of the Hydro-Brake® Drop.



The study had three main objectives:

- To assess the rate of air entrainment over the various operating modes, in order to accurately predict system pneumatics.
- To quantify oxygenation potential of the system and its impact on hydrogen sulfide levels.
- To evaluate new inlet configurations in order to expand the range of scenarios in which the Hydro-Brake® Drop flow control may be applied.

The solution involved Scottish Water Horizons liaising with site operatives to ensure the equipment could be trialed in a suitable location on site. Prior to arrival at site, Scottish Water Horizons assisted Hydro

International with all pre-trial requirements and conducted a thorough Health and Safety review to ensure all risks were mitigated or managed appropriately. Once operational, Scottish Water Horizons regularly engaged with Hydro International to ensure that the trial requirements were being met on site.



The test, which took place in June 2016, involved two instrumentation systems attached to the test rig monitored its performance for over 70 hours of testing and provided data validation for the readings collected.

The results showed that for the configurations and flow rates tested the Hydro-Brake Drop flow control was shown to significantly aerate

the flow passing through it. The rate of air entrainment was shown to be predictable and consistent over the whole range of configurations and flow conditions tested. This confirmed that the different configurations performed as predicted and allowed further extension of the applications for which the Hydro-Brake Drop flow control can be designed.

Forward Look

A revised Hydro Nation strategy was endorsed by the Hydro Nation Forum in July and sets out a number of areas of focus in the coming year. As set out elsewhere in this report Rural Provision remains a strong domestic focus, with technology testing expected to feed into solution provision pilots. The key International changes to the Strategy for future focus (and which are expected to contribute to the national economy) include:

- New support arrangements for greater cooperation and collaboration across the public sector to underpin the delivery of commercial/consultancy services;
- More detail on the operation and development of the Hydro Nation International workstream;
- Updates to reflect progress in India where we are developing a technical pilot project with SDI and Indian authorities to contribute to the Ganga Clean-up programme. An anticipated Memorandum of Understanding between Hydro Nation and National Mission of Clean Ganga will underpin this work and link to research projects being delivered under the Hydro Nation International arrangements.
- Update on recent developments in Malawi. We are continuing our long term commitment through Hydro Nation and CJF to work with the Government of Malawi and international charities and other stakeholders to deliver SDG6. We are continuing with the mapping and water point refurbishment programme and extending the scope to include water pump technology enhancement trials in country which will increase the efficiency of pumps, and working with major UK retailers to ensure in-country water sustainability for key export products such as tea and coffee.

Scottish Water International has recently refreshed its strategy and has identified Europe, Australasia and North America as key target markets. Efforts will be primarily focussed in these areas in future years. SWI will also continue to fulfil its contracts in Qatar and to support capacity building work in Malawi and India. Further details of planned activities are outlined below.

Australasia: A number of Water companies in Australia and New Zealand are looking at ways to deliver capital programmes more efficiently and will be going to the market for proposals in the next one to two years. To meet this need, SWI has developed a unique offering with KBR and will be active in pursuing bids in this area in the coming years.

SWI will continue to provide strategic support to SA Water, WaterNSW and Wellington Water (New Zealand) building on the excellent relationships developed in the current year. Areas of strategic support include Customer Strategies, Asset Management, Capital Delivery, Industry Frameworks and Operating Models.

As Water companies strive to deliver services more effectively and with greater customer focus, SWI will pursue business change and implementation of new operating model opportunities as they arise with key strategic partners such as Ernst & Young.

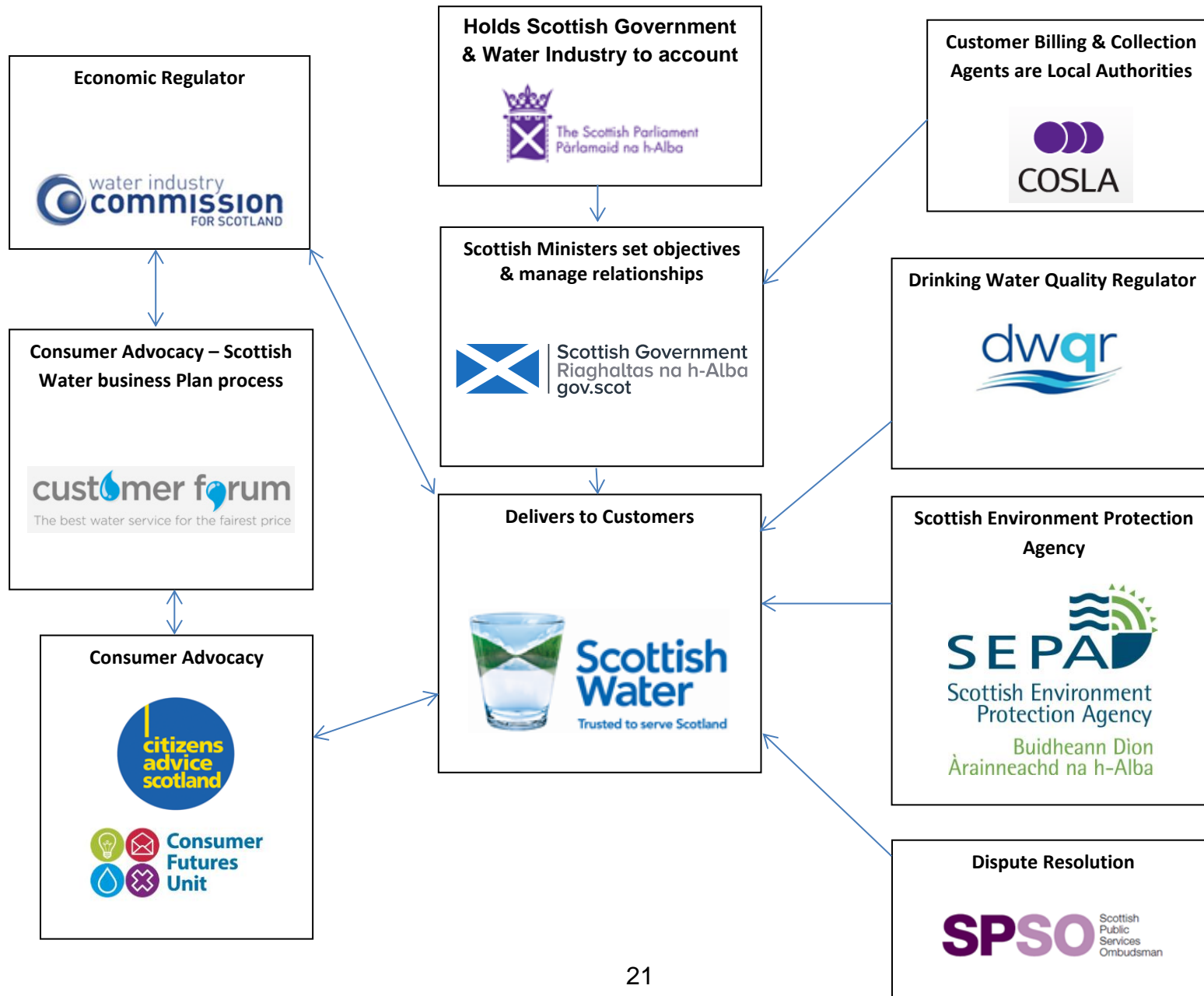
Europe: In Ireland, SWI hope to continue to provide advice and support to Irish Water with operation and maintenance improvements and will be bidding to support the implementation of the new Water Industry Operating Framework in Ireland when this comes to market.

In Romania, SWI along with WICS and SEPA are currently working in a cross public sector partnership with a bid proposal to support Romania's water regulator to strengthen its activities and support the water companies respond to that improved regulation. This project is supported by the EU.

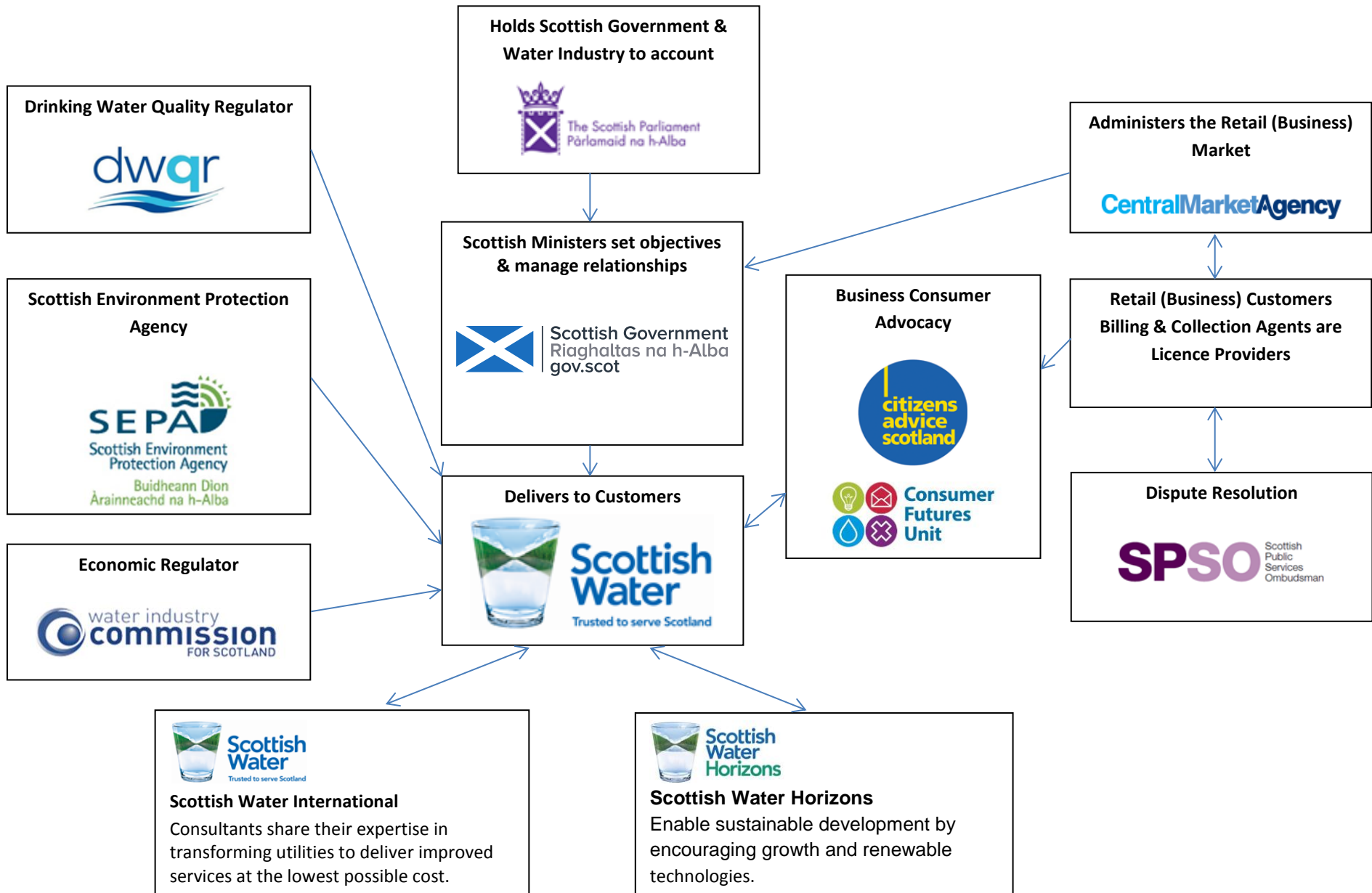
In **Norway,** SWI are looking to support the City of Oslo with the development of best practice asset management and in particular their strategies around risk management of major water trunk mains.

North America: SWI are looking to build on the successful work in transformational change of water services in the City of Calgary and work with other water service companies to support their drive to increase performance. This coming year will see increased marketing and brand awareness with the following year (2018/19) looking to become more active in this market.

As part of our efforts in **supporting international events in Scotland,** we are working with the International Standards Organisation to support the ISO Technical Committee on Water Quality Conference in Edinburgh in April 2018 and will continue to explore similar opportunities to help promote Scotland's water profile.



Structures of Governance - Retail (Business) Market



Structures of Governance – Who does what?

Central Market Agency (CMA) – on 1 April 2008 competition was introduced into the water industry in Scotland for retail (business) customers. The CMA is the organisation that administers the retail market for water and wastewater services in Scotland. They are a company limited by guarantee and owned by its members.

The Consumer Futures Unit (CFU) of Citizens Advice Scotland (CAS) – represents water consumers, and is a key partner in many areas of policy development. They are responsible for:

- Advocacy - to provide advice and information, make proposals and represent the views of consumers to Ministers, regulators, European Institutions and other relevant bodies.
- Evidence – conducting research to obtain information about consumer matters and consumers' views on those matters.
- Empowerment – facilitating the dissemination of advice and information to consumers

Convention of Scottish Local Authorities (COSLA) – are the representative voice of Scottish local government. Local Authorities provide the collection and billing for water and sewerage services on behalf of Scottish Water for all domestic (and non-metered) customers.

Customer Forum – was established to participate in the price setting process for 2015-2021 in order to provide customers with a stronger voice and to secure the most appropriate outcome for customers.

Drinking Water Quality Regulator (DWQR) – are responsible for monitoring and confirming that the drinking water supplied by Scottish Water through the public water mains system meets the requirements of the drinking water quality regulations and is safe to drink. DWQR also advises Ministers on the delivery of and the need for future investment in drinking water quality.

Licence Providers (LPs) – Retail (Business) customers are able to choose who supplies their water and sewerage services. All water and sewerage service providers are licensed and are therefore known as Licensed Providers.

Scottish Environment Protection Agency (SEPA) – are responsible for ensuring that Scottish Water meets strict environmental requirements. SEPA also advises Ministers on the delivery of and the need for future investment in environmental improvements.

Scottish Government – Scottish Ministers and their officials manage the relationship with Scottish Water and its regulators within the statutory framework established under the Water Industry (Scotland) Act 2002. Scottish Ministers set the objectives for the industry (as set out in the Ministerial Directions available [here](#)) and the principles that should underpin charges (as set out in the Principles of Charging Statement available [here](#)). More information about our role can be found on our website.

Scottish Parliament – scrutinises the work of the Scottish Government and their public bodies, and hold it to account. Both the Scottish Government and the Scottish Parliament are accountable to the people of Scotland.

Scottish Public Services Ombudsman (SPSO) – is the final stage for complaints about Local Authorities, most water providers, the Scottish Government and its agencies and departments. If customers have complaints they should in the first instance try and resolve that with the organisation they have a complaint about. However, if they remain dissatisfied they may be able to raise their issue with the SPSO.

Scottish Water – is a public corporation accountable to Scottish Ministers and through it to the Scottish Parliament. Scottish Water provides clean safe drinking water to 2.49 million households and 152,000 business premises across Scotland. Every day it supplies 1.37 billion litres of treated drinking water and takes away nearly one billion litres of wastewater from customers' properties and treats it carefully before returning it safely to the environment. With more than 60,000 miles of pipes and 2,000 treatment works, Scottish Water supports communities the length and breadth of Scotland every day. In providing these essential services to customers, it recognises these activities and operations can be visible in the communities it serves. That's why it works very hard to ensure it is responsive and sensitive to the needs of its customers in the community in every corner of Scotland and aim to put communities at the heart of the business.

Scottish Water Horizons – is a commercially sustainable, stand-alone business, who use innovative ideas, knowledge and assets to encourage growth and renewable technologies. From generating renewable energy from wind, waste and water to facilitating the installation of high-speed broadband within Scottish Water's sewer networks, Horizons is all about improving connections, communications and enabling sustainable development.

Scottish Water International – is a wholly-owned subsidiary of Scottish Water, delivering reputational-enhancing projects. Drawing on its experience of the remarkable transformation in the water industry in Scotland it offers services to utilities, governments and other clients from around the world, including the Middle East, Canada, Ireland and Australia. Their team of high

calibre in-house consultants offer services to support utilities transform their efficiency and service, with specific focus on:

- Operations and maintenance advice and support, including training and strategic advice;
- Asset management and capital investment governance;
- Regulatory and financial restructuring for public utilities; and
- Customer satisfaction and customer engagement strategic advice.

Water Industry Commission for Scotland (WICS) – is Scottish Water’s economic regulator. It is required to determine the maximum charges that customers will pay for services provided by Scottish Water. It is also required to oversee the operation of the retail market which serves business customers – issuing licences to operators and ensuring fair competition.

Chair: **Roseanna Cunningham MSP**, Cabinet Secretary for Environment, Climate Change and Land Reform.

Professor Robert Ferrier, Director of Research Impact, James Hutton Institute.

Gail Walker, Water Policy Team Manager, Consumer Futures Unit, Citizens Advice Scotland.

Dr Howard Dryden, Founder of Dryden Aqua.

Dr Alan MacDonald, Principal Hydrogeologist, British Geological Survey.

Terry A'Hearn, Chief Executive of SEPA.

Chrysoula Pantsi, Edinburgh Napier University, School of Engineering & the Built Environment.

Professor Robert Kalin, Professor of Environmental Engineering for Sustainability, Strathclyde University.

Steve Dunlop, Chief Executive of Scottish Canals.

George Fleming, Founder and Chairman, EnviroCentre.

May East, Chief Executive, CIFAL Scotland.

Galen Fulford, Managing Partner, Biomatrix Water Technology.

Simon Parsons, Director of Strategic Customer Service Planning, Scottish Water.

Dr David Johnstone, Senior Visiting Research Associate, School of Geography and the Environment, University of Oxford.

Alan Simpson, Chairman, Institute of Civil Engineers.

Professor Chris Spray MBE, Chair of Water Science & Policy, UNESCO Centre for Water Law, Policy & Science, University of Dundee.

Nick Lyth, Director, Green Angel Syndicate.

Jan Reid, Senior Manager, Low Carbon Technologies, Scottish Enterprise.

Diane Duncan, Head of Low Carbon and Environmental Clean Technologies, Highlands and Islands Enterprise.

Professor Campbell Gemmell, Professor of Environment Research, Policy, Regulation and Governance, Glasgow University.

Jim Panton, CEO Panton McLeod Ltd (a successful Scottish water SME specializing in robotic cleaning technology) and 2017 Chair of the Institute of Water (Scotland).

Dr. Michael Gormley MSc MPhil PhD CEng MCIBSE MIET FHEA.
Associate Professor, Director of the Water Academy, Heriot-Watt University.

Hydro Nation Scholars - Who are they & what are they doing?

Annex C

Scholar	Cohort	Project	University
Juan Carlos Sanchez	2013-17	<p>Trans-boundary Waters & Ecosystems: Opportunities for Improved Cooperative Governance.</p> <p>Community Impact: Improved governance frameworks will enhance the quality of communities' lives by ensuring the more equitable delivery of water services between jurisdictions.</p>	University of Dundee
Ruby Mahana Moynihan	2013-17	<p>Contribution of the UNECE Water Regime to Multi-Level Co-operation & Cross-Sectoral Coherence in International Water Law.</p> <p>Community Impact: More coherence and institutional coordination will enhance the quality of communities' lives by contributing to better balanced decisions impacting on water services and biodiversity.</p>	University of Edinburgh
Christopher Schulz	2013-17	<p>A Multi-Stakeholder Perspective on the Value of Water in the Brazilian Cuiaba River Basin & in the Pantanal to Inform Water Governance Across Brazil and Scotland.</p> <p>Community Impact: Improved understanding of the economic and cultural value of water will contribute to better governance and reduce risk for communities.</p>	University of Edinburgh

Scholar	Cohort	Project	University
Nazli Koseoglu	2013-17	<p>Optimising Water Use in Scotland: Valuation, Tradability & Portfolio Theory.</p> <p>Community Impact: Improved understanding of competing uses and economic and cultural value of water will contribute to better policy making on governance and resource allocation.</p>	University of Edinburgh
Bas Buddendorf	2014-18	<p>Multi-scale modelling to assess impacts on flows & ecology in regulated rivers.</p> <p>Community Impact: communities benefit through improved understanding and management of complex ecological systems to optimise usage and minimise environmental impact.</p>	University of Aberdeen
Nandan Mukherjee	2014-18	<p>Integrated river basin management framework under the lens of loss and damage.</p> <p>Community Impact: more sophisticated assessment of the impact of climate change on water resources will lead to improved management and planning, improving understanding of appropriate adaption/mitigation action for fragile communities.</p>	University of Dundee

Scholar	Cohort	Project	University
Yuan Li	2014-18	<p>Can low-cost bio-sorbent technology be used to efficiently remove steroid hormones & pharmaceutical residues from wastewater effluents?</p> <p>Community Impact: the efficient removal of pharmaceuticals reduces treatment costs and support improved environmental and public health.</p>	University of the Highlands and Islands
Kathleen Stosch	2015-19	<p>Building Resilience to Respond to Future Environmental Change Across Scottish Catchments.</p> <p>Community Impact: Better understanding of the complex interactions in catchment management will contribute to strategies to improve resilience and reduce harmful outcomes impacting on those living in catchments.</p>	University of Stirling
Carolin Vorstius	2015-19	<p>Safeguarding and Improving Raw Water Quality by Increasing Catchment Resilience.</p> <p>Community Impact: Better integrated catchment resilience enhances environmental protection and reduces treatment costs resulting from compromised catchments.</p>	University of Dundee & James Hutton Institute

Scholar	Cohort	Project	University
Fortune Gomo	2015-19	<p>Supporting Better Decisions Across the Nexus of Water-Energy-Food Challenges.</p> <p>Community Impact: Improved understanding of interactions benefits and trade-offs will improve quality of decision making enhancing the sustainability of rural communities.</p>	University of Dundee & James Hutton Institute
Aaron Neill	2015-19	<p>Linking Small-Scale Hydrological Flow Paths, Connectivity & Microbiological Transport to Protect Remote Private Water Supplies.</p> <p>Community Impact: Better understanding the complex movement of pathogens to reduce impacts on Private Water Supplies will positively impact public health in remote rural communities.</p>	University of Aberdeen
Maricela Blair	2015-19	<p>Micro & Nanoplastics in Wastewater Treatment Systems & Receiving Waters.</p> <p>Community Impact: better understanding the movement of these plastics is essential in designing policy to tackle environmental harm and reduce treatment costs thereby enhancing the lives of coastal and other communities.</p>	University of Glasgow

Scholar	Cohort	Project	University
Robert Trogrlic	2015-19	<p>Community-based Non-Structural Flood Risk Management for Malawi.</p> <p>Community Impact: this project will directly benefit communities adversely affected by flood by engaging them in activity to minimise impacts through low-cost strategies.</p>	Heriot Watt University
Valerio Cappadonna	2016-20	<p>Can Wastewater Treatment Plants Cope with Future Nanoparticle Loading Scenarios?</p> <p>Community Impact: Improved understanding contributes to strategies to more efficient and effective treatment understanding the impact of nano-particles on treatment will help optimise plant efficiency, reduce costs and protect receiving waters thereby enhancing the natural environment for communities with receiving waters.</p>	University of Strathclyde
Lydia Niemi	2016-20	<p>Assessment of the Degradation Pathway, Persistence & Eco-Toxicological Impacts of Human Pharmaceuticals to the Aquatic Environment.</p> <p>Community Impact: efficient removal of pharmaceuticals reduces treatment cost to support improved environmental & public health & reduced impact on receiving waters.</p>	University of the Highlands and Islands

Scholar	Cohort	Project	University
Kirsty Holstead	2016-20	<p>Governing Water One Drop at a Time: Responses to, and Implications of, Community Water Management in Scotland & Beyond.</p> <p>Community Impact: will help optimise community engagement to protect and maintain raw water quality, improving quality of supply and reduce treatment in remote rural communities.</p>	University of St Andrews
Jonathan Fletcher	2016-20	<p>Optimising Multi-Pollutant Phytoremediation Strategies to Sustainably Improve Raw Water Quality.</p> <p>Community Impact: Contribution to increased raw water security will develop more sustainable and innovative treatment options, reducing environmental impact and costs.</p>	University of Stirling
Bhawana Gupta	2016-20	<p>Tackling the challenge of the water, food, energy nexus in India & Scotland'.</p> <p>Community Impact: through improved understanding project will contribute to better cross-sectoral approaches to improve the livelihood of rural communities.</p>	University of Dundee & James Hutton Institute



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