

Annex 2:
Data Files

Annex 2. Table1: Composition of ash in algae analyzed within the project compared to other biomasses analyzed in other projects

Origin	Sample	ash	K	Na	Mg	Ca	Fe	Si	Al	Zn	Cu	Mn	Sr	S	Cl	P
		wt% d.b.	wt% in ash													
1	Ulva pool 08	16,5	2,640	1,650	1,815	0,743	0,132	0,017	0,005					1,980	1,584	0,162
1	Ulva pool 08 washed	14	1,540	0,100	2,190	1,300	0,350	0,020	-					1,680	0,240	0,580
1	Ulva Pool10	21	1,504	3,343	2,298	0,564	0,048	0,169		0,013	0,010	0,086	-	1,421	5,014	0,334
1	Ulva pool 10 pressrest	17	2,002	1,668	2,002	0,584	0,077	0,200		0,020	0,020	0,132	-	1,618	2,002	0,434
1	Ulva sea 07	35	3,010	2,030	2,630	2,070	0,460	3,850						2,660	3,150	0,530
1	Ulva Sea 09	50	2,400	2,600	2,100	2,300	0,760	8,500	0,770	0,011	0,002	0,420	-	3,000	4,400	0,340
1	Ulva sea 09 washed	31	2,400	0,230	2,000	2,600	0,310	5,400	0,290	0,008	0,002	0,510	-	3,200	1,100	0,350
1	Sargassum muticum	24	5,000	1,200	0,980	1,700	0,026	0,630	0,093	<0,001	<0,001	0,008	-	1,100	5,000	0,170
1	Chaetomorpha linum	40	8,100	0,710	0,320	1,400	0,060	0,510	0,110	<0,001	<0,001	0,061	-	3,000	6,800	0,130
1	Gracilaria vermiculophyllum	21	3,500	0,540	0,380	0,340	0,038	0,420	0,067	<0,001	<0,001	0,059	-	1,800	2,300	0,200
2	Bark	2,8	0,146	0,011	0,051	0,440	0,067	0,432	0,098	-	-	-	-	-	0,021	0,021
2	Beech wood chips	0,5	0,071	0,008	0,022	0,100	0,001	0,011	0,001	-	-	-	-	-	0,044	0,008
2	wheat straw	5,9	1,090	0,071	0,078	0,293	0,034	1,415	0,073					0,210	0,353	0,062
2	Grain waste	9	1,345	0,030	0,141	0,502	0,053	2,608	0,071	-	-	-	-	-	0,279	0,228
2	Mask	3,3	0,049	0,007	0,175	0,203	0,017	0,586	0,003	-	-	-	-	-	0,014	0,475
2	Shea meal	4,8	2,032	0,005	0,171	0,161	0,030	0,247	0,038	-	-	-	-	-	0,077	0,161
2	Carrageenan	8,6	0,450	0,163	0,384	1,905	0,072	0,523	0,109	-	-	-	-	-	0,297	0,053
2	Olive stones	8,1	2,421	0,017	0,347	0,637	0,125	0,644	0,107	-	-	-	-	-	0,284	0,173

Origin: 1) PSO project søsalat, 2) PSO project 5075

Calculation of *Ulva lactuca* production at a power plant in 1 Ha basins without CO2 addition

15.08.2011	15.11.2011 rev	1000 DKK
Harvest hours	400 1 time/week. 8 hours	600 Dry <i>Ulva</i>
Time for pumping	7000 hour/year	400 Wet <i>Ulva</i>
Machinery	15 years depreciation	
Buildings	15 years depreciation	
Interest	4 % pa	
Electr. price	0,4 DKK/Kwh	
Harvest	400 Tons wet algae/year	
Production	50 Tons DM algae/year	
Pris/Tons DM	500 DKK	

Annex 2. Table 2

	Dry <i>Ulva</i>	Wet <i>Ulva</i>
Timer	174	174
1000 DKK	4	4
EL water supply, pumps, paddle etc	62	
El harvest and conveyor band	25	
El drying line	40	
EL SUM	184	178

1000 DKK	Dry	Wet	Comments
Invest. machinery			
4 raceways	9300	9300	
Water supply, pumps	1200	1200	
Harvest and conveyors	1500	1500	
Drying line	2000	0	
Storage tank for NPK	100	100	200 m3
Total	14100	12100	0

1000 DKK	Dry	Wet	kr/m2	m2
Investment buildings				
Drying line	450	0	1500	300
Storage	450	0	1500	300
Total	900	0		

GJ/tons
12

1000 DKK	Dry	Wet
Capital costs annually		
Machinery deprecia.	940	807
Building deprecia.	60	0
Interest (average)	300	242
Variable costs annually		
Wages	600	400
Maintenance 2% of investment	300	242
Electricity	184	178
Steam for drying	33	
Gas for drying		
Water, chemicals, fertilizer	100	100
Total in 1000 DKK annually	2517	1968
Value of algae production in 1000 DKK	25	20

DKK	Capital costs	Variable costs	Total costs	DKK/tonsDM	DKK/GJ
Dry without CO2 add.	1.300.000	1.217.000	2.517.000	50.340	4.195
CO2 addition	730.000	470.000	1.200.000	24.000	2.000
Total dry with CO2 add.	2.030.000	1.687.000	3.717.000	37.170	3.098
Wet without CO2 add.	1.048.667	919.600	1.968.267		
CO2 addition	730.000	470.000	1.200.000		
Total wet with CO2 add.	1.778.667	1.389.600	3.168.267		

Vandfordampning af 350 tons vand/år

Opvarmning fra 10 gr til 90 grader:	132 GJ
Vandfordampning:	770 GJ
	902 GJ
	251 MWh

Pris ved køb af gas (Dansk Fjv. Statistik)	57.647 DKK	230 DKK/MWh
Pris af damp fra kraftværk (Bo Sander)	33.385 DKK	37 Kr/GJ