Sustainable Energy Strategy

Irish Water

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EED Irish Study Visit

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Part of ervia group

National Utility - Embedding Sustainability

- Sustainability and Sustainable Development;
  - *Key considerations of water resources and wastewater planning*
  - *Policies aligned with UN SDG's*

- Irish Water - Dedicated sustainability team
  - *Developing and integrating sustainability as BAU*
  - *Aligned with Project Ireland 2040, Climate Action Plan , UN SDG's*
- UN SDG's have set an ambitious framework
  - *Water services has an individual goal within the SDG's*

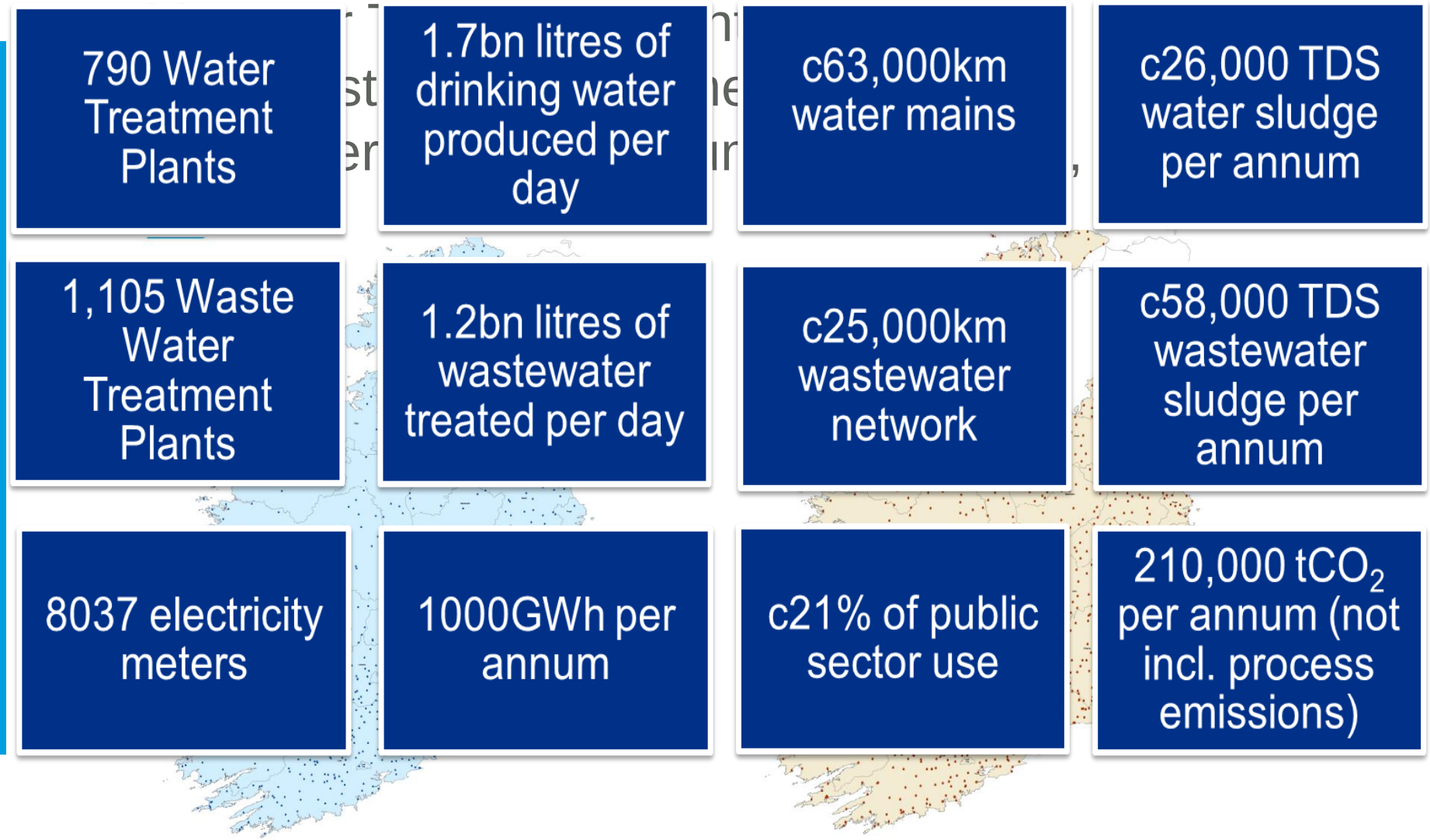
SDG 6 clean water and sanitation

SDG6 – Clean Water and Sanitation

- Thematically, all SDG's are interconnected
- Irish Water's performance under SDG6
  - *Influences national progress and development*
  - *Ultimately affecting individual wellbeing*

- SDG 6 is pivotal to achieving other goals

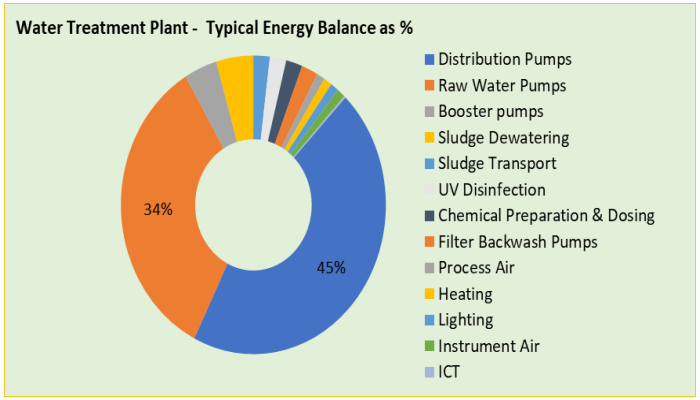
Irish Water Assets

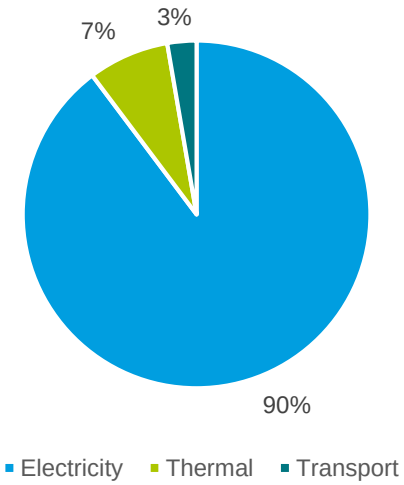


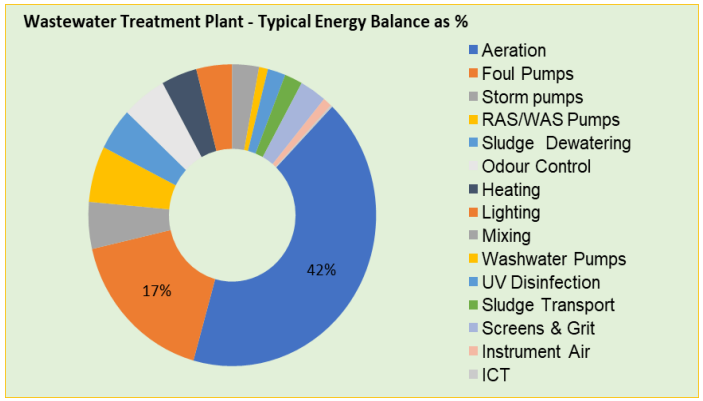
Overview – Energy Consumption

- Largest consumer of electricity in public sector - c21%
- Electrical energy ~ 90% energy consumption
- Power over 200,000 homes for a year
- Annual spend ~€85m per year

- Majority of electricity used in:
  - Pumping Water
  - Aeration
  - Pumping waste water







Overview - Sustainable Energy Strategy

- **Goal** : Become an energy efficient, low carbon, sustainable water utility

- 36 business wide energy action plans to improve energy efficiency
- 255 energy projects - 2020

  - Energy Efficient Design (EED) for all new and upgraded assets
  - Energy retrofit upgrades – diffused aeration, pump replacement
  - Water conservation
  - Renewable energy – PV, Anaerobic Digestion, wind
  - Lighting and Heating
  - Transport and Process Optimisation

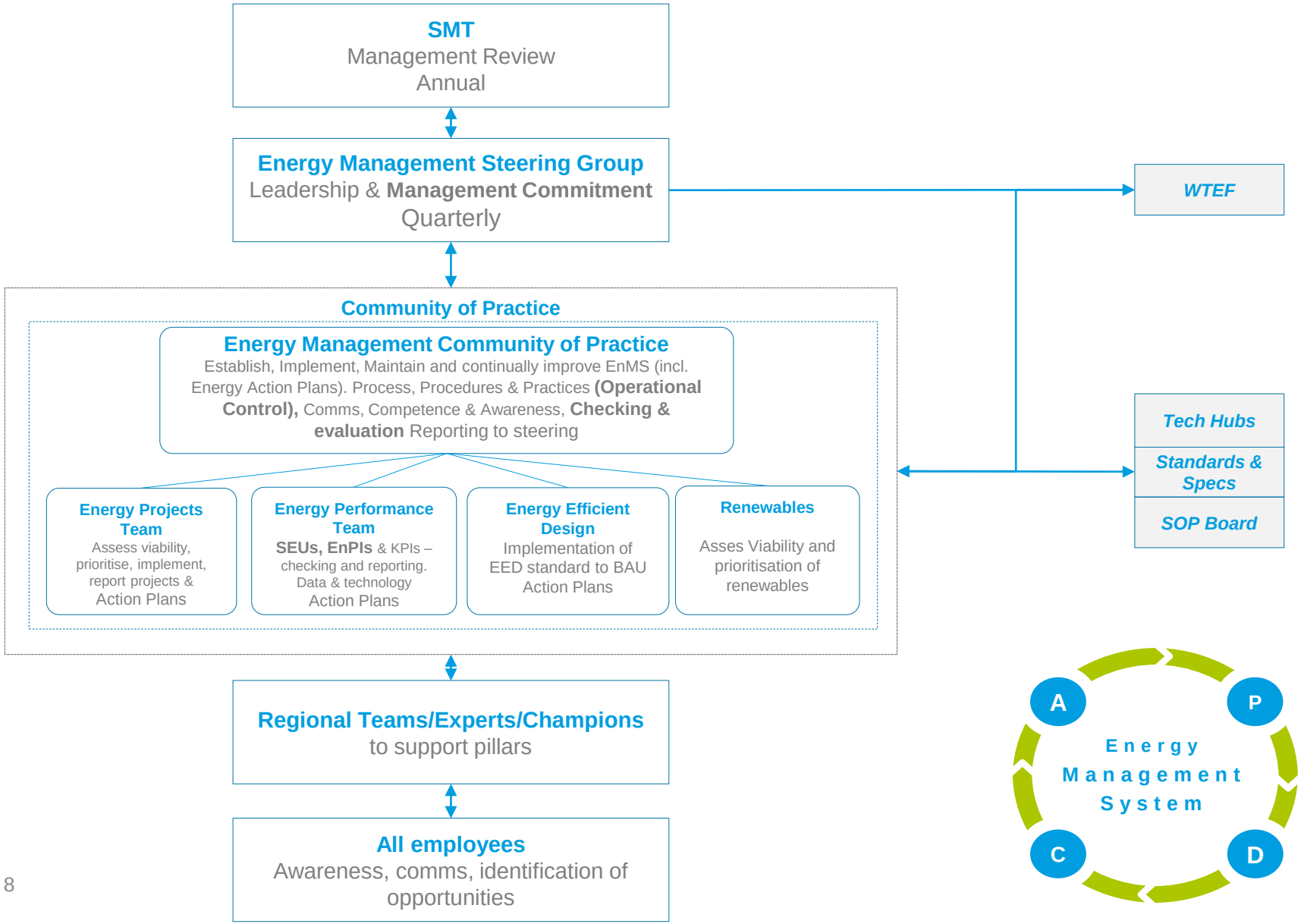
- SEAI Strategic Agreement – Embedding EED as BAU
- ELENA – European Funding -–support project pipeline

- On track to meet 33% target - 50% energy efficiency by 2030
- 75,000 tonnes carbon avoided

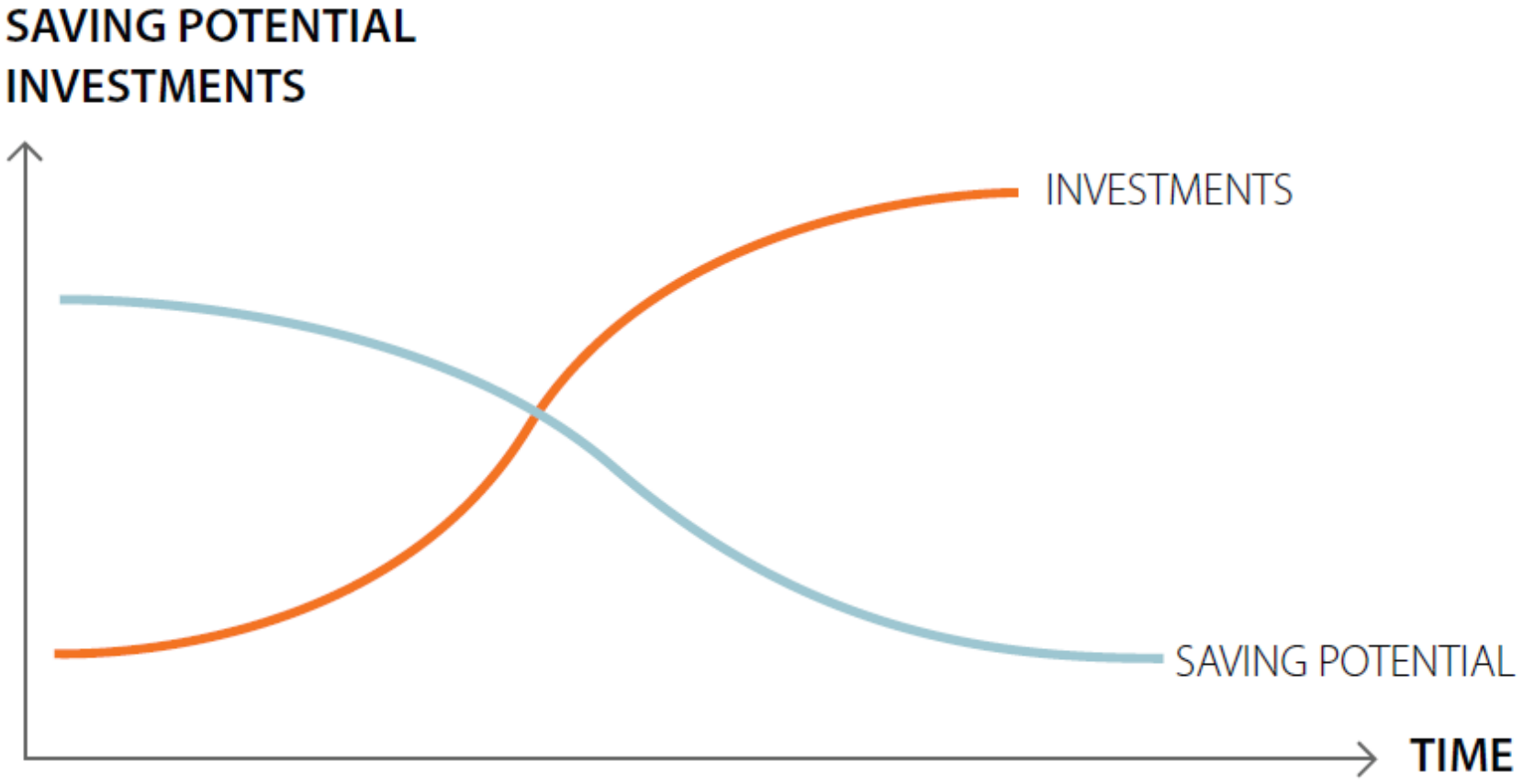
Strategy Structure

Target	Strategic Objectives	Strands	
Improve energy efficiency by 33% **(New Target 50%)**	Improve energy efficiency via the upgrading, replacement and optimisation of inefficient plant and processes	Energy Projects	**36 Energy Action Plans**
	Procuring energy efficient products and services and including energy performance evaluation criteria in relevant procurement tenders and contracts	New Projects	
	Design, build and operate assets to ensure energy efficiency and embedding the principles and practice of Energy Efficient Design		
	Encourage the utilisation of innovative techniques and technologies	Energy Innovation	
	Increasing our portfolio of renewables and integrating renewable energy opportunities where feasible	Renewable Energy	
	Reduce our demand for energy by reducing leaks	Water Conservation	
	Reduce our demand for energy by regulating discharges to our sewers	Source Control	
	Continually improving energy performance and energy management system	Communication Reporting and Performance	
	Communicate our energy performance to our staff and partners; Reporting on our energy performance, energy initiatives and savings made on an annual basis;		
	Developing and delivering appropriate training, communications and awareness in relation to energy management and developing a culture of energy efficient behaviour		

Energy Management Governance



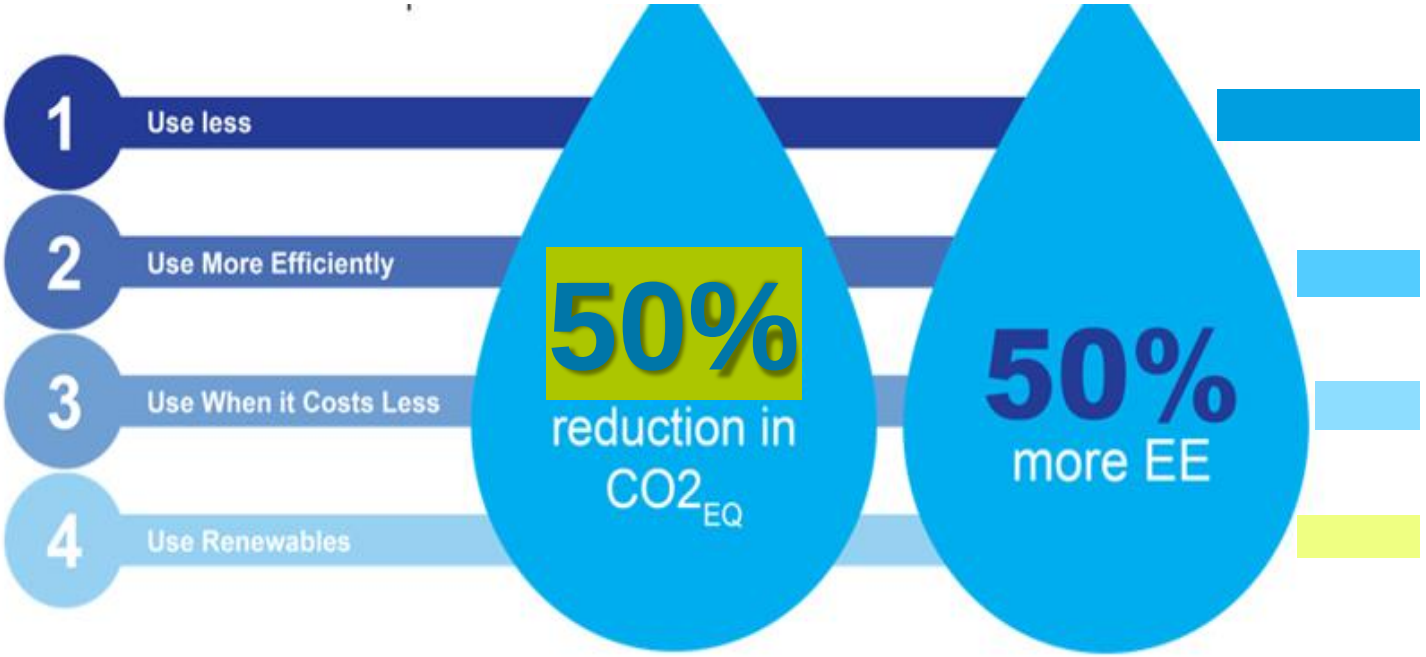
Why Energy Efficient Design



Concept Design **Build Phase**

Scope

- A design process for all Irish Water projects



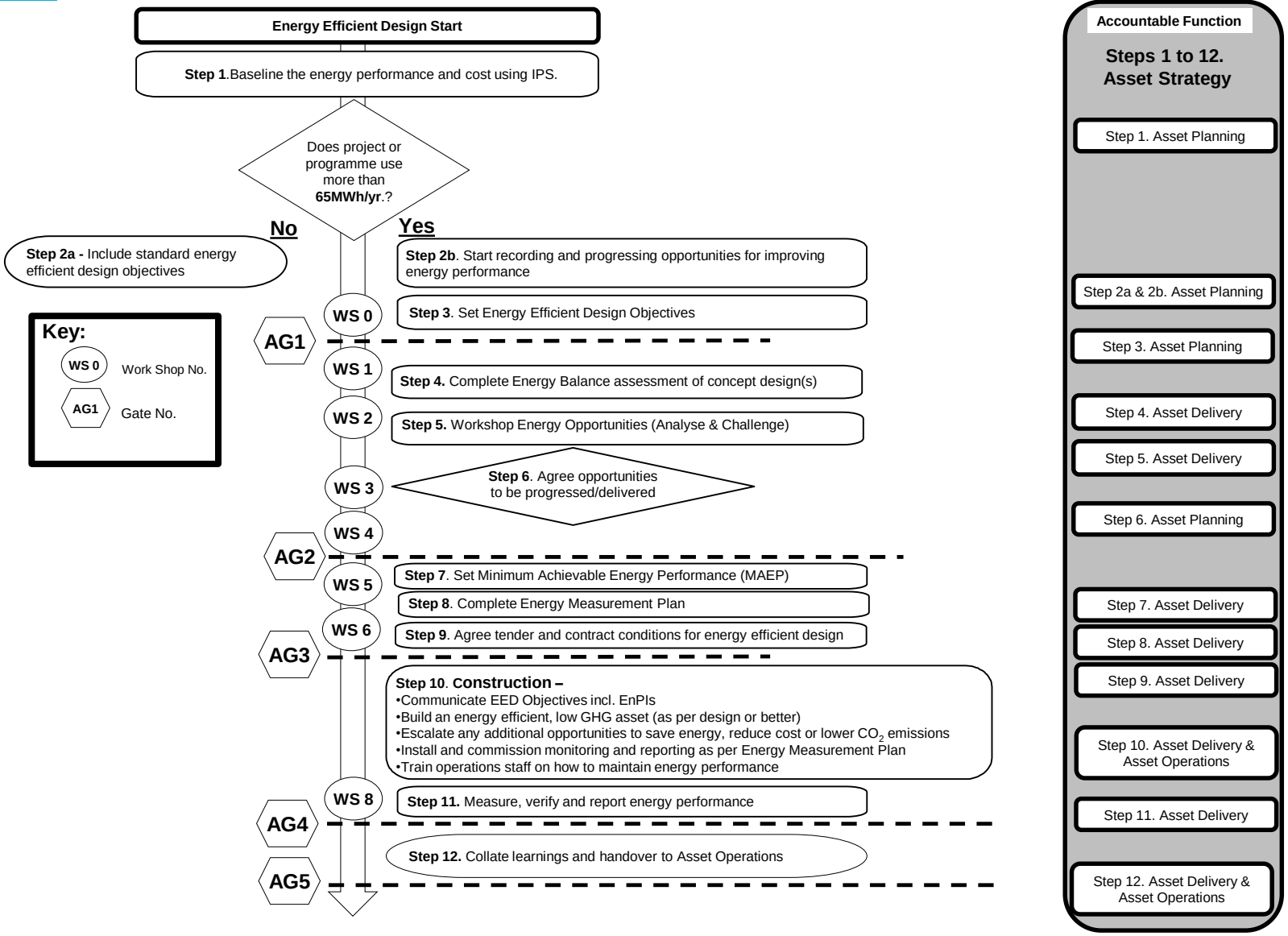
Carbon Neutral by 2050

CLIMATE ACTION PLAN 2019
To Tackle Climate Breakdown

Programme for Government
Our Shared Future

The European Green Deal

12 Step Energy Efficient Design Process



Sludge is not a Waste

Valuable resource/product

Sustainable/Circular Economy model

Recovery/reuse – preferred long term sustainable option for Irish Water

Value of WwTP Sludge

Energy recovery

Biogas from anaerobic digestion used to generate heat and electricity

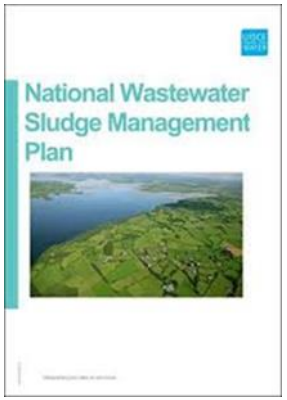
Electricity produced used as renewable electricity source for wastewater treatment

Fertiliser

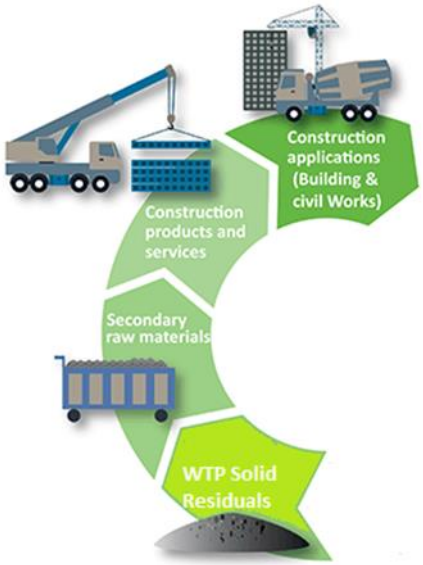
Phosphorus and nitrogen content replacing artificial fertiliser needs

Carbon footprint

Energy recovery from sludge reduces overall carbon footprint of wastewater treatment



Value of WTP Sludge



Cement Industry

Displace use of raw materials

Alternative/complement to current raw materials
High aluminium content - similar physical and chemical characteristics

Brick manufacturing

Alum residual in clay brick manufacturing

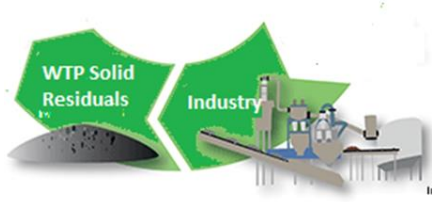
Value of WTP Sludge

Integrated Constructed Wetland – ICW

Alum residual as a substrate
Nutrient reduction
Soil amendment & enhancement

Discharge to IW sewerage system

P removal, chemical saving

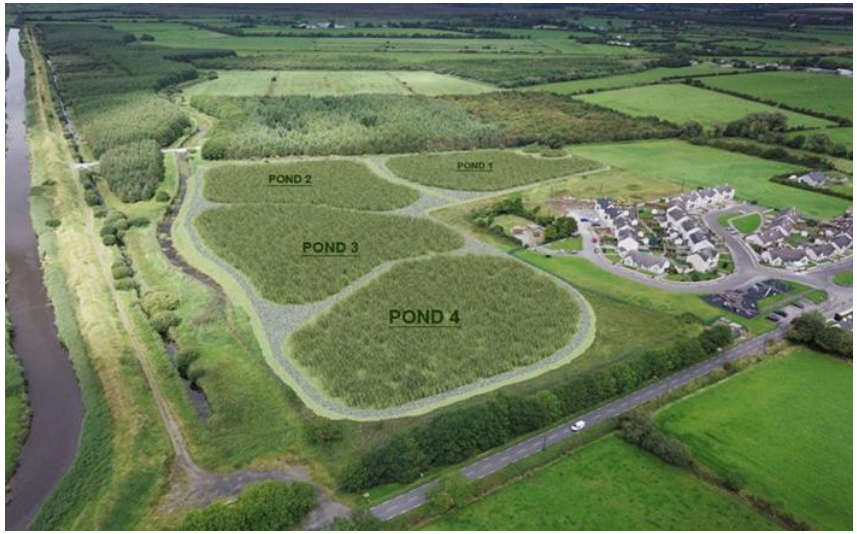


Development of long/short term storage

Provide ability to meet supply & demand

Low Carbon Nature Based Solutions

- We have developed a Biodiversity Action Plan (BAP) to help us to conserve, enhance and work with nature.
- This BAP identifies a range measures to be applied across our 7,000 sites to enhance native biodiversity, carbon sequestration and source protection.
- Sludge Drying Reed Beds (SDRB) at five pilot sites
- Integrated Constructed Wetlands



Energy Projects Pipeline

Sustainable FUTURE PROOFING

Solar Pilots - Informing larger programme pipeline

Nenagh WwTP

- 128 solar panels (220 square metres)
- 32,000 kWh (kilowatt hours) pa
- Saving 15 tonnes carbon

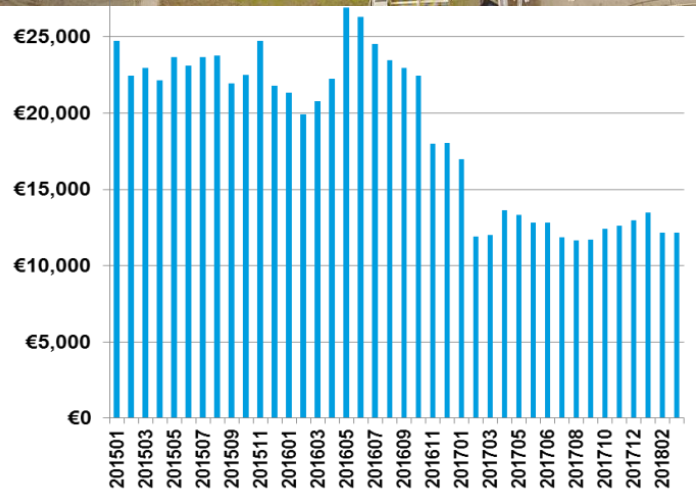
Newcastlewest WwTP

- 112 solar panels (180 square metres)
- 26,500 kWh (kilowatt hours) pa
- Saving 11.5 tonnes carbon

Purcellsinch WwTP

- **Purcellsinch WWTP, Kilkenny City**
- Replaced existing mechanical aeration system with **Fine Bubble Diffused Aeration** coupled to variable speed Air Blowers with accurate Oxygen Input Control
- Energy saving eq, - 193 homes powered/year

Before	After
EPA Licence – Non-Compliance Issues	Plant in Compliance
High Energy Usage	**48%** Energy reduction - **965,000 kWhr** per Annum (approx €144,750)
Maintenance Costs	Maintenance costs reduced >€50,000 per annum.
	Increased Plant headroom for future growth and major Investment deferred.



Killarney WwTP – Deep Tank Aeration

Original installation

- 62no Diffusers per Tank.
- High airflow per Diffuser.
- Poor oxygen transfer with the low density.
- High diffuser failure rate.
- High energy usage due to air flow requirements.

Aeration Upgrade

- 36no Fine Bubble Strip Diffusers per Tank.
- Low airflow (<30%) per Diffuser with high oxygen transfer.
- High Diffuser density with full distribution.
- Precise DO Control.
- Energy reduction of ~500kwh per day (€27,000 per annum)

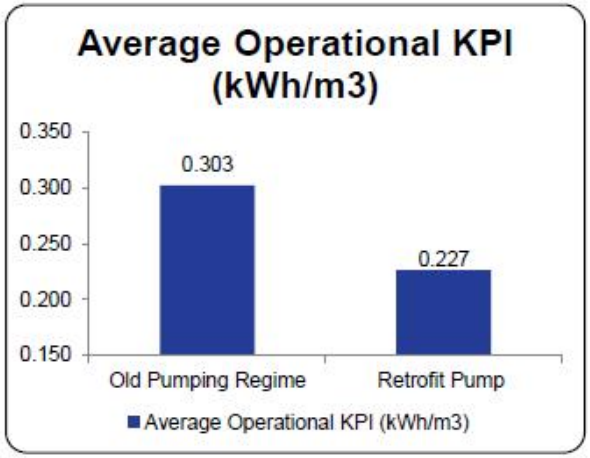
Danganbeg WTP – High Lift Pump upgrade

Scope of Works

- Retrofit 2xNo. 75 kW KSB Multitec (duty/standby)
- Control & Ancillary Works

Before	After
Average operational hydraulic efficiency as tested = 60%	Average operational hydraulic efficiency as tested = 74%
Annual kWh: 420,010 Annual Cost: €63,002	Annual kWh: 314,478 Annual Cost: € 47,172

Project Summary	
Annual Savings:	105,533 kWh & €15,830 (25 %)
Capital Cost (Inc. VAT):	€80,186
Simple Payback Period	5 Years
Other Benefits	Control philosophy upgraded – Headloss reduction / variable flow & improved process control



Pump Upgrade - West Pier PS

- **West Pier PS** - Pumping waste water - Dun Laoghaire to Ringsend WWTP
- Plant upgrade – 3 x 170 KW pumps capable of pumping 700l/sec

Before	After
Existing pumps had a low overall efficiency at **47%**	Retrofit pump hydraulic efficiency: **82%**
Annual electricity cost: **€177,091**	Annual Cost Savings: - **€60,173** Annual kWh Savings: **440,156**
Approx Maintenance Cost associated with blockages: €14,000 PA	Reduction in plant maintenance costs: **€14,000**
	Overall Plant Energy Reduction: **34%**
	Payback: **2.57 years**

Energy Project Snapshots

Atlantic Pond Pumping Station

Project Details:
Installation of 8 energy efficient controls for foul and storm pumps.

VERIFIED SAVINGS

- 347 tCO_2/yr.
- €158,750/yr.
- 0.72 GWh/yr.
- 144 homes powered for one year

Newcastle West WWTP

Project Details:
Accelerated replacement of inefficient mechanical wastewater surface aerator with more efficient fine bubble diffused aeration system.

VERIFIED SAVINGS

- 125 tCO_2/yr.
- €31,900/yr.
- 0.26 GWh/yr.
- 52 homes powered for one year

Castletroy WWTP Aeration Upgrade

Project Details:
Upgrade of inefficient mechanical wastewater aeration system with new fine bubble-diffused aeration system. Project increased plant capacity from 28,000 PE to 35,000 PE.

VERIFIED SAVINGS

- 120 tCO_2/yr.
- €44,303/yr.
- 0.25 GWh/yr.
- 50 homes powered for one year

Tuam Regional Water Scheme

Project Details:
Upgrade of high-lift pumps with two new pumps using existing 900 kW motors and variable speed drives.

VERIFIED SAVINGS

- 294 tCO_2/yr.
- €78,400/yr.
- 0.61 GWh/yr.
- 121 homes powered for one year

Summary – Sustainable Energy Strategy

- **Energy Management**

Success requires sustained effort throughout the organisation from senior management through to key decision makers and operations staff on the ground

- **Energy Efficient Design**

Key component of the strategy as the assets we put in the ground now will be still operational post 2050 when the continent will be carbon neutral

- **Decarbonisation**

Rethink of the way we do business as efficiency first through energy management, design of new assets with best in class technologies and a clear plan on decarbonising the energy sources through the use of renewables, low carbon solutions and energy procurement strategies.

Summary - Irish Water Sustainability

Water is one of the most essential substance on earth

Critical for human health, production of food, industrial activity

- Provision of clean drinking water and a reliable wastewater service, in a manner that protects the natural environment, is critical to a country's economic and social development

We have made significant progress on our sustainability journey

- Irish Water as guardians of Ireland's water and wastewater assets, integrating and embedding sustainability and sustainable development