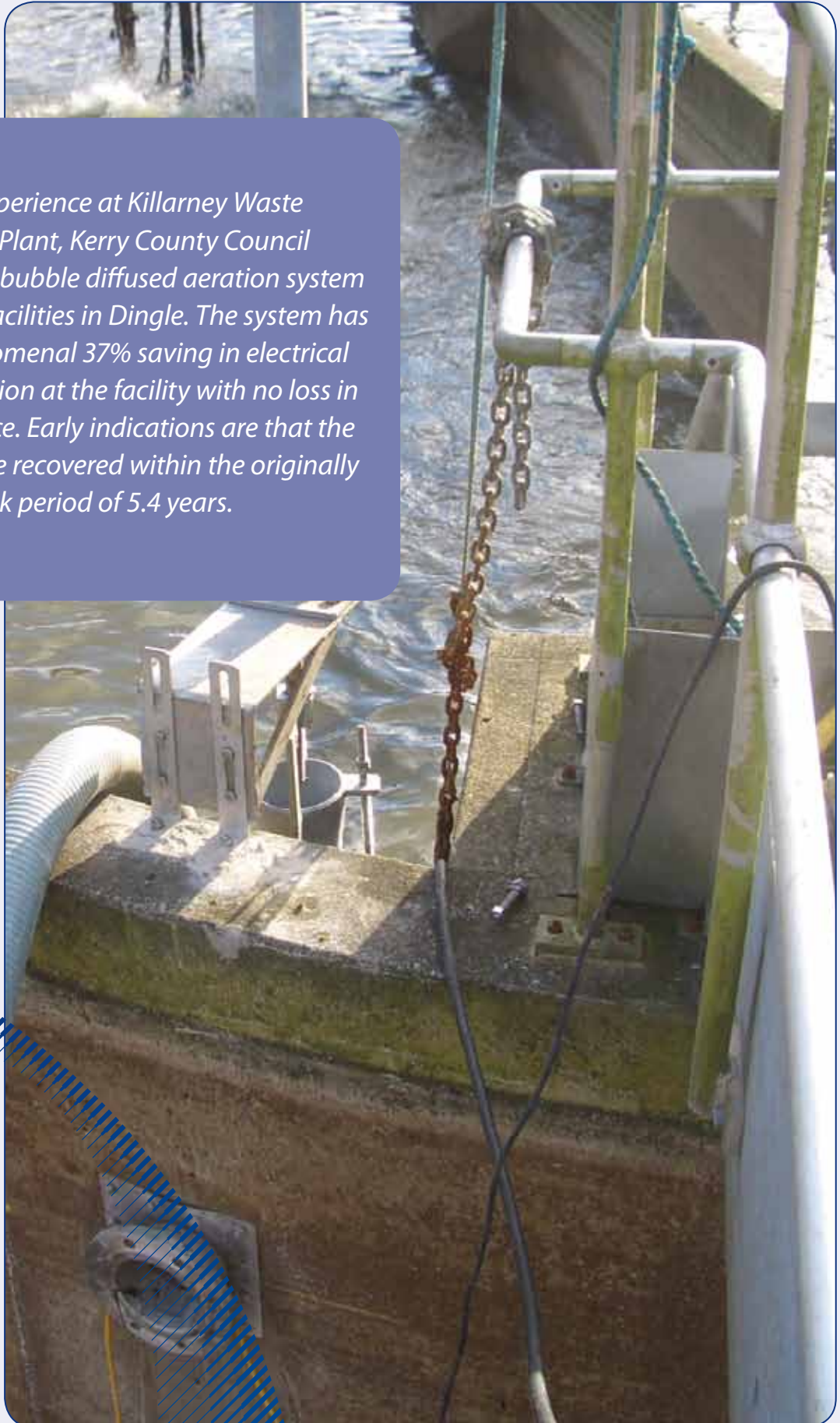


## Air power at Dingle Waste Water Treatment Plant



*Building on its experience at Killarney Waste Water Treatment Plant, Kerry County Council introduced a fine bubble diffused aeration system at its treatment facilities in Dingle. The system has achieved a phenomenal 37% saving in electrical energy consumption at the facility with no loss in plant performance. Early indications are that the investment will be recovered within the originally projected payback period of 5.4 years.*



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## Introduction

In waste water treatment processes, aeration introduces air (oxygen) into the liquid which encourages microbial breakdown of dissolved and suspended organic matter. Aeration systems can be mechanical, where the liquid surface is agitated by blades or propellers to introduce air, or alternatively air can be blown into the liquid below the surface.

Diffused aeration systems can be used to directly replace large rotor aeration systems, reducing energy consumption and maintenance costs. Fine bubble diffused aeration encourages high oxygen transfer efficiencies.

At Dingle, a fine bubble diffused aeration process is now in operation with support funding for the introduction of this technology coming from SEAI's Supports for Exemplar Energy Efficiency Projects (SEEEP) scheme.

## Project Overview

For Waste Water Treatment Plants (WWTPs) with high Biological Oxygen Demand (BOD) loadings, installation of fine bubble diffused aeration systems coupled to variable speed blowers enables plant handling capacity to be increased without a requirement for extension of the plant space.

Killarney Waste Water Treatment Plant (WWTP) already uses fine bubble aeration to increase treatment efficiency and oxygen transfer. This high efficiency oxygen transfer system has reduced the power demand in the aeration ditch from 45kW to less than 15kW.

The new system is capable of handling a greater BOD load. This has allowed the plant operator to transfer more effluent to this ditch and switch off one of the other less efficient aeration tanks. Flow boosters were also repositioned to achieve more efficient and effective flow.

The objective at Dingle WWTP was to replicate the savings achieved in Killarney by applying the technology to both existing oxidation ditches. A low speed variable output blower coupled to a high efficiency motor is controlled by an electronic variable speed controller which regulates the blower output to achieve the required oxygen levels.

Specifically the project aimed to:

- reduce the energy consumption and overall running cost of the plant to the extent possible
- reduce maintenance costs for the oxidation ditches
- expand ditch capacity to handle up to 25% higher BOD loadings.

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## Technology Specification

Two aeration ditches at Dingle WWTP were upgraded to include an array of fine bubble diffused aeration discs mounted on the ditch floor. Air is supplied from a low speed variable output blower coupled to a high efficiency motor.

The blower assembly is operated by an electronic variable speed controller to maintain the required oxygen level in the ditch.

The new system also allows the ditches to handle a greater BOD load. Breakdown of waste by bacteria is most efficient at a constant oxygen level. .



## Installation and operation

The project at Dingle WWTP involved the replacement of mechanical rotor aerators with fine bubble diffused aeration technology (as per Killarney facility) in both existing oxidation ditches. Dingle WWTP is fitted with one clarifier connected to each of the two existing aeration ditches. These pipes have been cross connected using a splitter box to allow both clarifiers to be used even if one ditch is shut down. This gives the plant operator the option of connecting either ditch to both clarifiers. In the off season / winter time, one aeration ditch with both clarifiers is adequate as the BOD loading is low but there is high hydraulic loading. This eliminates the energy costs for one ditch for up to 50% of the year.

The main operational objective is to achieve acceptable effluent quality while maximising the aeration efficiency.

The new installation has been operational since November 2009.

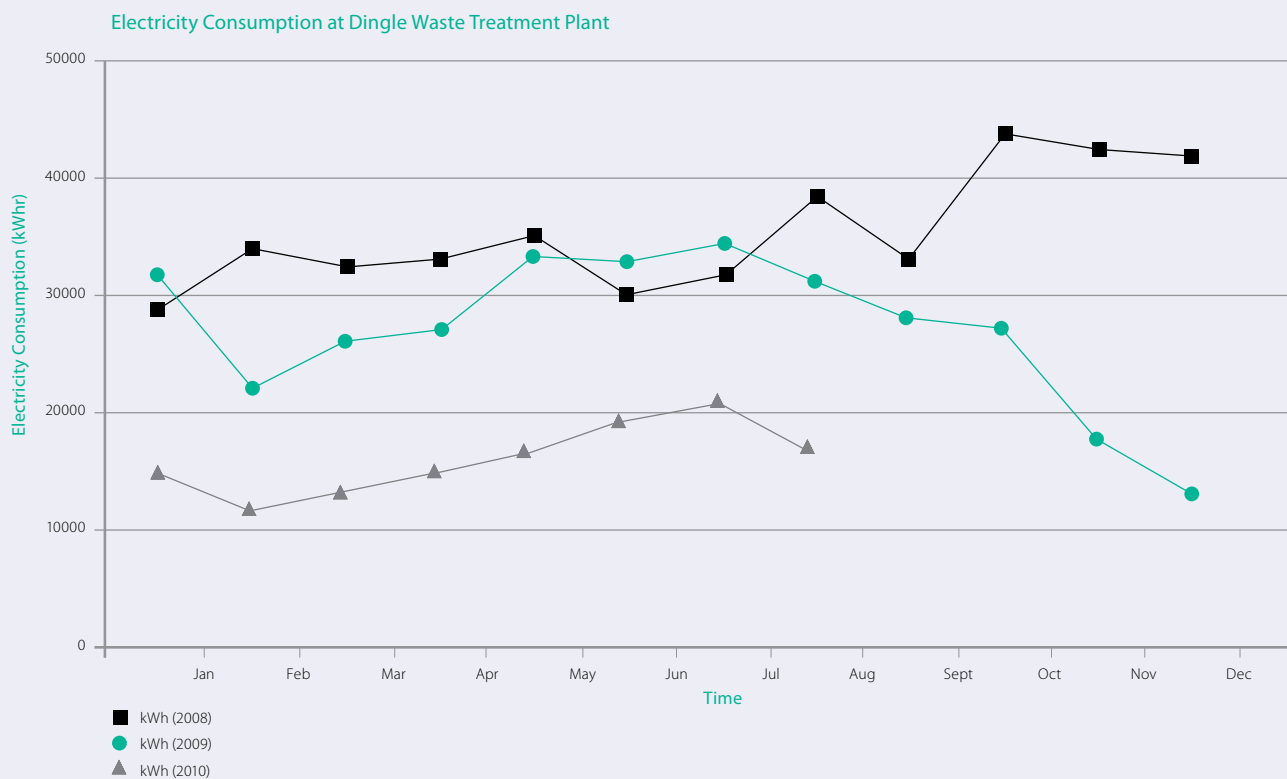
## Benefits

The graph below shows how a 52% reduction in plant energy consumption has been achieved during the period Dec 2009 – Feb 2010 when compared with the same period in previous years. Over the period concerned, electricity consumption has reduced from 996 kWhr/day to 427kWhr/day with no loss in plant performance. Energy consumption per unit BOD (kWh/ kg BOD) has reduced from 4.0 kWh/ kg BOD to 2.5 kWh/ kg BOD during the same period which represents a very substantial 37% reduction.

These results are preliminary, being based on a 3 month monitoring period. An extended monitoring period will allow efficiency improvements to be fully assessed and will reduce the impact of wet/dry weather periods on calculated results. However, it is clear that a significant improvement in energy efficiency has been achieved.

Based on the originally projected annual energy savings a payback period of 5.4 years (before grant support) was calculated for this investment. These early results indicate that full investment recovery will be achieved within or ahead of this timescale.

For WWTPs with high BOD loadings, installation of fine bubble diffused aeration systems coupled to variable speed blowers enables plant handling capacity to be increased without a requirement for increased plant space or an extension. This is an important feature particularly in tourist areas where additional capacity is normally required in the summer months.



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## Project team

The project to install the aeration system and make necessary pipework modifications was managed by Kerry County Council Water Services / Energy Office. The Contractor was EPS Pumping and Treatment Systems.

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