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Appendices

Appendix 1. Kg N in digestate (section 2.2.2)

50:50 grass: slurry

4 kg N/t grass and 3 kg N/t slurry equates to 3.5 kg N/t feedstock

94% N remaining = 3.29 kg N/t

84% reduction in volume of digstate

Thus 3.29/0.84 = 3.89 kg N/t digestate

Appendix 2: H_2 conversion efficiency (section 2.2.3)

1 kg H_2 equivalent to 11.2 m^3 H_2 equivalent to 134 MJ or 37 kWh.

49kWh to produce 37 kWh equates to 75% conversion efficiency.

Appendix 3. Simulation results from Superpro Designer for S1, S2 and S3 with 60 : 40 VS grass and slurry (section 2.4.2).

Table 3.1: Inputs and outputs for three scenarios

	S1	**S2**	**S3**
Grass silage (tonnes)	25,344	25,344	25,344
Slurry (tonnes)	70,607	70,607	70,607
Hydrogen (tonnes)	**-**	1436	1496
Renewable methane (m^3)	4,174,132	8,196,291	8,341,716
Digestate (tonnes)	84,660	84,660	84,660

Table 3.2: Parasitic energy demands

	Scenario 1		Scenario 2		Scenario 3	
Energy produced - MJ (LHV):	150,268,753		295,066,477		300,301,780	
	Heat (kWh)	Electricity (kWh)	Heat (kWh)	Electricity (kWh)	Heat (kWh)	Electricity (kWh)
Biogas production	1,842,305	1,558,781	1,842,305	1,558,781	1,842,305	1,558,781
Amine upgrading	8,767,488	185,872	8,767,488	185,872	-	-
Ex-situ biological methanation	-	-	0	3,966,336	0	4,126,320
Compression		1,460,946		2,868,702		2,919,601