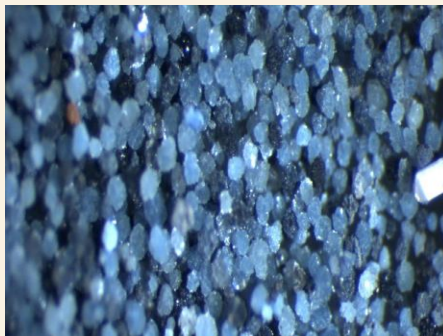


Valorisation of phosphorus via the extraction of vivianite from sewage sludge

ESNI-NERM 2026 Conference

Paul Roeleveld
Brussels, 29th of April 2026



Vivianite from sludge



Magnetic separator

New ownership for ViviMag® technology



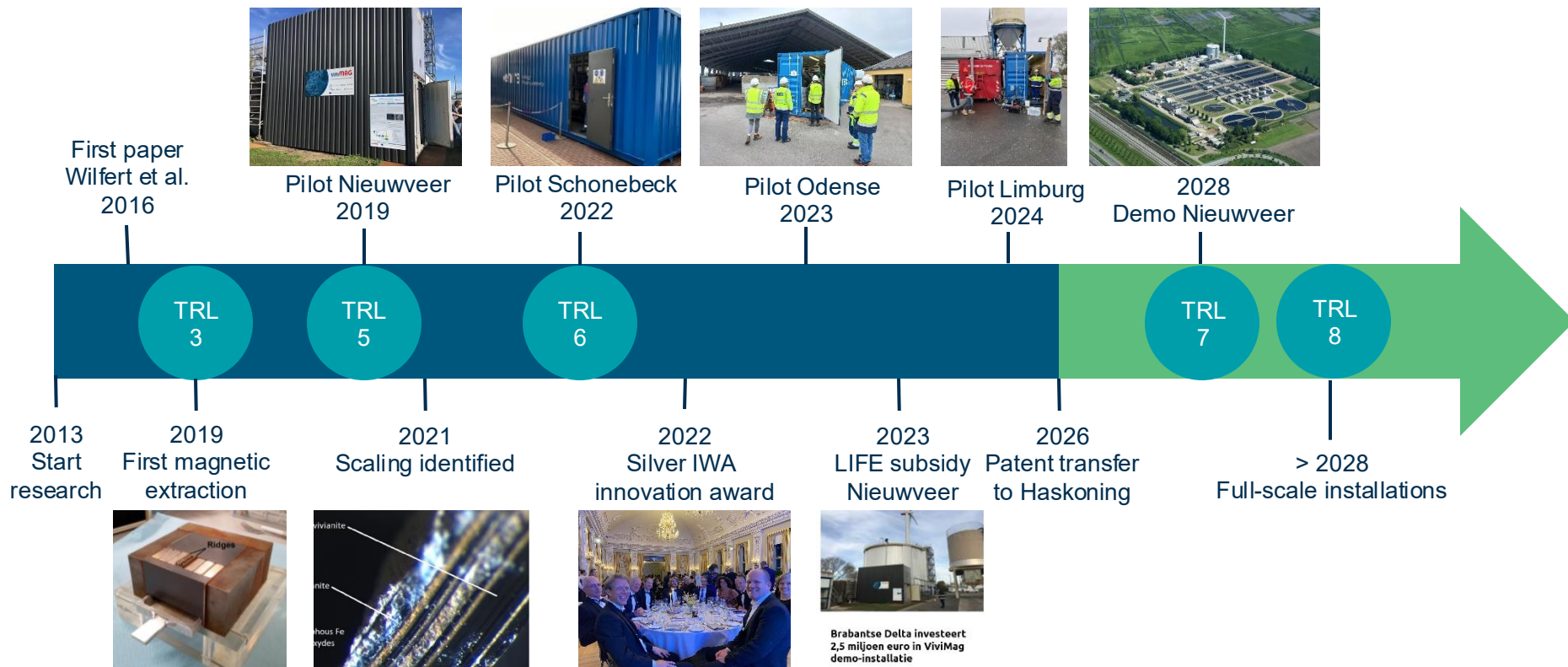
Haskoning ViviMag® team, from left to right:
Sigrid Scherrenberg, Paul Roeleveld and Martijn van Leusden.
© Haskoning.

Setting new standards for phosphorous recovery from sewage sludge

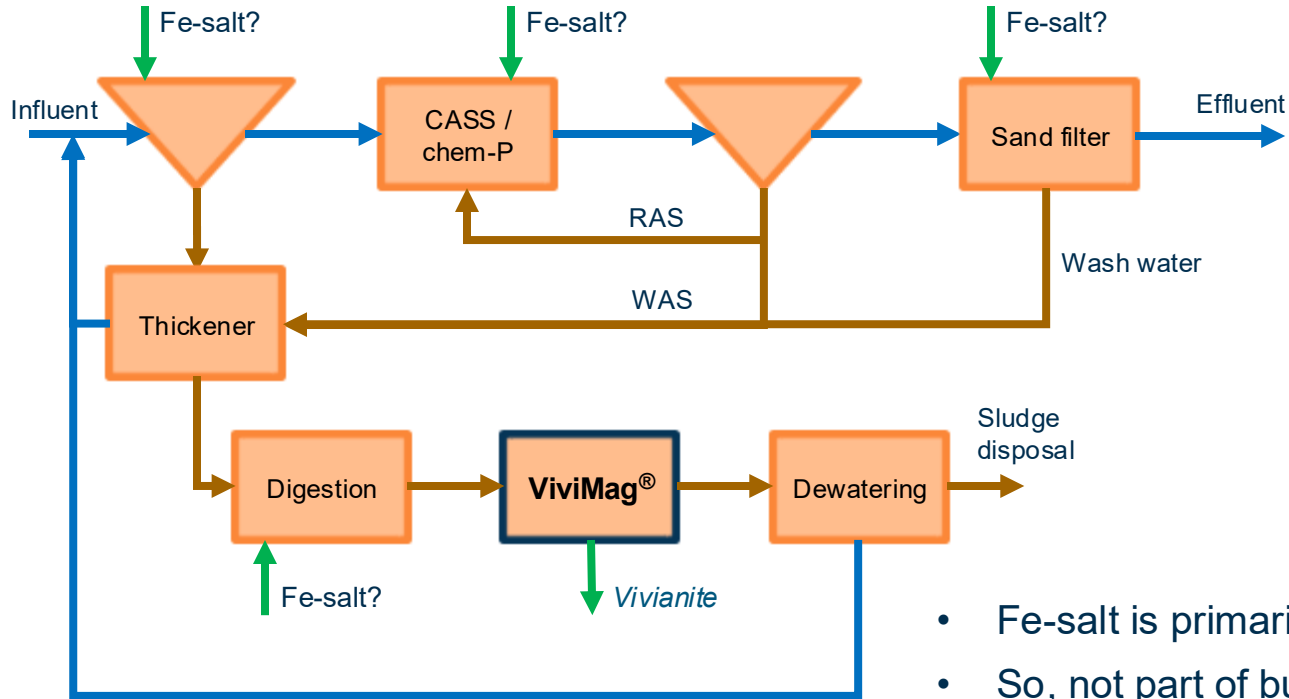
Haskoning acquires patent for groundbreaking ViviMag® water technology



Timeline of the development of ViviMag

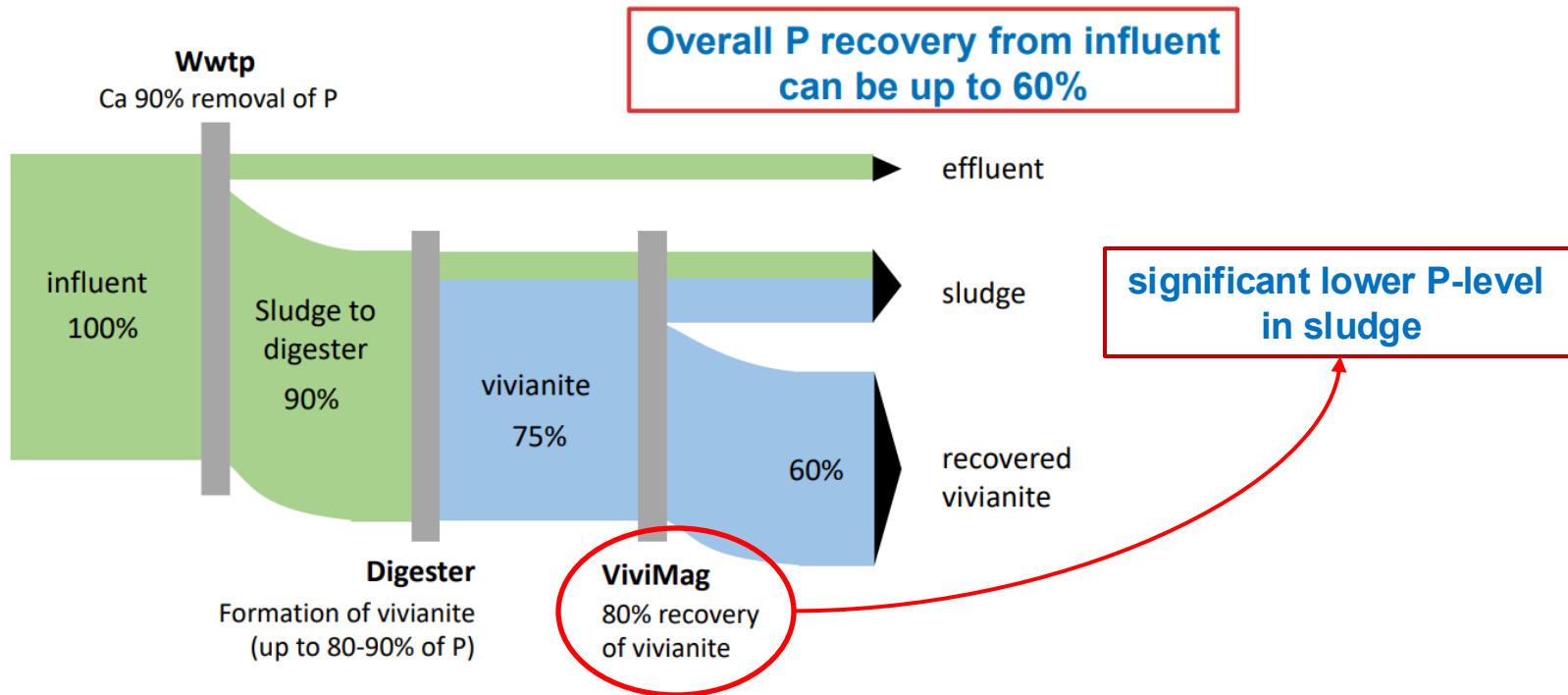


ViviMag process configuration



- Fe-salt is primarily required for P-removal
- So, not part of business case for ViviMag

Mass balance of phosphorus with ViviMag



Quality of Vivianite

Vivianite in Schönebeck

- Compliant with EU fertilizer regulations regarding metal impurities
- 10 – 12 % in DM P
- 24 – 27 % in DM Fe
- 6 – 8 % in DM TOC
- 26 – 32 % TS (at 105°C)

Parameter	Unit	Vivianite Schönebeck	EU fertilizer regulation 2019/1009 PFC 1(C)(I)
Arsenic (As)	mg/kgDM	1.6	40
Cd per P ₂ O ₅	mg/kg P ₂ O ₅	<1.7	60
Copper (Cu)	mg/kgDM	130	600
Mercury (Hg)	mg/kgDM	0.15	1
Nickel (Ni)	mg/kgDM	42	100
Lead (Pb)	mg/kgDM	15	120
Zinc (Zn)	mg/kgDM	380	1500

Earlier experiences [Wetsus]

- Organic micropollutants low
- Pathogens significantly reduced

With purification [rinsing]

- 80% vivianite content increased to > 95%
- 25-70% reduction of metal impurities
- TOC < 3%

First full-scale project at WWTP Nieuwveer



- Full commercial scale on wwtp of 400.000 p.e.
- Production of a few hundred tons of vivianite per year
- Preparations and design stage have been started

Part of EU LIFE PHOS4EU and co-funded by UppWater



Co-funded by
the European Union



Valorisation strategies for vivianite

Starting point: production of vivianite will start in 3-5 years on several locations

Fertilizer industry:

- In the process for acceptance in the Fertilizer Product Regulation (FPR)

LiFePO₄-batteries:

- PhD-research coming years of Wetsus with Technical University of Delft

Splitting of vivianite into Fe and PO₄

- Research proposals at Wetsus and Wageningen University

Valorization in other industries:

- removal of H₂S in digesters
- using infrastructure for P-recovery from incineration ashes

With help from:



Drivers for our clients

- Measure to obtain more than 50% P-recovery from wastewater → targets known in 2028
- Lowering the P-content in sludge (used as biosolids) up to 80% → biggest actual driver
- Lower sludge production (10 to 20%) due to harvesting of vivianite → positive BC for client
- Decreased risk for maintenance issues due to scaling of vivianite → positive BC for client
- Decrease the dependency of the Fe-market by reuse of Fe → future opportunity

If you are interested, please contact us



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