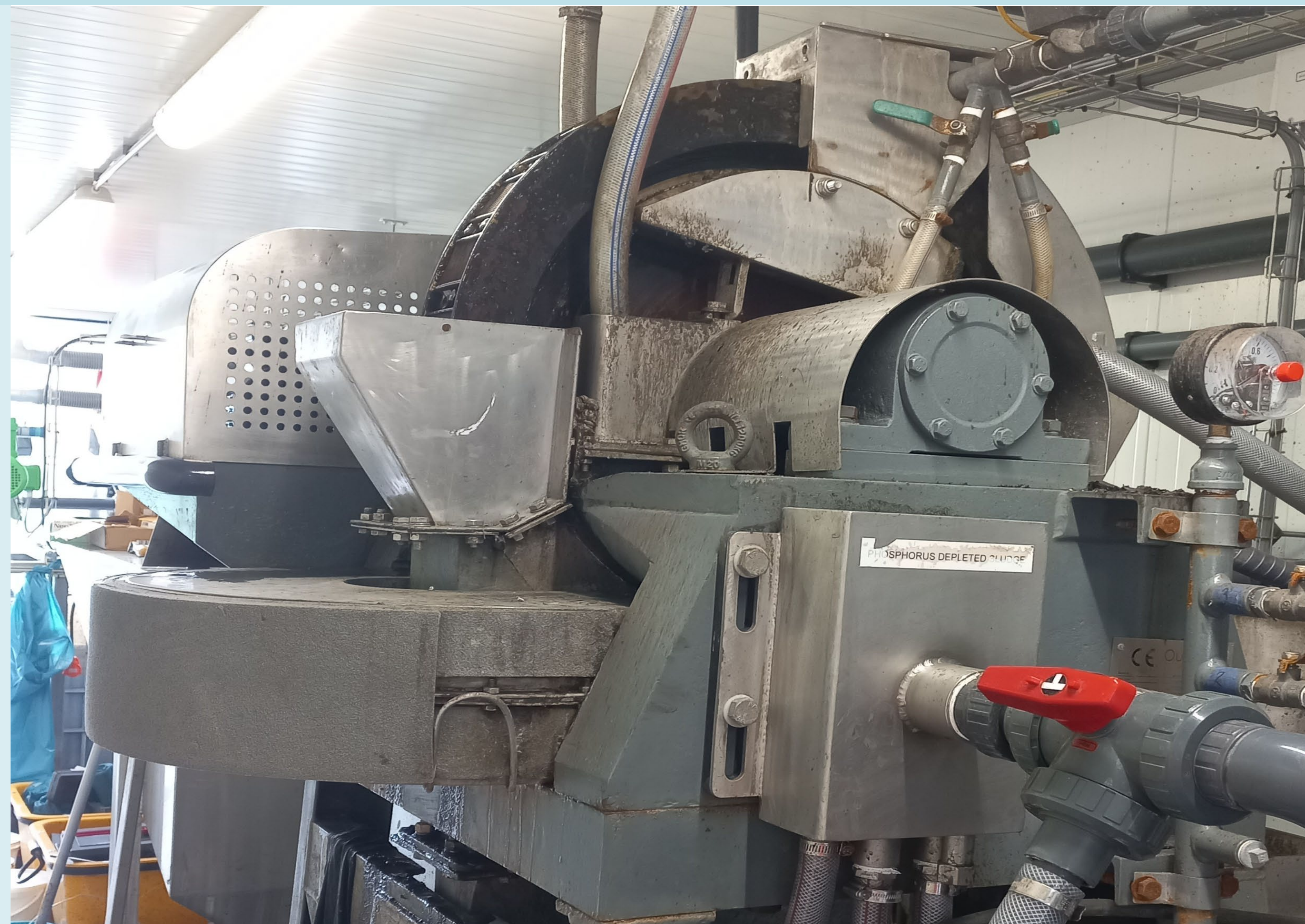


ViviMag® | P-recovery from sludge

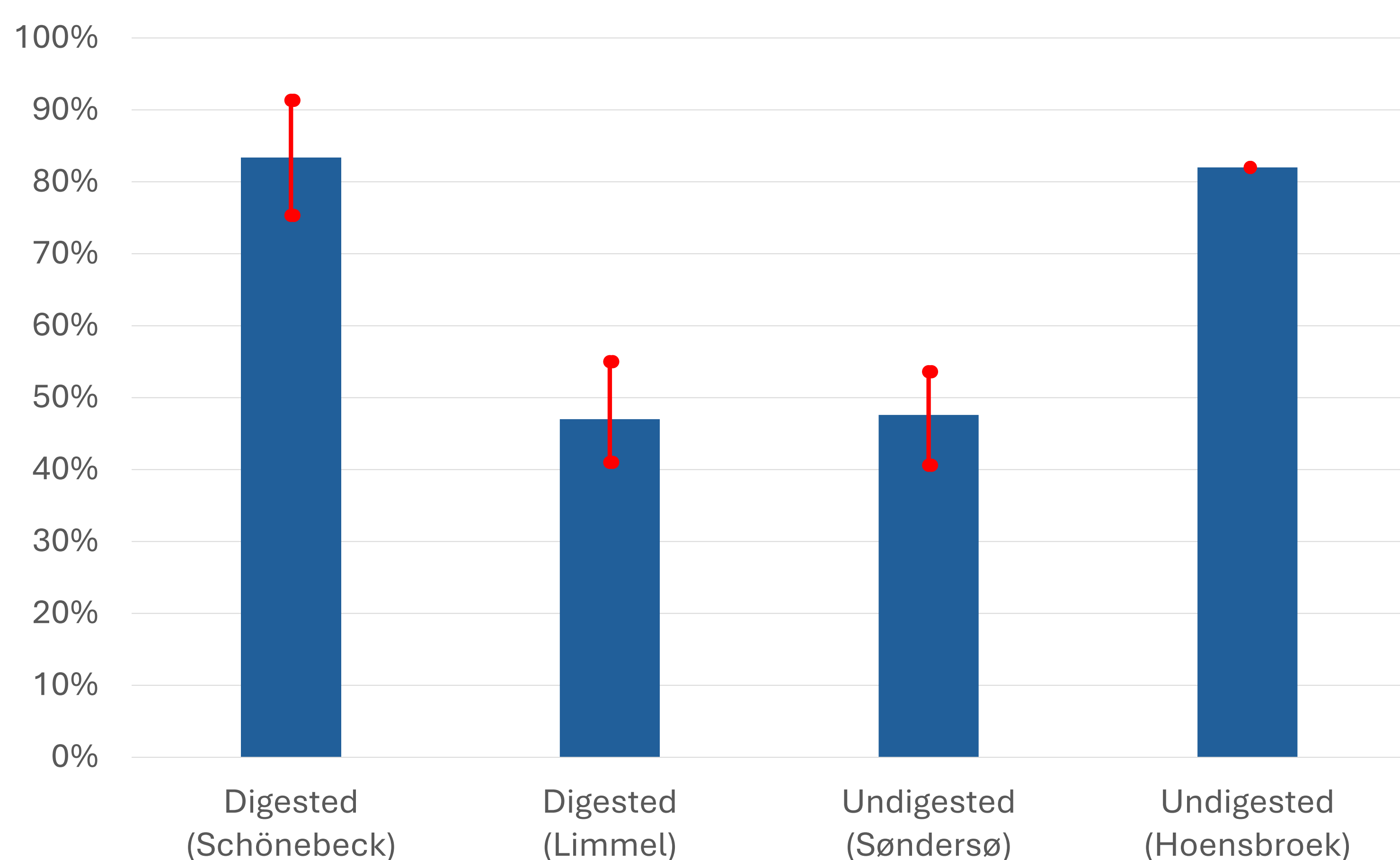
Recovering **phosphorus** at WWTPs is essential for sustainability and resource efficiency. With **upcoming EU regulations**, WWTPs will be required to meet -still to be defined- **recovery targets**. Besides, more stringent effluent requirements will result in an increase of P in the sludge. Traditional methods like incineration of sludge or land application are not future-proof, either removing P from the food chain or lacking control over P-content. There is a novel solution to **meet recovery targets** by recovering P from sludge as a mineral called **vivianite**.

Phos4EU: Advancing Phosphorus Recovery

- Over a decade of innovation in phosphorus recovery technology
- Initially developed by Wetsus and TU Delft and advanced by Kemira Oyj
- Industrial implementation driven by key partners:
 - Waterschap Brabantse Delta
 - Kemira Oyj
 - Waterschap Limburg
 - VandCenter Syd
 - Haskoning
 - Aquaminerals
 - Acciona
 - STOWA
- Demonstration through the Phos4EU project



P in vivianite



Process steps ViviMag®

1. Iron is added to wastewater to bind phosphorus, increasing effluent quality.
2. In anaerobic conditions (e.g. sludge buffers), iron and phosphorus form vivianite.
3. Vivianite is a paramagnetic mineral, enabling recovery via magnetic separation.
4. Magnetic separation techniques, adapted from the mining industry, separate vivianite from sludge.

The technology was first piloted at Nieuwveer WWTP in 2019, offering a novel and sustainable route for phosphorus recovery.

Achievements

The ViviMag® pilot demonstrated effective phosphorus recovery in four European WWTPs, with influent P-recovery rates up to 50% and aiming for 80% vivianite recovery.

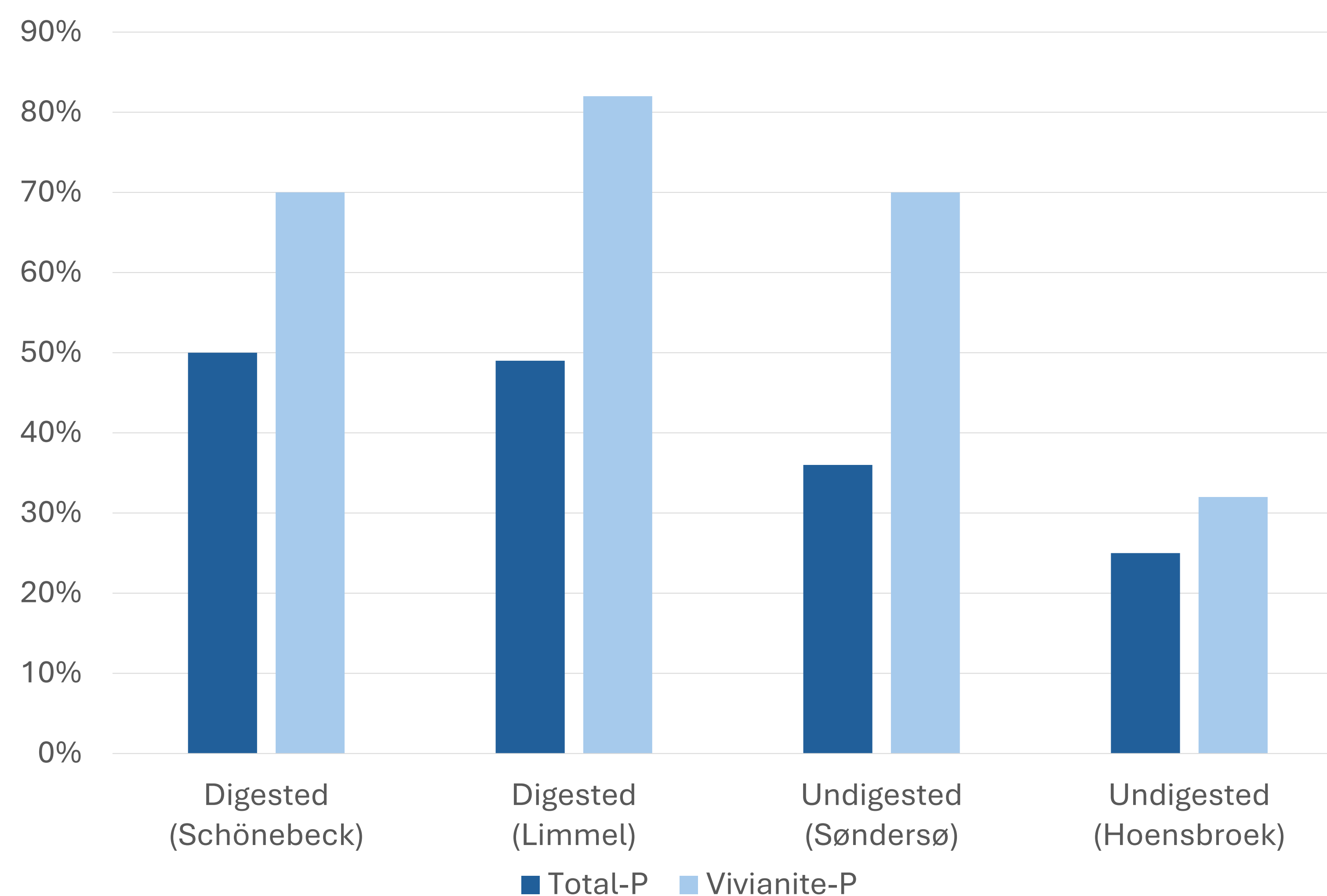
These results confirm ViviMag® as a great opportunity to meet future EU requirements on P-recovery in combination with excellent effluent standards.

Vivianite valorisation

Multiple ways to increase the valorisation of vivianite are being explored with vivianite as fertiliser being the reference option.

A full-scale demo at WWTP Nieuwveer is being realised. This project is part of EU LIFE PHOS4EU.

Total-P and Vivianite-P recovery rates



PARTICIPATING ORGANIZATIONS