

Table S1. Initial conditions for coagulant selection

Coagulant	Dosage (mg/L)	Mixing time (min)	Mixing speed (rpm)	Settling time (min)
$FeCl_3$				
$Al_2(SO_4)_3$	50	5	200	30
Derypol HT20				

Table S2. Flocculation parameters

Flocculation Parameters

Mixing time	30 min
Mixing speed	30 rpm
Resting time	30 min
Dosage	10, 25, 30, 40 and 50 mg
Flocculant	$Fe_3O_4 + SiO_2$ (30-70%)

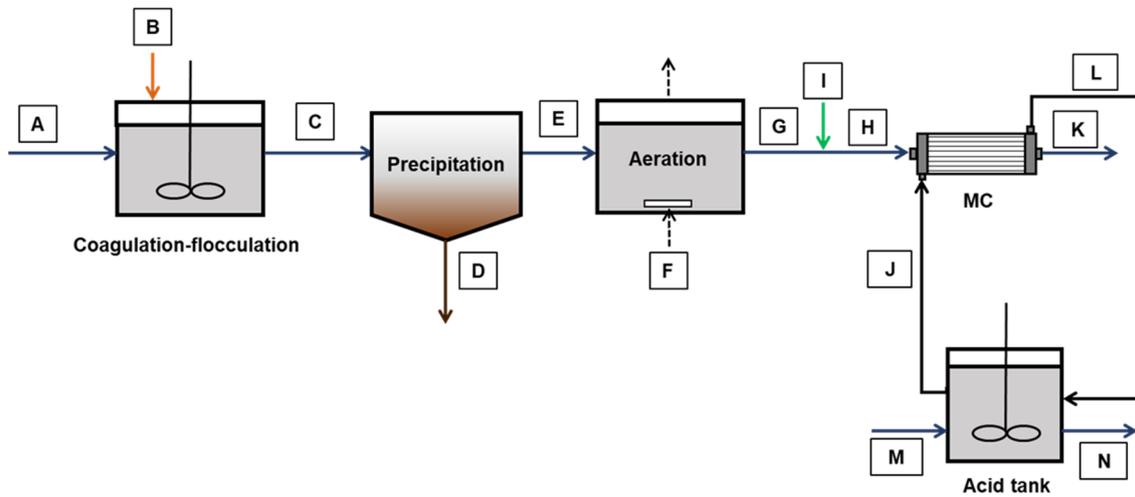


Figure S1. Schematic representation of the nitrogen recovery scheme.

Table S3. Main flow data for the nitrogen recovery scenario under study.

(A) Anaerobic digester centrate	
Flow rate (m ³ /day)	150
TSS (g/L)	0.24
TAN (g N/L)	0.71
pH (-)	8.1
(B) $Al_2(SO_4)_3$ solution	
Flow rate (m ³ /day)	9
$Al_2(SO_4)_3$ (mg/L)	500
(C) Coagulation-flocculation effluent	
Flow rate (m ³ /day)	159
TSS (g/L)	0.22

TAN (g N/L)	0.67
pH (-)	8.1
(D) Solid fraction precipitator	
Flow rate (m ³ /day)	8
TSS (g/L)	3.98
(E) Liquid fraction precipitator	
Flow rate (m ³ /day)	151
TAN (g N/L)	0.67
pH (-)	7.9
(F) Air	
Flow rate (Nm ³ /day)	2288
(G) Effluent aeration tank	
Flow rate (m ³ /day)	151
TAN (g N/L)	0.67
pH (-)	8.9
(I) NaOH solution	
Flow rate (m ³ /day)	0.3
NaOH (mol/L)	1
(H) Feeding solution MC_{t=0}	
Flow rate (m ³ /day)	151.3
TAN (g N/L)	0.67
pH (-)	10.3
(K) Feeding solution MC_{t=F}	
Flow rate (m ³ /day)	151.3
TAN (g N/L)	0.24
pH (-)	8.42
(M) HNO₃ solution	
Volume/cycle (m ³ /cycle)	0.52
Number of cycles (cycles/day)	22
HNO ₃ (mol/L)	0.4
pH (-)	0.4
(N) NH₄NO₃ solution	
Volume/cycle (m ³ /cycle)	0.52
Number of cycles (cycles/day)	22
NH ₄ NO ₃ (mol/L)	0.4
pH (-)	6

Table S4. Main design parameters used for the economic evaluation.

	Parameter	Value	Source
Coagulation-flocculation	Specific Al ₂ (SO ₄) ₃ consumption (g Al ₂ (SO ₄) ₃ /L _{concentrate})	0.19	Lab-scale data
	Retention time (h)	0.1	Lab-scale data
	Mixer revolutions (rpm)	100	Lab-scale data
Precipitation	Retention time (h)	0.5	Lab-scale data
	Q ₀ /Q _E (%)	95	Lab-scale data
Aeration	Retention time (h)	1	Lab-scale data

	Specific air consumption (NL/h/L _{tank})	364	Lab-scale data
	K _m (m/s)	1.04×10 ⁻⁵	Lab-scale data
	TAN recovery (%)	64	Lab-scale data
Membrane contactor	Flow rate trapping solution:Flow rate feed solution	1:1	Lab-scale data
	Specific NaOH consumption (mol NaOH/mol TAN _{recovered})	0.067	Lab-scale data
	pH _{t=0} HNO ₃ trapping solution (-)	0.4	Lab-scale data
	pH _{t=F} HNO ₃ trapping solution (-)	6	[1]

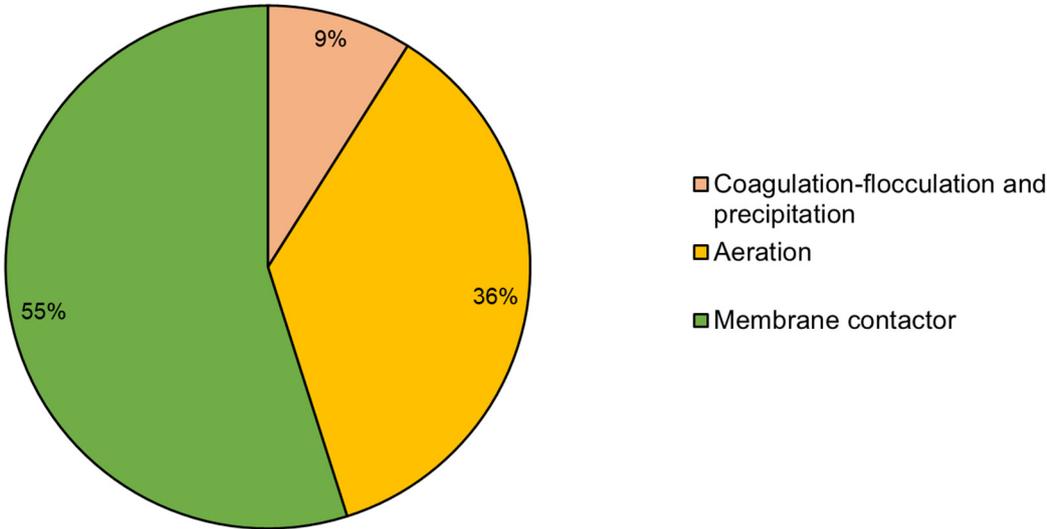
Table S5. Main economic parameters used for the economic evaluation.

Parameter	Value	Source
Tank cost (€/m ³)	220	[2]
Settler cost (€/m ³)	100	[3]
Pump cost (€/m ³ /h)	12.1	[2]
Stirrer cost (€/m ³ _{Tank})	27.8	[4]
Blower cost (€/Nm ³ /h)	4.15	[2]
Membrane cost (€/m ²)	49	[3]
Al ₂ (SO ₄) ₃ cost (€/kg)	0.16	[5]
NaOH cost (€/kg)	0.62	[6]
HNO ₃ cost (€/kg)	0.38	[7]
Electricity cost (€/kWh)	0.1445	[8]
Sludge disposal cost (€/t TS)	373	[9]
Lifetime membrane (years)	10	[3]
Lifetime auxiliary equipment (years)	10	[3]
NH ₄ NO ₃ price (€/kg)	0.43	[10]
Energy consumption mainstream N removal (kWh/kg N)	2.38	[11]

Table S7. Experiments set of Design Expert 11 software.

<i>Run</i>	<i>M. Time (min)</i>	<i>M. Speed (rpm)</i>	<i>S. Time (min)</i>	<i>Run</i>	<i>M. Time (min)</i>	<i>M. Speed (rpm)</i>	<i>S. time (min)</i>
<i>1</i>	25	100	45	<i>10</i>	25	250	15
<i>2</i>	15	175	30	<i>11</i>	5	100	45
<i>3</i>	5	250	15	<i>12</i>	5	250	45
<i>4</i>	15	175	30	<i>13</i>	15	175	37,5
<i>5</i>	25	250	45	<i>14</i>	10	175	30
<i>6</i>	25	100	15	<i>15</i>	5	100	15
<i>7</i>	15	137,5	30	<i>16</i>	15	175	30
<i>8</i>	15	175	22,5	<i>17</i>	15	212,5	30
<i>9</i>	20	175	30				

A)



B)

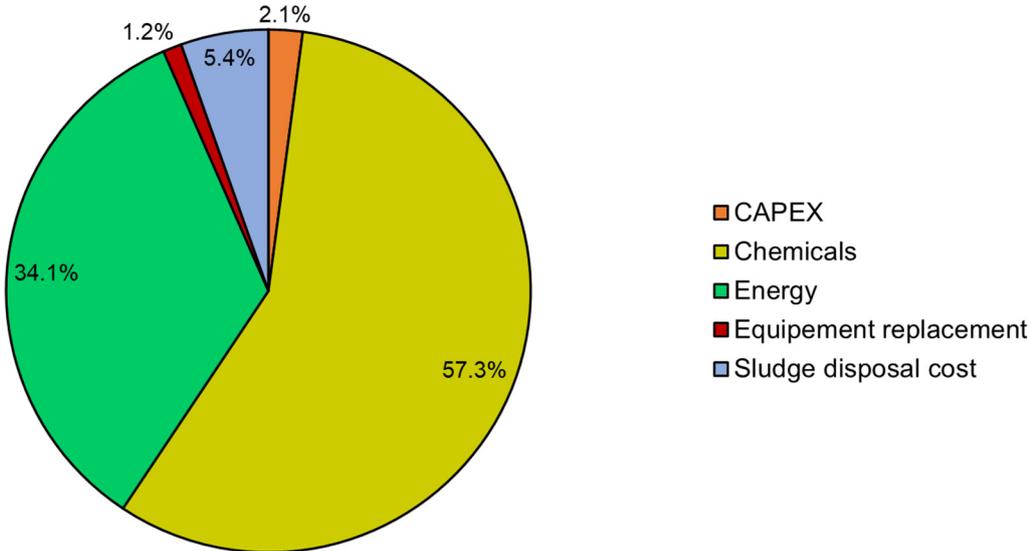


Figure S2. Gross cost contribution of the nitrogen recovery scenario under study for: (A) the different processes and (B) for the different capital and operating costs.

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