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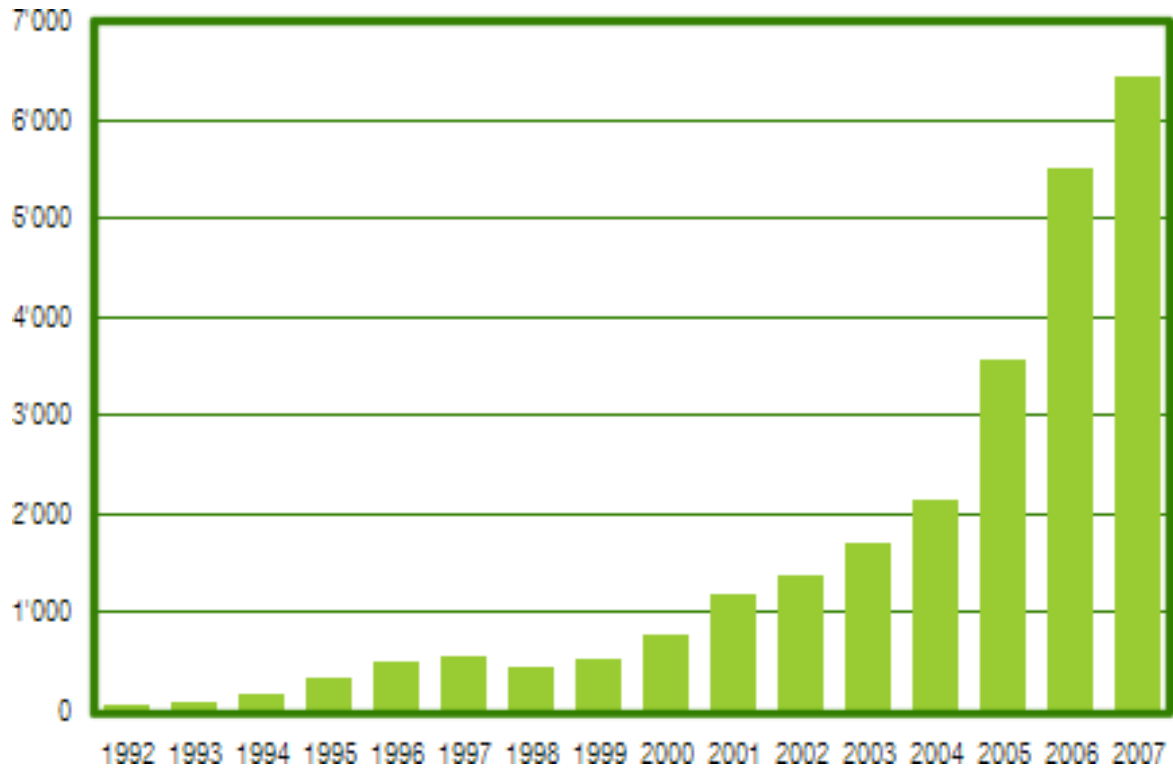
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BIODIESEL

97% from vegetable oils

OIL FROM CROPS: *Rape seeds, cotton,soya,sunflower*

Evolution of bio-diesel production in the EU 1992 – 2007, Mil.tons



Commercial production of algae biomass for bio-fuel industry

Business start-up



Situation & prognosis

**DRAMATIC DEFICIT OF RAW
MATERIALS – VEGETABLE OIL
FOR BIO-FUEL PRODUCTION**

**ON-LAND CROPS
NOT ENOUGH**

**AGRICULTURAL
LAND
NOT ENOUGH**

**IMPORT
NOT ENOUGH**

**LACK OF
EUROPEAN
PLANNING**

BIODIESEL PRODUCTION OVER THE PAST 6 YEARS IN THE 10 MAJOR PRODUCING EU COUNTRIES

Source: the European Biodiesel Board (EBB)

Country	Annual production [Mt/yr]					
	2002	2003	2004	2005	2006	2007
Germany	619	805	1'166	1'880	2'998	3'255
France	412	402	392	554	837	982
Italy	236	307	360	446	503	409
Austria	28	36	64	96	139	301
Portugal	0	0	0	1	102	197
Spain	0	7	15	82	111	189
Belgium	0	0	0	1	28	187
UK	3	10	10	57	216	169
Greece	0	0	0	3	47	113
Netherlands	0	0	0	0	20	96
Others	59	126	128	440	505	537
EU-27	1'359	1'693	2'134	3'555	5'507	6'434

BIODIESEL PRODUCTION PLANTS IN GREECE

CONSTRUCTED AND GRANTED UNDER DIRECTIVE 2003/30/EC OF POTENTIAL BIOFUELS IN EUROPE

Source: National report on biodiesel use in Greece

N	COMPANY	LOCATION	OPERATED FROM	PRODUCTION CAPACITY, t / YEAR
1	HELLENIC BIOPETROLEUM INDUSTRIAL AND COMMERCIAL S.A.	KILKIS	DECEMBER 2005	40,000
2	VERT OIL S.A.	THESSALONIKI	JULY 2006	25,000
3	PAVLOS N.PETTAS INDUSTRIAL AND COMMERCIAL S.A.	PATRAS	JULY 2006	50,000
4	AGROINVEST S.A.	FTHIOTIDA	NOVEMBER 2006	200,000
5	ELINOIL S.A.	VOLOS	DECEMBER 2006	80,000
6-9	Owners not reported	4 UNITS x 5,000 t	END OF 2007	20,000
10-11	Owners not reported	2 UNITS x 11,000 t	END OF 2007	22,000
12	Owners not reported	1 UNIT	END OF 2007	100,000
TOTAL				537,000

Demand of technical oil in Greece

600 000 t/year

Agricultural area used for domestic food oil crops

374 740 ha

Agricultural area needed to cover technical oil demand

840 000 ha

Solution

Large-scale production of basic raw materials for alternative fuel power engineering

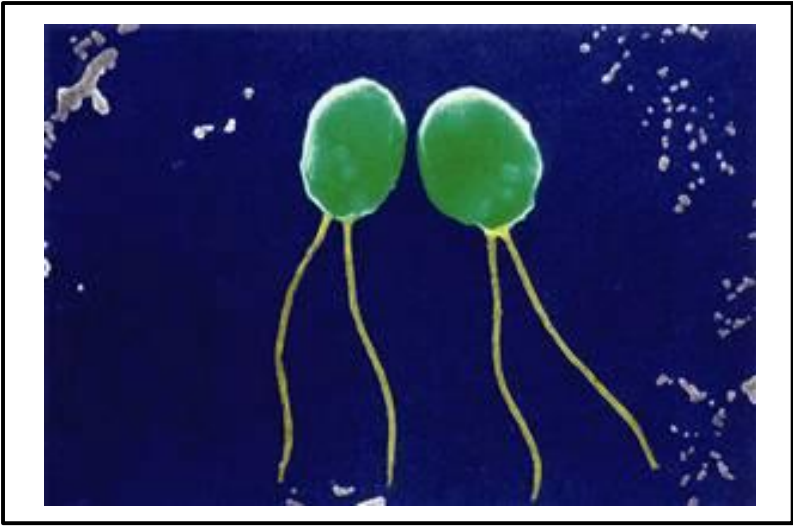
Algae biomass production plants

BIO-DIESEL

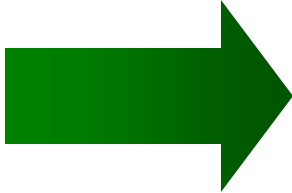
BIO-ETHANOL

BIOCOAL

BY-PRODUCTS



MICROALGAE - 0,2 / 0,4 MM



ALGAE BIOMASS



ALGAE CULTURE IS MUCH MORE PRODUCTIVE THEN ANY ON-LAND CROP

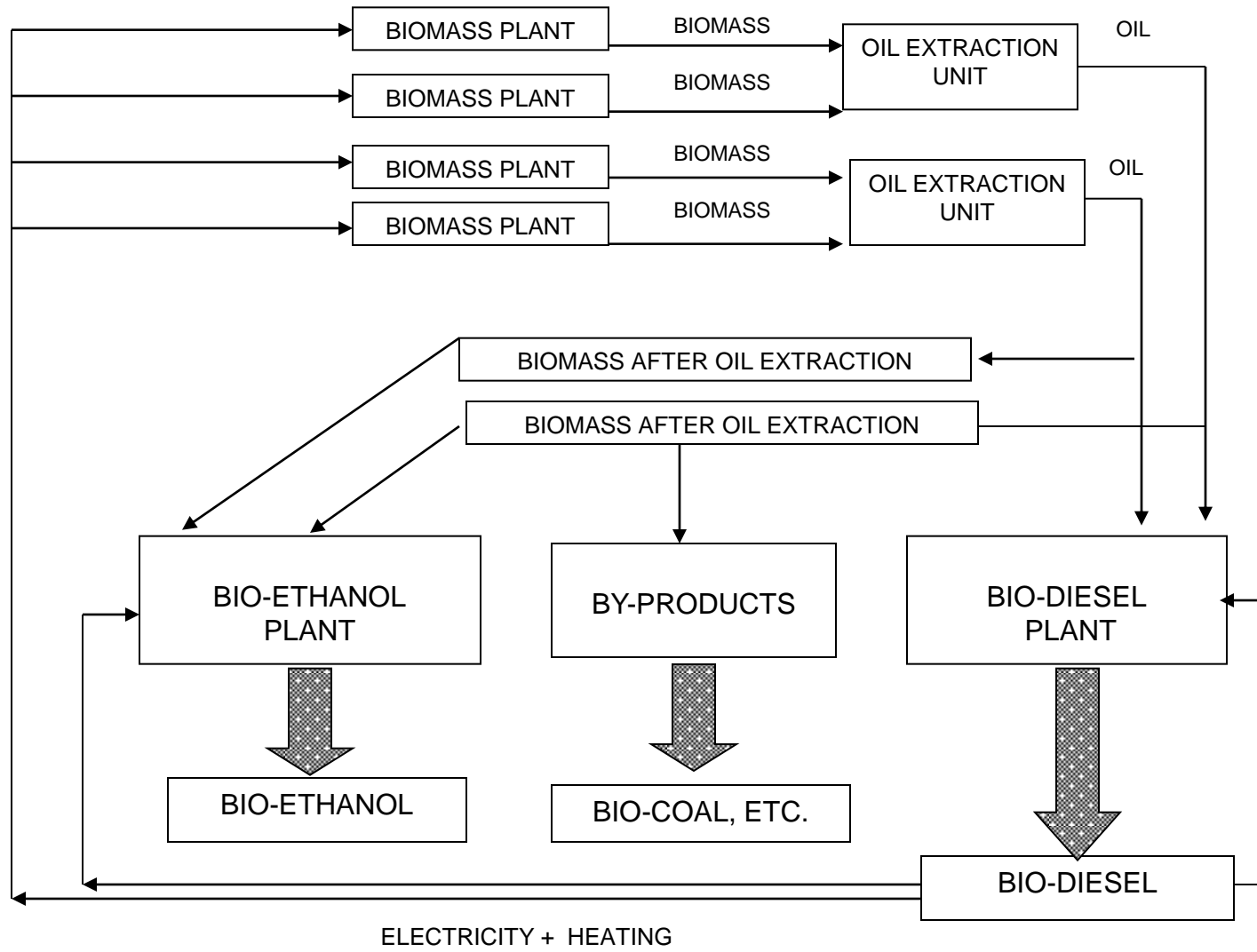
Source: Algae Biomass Summit, San Francisco, 2007

CROP	QUANTITY OF PRODUCED OILS L / Ha
COTTON	340
SOYA	460
SUNFLOWER	970
RAPE	1210
ALGAE	11400 -95000

MICROALGAE BIOMASS

High growth rate	→	80 –200 times more then on-land crop
Oil 60-85%	→	Bio - diesel
Carbohydrates	→	Bio-ethanol
Proteins	→	Food supplements
Biomass	→	Bio-coal Soil fertilizers & conditioners
By-products	→	Poly-unsaturated fatty acids Vitamins Antioxidants β -carotene and astaxanthin Sterols Antimicrobial, antiviral and anticancer compounds.

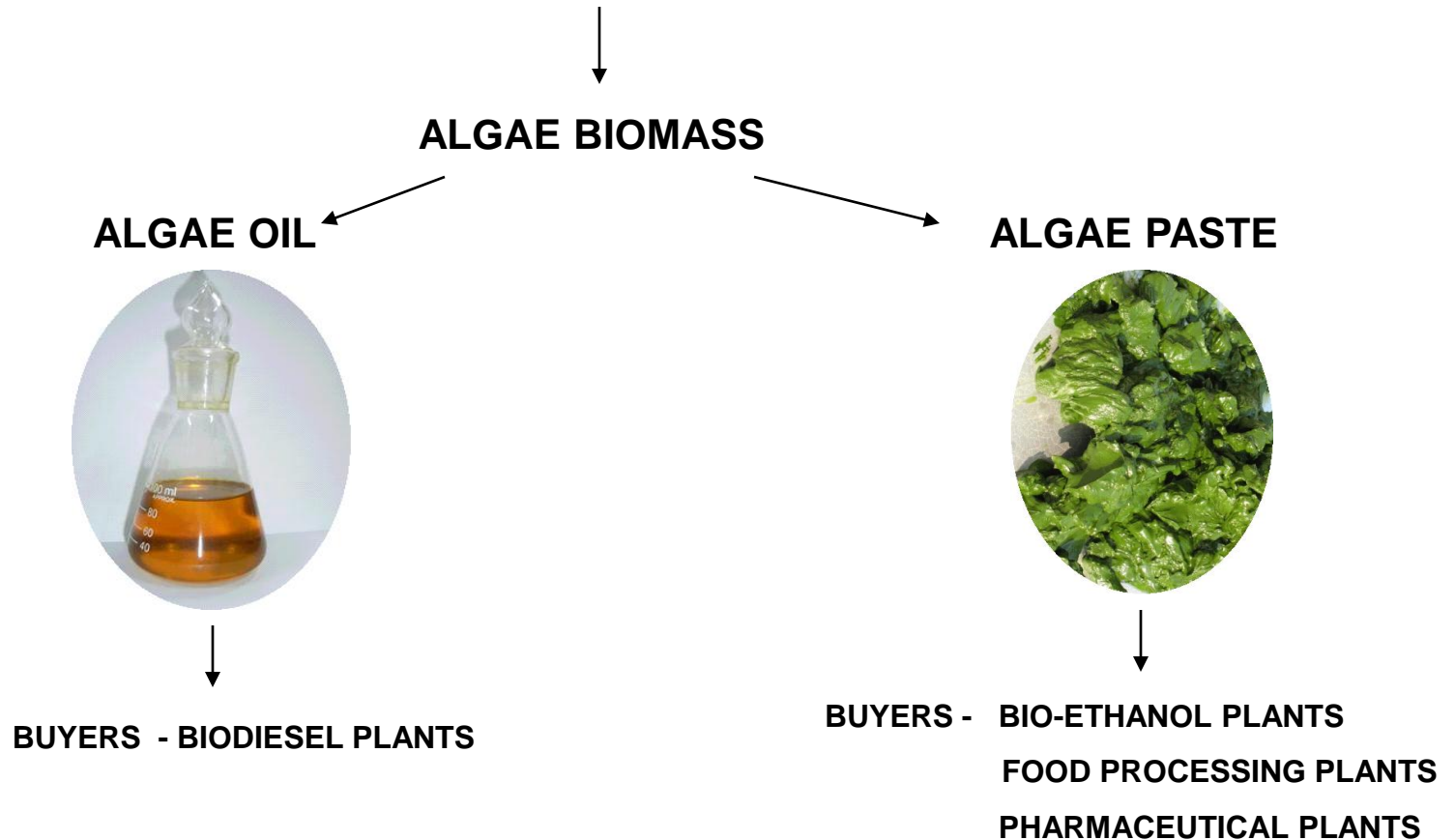
Closed-cycle algae biomass production for bio-fuel industry



Algae biomass production plant 10 t/ day

Commercial pilot project

ALGAE BIOMASS PRODUCTION PLANT

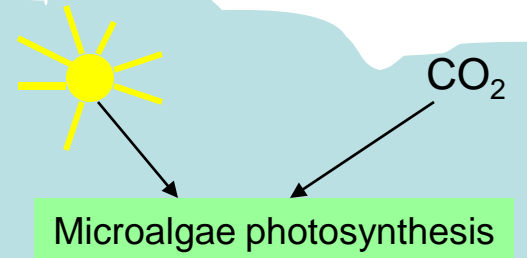


PRICES - 2008

ALGAE OIL	650 € / T – 800 EURO / T
ALGAE PASTE	1500 € / T – 3000 EURO / T
OMEGA – 3	110 €/KG
ASTAXANTIN	2210 €/KG

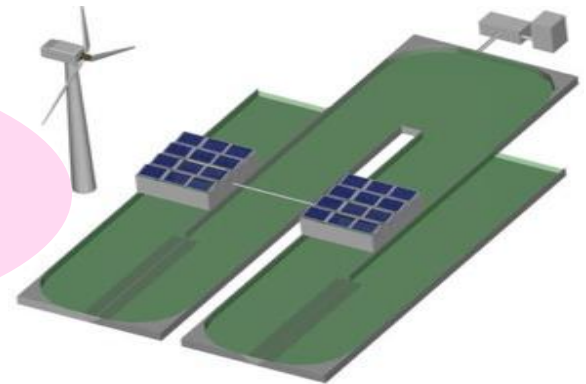
Technology

PRODUCTION MODULE
1 T / DAY



BIO- FUEL

PRODUCTION PLANT
10 - 100 T/ DAY



Industrial capacity of algae production

	PRODUCTION, TONS	
	MODULE	PLANT
DAILY TOTAL CAPACITY	1	10
ALGAE OIL	0,45	4,5
ALGAE PASTE	0,55	5,5
ANNUAL TOTAL CAPACITY	365	3 650
ALGAE OIL	165	1 650
ALGAE PASTE	200	2 000

Gross income, costs & ROI from algae production modules & plants

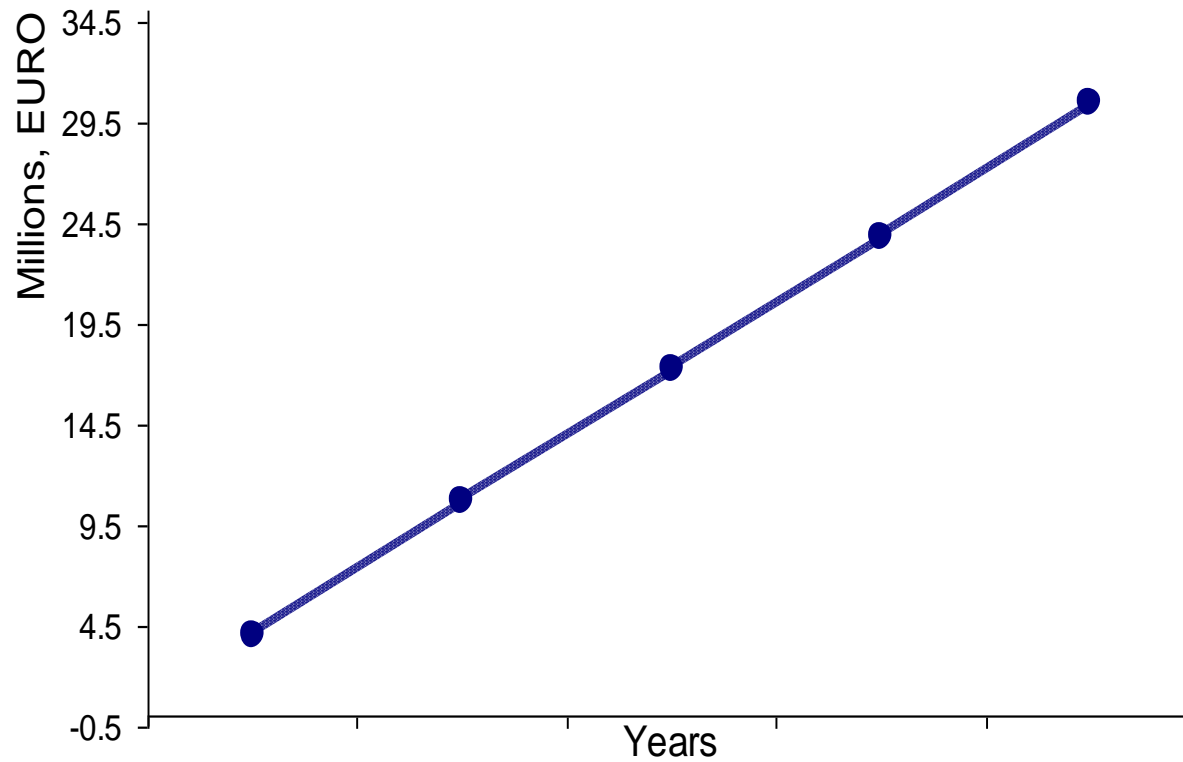
	PROFITS, EURO	
	MODULE	PLANT 10 T/DAY
GROSS INCOME PER DAY	1 118 – 2 010	11 180 – 20 100
GROSS INCOME PER YEAR	408 070 – 733 650	4 078 875 – 7 336 500

	COSTS, EURO
MODULE 1 T/DAY	580 000
PLANT 10 T/ DAY	2 500 000
PLANT 100 T/ DAY	10 000 000

Project pre-tax ROI approximately 12 to 22 months

PLANT 10 T/ DAY

Net profit after costs deduction for 5 years



ALGAE PRODUCTION

Financial plan for 5 years of operation

Millions, EURO		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
		Equipment, Operations, Raw materials	Operations, Raw materials	Operations, Raw materials	Operations, Raw materials	Operations, Raw materials
ALGAE PRODUCTION MODULE 1 TON / DAY						
COSTS		0,75	0,17	0,17	0,17	0,17
MIN. PRICES	GROSS INCOME	0,41	0,41	0,41	0,41	0,41
	NET PROFIT	-0,34	-0,11	0,12	0,35	0,59
MAX. PRICES	GROSS INCOME	0,73	0,73	0,73	0,73	0,73
	NET PROFIT	-0,02	0,53	1,15	1,65	2,21

ALGAE PRODUCTION PLANT 10 TON / DAY						
COSTS		3,25	0,75	0,75	0,75	0,75
MIN. PRICES	GROSS INCOME	4,07	4,07	4,07	4,07	4,07
	NET PROFIT	0,82	4,15	7,48	10, 81	14,14
MAX. PRICES	GROSS INCOME	7,33	7,33	7,33	7,33	7,33
	NET PROFIT	4,08	10,67	17,25	23,84	30,43

Market potential

Demand for oil for bio-diesel production in Greece only

600 000 tons

Quantity of algae production plants needed in Greece

360 - Industrial capacity of algae production 10 ton / day

36 - Industrial capacity of algae production 100 ton / day

+ EXPORT POTENTIAL

Profitability of business strategies

N	BUSINESS STRATEGY	UNIT	INVESTMENT , Mil EURO	RETURN ON INVESTMENTS, YEAR	INCOME/YEAR AFTER RETURN ON INVESTMENTS Mil, EURO	ANNUAL PROFITABILITY VERSUS INITIAL INVESTMENTS, %
1	INDUSTRIAL OPERATION	PLANT	3,2	0,6 –1,0	5,5	170
2	SALE OF BUSINESS	PLANT	2,5	INSTANT	>0,5	>20
3	FRANCHISE, RENT,LEASE	MODULE	0,5	1,6	0,3	60

Commercial pilot site for algae biomass production

10 t/day

Investments requirement	2,5 – 3,2 Mil.€
Return on investments	6-12 months
Gross income per year	5,5 Mil.€ /year
Earnings in 5 years of operation (costs deducted)	14 - 35 Mil.€

Action plan

General project arrangements	4 months	50 000 €
Algae production module 1 t/day - turn-key	6 months	750 000 €
Algae production plant 10 t/day - turn-key	8 months	3 250 000 €
Algae production plant 100 t/day - turn-key	12 months	21 000 000 €