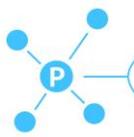
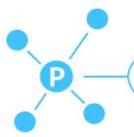


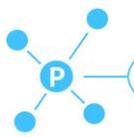
Raw material category	Abbrev.	Comment
Liquid/slurry phase		
Digestate	DIG	From different substrates : sludge, crops, biowaste
Domestic wastewater	DWW	
Groundwater	GW	
Industrial wastewater	IWW	
Landfill leachate	LL	
Manure	MAN	
Sludge liquor	SL	
Urine	URI	
Wastewater	DWW	
Sewage sludge	SS	
Solid phase		
Ashes	ASH	From different substrates : sludge, fly ashes, etc.
Biowaste	BIOW	Agriculture & food industries : waste wool, etc.
Waste	W	Any other applicable waste
Gas		
Air	AIR	Collected for odour treatment (compost, stables, manure storage, etc.) or N ₂ O capture
Biogas	BIOGAS	Collected for treatment before energy valorisation
Flue gas	FG	Exhaust from power plants
Off-gas	OG	Exhaust from industrial operation or incineration plant or sludge drying



Technology category	Abbrev.	Comment
Solid-liquid separation	SEP	Pretreatment
Centrifugation	CENT	
Coagulation	COAG	
Electrocoagulation	EC	
Flottation	FLOT	
Filtration	FILT	
Membrane separation	MEMSEP	
Microfiltration	MF	Membrane filtration
Precipitation	PPTN	
Ultrafiltration	UF	Membrane filtration
Adsorption	ADS	Often ion exchange, but without regeneration
Biochar/hydrochar	CHAR	
Biological conversion		Specifically as part of a recovery process
Nitrification	NITRIF	
Membrane bioreactor	MBR	Often NITRIF
Concentration		To concentrate N in liquid phase
Capacitive deionisation	CADEI	
Electrodialysis	ELECDIA	
Crystallisation	CRY	Also called precipitation in some papers (although different product) -> struvite or other
Electrochemistry	ELECHEM	
Microbial electrolysis	MELEC	
Microbial fuel cell	MFC	
Evaporation	EVA	To concentrate N in liquid phase
Evapo-concentration	EVACONC	
Vacuum membrane distillation	VMD	
Hydrolysis	HYD	
Superheated water hydrolysis	SWHYD	
Ion exchange	IEX	With regeneration -> concentrated solution
Resins	IEXRES	
Zeolites	IEXZEO	
Membrane filtration	MEMBF	To concentrate N in liquid phase
Forward osmosis	FO	
Nanofiltration	NF	
Reverse osmosis	RO	
Membrane separation	MSEP	To specifically separate N from the liquid phase
Hydrophobic membranes	HM	
Membrane contactor	MCONT	
Vacuum membranes	VM	
Scrubbing	SCRUB	Gas phase treatment (including stripping air, odour treatment, off-gas and flue gas, etc.)
Stripping	STRIP	To transfer N in gas phase, followed by treatment (SCRUB or other) or condensation
Air stripping	ASTRIP	
Digester stripping	STRIP	Operated to increase stripping and N recovery in gas as objective
Microwave stripping	MICSTRIP	



Membrane stripping	MEMSTRIP	
Steam stripping	SSTRIP	
Thermal drying / combustion	THERM	With N recovery in gas phase as one of the objectives
Thin-film evaporation	TFE	
Vacuum distillation	VACDIST	With N recovery in gas phase as one of the objectives



Targeted N species	Abbrev.	Comment
Ammonia/ammonium	NH ₃ /NH ₄	
Nitrate	NO ₃	
Nitrite	NO ₂	
Nitrogen oxide	NO _x	
Nitrous oxide	N ₂ O	

Organisation country	Organisation name	Organisation type	Organisation category*	Technology commercial name	Raw material (substrate)	Technology type	TRL	Final product	Product use	Website	Main source of info	Remark
Belgium	DETRICON	Private company	TP	-	DIG - Animal manure	STRIP & SCRUB	Industrial	NH ₄ / NO ₃ ⁻ SLTN	Fertiliser	https://www.detricon.eu/copy-of-nitroman		DIGESMART project. Partners: AINIA, Biogas-E, Detricon, SATA, Unito
Belgium	Waterleau	Private company	TP	-	IWWS, Animal Manure	EVACONC	Industrial	NH ₄ SLTN	Reductant in the DeNOx system of Incineration Plants	https://www.waterleau.com/en/about	Website	https://systemicproject.eu/wp-content/uploads/Factsheet-5-Waterleau-BE_20102021.pdf
Belgium	Ghent University	University	TD	-	AS-Swine	ASTRIP & SCRUB	Lab	AS, AN			Sigurnjak et al 2019	CO ₂ stripping then H2SO4
Belgium	Ghent University	University	TD	-	Fermentation Filtrate	THERM (HT oxidation)	Lab	nitrate and ammonium SLN	plant nutrition in regenerative life support systems		Zhang et al 2019	
Belgium	Ghent University	University	TD	-	DIG	Sub- and supercritical water oxidation (WOXI)	Lab	NH ₄ ⁺ , NO ₃ ⁻ SLN	Fertiliser in Regenerative Life Support Systems		Zhang et al 2018	H2O2 for oxidation
Belgium	Group op de Beek	Private company	TU		DIG	CENT, EVA, STRIP	Industrial	NH ₄ SLTN	Fertiliser	https://www.grouppopdebeek.com/en/ennu_nutrientre_cuperatie/	Website	
Belgium	John Cockerill	Private company	TP	Recov'Ammonia™		STRIP & SCRUB	Industrial	AS	fertiliser	https://johncockerill.com/en/environment/air-de-pollution/effluents-re-use-stripping/	website	http://www.europe-environnement.com/wp-content/uploads/2019/11/DAS-Stripping_EN.pdf
Belgium	TASK Environmental Engineering	Private company	TP	-	WW	STRIP & SCRUB	Industrial	AS	Fertiliser	https://task.be/en/wastewater-treatment/nh3-stripping-towers/	Website	
Belgium	Vermeulen Construct	Private company	TP	VeDoWS	URI		Industrial	AN	Fertiliser	https://www.vermeulenconstruct.be/en/animal-stall-equipment/	Website	They Produce the Vermeulen Dobbelaere Welfare System (VeDoWS) stabling system for manure separation
Czech Republic	MemBrain s.r.o.	Private company	TP		WW	MEMBF	Lab	AN	Fertiliser	https://www.membrain.cz/en/	website	Sales Lab & pilot Units
Denmark	Ammongas	Private company	TP	-	GAS	STRIP & SCRUB	Industrial	AN	Fertiliser	https://www.ammongas.com/ammongas-biogas-upgrade/	website	
Denmark	University of Copenhagen,	University	TD	-	Agricultural drainage water	IEXZEO	Pilot	NH ₄ SLTN	Fertiliser		Florea et al 2022	Zero valent iron then zeolite
Denmark	Technical University of Denmark	University	TD	-	Domestic biowaste DIG	ELECHEM	Lab	NH ₄ SLTN	cultivation medium for Single cell protein (SCP) production - for animal feed		Khoshnevisan et al 2019	
Denmark	Technical University of Denmark	University	TD	-	Cod Frame	HYD	Lab	fish protein hydrolysate (FPH)	antioxidants in the food and pharmaceutical industries		Jafarpour et al 2020	
Denmark	Technical University of Denmark	University	TD	-	URI, DWW, DIG	ELECHEM	Lab	NH ₄ SLTN	Cultivation of methanotrophs for microbial protein		Khoshnevisan et al 2020	Touches on the presence of pollutants e.g. pharmaceuticals in the final product

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Finland	Napapiirin Energia ja Vesi (NEVE) Ltd.	Private company	TU	-	SS	STRIP & SCRUB	Pilot	AS	Fertiliser	https://www.neve.fi/	Havukainen et al., 2022	Scrubbing with NaOH. :Havukainen, J., Saud, A., Astrup, T. F., Peltola, P., & Horttanainen, M. (2022, Jan 1). Environmental performance of dewatered sewage sludge digestate utilization based on life cycle assessment [Article]. Waste Manag, 137, 210-221. https://doi.org/10.1016/j.wasman.2021.11.005
Finland	Kajaani University of Applied Sciences	University	TD	-	WWTP & mine wastewaters)	MCONT & IEXRES	Lab	AS, MAP			Samarina & Takaluoma 2020	3M Liqui-Cel® membrane contactor
Finland	Helsinki Region Environmental Services HSY	Administration	TU	RAVITA	WWTS	STRIP	Pilot	(NH ₄) ₃ PO ₄	Fertiliser		Rossi et al 2018	H ₃ PO ₄
Finland	Aalto University	University	TD	-	1. Municipal WW, 2. Landfill Leachate	COAG & MCONT	1. Lab & Pilot, 2. Lab	1. AS	1. Fertiliser		1. Righetto et al 2021a, 2. Righetto et al 2021b	1. Starch based coagulants PrimePHASE 3545, PrimePHASE 3501, Polyaluminum chloride coagulant (PAX-XL100) and polymer (Superfloc A), 2. Decent removal of cationic surfactants, phenols and pharmaceuticals such as 5-methylbenzotriazole, ibuprofen, carbamazepine, and metoprolol was also achieved with the treatment
Finland	Tampere University of Technology	University	TD	-	URI	ELECHEM	Lab	NH ₄ HCO ₃			Jermakka et al 2018	
Finland	Tampere University	University	TD	-	DWW	MELEC & ELECDIA	Lab	NH ₄ SLTN			Koskue et al 2021	Notes highest recovery rate for bioelectroconcentration techniques (approx 75%). Reports microbial communities around electrodes
Finland	Tampere University	University	TD	-	Synthetic WW and WW	ELECHEM & STRIP	Lab	NH ₄ SLTN & AS	Fertiliser		Koskue et al 2021b	chloride oxidation at the BDD has been found to result in the formation of a persistent toxic by product, namely, perchlorate [40]. Here, perchlorate or other chlorination products were not analysed, but as the initial chloride concentrations at the anode were low, little toxic chloride by-product formation can be expected.
Finland	Aalto University	University	TD	NPHarvest	DWW, landfill leachate, & URI	MCONT & STRIP	Pilot and Industrial	AS	Fertiliser		Kaljunen et al 2020	The paper discusses the quality of ammonium sulfate in terms of vegetative cells and coliphages, harmful metals, and organic micropollutant measurements. The paper also provides comprehensive information on chemicals used and costs likely to be incurred.
Finland	Lappeenranta University of Technology	University	TD	-	DIG	THERM	Lab	NH ₃ gas			Deviatkin et al 2018	The paper just hints on other N recovery technologies that can be used after recovering NH3 gas
Finland	Lappeenranta-Lahti University of Technology LUT	University	TD	-	DIG -SS & WW	THERM & SCRUB	Lab	AS	Fertiliser		Saud et al 2021	Authors highlight that it is not possible to recover a large amount of nitrogen from thermal drying alone, and investment for this purpose only would not be cost-effective
Finland	Lappeenranta-Lahti University of Technology LUT	University	Technology developer	-	DWW	CADEI	Laboratory	?	?	www.lut.fi		

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Finland	VTT Technical Research Centre of Finland	Research centre	Technology developer		Lq phase	Membrane					Email	
France	The European Space Agency (ESA).	Multi-Governmental	TD	MELISSA - Loop	All organics	THERM (HT oxidation)	Pilot	NS	Fertiliser	https://www.esa.int/Enabling_Support/Space_Engineering_Technology/Melissa	Zhang et al., 2018	
France	John Cockerill Europe Environnement	Private company	TP	RECOV'AMMONIA	DIG	STRIP & SCRUB	Industrial	AS	Fertiliser	http://www.europe-environnement.com/en/	Folino et al (2020) & Website	
France	France Evaporation	Private company	Technology provider	-	WW, AIR	ASTRIP/SSTRIP SCRUB	Industrial	DAS (Lq), DAP, NH3 sltn	Fertiliser	https://www.evaporation.fr/en/		
France	Geotexia	Private company	Technology user	-	DIG (MAN + biowaste)	CENT -> lq : UF + RO -> Conc. : EVA	Industrial	NK lq (20% DM)	Fertiliser	https://geotexia.wordpress.com/#	https://geotexia.wordpress.com/#	
Germany	Envimac	Private company	TP	ENVIMAC stripping technology	landfill gas, digestate, sludge	STRIP	Industrial	NH ₄ SLTN, AS	Fertiliser	http://www.envimac.com/technologies/waste-water-processing/ammonia-removal-and-recovery.html	website	
Germany	GNS (Röblingen am See, DE)	Private company	TP	FiberPlus - (Formerly ANAStrip)	chicken litter DIG	STRIP & SCRUB	Pilot	AN, AS	Fertiliser	https://www.gns-halle.de/en/services/gns-procedure.php	Folino et al (2020) & Website	They use Gypsum to scrub, See also: http://www.cings.net/de/projekte/gaarrestaufbereitung-roeblingen and https://systemicproject.eu/wp-content/uploads/NH3stripping-scrubbing_gypsum.pdf
Germany	Benas-GNS	Private company	TU	FiberPlus	Chicken litter manure	STRIP	Industrial	AS	Fertiliser	https://benas-gruppe.com/willkommen-bei-der-benas-gruppe/nachhaltige-papier-und-fasergussproduktion/	Sigurnjak et al (2019) and Website	https://systemicproject.eu/wp-content/uploads/Factsheet-4-Benas-year-3-final.pdf
Germany	Münster University of Applied Sciences	University	TD	-	WW	MCONT	Lab	AS	Fertiliser	https://www.fh-muenster.de/hochschule/aktuelles/pressemitteilungen.php?pmid=8904	Richter et al 2021	
Germany	Münster WWTP	Administration	TU	-	WW	MCONT	Industrial	AS	Fertiliser		Richter et al 2021, Richter et al 2021	Münster wastewater treatment plant (WWTP) is the first municipal WWTP in Germany operating a full-scale membrane contactor system
Germany	Fraunhofer UMSICHT, Abteilung Umwelt und Ressourcennutzung	Research centre	Technology developer	-	SL	MEMSEP, IEX	Pilot	NO3 sltn, DAS (lq)	Fertiliser		Email	SUSKULT project
Germany	KWB	Research centre	Technology developer	-	DIG	Vacuum STRIP	Pilot	?	Fertiliser	https://www.kompetenz-wasser.de/en	https://www.circularagronomics.eu/	Circular Agronomics project
Germany	RVT Process Equipment GmbH	Private company	TP	Turnkey Units	WW, DIG	STRIP & SCRUB	Industrial	AS	Fertiliser	https://www.rvtp.com/global/en/products/turnkey-units/ammonia-recovery	Website	https://sswm.info/sites/default/files/reference_attachments/RVT%202010%20Ammonia%20Recovery_%20Ammonia%20Removal%20from%20Liquids%20and%20Gases.pdf
Hungary	University of Szeged	University	TD	-	Milking Parlor WW	IEX PPP-Pomogrenate Peel Powder	Lab	NH ₄ + doped PPP			Hodúr et al 2020	

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Hungary	Budapest University of Technology and Economics	University	TD	-	URI WW	HM	Lab	AS	Fertiliser		Nagy et al 2019	
Ireland	BioAtlantis	Private company	TU		Seaweed	HYD	Industrial	amino acids	humans and animal nutrition	https://www.bioatlantis.com/who-we-are	Website	
Ireland	tccb Resource (Irish Research Centre for Resource Efficiency - Company Limited)	Research Organisation	TD	SLURRES Pilot	WW	ASTRIP & SSTRIP	Scaling Up	NH ₄ SLTN	Fertiliser	http://www.tccbresource.ie/	website	
Ireland	Biomarine Ingredients	Private company	TU		Fish	HYD & FILTRATION	Industrial	hydrolysed Fish Protein Isolates	Human and Animal nutrition ingredients	https://www.biomarine.ie/who-we-are/	Website	
Italy	Acqua & Sole	Private company	TU	-	DIG	STRIP	Industrial	AS	Fertiliser	https://neorisorse.net/	Sigurnjak et al (2019) and Website	https://systemicproject.eu/wp-content/uploads/Factsheet-3-rev.-AcquaSole-26112021.pdf
Italy	University of Rome Sapienza	University	TD	-	DIG	MELEC	Pilot	NH ₄ SLTN			Cristiani et al 2020	
Italy	University of Rome Sapienza	University	TD	-	Synthetic WW	MELEC	Lab	NH ₄ SLTN	Fertiliser		Zeppilli et al 2019	
Italy	Architctural and Environmental Engineering University	University	TD	-	DIG - buffalo manure	STRIP	Lab	Gaseous Ammonia	Single Cell Proten production		Silvio Matassa et al 2020	
Norway	N2 Applied	Private company	Technology provider	?	MAN	Plasma	Industrial	N-enriched manure	Fertiliser	https://n2applied.com/		
Poland	Wroclaw University of Environmental and Life Sciences	University	TD	-	WW	nitritation, MF, NF was IEX	Lab	nitrite solution	Fertilizer or inhibitor of H ₂ S formation in sewers		Wiercik et al 2020	
Slovenia	University of Maribor	University	TD	-	DWW	IEXZEO	Lab	NH ₄ SLTN	N/A		Petrovic et al 2021	Na-zeolite
Spain	Cetaqua	Research centre	Technology provider	-	?	IEXZEO and MCONT	?	NH ₄ salts	Fertiliser	www.cetaqua.com		Walnut project https://walnutproject.eu/
Spain	Ecotec	Private company	Technology provider	-	WW, AIR	ASTRIP SCRUB	Industrial	DAS (Lq), DAP	Fertiliser	https://www.ecotec.es/en/index.php		
Spain	University of Valladolid	University	Technology developer	-	MAN	MEMSTRIP	Pilot	?	Fertiliser			Green Ammonia project (+ 3 livestock companies)

Organisation country	Organisation name	Organisation type	Organisation category*	Technology commercial name	Raw material (substrate)	Technology type	TRL	Final product	Product use	Website	Main source of info	Remark
Spain	Leitat Technological Center	Research Organisation	TD	-	Synthetic WW	MFC & STRIP	Lab	AN	Fertiliser	https://www.leitat.org/en/about-us/	Losantos et al 2021	EU H2020 Run4Life Project (2017–2021, GA 730285)
Spain	Universidad de Leon	University	TD	-	DIG and pig slurry	MELEC	Lab	NH ₄ SLTN	Fertiliser		San-Martín et al 2019	
Spain	Institute of Agrifood research Technology	Research Organisation	TD	-	pig slurry DIG	MELEC & HM	Lab	NH ₄ SLTN	Fertiliser		Cerrillo et al 2021a	
Spain	Institute of Agrifood research Technology	Research Organisation	TD	-	pig slurry DIG	MELEC & HM	Lab	NH ₄ SLTN	Fertiliser		Cerrillo et al 2021b	
Spain	University of Barcelona	University	TD	-	municipal solid waste broth/slurry	MCONT	Pilot	AS	Fertiliser		Serra-Toro et al 2022	
Spain	Universitat Politècnica de Valencia	University	TD	-	WW	MCONT	Lab	AS	Fertiliser		Noriega-Hevia et al 2020	
Spain	Miguel Hernandez University	University	TD	-	DIG	HM	Lab	NH ₄ SLTN			Filho et al 2018	
Spain	Agricultural Technological Institute of Castilla and Leon (ITACyL)	Research Organisation	TD	-	livestock WW	HM	Pilot	AS	Fertiliser		Molinuevo-Salces et al 2020	
Sweden	EasyMining	Private company	TP	CleanMAP, Aqua2™N	WW	Chemical adsorption (not specified)	Industrial	MAP, AS	Fertiliser	https://www.easymining.se/about/this-is-easymining/	website	
Sweden	EkoBalans	Private company	TP	eco:N	WW	STRIP & SCRUB	Industrial	AS	Fertiliser	https://ekobalans.se/	website	constructed pilot plant at the Hammarby Sjöstadsværk facility in 2020
Sweden	Mälardalen Högskola	University	TD	-	Synthetic Solution	CHAR	Lab	NH ₄ -loaded biochars			Beckinghausen et al 2020	digested sewage sludge biochar
Sweden	Swedish University of Agricultural Sciences	University	TD	-	URI	IEX, EVA, CHAR/ASH	Lab	NH ₄ loaded CHAR/ASH	Soil conditioner /Fertiliser		Simha et al 2018, Simha et al 2020	
Sweden	Mälardalen University	University	TD	-	DIG	THERM (combustion, pyrolysis, and gasification) & STRIP	Lab	AS	Fertiliser		Salman et al 2019	

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Switzerland	Membratec	Private company	Technology provider	-	DIG	MCONT	Industrial	AS	Fertiliser	https://www.membratec.ch/eau/stripping-membranaire-production-engrais-azote-670.html	Contact	
Switzerland	Swiss Federal Institute of Aquatic Science and Technology	Research Organisation	TD	-	URI	EVA	Lab & Pilot	AS			Riechmann et al 2021	
The Netherlands	Inno+	Private company	TP	Pollo air scrubber		SCRUB	Industrial			https://inno-plussystems.com/en/pollo-air-scrubber-for-poultry-farming/	Website	
The Netherlands	Byosis Group BV	Private company	TP	ByoFlex®	WW, DIG	STRIP & SCRUB	Industrial	AS	Fertiliser	https://byosis.com/systems/byoflex	Website	
The Netherlands	Bluetech	Private company	TP		WW	Hollow fiber HM	Industrial	AS	Fertiliser	https://www.bluetec.nl/ammonia-membrane-stripping	Website	
The Netherlands	Colsen	Private company	TP	MBR-NAS®, AMFER	WW	MEMBF	industrial	AS	Fertiliser	https://www.colsen.nl/en/projects/manure-valorisation-navia	Folino et al (2020) & Website	
The Netherlands	CircularValues	Private company	TP	Farmcubes QNR and Farmcubes HPRO	DIG	RO, STRIP	Industrial	AS, AN	Fertiliser	https://circularvalues.eu/en/farmcubes_quadro/	Website	
The Netherlands	Evides Water Company	Private company	Technology provider	-	DWW	EC -> lq : NF + RO -> Conc. -> Microalgae	Pilot	phycocyanine	Pigment	https://www.evidesindustriewater.nl/nl/nereus	https://www.nereus-project.eu/nutrients/	Nereus project
The Netherlands	GMB BioEnergie	Private company	TP	-	AIR (for odour treatment)	STRIP & SCRUB	Industrial	AS	Fertiliser	https://www.gmb.eu/gmb-clusters/gmb-bioenergie/nutriententerugwinnig	Website	
The Netherlands	Lenntech	Private company	Technology provider	-	DIG, etc.	Bipolar membrane ELECDIA	Pilot	?	?	www.lenntech.com	Contact	
The Netherlands	Merensteyn	Private company	Technology user	-	DIG	SEP -> lq : FLOT -> lq : RO (+ H2SO4) -> Concentrate lq -> IOX	Industrial	NK concentrate	Fertiliser		WUR evaluation	160.000 T/y
The Netherlands	Mezt	Private company	Technology provider	-	DIG	BiPolar ELECDIA + VM Stripping	Pilot	NK (?)	Fertiliser	www.mezt.eu		
The Netherlands	Natuchem	Private company	Technology user	?	?	?	Industrial	DAS (solid)	Fertiliser	www.natuchem.eu		see Circular Values
The Netherlands	Nijhuis Saur Industries	Private company	Technology provider	AECO-NAR or GENIUS/GENIAAL	DIG (MAN, sludge) or MAN	CENT -> (lq : FLOT ->) lq : STRIP + SCRUB	Industrial	DAS (Lq) or NK concentrate	Fertiliser	https://www.nijhuisindustries.com/solutions/resource-recovery/aeco-nar	https://www.nutrientplatform.org/succesverhalen/	see WUR evaluation : Groot Zevent Vergisting (NL) : 125 T/d
The Netherlands	Opure	Private company	Technology provider	-	DIG	SEP -> MBR -> NF	Industrial	NO3 concentrate	Fertiliser	https://www.opure.nl/productie-glastuinbouw-nutrienten-uit-mest		see WUR evaluation : Ecoson (NL) : 125 T/d
The Netherlands	RN Solutions	Private company	Technology provider	-	DIG (RO conc.)	VMD	Pilot ?	NH3 sltn	Fertiliser	https://www.rnsolutionsbv.com/	WUR evaluation : NK RO concentrate	
The Netherlands	Van Amstel	Private company	Technology user	-	DIG	SEP -> lq : FLOT -> lq : RO (+ H2SO4) -> Concentrate lq -> IOX	Industrial	NK concentrate	Fertiliser		WUR evaluation	35.000 T/y

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The Netherlands	Van Iperen International BV	Private company	Technology user	GreenSwitch Nitrate (ART & AIR process)	DIG (MAN + biowaste + etc.)	SEP -> Iq : STRIP + SCRUB (+ KHCO3) -> Iq : nitrification -> CONC (RO ?)	Industrial	KNO3 Iq (GreenSwitch® Original HG)	Fertiliser	https://www.vaniperen.com/story/greenswitch/	See PureGreen Agriculture	
The Netherlands	Wageningen University	University	TD	-	Synthetic WW	ELECHEM, ELECDIA	Lab	AS, AN	Fertiliser		Rodrigues et al 2021a, b & Rodrigues et al 2022	
United kingdom	Agua DB	Private company	Technology provider	NTPlus	GW	IEX	Proof of concept	KNO3 sltn	Fertiliser	www.aguadb.com		
United kingdom	CCm Technologies	Private company	Technology provider		DIG	?	?	Biochar	Fertiliser	https://www.ccstechnologies.co.uk/		
United kingdom	Cranfield University	University	Technology developer	-	WW	IEX	Pilot	NH3 sltn, N salt	Chemicals, fertiliser	https://www.cranfield.ac.uk/smartplant	http://www.smart-plant.eu/	SMART-Plant project
United kingdom	Organics Group	Private company	Technology provider	?	WW	ASTRIP SCRUB	Industrial	NH4 salt, NH3 sltn	?	www.organicsgroup.com		
United kingdom	Thermax Europe Limited	Private company	TP	-	-	RO, NF, UF MEMBF	Industrial			https://www.thermaxglobal.com/europe/	website	
United kingdom	University of Leeds	University	TD	-	Synthetic Solution	CHAR	Lab				Takaya et al 2021	oak-based hydrochar

* TD : Technology developer
TP : Technology provider
TU : technology user

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Australia	University of Technology, Sydney (UTS)	University	TD	-	URI	FO	Lab	STRU & NH ₃ SLTN	Fertiliser		Volpin et al 2019	Mg(NO ₃) ₂ , fertiliser-drawn FO (DFDO)
Australia	University of New South Wales	University	TD	CapAmm	WW	Flow Electrode CADEI	Lab	AS	Fertiliser		Zhang et al 2018	
Australia	University of Technology, Sydney (UTS)	University	TD	-	Synthetic URI	FO	Lab	STRU & Urea SLN	Fertiliser		Volpin et al 2018	
Australia	University of Technology, Sydney (UTS)	University	TD	-	URI	FO & MD	Lab	NH ₃ SLTN & Urea SLTN	Fertiliser		Volpin et al 2020	
Australia	University of Technology Sydney (UTS)	University	TD	-	URI	NITRI (in a membrane bioreactor) & Solar EVA	Pilot	nitrate solution	Fertiliser		Ren et al 2021	Urine stabilization by nitrification
Austria	Montanuniversität Leoben	University	TD	-	swine manure	IEXZEO	Pilot	AS	industrial off-gas cleaning (DeNOx) or fertilizer		Ellersdorfer et al 2020	Zeolite
Austria	Montanuniversität Leoben	University	TD	-	Sludge WW	IEXZEO	Pilot	AS	reducing agent for industrial off-gas treatment		Lubensky & Ellersdorfer 2021	
Belgium	DETRICON	Private company	TP	-	DIG - Animal manure	STRIP & SCRUB	Industrial	NH ₃ / NO ₃ SLTN	Fertiliser	https://www.detricon.eu/copy-of-nitroman		DIGESMART project. Partners: AINIA, Biogas-E, Detricon, SATA, Unito
Belgium	Waterleau	Private company	TP	-	IWWS, Animal Manure	EVACONC	Industrial	NH ₃ SLTN	Reductant in the DeNOx system of Incineration Plants	https://www.waterleau.com/en/about	Website	https://systemicproject.eu/wp-content/uploads/Factsheet-5-Waterleau-1F-20102021.pdf
Belgium	Ghent University	University	TD	-	AS-Swine	ASTRIP & SCRUB	Lab	AS, AN			Sigurnjak et al 2019	CO ₂ stripping then H2SO4
Belgium	Ghent University	University	TD	-	Fermentation Filtrate	THERM (HT oxidation)	Lab	nitrate and ammonium SLN	plant nutrition in regenerative life support systems		Zhang et al 2019	
Belgium	Ghent University	University	TD	-	DIG	Sub- and supercritical water oxidation (WOXI)	Lab	NH ₄ ⁺ , NO ₃ SLN	Fertiliser in Regenerative Life Support Systems		Zhang et al 2018	H2O2 for oxidation
Belgium	Group op de Beeck	Private company	TU	-	DIG	CENT, EVA, STRIP	Industrial	NH ₃ SLTN	Fertiliser	https://www.groepopdebeeck.com/en/ennu-nutrientrecuperatie/	Website	
Belgium	John Cockerill	Private company	TP	Recov'Ammonia™		STRIP & SCRUB	Industrial	AS	fertiliser	https://johncockerill.com/en/environment/af-de-pollution/effluents-re-use-stripping/	website	http://www.europe-environnement.com/wp-content/uploads/2019/11/DAS-Stripping_EN.pdf
Belgium	TASK Environmental Engineering	Private company	TP	-	WW	STRIP & SCRUB	Industrial	AS	Fertiliser	https://task.be/en/wastewater-treatment/nh3-stripping-towers/	Website	
Belgium	Vermeulen Construct	Private company	TP	VeDoWS	URI		Industrial	AN	Fertiliser	https://www.vermeulenconstruct.be/en/animal-stall-equipment/	Website	They Produce the Vermeulen Dobbelaere Welfare System (VeDoWS) stabling system for manure separation
Brazil	Federal University of Minas Gerais	University	TD	-	Food waste DIG	ASTRIP & SCRUB	Lab	AS	Fertiliser		Melgaco et al 2020	H2SO4
Brazil	Federal University of Pelotas	University	TD	-	Landfill leachate	STRIP & SCRUB	Pilot	MAP	Fertiliser		dos Santos et al 2020	
Canada	BTS Biogas	Private company	TU	NITROstripp	GAS	STRIP & SCRUB	Industrial	AS	Fertiliser		website	
Chile	Universidad Técnica Federico Santa María	University	TD	-	Salmon Frame	HYD	Lab	fish protein hydrolysate (FPH)	food supplements		Valencia et al 2021	
China	Shanghai Laogang Municipal Solid Waste Treatment Co., Ltd	Private company	TU	-	Landfill Leachate	SSTRIP	Pilot	NH ₄ HCO ₃	Fertiliser and chemical industry		Xiong et al (2018)	https://doi.org/10.1016/j.jclepro.2018.08.285
China	Wuhan University	University	TD	-	WWTP Effluent	IEXCER	Lab	NH ₃ SLTN	Fertiliser		Shao et al 2022	Modified ceramsite
China	Xi'an University of Architecture and Technology	University	TD	-	WWAS	STRIP	Lab	NH ₃ SLTN	Not given		Yang et al 2022	
China	Tsinghua University	University	TD	-	Synthetic WW	Flow Electrode CADEI	Lab	NH ₃ SLTN			Fang et al 2018	K ₂ FeO ₄ , then alkali-stripping

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China	China Agricultural University	University	TD	-	1. Leachate-Compost, 2. DIG	CHAR	Lab			Same person (1)	1. Zhang et al 2019, 2. Zhang et al 2020	1. Raw compost leachate from a pig farm
China	Nanchang University	University	TD	-	Swine WW	CHAR & IEXZEO	Lab				Yu et al 2020	After adsorbing nh4 micro algae were grown
China	Northeastern University	University	TD	-	Mine WW	1. STRIP & SCRUB, 2. CRY	Lab	1. AS, 2. STRU	fertiliser	Same person (3)	1. Zhou et al 2021a, 2. Zhou et al 2021b	1. hazardous vanadium-extracted solution
China	Qingdao University of Technology	University	TD	ENRRA	IWW	ELECHEM	Pilot	AS	fertiliser		Gao et al 2021	Printing industry WW
China	Chongqing University	University	TD	-	Landfill Leachate	ELECDIA	Lab	NH ₄ SLTN	Fertiliser		Zhang et al 2020	
China	Tianjin University	University	TD	-	Synthetic URI	MFC & HM	Lab	AS	Fertiliser		Han et al 2022	
China	Beihang University	University	TD	-	URI	HYD	Pilot	NH ₄ SLTN	Fertiliser in space Life support systems		Zhu et al 2019	They used biological activated carbon (BAC) immobilizing urease-producing microorganisms as the continuous provider of urease to hydrolyze urea in urine. For regenerative life support systems
China	Gongshang University	University	TD	-	Fish backbones	HYD	Lab	fish protein hydrolysate (FPH)	Food supplements, cosmetics and pharmaceuticals		Dong et al 2021	
China	Nankai University	University	TD	-	WW	MFC	Lab		Fertiliser		Wan et al 2020	dissimilatory nitrate reduction to ammonia (DNRA) then melecham
China	Donghua University	University	TD	-	palladium leachate - mine WW	direct contact membrane distillation (DCMD)	Lab	ammonium chloride (AC)			Hu et al 2022	
China	Tsinghua University	University	TD	-	URI	NITRI & Dissolved Oxygen (DO) bioreactor	Lab	AN	Fertiliser		Zuo et al 2022	
China	Fudan University	University	TD	-	Landfill leachate	SSTRIP	Pilot	NH ₄ HCO ₃	industry and agriculture.		Xiong et al 2018	
China	Beijing Jiaotong University	University	TD	-	URI	Vacuum Thermal Stripping (VTSTRIP)	Lab	AS			Tian et al 2019	
China	Chongqing Technology and Business University	University	TD	-	DIG - SS	THERM (pyrolysis)	Lab	NH ₄ HCO ₃			Qi et al 2020	
China	Huazhong Agricultural University	University	TD	-	DIG - biogas slurry	(humidification/ dehumidification) HW/MID	Lab	Conc nutrient Slurry	Fertiliser		Wang et al 2020	The only publication seen so far that has this process
Czech Republic	MemBrain s.r.o.	Private company	TP	-	WW	MEMBF	Lab	AN	Fertiliser	https://www.membrain.cz/en/	website	Sales Lab & pilot Units
Denmark	Ammongas	Private company	TP	-	GAS	STRIP & SCRUB	Industrial	AN	Fertiliser	https://www.ammongas.com/ammongas-biogas-upgrading/	website	
Denmark	University of Copenhagen,	Academic Organisation	University	-	Agricultural drainage water	IEXZEO	Pilot	NH ₄ SLTN	Fertiliser		Florea et al 2022	Zero valent iron then zeolite
Denmark	Technical University of Denmark	University	TD	-	Domestic biowaste DIG	ELECHEM	Lab	NH ₄ SLTN	cultivation medium for Single cell protein (SCP) production - for animal feed		Khoshnevisan et al 2019	
Denmark	Technical University of Denmark	University	TD	-	Cod Frame	HYD	Lab	fish protein hydrolysate (FPH)	antioxidants in the food and pharmaceutical industries		Jafarpour et al 2020	
Denmark	Technical University of Denmark	University	TD	-	URI, DWW, DIG	ELECHEM	Lab	NH ₄ SLTN	Cultivation of methanotrophs for microbial protein		Khoshnevisan et al 2020	Touches on the presence of pollutants e.g. pharmaceuticals in the final product

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Finland	Napapiirin Energia ja Vesit (NEVE) Ltd.	Private company	TU	-	SS	STRIP & SCRUB	Pilot	AS	Fertiliser	https://www.neve.fi/	Havukainen et al., 2022	Scrubbing with NaOH. Havukainen, J., Saud, A., Astrup, T. F., Peltola, P., & Horttananen, M. (2022, Jan 1). Environmental performance of dewatered sewage sludge digestate utilization based on life cycle assessment [Article]. Waste Manag, 137, 210-221. https://doi.org/10.1016/j.wasman.2021.11.005
Finland	Kajaani University of Applied Sciences	University	TD	-	WWTP & mine wastewaters)	MCONT & IEXRES	Lab	AS, MAP			Samarina & Takaluoma 2020	3M Liqui-Cel® membrane contactor
Finland	Helsinki Region Environmental Services HSY	Administration	TU	RAVITA	WWTS	STRIP	Pilot	(NH ₄) ₂ PO ₄	Fertiliser		Rossi et al 2018	H ₂ PO ₄
Finland	Aalto University	University	TD	-	1. Municipal WW, 2. Landfill Leachate	COAG & MCONT	1. Lab & Pilot, 2. Lab	1. AS	1. Fertiliser		1. Righetto et al 2021a, 2. Righetto et al 2021b	1. Starch based coagulants PrimePHASE 3545, PrimePHASE 3501, Polyaluminum chloride coagulant (PAX-XL100) and polymer (Superfloc A). 2. Decent removal of cationic surfactants, phenols and pharmaceuticals such as 5-methylbenzotriazole, ibuprofen, carbamazepine, and metoprolol was also achieved with the treatment
Finland	Tampere University of Technology	University	TD	-	URI	ELECHEM	Lab	NH ₄ HCO ₃			Jermakka et al 2018	
Finland	Tampere University	University	TD	-	DWW	MELEC & ELECDA	Lab	NH ₄ SLTN			Koskue et al 2021	Notes highest recovery rate for bioelectroconcentration techniques (approx 75%). Reports microbial communities around electrodes
Finland	Tampere University	University	TD	-	Synthetic WW and WW	ELECHEM & STRIP	Lab	NH ₄ SLTN & AS	Fertiliser		Koskue et al 2021b	chloride oxidation at the BDD has been found to result in the formation of a persistent toxic by-product, namely, perchlorate [40]. Here, perchlorate or other chlorination products were not analysed, but as the initial chloride concentrations at the anode were low, little toxic chloride by-product formation is expected
Finland	Aalto University	University	TD	NPHarvest	DWW, landfill leachate, & URI	MCONT & STRIP	Pilot and Industrial	AS	Fertiliser		Kaljunen et al 2020	The paper discusses the quality of ammonium sulfate in terms of vegetative cells and coliphages, harmful metals, and organic micropollutant measurements. The paper also provides comprehensive information on chemicals used and costs likely to be incurred.
Finland	Lappeenranta University of Technology	University	TD	-	DIG	THERM	Lab	NH ₃ gas			Deviatkin et al 2018	The paper just hints on other N recovery technologies that can be used after recovering NH ₃ gas
Finland	Lappeenranta-Lahti University of Technology LUT	University	TD	-	DIG-SS & WW	THERM & SCRUB	Lab	AS	Fertiliser		Saud et al 2021	Authors highlight that it is not possible to recover a large amount of nitrogen from thermal drying alone, and investment for this purpose only would not be cost-effective
Finland	Lappeenranta-Lahti University of Technology LUT	University	Technology developer	-	DWW	CADEI	Laboratory	?	?	www.lut.fi		
Finland	VTT Technical Research Centre of Finland	Research centre	Technology developer	-	Lq phase	Membrane					Email	
France	The European Space Agency (ESA).	Multi-Governmental	TD	MELISSA - Loop	All organics	THERM (HT oxidation)	Pilot	NS	Fertiliser	https://www.esa.int/Enabling_Support/Space_Engineering_Technology/Melissa	Zhang et al., 2018	
France	John Cockerill Europe Environnement	Private company	TP	RECOV'AMMONIA	DIG	STRIP & SCRUB	Industrial	AS	Fertiliser	http://www.europe-environnement.com/en/	Folino et al (2020) & Website	
France	France Evaporation	Private company	Technology provider	-	WW, AIR	ASTRIP/SSTRIP-SCRUB	Industrial	DAS (Lq), DAP, NH ₃ slts	Fertiliser	https://www.evaporation.fr/en/		
France	Geotexia	Private company	Technology user	-	DIG (MAN + blowaste)	CENT -> lq ; UF + RO -> Conc - EVA	Industrial	NK lq (20% DM)	Fertiliser	https://geotexia.wordpress.com/#	https://geotexia.wordpress.com/#	
Germany	Envimac	Private company	TP	ENVIMAC stripping technology	landfill gas, digestate, sludge	STRIP	Industrial	NH ₄ SLTN, AS	Fertiliser	http://www.envimac.com/technologies/waste-water-processing/ammonia-removal-and-recovery.html	website	
Germany	GNS (Röblingen am See, DE)	Private company	TP	FiberPlus - (Formerly ANAstrip)	chicken litter DIG	STRIP & SCRUB	Pilot	AN, AS	Fertiliser	https://www.gns-halle.de/en/services/gns-procedure.php	Folino et al (2020) & Website	They use Gypsum to scrub. See also: http://www.cings.net/de/projekte/gaerrestaufbereitu-ng-roeblingen and https://systemicproject.eu/wp-content/uploads/NH3stripping-scrubbing_gypsum.pdf
Germany	Benas-GNS	Private company	TU	FiberPlus	Chicken litter manure	STRIP	Industrial	AS	Fertiliser	https://benas-gruppe.com/willkommen-bei-der-benas-gruppe/nachhaltige-papier-und-faserherstellung/ https://www.fh-muenster.de/hochschule/aktuelles/pressemitteilungen.nho?mid=8904	Sigurnjak et al (2019) and Website	https://systemicproject.eu/wp-content/uploads/Factsheet-4-Benas-year-3-final.pdf
Germany	Münster University of Applied Sciences	University	TD	-	WW	MCONT	Lab	AS	Fertiliser		Richter et al 2021	Paper is in German!
Germany	Münster WWTP	Administration	TU	-	WW	MCONT	Industrial	AS	Fertiliser		Richter et al 2021, Richter et al 2021	Münster wastewater treatment plant (WWTP) is the first municipal WWTP in Germany operating a full-scale membrane contactor system
Germany	Fraunhofer UMSICHT, Abteilung Umwelt und Ressourcennutzung	Research centre	Technology developer	-	SL	MEMSEP, IEX	Pilot	NO ₃ sltn, DAS (lq)	Fertiliser		Email	SUSKULT project

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Germany	KWB	Research centre	Technology developer	-	DIG	Vacuum STRIP	Pilot	?	Fertiliser	https://www.kompetenz-wasser.de/en	https://www.circularagronomics.eu/	Circular Agronomics project
Germany	RVT Process Equipment GmbH	Private company	TP	Turnkey Units	WW, DIG	STRIP & SCRUB	Industrial	AS	Fertiliser	https://www.rvtpe.com/global/en/products/turnkey-units/ammonia-recovery	Website	https://sswm.info/sites/default/files/reference_attachments/RVT%202010%20Ammonia%20Recovery_%20Ammonia%20Removal%20from%20Liquids%20and%20Gases.pdf
Hungary	University of Szeged	University	TD	-	Milking Parlor WW	IEX PPP- Pomogrenate Peel Powder	Lab	NH ₄ ⁺ doped PPP			Hodúr et al 2020	
Hungary	Budapest University of Technology and Economics	University	TD	-	URI WW	HM	Lab	AS	Fertiliser		Nagy et al 2019	
India	VIT University	University	TD	-	URI	CHAR	Lab	Urea	Fertiliser		Simha et al 2018	Microwave Pre-treated Activated Carbon made from Coconut Shells
Iran	Islamic Azad University	University	TD	-	Fish heads & Skin	HYD	Lab	fish protein hydrolysate (FPH)	antioxidants in the food and pharmaceutical industries		Hasani et al 2022	
Ireland	BioAtlantis	Private company	TU	-	Seaweed	HYD	Industrial	amino acids	humans and animal nutrition	https://www.bioatlantis.com/who-we-are	Website	
Ireland	tcb Resource (Irish Research Centre for Resource Efficiency - Company Limited)	Research Organisation	TD	SLURRES Pilot	WW	ASTRIP & SSSTRIP	Scaling Up	NH ₄ SLTN	Fertiliser	http://www.tcbresource.ie/	website	
Ireland	Biomarine Ingredients	Private company	TU	-	Fish	HYD & FILTRATION	Industrial	hydrolysed Fish Protein Isolates	Human and Animal nutrition ingredients	https://www.biomarine.ie/who-we-are/	Website	
Italy	Acqua & Sole	Private company	TU	-	WWTD, DWS	STRIP	Industrial	AS	Fertiliser	https://neorisorse.net/	Sigurnjak et al (2019) and Website	https://systemicproject.eu/wp-content/uploads/Factsheet-3-rev-AcquaSole-76112021.pdf
Italy	University of Rome Sapienza	University	TD	-	DIG	MELEC	Pilot	NH ₄ SLTN			Cristiani et al 2020	
Italy	University of Rome Sapienza	University	TD	-	Synthetic WW	MELEC	Lab	NH ₄ SLTN	Fertiliser		Zeppilli et al 2019	
Italy	Architectural and Environmental Engineering University	University	TD	-	DIG - buffalo manure	STRIP	Lab	Gaseous Ammonia	Single Cell Proten production		Silvio Matassa et al 2020	
Japan	Hiroshima University	University	TD	-	Synthetic Solution	IEX (zeolites, zirconium phosphate montmorillonite, acid impregnated activated carbon)	Lab				Yamaguchi et al 2020	
Japan	Hiroshima University	University	TD	-	W- Chicken Manure	THERM (HT)	Lab	NH ₄ gas	hydrogen carrier		Matsumura et al 2021	
Nigeria	Adekunle Ajasin University	University	TD	-	URI	IEX (granular gastropod shell)	Pilot	NH ₄ SLTN	Fertiliser		Saliu et al 2020	
Poland	Wroclaw University of Environmental and Life Sciences	University	TD	-	WW	nitritation, MF, NF was IEX	Lab	nitrite solution	Fertilizer or inhibitor of H ₂ S formation in sewers		Wiercik et al 2020	
Republic of Korea	Korea University	University	TD	-	Synthetic WW	CADEI	Lab	NH ₄ SLTN			Kim et al 2019	
Republic of Korea	Korea Advanced Institute of Science and Technology (KAIST)	University	TD	-	Synthetic WW and Livestock WW	ELECHEM	Lab	NH ₄ SLTN			Lee et al 2021	
Republic of Korea	University of Science & Technology	University	TD	-	URI	MCONT	Lab	AS, MAP, and AN	Fertiliser		Damtie et al 2021	
Republic of Korea	Seoul National University	University	TD	-	DWW	HM	Lab	NH ₄ SLTN	Fertiliser		Lee et al 2021	
Slovenia	University of Maribor	University	TD	-	DWW	IEXZEO	Lab	NH ₄ SLTN	N/A		Petrovic et al 2021	Na-zeolite
Spain	Cetaqua	Research centre	Technology provider	-	?	IEXZEO and MCONT	?	NH ₄ salts	Fertiliser	www.cetaqua.com		Walnut project https://walnutproject.eu/
Spain	Ecotec	Private company	Technology provider	-	WW, AIR	ASTRIP SCRUB	Industrial	DAS (Lq), DAP	Fertiliser	https://www.ecotec.es/en/index.php		
Spain	University of Valladolid	University	Technology developer	-	MAN	MEMSTRIP	Pilot	?	Fertiliser			Green Ammonia project (+ 3 livestock companies)
Spain	Leitat Technological Center	Research Organisation	TD	-	Synthetic WW	MFC & STRIP	Lab	AN	Fertiliser	https://www.leitat.org/en/about-us/	Losantos et al 2021	EU H2020 Run4Life Project (2017–2021, GA 730285)

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Spain	Universidad de Leon	University	TD	-	DIG and pig slurry	MELEC	Lab	NH ₄ SLTN	Fertiliser		San-Martin et al 2019	
Spain	Institute of Agrifood research Technology	Research Organisation	TD	-	pig slurry DIG	MELEC & HM	Lab	NH ₄ SLTN	Fertiliser		Cerrillo et al 2021a	
Spain	Institute of Agrifood research Technology	Research Organisation	TD	-	pig slurry DIG	MELEC & HM	Lab	NH ₄ SLTN	Fertiliser		Cerrillo et al 2021b	
Spain	University of Barcelona	University	TD	-	municipal solid waste broth/slurry	MCONT	Pilot	AS	Fertiliser		Serra-Toro et al 2022	
Spain	Universitat Politècnica de Valencia	University	TD	-	WW	MCONT	Lab	AS	Fertiliser		Noriega-Hevia et al 2020	
Spain	Miguel Hernandez University	University	TD	-	DIG	HM	Lab	NH ₄ SLTN			Filho et al 2018	
Spain	Agricultural Technological Institute of Castilla and Leon (ITACYL)	Research Organisation	TD		livestock WW	HM	Pilot	AS	Fertiliser		Molinuevo-Salces et al 2020	
Sweden	EasyMining	Private company	TP	CleanMAP, Aqua2™N	WW	Chemical adsorption (not specified)	Industrial	MAP, AS	Fertiliser	https://www.easymining.se/about/this-is-easymining/	website	
Sweden	EkoBalans	Private company	TP	eco-N	WW	STRIP & SCRUB	Industrial	AS	Fertiliser	https://ekobalans.se/	website	constructed pilot plant at the Hammarby Sjöstadsverk facility in 2020
Sweden	Mälardalen Högskola	University	TD	-	Synthetic Solution	CHAR	Lab	NH ₄ -N-loaded biochars			Beckinghausen et al 2020	digested sewage sludge biochar
Sweden	Swedish University of Agricultural Sciences	University	TD	-	URI	IEX, EVA, CHAR/ASH	Lab	NH ₄ loaded CHAR/ASH	Soil conditioner /Fertiliser		Simha et al 2018, Simha et al 2020	
Sweden	Malardalen University	University	TD	-	DIG	THERM (combustion, pyrolysis, and gasification) & STRIP	Lab	AS	Fertiliser		Salman et al 2019	
Switzerland	Membratec	Private company	Technology provider	-	DIG	MCONT	Industrial	AS	Fertiliser	https://www.membratec.ch/eau/stripping-membranaire-production-engrais-azote-670.html	Contact	
Switzerland	Swiss Federal Institute of Aquatic Science and Technology	Research Organisation	TD	-	URI	EVA	Lab & Pilot	AS			Riechmann et al 2021	(Ca(OH) ₂) then evap
The Netherlands	Byosis Group BV	Private company	TP	ByoFlex®	WW, DIG	STRIP & SCRUB	Industrial	AS	Fertiliser	https://byosis.com/systems/byoflex	Website	
The Netherlands	Bluetech	Private company	TP		WW	Hollow fiber HM	Industrial	AS	Fertiliser	https://www.blue-tec.nl/ammonia-membrane-stripping	Website	
The Netherlands	Colsen	Private company	TP	MBR-NAS®, AMFER	WW	MEMBF	Industrial	AS	Fertiliser	https://www.colsen.nl/en/projects/manure-valorisation-nava	Folino et al (2020) & Website	
The Netherlands	CircularValues	Private company	TP	Farmcubes Quadro Nitrogen Recovery (QNR) and Farmcubes High Pressure Reverse Osmosis (HPRO)		RO, STRIP	Industrial	AS, AN	Fertiliser	https://circularvalues.eu/en/farmcubes-quadro/	Website	
The Netherlands	Evides Water Company	Private company	Technology provider	-	DWW	EC -> lq : NF + RO -> Conc. -> Microalgae	Pilot	phycocyanine	Pigment	https://www.evidesindustriewater.nl/nl/nereus	https://www.nereus-project.eu/nutrients/	
The Netherlands	Inno+	Private company	TP	Pollo air scrubber	Poultry Litter	SCRUB	Industrial			https://inno-plussystems.com/en/pollo-air-scrubber-for-poultry-farming/	Website	
The Netherlands	GMB BioEnergie	Private company	TP		AIR (for odour treatment)	STRIP & SCRUB	Industrial	AS	Fertiliser	https://www.gmb.eu/gmb-clusters/gmb-bioenergie/nutriententerugwinning	Website	
The Netherlands	Lenntech	Private company	Technology provider	-	DIG, etc.	Bipolar membrane ELEC/DIA	Pilot	?	?	www.lenntech.com	Contact	
The Netherlands	Merensteyn	Private company	Technology user	-	DIG	SEP -> lq : FLOT -> lq : RO (+ H2SO4) -> Concentrate lq -> IOX	Industrial	NK concentrate	Fertiliser		WUR evaluation	160.000 T/y
The Netherlands	Mest	Private company	Technology provider	-	DIG	BIPolar ELEC/DIA + VM Stripping	Pilot	NK (?)	Fertiliser	www.mest.eu		
The Netherlands	Natuchem	Private company	Technology user	?	?	?	Industrial	DAS (solid)	Fertiliser	www.natuchem.eu		see Circular Values
The Netherlands	Nijhuis Saur Industries	Private company	Technology provider	AECO-NAR or GENIUS/GENIAAL	DIG (MAN, sludge) or MAN	CENT -> (lq : FLOT ->) lq : STRIP + SCRUB or	Industrial	DAS (Lq) or NK concentrate	Fertiliser	https://www.nijhuisindustries.com/solutions/resource-recovery/aeco-nar https://www.nijhuisindustries.com/uk/soluti	https://www.nutrientplatform.org/successverhalen/	see WUR evaluation : Groot Zevent Vergisting (NL) : 125 T/d

Organisation country	Organisation name	Organisation type	Organisation category*	Technology commercial name	Raw material (substrate)	Technology type	TRL	Final product	Product use	Website	Main source of info	Remark
The Netherlands	Opure	Private company	Technology provider	-	DIG	SEP -> MBR -> NF	Industrial	NO3 concentrate	Fertiliser	https://www.opure.nl/productie-elastuinbouw-nutriënten-uit-mest		see WUR evaluation : Ecoson (NL) : 125 T/d
The Netherlands	RN Solutions	Private company	Technology provider	-	DIG (RO conc.)	VMD	Pilot ?	NH3 sltn	Fertiliser	https://www.rnsolutionsbv.com/	WUR evaluation : NK RO concentrate	
The Netherlands	Van Amstel	Private company	Technology user	-	DIG	SEP -> Iq : FLOT -> Iq : RO (+ H2SO4) -> Concentrate Iq -> IOX	Industrial	NK concentrate	Fertiliser		WUR evaluation	35.000 T/y
The Netherlands	Van Iperen International BV	Private company	Technology user	GreenSwitch Nitrate (ART & AIR process)	DIG (MAN + biowaste + etc.)	SEP -> Iq : STRIP + SCRUB (+ KHCO3) -> Iq : nitrification -> (CONC. Iq -> ?)	Industrial	KNO3 Iq (GreenSwitch® Original HG)	Fertiliser	https://www.vaniperen.com/story/greenswitch/	See PureGreen Agriculture	
The Netherlands	Wageningen University	University	TD	-	Synthetic WW	ELECHEM, ELECEDIA	Lab	AS, AN	Fertiliser		Rodrigues et al 2021a, b & Rodrigues et al 2022	
United kingdom	Agua DB	Private company	Technology provider	NTPlus	GW	IEX	Proof of concept	KNO3 sltn	Fertiliser	www.aguadb.com		
United kingdom	CCM Technologies	Private company	Technology provider	-	DIG	?	?	Biochar	Fertiliser	https://www.ccmtechnologies.co.uk/		
United kingdom	Cranfield University	University	Technology developer	-	WW	IEX	Pilot	NH3 sltn, N salt	Chemicals, fertiliser	https://www.cranfield.ac.uk/smartplant	http://www.smart-plant.eu/	SMART-Plant project
United kingdom	Organics Group	Private company	Technology provider	?	WW	ASTRIP SCRUB	Industrial	NH4 salt, NH3 sltn	?	www.organicsgroup.com		
United kingdom	Thermax Europe Limited	Private company	TP	-	-	RO, NF, UF MEMBF	Industrial			https://www.thermaxglobal.com/europe/	website	
United kingdom	University of Leeds	University	TD	-	Synthetic Solution	CHAR	Lab				Takaya et al 2021	oak-based hydrochar
USA	Ductor	Private company	TP	Not Given	chicken litter	Not Given	Industrial	NH4 SLTN N salt	Fertiliser	https://www.ductor.com/products-services/#fertilizers	website	
USA	Linde	Private company	TP	-	-	STRIP	Industrial			https://www.lindeus.com/industries/energy-decarbonization/nitrogen-stripping	Website	
USA	PureGreen	Private company	TP	GreenSwitch	DIG (MAN + biowaste + etc.) BIOGAS	SEP -> Iq : STRIP + SCRUB (+KHCO3) -> Iq : nitrification -> (CONC. Iq -> ?)	Industrial	KNO3 Iq	Fertiliser	https://puregreenagriculture.com/	website, email	
USA	Sedron Technologies	Private company	TP	Varcor	WW	SSTRIP	Industrial	NH4 SLTN	Fertiliser	https://www.sedron.com/varcor/	website	
USA	Perma Pure LLC	Private company	TP	AS Series Ammonia Scrubber	-	SCRUB	Industrial	MAP	-	https://www.permapure.com/environmental-scientific/products/gas-drying-systems/extras/accessories-for-sample-conditioning/as-series-ammonia-scrubber/	website	They supply scrubbers for medical, industrial and scientific applications
USA	Indusco Environmental Services Inc.	Private company	TP	-	-	SCRUB	Industrial			https://www.induscoenviro.com/	website	They supply ammonia strippers
USA	Branch Environmental Corporation	Private company	TP	-	IWW	STRIP & SCRUB & SSTRIP	Industrial	AS, AH	Fertiliser	https://www.branchenv.com/	Folino et al (2020) & Website	They produce Ammonia strippers and scrubbing towers
USA	Organics USA	Private company	TP	-	-	THERM-STRIP	Industrial			https://www.organicsusainc.com/ammonia-recovery/	Xiang et al (2020)	
USA	Johns Hopkins University	University	TD	-	URI	IEXZEO	Lab	NH4 SLTN			Manto et al 2018	ZSM-5 zeolite
USA	University of Notre Dame	University	TD	-	urea	ELECHEM	Lab	NH4 OR NO3 SLTN	Fertiliser		Schranck and Doudrick 2019	undivided reactor produced ammonia and a divided reactor produced NO3-
USA	University of Colorado Boulder	University	TD	-	WWS	MELEC & HM	Lab	NH4 SLTN			Hou et al 2018	
USA	Stanford University	University	TD	-	Synthetic WW	ELECHEM	Lab	AS	Fertiliser		Liu et al 2020	
USA	Arizona State University	University	TD	-	URI	FO	Lab	NH4 SLTN	Fertiliser		Ray et al 2020	
USA	Columbia University	University	TD	-	Synthetic URI	isothermal membrane distillation (IMD)	Lab	NH4 SLTN	Fertiliser		McCartney et al 2020	acetic acid was used in the acidic collector
USA	New Mexico State University	University	TD	-	WW	HM	Lab	AS	Fertiliser		Munasinghe-Arachchige et al 2020	
USA	New Mexico State University	University	TD	-	WW	HM	Lab	AS	Fertiliser		Munasinghe-Arachchige et al 2021	

Organisation country	Organisation name	Organisation type	Organisation category*	Technology commercial name	Raw material (substrate)	Technology type	TRL	Final product	Product use	Website	Main source of info	Remark
USA	University of California Davis	University	TD	-	DIG - Food waste & WW (centrate)	Vacuum Thermal Stripping (VTSTRIP)	Pilot	AS	Fertiliser		Leverenz et al 2021	
USA	The Pennsylvania State University	University	TD	-	BIOW - Food waste	THERM	Lab	NH ₄ ⁺ , NO ₃ ⁻ SLN			Motavaf et al	
USA	New Mexico State University	University	TD	StARR	mixotrophic algae	THERM (HTL) & HM	Lab	AS, STRU	Fertiliser		Abeyirwardana-Arachchige et al 2022	
USA	University of California, Berkeley	University	TD	-	URI	IEZXEO	Pilot	AS	Fertiliser		Tarpeh et al 2018	
USA	Iowa State University	University	TD	-	URI - synthetic	progressive freeze concentration (PFC)	Lab	NH ₄ SLTN	Fertiliser		Moharramzadeh et al 2022	NOVEL, stabilised by Peracetic acid
USA	Arizona State University	University	TD	-	URI	MSEP - RO, NF, MF	Lab	Urea and ammonia			Ray et al 2020	After comparison of the MSEP methods, NF was found to be a promising technology to recover up to 90% of ammonia
USA	Monroe Environmental	Private company	TP	-	Landfill leachate, DIG	STRIP	Industrial	NH ₄ SLTN			Website	
Vietnam	University of Food Industry	University	TD	-	Catfish byproducts	HYD	Lab	fish protein hydrolysate (FPH)	antioxidants in the food and pharmaceutical industries		Nam et al 2019	
Vietnam	University Ho Chi Minh City	University	TD	-	Tuna skin	HYD	Lab	Collagen hydrolysate	in food and functional food products		Nguyen et al 2021	
Vietnam	Nong Lam University	University	TD	-	Tuna skin	HYD & UF	Lab	Collagen hydrolysate	in food and functional food products		Nguyen et al 2021	

* TD : Technology developer
TP : Technology provider
TU : technology user

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ACTORS LIST

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