Northern Ireland

Sustainable
Water Management

Delivered by Invest Northern Ireland

Robin Andrews

Regional Senior Manager, SE Asia, Invest NI

Trevor Haslett

CASE

CASE
CENTRE FOR ADVANCED SUSTAINABLE ENERGY

CASE
Centre For Advanced Sustainable Energy

Department for the Economy
www.economy-ni.gov.uk

Morgan Freeman said…

“…everyone should have a dream…without a dream there is no life”

He could have said…

“…everyone should have access to water…without water there is no life”

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Sustainable water management..

What do nett zero strategies look like in UK Water Companies?

What strategy is in place for NI Water to meet nett zero targets?

CASE funded projects supporting the nett zero journey

Invest Northern Ireland

MATERIALS RESEARCH

LOW ENERGY WATER AND WASTEWATER TREATMENT RECOVERY OF AMMONIA AND METHANE

DIGITAL AND ANALYTICAL TOOLS

WATER FOR HYDROGEN PRODUCTION

Ed Archer

Purapipe

PURAPIPE

MOVING WATER AND ENERGY. SUSTAINABLY.

INNOVATIVE PURAPIPE PIPELINE TECHNOLOGY

Dr Edward Archer

Senior Business Consultant

Dr George McIlroy

Director and CEO Purapipe UK

MARCH 2024

www.purapipe.com

INTRODUCTION

Purapipe is a technology development and Engineering, Procurement and Construction (EPC) company delivering the expertise, systems and platforms to enable continuous seamless pipeline production for a wide range of customers and applications.

VISION

A world where water & energy moves freely to those in need at low cost without leakage and environmental impact is lessened through the use of sustainable composite technologies.

MISSION

By producing seamless, corrosion- and leakage free water & energy pipelines, on-site where they are needed, Purapipe enables lower construction & operating costs, faster deployment and lower environmental footprint than any other solution.

Purapipe Mobile Pipeline Production Unit (MPPU) - artist rendition

PROBLEMS – RETHINK & INNOVATE

Problems. Needs.

- ✓ Reduce carbon footprint
- ✓ Reduce 20-40+% leakage
- ✓ Increase pipeline life to 50 years
- ✓ Metallic v. Non-Metallic transition
- ✓ Pipes (materials) - new green energy
- ✓ Reduce time to build & de-risk
- ✓ Reduce costs – supply & install
- ✓ Reduce costs – operate & maintain
- ✓ Monitor critical infrastructure
- ✓ Scale quickly & globally

Innovate via New Approach.

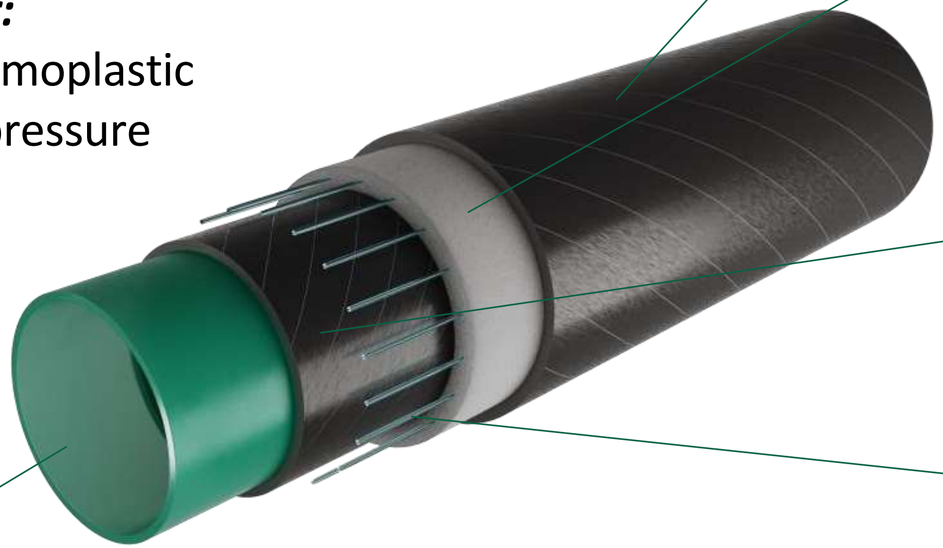
PIPELINE DETAILS

- Onsite Production of Internal diameters: 8-42 inch
- Seamless, joint-free and corrosion-resistant

External Load Carrier:
Fiber-reinforced thermoplastic

Thermal Insulation:
Extruded foamed thermoplastic

Internal Load Carrier:
Fiber-reinforced thermoplastic withstands internal pressure



Mechanical Protective Layer:
Extruded thermoplastic

Integrated Fiber Optic Surveillance
- Detection of Leak, Strain and Stress
- Detection of Damage, & Siphoning Attempts
- Temperature, Pressure, and Flow Rate Monitoring

Chemical Barrier:
Extruded thermoplastic liner withstands chemical corrosion and erosion

In addition to enabling less construction time, lowering cost and carbon emissions; Purapipe also de-risks projects' timeline and financial budgets

80%
Less time required for pipeline construction / execution[1]

15 - 50%
Lower cost per km of pipe construction[1]

80%
Lower carbon emissions[2]

60 - 75%
Lower transmission O&M[1]

30-35%
Reduction in non-revenue-water[1]

De-risk: time & financial budget overrun

1. Deep dive to follow; Assumptions: Pipeline length=180km, pipe diameter=32", Region=Middle East, # of teams for steel pipe=1, # of MPPUs constructing pipe=1
2. Purapipe calculations; Not verified by McKinsey

Note: Analysis uses inputs received from Purapipe, not verified by McKinsey given forward looking claims with no historical/actuals available

Source: McKinsey, *Purapipe Go-To-Market Strategy, May 2023*

CARBON FOOTPRINT REDUCTION 80%*

** Over a 50-year period compared to an equivalent steel pipeline*

PRODUCTION & CONSTRUCTION

- Reduced energy & emissions (coal) in manufacturing
- Reduced manpower, machinery and truck movement
- Reduced land use (Right-of-Way)

OPERATION

- Reduced energy consumption for compression/pumping
- Elimination of corrosion inhibitors
- Earlier detection of pipeline damage
- Elimination of leaks from joints
- Reduced maintenance
- Longer life span

DECOMISSIONING

- Simpler removal
- Reduced transport costs
- Recyclable Materials

THANK YOU

Purapipe are involved in a Pilot Pipeline Demonstration Project in the UK with the Water Research Centre, the Ulster University, and local Water Utility Companies. Purapipe will be delighted to provide additional information on our innovative technology, and assisting you in meeting your Net Zero targets, and Sustainable Water Resource Management objectives, into the future.

Dr George McIlroy

Director and CEO Purapipe UK

sgm@purapipe.com

www.purapipe.com

purapipe

MOVING WATER AND ENERGY. SUSTAINABLY.

Davy Simms

Photonic Measurements

Photonic Measurements

Photonic Measurements

Davy Simms
Sales Director

Davy.simms@photonicmeasurements.com

Water is Wealth

- Economic Growth
- Attracting Investment
- Environmental Sustainability

Ministry of Environment and Forestry
REPUBLIC OF INDONESIA

Indonesian Ministry of Environment River Monitoring Project

- Over 5000 rivers
- Ministry of Environment estimates 72% of rivers are polluted
- Harmful chemicals

Portable Laboratory Solution

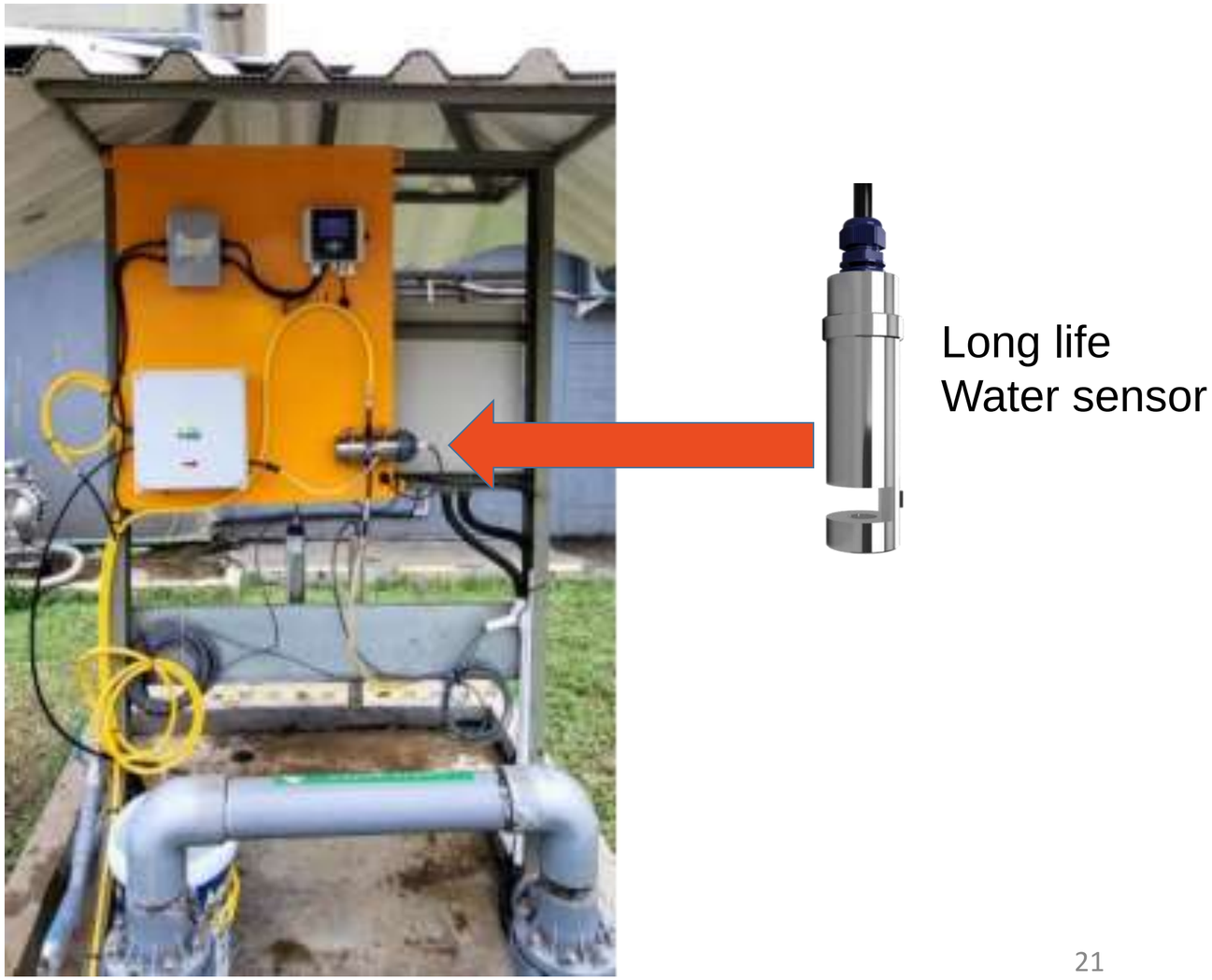
- Easy to use
- A small water sample and push a button
- No hazardous chemicals

River Monitoring Challenges – Phase 2

- Only get indication of water quality at that time
- Miss pollution events
- Logistical issue
- Costly

Continuous Monitoring Laboratory

- Ongoing water quality measurements
- Data sent to Ministry office every 60 secs
  - Don’t miss pollution events
- Visit once or twice a year
  - Solves logistical issue
  - Affordable
- Automated testing system



Partnership with PT Cakrawala

- Photonic provided
  - Water quality sensor
  - Water quality controller
- Cakrawala provided:
  - Data website
  - Electrical design
  - Installation
  - Service and Support
  - 5G Communications

River Monitoring Project Success

- 82 river monitors delivered November - 2023
- 200 river monitors planned - 2024
- 300 river monitors planned - 2025

Waste Water Project

Indonesia Ministry of Health

- 2024
  - 100 COD monitors
  - 100 nitrate monitors

Water is Wealth

Photonic Measurements

Neil McKenzie

Lagan MEICA

NI Net Zero Exchange

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Delivering Greener Solutions

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Delivery of innovative design and build MEICA solutions for the water and wastewater industry

Optimising existing wastewater processes

Deployment of Green Hydrogen and Oxygen technologies to benefit the wastewater industry

Worldwide wastewater problems

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- Increasing energy costs
- Ageing infrastructure
- Industrial loading
- Maintenance
- Reluctance to embrace new technology
- Missing out on new revenue streams

Kinnegar Wastewater Problems

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3rd largest wastewater treatment plant in N Ireland

- We pay for the power and the chemicals
- We use Kinnegar to trial new technologies at our risk

We have reduced power usage by 50% from 2016

We know what works !

How did we achieve this ?

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- Recommissioned existing works to establish a stable base position
- Added & tested robust instrumentation
- Added a dashboard to clearly measure improvements
- Reprogrammed the scada to make the plant perform in line with modern thinking (more efficient)

How did we achieve this ?

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Added real time control to react to incoming loads (more efficient)

Added ammonium monitors to cut out over aeration

Benefits : less power used

Less greenhouse gases produced

Process reports & dash boards on top 25 NI Water sites

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Invest wisely in new technology
Installed turbo blowers

Five normal blowers to two turbo blowers

Benefits :

power saving of 405 kw/hour

less maintenance

Two belt presses replaced by one centrifuge

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Higher power usage
Less maintenance
safer,
less odour and cost effective

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Smart use of technology

New revenue streams
installed DS3 and DSU services

Generation back to the grid

Belfast Demonstrator WwTW

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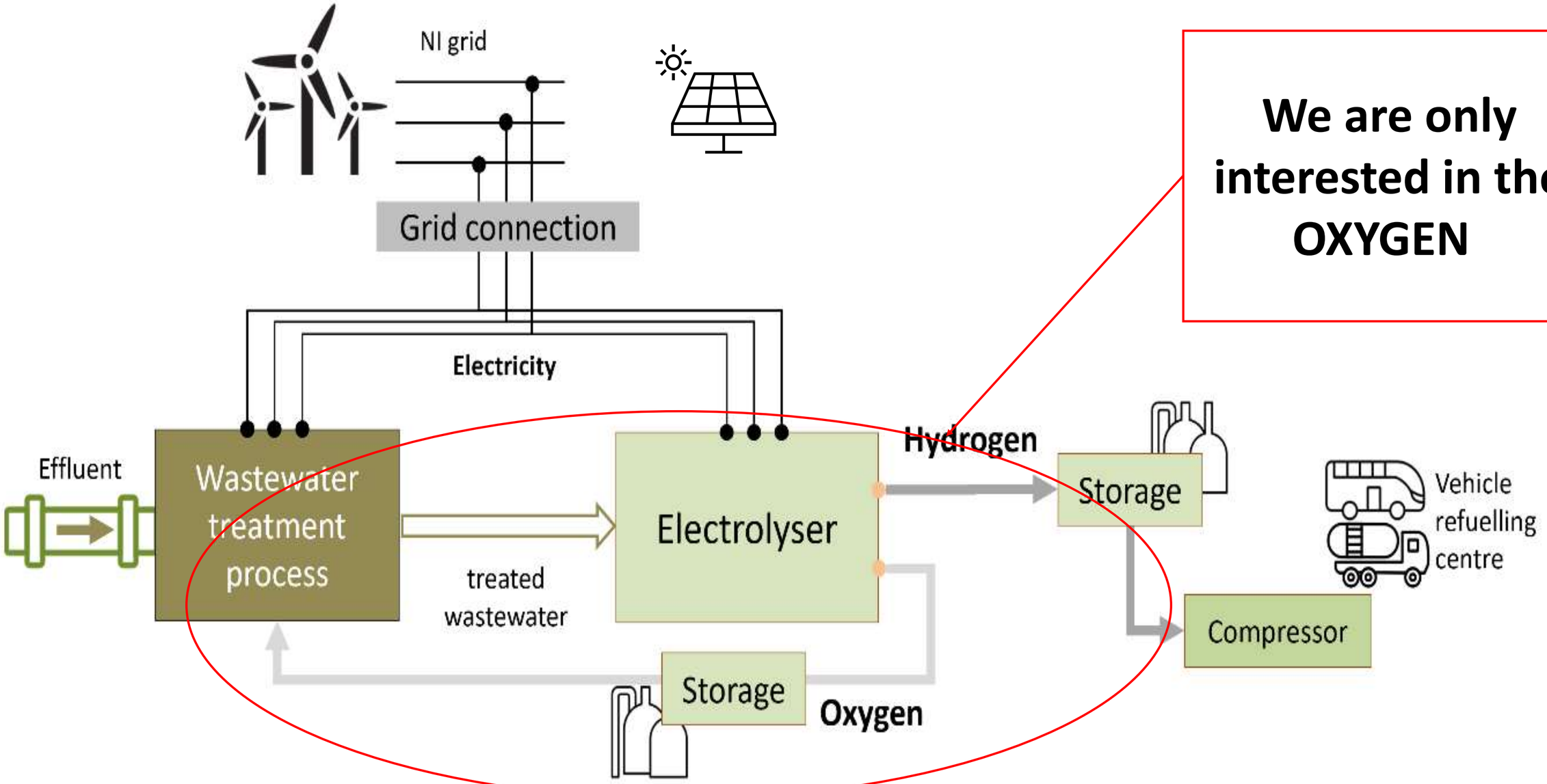

We are only interested in the OXYGEN

H2 O2 pilot plant

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Why Hydrogen?

1kg Hydrogen = 8 kg Oxygen

Project Aims

- Lower electricity
- Increase plant capacity
- Reduced sludge
- Compress hydrogen

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Belfast Demonstrator WwTW

New Electrolyser Trial for Belfast

CPH2 CLEAN POWER HYDROGEN

- Membrane-Free Electrolyser™ (MFE) with cryogenic separation of hydrogen and oxygen
- Does not require precious metals such as Palladium or Platinum for membranes.
- Alternative to Alkali or PEM electrolysers.

Site layout to accommodate the Oxygen trial

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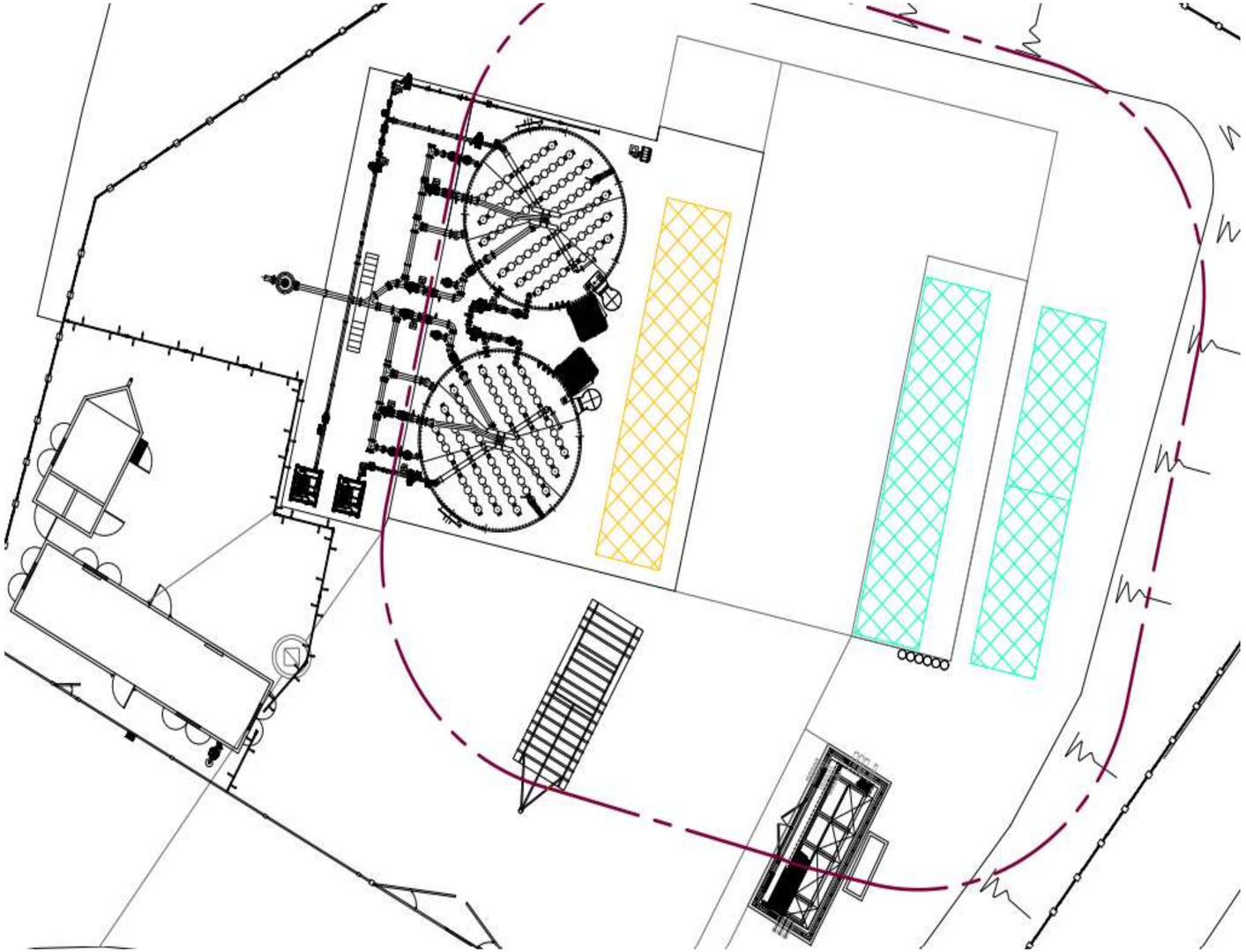

The liquid Oxygen delivery system

O2 trial interim results

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15% reduction in secondary treatment
31% faster reaction phase
13% saving in energy
15% reduction in sludge produced

Therefore:

- More energy efficient secondary process
- Reduced sludge treatment, transport and disposal costs

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“You can’t save if you don’t measure”

Recommission with an energy focus

New instrumentation and technology enhance operational efficiency and reduce emissions.

Better performance, makes a powerful argument for blended Oxygen.

Better efficiencies are the green way forward, saving power and reducing emissions

Questions

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