

Energy

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# PR19: Energy

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## Contents

<b>Executive summary</b>	<b>2</b>
<b>1 Delivering our customer outcomes</b>	<b>5</b>
Need for investment	5
Background	5
Views of our customers and stakeholders	6
Benefits for our customers	6
<b>2 Investing for now and the long-term</b>	<b>7</b>
Delivering for our customers	7
Building on progress	7
Forward Looking Analysis - Performance	8
<b>3 Investment Options</b>	<b>10</b>
Background	10
<b>4 Preferred option</b>	<b>11</b>
Preferred option	11
<b>5 Cost efficiency and Innovation</b>	<b>14</b>
Opportunities for innovation	14
<b>6 Value for money and affordability</b>	<b>16</b>
Impact on customer bills	16
Value for money	16
Assumptions and risks	16
<b>7 Delivery</b>	<b>18</b>
<b>8 Assurance</b>	<b>19</b>
Governance	19
Cost assurance	19
Customer consultation assurance	19

## Executive summary

### Driver for investment

In our Welsh Water 2050 vision we have set a commitment to become energy neutral by 2050, generating as much energy ourselves as we consume. We will continue to make steps along this journey over the years up until 2050. As a major user of energy, to achieve our commitments, we will need to deliver:

- A low cost energy supply so that we can keep bills low for our customers;
- A secure energy supply so that we can supply a reliable service to customers;
- A low carbon energy supply so that we can reduce our carbon emissions in line with national and international targets to achieve an 80% reduction by 2050 from 2007 levels.

Water and wastewater management are energy intensive processes and we used 466GWh of electricity in 2016-17. The price of delivered energy rose by 50% over AMP5 (2010-2015) and has continued to rise over AMP6. Energy is our largest cost after people.

The energy we generate has risen from 10 GWh in 2009-10 to 98 GWh in 2017-18 and we aim to produce 130 GWh of energy (electricity generated and electricity equivalent of exported gas) by the end of AMP6. For AMP7 we are proposing a new performance commitment reporting the electricity and gas we produce as a percentage of all electricity and gas consumed. By the end of AMP7 we aim to increase the percentage we generate and gas we inject to grid to 35% of all electricity and gas consumed.

### The Investment

This investment case sets out our proposals for energy related capital investment over AMP7. A pre-efficiency investment of £27.75m (£27.46m post efficiency) is proposed over AMP7 for the development of new assets and initiatives and the maintenance of existing energy assets.

This investment will contribute to our long term (2050) commitment to become energy neutral and minimise the economic impact on our customers from rising energy prices, by:

- Reducing the amount of energy we use to deliver our compliance and customer service objectives;
- Generating an increasing proportion of the energy we use ourselves;
- Minimising the cost of the energy we use through our purchasing strategy and optimising the time of use.

The outline of the proposed £27.75m expenditure is included in Table 1. This comprises £22m capital expenditure on new assets / initiatives (to save £2.78m/year opex by the end of AMP7)) and £5m capital maintenance expenditure on existing assets.

Initiative / Scheme type	Potential no. of schemes	Expenditure (£m)	Savings/yr (£m)
Renewable Energy Generation – Hydro	8	5.3	0.45
Renewable Energy Generation - AD, PV & wind	6	5.6	0.64
Increased Efficiency – Pumps & Control	58	4.6	0.73
Increased Efficiency – Aeration	15	3.95	0.36
Increased Efficiency – Lights	13	1.3	0.23
Demand Management & Storage	2	2.0	0.22
Subtotal - Projects	102	22.75	2.63
Maintenance	n/a	5.0	n/a
PRE-EFFICIENCY TOTAL		<b>27.75</b>	
POST-EFFICIENCY TOTAL		<b>22.89</b>	

Table 1: Proposed energy investment for AMP7

## Delivering for our customers

The proposed investment will help us meet the following of our customer promises:



**Fair bills for everyone:** Reducing the cost of energy use to the business and therefore reducing bills for the long-term.



**A better future for all our communities:** Increasing our level of energy self-sufficiency and playing our part in reducing the overall energy use of the country.

## Delivering for the future

In our strategic Welsh Water 2050 publication, we identified future trends that would have an impact upon our business and the services we provide. This investment will help to address the impacts from the following future trends:



**Climate change:** Climate change will result in more extreme events such as drier, hotter periods and intense summer rainfall events, which could lead to increased pressure on the electricity supply system prompting the need for greater physical and economic energy resilience.

## Delivering our Strategic Responses

In Welsh Water 2050, we set out to deliver 18 Strategic Responses in order to offset predicted future trends. This investment will contribute to the following Strategic Responses:



**Strategic Response 18:** Promoting a circular economy and combatting climate change.

## Achieving our measures of success

Over AMP5 the key driver for energy efficiency and generation was a reduction in carbon emissions; as energy accounted for over 80% of operational carbon emissions at that time.

In AMP6 our Measure of Success (MOS) centred on the amount of renewable energy generated by ourselves (measured as GWh). A target of 100GWh was set for the end of AMP6 (from 40GWh in 2014-15). This measure has proved easy to understand, however it does not reflect the overall benefits being delivered elsewhere such as improved energy efficiency.

With the carbon content of grid supplied electricity falling quickly and economically viable options being available to purchase Renewable Energy Guarantees of Origin (REGO) backed carbon free renewable energy, we propose to retain an energy based, rather than carbon based, performance target over AMP7 but amend the exact measure used.

Our proposed Measure of Success over AMP7 and associated targets are identified in Table 2 and will report the amount of electricity we generate and gas we inject to grid as a percentage of all electricity and gas we consume (gas expressed as an electricity equivalent). Our target for the end of AMP6 was equivalent to 26% (although we may achieve 30%) and for the end of AMP7 is 35%. Our long-term vision is that by 2050 we will achieve a target of 100%.

Measure of Success	2019-20 Target	2024-25 Target	AMP8 Target	AMP9 target	2045 target	2050 target
Ft3 - Energy self-sufficiency	26%	35%	50%	60%	85%	100%

Table 2: Our AMP7 Measure of Success and associated targets

## 1 Delivering our customer outcomes

### Need for investment

We spend £48m on energy (electricity and gas spend in 2017-18). We also generate 20% of our energy needs ourselves via our portfolio of 60 renewable energy assets located on some of our operational sites. This proportion has increased from around 2% in 2009-10 making Welsh Water one of the fastest growing renewable energy generators in the water sector. We have also consistently invested in energy efficiency across the last three AMP periods, investment which enables us to hold consumption steady, against the pressure from the additional sites and equipment deployed over the same period, to improve the standards of water and waste water treatment. Meanwhile, the cost of delivered energy has increased significantly, particularly with the burden of network charges and green energy support schemes such as Feed in Tariffs, Renewables Obligations, Carbon Reduction Commitment and Climate Change Levy. Wholesale prices have also shown periods of volatility, creating an uncertain future. The faster we can progress towards our long term goal of energy self-sufficiency, the quicker we can bring economic resilience to this, our second largest operational spend (after people).

Our proposed expenditure of £27.75m over AMP7 will contribute to our long term aim of being energy neutral by 2050 and will also reduce the economic impact of rising energy prices on our customers. This will be achieved through:

- Reducing the amount of energy we use to deliver our customer service objectives and achieve our regulatory requirements;
- Generating an increasing proportion of the energy we use ourselves, wherever feasible and economic to do so;
- Minimising the cost of the energy we use through more effective demand management and our purchasing.

Investment will also help us achieve the following supporting objectives over AMP7:

- To seek opportunities for energy efficiency throughout the business;
- Identify and implement renewable energy generation opportunities;
- Encourage behavioural energy efficiency amongst our employees;
- Ensure energy efficiency and carbon reduction is considered in all new developments;
- Ensure that innovations in efficiency and generation technologies are evaluated and implemented where commercially viable;
- Monitor and regularly review our energy performance against business plan targets.

### Background

Water and wastewater management are energy intensive processes and we typically use around 250-466GWh of energy each year (466 GWh in 2016-17). The price of delivered energy rose by 50% over AMP5 (2010-2015) and has continued to rise over AMP6. Within this price, the element associated with carbon and climate change levies tripled in AMP5 and are expected to rise by a further 50% by the end of AMP6, whilst transmission and distribution charges also rose. Growth in the extent of our service (through population and economic growth) and improvements in effluent quality to meet new regulatory requirements has and will continue to place increasing pressure on energy use.

Energy currently comprises over 13% of our operating costs, which is our largest cost after people. Energy use has therefore a significant impact on the cost and resilience of Welsh Water's service to customers and on the carbon footprint of the organisation. Until switching to a supply that is from 100% REGO-backed renewable sources, energy use contributed to over 80% of our operational carbon footprint.

The energy we generate has risen from 10 GWh in 2009-10 to 98 GWh in 2017-18 through investment in renewable energy assets (both new and acquired) and we aim to produce 130 GWh of energy (electricity and electricity equivalent of exported gas) by the end of AMP6.

Over AMP7 we propose reporting the electricity we produce as a percentage of all electricity and gas

consumed. Our end of AMP6 forecast against this new measure is 26% and by the end of AMP7 we aim to increase the percentage we generate and gas we inject to grid to 35% of all electricity and gas consumed.

## Views of our customers and stakeholders

We have engaged with our customers and stakeholders throughout AMP6 to understand their expectations and preferences, including consultations on the use of customer dividend money in AMP6 and the PR19 Business Plan. Our Welsh Water 2050 strategy consultation, held in the summer of 2017, engaged with 20,000 customers. We have also utilised wider industry-level research and assessed its implications for our region, our stakeholders and our future plans. Our customer preference research in March 2016 identified that:

- Customers considered the development of efficiency measures such as generating our own energy to be a priority;
- Stakeholders identified the reduction of CO2 as an area of improvement.

Feedback from qualitative customer research in June 2017 supported our proposals with findings identifying:

- There was a strong preference (69%) for increasing the percentage of self-generated energy.

## Benefits for our customers

### Affordability of Bills

The development of cost beneficial initiatives associated with the increased generation of renewable energy, increased efficiencies and reduced demand will result in reduced operating costs and hence more affordable bills for our customers.

### Increased Resilience

The provision of a more secure energy supply will help increase the resilience of our activities and provide a more reliable service to our customers.

## 2 Investing for now and the long-term

In our Welsh Water 2050 strategy document, we have set out our long-term vision for our business and how we will continue to meet our customer needs into the future. It identifies the trends/challenges related to our activities as set out in Figure 1.

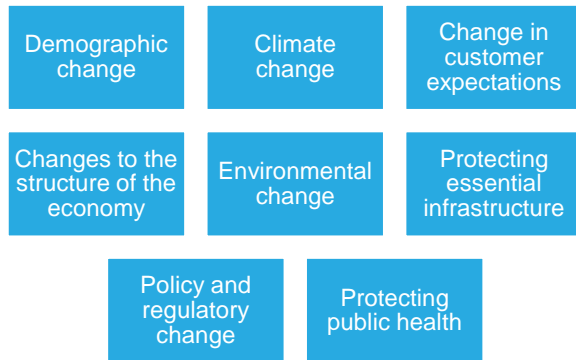


Figure 1: Trends impacting on our Activities

### Delivering for our customers

The 2050 document also sets out promises made to our customers to ensure a sustainable position for future generations and also the Strategic Responses we will need to develop to address future challenges. The investment proposed in this Investment Case will help us achieve the following of our customer promises:

- **Safeguard our environment for future generations:** Investment will increase the resilience of our wastewater assets to reduce the risk of pollution and flooding incidents.
- **Put things right when they go wrong:** By increasing the resilience of our processes the investment will reduce the risk of service failure.
- **A better future for all our communities:** Reducing the risk of pollution will improve the natural environment for people, and help communities create a better future for themselves.

The proposed investment will, through the development of more sustainable and resilient energy sources and hence more resilient assets, also contribute to the Strategic Responses

identified in Welsh Water 2050 to address the future trends, in particular:

- **Strategic Response 18 - Promoting a circular economy and combatting climate change.**  
This will be achieved by:
  - Contributing to the delivery of an energy neutral business;
  - Increasing our deployment of energy efficient treatment processes and assets;
  - Being energy neutral we will have reduced our carbon emissions by over 80% and played our part in achieving the Welsh Government’s target set out in the Environment (Wales) Act (2016).

### Building on progress

Our energy investment to date has focused on the development and delivery of the following strategic themes:

- **Investing in energy efficiency and energy generation:**
  - Designing new sites and maintaining existing sites to minimise whole-life-costs;
  - Implementing policies to buy the most energy efficient equipment available where economic to do so;
  - Owning and operating energy generation assets on our sites and land (supplying energy directly to our assets/ equipment on site or supplying via Grid)
  - Acquiring and building generation assets on third party sites where these can be linked to and supply our sites by private wire.
- Provision of **effective maintenance and support contracts** to enable generation issues to be promptly addressed and output levels to be optimised.



- **Information** - available where and when it is needed to enable energy use to be minimised and generation maximised, including:
  - Real time data available for all generation sites and the larger consuming locations;
  - Next day data available for all other sites (where it is economic to install and use the necessary metering and communications);
  - Colleagues made aware of their potential to influence energy cost and energy use through:
    - Team based learning sessions and workshops;
    - Support staff being available to analyse issues and answer queries.
- **Purchasing and hedging energy** through a risk management based approach to balance the reduction in risk from price volatility whilst maximising value.

## Historical analysis

The original AMP6 energy programme allocated £26m to energy with a target of saving £3.9m per year. Our board made an additional £19m available with a target of an additional £2.5m of savings. To the end of Year 3 AMP6 £32m has been spent delivering a full year effect of £4.8m in savings with the remaining £13m on track to complete during Year 5 and bring the total up to the target of £6.4m.

The energy we generate has risen from 10 GWh in 2009-10 to 98 GWh in 2017-18 and we aim to produce 130 GWh of energy (electricity generated and electricity equivalent of exported gas) by the end of AMP6. These figures are equivalent to a rise from 2% to 20% by 2017-18 using our proposed AMP7 Measure of Service (see below). Recent examples of energy generation schemes successfully delivered are:

- Our two wind turbines (one at Nash WWTW near Newport and one at Swansea WWTW) were completed in 2016-17 and have now just finished the first full year of operation. Both

mainly supply the site on which they are located with only the one at Nash exporting to grid at times of maximum output.

- Eleven further solar photovoltaic generation sites have been added to our portfolio which now stands at 26 sites. The largest scheme within this group is one of 750kW at Felindre WTW where it is mounted, using a low impact (easy to remove) system on the service reservoir roof.
- Six further hydro turbines have been commissioned, all completed within Ofgem accreditation deadlines, so enabling the company to obtain full benefit from the feed-in-tariff support scheme. This investment included a hydro integrated into the inlet of the new Water Treatment Works at Bryn Cowlyd in North Wales. This 550kW facility supplements two sites already completed on the main down from the reservoir to the works and means that over 5 GWh/year) can be generated from that supply.

Our AMP 6 programme has also included significant investment into energy efficiency. Unlike a large wind turbine or hydro scheme, energy efficiency projects are generally much smaller but reach a far wider range of our asset base. Around 150 schemes have been progressed in this AMP and many of them cover multiple sites. Examples include:

- Replace blowers at some of our larger waste water treatment sites with more energy efficient models. Typically these can save 25%-40% of the power required to operate.
- A large programme of lighting replacements, switching to LED lights on all our larger sites.
- Four of our largest waste water treatment works are having or have had a multi-variate process control system installed to optimise the plants.

## Forward Looking Analysis - Performance

Our proposed Measure of Success over AMP7 and associated targets are identified in Table 3 and will report the amount of electricity we generate and

gas we inject to grid as a percentage of all electricity and gas we consume (gas expressed as an electricity equivalent). Our forecast for the final year of AMP6 is 26% with a full year effect of 30% achieved by the following year. For the end of AMP7 our target is 35%. Our long-term vision is that by 2050 we will achieve a target of 100%. For AMP7 we are looking to continue the delivery of our energy investment strategy. Specifically we aim to:

- Achieve the revised measure of service of 35% of our energy consumption generated by our own sources (approaching this by both minimising the energy we use and maximising the energy generated);
- Take a step towards our long term goal of energy neutrality by 2050;
- Deliver value for customers through contributing to lower costs and therefore lower bills.

The ‘Energy Self-Sufficiency’ MoS is defined as the quantity of electricity generated and gas injected to the grid as a percentage of all electricity and gas consumed (gas expressed as an electricity equivalent).

Measure of Success	Targets					
	2019	2024	AMP 8	AMP 9	2045	2050
Ft3 Energy self-sufficiency	26%	35%	50%	60%	85%	100%

Table 3: Our AMP7 Measure of Success and associated targets

To achieve the MoS our investment proposals over AMP7 are grouped under the following themes;

- **Energy Efficiency:** We will continue to invest in energy saving measures and deliver opex savings in the rest of our capital investment

programme by ensuring that energy efficient solutions are selected through a totex approach. As larger and more evident energy saving schemes have already been delivered, then investment would be focused on smaller schemes for example we expect to see a large number of smaller aeration and pumping schemes;

- **Renewable Energy Generation:** We will continue to increase our renewable energy output, maximising the available opportunities on our own land and working together with nearby land-owners on private-wire connections. In comparison to previous AMPs, these schemes are likely to be smaller, as the obvious opportunities have already been adopted;
- **Demand Side Management and Storage:** The cost of using electricity is increasingly about when you use power rather than how much you use. We will optimise our use of electricity to minimise cost, providing a balancing service to the electricity networks, and increasing flexibility to take advantages of short term price signals. Linked to demand side management is the ability to store energy on our sites locally, for example in battery storage. This allows us to provide additional balancing services but can also increase security of supply in the event of a power failure. This storage will also allow us to more closely match our on-site generation with our usage so maximising the value from the power produced on site.

## 3 Investment Options

### Background

Our approach to identifying and prioritising expenditure over AMP7 has been underpinned by our aims to:

- Maintain serviceability;
- Achieve performance targets set out in our measures of success;
- Manage risks, costs and performance so as to deliver the benefits to our customers and the environment at an affordable cost.

The following identifies the investment options considered in developing this Investment Case.

### Potential Options

**Option 1** – Total Investment = £49m (Capital investment on energy schemes / initiatives (= £45m) and capital maintenance of existing assets (=£5m)).

Currently there are circa £45m of energy schemes identified at site level with the potential of delivering energy benefits. However, initial analysis identified that only circa 50% of the expenditure could be justified in terms of cost benefit. This option was therefore not considered viable.

**Option 2** - Capital investment on energy schemes / initiatives (= £22.75m) and capital maintenance of existing assets (=£5m). This option includes investment of £22.75m to deliver identified cost beneficial schemes and initiatives which will:

- Contribute to our long term (2050) commitment to become energy neutral and
- Minimise the economic impact on our customers from rising energy prices.

An investment of £5m is also proposed for the maintenance of existing energy assets.

**Option 3** – Maintenance of existing assets only - no development of energy schemes / initiatives

This option will only maintain current assets and opportunities for the delivery of cost beneficial schemes (which will lead to reduced operational costs) will not be developed.

This option is not considered viable as:

- Opportunities for reducing our totex costs will be missed;
- Proposal is contrary to our customers' aspirations, as they considered the development of efficiency measures, such as generating our own energy, to be a priority.

## 4 Preferred option

### Preferred option

Option 2 is our preferred option. A pre-efficiency investment of £27.75m (£27.46m post efficiency) is proposed over AMP7 for the development of new assets and initiatives and the maintenance of existing energy assets.

This investment will deliver our performance commitment and contribute to our long term (2050) aim to become energy neutral and minimise the economic impact on our customers from rising energy prices, by:

- Reducing the amount of energy we use to deliver our compliance and customer service objectives;
- Generating an increasing proportion of the energy we use ourselves;
- Minimising the cost of the energy we use through our purchasing and use strategies.

The outline of the proposed £27.75m expenditure is included in Table 4. This comprises:

- £22.75m capital expenditure on new assets / initiatives (to save £2.63m/ year opex). This is based on a desk top analysis of our assets as well as some more specific outline feasibility assessments for energy generation and efficiency schemes and initiatives; the current analysis suggests that these are all cost beneficial schemes
- £5m capital maintenance expenditure on existing assets. A detailed analysis has been conducted of the age of each of our generating sites and expected timescales for major replacements. This investment will be utilised to extend the life of some of our existing renewable energy assets which are expected to reach key milestones over AMP7 and hence will require planned capital maintenance.

Initiative / Scheme type	Potential no. of schemes	Expenditure (£m)	Savings/yr (£m)
Renewable Energy Generation – Hydro	8	5.3	0.45
Renewable Energy Generation - AD, PV & wind	6	5.6	0.64
Increased Efficiency – Pumps & Control	58	4.6	0.73
Increased Efficiency – Aeration	15	3.95	0.36
Increased Efficiency – Lights	13	1.3	0.23
Demand Management & Storage	2	2.0	0.22
<b>Sub-total: Projects</b>	<b>102</b>	<b>22.75</b>	<b>2.63</b>
<b>Maintenance</b>	<b>n/a</b>	<b>5.0</b>	<b>n/a</b>
<b>Grand total</b>	<b>102</b>	<b>27.75</b>	<b>2.63</b>

Table 4 PR19 scheme breakdown

Further information on the proposed initiatives / schemes is as follows:

### Renewable energy generation

Unlike AMPs 5 and 6 where renewable energy schemes dominated the programme, in AMP7 we envisage only around half of the total proposed expenditure on projects being in this area (i.e. £10.9m of the £22.75m). This expenditure will be focused on the following type of schemes / projects:

- Hydro - There is the potential for further hydro schemes, although for some of these to be viable, final delivery would be required in Year 1 of AMP7, so as to claim feed-in-tariff support which will expire at the end of March. Most of these schemes will be small (under 100kW) and on a mixture of reservoir outlets and treatment works inlets. These will include bringing hydro

power back to Cantref, a water treatment works (WTW) which historically (before the advent of the Grid) used to be powered by a stand-alone (off-grid) hydro turbine. In the current programme £5.3m investment is proposed to deliver £0.45m/year return by the end of AMP7. It should be noted that, whilst traditionally a lower initial rate of return, hydro sites can continue to operate for an asset life of 40 years (our oldest operational turbine is 53 years old) giving long term benefits for customers;

- **Solar** - With another large phase of solar planned for Year 4 of AMP6, there is limited scope for further major solar development in AMP7 on our land. However with floating solar becoming viable there are several possible sites on our smaller raw water storage reservoirs adjacent to some treatment works;
- **Wind** - Opportunities are limited for viable on-shore wind. However, a feasibility study has identified that a site at our Five Fords WwTW is technically possible and we propose to implement this over AMP7 if economically viable;
- **Anaerobic digestion** - we do not anticipate any major further investment in AMP7. However, we will develop from our innovation projects in AMP6 to further optimise the gas output from digesters.

In total an investment of £5.6m on solar, wind and anaerobic schemes is forecast to deliver a benefit of £0.64m/year by the end of AMP7.

## Increased efficiency

To support our AMP7 Measure of Success and our long term 2050 vision, AMP7 will see a greater balance of investment focused on energy efficiency (reducing what we consume). Three efficiency themes have been identified:

- **Pumps and pump network control** will form the largest component of the efficiency investment. A combination of desktop analysis and site surveys have identified over 50 sites where pump replacement with a more efficient pump and motor specification could be economically viable schemes. As in AMP6 we propose continuing with the successful policy of

both, looking for sites where pumps can be upgraded on energy efficiency grounds alone, and contributing to sites already being addressed via maintenance to avoid like for like replacements being installed. The average scheme size on pumps will be around £30k. The pump network control has the potential to offer efficiencies both by simultaneously optimising pumps to operate at their lowest cost operating point and the time of operation. This investment will be partly dependent upon a full evaluation of a current AMP6 project due to be completed in Year 5. However, for the purposes of this proposal it has been assumed that two further schemes will be viable, one in Water and one in Waste.

It is proposed to spend £4.6m with an expected saving of £0.73m/year;

- **Aeration** has seen success over AMP6 through the provision of more efficient blowers at some of our larger wastewater treatment works where cost benefit could be demonstrated. Over AMP7 we propose rolling this out to some of our smaller works as well as revisiting the business cases for the larger works which are not already updated with new technology. Initial desktop assessments have been undertaken at 15 sites, with several of these also being supported by more detailed feasibility work.

It is proposed to spend £3.95m with an expected saving of £0.36m/year;

- **Lights** have now been converted to LED on many sites but some still remain to be fitted.

It is proposed to spend £1.3m with an expected saving of £0.23m/year.

## Demand Management and storage

Energy storage is an area of large potential but also uncertainty. Energy costs, whilst rising in general, are becoming increasingly variable, dependent upon the time of day at which the energy is bought (or sold). This does not just apply to the wholesale market for energy but also for the use of distribution and transmission system charges.

There are now a variety of schemes for demand side response, where we could turn our power usage up or down in response to price signals. The faster the response the greater the opportunities for income. The development of battery storage provides the fastest way of responding. We have therefore included limited provision (£2m) for these types of schemes. If the technology and approach proves economically viable such as if battery storage costs were to reduce, then further opportunities could be developed if funding was to be available.

## Maintenance

We have invested in renewable energy for many years; particularly since late in AMP4. As we go through to 2025 several of our renewable energy assets will require planned capital maintenance to enable them to continue to operate at full efficiency and maximise their asset life. Based on experience to date and reviewing our generation asset portfolio, an annual maintenance expenditure of £1m will be required over AMP7. The full split of costs by technology is included in Table 5.

Technology	Capital maintenance (£m)
Hydro	0.9
CHP	2.5
Bio-methane	0.2
Solar	0.2
Wind	0.1
RCM	1.1
<b>Total</b>	<b>5.0</b>

Table 5: Planned Maintenance Programme

## 5 Cost efficiency and Innovation

Our intention over AMP7 is to build on initiatives developed in AMP6 and to reduce scheme costs through the development of further efficiencies through our Alliance Partners in the planning and delivery of our AMP7 interventions.

The efficiency savings associated with this Investment Case are identified in Table 6.

Programme of work	AMP7 Capital Investment pre efficiency	AMP7 Capital Investment post efficiency	AMP 7 savings by end of AMP7
Schemes / Projects	£22.75m	£22.46m	£2.63m/yr
Maintenance	£5.0m	£5.0m	0
<b>Total (pre-efficiency)</b>	<b>£27.75m</b>	-	<b>£2.63m/yr</b>
<b>Total (post-efficiency)</b>	-	<b>£27.46m</b>	<b>£2.63m/yr</b>

Table 6 Investment Case Savings

### Opportunities for innovation

We generally aim to be a fast follower, employing technology as soon as it is proven to be both effective and economically viable. Good examples of this approach include the blade compressors (blowers) we installed at four sites including Parc y Splott, Gresford, Aberystwyth and Pembroke Dock WWTWs and the move to LED lighting.

The following bullet points identify four themes which will form the basis of the projects and initiatives we will develop to help us meet future challenges of a low cost, low carbon and secure energy future:

- Improved Energy Efficiency
- Increased Energy Storage
- Demand Management
- Renewable Energy

The themes are very much linked to and support each other. Energy efficiency reduces energy use, making it easier to meet our energy demand using renewable energy. Demand management allows us to manage renewable energy use more effectively, in particular during high demand and cost electricity periods, thus providing cost savings. Storage increases our ability to manage demand and gives us a more reliable supply in the event of short-term interruptions.

We will develop opportunities to:

- Provide more dynamic grid balancing services by responding within seconds to imbalances in national grid supply and demand, in particular through the increased automation, telemetry and control of our processes. This will reduce our costs and, by managing our energy use and will help electricity companies manage the changing balance of supply and demand, resulting in a more stable electricity network.
- Develop initiatives that enable us to maximise the storage of energy at our sites at reduced costs, in particular battery storage. This would allow us to continue to run our assets seamlessly, increase our security of supply in the event of a power failure and protect our services to customers.
- Act as a supplier of renewable heat from our sewer network, utilising heat pumps installed in sewers to provide heat to nearby buildings. We are currently exploring this with a view to possible rollout in AMP7;
- Optimise our existing generation assets to increase their efficiency / energy generation;
  - Some of our hydro-turbines will have reached the point where they would benefit from replanting to increase their efficiency;
  - There is also potential to pilot increasing the gas from our anaerobic digestion sites by co-digesting the sludge with other feedstocks where this is permitted by bio-solids regulations.

## Partnering and co-creation

Working closely with our partners is essential to the way we plan to work in the future. Our 2050 strategy highlights this through identifying partners for each of our programmes of future work.

We aim to progress innovation in partnership with stakeholders, customers and communities and our Customer Challenge Group. We will also continue to share best practice across the industry from conference attendance and the Innovation Forum.



## 6 Value for money and affordability

### Impact on customer bills

We understand the importance of balancing the need for investment with the affordability of our bills. We believe the investment will help to deliver the level of service our customers and regulators expect, and represents an optimal approach for sustained long term improvement.

### Value for money

We recognise the need to demonstrate value for money in everything that we do. In arriving at the proposed investment, we have closely considered the costs and benefits of different approaches to make sure that the investment represents long term value to our customers.

As outlined in the section 5 of this document, we will also seek to ensure value for money by promoting innovation throughout delivery, by learning lessons from the work we have delivered to date, and by working closely with our partners to encourage best practice and incentivise efficiency.

### Assumptions and risks

#### Assumptions

The following assumptions have been made:

- We will further develop behavioural efficiency of our workforce to support proposed capital investment to achieve our end of AMP7 Measure of Service target of 35% of energy used being generated by us.
- Our proposals have been based on known technology and an assumption, in the most part, that costs of technology remain static in real terms. However, for wind and solar we have assumed a continued decrease in costs of about 10% from 2017 levels, which is supported by market engagement undertaken on the later parts of our AMP6 solar programme.

- No subsidy (feed-in–tariff) is assumed for generation schemes other than for the hydro element, which is still expected to qualify if the schemes can be preliminary accredited by 31 March 2019 and delivered by 31 Mar 2021.
- Innovations will inevitably arise during the period and we will adopt the flexible approach we have undertaken in AMP6 to adjust our plans when new proven technologies arise for example in AMP6 the improvement and reduction in cost of LED lighting.
- Future external economic conditions maintain a favourable environment for energy generation/saving schemes to maintain a benefit for our customers from the investment in those particular technologies. For example over AMP6 solar PV has become cheaper to install (though offset by subsidy decline) but wind investment did not change as quickly.
- There will be no significant increase in our overall energy requirements.
- The volume of water we remove from our sewerage systems through RainScope schemes (funded through other Investment Cases) will determine savings associated with costs for wastewater pumping.

#### Risks

The following risks have been identified:

- Future energy costs will have impact on the economic case for investment on energy schemes and efficiency initiatives. Energy costs are likely to keep rising; the only uncertainty being at what rate.
- The wholesale energy cost, which we would obtain if we have to export energy rather than using it on our site, is not certain with many forecasts predicting a decline in real terms through AMP7. This reduces the potential for saving on some schemes.
- The level and availability of support for renewables may also have an impact on hydro projects but wind and solar are largely subsidy free so are not exposed to this risk;

# Energy

- Battery storage is currently not a financially viable technology for grid balancing and hence if to be developed over AMP7 we have assumed that that costs will come down significantly to provide cost benefits and enable at least a pilot roll out.

## 7 Delivery

### Procurement

The various projects will be managed by our Energy team throughout AMP7 with specialist procurement support from our Procurement team. Scope and programme adjustments being made as necessary to address operational and other issues.

### Programme

Our Energy Team will work with our Water and Wastewater Asset (WWA) Teams to develop a prioritised programme of capital expenditure schemes and projects as well as the proposed maintenance programme.

Our plan will be to continue with the investment programmes beyond March 2025 having regard to new technology and costs, to identify and optimise investment needs for PR24 and beyond.

### Risk mitigation and customer protection

We will deliver our programme in a phased approach so that we can learn from and build upon our experiences of delivering interventions.

## 8 Assurance

### Governance

Our performance is regularly reviewed and shared internally, to ensure that emerging trends and problem areas are targeted quickly. Our annual performance is reported externally.

All capital projects must pass through a gateway approval process to ensure there is sufficient scrutiny and challenge from senior management. Our Capital Programme Board (CPB) has the delegated authority to approve projects through the gateways. The approach provides strong governance for approving investment decisions and is transparent and fully auditable.

We will continue to apply these effective governance systems for our proposed AMP7 investment programme.

The investment and supporting programmes of work proposed in the Investment Case have been developed by our Energy Team approved by the Wastewater and Water Totex Steering Groups. These groups are chaired by the Director of Wastewater Services and Director of Water Services respectively.

Our Board will carry out a final review of this investment in detail prior to the submission of the PR19 Business Plan in September.

### Cost assurance

We have undertaken a high-level feasibility studies to enable the high-level scope of work and cost of proposed programmes of work to be assessed.

### Customer consultation assurance

Proposed investment will support customer priorities to:

- Develop efficiency measures such as generating our own energy
- Reduce our CO<sub>2</sub> emissions and reduce pumping costs as an area of improvement.

We will continue to act on feedback throughout AMP6 and AMP7 by working with the Customer Challenge Group and listening to focus groups.