African Water Association

INTRODUCING AN INNOVATION PLATFORM FOR SSA

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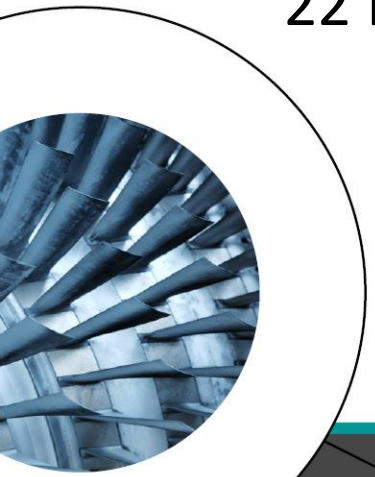
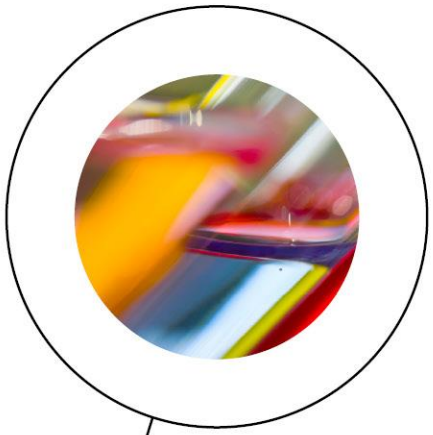
BEN TAM

22 NOVEMBER 2016






Agenda

Introduction to Isle	**Who we are and what we do**
Background to the project	**Objectives of the Innovation Platform / TAG for SSA**
	The opportunity for AfWA members
	The donor organisations
How the IP can introduce and facilitate the adoption of new technology	**The approach**
	The benefits
	The expected outcomes
An interactive session	**Understanding the technology needs & challenges of AfWA members**
	Prioritisation
	Mapping
Timelines and next steps	

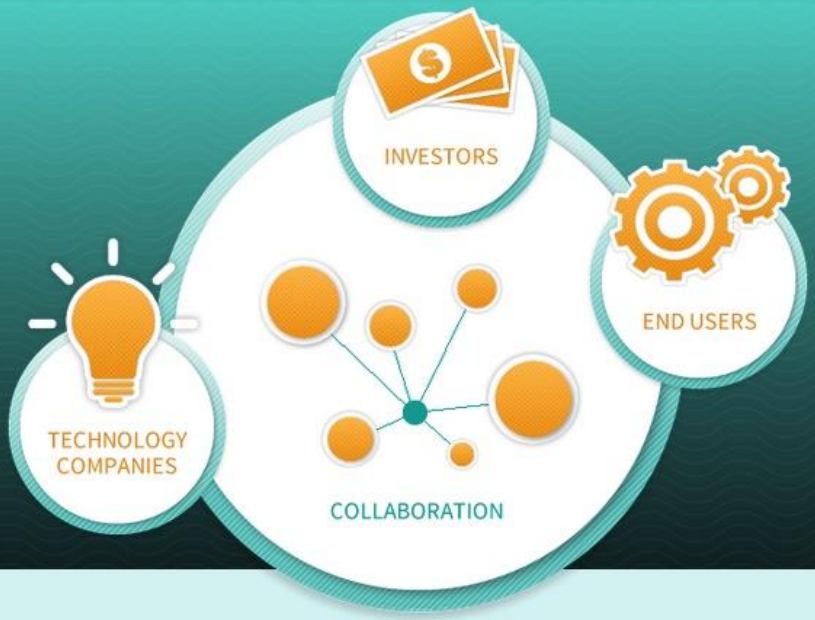
Aim of this session

- Introduce the Innovation Platform (IP) or TAG
- Outline the project objectives, approach and opportunities
- Understand key water sector needs across SSA
- Map how new technology can help address the challenges
- Timelines, milestones and next steps

Introducing Isle

Bringing new technologies to life

Connecting expertise, investment and inspired ideas across the globe



Technology Approval Group

TAG is a global innovation forum for the world's leading water utilities. The TAG model was first launched in the UK in 2005, we now run 12 TAG groups across 5 continents, with more groups on the horizon.

Global Locations

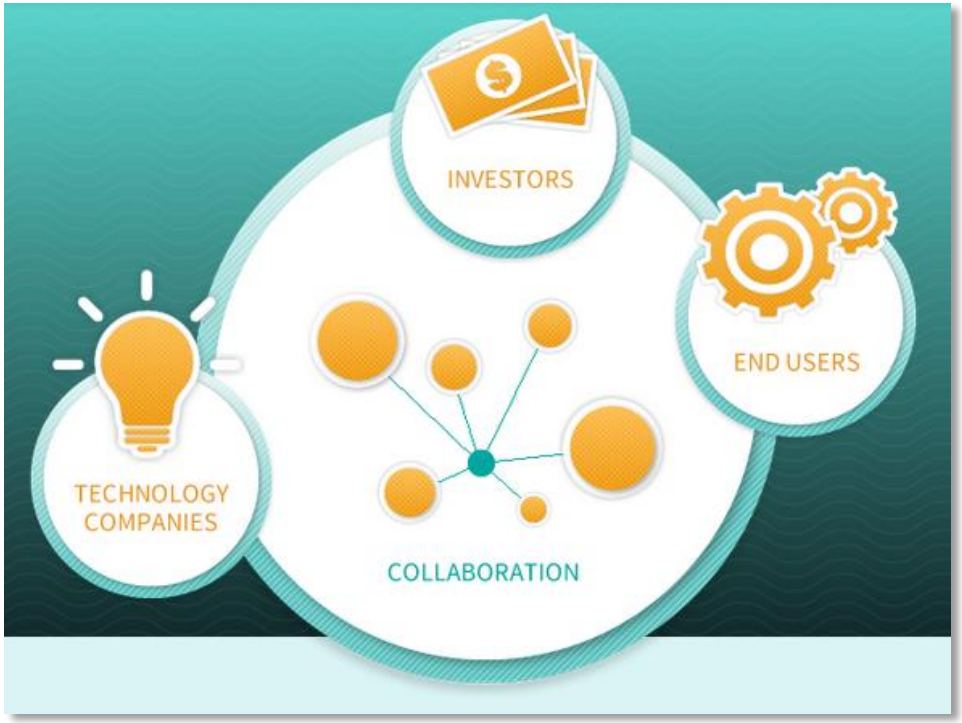
- UK
- The Netherlands
- Australia
- US
- Singapore
- UAE

Consulting

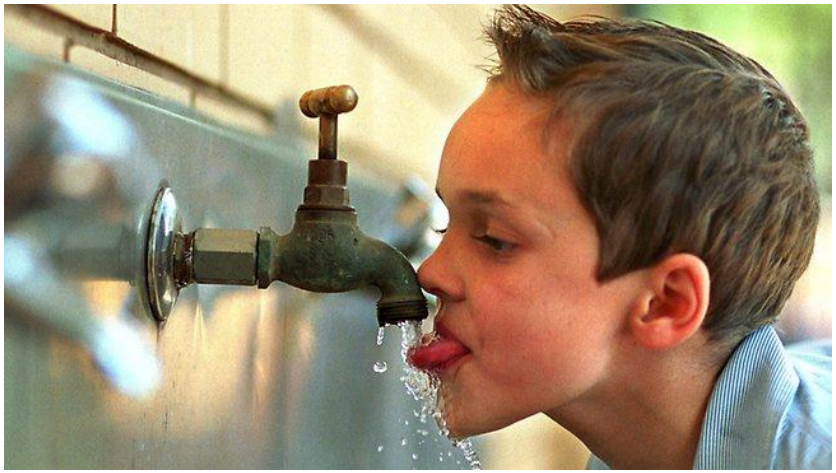
With its highly skilled team of engineers and scientists Isle can provide a wider range of consulting services, from research consultancy to due diligence (both technical and market) to feasibility and evaluation studies.

Overview

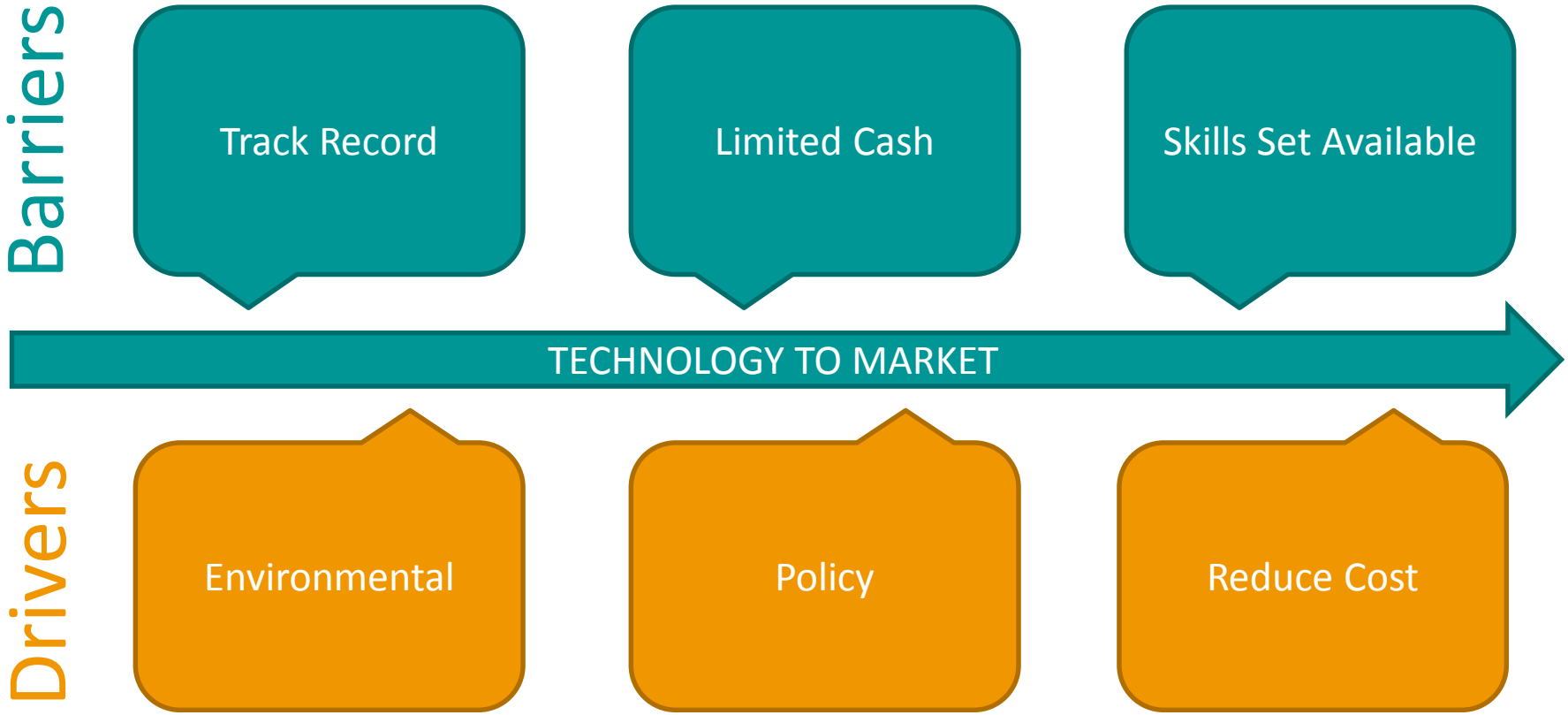
- Technology and innovation consultancy
- Water focus
- Global presence
- Novel Innovation Platform – TAG (Technology Approval Group)
- Facilitating international industry collaboration
- Unparalleled track record in bringing appropriate technologies to address market needs



Addressing the needs



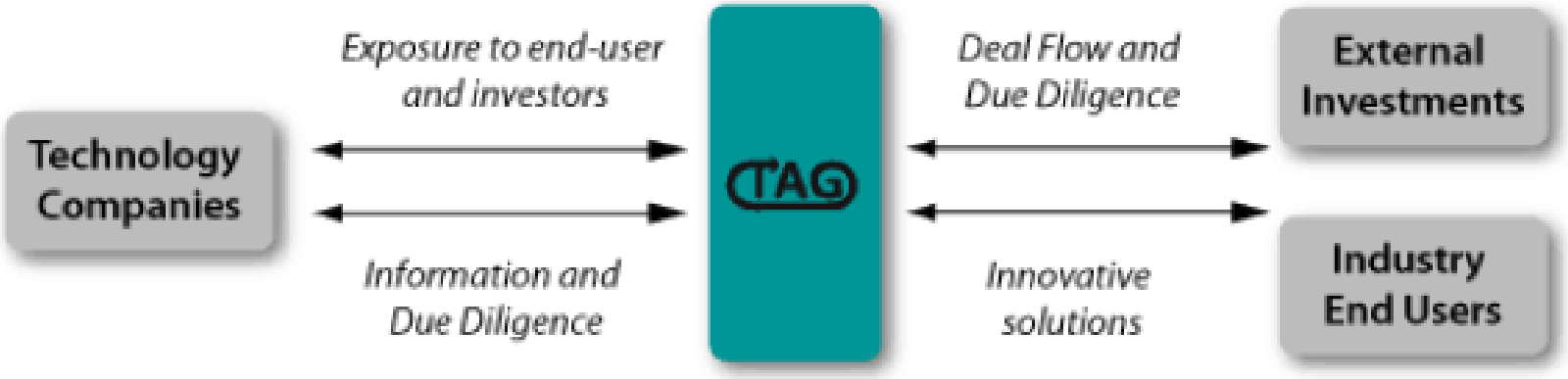
Turning challenges into opportunities



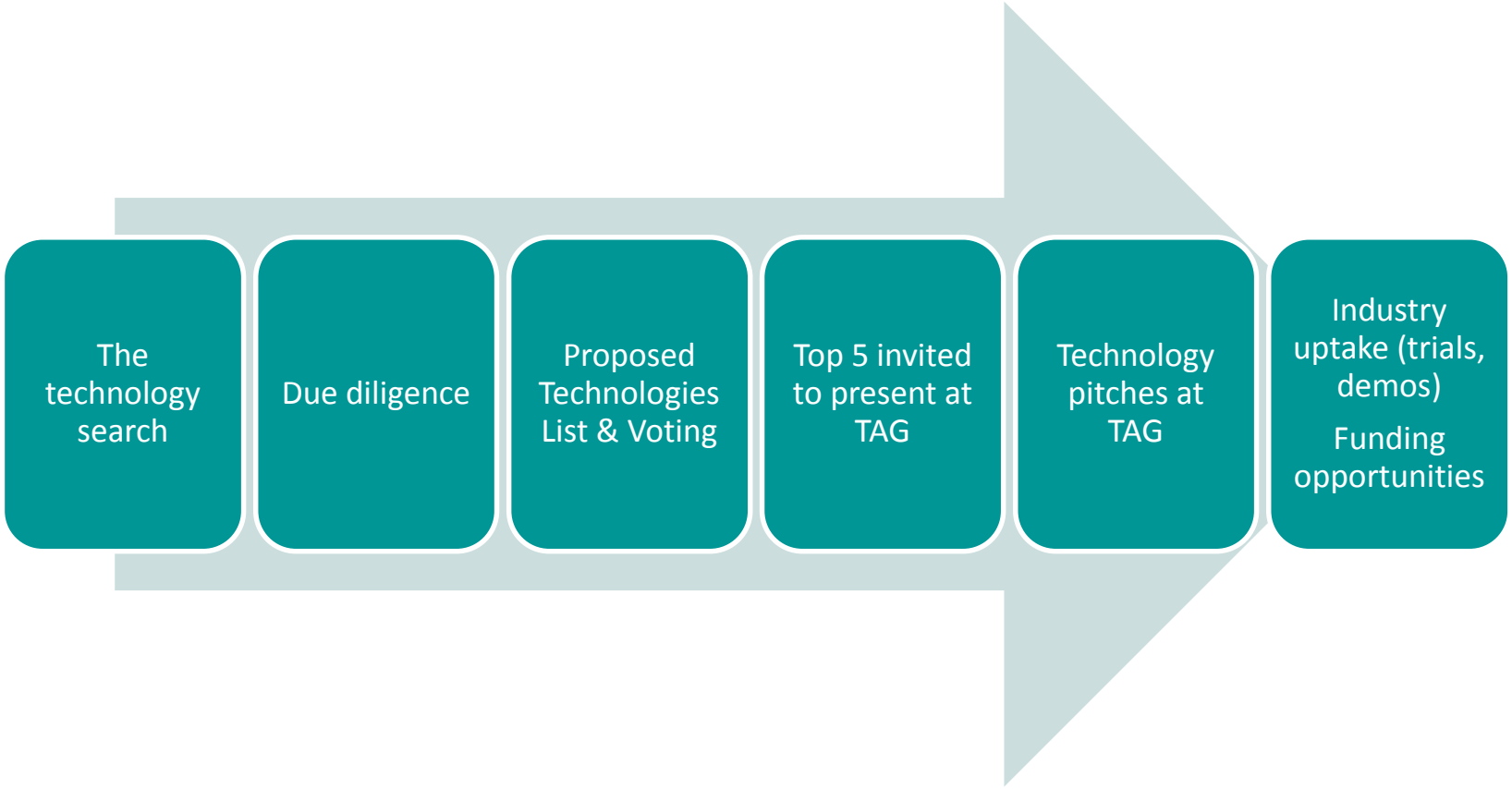
Technology Approval Group (TAG)

TAG brings a new energy & momentum to the water sector

- Understands sector needs
- Identifies appropriate technology solutions
- Accelerates technology uptake through end user engagement
- Facilitates international water sector collaboration / sharing of best practice
- Builds strong links to funding
  - Trials
  - Projects
  - Investment



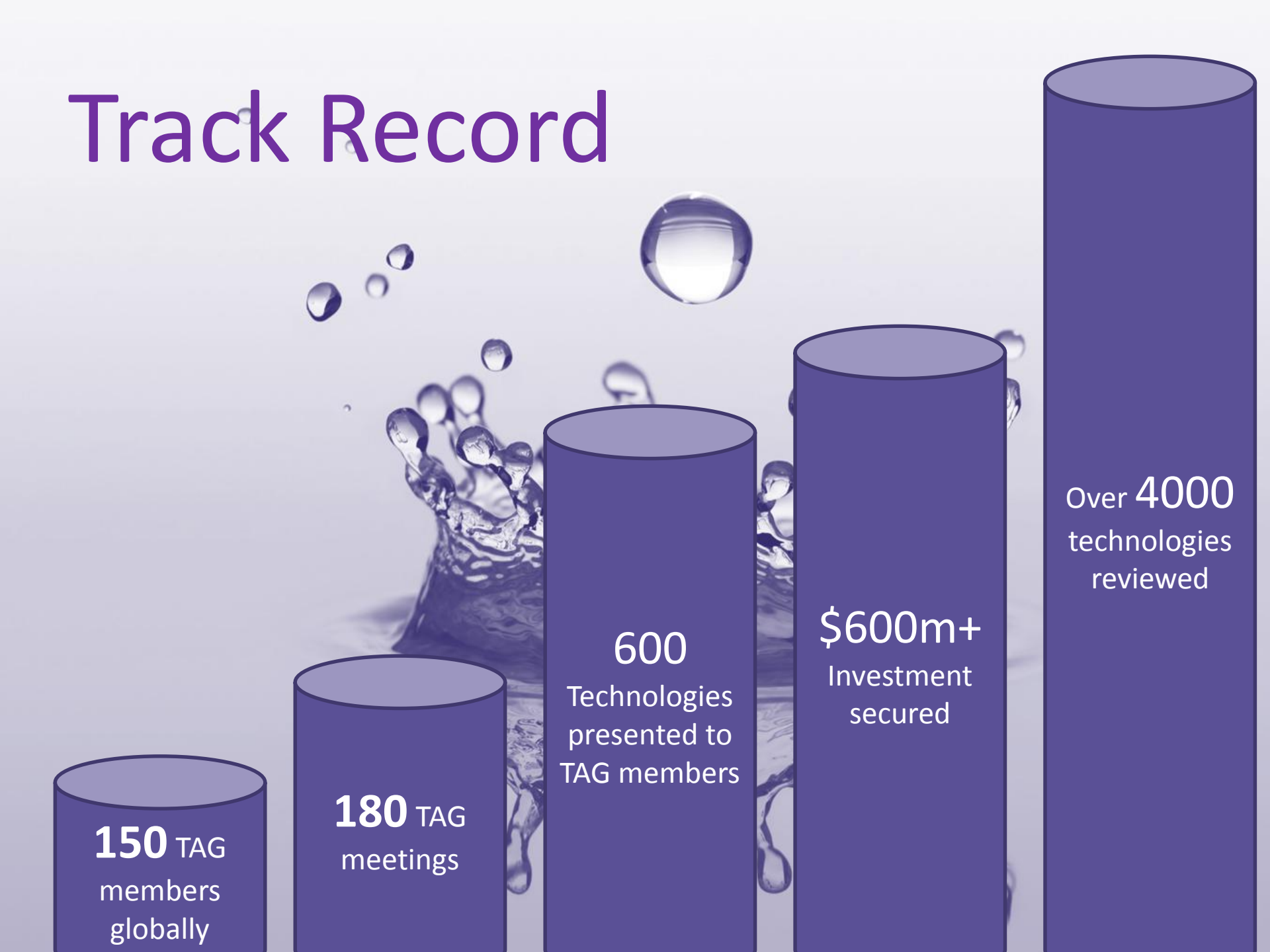
Summarising the TAG process



The benefits of TAG

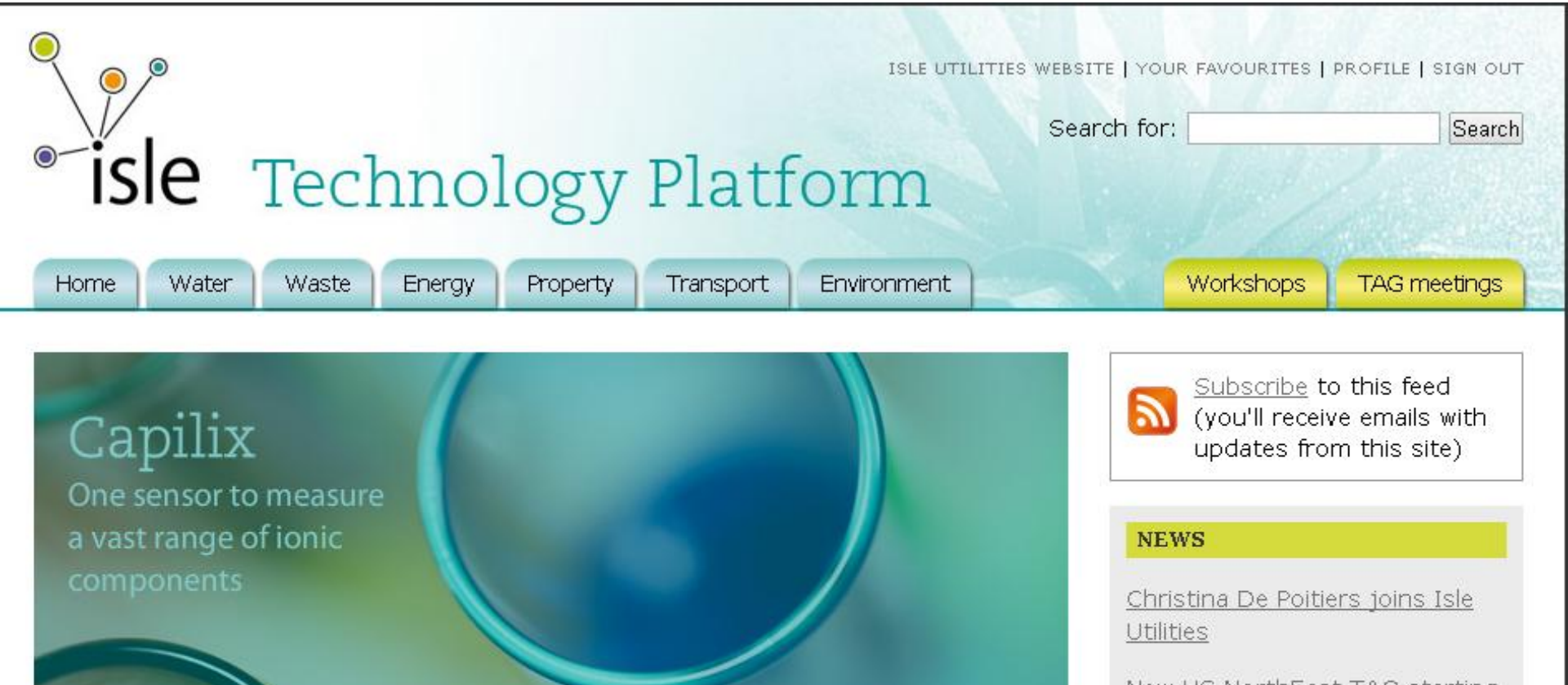
Global TAG members

Track Record

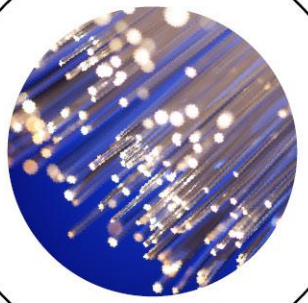


Technology Platform

Our Technology Platform is a dynamic online database of novel, emerging technologies from around the world. The portal gives you access to Isle's extensive technology database, discussion forums and the latest news and events.



A Sustainable Innovation Platform / TAG for SSA



The Background

- The need for innovation and new technology was identified and AfWA supported the creation of a TAG type model for water utilities in Africa

BUT

- Funding was required to mobilise such an initiative. Isle therefore pitched the concept to a number of organisations to secure funding and support

- The metrics for success will be based on the ability to establish a sustainable platform for the future.

Understanding the challenges

- The diverse nature of the many African nations;
- Africa's increasing demand for water and degradation of water resources;
- Lack of access to potable water;
- Illicit dumping, lack of access to sewage collection and subsequent treatment;
- Managing the contrasting needs between the big cities and urban poor vs the regional areas and isolated communities;
- Non revenue water (typical losses may range 30-60%) impacting the financial stability of water utilities;
- Climate change and resilience;
- Shrinking bugets and increasing geopolitical challenges;
- The need for capacity development across utilities.

The outline project objectives

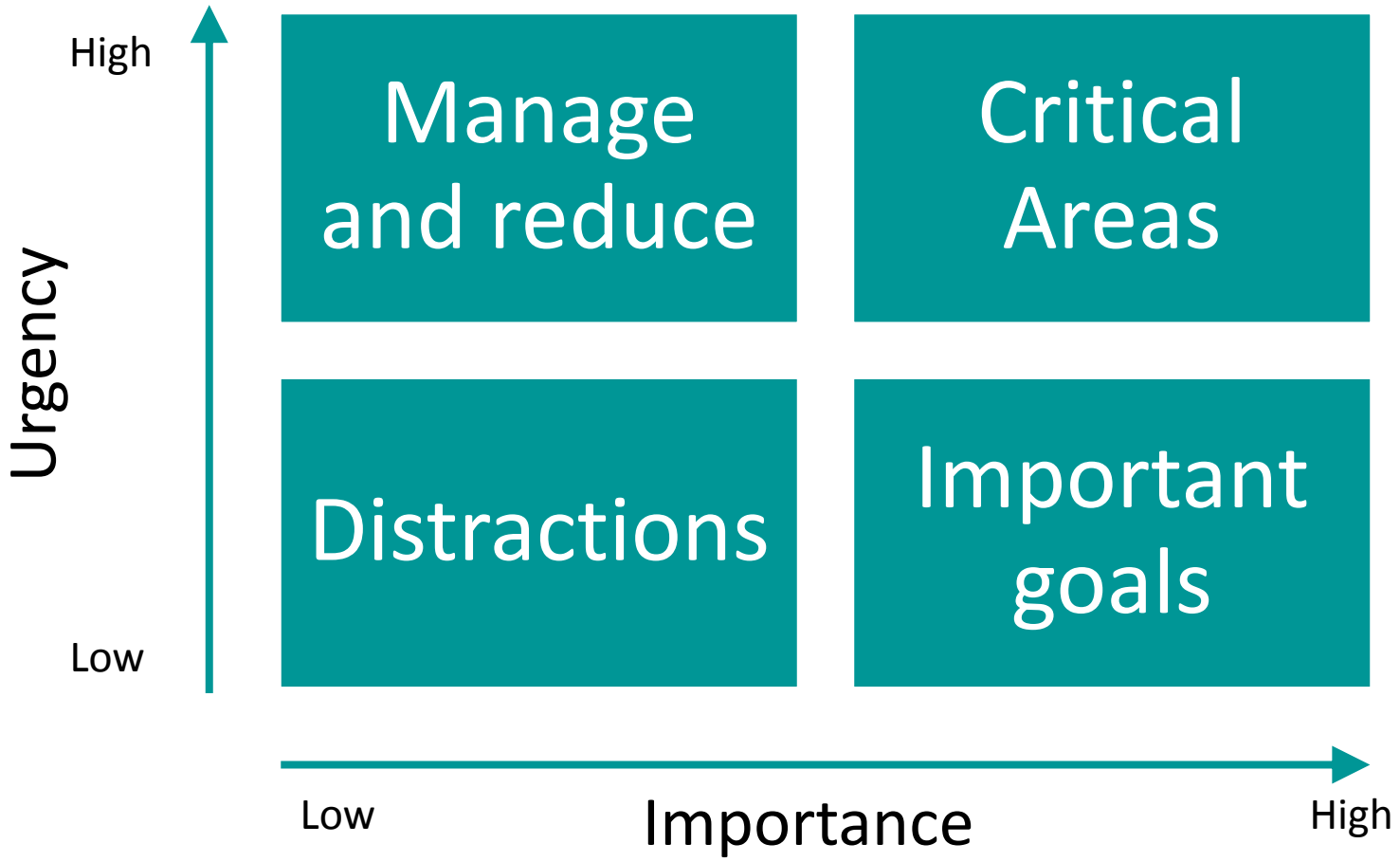
- Support the Sustainable Development Goals
  - Universal access to clean water
  - Improved sanitation
- Work with AfWA to build a delivery platform for water utilities across SSA;
- Understand the diverse needs and infrastructure challenges;
- Introduce relevant technologies and solutions;
- Facilitate testing, piloting and implementation, working with relevant partner organisations;
- Create a sustainable IP for the future.

Approach

Phase 1 – Project scoping (6 months)

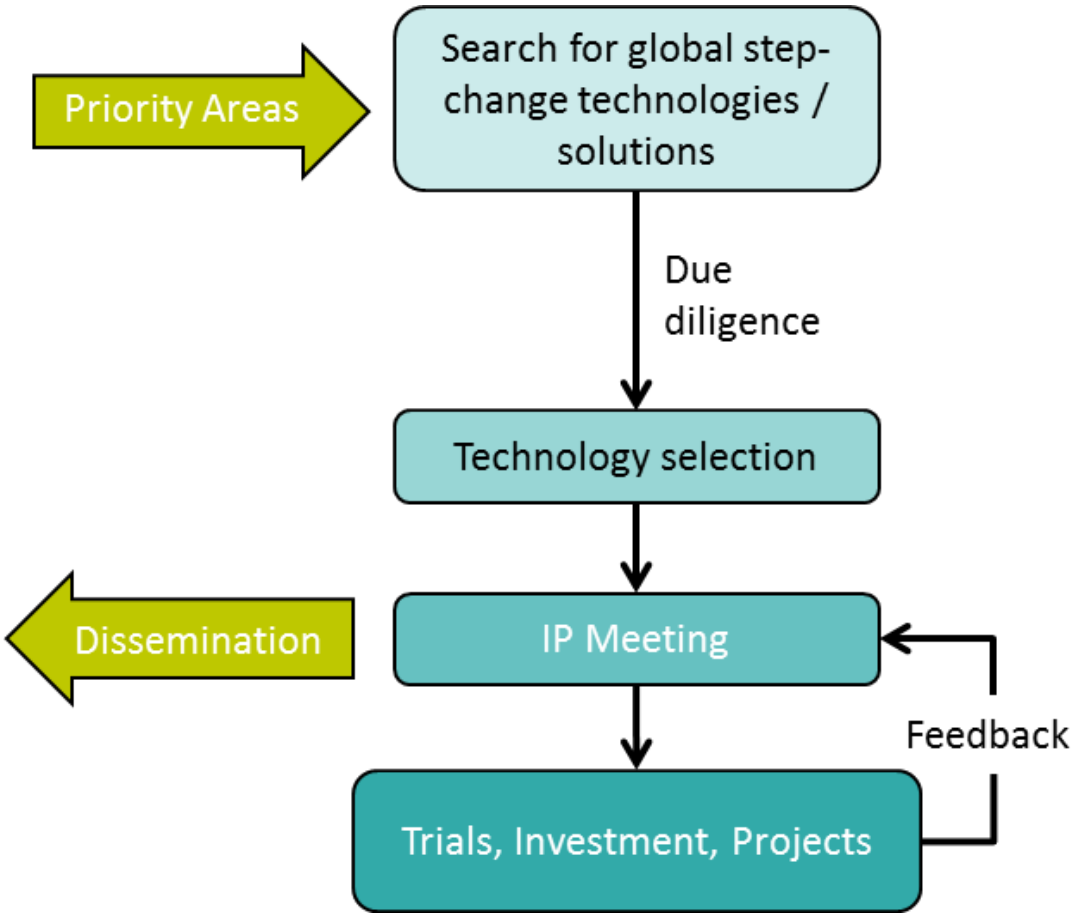
- Work with AfWA to build relationships with its members
- Initital workshop at Lilongwe STC meeting – start to understand common challenges as well as more specific priorities
- One-to-one meetings with water utilities as needed
- Build advisory panel / local taskforce
- Feedback & deliver progress workshop in Rabat (Feb 17) – map themes / focus areas
- Report and recommendations – define benchmarks for success and plan for Phase 2

Identifying priorities



Phase 2 – IP Meetings (12 - 18 months)

Summary of the IP / TAG activities



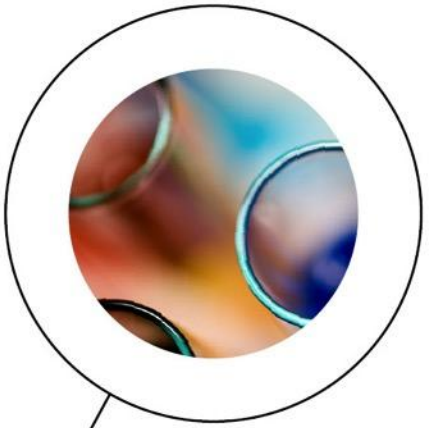
Technology platform

Key criteria for technology synopsis

Company name	X Company
Technology name	Y Technology
Technology Readiness	Target TRL 9 with an established track record
Description	A brief introduction
Application	To include how the technology works
Unique selling point	Why it is novel and how it differs from the competition or what is currently available in SSA
Cost & business case	To include capex and opex information, ROI and other financial benefits
Case studies	For example performance data
Business model	For example direct sales, licensing, partnership etc.
IP opportunity	Specifically how the technology company will deliver benefits for the IP participants and what the next steps following the IP meeting may look like

Phase 2B – Project development

Technology Examples

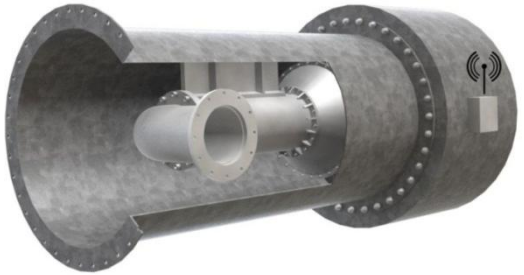


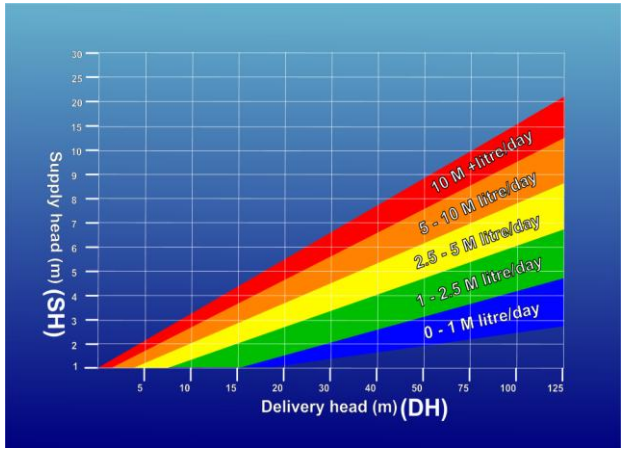
Shade balls:
Evaporation loss prevention

- Black plastic balls were released into a 175-acre Los Angeles Reservoir in Sylmar, California by Los Angeles Department of Water and Power (LADWP).
- The innovative balls were made by a company called XavierC.
- They are designed to cover the water, prevent evaporation and protect it from dust, rain, chemicals and wildlife.
- The polyethylene balls, around the size of an apple, cost $0.36 USD each and the black colour helps deflect the UV rays.
- Prevents up to 300 million gallons of water from evaporating each year.

Papa Pump:
Zero energy pump

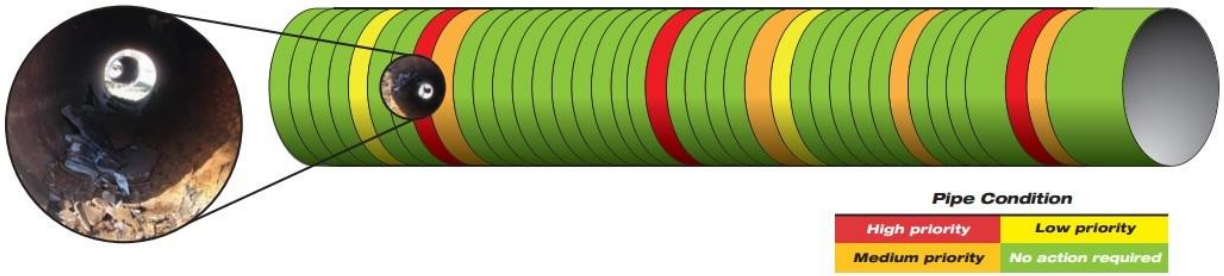
- Takes the energy from a large flow at low pressure and converts it to a low flow at high pressure
- The smaller version of the pump can be used to boost network pressure at critical points
- The larger version can be used for river abstraction
- Potential to lift 30x the original head
- Has no need for a power connection
- Clear opportunity identified in SA





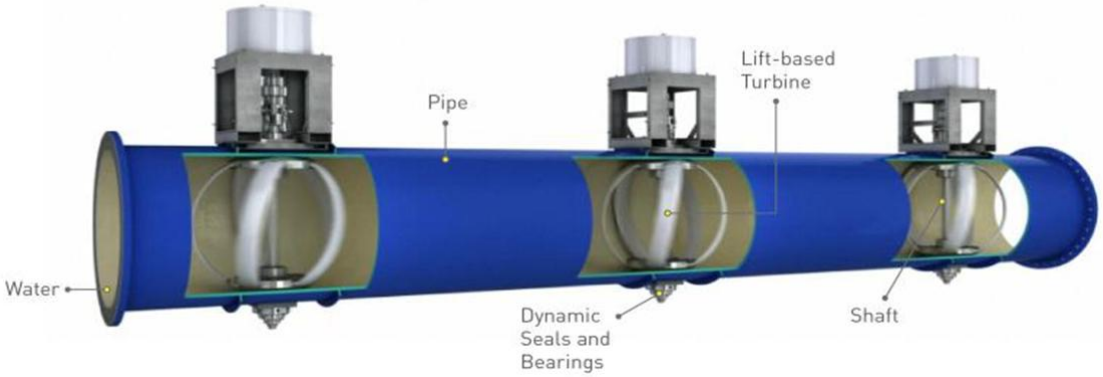
Detection Services: Pipeline condition assessment

- Non-invasive and non-destructive pipeline condition assessment technology to support pipe replacement and maintenance decision-making
- Based on inverse transient analysis – generating low pressure signals with pre-defined characteristics and measuring returning responses
- Pipe screening tool for long distance pipes, identifying small localised “hot spots”
- Measures and determines internal and external condition of pipes on metallic, reinforced concrete and/or cement based pipelines (AC)
- Preparing for a collaborative trial hosted by Vitens in the Netherlands



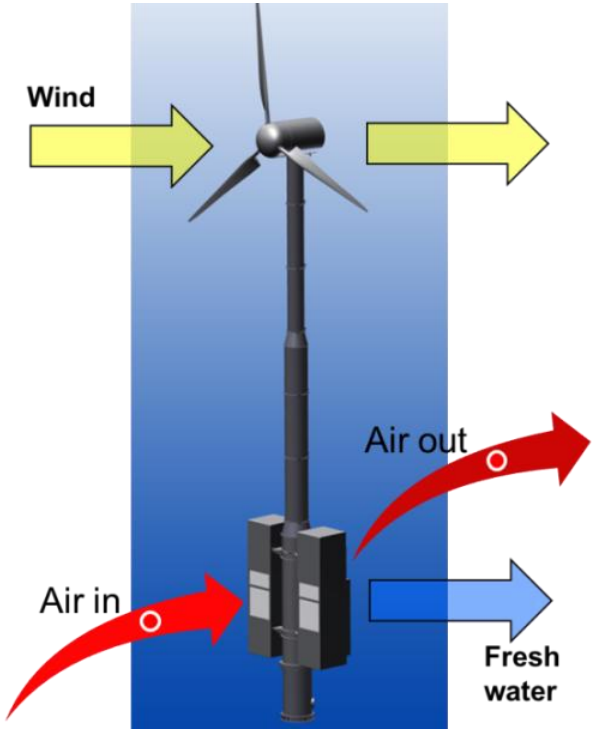
Lucid Energy: Micro turbine

- The LucidPipe Power System for energy recovery from large diameter gravity-fed water pipelines and effluent streams
- Each LucidPipe turbine produces up to 100 kilowatts of renewable, zero-emissions electricity - systems can be deployed 3-4 turbine diameters apart
- Utilises a unique, lift-based, vertical axis spherical turbine that fits inside of large diameter (600 – 3000mm) water pipes, allowing for generation across a very wide range of flow conditions, volumes and velocities
- Installations across US and AUS with new opportunities in South America



Dutch Rainmaker: Wind powered water production

- Wind directly drives water production unit (no electricity). Hybrid system possible for contingency
- Air enters heat exchanger
- The air is cooled: condensing of water droplets
- Condensate captured directly in a water tank
- Markets include emergency supply (containerized units), deserts, golf course, mountains, rural areas, reservoir for fire fighting in dry regions
- Water-to-Water desalination unit in development
- Scoping project with Scottish Water in UK

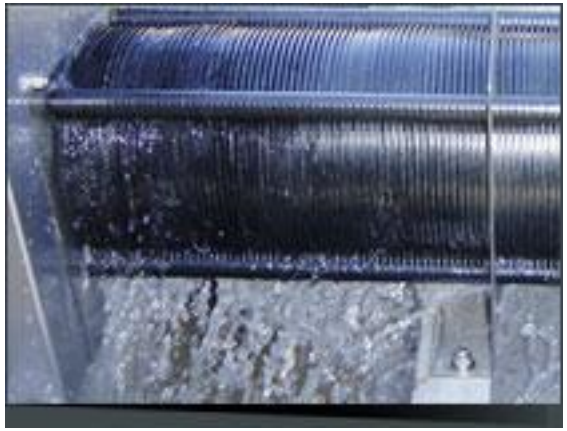


Smartsan:
Packaged ww treatment and water reuse

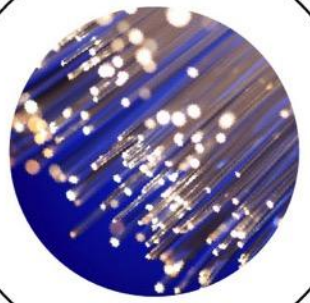
- Decentralised wastewater treatment plant for single households and small communities
- Incorporates recirculation of treated effluent for toilet flushing, in a near closed loop system
- Treatment through biological (aerobic and anaerobic) processes and filtration
- Robust, easy to install, solar powered, small footprint; well suited to rural and semi urban applications
- Factories in SA and Namibia, also exporting to Zambia and Mozambique
- Supporting proposed trails in SA and Europe

Volute:
Screw press for thickening/dewatering

- Made up of fixed rings and moving rings with a unique design of tapered shaft and flights
- Modular design, operating on a continuous process and the shaft motor rotates at 2 rpm
- Low energy consumption (0-10 kW) and very low noise (<40bB)
- Dewatering from 2.5%DS to 30% DS
- Very low wash water requirements (<54 gal/h) for odour control
- Large and small scale applications – municipal, industrial, agricultural and domestic
- Explored opportunity with Gates Foundation



Timeline and next steps



Timeline

Ph	Activity	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J
1	Intro workshop Lilongwe STC																					
1	1-2-1 meetings																					
1	Develop project taskforce																					
1	Feedback workshop Rabat STC																					
1	Confirm participant interest																					
2	Technology sourcing																					
2	Technology appraisal & DD																					
2	IP / TAG meetings																					
2	Feedback & next steps																					
2b	Technologies for testing																					
2b	Identify sites and project plan																					
2b	Build steering group																					
2b	Implementation & testing																					

Next steps

- Isle to consolidate today's discussion and outputs
- 1-2-1 meetings today and over the next few months
- Engage with relevant technical staff
- Map challenges, priorities and key themes
- Feedback in Rabat (Feb 2017)
- Develop advisory panel / project task force

AOB

Thank you

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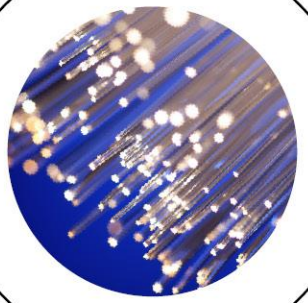
Technology focus areas



Format of technology discussion

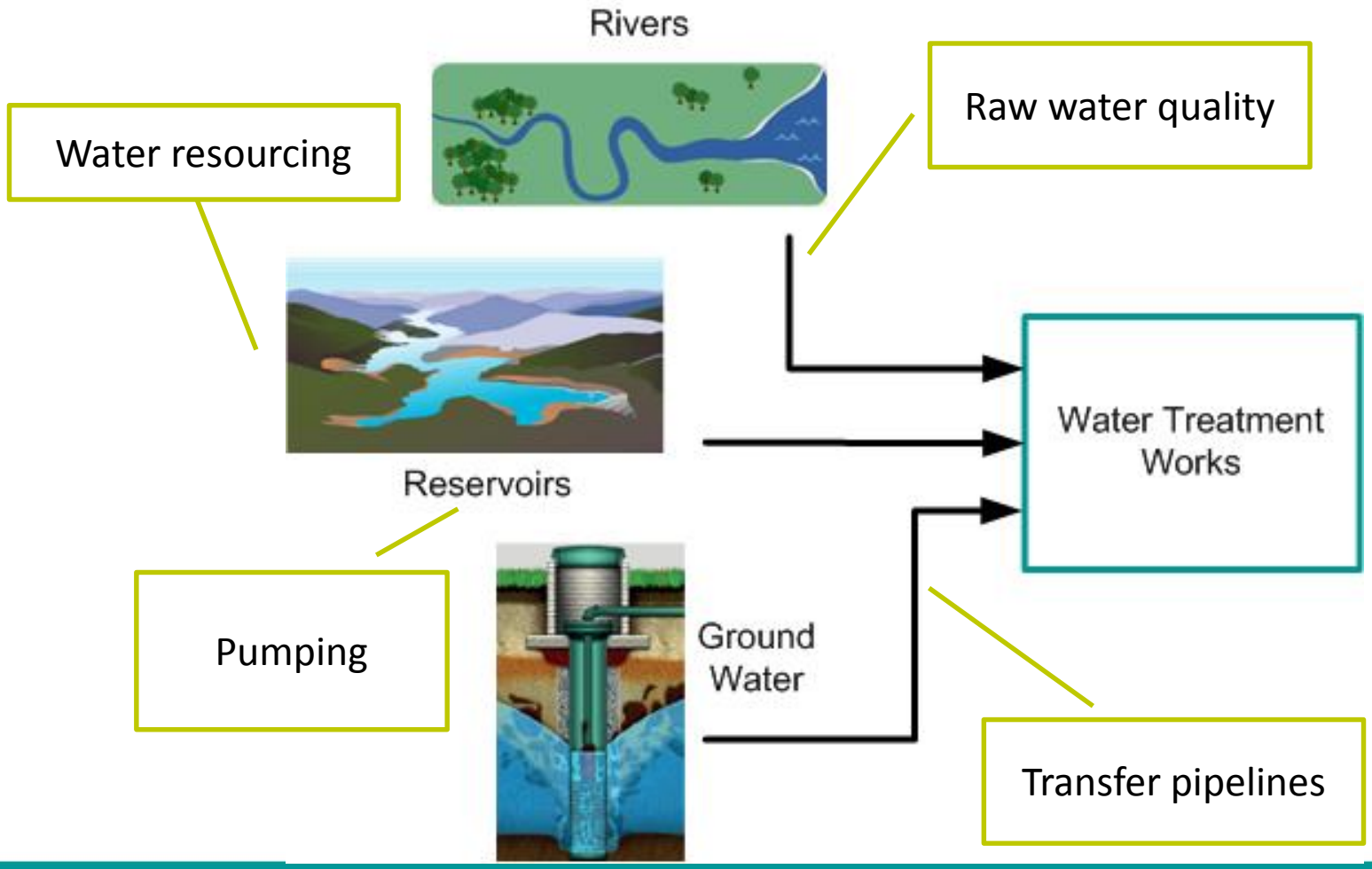
Brainstorming the challenges behind:

1. Water Resources, Treatment and Distribution
2. Wastewater Collection, Wastewater Treatment, Sludge Treatment

- What are the main needs and challenges?
- How widespread are these?
- Are these issues part of strategic planning or is there a short-term solution required?

Water Resources, Treatment and Distribution

Water Resources Overview



Water Resources - interest areas

Sector	Interest Areas	Interest
Water quality	Real Time Monitoring (single & multi-parameters)	
	Stratification and Algae	
	Pathogens	
Water resourcing		
Pumping	Energy reduction	
Hydro power generation	Micro turbines	

Papa Pump – Zero energy pump

- Takes the energy from a large flow at low pressure and converts it to a low flow at high pressure
- The smaller version of the pump can be used to boost network pressure at critical points
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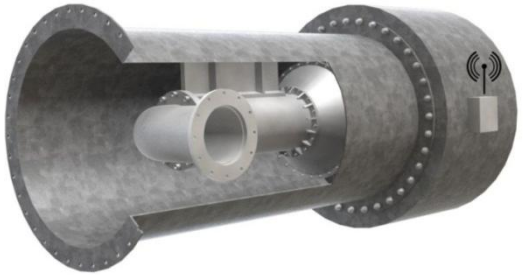
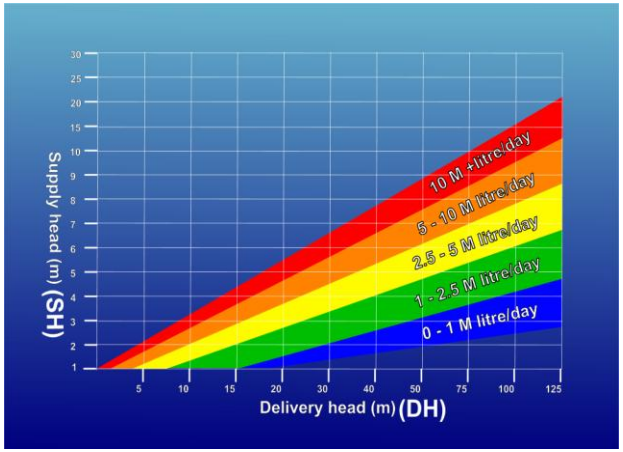
- Potential to lift 30x the original head
- Has no need for a power connection





Lucid Energy – micro turbine

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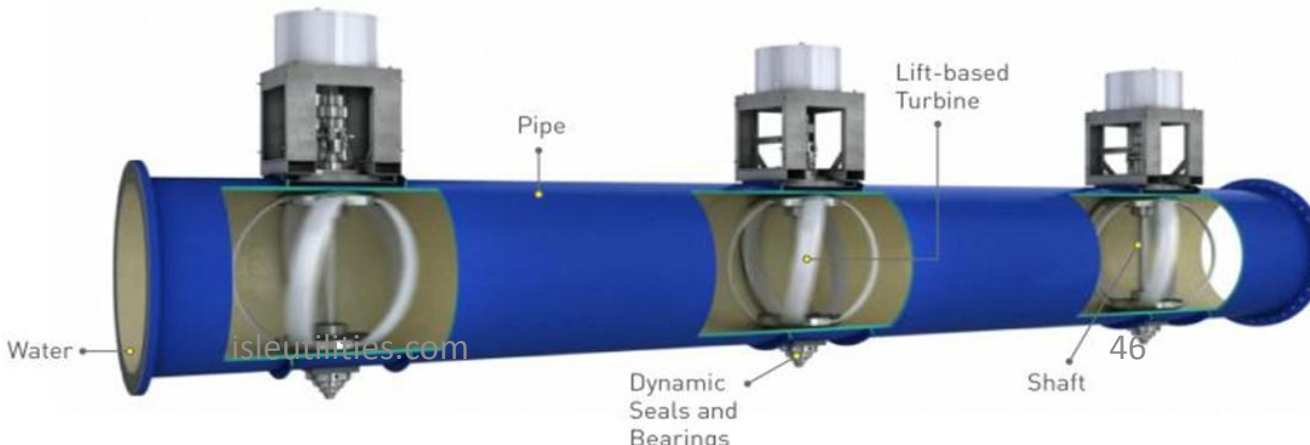
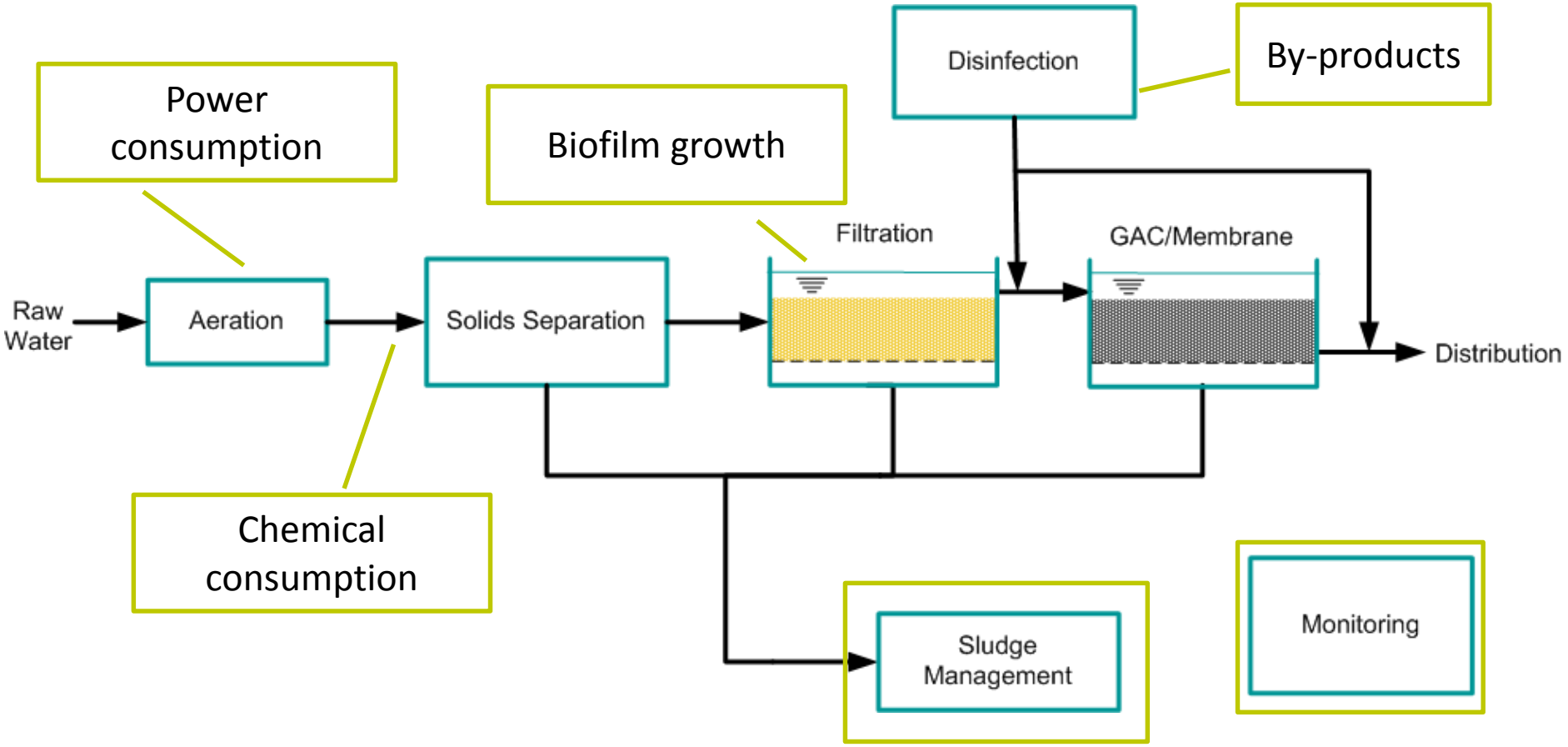


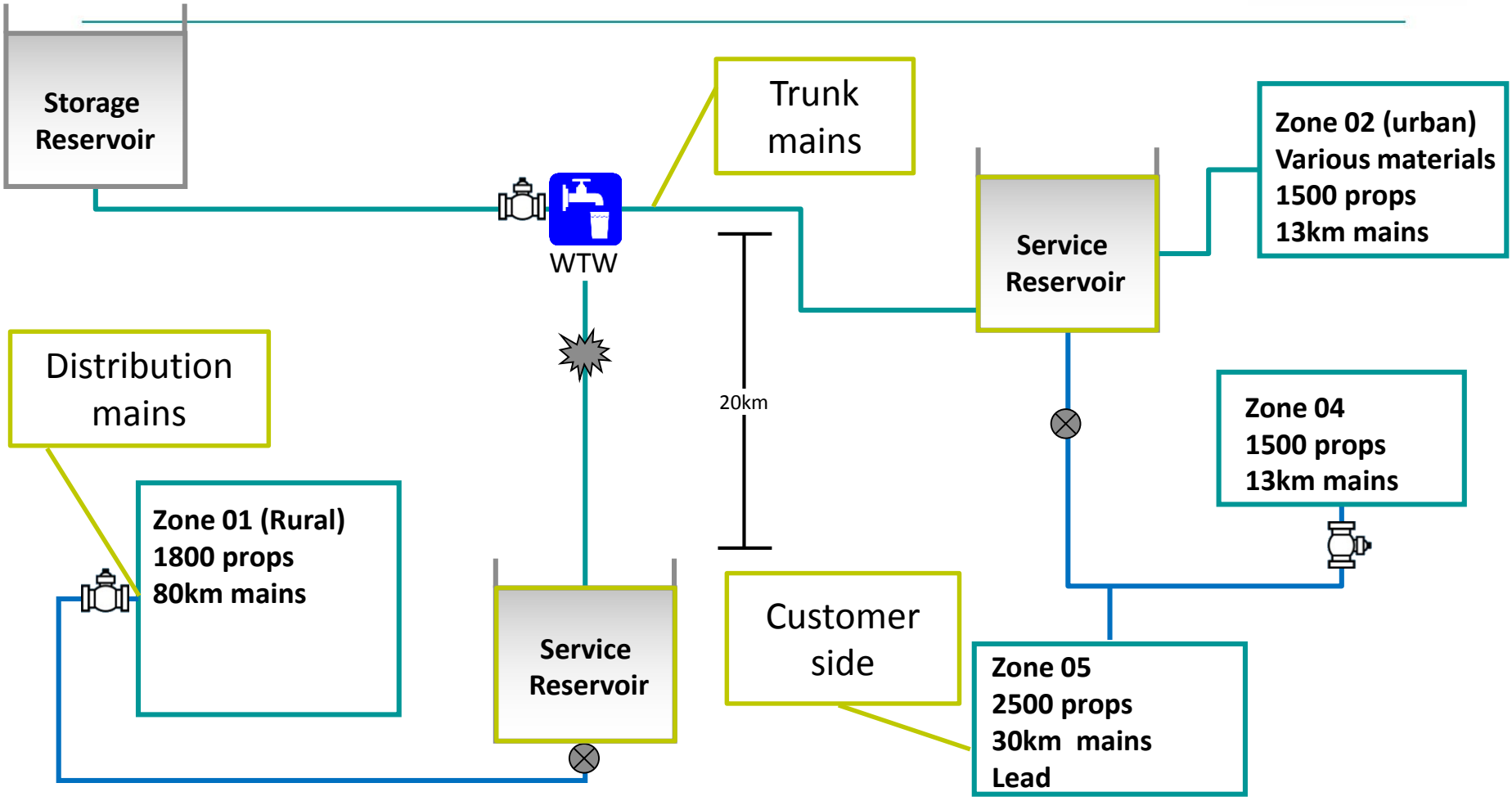
Water Treatment Overview



Water Treatment – interest areas

Sector	Interest Areas	Interest
Solids Separation	Coagulation & chemicals control & optimisation	
	Contact tank and mixing	
Dissolved Air Floatation	Energy consumption reduction	
Filtration	Backwashing & Biofilm formation	
Oxidation	Chlorination/ozonation	
	Energy consumption reduction	
Membranes	Pre-treatment and Biofouling	
	Monitoring	
Disinfection	Chlorination & UV / Ozone	
	Onsite hypochlorite generation	
Sludge Management	Thickening / dewatering, treatment and re-use	

Water Distribution Overview

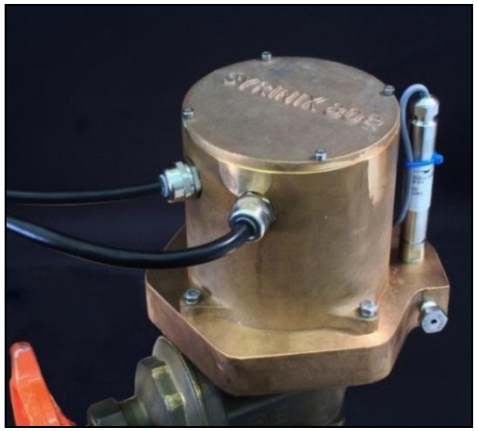


Water Distribution Overview – interest areas

Sector	Interest Areas	Interest
Trunk & Distribution Mains	Leakage / burst & repairs	
	Water Quality Monitoring	
	Metering & sub-metering	
	Pressure Management	
	Structural lining	
	Condition assessment	
	Smart Networks	
Customer side	Automatic meter reading	
	Pressure boosting – isolated properties	
	Billing	

Syrinix – Continual, automated monitoring of trunk mains

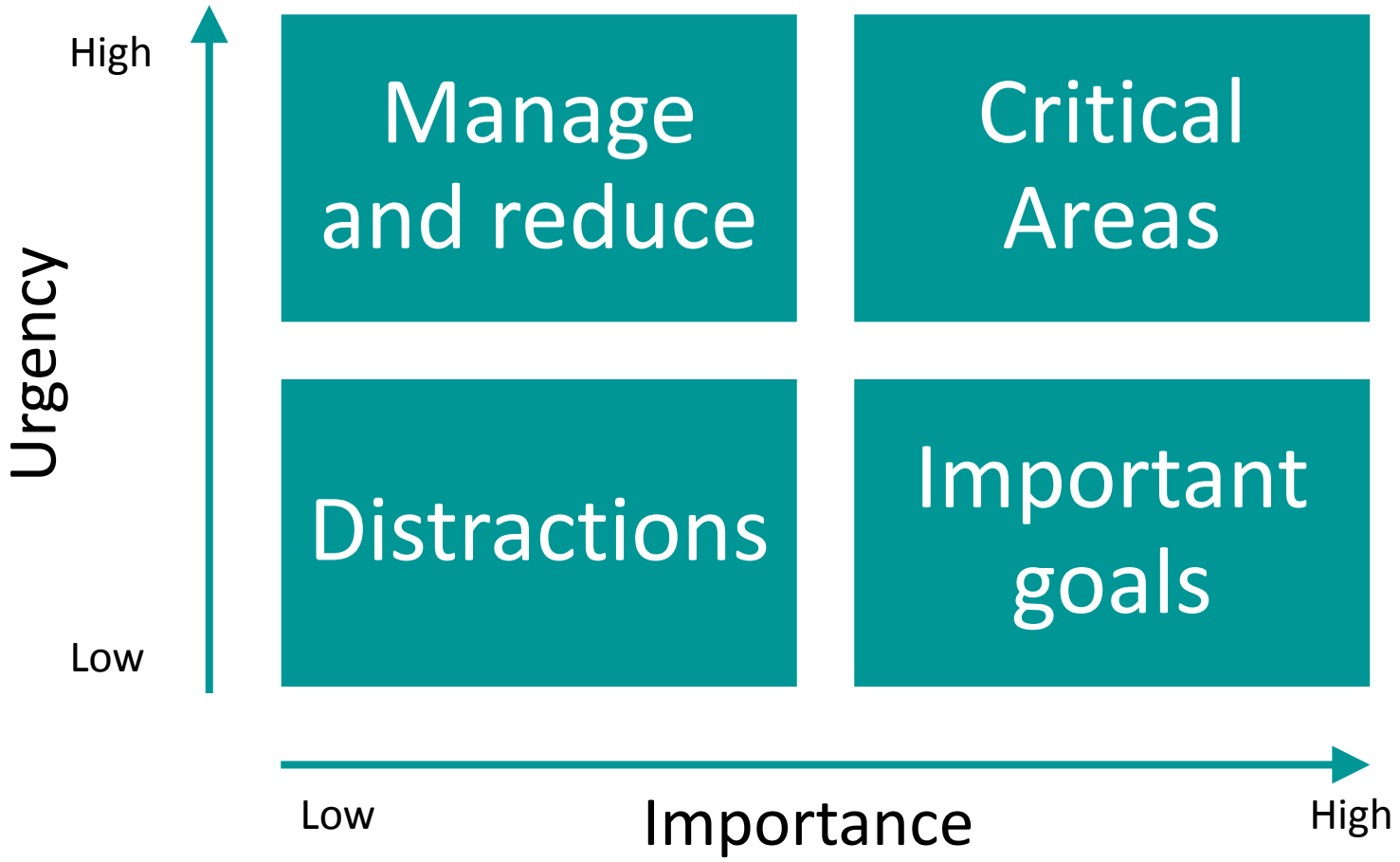
- Syrinix (UK) has developed the TrunkMinder for water burst prevention
- TrunkMinder is a fixed system that continually monitors the trunk main for small leaks that could escalate into bursts
- The system is based on a combination of sensors (hydrophones, geophones, pressure sensors and flow monitors) that are positioned in pairs so that small leaks can be detected in the section of pipeline between the sensors
- TrunkMinder is generally applied in locations with important infrastructure (rail, hospitals, main roads, services etc.)
- Installations in UK, US and Middle East



Detection Services – p-CAT

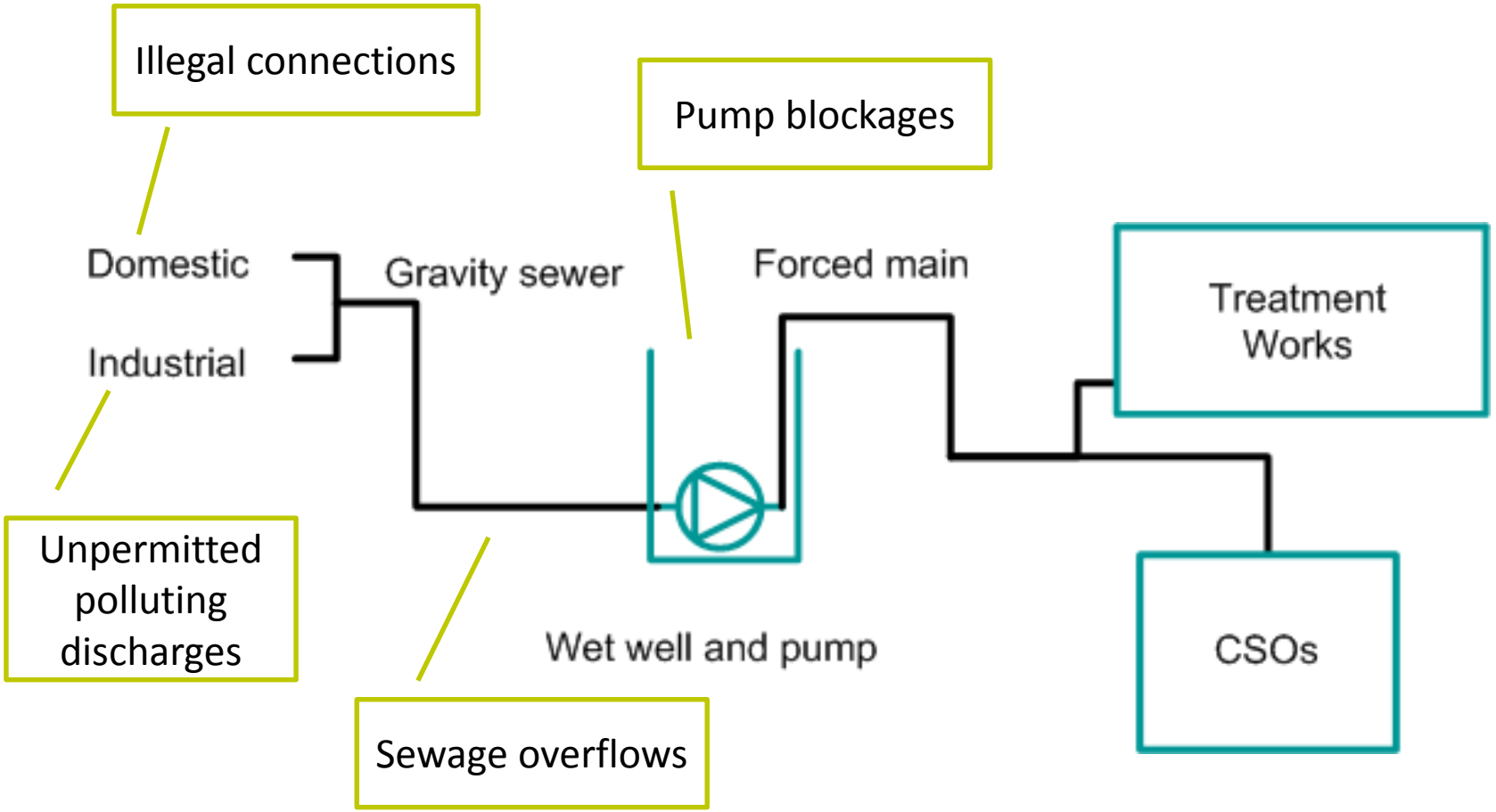
- p-CAT™ - transience based condition assessment tool for all pressurised water and waste water pipelines
- Pressure signals are generated, induced and returning pressure wave responses measured and analysed
- Allows for screening of long lengths of pipe for sections of localised deterioration down to 10m resolution - identifies air / gas pockets, wall loss, wall thinning, lost lining, blockages and/or closed valves
- Can be used on metallic, reinforced concrete and/or cement based pipelines (AC)
- Installations in AUS and NZ, to present at EU Water Nov 2015

Identifying priorities



Wastewater Collection, Treatment and Sludge management

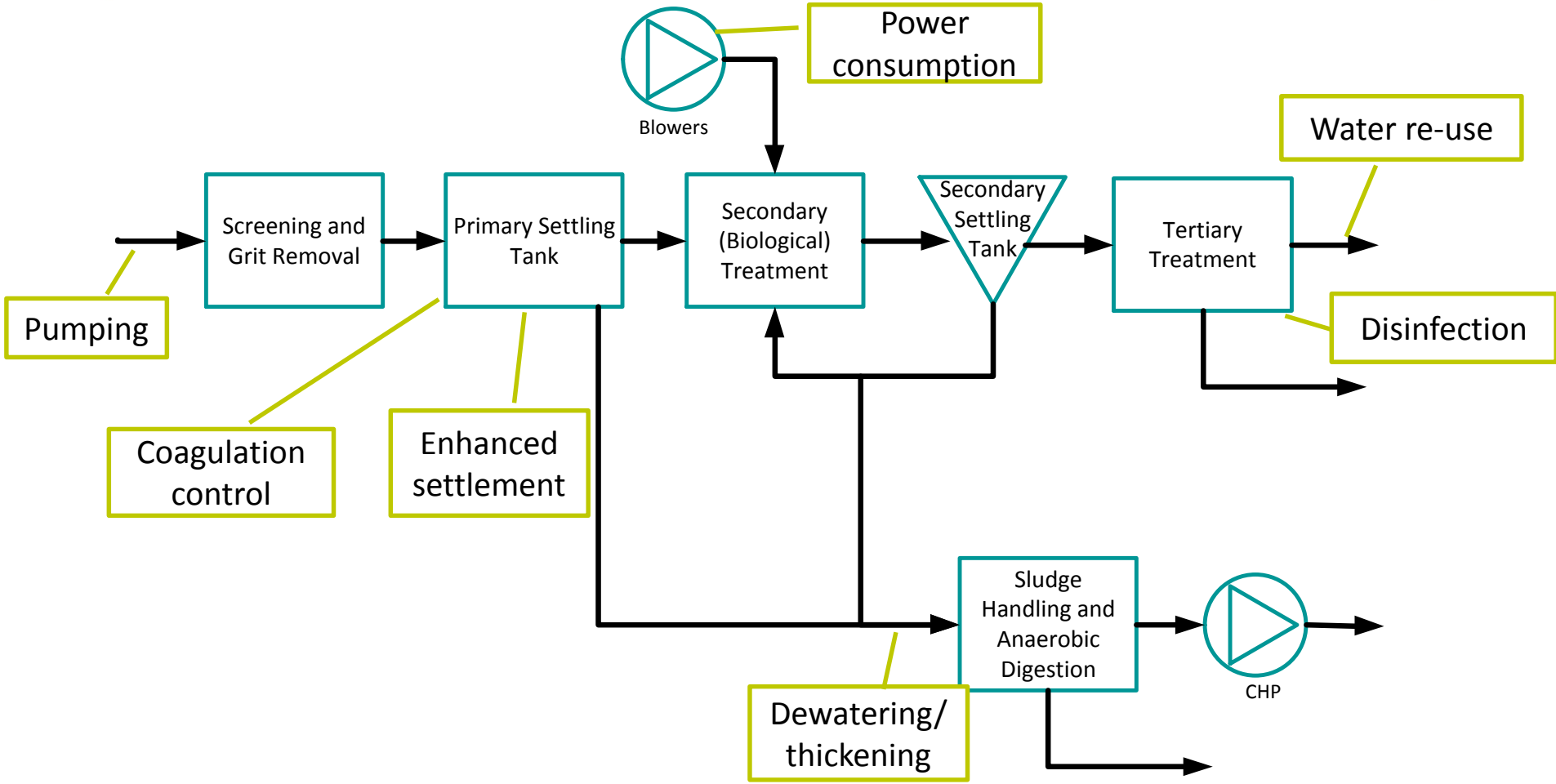
Wastewater Collection System



Wastewater collection – interest areas

Sector	Interest Areas	Interest
Sewer	Corrosion	
	Monitoring	
	Pipe lining	
	Pump blockages	
	Energy generation	
	Illegal connections	
	CSO/SSO	

Wastewater Process Overview



Wastewater Treatment – Interest Areas

Sector	Interest Areas	Interest
Pre-treatment	Screening, grit, FOG removal and ragging	
Primary Settlement	**Chemical control and optimisation**	
	Sludge pumping and treatment	
Secondary treatment	Growth on media	
	Energy consumption optimisation (aeration)	
	Mechanical surface aeration	
	Monitoring and control systems	
Secondary Settlement	**Thickening, dewatering and transportation**	
Disinfection	UV, Chlorine, ferrate	
Reuse	RO, Groundwater recharge	

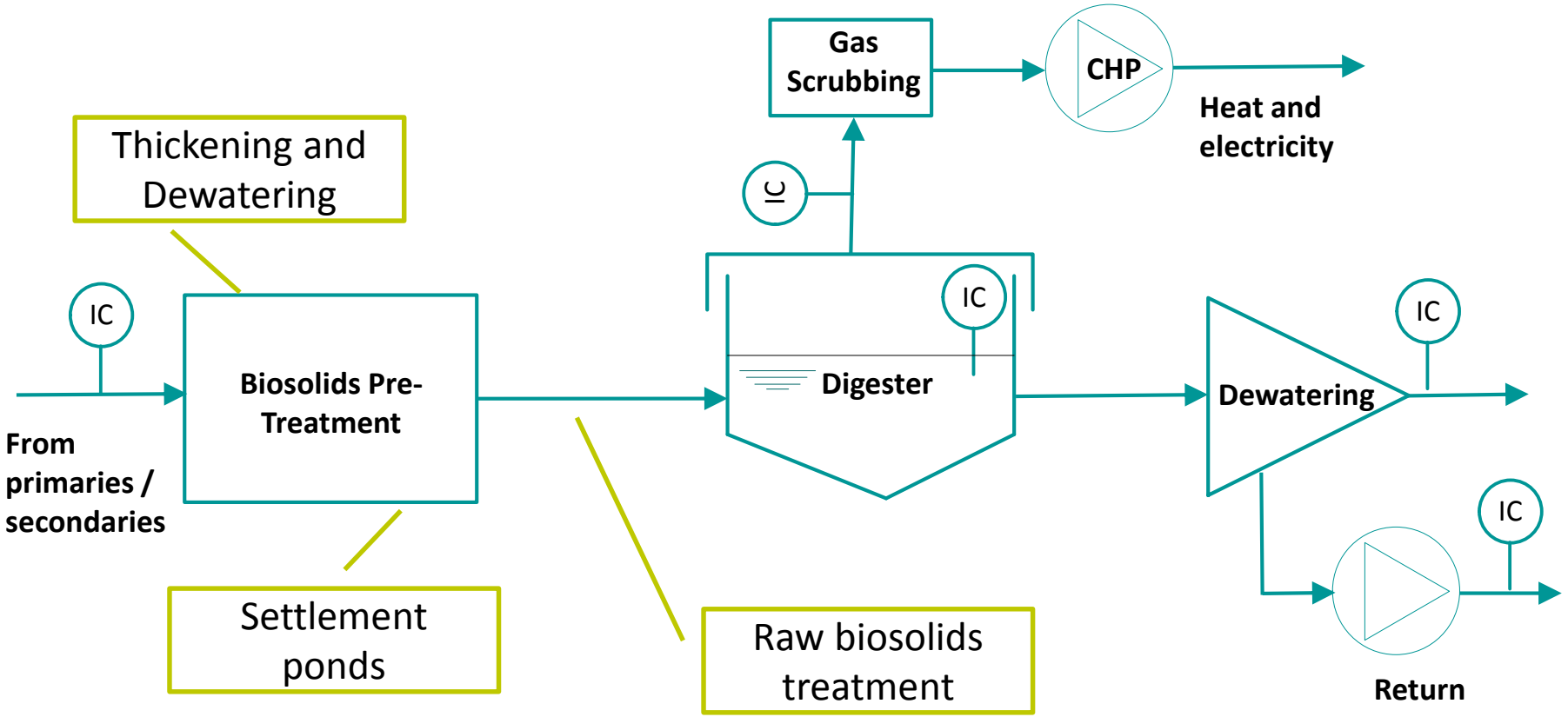
Enviplan - AquaTector fine-bubbled physical separation

- Dense, homogeneous micro-bubbles generate extremely high interphases and enable in most cases, a separation of almost 100% of the settleable material
- Approximately 100% of its micro-bubbles of 30-50µm diameter
- Operational pressure between 2 and 4 bar
- High final dry solids of sludge
- Pilot plants available between 0.5m^3/h to 10m^3/h

Mapal – floating fine bubble diffuser system

- Mapal Green Energy has developed a floating fine-bubble low-energy aeration system
- For new plants or to upgrade existing plants
- Replace existing mechanical surface aerators (fixed or floating)
- No down time required during installation and no process interruption
- Modular system for every scale of operation
- Compared to other aeration systems, demonstrated energy savings of over 20%

Sludge treatment

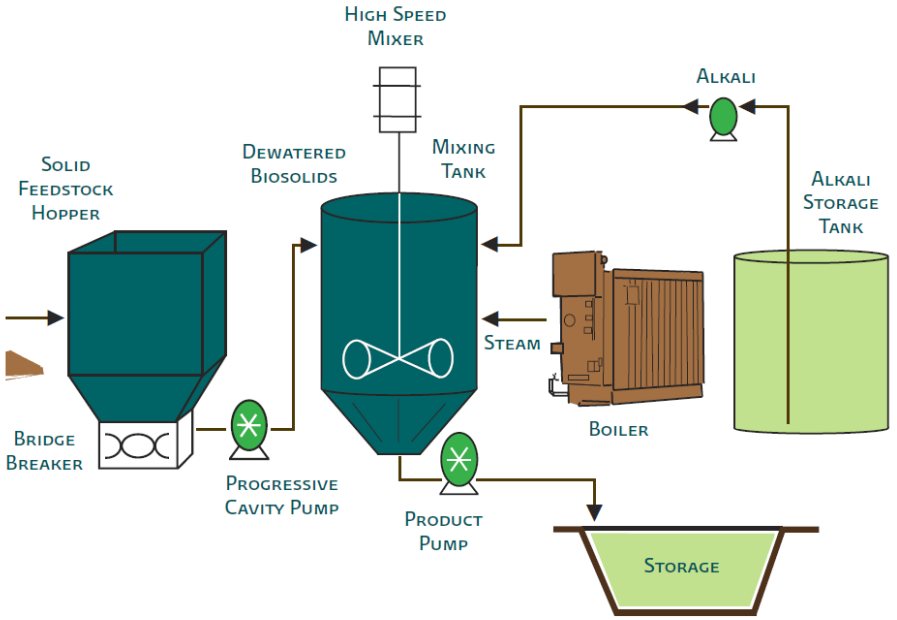


Sludge treatment

Sector	Interest Areas	Interest
Anaerobic Digestion	**Optimisation of energy recovery**	
	Sludge pumping and treatment	
Raw sludge treatment	Composting, stablisation	
Disposal	**Dewatering, land**	
Bio-gas	**CHP, fuel cells**	

Lystek – Post/Pre AD hydrolysis

- Lystek is a hydrolysis process, transforms raw or digested sludge into a nutrient rich fertiliser product and biogas
- High speed shearing, alkali addition and low pressure, low temperature steam injection is applied simultaneously in a single enclosed reactor
- Can be recycled to digesters or a BNR stage
- Recycling to the digester increases biogas yields by at least 25%
- The Lystek system is proven at full scale, with 5 installations in Ontario, Canada



Volute - screw press for thickening/dewatering

- Made up of fixed rings and moving rings with a unique design of tapered shaft and flights
- Modular design, operating on a continuous process and the shaft motor rotates at 2 rpm
- Low energy consumption (0-10 kW) and very low noise (<40bB)
- Dewatering from 2.5%DS to 30% DS
- Very low wash water requirements (<54 gal/h) for odour control
- Large and small scale applications – municipal, industrial, agricultural and domestic

Identifying priorities