InspireWater - SpotView final web conference: "Holistic approaches for water and resources efficiency in process industry"

SpotView - Next steps towards creating sustainable impact through business exploitation

March 26, 2020

Hank Vleeming | Process Design Center | The Netherlands







Horizon 2020 European Union Funding for Research & Innovation



Presentation outline



- Technologies and strategies
- Exploitation strategy
- Key exploitable results / Breakthrough technologies
 - Valmet Ultrafiltration
 - Capacitive Deionization
 - Anaerobic/aerobic membrane reactor
 - BioControl Concept
 - Chemical Heat Pump

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Process Design Center

- **Technology provider** in process development, integration, and optimization
- PROSYN[®]: Unique knowledge-based system offering a structured and systematic methodology to Conceptual Process Design (CPD), Techno-Economic Analysis (TEA) and Process Integration.



• Process development and validation

Role in **SpotView**

- Integration and optimization of water and energy reuse strategies
- IPR strategy and exploitation of SpotView results

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SpotView technologies



SpotView Technologies 🗯 & Partners 📀			
Washer Thickener		KĀDANT	
Dissolved Air Flotation (DAF) / Centrifuge decanter			Arcelor Mittal
Sand filter			Arcelor Mittal
Ultrafiltration (UF)	CERTH CENTRE FOR RESEARCH & TECHNOLOGY HELLAS	Valmet	Arcelor Mittal
Reverse osmosis (RO), ion exchange (IX), Capacitive Deionization (CDI)			ArcelorMittal
Enhanced biological treatment		cente technique du papier	
Micellar Enhanced Ultrafiltration (MEUF)	CERTH CENTRE FOR RESEARCY & TEDINOLOGY HELLAS		
Elevated Pressure Sonication (EPS)	SERE-Tech	SERE-Tech	
Membrane Bio-Reactor (MBR)	CERTH CENTRE FOR RESEARCY & TECHNOLOGY HELLAS		
Biocontrol Concept		XX VTT Valmet	
Chemical Heat Pump (CHP)		C QPINCH	

SpotView strategies



Strategies 5			
Separative technologies to recycle process wa recover valuable substances	ater and		
Improve WWTP to recycle water and produce	biogas		
Water reuse without treatment (cascade tech	nique)		
Microbial control for water recycling			
Saving fresh water using rain/sea water			
Waste heat recovery			

Exploitation strategy in SpotView



- Impact and exploitation strategy
 - Monitoring impact and exploitation activities
 - Development of 5 Key Exploitable results (KERs)
 - Exploitation Strategy Seminars (ESS)
 - April 2018 (M18) Luxembourg EC Common Exploitation Booster
 - April 2019 (M30) Thessaloniki Internal workshop
 - Technology leaflets
 - Workshops
 - Avilès, Oct. 2018
 - Zaragoza, Dec. 2019
 - Web conference, Mar. 2020
- Commercial scenarios
 - Up-to-date business and exploitation plan per partner
 - CANVAS model and risk assessment

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Characterization of the SpotView KER

The Novel Solution - Product & Problem

Exploitation Strategy Tools

- Market Customers
- Market Competitors
- Partners & External Experts
- Intellectual Property Rights
- Exploitation strategy Activities & Costs
- Exploitation strategy Financing & Revenues
- Market analysis and business modelling
 - Lean CANVAS model
- Risk assessment
 - Risk assessment matrix
 - Priority map of risks

	The Lean Canvas	Name	of KER	Date Iteration #
Problem Top 3 probl	Book Solution Top 3 features Solution Top	Unique Value Proposition Single, clear, compelling message that states why you are different and worth paying attention	Can't be easily copied or bought	Customer Segments Target customers
Alternative	eSolutions	Revenue	Streams	Early adopters 3

Characterization table for KER to product Name of the Key Exploitable Result

el Solution - Product & Proble

Market - Customers

Market - Competitor

Intellectual Property Right

pitation strategy - Financing & Revenu

ers & External Exnert



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SpotView Exploitable Results

Technologies			
Washer Thickener		Washer	
Dissolved Air Flotation (DAF)		Thickener + DAF	
Sand filter			
Ultrafiltration (UF)		Valmet UF-CR	
Reverse osmosis (R)), ion exchange (IX), Capacitive Deionization (CDI)		CDI	CDI
Enhanced biological treatment			
Micellar Enhanced Ultrafiltration (MEUF)			
Elevated Pressure Sonication (EPS)			
Anaerobic + Aerobic Membrane Bio-Reactor (MBR)	aaMBR		
Biocontrol Concept		BioC	
Chemical Heat Pump (CHP)		СНР	СНР
Key Exploitable Result		Potential exploitable result	

Exploitable result

Disqualified

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Valmet Ultrafiltration for tissue mill

Category: Technology \square , Process \square , Service \square , Method \square , R&D knowledge \square , Other \square

Benefit summary: Ultrapure water is produced with the new designed Valmet's Cross Rotational Ultrafilter. Permeate water is used to replace fresh water and decrease the water and energy consumption at the tissue paper production. Also, process cleanliness is maintained or improved.

Development status: First prototype has been designed and demonstrated in Essity Nokia mill at a permeate flow of 6 - 10 m³/hr, reducing fresh water consumption by 1-2 m³/t produced paper. Technology Readiness Level (TRL) = 7

• Exploitation / licensing

- Valmet Ultrafiltration Tissue process will be part of Valmet Water Management portfolio and thus available through on sales activities
- Technology supplier
 - Valmet Technologies Inc., Keilasatama 5 / PO Box 11, FI-02150 Espoo, Finland, <u>https://www.valmet.com</u>



Valmet 🔷





Category: Technology □, Process □, Service ☑, Method □,

R&D knowledge □, Other □

Benefit summary: Capacitive deionization (CDI) is a new ionization method for the removal of ions from water by electrostatic adsorption on two opposed charged electrodes by a low-voltage electromagnetic field. Advantage of the CDI include low energy demand and the chemical free operation.

Development status: Demonstration unit operated in steel factory

IP status: Technology patented by developer (Voltea)

• Exploitation / licensing

 BFI is adapting the CDI technology to requirements in Iron and Steel industry as pretreatment of disturbing components, and operational parameters of CDI

Supplier

 VDEh-Betriebsforschungsinstitut GmbH (BFI), im Stahl-Zentrum · Sohnstraße 65 · 40237 Düsseldorf · Germany, <u>http://www.bfi.de</u>

Capacitive Deionization (CDI)





Porous electrode

Porous electrode

OUT

Desalting

Anaerobic/aerobic membrane bioreactor

Category: Technology \square , Process \square , Service \square , Method \square , R&D knowledge \square , Other \square

Benefit summary: Novel anaerobic/aerobic membrane bioreactor (aaMBR) enables advanced wastewater treatment performance and water reclamation through integration of membrane technology with biological wastewater treatment. Main advantages of aaMBR include: Complete separation of the activated sludge, higher concentration of active biomass, process intensification, and overall higher effluent quality.

Development status: Pilot unit

IP status: Patent pending

- Exploitation / licensing
 - Collaboration type sought: Partner and funding for installation and operation of the first full scale unit.
- Technology supplier
 - CERTH-NRRE Lab, Thermi -Thessaloniki, Greece



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BioControl Concept

Category: Technology \square , Process \square , Service \square , Method \square , R&D knowledge \square , Other \square

Benefit summary: Biocontrol (of micro-bacterial activity) by biocide production at-site directly from the salt substances in the process by utilizing electrolysis. Reduced cost, handling and transportation of hazardous chemicals resulting in an increase in occupational safety.

Development status: Demonstration unit running

- Exploitation / licensing
 - Direct sales of equipment and services (including consultancy and training) to customers with a need for control of the micro-bacterial activity
- Technology supplier
 - XerChem Oy, Peuraniitty 5 A 18, 02750 Espoo, Finland, http://www.xerchem.fi/







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Chemical Heat Pump

Category: Technology \square , Process \square , Service \square , Method \square , R&D knowledge \square , Other \square

Benefit summary: The Chemical Heat Pump (CHP) transforms industrial low-temperature waste heat to a substantial higher and useful temperature. Unique selling points are the high temperature lift (40-60°C), low electricity use (only 2-4%) and high reliability (8300 running hours/y).

Development status:

A **first-generation** unit is under execution at Borealis Antwerp and expected on stream in 2020 (see picture). This installation will save up to 2200 tons of CO_2 per year.2 other units are in execution phase to be on stream by the end of 2020.

A **second-generation** demonstration unit on 100 kW scale for SPOTVIEW low temperatures (35-80°C) is in operation at Qpinch's Antwerp Pilot facilities.

IP status: Qpinch has the full Freedom To Operate (FTO).

Exploitation / licensing

 Any market or customer with waste heat and a need for heat at elevated temperature. Sales of first installations & licenses.



- Technology supplier
 - Qpinch, Rijnkaai 37, 2000 Antwerp, Belgium, www.qpinch.com/

Spot View

Technology leaflets



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