

**NI Water Energy Sustainability and Resilience Strategy V2.0 July 2019**

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Acronyms, and Abbreviations

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| Acronym | Description |
| AGU | Aggregated Generation Unit |
| CPPA | Corporate Power Purchase Agreement |
| CRC | Carbon Reduction Commitment |
| DER | Distributed Energy resource |
| DSR | Demand Side Reduction |
| DSU | Demand Side Units |
| EAP | Energy Action Plan |
| EESS | Electrical Energy Storage Systems |
| EnMS | Energy Management System |
| GWhr | Gigawatt Hour |
| HoF | Head of Function |
| kWh | Kilowatt Hour |
| kWp | Kilowatt peak |
| MM&T | Metering Monitoring and Targeting |
| NIEN | Northern Ireland Electricity Networks |
| PPA | Power Purchase Agreement |
| ROC | Renewable Obligation Certificate |

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# ENERGY SUSTAINABILITY AND RESILIENCE STRATEGY CONTEXT

The Energy Sustainability and Resilience Strategy, together with related policies, are integral parts of NI Water’s overarching Environmental objectives.

NI Water’s **Environmental objectives** outline NI Water’s leadership ambitions in contributing to the implementation of the United Nations 2030 Agenda for Sustainable Development. Agenda 2030 is a ‘plan of action for people, planet and prosperity’ consisting of 17 Sustainable Development Goals.

Our detailed goals are publically available online at <https://www.niwater.com/our-environment.aspx> and approved by our Chief Executive Officer.

# ENERGY LANDSCAPE

NI Water is the largest user of electricity in NI with expenditure of £23.7m within a total energy bill of £25.3m during 2016/17.

Following recent UK government energy policy announcements, impending electricity market changes and the falling costs of generation and storage technology, there is increasing interest in the benefits that large consumers can bring to the efficient operation of the grid.

This impending transformation of the energy sector is of strategic importance to NI Water. How the electricity market operates today will be very different to how it will operate in the near future.

In the ‘new world’ electricity system, renewable energy and two way power flows will play a much larger part. These dynamics are set to grow significantly, not least to facilitate electric transport and heat demands that the ‘old world’ electricity system is unable to accommodate. To do so efficiently will require the wide spread deployment of energy storage and the establishment of a Distribution System Operator (DSO). Digital technology will also be key to this transformation.

The DSO in NI will be NIE Networks (NIEN). The shift in their role is quite profound. Instead of being paid to “put copper in the ground” in effect to build and maintain the local network, they will be incentivised to operate the network by matching supply and demand as efficiently as possible with the minimum investment required. To do this NIEN will need to address network constraints, manage two way power flows and operate the local network effectively. Crucially this will require the deployment of a range of innovative technologies and the creation of new market payment mechanisms.

NI Water can harness this opportunity to the significant advantage of its customers and shareholders.

This refreshed NI Water Energy Sustainability and Resilience Strategy suggests a hierarchy of actions to optimise NI Water energy consumption and provision.

# LEGAL REQUIREMENTS

NI Water is both a Non-Departmental Government Body (NDPB) and a Government owned company (Go-Co). This Energy Strategy is developed recognising the requirements and the various challenges of this status particularly in relation to procurement limitations and funding constraints.

NI Water ensures compliance with legislative and regulatory reporting requirements whilst driving improvements in monitoring and reporting procedures and the continued promotion and use of this management information throughout the organisation to deliver NI Waters strategic energy objectives.

As a regulated water company, large energy user and NDPB, NI Water must comply with Energy specific regulatory and legislative reporting requirements. These include but are not limited to:

* + CRC (Carbon Reduction Commitment)
  + ESOS (Energy Savings Opportunity Scheme)
  + AIR (Asset Information Return)

Legal requirements for NI Water are tracked and managed within the ISO50001 Energy Management System documentation.

# RESILIENCE

Food, water and energy are the three of the key pillars upon which humanity exists and develops.

Indeed, these are the three ‘human vulnerability’ indicators for their respective United Nations Sustainability Development Goals (SDGs):

* + SDG 2 (Zero hunger)
  + SDG 6 (Clean water and sanitation for all)
  + SDG 7 (Affordable and clean energy)

It is well recognised globally that food, water and energy are intrinsically linked; the Food, Water, Energy Nexus. Northern Ireland is not exempt.

The agriculture and food processing sectors are a significant element of the Northern Ireland economy, collectively accounting for around 70,000 local jobs.

NI Water is the largest electricity consumer in Northern Ireland and NI Water is the sole provider of water services.

Northern Ireland’s economy and citizens are totally dependent on NI Water for water services and NI Water is totally dependent on a secure electricity network.

It is therefore essential that NI Water should be energy resilient.

NI Water’s energy resilience is improved by implementing the four strategic energy objectives in this Energy Sustainability and Resilience Strategy:

* Objective 1: Use Less
* Objective 2: Buy Less
* Objective 3: Buy Better
* Objective 4: Earn More

Ensuring that NI Water is able to secure funding to invest in long-term resilience while keeping water service costs at an acceptable level will be a challenge. To develop resilient water infrastructure that offers best value for money over the long-term will increasingly involve innovative and cost-efficient solutions.

Without investing in energy resilience NI Water can only be as cost-efficient and reliable as the electricity network dictates.

# HIGH LEVEL STRATEGY

Energy is essential to the delivery of water and sewerage services throughout Northern Ireland.

Significant investment in distributed energy resources (DERs), particularly renewable generation, across Northern Ireland (NI), the introduction of the Integrated Single Electricity Market (ISEM), electrification of transport, electrification of heat and falling technology costs will shortly start to transform the NI electricity market.

The Northern Ireland electricity network is small, mainly rural, overhead, expensive to maintain and therefore expensive for consumers. It has the highest penetration of wind generation in the UK.

As the single largest electricity consumer in Northern Ireland, with widely distributed assets and the ability to modify its demand profile, NI Water is uniquely placed to significantly lower its costs and increase its revenue from energy related activity whilst playing a pivotal role in enabling the new NI electricity market to deliver meaningful benefits for all consumers.

NI Water is committed to developing innovative approaches to energy provision during the remaining PC15 period (2015-2021) and taking these learnings through into the PC21 consultation process. To reflect this, NI Water has revised its Energy Vision Statement for the PC15 period as follows:

*“Use innovative approaches to energy and new technology to deliver NI Water’s services for the lowest financial and environmental cost, whilst simultaneously maximising consumer and community benefits.”*

To communicate this vision clearly NI Water has developed four energy objectives:

###### Objective 1: Use Less

* + **Objective 2: Buy Less**
  + **Objective 3: Buy Better**
  + **Objective 4: Earn More**

NI Water is a large organisation and energy is common to all business areas. Consequently, to maximise effectiveness, align with existing management standards and deliver efficiently on potential savings, NI Water has developed this Energy Sustainability and Resilience Strategy in line with ISO 50001 guidelines.

ISO 50001 is an internationally recognised energy management Standard (EnMs) that is aligned with ISO 14001; the suite of environmental standards that NI Water has already attained.

Encompassing existing and planned energy management activity within an internationally recognised energy management standard will embed energy management into NI Water’s business processes and drive continual improvement.

# RESOURCE

Every NI Water employee is responsible for energy. However, the managers of NI Water business units demonstrate their commitment and support to the NI Water’s ESRS and continually improve its effectiveness within the areas for which they are responsible by:

* Providing resource to establish, implement, maintain and improve their energy management systems;
* Ensuring energy performance objectives and targets are realised;
* Communicating the importance of energy management and progress towards targets;
* Including strategic energy considerations in long-term planning;
* Ensuring that results are measured and reported;
* Conducting management reviews.

The Senior Responsible Person for energy in each business function is detailed within the energy Management System.

Energy is relevant to every NI Water business function. The NI Water Energy Team will work internally and across the business functions to deliver, monitor and report on Energy Actions.

# BASELINE

Mindful of the phrase ‘You can’t manage what you don’t measure’, it is important to first consider what main sources of energy are consumed across NI Water’s estate, where they are consumed and how they are consumed.

The baseline for monitoring performance will be detailed within the Energy Management System.

# USE LESS (Energy Management: Objective 1)

***Reducing energy use makes perfect business sense; it saves money, enhances corporate reputation and helps the fight against climate change.***

### Metering, Monitoring and Targeting (MM&T)

The primary purpose of NI Water’s metering monitoring and targeting analysis system is to relate energy consumption data to production and environmental factors to gain a better understanding of how energy is being used. In particular, to identify if there are signs of avoidable waste or other opportunities to reduce consumption.

NI Water’s MM&T system uses a mixture of automatic meter and sub meter reading at a variety of resolutions to:

* Detect avoidable energy waste that might otherwise remain hidden. This is waste that occurs at random because of poor control, unexpected equipment faults or human error, and which can usually be put right quickly and cheaply (or, indeed, at no cost).
* Quantify the savings achieved by energy projects and campaigns in a manner that accounts fully for variations in weather, levels of production activity and other external factors.
* Identify fruitful lines of investigation for energy surveys. Rather than starting a survey with no clear agenda, NI Water’s MM&T system will help identify inform further investigation, prompted by observed erratic or unexpected patterns of consumption.
* Provide feedback for staff awareness, improve budget setting and undertake benchmarking.

NI Water has considerable energy and process data. However, not all of NI Water’s data sets are centralised or capable of being keyed to one another.

One of the first use cases for NI Water’s ongoing Business Analytics activity will be to further refine the resolution and automation of NI Water’s MM&T systems.

### Energy Management

An effective Energy Management System (EnMs) enables organisations to establish the systems and processes necessary to improve energy performance, including energy efficiency, use, consumption and intensity.

The implementation of an EnMS and conformance to a recognised standard will lead to reductions in energy cost, greenhouse gas emissions and other environmental impacts, through the systematic management of energy consumption.

NI Water will be seeking to attain ISO 50001 - Energy Management Systems. ISO 50001 is a voluntary International Standard developed by ISO (International Organisation for Standardization). ISO 50001 provides organisations with the requirements for the effective implementation of EnMS.

##### Behavioural Change

NI Water recognise the importance of making staff aware of the need to save energy, both for the business and the environment. Individual staff members are more likely to change their own habits if they understand how their actions affect consumption. Though energy communication, training and feedback, NI Water staff will feel confident to make suggestions and take action when necessary.

**Communication**

#### Internal Communications

Internal energy communications are conveyed through a number of channels including:

* + Management Team Briefing system;
  + articles published in Waterline;
  + internal newsletters;

We will extend these communications through the deployment of the Energy Management System to include at a later date:

* + Energy Dashboards;
  + Notice boards; and
  + Northern Ireland Water (NIW) Intranet.

#### External Communication

A wide range of systems are in place to ensure effective energy communications with external stakeholders including:

###### Roadshows (NIW Exhibitions)

NIW provides Roadshows on an ad-hoc basis. These exhibitions include general information relating to the Water Industry and specific NIW information. Roadshows are provided for such public functions as The Agricultural Show at Balmoral, four county agricultural shows the Ideal Home Exhibition and the Chemistry at Work Exhibition at Queens University Belfast. Information packs are also available for schools.

NIW maintains the Water Bus, which is a mobile educational unit for school children. The Water Bus aims to make children aware of the water cycle and highlights ways of using water wisely.

###### NIW Open Days

NIW holds open days at water and waste water facilities for the public. These are on an ad-hoc basis and are sometimes linked to the opening of a new plant. In addition to these open days NIW also maintains a permanent Visitors Centre at the Silent Valley and a Heritage Centre at Duncrue Street WwTW in Belfast.

###### NIW Internet Web Site

NIW provides energy information to the public through its Internet Web Site www.niwatercom.

###### Consultants and Contractors

All NIW consultants and contractors receive a copy of the NW Energy Policy as part of tender documentation. In addition, all consultants working for NIW Engineering & Procurement Directorate have access to EnMS documentation via the NIW internet site. Other consultants and contractors are provided with EnMS information relating to their specified duties and activities while working for NIW, details vary depending on contract.

## Training

Northern Ireland Water ensures that employees, consultants and contractors who are involved in dealing with the significant energy aspects of Northern Ireland Water activities are aware of and competent to manage the risks.

All training needs (including specific energy training) are identified through the annual review process. Every member of Northern Ireland Water staff receives an annual review as part of this process from which training needs are identified. Training will then be provided as part of operational training courses offered by Northern Ireland Water or through specific environmental training courses.

All training is recorded by Northern Ireland Water.

###### CSR & ISO 50001 Awareness Training

General Sustainability and Energy Awareness Training will be developed and provided through a suite of eLearning modules and tools that have been specifically mapped to the competence, training and awareness requirements of ISO 50001.

These are to be developed to include:

###### Induction Training

New Northern Ireland Water employees will receive General Energy Awareness Training as part of their Induction. Northern Ireland Water Head Office Personnel organise induction training for non-industrial employees. Induction training for industrial employees is organised by their line manager.

# BUY LESS (Resilience: Objective 2)

### Renewable Energy Self Generation

NI Water has already installed, and continues to install, renewable generation feeding directly into large electricity consuming sites. These include:

PV – 6.4MW - Dunore and multiple installations. Hydro – 0.4MW - Silent Valley.

Investment in renewable energy generation fell 56% in UK in 2017 following the removal of many incentive mechanisms. In a post incentive world, investment by NI Water in embedding new renewable generation is now considerably less financially viable, albeit at currently low wholesale market prices.

Greatly reduced financial viability is much more of an issue for the renewable generation projects throughout Northern Ireland that have been under development, at considerable expense, yet have been unable to connect to the grid. Developers of these projects have ‘sunk costs’ and very little expectation of realising any value from their investment.

NI Water, with geographically dispersed assets and large consumption profiles, may under the right circumstances enable some of these ‘stranded’ projects to gain access to the grid via private wire behind the site demand. Private wire PPAs and NI Water’s work in this area are covered in more detail in Section 9.

However, from an energy sustainability and resilience perspective it would more advantageous for NI Water if ‘stranded private wire’ renewable generation assets were owned by NI Water. By doing so, NI Water could, potentially very cost effectively, increase embedded renewable generation and business resilience.

# BUY BETTER (Resilience: Objective 3)

### Load shift

If generated electricity is not consumed or stored on the NI electricity network it is wasted. This is a problem and is referred to as power loss. Electricity demand changes over time, in that peak load could be multiple times that of off-peak load. To satisfy peak load demand on the NI network, generators must generate electricity according to this peak load. Consequently the utilisation efficiency of grids is lower during off-peak loads and there is more power loss.

Electricity market prices reflect these inefficiencies. The introduction of I-SEM in May 2018 and Eirgrid’s ongoing multi-year DS3 (Delivering a Secure, Sustainable Electricity System) programme will further exacerbate the power loss cost.

As a result, electricity retailers, aggregators and DSO’s will likely adopt radically new pricing structures.

In this scenario, bundled retail tariffs, i.e. those designed for one-directional electricity flows and largely passive consumers will become outdated.

NI Water’s potential ability to alter or maintain a specified load profile will be valuable.

The NI Water Energy Team are investigating the potential to shift NI Water electricity consumption from peak periods to off-peak periods without compromising operations or compliance.

### Energy Storage Arbitrage

Electrical energy Arbitrage involves purchasing inexpensive electrical energy, available during periods when the price is low, to charge an Electrical Energy Storage System (EESS) so that the stored energy can be used or ‘sleeved’ at a later time when the price is high.

For the Arbitrage application, the EESS discharge duration is determined based on the incremental benefit associated with being able to make additional buy-low/use-high transactions during the year versus the incremental cost for additional EESS (discharge duration).

Two performance characteristics that have a significant impact on EESS variable operating cost are efficiency and the rate at which storage performance declines as it is used.

Assuming that EESS is not subject to transmission congestion during charging, distributed EESS may be used to store inexpensive off-peak electric energy from the grid so that the energy may be used or ‘sleeved’ to other sites when value/price is high.

It is now planned via an Invest NI (INI) project entitled Girona, to work collaboratively with a range of stakeholders including NIEN, the Utility Regulator and Ulster University to assess the potential of various technologies, including EESS, in addressing an existing network constraint in the Coleraine area. This project will not only prove a valuable pilot for the operation of EESS technology but will also provide data to model deployment at scale across NI.

### Renewable Energy ‘Private Wire’ Power Purchase Agreement (PPA)

A power purchase agreement (PPA) is a contract between an electricity generator and NI Water that incorporates the commercial terms for the sale and purchase of electricity from a renewable electricity generator. Where the purchase is not a licensed supplier of electricity, it is typically referred to as a ‘private wire’ PPA.

Where the purchase is not a licensed supplier of electricity, it is typically referred to as a ‘private wire’ PPA.

The key benefit of a private wire PPA, for both the generator and NI Water, is the opportunity to share savings in avoiding grid charges and policy costs applied to electricity imported from the grid.

The removal of renewable energy subsidies, lack of grid availability and impending market changes means that the financial viability of existing and consented renewable energy projects throughout Northern Ireland may be enhanced through a private wire PPA with NI Water.

The NI Water Energy Team are developing a robust PPA strategy that includes market information requests to assess the viability of, and procurement route for, private wire PPAs.

### Corporate PPA (CPPA)

Large energy users in GB are increasingly buying renewable energy via supply contracts negotiated for periods lasting 10 to 15 years. These contracts are attractive because they cut CO2 emissions, provide price certainty and security of supply and are commercially competitive.

Whilst new to the NI electricity market, offering long-term Corporate Power Purchase Agreements (CPPA) is under serious consideration by a number of suppliers.

NI Water’s electricity demand profile makes it an ideal customer for a CPPA and early market indications are that there is strong interest amongst suppliers in exploring the potential of such agreements.

The Energy Team is assessing the advantages for NI Water in contracting at an early stage in the roll out of CPPAs in NI and how the company can most effectively extract value from the procurement process when the existing electricity contracts expire in September 2019.

This work will be achieved through a range of research and analysis activities, including but not limited to:

* + Conducting a thorough price and features review of existing NI CPPA offerings, including 100% renewable electricity provision.
  + Researching the GB CPPA market to identify any ‘best practice’ offerings.
  + Researching and defining any relevant NI Water CPPA USPs stemming from the introduction of ISEM and DS3.
  + Reviewing existing CPPA legal documentation and identifying critical common clauses.
  + Developing a series of equitable critical common CPPA clauses that may be included in a range of CPPA legal documentation without impinging on NI Water’s energy objectives.
  + Developing a robust CPPA strategy that maps out an optimal pathway to deliver 100% of NI Water’s annual electricity consumption from CPPAs.

### Market Procurement

All NI Water procurement is based on obtaining best value for money having due regard to propriety and regularity. “Best value for money” is defined as “the optimum combination of whole life cost and quality (or fitness for purpose) to meet the customer’s requirements”. While “best value for money” will be the primary objective of the procurement policy, this definition allows for the inclusion, as appropriate, of social, economic and environmental objectives within the procurement process.

All procurement activity within NI Water will be governed by NI Water policies & procedures, in particular the Financial and Procurement Delegation Policy, Procurement of Goods & Services Procedures, CPMR Procedures, and Codes of Conduct, particularly with regard to the key principles of integrity, honesty, objectivity and impartiality, together with the other principles which underpin procurement activity.

Energy and energy services are procured through NI Water’s Energy Category Council.

##### Energy Supply Chain Support

Energy Supply Chain Support is a ‘single point of contact’ centralised procurement service through which energy related goods and services are introduced to the business and by which procurement mechanisms to support their adoption are created.

NI Water’s Energy Supply Chain Support service avoids multiple points of entry into the business to avoid duplication, nugatory effort and unrealistic vendor expectation.

# EARN MORE (Financial: Objective 4)

### Demand Side Unit (DSU)

At times when the NI grid does not have enough generation capacity to meet demand, the Transmission System Operator (TSO) will be forced to initiate rolling power cuts. To avoid this situation, the TSO has provided a scheme whereby demand can be reduced to meet the available generation capacity.

Individual Demand Sites use plant shutdown to deliver the demand reduction. By being available for dispatch the DSU will be eligible for Capacity Payments in the Single Electricity Market (SEM).

Each Demand Side Unit has one hour to reduce its demand and must be capable of maintaining the demand reduction for at least two hours.

In conjunction with the potential introduction of new grid service revenues, the NI Water Energy Team will be assessing the potential to optimise DSU revenues.

### Aggregated Generation Unit (AGU)

An AGU is a collection of generators, each of which have a capacity of no greater than 10MW, and that are either, on generation sites covered by more than one connection agreement or are not located on contiguous sites.

Similar to DSU, by being available for dispatch the AGU will be eligible for Capacity Payments in the Single Electricity Market (SEM).

NI Water currently has generators at 20 sites within an AGU.

In conjunction with the potential introduction of new grid service revenues, the NI Water Energy Team will be assessing the potential to optimise AGU revenues.

### Electrical Energy Storage System (EESS) Grid Service Revenues

EESS will play an important role in the development of the local Smart Grid by helping avoid or defer expensive infrastructure capital investment in areas of network constraint and assist in the efficient operation of the electricity grid.

Faced with growing peak demand as the electrification of transport and heat gains traction, the NI transmission and distribution networks will need to be upgraded to ensure that there is sufficient capacity to maintain an acceptable level of security of supply. EESS can create value by enabling NIE Networks (NIEN) to defer (or avoid entirely) the need to invest to upgrade transmission or distribution equipment and consequently to extend the life of existing equipment.

EESS can also provide a means of relieving congestion on transmission networks, especially in areas with high levels of renewable generation.

In addition, EESS will permit NI Water to derive an income from future Ancillary Services payment mechanisms. Accessing Ancillary Services is not providing energy as such, rather the capacity to supply a contracted service when required.

Given NI Water’s distributed range of assets and established network connections across Northern Ireland, it is uniquely placed to act as a partner to NIEN in helping them to manage demand and supply in the local network as it becomes the Smart Grid of the future and ultimately facilitates the wide scale adoption of Electric Vehicles (EVs) amongst other innovations. This is increasingly recognised by NIEN and the Regulator but is not yet facilitated by NI Energy Policy and Regulation.

NI Water is participating in an Invest NI (INI) Collaborative Network entitled Girona, which is seeking to work collaboratively with a range of other stakeholders including NIEN, the Utility Regulator and Ulster University to assess the potential of various technologies, including EESS, in addressing an existing network constraint in the Coleraine area. This project will not only prove a valuable pilot for the deployment of EESS but will also provide data to model deployment at scale across NI.

# ENERGY GOVERNANCE STRUCTURE

