

## Inventory of phosphorus “recovery and /or recycling” facilities operating or under construction at or downstream of wastewater treatment installations

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Technology	Location and operator	Operational since	Recovered material or product	Qty/a in tons
<b>Onsite wastewater treatment plants</b>				
AD-HAP (since 2014 by Hitachi Zosen)	Senboku Blackwater TP (JP), Senboku City	2007		15
	Totsugawa Village (JP)	2008		2
	Seihokugo Environment Improvement Assoc. (JP)	2009	HAP	40
	Kushimoto Town (JP)	2011	(from Night Soil)	11
	Shimanto Town (JP)	2011		11
	Kofu Town (JP)	2015		4
AirPrex®	MG-Neuwerk (DE), Niersverband	2009		100
	Wassmannsdorf (DE), Berliner Wasserbetriebe	2010		350
	Echten (NL), Drents Overijsselse Delta	2013		n.i.
	Amsterdam-West (NL), Waternet	2014		500
	Salzgitter Nord (DE), ASG	2015		50
	Uelzen (DE), SE Uelzen	2015		n.i.
	Tianjin (CN), Tianjin CEPG	2015		offline
	Wolfsburg (DE), SE Wolfsburg	2017	Struvite	(50)
	Liverpool, OH (USA), Medina County	2018		--*
	Savage, MD (USA), Howard County	2018		--*
	Denver, CO (USA), Denver Metro	2019		--*
	Ft. Collins, CO (USA)	2019		--*
	Göppingen (DE), SE Göppingen	2020		--
	Haifa (IL), Haifa District Industries Association	2022		--
Erlangen (DE), EBE Erlangen	2023		--	
ANPHOS®	Well (NL), EcoFuels, (biomass digestion)	2005		n.i.
	Odiliapeel (NL), Peka Kroef	2006		400
	Kruiningen (NL), Lamb Weston Meijer	2003		650
	Bergen op Zoom (NL), Lamb Weston Meijer	2007/16		290
	Budrio (IT), Pizzoli	2010	Struvite	150
	Haps (NL), Waterschap Aa en Maas	2011		n.i.
	Oosterbierum (NL), Lamb Weston Meijer	2016		580
	Den Bosch (NL), Waterschap Aa en Maas	2018		n.i.
	Asturias (ES), Longas	2018		n.i.
	Tiel (NL), Waterschap Rivierenland	2019		n.i.
Crystalactor®	Nanjing (CN), Royal Haskoning DHV	2010	Struvite	n.i.
EloPhos®	Lingen (DE), SE Lingen	2016	Struvite	--
Gifhorn	Gifhorn (DE), ASG (mothballed)	2007	Struvite/CaP	--
J-Oil	Yokohama (JP), J-Oil Mills Co.		HAP	260
JSA	Kawasaki (JP), Japan Synthetic Alcohol Co.	1998	HAP	n.i.
KURITA	Fukuoka North, South and Wasui (JP), Fukuoka C.	1997	Struvite	120
Kyowa Hakko	Hofu (JP), Kyowa Hakko Bio Corp.	2006	HAP	90
Multiform™ (acquired by Ostara) now called PEARL Fx	Yakima, WA (USA)	2012		n.i.
	Boise, ID (USA)	2015		n.i.
	Massey, MD (USA), Jones Family Farms (dairy)	2019	Struvite	n.i.
	Green Bay, WI (USA)	2019		n.i.
	Paso Robles, CA (USA), City of Paso Robles	2019		75

Multi-Solid	Hagenow (DE), AZV Hagenow & Umlandgemeinden	2023	Struvite	(100)
NASKEO	Castres (FR)	2015	Struvite	25
	Harelbeke (BE), Agristo	2008		250
	2x Niewkuerke (BE), Clarebout Potatoes	2009/12		650
	Waasten (BE), Clarebout Potatoes	2012		n.i.
	Geel (BE), Genzyme	2014		80
NuReSys®	Leuven (BE), Aquafin	2013	Struvite	50
	Land van Cuijk (NL), Logisticon	2015		150
	Apeldoorn (NL), Vallei & Veluwe	2016		550
	Braunschweig Steinhof (DE), SE BS / AVB	2019		--*
	Pima County, Tres Rios WRF, AZ (USA)	2021		--*
NutriTec® (Sustec, DMT)	Zutphen (NL), SaNiPhos® GMB	2010	Struvite & DAS	offline
	Tigard, OR (USA), Clean Water Services	2009		760
	Suffolk, VA (USA), Hampton Roads Sanit. District	2010		400
	York, PA (USA), City of York	2010		270
	Hillsboro, OR (USA), Clean Water Services	2012		1000
	Slough (UK), Thames Water	2012		130
	Saskatoon, SK (CDN), City of Saskatoon	2013		500
	Madison, WI (USA), Madison Metro. Sew. Distr.	2014		1000
	Burford, GA (USA), Gwinnett County	2015		1000
	Amersfoort (NL), Vallei & Veluwe	2015		500
PEARL® (OSTARA)	Edmonton, AB (CDN), EPCOR Water Services	2015	Struvite	2500
	Stickney, IL (USA), Metro. Water Recl. Chicago	2016	(Crystal Green®)	7700
	Reno, NV (USA), Cities of Reno and Sparks	2016		500
	Madrid (ES), Canal de Isabel II	2016		500
	Winchester, VA (USA), F. Winchester Service A.	2016		500
	St. Cloud, MN (USA), City of St. Cloud	2018		500
	Atlanta, GA (USA), City of Atlanta	2018		1000
	Jarocin (PL), City of Jarocin	2021		(130)
	Tel Aviv, (IL), Shafdan WWTP, Mey Ezor Dan	2021		(5000)
	Ottestad (NO), Hias WWTP, Hias IKS	2022		(250)
	Dublin (IE), Ringsend WWTP, Irish Water	2023		(5000)
PhosForce (Veolia)	Schönebeck (DE), OEWA Wasser & Abwasser GmbH	2023	Struvite/ Brushite (DCP)	(1000) customized
	7 plants installed in Japan between 1989 and 2011 with capacities between 80-500 m <sup>3</sup> /d	1989		n.i.
	--	1992		n.i.
	--	1995		n.i.
PHOSNIX® (Hitachi Zosen)	Lake Shinji-East (JP), Matsue City (1998)	1998	Struvite	125
	--	2000		n.i.
	--	2009		n.i.
	--	2011		n.i.
	Kinan Environment Improvement Association (JP)	2014		n.i.
PHORWater	Calahorra (ES), El Cidacos	2015 (demo)	Struvite	n.i.
	Olburgen (NL), Waterstromen (municipal & food)	2006		400
	Lomm (NL), Waterstromen (food)	2007		260
	China (brewery)	2011		(1100)
PHOSPAQ™	Poland (bio-ethanol)	2011	Struvite	(500)
	Nottingham (UK), Severn Trent Water	2012		730
	USA (confidential)	2013		(800)
	Hünfeld (DE), BFG-IAR Hünfeld GmbH (dairy)	2014		730
	China (food processing)	2015		(1400)

	China (ethanol)	2016		(90)
	Tilburg (NL), Waterchap de Dommel	2016		340
	UK (municipal)	2017		(600)
PhosphoGREEN (SUEZ)	Aaby (DK), Aarhus Water	2013		110
	Herning (DK), Herning Water	2016		106
	Marselisborg (DK), Aarhus Water	2018	Struvite	302
	Villiers Saint Frederic (FR), SIARNC	2019		43
	Sausheim (FR), Mulhouse	2019		88
P-RoC	Bachgau (DE), Markt Großostheim	2025	CaP at CSH	(40)
REPHOS® (delivered by NuReSys)	Altentreptow (DE), Remondis Aqua (dairy)	2006	Struvite	200
Rintoru®	Mobile unit applying A-CSH to recover P	--	CaP at CSH	--
STRUVIA™	Helsingør Southcoast (DK)	2015	Struvite	40
Swing	Higashi-Nada, Kobe City (JP), Swing Corp.	2012	Struvite	130
<b>Downstream wastewater treatment plants and ashes</b>				
Ash2®Phos	Schkopau (DE), EasyMining & Gelsenwasser AG	2024	HAP	(15.000)
	Helsingborg (SE), EasyMining Sweden AB	2025		(15.000)
AshDec®	Altenstadt (DE), Emter GmbH	2024	Calcined phosphate	(16.000)**
EUPHORE®	Mannheim (DE), MVV Energie AG	2022/23	Improved ash	(14.000)**
Fertiliser industry	Various companies already apply or consider use of secondary P sources	tested and intended	Commercial fertilisers	Mixed in***
Glatt® PHOS4green	Haldensleben (DE), SERAPLANT GmbH Bound to premium ash input (very limited)	2021	SSP, MCP, NPS	Intended (60.000)*** fertilisers
METAWATER	Gifu North (JP), Gifu City	2010	HAP	300
	Akisato (JP), Tottori City	2013		150
Nippon PA	Chiba (JP), Nippon Phosphoric Acid	2009	H <sub>3</sub> PO <sub>4</sub>	n.i.
TetraPhos®	Hamburg (DE), Hamburger Phosphorrecyclinggesellsch. mbH	2021	H <sub>3</sub> PO <sub>4</sub>	(7.000)

**Product/ P recycle column footnotes :**

\*P recycles (i.e. Struvite) are not extracted/harvested, but potentially adapted in future

\*\* P remains in the ash matrix, heavy metals are partially depleted by additive dosage and thermal treatment (thermo-chemical ash modification)

\*\*\* sludge ashes are mixed with other materials to form the P recycles (heavy metals are diluted, but not separated)

**Any full-scale facility missing? Please let me/us know!**

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