
This is the **submitted version** of the article:

Verónica Arcas Pilz, Verónica; Rufí Salís, Martí; Parada, Felipe; [et al.]. «Assessing the environmental behavior of alternative fertigation methods in soilless systems : the case of Phaseolus vulgaris with Struvite and Rhizobia inoculation». Science of the total environment, Vol. 770 (May 2021), art. 1447442021. DOI 10.1016/j.scitotenv.2020.144744

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Supplementary Information:

Table 1

TEMPERATURE	2019	2020
AVERAGE T °C	18.94	20.48
MINIMUM T °C	4.48	11.23
MAXIMUM T °C	29.89	29.48
STANDARD DEVIATION	2.09	4.68
REALATIVE HUMIDITY	2019	2020
AVERAGE (RH)	38.11	38.78
MINIMUM (RH)	5.65	7.51
MAXIMUM (RH)	77.37	59.78
STANDARD DEVIATION	5.83	11.25

Figure 1:

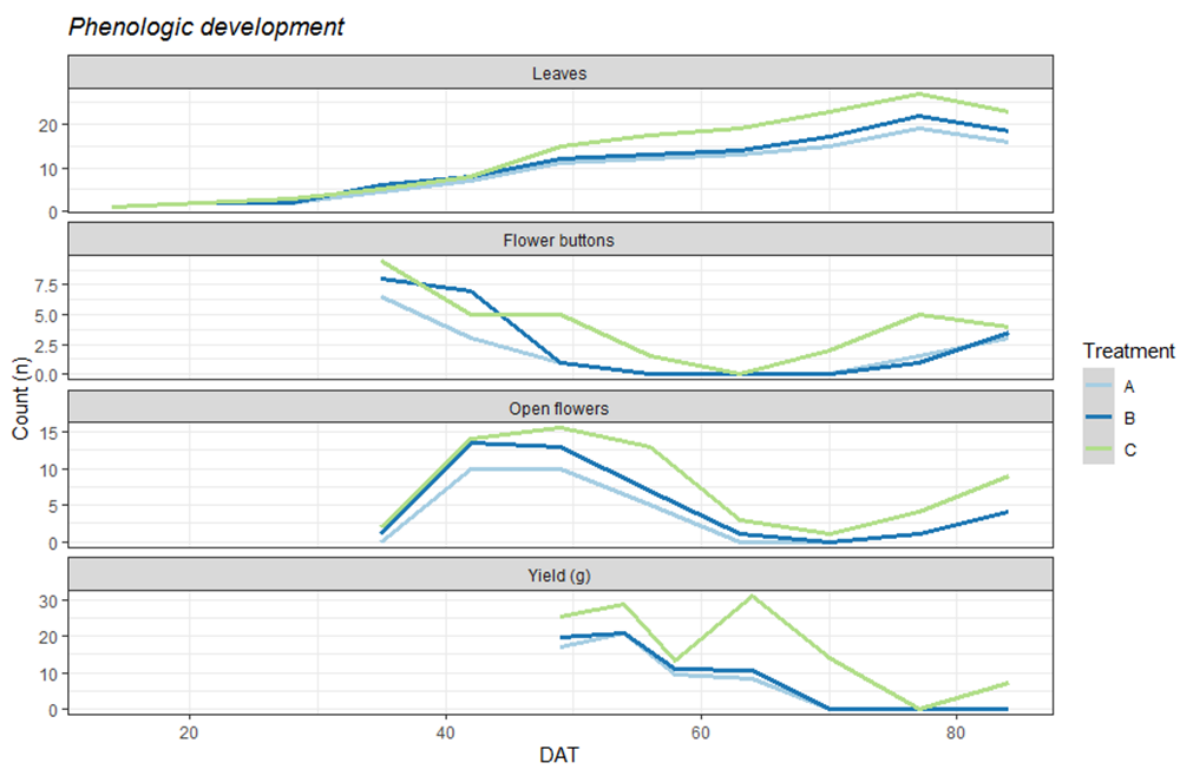


Figure 2:

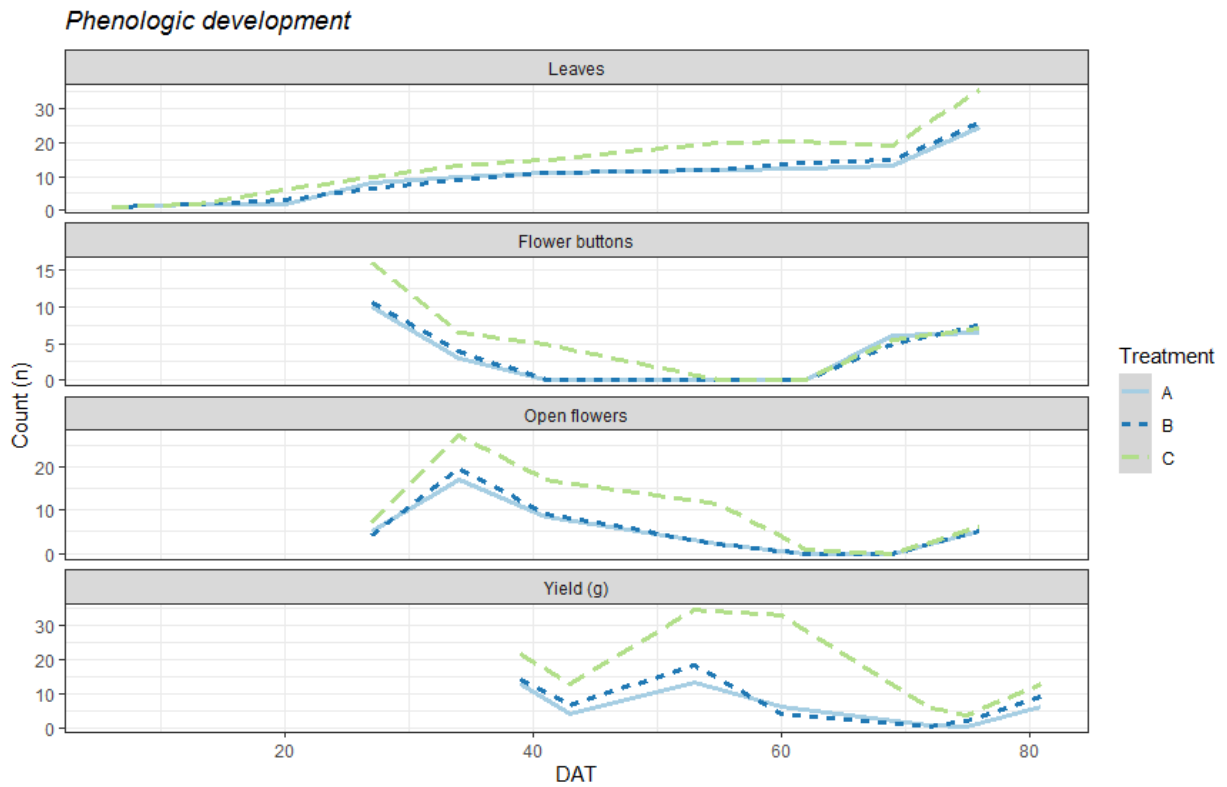


Table 2:

SR2		
Auxiliary		Amo
Equipment	Materials/assemblies	unt
Iron Pump + PS	Cast iron {GLO} market for Cut-off, S	0.201 k
		9 g
Steel Pump + PS	Steel, low-alloyed {GLO} market for Cut-off, S	0.023 k
		8 g
HDPE Pump + PS	Polyethylene, HDPE, granulate, at plant/RER S	0.011 k
		9 g
HDPE Digital timer	Polyethylene, HDPE, granulate, at plant/RER S	0.011 k
		8 g
Electronics		0.000 k
Digital timer	Electronics, for control units {GLO} market for Cut-off, S	0.036 k
		6 g
Dosatron	Polypropylene, granulate {GLO} market for Cut-off, S	0.036 k
		6 g
Pipe 32 mm	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	0.011 k
		3 g
Pipe 25 mm	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	0.055 k
		8 g
Joints	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	0.138 k
		6 g

Nutrient tank	Polyethylene, high density, granulate {GLO} market for Cut-off, S	0.187 k 1 g
Water Tank	Polyethylene, high density, granulate {GLO} market for Cut-off, S	0.346 k 2 g
Iron Flow Meter	Cast iron {GLO} market for Cut-off, S	0.109 k 3 g
HDPE Flow Meter	Polyethylene, high density, granulate {GLO} market for Cut-off, S	0.005 k 8 g
Primary pipe	Polyethylene, low density, granulate {GLO} market for Cut-off, S	0.056 k 4 g
Secondary pipe	Polyethylene, low density, granulate {GLO} market for Cut-off, S	0.069 k 7 g
Joint	Polyethylene, high density, granulate {GLO} market for Cut-off, S	0.002 k 8 g
Joint insertion	Polyethylene, high density, granulate {GLO} market for Cut-off, S	0.002 k 8 g
Stopper	Polyethylene, high density, granulate {GLO} market for Cut-off, S	0.002 k 2 g
Drip tube	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	0.023 k 6 g
Drip	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	0.003 k 9 g
Gripping piece	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	0.007 k 9 g
Manometers	Cast iron {GLO} market for Cut-off, S	0.006 k 9 g
Manometers	Bronze {GLO} market for Cut-off, S	k 0.001 g
Manometers	Glycerine {Europe without Switzerland} esterification of rape oil Cut-off, S	0.008 k 7 g
Processes		
Transport	Transport, van <3.5t/RER S	0.066 tk 33 m
Transport to end of Life	Transport, van <3.5t/RER S	0.066 tk 33 m
Injection moulding	Injection moulding/RER S	0.991 k 5 g
Metal working	Metal working, average for metal product manufacturing {RER} processing Cut-off, S	0.342 k 8 g
Energy	Processes	
Water pump		k W
New Water RTG	Electricity, high voltage, production ES, at grid/ES S	1.01 h
Water pump Leachates		k W
Water RTG	Electricity, high voltage, production ES, at grid/ES S	1.01 h
Waterproof pump Water		k W
RTG	Electricity, high voltage, production ES, at grid/ES S	1.01 h
Fertilizers	Materials/assemblies	

KNO3	Potassium nitrate {GLO} market for Cut-off, S	0	k
60,3% KPO4H2	Phosphate fertiliser, as P2O5 {GLO} market for Cut-off, S	0	g
K2SO4	Potassium sulfate, as K2O {GLO} market for Cut-off, S	0.93	k
CaNO32	Calcium nitrate {GLO} market for Cut-off, S	0	g
CaCl2	Calcium chloride {RER} market for calcium chloride Cut-off, S	0.23	k
MgNO32	Magnesium oxide {GLO} market for Cut-off, S	0	g
50,7% Hortilon	Iron sulfate {RER} market for iron sulfate Cut-off, S	0.011	k
23,6% Hortilon	Magnesium oxide {GLO} market for Cut-off, S	1	g
4,7% Hortilon	Zinc monosulfate {RER} market for zinc monosulfate Cut-off, S	0.001	k
18,9% Hortilon	Copper oxide {GLO} market for Cut-off, S	03	g
2% Hortilon	Molybdenite {GLO} market for Cut-off, S	0.004	k
Sequestrene	Iron sulfate {RER} market for iron sulfate Cut-off, S	1	g
39,7% KPO4H2	Potassium fertiliser, as K2O {GLO} market for Cut-off, S	0.000	k
MgCL2/ NaOH	Struvite	44	g
Processes			
Fertilizer		0.022	k
Transport	Transport, van <3.5t/RER S	0.000	g
Emissions to Air	Ammonia	58	m
		0.000	
		0592	k
		5	g
		2.468	
		75E-	k
	Dinitrogen monoxide	05	g
		0.000	k
	Nitrogen oxides	1975	g
Emissions to Water	Nitrogen	0.001	k
		975	g
		0.002	k
	Phosphorous	609	g
Greenhouse Structure	Materials/assemblies		
Concrete	Concrete roof tile {GLO} market for Cut-off, S	6.09	k
LDPE	Polyethylene, low density, granulate {GLO} market for Cut-off, S	2.24	g
Polycarbonate	Polycarbonate {GLO} market for Cut-off, S	4.6	k

Polyester	Glass fibre reinforced plastic, polyester resin, hand lay-up {GLO} market for Cut-off, S	0.224	k g
Aluminium	Aluminium, primary, ingot {IAI Area, Russia & RER w/o EU27 & EFTA} aluminium production, primary, ingot Cut-off, S	0.224	k g
	Steel, low-alloyed {RER} steel production, electric, low-alloyed Cut-off, S	24.04	k g
	Processes	1.870	tk
Transport	Transport, lorry >32t, EURO5/RER S	9	m
Transoceanic freight ship	Transport, freight, sea, transoceanic ship {GLO} market for Cut-off, S	3.71	tk m k
Machinery use	Energy, from diesel burned in machinery/RER Energy	0.011	W h
End of Life	Transport, lorry 16-32t, EURO5/RER S	1.323	tk m
<u>Pesticides</u> Materials/assemblies			
Spintor	Pesticide, unspecified {GLO} market for Cut-off, S	0	k g
20% Potassium soap	Potassium sulfate, as K2O {GLO} market for Cut-off, S	0,04*	k g
80% Potassium soap	Water, deionised, from tap water, at user {Europe without Switzerland} market for water, deionised, from tap water, at user Cut-off, S	0,04*	k g k
Costar	Pesticide, unspecified {GLO} market for Cut-off, S	0	g k
Wettable sulphur	Sulfur {GLO} market for Cut-off, S	0	g k
MeemAzal	Pesticide, unspecified {GLO} market for Cut-off, S	0	g
	Processes		tk
Pesticide Transport	Transport, van <3.5t/RER S	0.02	m
<u>Rainwater Harvesting System</u> Materials/assemblies			
Water tank	Glass fibre reinforced plastic, polyamide, injection moulded {GLO} market for Cut-off, S	3.01	k g k
Pipes	Polyethylene, HDPE, granulate, at plant/RER S	0.23	g k
Iron Pump	Cast iron {GLO} market for Cut-off, S	0.05	g k
Steel Pump	Steel, chromium steel 18/8 {GLO} market for Cut-off, S	0.01	g
	Processes		tk
Transport GFRP	Transport, lorry 7.5-16t, EURO3/RER S	0.36	m

Transport pipes and pump	Transport, van <3.5t/RER S	0.03	tk m m
Excavation	Excavation, hydraulic digger {GLO} market for Cut-off, S	0.07	3
Transport End of Life	Transport, lorry 3.5-7.5t, EURO5/RER S	0.2	tk m
Injection moulding	Injection moulding/RER S	3.23	k g
Metal working	Metal working, average for metal product manufacturing {RER} processing Cut-off, S	0.05	k g
Struvite 1kg	Materials/assemblies	0.423	k
MgO	Magnesium oxide {GLO} market for Cut-off, S	9	g k
pH	HCl	0.766	g
	Sodium hydroxide, without water, in 50% solution state {GLO} market for Cut-off, S	0.039	k g k
	Tap water, at user/RER S	0.189	g
	Processes		k W
Electricity	Electricity, medium voltage {ES} market for Cut-off, S	0.523	h tk
Transport	Transport, van <3.5t/RER S	0.003	m
Substrate	Materials/assemblies		
HDPE Substrate	Polyethylene, high density, granulate {GLO} market for Cut-off, S	0.12	k g k
Perlite	Perlite {GLO} market for Cut-off, S	4.39	g
	Processes		tk
Transport	Transport, lorry 16-32t, EURO5/RER S	3.544	m

Table 3:

SR5		
Auxiliary Equipment	Materials/assemblies	Amount
Iron Pump + PS	Cast iron {GLO} market for Cut-off, S	0.201 9 0.023
Steel Pump + PS	Steel, low-alloyed {GLO} market for Cut-off, S	8 0.011
HDPE Pump + PS	Polyethylene, HDPE, granulate, at plant/RER S	9 0.011
HDPE Digital timer	Polyethylene, HDPE, granulate, at plant/RER S	8 g

Electronics		0.000 k
Digital timer	Electronics, for control units {GLO} market for Cut-off, S	6 g
		0.036 k
Dosatron	Polypropylene, granulate {GLO} market for Cut-off, S	6 g
Pipe 32 mm	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	0.011 k
		3 g
Pipe 25 mm	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	0.055 k
		8 g
Joints	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	0.138 k
		6 g
Nutrient tank	Polyethylene, high density, granulate {GLO} market for Cut-off, S	0.187 k
		1 g
Water Tank	Polyethylene, high density, granulate {GLO} market for Cut-off, S	0.346 k
		2 g
		0.109 k
Iron Flow Meter	Cast iron {GLO} market for Cut-off, S	3 g
HDPE Flow Meter	Polyethylene, high density, granulate {GLO} market for Cut-off, S	0.005 k
		8 g
Primary pipe	Polyethylene, low density, granulate {GLO} market for Cut-off, S	0.056 k
		4 g
Secondary pipe	Polyethylene, low density, granulate {GLO} market for Cut-off, S	0.069 k
		7 g
Joint	Polyethylene, high density, granulate {GLO} market for Cut-off, S	0.002 k
		8 g
Joint insertion	Polyethylene, high density, granulate {GLO} market for Cut-off, S	0.002 k
		8 g
Stopper	Polyethylene, high density, granulate {GLO} market for Cut-off, S	0.002 k
		2 g
Drip tube	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	0.023 k
		6 g
Drip	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	0.003 k
		9 g
Gripping piece	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	0.007 k
		9 g
		0.006 k
Manometers	Cast iron {GLO} market for Cut-off, S	9 g
		k
Manometers	Bronze {GLO} market for Cut-off, S	0.001 g
Manometers	Glycerine {Europe without Switzerland} esterification of rape oil Cut-off, S	0.008 k
		7 g
	Processes	
		0.066 tk
Transport	Transport, van <3.5t/RER S	33 m
Transport to end of Life	Transport, van <3.5t/RER S	0.066 tk
		33 m
Injection moulding	Injection moulding/RER S	0.991 k
		5 g
Metal working	Metal working, average for metal product manufacturing {RER} processing Cut-off, S	0.342 k
		8 g
Energy	Processes	

Water pump			k
New Water RTG	Electricity, high voltage, production ES, at grid/ES S	1.01	h
Water pump			k
Leachates			W
Water RTG	Electricity, high voltage, production ES, at grid/ES S	1.01	h
Waterproof pump Water			k
RTG	Electricity, high voltage, production ES, at grid/ES S	1.01	h
Fertilizers	Materials/assemblies		
60,3% KPO4H2	Phosphate fertiliser, as P2O5 {GLO} market for Cut-off, S	0	g
39,7% KPO4H2	Potassium fertiliser, as K2O {GLO} market for Cut-off, S	0	g
KNO3	Potassium nitrate {GLO} market for Cut-off, S	0	g
K2SO4	Potassium sulfate, as K2O {GLO} market for Cut-off, S	0.93	g
CaNO32	Calcium nitrate {GLO} market for Cut-off, S	0	g
CaCl2	Calcium chloride {RER} market for calcium chloride Cut-off, S	0.23	g
MgNO32	Magnesium oxide {GLO} market for Cut-off, S	0	g
50,7% Hortilon	Iron sulfate {RER} market for iron sulfate Cut-off, S	0.011	k
23,6% Hortilon	Magnesium oxide {GLO} market for Cut-off, S	1	g
4,7% Hortilon	Zinc monosulfate {RER} market for zinc monosulfate Cut-off, S	0.001	k
18,9% Hortilon	Copper oxide {GLO} market for Cut-off, S	0.03	g
2% Hortilon	Molybdenite {GLO} market for Cut-off, S	0.004	k
Sequestrene	Iron sulfate {RER} market for iron sulfate Cut-off, S	1	g
MgCL2/ NaOH	Struvite	0.000	k
		44	g
Processes			k
Fertilizer		0.076	tk
Transport	Transport, van <3.5t/RER S	1885	m
Emissions to Air	Ammonia	0.000	k
		0669	g
		0.000	k
	Dinitrogen monoxide	0278	k
		75	g
		0.000	k
	Nitrogen oxides	223	g
Emissions to		0.002	k
Water	Nitrogen	23	g

		0.003 k
	Phosphorous	5 g
<u>Greenhouse</u>		
<u>Structure</u>	Materials/assemblies	
		k
Concrete	Concrete roof tile {GLO} market for Cut-off, S	6.09 g
LDPE	Polyethylene, low density, granulate {GLO} market for Cut-off, S	k
		2.24 g
		k
Polycarbonate	Polycarbonate {GLO} market for Cut-off, S	4.6 g
	Glass fibre reinforced plastic, polyester resin, hand lay-up	k
Polyester	{GLO} market for Cut-off, S	0.224 g
	Aluminium, primary, ingot {IAI Area, Russia & RER w/o EU27 & EFTA} aluminium production, primary, ingot Cut-off, S	k
Aluminium	Steel, low-alloyed {RER} steel production, electric, low-alloyed Cut-off, S	0.224 g
		k
		24.04 g
	Processes	
		1.870 tk
Transport	Transport, lorry >32t, EURO5/RER S	9 m
Transoceanic freight ship	Transport, freight, sea, transoceanic ship {GLO} market for Cut-off, S	tk
		3.71 m
		k
		0.011 W
Machinery use	Energy, from diesel burned in machinery/RER Energy	5 h
		tk
End of Life	Transport, lorry 16-32t, EURO5/RER S	1.323 m
<u>Pesticides</u>		
	Materials/assemblies	
		k
Spintor	Pesticide, unspecified {GLO} market for Cut-off, S	0 g
20% Potassium soap	Potassium sulfate, as K2O {GLO} market for Cut-off, S	0,04* k
	Water, deionised, from tap water, at user {Europe without Switzerland} market for water, deionised, from tap water, at user Cut-off, S	0,2 g
80% Potassium soap		0,04* k
		0,8 g
		k
Costar	Pesticide, unspecified {GLO} market for Cut-off, S	0 g
Wettable sulphur	Sulfur {GLO} market for Cut-off, S	k
		0 g
		k
MeemAzal	Pesticide, unspecified {GLO} market for Cut-off, S	0 g
	Processes	
Pesticide		tk
Transport	Transport, van <3.5t/RER S	0.02 m
<u>Rainwater</u>		
<u>Harvesting</u>		
<u>System</u>	Materials/assemblies	
		k
Water tank	Glass fibre reinforced plastic, polyamide, injection moulded {GLO} market for Cut-off, S	3.01 g

Pipes	Polyethylene, HDPE, granulate, at plant/RER S	0.23	g
Iron Pump	Cast iron {GLO} market for Cut-off, S	0.05	g
Steel Pump	Steel, chromium steel 18/8 {GLO} market for Cut-off, S	0.01	g
	Processes		
Transport GFRP	Transport, lorry 7.5-16t, EURO3/RER S	0.36	m
Transport pipes and pump	Transport, van <3.5t/RER S	0.03	m
Excavation	Excavation, hydraulic digger {GLO} market for Cut-off, S	0.07	3
Transport End of Life	Transport, lorry 3.5-7.5t, EURO5/RER S	0.2	m
Injection moulding	Injection moulding/RER S	3.23	g
Metal working	Metal working, average for metal product manufacturing {RER} processing Cut-off, S	0.05	g
Struvite 1kg	Materials/assemblies		
MgO	Magnesium oxide {GLO} market for Cut-off, S	0.423	k
pH	HCl	0.766	g
	Sodium hydroxide, without water, in 50% solution state {GLO} market for Cut-off, S	0.039	g
	Tap water, at user/RER S	0.189	g
	Processes		
Elictricity	Electricity, medium voltage {ES} market for Cut-off, S	0.523	h
Transport	Transport, van <3.5t/RER S	0.003	m
Substrate	Materials/assemblies		
HDPE Substrate	Polyethylene, high density, granulate {GLO} market for Cut-off, S	0.12	g
Perlite	Perlite {GLO} market for Cut-off, S	4.39	g
	Processes		
Transport	Transport, lorry 16-32t, EURO5/RER S	3.544	m

Table 4:

<u>Auxiliary Equipment</u>	Materials/assemblies	Amount
		0.20 k
Iron Pump + PS	Cast iron {GLO} market for Cut-off, S	19 g
		0.02 k
Steel Pump + PS	Steel, low-alloyed {GLO} market for Cut-off, S	38 g
HDPE Pump + PS	Polyethylene, HDPE, granulate, at plant/RER S	0.01 k
		19 g
HDPE Digital timer	Polyethylene, HDPE, granulate, at plant/RER S	0.01 k
		18 g
Electronics		0.00 k
Digital timer	Electronics, for control units {GLO} market for Cut-off, S	06 g
		0.03 k
Dosatron	Polypropylene, granulate {GLO} market for Cut-off, S	66 g
	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	0.01 k
Pipe 32 mm		13 g
	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	0.05 k
Pipe 25 mm		58 g
	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	0.13 k
Joints		86 g
	Polyethylene, high density, granulate {GLO} market for Cut-off, S	0.18 k
Nutrient tank		71 g
	Polyethylene, high density, granulate {GLO} market for Cut-off, S	0.34 k
Water Tank		62 g
		0.10 k
Iron Flow Meter	Cast iron {GLO} market for Cut-off, S	93 g
HDPE Flow Meter	Polyethylene, high density, granulate {GLO} market for Cut-off, S	0.00 k
		58 g
	Polyethylene, low density, granulate {GLO} market for Cut-off, S	0.05 k
Primary pipe		64 g
	Polyethylene, low density, granulate {GLO} market for Cut-off, S	0.06 k
Secondary pipe		97 g
	Polyethylene, high density, granulate {GLO} market for Cut-off, S	0.00 k
Joint		28 g
	Polyethylene, high density, granulate {GLO} market for Cut-off, S	0.00 k
Joint insertion		28 g
	Polyethylene, high density, granulate {GLO} market for Cut-off, S	0.00 k
Stopper		22 g
	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	0.02 k
Drip tube		36 g
	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	0.00 k
Drip		39 g
	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	0.00 k
Gripping piece		79 g
		0.00 k
Manometers	Cast iron {GLO} market for Cut-off, S	69 g
		0.00 k
Manometers	Bronze {GLO} market for Cut-off, S	1 g
	Glycerine {Europe without Switzerland} esterification of rape oil Cut-off, S	0.00 k
Manometers		87 g

Processes		0.06 tk
Transport	Transport, van <3.5t/RER S	633 m
Transport to end of Life	Transport, van <3.5t/RER S	0.06 tk 633 m
Injection moulding	Injection moulding/RER S	0.99 k 15 g
Metal working	Metal working, average for metal product manufacturing {RER} processing Cut-off, S	0.34 k 28 g
Energy	Processes	
Water pump		k W
New Water RTG	Electricity, high voltage, production ES, at grid/ES S	1.01 h
Water pump Leachates		k W
Water RTG	Electricity, high voltage, production ES, at grid/ES S	1.01 h
Waterproof pump Water RTG		k W
	Electricity, high voltage, production ES, at grid/ES S	1.01 h
Fertilizers	Materials/assemblies	
KNO3	Potassium nitrate {GLO} market for Cut-off, S	k 0 g
60,3% KPO4H2	Phosphate fertiliser, as P2O5 {GLO} market for Cut-off, S	k 0 g
K2SO4	Potassium sulfate, as K2O {GLO} market for Cut-off, S	0.93 g k
CaNO32	Calcium nitrate {GLO} market for Cut-off, S	0 g k
CaCl2	Calcium chloride {RER} market for calcium chloride Cut-off, S	0.23 g k
MgNO32	Magnesium oxide {GLO} market for Cut-off, S	0 g 0.01 k
50,7% Hortilon	Iron sulfate {RER} market for iron sulfate Cut-off, S	11 g 0.00 k
23,6% Hortilon	Magnesium oxide {GLO} market for Cut-off, S	51 g
4,7% Hortilon	Zinc monosulfate {RER} market for zinc monosulfate Cut-off, S	0.00 k 103 g
18,9% Hortilon	Copper oxide {GLO} market for Cut-off, S	0.00 k 41 g
2% Hortilon	Molybdenite {GLO} market for Cut-off, S	0.02 k 044 g
Sequestrene	Iron sulfate {RER} market for iron sulfate Cut-off, S	2 g k
39,7% KPO4H2	Potassium fertiliser, as K2O {GLO} market for Cut-off, S	0 g
MgCL2/ NaOH	Struvite	0.64 p
Processes		
Fertilizer		0.09 tk
Transport	Transport, van <3.5t/RER S	2 m

		0.00	
Emissions to Air	Ammonia	0109	k
		44	g
	Dinitrogen monoxide	0.00	k
		0456	g
	Nitrogen oxides	0.00	k
Emissions to Water	Nitrogen	3648	g
		0.00	k
	Phosphorous	66	g
		0.00	k
		7	g
<u>Greenhouse Structure</u>			
	Materials/assemblies		
			k
Concrete	Concrete roof tile {GLO} market for Cut-off, S	6.09	g
LDPE	Polyethylene, low density, granulate {GLO} market for Cut-off, S		k
		2.24	g
			k
Polycarbonate	Polycarbonate {GLO} market for Cut-off, S	4.6	g
Polyester	Glass fibre reinforced plastic, polyester resin, hand lay-up {GLO} market for Cut-off, S	0.22	k
		4	g
Aluminium	Aluminium, primary, ingot {IAI Area, Russia & RER w/o EU27 & EFTA} aluminium production, primary, ingot Cut-off, S	0.22	k
	Steel, low-alloyed {RER} steel production, electric, low-alloyed Cut-off, S	4	g
		24.0	k
		4	g
	Processes		
Transport	Transport, lorry >32t, EURO5/RER S	1.87	tk
Transoceanic freight ship	Transport, freight, sea, transoceanic ship {GLO} market for Cut-off, S	09	m
			tk
		3.71	m
			k
		0.01	W
Machinery use	Energy, from diesel burned in machinery/RER Energy	15	h
		1.32	tk
End of Life	Transport, lorry 16-32t, EURO5/RER S	3	m
<u>Pesticides</u>			
	Materials/assemblies		
			k
Spintor	Pesticide, unspecified {GLO} market for Cut-off, S	0	g
20% Potassium soap	Potassium sulfate, as K2O {GLO} market for Cut-off, S	0,04*	k
	Water, deionised, from tap water, at user {Europe without Switzerland} market for water, deionised, from tap water, at user Cut-off, S	0,2	g
80% Potassium soap		0,04*	k
		0,8	g
			k
Costar	Pesticide, unspecified {GLO} market for Cut-off, S	0	g
Wettable sulphur			k
	Sulfur {GLO} market for Cut-off, S	0	g
			k
MeemAzal	Pesticide, unspecified {GLO} market for Cut-off, S	0	g

	Processes		
Pesticide			tk
Transport	Transport, van <3.5t/RER S	0.02	m
<u>Rainwater</u>			
<u>Harvesting</u>			
<u>System</u>			
	Materials/assemblies		
	Glass fibre reinforced plastic, polyamide, injection moulded		k
Water tank	{GLO} market for Cut-off, S	3.01	g
			k
Pipes	Polyethylene, HDPE, granulate, at plant/RER S	0.23	g
			k
Iron Pump	Cast iron {GLO} market for Cut-off, S	0.05	g
			k
Steel Pump	Steel, chromium steel 18/8 {GLO} market for Cut-off, S	0.01	g
	Processes		
			tk
Transport GFRP	Transport, lorry 7.5-16t, EURO3/RER S	0.36	m
Transport pipes and pump	Transport, van <3.5t/RER S	0.03	m
			m
Excavation	Excavation, hydraulic digger {GLO} market for Cut-off, S	0.07	3
Transport End of Life	Transport, lorry 3.5-7.5t, EURO5/RER S	0.2	m
Injection moulding	Injection moulding/RER S	3.23	g
	Metal working, average for metal product manufacturing {RER} processing Cut-off, S		k
Metal working		0.05	g
<u>Struvite 1kg</u>			
	Materials/assemblies		
		0.42	k
MgO	Magnesium oxide {GLO} market for Cut-off, S	39	g
		0.76	k
pH	HCl	6	g
	Sodium hydroxide, without water, in 50% solution state {GLO} market for Cut-off, S	0.03	k
		9	g
		0.18	k
	Tap water, at user/RER S	9	g
	Processes		
			k
Electricity	Electricity, medium voltage {ES} market for Cut-off, S	0.52	W
		3	h
Transport	Transport, van <3.5t/RER S	0.00	tk
		3	m
<u>Substrate</u>			
	Materials/assemblies		
	Polyethylene, high density, granulate {GLO} market for Cut-off, S		k
HDPE Substrate		0.12	g
			k
Perlite	Perlite {GLO} market for Cut-off, S	4.39	g

	Processes	3.54 tk
Transport	Transport, lorry 16-32t, EURO5/RER S	4 m

Table 5:

SR20		
Auxiliary Equipment	Materials/assemblies	Amount
		0.20 k
Iron Pump + PS	Cast iron {GLO} market for Cut-off, S	19 g
		0.02 k
Steel Pump + PS	Steel, low-alloyed {GLO} market for Cut-off, S	38 g
HDPE Pump + PS	Polyethylene, HDPE, granulate, at plant/RER S	0.01 k
HDPE Digital timer	Polyethylene, HDPE, granulate, at plant/RER S	19 g
Electronics Digital timer	Polyethylene, HDPE, granulate, at plant/RER S	0.01 k
		18 g
		0.00 k
Digital timer	Electronics, for control units {GLO} market for Cut-off, S	06 g
		0.03 k
Dosatron	Polypropylene, granulate {GLO} market for Cut-off, S	66 g
		0.01 k
Pipe 32 mm	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	13 g
		0.05 k
Pipe 25 mm	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	58 g
		0.13 k
Joints	S	86 g
		0.18 k
Nutrient tank	Polyethylene, high density, granulate {GLO} market for Cut-off, S	71 g
		0.34 k
Water Tank	Polyethylene, high density, granulate {GLO} market for Cut-off, S	62 g
		0.10 k
Iron Flow Meter	Cast iron {GLO} market for Cut-off, S	93 g
HDPE Flow Meter	Polyethylene, high density, granulate {GLO} market for Cut-off, S	0.00 k
		58 g
		0.05 k
Primary pipe	Polyethylene, low density, granulate {GLO} market for Cut-off, S	64 g
		0.06 k
Secondary pipe	Polyethylene, low density, granulate {GLO} market for Cut-off, S	97 g
		0.00 k
Joint	Polyethylene, high density, granulate {GLO} market for Cut-off, S	28 g
		0.00 k
Joint insertion	Polyethylene, high density, granulate {GLO} market for Cut-off, S	28 g
		0.00 k
Stopper	Polyethylene, high density, granulate {GLO} market for Cut-off, S	22 g
		0.02 k
Drip tube	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	36 g
		0.00 k
Drip	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	39 g
		0.00 k
Gripping piece	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	79 g

Manometers	Cast iron {GLO} market for Cut-off, S	0.00 k 69 g
Manometers	Bronze {GLO} market for Cut-off, S	0.00 k 1 g
Manometers	Glycerine {Europe without Switzerland} esterification of rape oil Cut-off, S	0.00 k 87 g
	Processes	0.06 tk
Transport	Transport, van <3.5t/RER S	633 m
Transport to end of Life	Transport, van <3.5t/RER S	0.06 tk 633 m
Injection moulding	Injection moulding/RER S	0.99 k 15 g
Metal working	Metal working, average for metal product manufacturing {RER} processing Cut-off, S	0.34 k 28 g
Energy	Processes	k
Water pump		W
New Water RTG	Electricity, high voltage, production ES, at grid/ES S	1.01 h
Water pump		k
Leachates		W
Water RTG	Electricity, high voltage, production ES, at grid/ES S	1.01 h
Waterproof pump		k
Water RTG	Electricity, high voltage, production ES, at grid/ES S	1.01 h
Fertilizers	Materials/assemblies	k
60,3% KPO4H2	Phosphate fertiliser, as P2O5 {GLO} market for Cut-off, S	0 g k
39,7% KPO4H2	Potassium fertiliser, as K2O {GLO} market for Cut-off, S	0 g k
KNO3	Potassium nitrate {GLO} market for Cut-off, S	0 g k
K2SO4	Potassium sulfate, as K2O {GLO} market for Cut-off, S	0.93 g k
CaNO32	Calcium nitrate {GLO} market for Cut-off, S	0 g k
CaCl2	Calcium chloride {RER} market for calcium chloride Cut-off, S	0.23 g k
MgNO32	Magnesium oxide {GLO} market for Cut-off, S	0 g 0.01 k
50,7% Hortilon	Iron sulfate {RER} market for iron sulfate Cut-off, S	11 g 0.00 k
23,6% Hortilon	Magnesium oxide {GLO} market for Cut-off, S	51 g
	Zinc monosulfate {RER} market for zinc monosulfate Cut-off, S	0.00 k
4,7% Hortilon	S	103 g 0.00 k
18,9% Hortilon	Copper oxide {GLO} market for Cut-off, S	41 g 0.00 k
2% Hortilon	Molybdenite {GLO} market for Cut-off, S	044 g

Sequestrene	Iron sulfate {RER} market for iron sulfate Cut-off, S	0.02 k
MgCL2/ NaOH	Struvite	2 g
		1.28 p
Processes		
Fertilizer		0.12 tk
Transport	Transport, van <3.5t/RER S	415 m
		0.00
		0218 k
Emissions to Air	Ammonia	88 g
		0.00 k
	Dinitrogen monoxide	0912 g
		0.00 k
	Nitrogen oxides	7296 g
Emissions to Water	Nitrogen	0.01 k
		32 g
		0.01 k
	Phosphorous	4 g
<u>Greenhouse</u>		
<u>Structure</u>		
	Materials/assemblies	
		k
Concrete	Concrete roof tile {GLO} market for Cut-off, S	6.09 g
LDPE	Polyethylene, low density, granulate {GLO} market for Cut-off, S	k
		2.24 g
		k
Polycarbonate	Polycarbonate {GLO} market for Cut-off, S	4.6 g
Polyester	Glass fibre reinforced plastic, polyester resin, hand lay-up {GLO} market for Cut-off, S	0.22 k
		4 g
Aluminium	Aluminium, primary, ingot {IAI Area, Russia & RER w/o EU27 & EFTA} aluminium production, primary, ingot Cut-off, S	0.22 k
		4 g
	Steel, low-alloyed {RER} steel production, electric, low-alloyed Cut-off, S	24.0 k
		4 g
	Processes	
Transport	Transport, lorry >32t, EURO5/RER S	1.87 tk
Transoceanic freight ship	Transport, freight, sea, transoceanic ship {GLO} market for Cut-off, S	09 m
		tk
		3.71 m
		k
		0.01 W
Machinery use	Energy, from diesel burned in machinery/RER Energy	15 h
		1.32 tk
End of Life	Transport, lorry 16-32t, EURO5/RER S	3 m
<u>Pesticides</u>		
	Materials/assemblies	
		k
Spintor	Pesticide, unspecified {GLO} market for Cut-off, S	0 g
20% Potassium soap	Potassium sulfate, as K2O {GLO} market for Cut-off, S	0,04* k
	Water, deionised, from tap water, at user {Europe without Switzerland} market for water, deionised, from tap water, at user Cut-off, S	0,2 g
80% Potassium soap		0,04* k
		0,8 g

Costar	Pesticide, unspecified {GLO} market for Cut-off, S	0	k
Wettable sulphur	Sulfur {GLO} market for Cut-off, S	0	g
MeemAzal	Pesticide, unspecified {GLO} market for Cut-off, S	0	g
	Processes		
Pesticide Transport	Transport, van <3.5t/RER S	0.02	tk
<u>Rainwater Harvesting System</u>			
	Materials/assemblies		
Water tank	Glass fibre reinforced plastic, polyamide, injection moulded {GLO} market for Cut-off, S	3.01	g
Pipes	Polyethylene, HDPE, granulate, at plant/RER S	0.23	g
Iron Pump	Cast iron {GLO} market for Cut-off, S	0.05	g
Steel Pump	Steel, chromium steel 18/8 {GLO} market for Cut-off, S	0.01	g
	Processes		
Transport GFRP	Transport, lorry 7.5-16t, EURO3/RER S	0.36	tk
Transport pipes and pump	Transport, van <3.5t/RER S	0.03	tk
Excavation	Excavation, hydraulic digger {GLO} market for Cut-off, S	0.07	3
Transport End of Life	Transport, lorry 3.5-7.5t, EURO5/RER S	0.2	tk
Injection moulding	Injection moulding/RER S	3.23	g
Metal working	Metal working, average for metal product manufacturing {RER} processing Cut-off, S	0.05	k
	Processes		
<u>Struvite 1kg</u>	Materials/assemblies		
MgO	Magnesium oxide {GLO} market for Cut-off, S	0.42	g
pH	HCl	6	g
	Sodium hydroxide, without water, in 50% solution state {GLO} market for Cut-off, S	0.03	k
	Tap water, at user/RER S	9	g
	Processes		
Elictricity	Electricity, medium voltage {ES} market for Cut-off, S	0.52	tk
Transport	Transport, van <3.5t/RER S	3	g
		0.00	tk
		3	m

Substrate	Materials/assemblies		
HDPE Substrate	Polyethylene, high density, granulate {GLO} market for Cut-off, S	0.12	k g
Perlite	Perlite {GLO} market for Cut-off, S	4.39	k g
	Processes	3.54	tk
Transport	Transport, lorry 16-32t, EURO5/RER S	4	m

Table 6:

Control			Am
Auxiliary Equipment	Materials/assemblies		oun t
Iron Pump + PS	Cast iron {GLO} market for Cut-off, S	0.20	k g
Steel Pump + PS	Steel, low-alloyed {GLO} market for Cut-off, S	19	g k
HDPE Pump + PS	Polyethylene, HDPE, granulate, at plant/RER S	0.02	g k
HDPE Digital timer	Polyethylene, HDPE, granulate, at plant/RER S	0.01	g k
Electronics Digital timer	Electronics, for control units {GLO} market for Cut-off, S	19	g k
Dosatron	Polypropylene, granulate {GLO} market for Cut-off, S	0.01	g k
Pipe 32 mm	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	13	g k
Pipe 25 mm	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	0.05	g k
Joints	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	58	g k
Nutrient tank	Polyethylene, high density, granulate {GLO} market for Cut-off, S	0.13	g k
Water Tank	Polyethylene, high density, granulate {GLO} market for Cut-off, S	86	g k
Iron Flow Meter	Cast iron {GLO} market for Cut-off, S	0.18	g k
HDPE Flow Meter	Polyethylene, high density, granulate {GLO} market for Cut-off, S	71	g k
Primary pipe	Polyethylene, low density, granulate {GLO} market for Cut-off, S	0.34	g k
Secondary pipe	Polyethylene, low density, granulate {GLO} market for Cut-off, S	62	g k
Joint	Polyethylene, high density, granulate {GLO} market for Cut-off, S	93	g k
Joint insertion	Polyethylene, high density, granulate {GLO} market for Cut-off, S	0.00	g k

Stopper	Polyethylene, high density, granulate {GLO} market for Cut-off, S	0.00 k 22 g
Drip tube	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	0.02 k 36 g
Drip	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	0.00 k 39 g
Gripping piece	Polyvinylchloride, bulk polymerised {GLO} market for Cut-off, S	0.00 k 79 g
Manometers	Cast iron {GLO} market for Cut-off, S	0.00 k 69 g
Manometers	Bronze {GLO} market for Cut-off, S	0.00 k 1 g
Manometers	Glycerine {Europe without Switzerland} esterification of rape oil Cut-off, S	0.00 k 87 g
Processes		
Transport	Transport, van <3.5t/RER S	0.06 tk 633 m
Transport to end of Life	Transport, van <3.5t/RER S	0.06 tk 633 m
Injection moulding	Injection moulding/RER S	0.99 k 15 g
Metal working	Metal working, average for metal product manufacturing {RER} processing Cut-off, S	0.34 k 28 g
Energy	Processes	
Water pump		k W
New Water RTG	Electricity, high voltage, production ES, at grid/ES S	1.01 h
Water pump		k
Leachates		W
Water RTG	Electricity, high voltage, production ES, at grid/ES S	1.01 h
Waterproof pump		k
Water RTG	Electricity, high voltage, production ES, at grid/ES S	1.01 h
Fertilizers	Materials/assemblies	
60,3% KPO4H2	Phosphate fertiliser, as P2O5 {GLO} market for Cut-off, S	0.22 k 1 g
39,7% KPO4H2	Potassium fertiliser, as K2O {GLO} market for Cut-off, S	0.14 k 5 g
KNO3	Potassium nitrate {GLO} market for Cut-off, S	k 0.21 g
K2SO4	Potassium sulfate, as K2O {GLO} market for Cut-off, S	k 0.59 g
CaNO32	Calcium nitrate {GLO} market for Cut-off, S	k 0.74 g
CaCl2	Calcium chloride {RER} market for calcium chloride Cut-off, S	0.23 g 0.38 k
MgNO32	Magnesium oxide {GLO} market for Cut-off, S	2 g 0.01 k
50,7% Hortilon	Iron sulfate {RER} market for iron sulfate Cut-off, S	11 g

23,6% Hortilon	Magnesium oxide {GLO} market for Cut-off, S	0.00 k 5 g
4,7% Hortilon	Zinc monosulfate {RER} market for zinc monosulfate Cut-off, S	0.00 k 1 g
18,9% Hortilon	Copper oxide {GLO} market for Cut-off, S	0.00 k 4 g
2% Hortilon	Molybdenite {GLO} market for Cut-off, S	0.00 k 044 g
Sequestrene	Iron sulfate {RER} market for iron sulfate Cut-off, S	0.02 k 2 g
Processes		3.05
Fertilizer		357 tk
Transport	Transport, van <3.5t/RER S	2 m
Emissions to Air	Ammonia	0.06 k 86 g
	Dinitrogen monoxide	0.02 k 859 g
	Nitrogen oxides	0.00 k 287 g
Emissions to Water	Nitrogen	0.22 k 9 g
	Phosphorous	0.08 k 4 g
<u>Greenhouse Structure</u>		
	Materials/assemblies	k
Concrete	Concrete roof tile {GLO} market for Cut-off, S	6.09 g
LDPE	Polyethylene, low density, granulate {GLO} market for Cut-off, S	k 2.24 g
Polycarbonate	Polycarbonate {GLO} market for Cut-off, S	k 4.6 g
Polyester	Glass fibre reinforced plastic, polyester resin, hand lay-up {GLO} market for Cut-off, S	0.22 k 4 g
Aluminium	Aluminium, primary, ingot {IAI Area, Russia & RER w/o EU27 & EFTA} aluminium production, primary, ingot Cut-off, S	0.22 k 4 g
	Steel, low-alloyed {RER} steel production, electric, low-alloyed Cut-off, S	24.0 k 4 g
	Processes	1.87 tk
Transport	Transport, lorry >32t, EURO5/RER S	09 m
Transoceanic freight ship	Transport, freight, sea, transoceanic ship {GLO} market for Cut-off, S	tk 3.71 m
Machinery use	Energy, from diesel burned in machinery/RER Energy	k 0.01 W 15 h
End of Life	Transport, lorry 16-32t, EURO5/RER S	1.32 tk 3 m

<u>Pesticides</u>	Materials/assemblies		
Spintor	Pesticide, unspecified {GLO} market for Cut-off, S	0	k g
20% Potassium soap	Potassium sulfate, as K2O {GLO} market for Cut-off, S Water, deionised, from tap water, at user {Europe without	0,04	k g
80% Potassium soap	Switzerland} market for water, deionised, from tap water, at user Cut-off, S	*0,2	k g
Costar	Pesticide, unspecified {GLO} market for Cut-off, S	0	k g
Wettable sulphur	Sulfur {GLO} market for Cut-off, S	0	k g
MeemAzal	Pesticide, unspecified {GLO} market for Cut-off, S	0	k g
	Processes		
Pesticide Transport	Transport, van <3.5t/RER S	0.02	tk m
<u>Rainwater Harvesting System</u>	Materials/assemblies		
Water tank	Glass fibre reinforced plastic, polyamide, injection moulded {GLO} market for Cut-off, S	3.01	k g
Pipes	Polyethylene, HDPE, granulate, at plant/RER S	0.23	k g
Iron Pump	Cast iron {GLO} market for Cut-off, S	0.05	k g
Steel Pump	Steel, chromium steel 18/8 {GLO} market for Cut-off, S	0.01	k g
	Processes		
Transport GFRP	Transport, lorry 7.5-16t, EURO3/RER S	0.36	tk m
Transport pipes and pump	Transport, van <3.5t/RER S	0.03	tk m
Excavation	Excavation, hydraulic digger {GLO} market for Cut-off, S	0.07	3
Transport End of Life	Transport, lorry 3.5-7.5t, EURO5/RER S	0.2	tk m
Injection moulding	Injection moulding/RER S	3.23	k g
Metal working	Metal working, average for metal product manufacturing {RER} processing Cut-off, S	0.05	k g
<u>Substrate</u>	Materials/assemblies		
HDPE Substrate	Polyethylene, high density, granulate {GLO} market for Cut-off, S	0.12	k g
Perlite	Perlite {GLO} market for Cut-off, S	4.39	k g
	Processes		

Figure 3:



Figure 3: Environmental performance of the operation System in % per IC.