

Scotland The Hydro Nation - First Annual Report - Towards A Water Economy

Introduction by Nicola Sturgeon MSP, Deputy First Minister and Cabinet Secretary for Infrastructure , Investment and Cities



I am pleased that there is much positive and exciting progress to report to Parliament on this first year of Scotland: The Hydro Nation. Our unique approach is now well recognised at home and, increasingly, further afield. We are supporting the sector to deliver increased economic benefits to the Scottish economy as a whole and improved services to customers. Our research base is strengthening, our businesses are having notable successes in foreign markets and the performance of Scottish Water continues to impress. We are building useful strategic international partnerships, and supporting development in sub-Saharan Africa.

I am grateful for the constructive help and advice of the members of the Hydro Nation Forum in developing this exciting agenda.

As we look forward, we remain focussed on growing the value of Scotland's water resources. Our aim is to develop Hydro Nation's contribution to the creation of a vibrant and dynamic water economy that brings benefits to all of the people of Scotland.

In May 2015, we will host the XVth World Water Congress in Edinburgh – the first time this prestigious global conference has come to Scotland and a unique opportunity to showcase and share Scotland's wealth of knowledge in water resource management.

Scotland: The Hydro Nation – First Annual Report – summary of activity

Developing our industry:

Our Enterprise Agencies have identified innovation and growth in the water sector as a priority area and are delivering dedicated programmes of activity and support

The Scottish Environment Protection Agency are supporting Environmental Technologies Verification assisting our businesses to bring products to market

We are establishing the Scottish Hydro Nation Water Innovation Service

We are growing our specialised research capacity including expanding the Hydro Nation Scholars Programme

Improving services:

Renewable energy generation and energy efficiency is increasing across Scottish Water's estate and class-leading services are being delivered to domestic water customers

We are working to address key policy challenges of rural service provision and the recovery of priority substances

Growing our international reputation:

The Water Industry Commission for Scotland (WICS) is working closely with European partners as an adviser and supporter of the water regulators network

We are exporting Scottish Water expertise to operators abroad

We will host the XVth World Water Congress in Edinburgh in May 2015

Section 1: Background: The Hydro Nation Duty

This report sets out the steps being taken to meet the duty placed on Scottish Ministers under The Water Resources (Scotland) Act to develop the monetary and non-monetary value of Scotland's water resources. Progress and direction is tracked and reported through the biannual meetings of the Hydro Nation Forum, chaired by the Deputy First Minister and Cabinet Secretary for Infrastructure, Investment and Cities, Nicola Sturgeon MSP.

Scotland The Hydro Nation

Scotland is fortunate to have a significant and high-quality water resource. Water is of central importance to the economy of Scotland, both as a sector in its own right and as a critical resource in the manufacturing, agriculture, food and drink, tourism and energy sectors. There is the potential to support, attract and develop opportunities for businesses or industries for whom a large volume of water is a critical resource. It is estimated that the Water Technologies industry could be worth around £900 million per annum for Scotland in water technologies alone¹.

Access to a highly-developed, diverse and specialised supply chain provides assurance that Scotland is an excellent place for water-sector businesses to set up shop. All of this is underpinned by a distinctive and internationally-respected model of governance and regulation.

The Scottish Government remains committed to delivering against our strategic vision of Scotland as the world's first 'Hydro Nation' – a nation that recognises the importance and value of water within our national and international identity, that manages the water environment to the best advantage, developing and promoting more efficient resource use and employing its knowledge and expertise at home and internationally in ways which contribute to a flourishing low-carbon economy.

¹ Based on UK data in the report HTechO: Tapping the Potential: A Fresh Vision for UK Water Technology, UKWRIP, 2014

Section 2: Scotland the Hydro Nation - First Annual Report

Governance of the Water Sector in Scotland

Scotland has a distinctive governance framework for the water environment and industry in which the industry (Scottish Water), independent regulators and Scottish Ministers each have a distinct and important role. They have responded to the opportunities of Scotland: The Hydro Nation to build on these roles.

The **Water Industry Commission for Scotland (WICS)** has reached out to the European water regulators network and is now an active participant in learning and sharing best practice. The WICS has been asked to provide advice to the new economic regulator in Greece demonstrating the respect in which our high-performing regulated industry is held.

The **Drinking Water Quality Regulator for Scotland (DWQR)** actively supports the rural provision agenda, commissioning work to understand better the nature of remote rural supplies and ways to improve service quality and access.

Following legislative change customers are now represented by **Citizens Advice Scotland**.

The innovative **Customer Forum** played a key role in the continuing Strategic Review of Charges and its impact is being keenly observed in many other countries.

Hydro Nation Water Innovation Service

Innovation is critical to the health of our economy and the water industry within it.

Our Enterprise Agencies already work hard to stimulate innovation and growth in the water sector. In responding to Hydro Nation, they are building on this by identifying the sector as a priority area and delivering tailored support aligned to individual companies' needs and circumstances including:

- market research and business information support;
- dedicated experienced business advisers to assist with strategy, business planning and overseas market entry and project management support;
- access to grant funding.

However, many businesses continue to face barriers in bringing innovative products to market. These barriers include

- the time it takes to gain approval for new products;
- the range and cost of accreditation and certification required; and
- the very limited access to suitable testing facilities.

In partnership with Scottish Water and the Enterprise Agencies we are therefore establishing the Scottish Hydro Nation Water Innovation Service. This will assist the

identification and exploitation of key opportunities to bring forward new technologies that can reduce costs and raise standards in all areas of water supply and management.

The Scottish Hydro Nation Water Innovation Service

The Innovation Service will:

manage access to testing facilities being developed by Scottish Water, develop networks of expertise across the sector, the research community and government and facilitate collaboration with other centres of expertise, at home and abroad.

*It will aid the competitiveness of Scottish businesses by linking them to the **Environmental Technology Verification (ETV)** process supported by the Scottish Environment Protection Agency, which is proving to deliver significant competitive advantage to participating businesses in raising the profile and credibility of their technologies.*

Following the completion of the procurement processes initial appointments should be made to the core team in the autumn of 2014.

A New Award

The Scottish Government has created a new Hydro Nation Award within the [VIBES](#) (Vision in Business for the Environment of Scotland) Awards. This award raises the profile of Scottish businesses in the water sector, and will help them gain recognition and open doors to European and global markets. Indeed, thanks to their success as a VIBES Hydro Nation Award winner, Dryden Aqua Ltd will be going forward to the biannual European Business Awards for the Environment (EBAE), to be held in Lyon in December 2014.



Howard Dryden founder of Dryden Aqua, and a member of the Hydro Nation Forum receiving the VIBES Hydro Nation Award

Dryden Aqua, which is a Scottish based marine biological company established in 1980, specialises in water quality and innovative treatment technology. Its activated water filtration media made from recycled green glass are able to be fine-tuned to remove specific pollutants and parasites from water and have application in a

number of areas including aquaculture, drinking water quality and waste water treatment.

Scottish Water and Hydro Nation

Scottish Water is making a significant contribution to the Hydro Nation agenda in a wide range of areas.

- Action to tackle climate change is being taken through developing and hosting renewable energy generation across its core estate and land holdings.
- It is delivering a successful international business through Scottish Water International.
- Work on rural supplies has been identified as a further priority area.
- Scottish Water is a major contributor to the Hydro Nation Water Innovation Service through the development of assets to enable product and technology testing under live network conditions.

Energy from Water - the Scottish Water approach

Promoting more efficient resource use is a key aspect of Hydro Nation. In providing high-quality drinking water and treatment services to the vast majority of the population of Scotland, Scottish Water is a significant user of energy with an annual requirement of around 450GWh. Scottish Water aims to reduce consumption by improving the efficiency of assets and operations; increasing and maximising self-generation where there is an economic return for customers; hosting private renewable energy investment on Scottish Water land; and optimising its energy purchasing strategy to maximise benefit for customers in terms of price-risk mitigation against rising energy costs.

Scottish Water currently generates around 7% of the energy it consumes through innovative use of its assets -

such as treatment works, pipes, catchments and pipelines and aims to generate 25GWh of electricity from water and wastewater assets within its ownership by 2015. Scottish Water expects to facilitate more energy generation than it consumes by 2018.



Photograph: Wastewater Treatment work, Ullapool

Energy from Water - the Scottish Water approach - water powering homes.

The 'Difgen' turbine at Denny (pictured) - the first of its kind in the UK to be installed in a trunk water main - is a water turbine that harnesses the natural power of water flowing through pipes to produce 600 MWh renewable energy per annum, enough to power 150 homes.

Generating renewable energy is a key priority for Scottish Water and the Difgen technology is contributing to Scotland's vision of a low-carbon economy. Scottish Water Horizons, Scottish Water's renewables and business services subsidiary company, is reviewing the potential of installing Difgens at other similar locations thereby generating more energy and helping to reduce Scottish Water's overall energy bill.



Scottish Water International

A wholly-owned subsidiary of Scottish Water, Scottish Water International was established in 2011 to benefit from the skills and experience of Scottish Water's engineers, scientists, technicians and managers, to deliver reputation-enhancing projects for utilities, governments and other clients around the world, including Poland, Australia, Canada, and in Qatar, where it is helping oversee management of a 5-year programme to transform drainage and waste-water service ahead of the 2022 FIFA World Cup. SWI's services include consultancy and technical advice to

help clients harness their water resources more effectively and efficiently in a range of areas including:

- Regulatory and financial restructuring for public utilities
- Transforming efficiency and service standards
- Operations and maintenance advice and support, including training and strategic advice
- Capital investment governance and management.

Addressing Key Policy Challenges

Rural Service Provision for drinking and waste water

There are around 20,000 Private Water Supplies in Scotland, largely in rural locations, and at some distance from the public supply network through often difficult terrain. These factors combine to result in connection costs that are prohibitive for most house owners and beyond the Reasonable Cost of Connection requirements for Scottish Water. Shortcomings in quality in a small number of supplies raise issues of potential concern in relation to public health and tourism which are incompatible with our vision of a nation that manages its water environment to the best advantage.



Private water supply, Dawick, Scottish Borders

The Rural Provision Group was established in January 2014 to examine how the private water and sewerage infrastructure can be upgraded to ensure legislative standards are met and advise Scottish Ministers. Led by the Scottish Government Water Industry Team, this requires key partners including Scottish Water, the Drinking Water Quality Regulator, the Scottish Environment Protection Agency, Water Industry Commission for Scotland and Citizens Advice Scotland to assess the current extent of private water and sewerage services, the operational difficulties arising from these arrangements, and the options available to

improve the provision of water and sewerage services in rural areas within Scotland. The Group is working actively to gain a better understanding of the location of private supplies and the impediments associated with their improvement, with a view to preparing a strategy to delivering improvements for Ministers' consideration in due course.

Green Growth: Phosphorus and Priority Substances

The Government Economic Strategy recognised Scotland's huge potential to derive benefit from the transition to a low-carbon economy through the exploitation of technology-driven opportunities. Reflecting the increasing profile of water as a key component of the low-carbon economy the Scottish Energy Advisory Board (SEAB) Green Growth Group has subsequently brought forward its draft "Water Action Plan" to accelerate the exploitation of Scotland's low-carbon market opportunities. The Plan sets out the actions required to achieve two key objectives - *to develop technologies and approaches to address Priority Substance removal or reduction in waste water, and to develop technologies and approaches for the reduction and or recovery of phosphorus in water treatment and stabilisation in soil (Phosphorus Reduction/Recovery)*. With the assistance of the Hydro Nation Forum we will work to ensure that this highly relevant example of wider low-carbon economic activity is appropriately aligned with Hydro Nation efforts to develop our water economy.

The Hydro Nation Research Programme

We recognise the importance of research excellence to underpin the Hydro Nation agenda. The establishment of Scotland's **Centre of Expertise for Waters (CREW)** stimulates the science/policy interface in the water domain.

Key current CREW-managed projects include

- the development of a dynamic interactive visualization tool for the Scottish Water Sector,
- work to determine how catchment management can potentially reduce drinking water-treatment costs,
- an assessment of the potential market for reclaimed water use and
- a project looking specifically at the concept of value in relation to our water resources.



The Hydro Nation Scholars Programme

The new Hydro Nation Scholars Programme, managed by CREW on behalf of the Scottish Government, funds postgraduate research projects aligned to the strategic priorities of the Hydro Nation Agenda. Scholars benefit from specialised programmes provided under the auspices of the Hydro Nation Graduate School managed by CREW to deliver objective and robust research and expert opinion to support the development and implementation of water policy in Scotland. The Programme include periods of research at a water-related institution, such as Scottish Water, the Scottish Government, Scottish Environment Protection Agency, or industry. Four Scholars were appointed in the first year of the Programme, which was launched in October 2013 and a further six Scholars will join from the 2014/15 academic year.

Building our international reputation as a Hydro Nation

Our strategy recognises that Hydro Nation must reach out to the world to share our knowledge and expertise and invite collaboration, and we are doing this in a number of ways:

- helping the water sector in Scotland identify and respond to international business opportunities
- growing awareness beyond Scotland of our capacity and reputation for academic and research excellence
- building on our expertise in governance and management practice.

Already a number of Scottish companies have had notable successes in foreign markets and Hydro Nation will seek to build on those successes through learning events and knowledge sharing at home and abroad.

***Biomatrix Water Solutions Ltd.**, based in Moray, is an ecological technology company working throughout the world providing products and services to meet the growing demand for ecological water technology that is both functional, attractive and sustainable. The company works through combining the use of durable modern materials with biomimicry processes which replicate natural processes, underpinned by engineering and design innovation to provide effective solutions to the problems of water pollution and habitat degradation many urban environments face today.*



Biomatrix Water ecological water treatment

Biomatrix services are used internationally by city councils, water agencies, river basin managers, restoration organisations, landscape architects, ecologists, property developers, conservationists, private clients and environmental engineers. They have installed projects in the UK, USA, Philippines, India, Brazil and China.

*Biomatrix Director Galen Fulford is a member of Hydro Nation Forum (see **Annex A**), the industry advisory group that supports and advises the Scottish Government on the development and implementation of Scotland: The Hydro Nation.*

Water as a development issue - Our work in Africa

The £6m Climate Justice Fund, supported by Hydro Nation, is already funding 5 water-related adaptation projects in Malawi and Zambia.

*Scotland enjoys a particular relationship with **Malawi** due to historical ties between the two nations, recognised under the Hydro Nation agenda through joint working at an official level*



on water resource management, governance and legislation. Peer-to-peer knowledge sharing on key issues has informed new legislation introduced by both countries in updating aspects of water law and dialogue has highlighted many common areas of interest including water-resource management, community management of assets and increasing public engagement. We will work further together on these aspects as part of our focus on improving rural provision.

Water management project, Salima district, Malawi, funded by Climate Justice Fund managed by Tearfund

The second £3m funding round, launched in April 2014, is open to Scottish-partnered projects in Malawi, Zambia, Tanzania and Rwanda with a focus that includes water and climate adaptation.

OECD Water Governance Initiative

We are proud that our framework of governance has provided the basis for the transformation of the performance of Scottish Water over the last decade. This is a story from which others can learn. We are therefore working with the OECD Water Governance Initiative, and to coincide with the IWRA Congress, the Scottish Government will be hosting a one-day Plenary Meeting of the OECD Water Governance Initiative, highlighting the approach to the governance of Scottish Water.

World Water Congress

Scotland will contribute to the debate on key water issues and increase our international profile with the Scottish Government hosting the XVth International Water Resources Association World Water Congress in May 2015. The Congress presents a unique opportunity to engage with the international water community, promoting the sustainable use of water resources – one of the major challenges of the 21st century – whilst highlighting the attraction of Scotland as a prime destination for innovation, commerce and leisure.



World Water Congress XV

International Water Resources Association (IWRA)

Edinburgh, Scotland. 25 - 29 May 2015

With its main theme of '***Global Water, A Resource for Development: Opportunities, Challenges and Constraints***,' the Congress is expected to attract in excess of 1,000 delegates each day from over 85 different nations and will provide an opportunity to showcase a wide range of domestic water-related enterprise and expertise, including a series of Hydro Nation-themed sessions.

Section 3: Towards a Water Economy – Taking Scotland The Hydro Nation Forward

We will develop the Hydro Nation programme to build on the success achieved to date. We will work to engage ever more stakeholders in the Hydro Nation agenda, working closely with the sector, sharing knowledge and expertise to identify opportunities to promote and drive Scotland the Hydro Nation forward. Our aim is to maximise the contribution of the Hydro Nation agenda to the development of a vibrant water economy in Scotland, by focusing on the following key themes:

- **Wealth creation** – growing the profitability of existing and new water sector businesses, with a particular focus on supporting SMEs through innovation and exploiting export potential;
- **Scotland’s international reputation** – we will continue to identify networks and opportunities for international collaboration and communication, supporting Climate Justice and knowledge sharing with the Malawi Government in particular, and we will be an active contributor to other global forums in water technology, skills and governance;
- **Education including research excellence** - we will build the scale and reputation of the Hydro Nation Scholars Programme. We will look to better connect SMEs with key emerging research findings, and we will explore potential new areas of work which can add value to the Hydro Nation agenda, e.g. flood-risk and drainage management;
- **Delivering for customers** - with a particular focus on rural communities we will establish a comprehensive workplan to deliver sustainable provision options for Scottish Ministers;
- **Sustainable development in the water sector** – we will continue to promote and support the development of more efficient resource use, and low-carbon service delivery across the sector, thereby developing and growing the value of our water resource;
- **Communication** - we will work with our partners to develop, inform and engage young people and others with the Hydro Nation agenda and contribute to our work on exploring the concept of value.

Hydro Nation Forum

Chairwoman: Nicola Sturgeon MSP, Deputy First Minister and Cabinet Secretary for Infrastructure, Investment and Cities.

Professor Iain Gordon, Chief Executive of the James Hutton Institute.

Dr Douglas Henderson, Senior Lecturer and School Director of Student Enterprise at Edinburgh Napier University.

George Eckton, Chief Officer for Development, Economy and Sustainability at COSLA.

Councillor Stephen Hagan, Spokesperson for the Environment and Regeneration Team at COSLA.

Gareth Pender, Head of School and Professor of Environmental Engineering in the School of the Built Environment at Heriot-Watt University.

Dr Howard Dryden, Founder of Dryden Aqua.

Dr Alan MacDonald, Principal Hydrogeologist at the British Geological Survey.

Professor James Curran, Chief Executive of SEPA.

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

Steve Dunlop, Chief Executive of Scottish Canals.

Professor George Fleming, Founder and Chairman of EnviroCentre.

May East, Chief Executive at CIFAL Scotland.

Galen Fulford, Managing Partner of Biomatrix Water Technology.

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

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

Lisa Webb, Convener of Freshwater Taskforce at Scottish Environment Link.

Alan Simpson, Chairman of the Institute of Civil Engineers.

Professor Geoffrey Gooch, Director of the Centre for Water Law, Policy and Science, University of Dundee.

Professor Gordon Hughes, Chairman at the Water Industry Commission for Scotland.

Nick Lyth, Director, Green Angel Syndicate.

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

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