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Algae and aquatic biomass for a sustainable production of 2nd generation biofuels

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AquaFUELS

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Report on ongoing R&D projects

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1 INTRODUCTION

1.1 Background

The rationale of this report is to present a comprehensive mapping of both finalised and ongoing projects in the field of algae biomass with a special regard to research and demonstration projects focusing on algae-to-biofuels production pathways (the projects have been selected and listed according to their relevance to the scope of our AquaFUELS project). Such mapping provides an overview of the actions involved in each project, providing also contact details and, when possible, describing the specific relevance of each action to AquaFUELS, highlighting potential links and synergies.

The overall aim of this action is to build up a database of information about projects which can then become instrumental in structuring the algae community. The projects that are listed in the following pages form a direct complement to the previous *“Report on Main Stakeholders”* (AquaFUELS deliverable 1.3) finalised during the first phase of our project. The list also adds up to the database of contacts of deliverable 1.3 and further improves the listing of the scientific stakeholders that has been taken over by the European Algae Biomass Association (EABA) - launched and supported by our AquaFUELS project.

Building up an initial networking and co-ordination with past and present projects, AquaFUELS aims to reducing the overlapping and/or the duplication of work among the various initiatives which have recently been launched or are being undertaken in the algae-to-biofuels production chain.

In the overall economy of our AquaFUELS project, this *“Report on ongoing research projects”* (AquaFUELS deliverable 4.3) comes in as the first deliverable from Work Package 4 (WP4) to be finalised. WP4 is dedicated to promoting synergies among projects on algae biomass and therefore directly or indirectly related to AquaFUELS. Within WP4, this Report represents the outcome of the work performed under task 4.1 on the creation of a platform of European flagship projects. Task 4.1 of the project is aimed to identify and categorise past and ongoing EU flagship projects with particular reference to the following EU Programmes: Framework Programs 5, 6 and 7, Intelligent Energy Europe, Cost, Eureka, Eurostars and also Interreg projects. Building up some clarity and references in the network of projects covering the issue of algal biomass will make it easier to elaborate and identify partners for signing Barter Agreements (exchanging services without financial compensation) with other projects’ consortia.

The AquaFUELS project sets a minimum target at 20 Barter agreements to be signed. Representatives for the relevant projects will be invited to attend some of AquaFUELS meetings and/or will be requested to peer-review AquaFUELS deliverables to strengthen mutual synergies. This Report will not only form the basis for all further actions under WP4 (exchange of services, synergetic meetings), but also for scientific dissemination actions under WP5 (dissemination).

1.2 Project mapping strategy

The initial input to this *“Report on ongoing research projects”* (AquaFUELS deliverable 4.3) consisted in a draft list of projects potentially relevant to the objectives of AquaFUELS, put together by EBB. The aim of that initial document was to set the basis for further contributions from the scientific experts in the consortium and eventually produce a second list of projects. To this aim, EBB did not only put together the broadest possible list of projects, but also carried out a first selection of potentially relevant projects and suggested the most relevant contact person for each project whenever possible. The projects for which EBB found no clear relevance after a more in-depth examination were highlighted (in red). This solution was preferred to deleting the project entries for projects deemed not directly relevant, in order to allow scientific partners having different views to express them.

The initial list drafted by EBB was based on the publicly available information on EU-funded projects, namely the CORDIS and Intelligent Energy Europe databases. The search in the CORDIS database returned 218 hits, while the search in the Intelligent Energy Europe (IEE) database resulted in 32 projects found.

The vast majority of the projects contacted in the context of this *“Report on ongoing research projects”* were known by AquaFUELS since the early stages of the project. Indeed, most of them had already been contacted during the initial survey period, referred to as *“Questionnaire preparation and distribution”* (AquaFUELS task 1.1) or identified in the context of the previous *“Report on Main Stakeholders”* (AquaFUELS deliverable 1.3). However, the present report also includes many suggestions made by project partners at different points of the project, e.g. during the project meetings or during events related to algae biomass. In addition, a major input was received through the AquaFUELS Roundtable, which allowed AquaFUELS to be in contact with representatives from the ALCHEMIS, BIOFAT, BIOGRACE, ALGADISK, ENERGETIC ALGAE, BLOWALK4BIOFUELS, Carbon Trust’s Algae Biofuels Challenge, etc.

Further to this work, EBB contacted the Intelligent Energy Europe officer in charge of liquid biofuels within the IEE team, Mr. Emilio Font de Mora, for additional suggestions for projects relevant to the activities of AquaFUELS. Similarly, EBB integrated the suggestion from Dr. Philippe Schild, the AquaFUELS project officer from the FP7 team dealing with energy issues, to coordinate with EUROBIOREF, a project funded by the European Commission to promote integrated processing of biomass in bio-refineries.

Once the initial list was ready, it was sent to the project partners officially involved in the task under the AquaFUELS Technical Annex (p.54), i.e. the University of Florence and Studio Martinelli. Certain changes were made, including additions of new projects and the further structuring of the deliverables. Ongoing projects and projects already finalised were distinguished. A further distinction was made between EU-funded, national/international projects and other projects. In total, 53 relevant projects in the field of algae biomass were identified, including 18 relevant EU-funded projects, 30 national or international projects and 5 other projects. This positive outcome should allow the selection of the expected 20 Barter Agreements.

After that first circulation to the University of Florence and other partners, EBB circulated the updated version to the consortium as a whole, in order to benefit from the network of each

partner, which have all been participating in various research projects before or in parallel to AquaFUELS. Even some very recently approved projects (BIOFAT) or holders of project proposals (EnAlgae) have been in contact with AquaFUELS. The final validation involved the Consortium partners, the Expert Group and the Roundtable participants.

1.3 Ongoing relevant projects

1.3.1 EU-funded projects

Title	Project Acronym	Project Reference	Programme Acronym	Coordinator Country	Status (dates)	RCN	Relevance
Adolescence for Renewable Energies in Transport	ADORE IT	IEE DATABASE	IEE	THE NETHERLANDS	Execution (01.09.08-31.08.11)	IEE/07/504	Relevant to downstream markets: creating a substantial market demand for pure and blended biofuels, mainly by large fleet owners. http://www.adore-it.eu
Biofuel from Algae Technologies	BIOFAT		FP7-ENERGY	SPAIN	Negotiation		Relevance to economic assessment, LCA; BIOFAT is a microalgae to biofuels demonstration project, with a targeted annual biomass production of 100 tons per ha ; several AquaFUELS partners and EVODOS (EABA member) are partners ; Scientific co-ordinator: Prof. Mario Tredici; Coordinator: Abengoa Bioenergy
Align Biofuel GHG Emission Calculations in Europe	BioGrace	IEE DATABASE	IEE	THE NETHERLANDS	Execution (01.05.10-31.03.13)	IEE/09/736 /SI2.558249	Relevant to Recommendations for decision-makers and the LCA: the project BioGrace aims to harmonise calculations of biofuel greenhouse gas (GHG) emissions and thus supports the implementation of the EU Renewable Energy Directive (2009/28/EC) and the EU Fuel Quality Directive (2009/30/EC) into national laws ; EBB hosted their first meeting ; BIOENERGY 2020+ GmbH (Roundtable participant) is a partner. http://www.BioGrace.net
Sustainable Fuels from Marine Biomass Project	BIOMARA		INTERREG IVA	IRELAND	Execution (2009-2013)		BioMara has similar objectives as AquaFUELS in Ireland and the UK, focusing on 4 aspects of algae-to-biofuels: Economic and social impacts, Microalgae strains and yields, Marine biomass (seaweed) as fuel, Downstream processing ; The Scottish Association for Marine Science (EABA member) is a partner ; the Irish government support BioMara (the energy attaché attended the AquaFUELS Roundtable)

<u>Title</u>	<u>Project Acronym</u>	<u>Project Reference</u>	<u>Programme Acronym</u>	<u>Coordinator Country</u>	<u>Status (dates)</u>	<u>RCN</u>	<u>Relevance</u>
Biofuels and Electric Propulsion Creating Sustainable Transport in Tourism Resorts	BIOSIRE	IEE DATABASE	IEE	SPAIN	Execution (01.09.08-31.08.11)	IEE/07/741/SI2.500395	Relevant to downstream markets: focus on the shift towards bio-diesel and electric propulsion for fleets in touristic areas http://www.biosire.eu
Biowaste and Algae Knowledge for the Production of 2nd Generation Biofuels	BIOWALK4 BIOFUELS	241383	FP7-ENERGY	ITALY	Execution (01.04.10-31.03.14)	94338	Recently started project intended to establish the viability and sustainability of biogas from macro-algae grown on bio-waste; contact established by EBB with NGVA Europe (http://www.ngvaeurope.eu), but it only deals with the project's communications Dr Silvano SIMONI ; Tel:+39-06-87452030 ; Fax:+39-06-87452050 ; http://www.uniroma1.it
Energetic Algae	ENALGAE	215G	INTERREG IVB -NWE	UNITED KINGDOM	Execution (01.11.09-30.06.15)		Relevant to Major Stakeholders/ Biotech: mapping of algae pilot plants in Northwest Europe ; the University of Gent and other AquaFUELS partners are partners
Utilization of Microalgae for Wastewater Treatment with Energy Purposes	ENERBIOALGAE	SOE2/P2/E374	INTERREG IVB-SUDOE	SPAIN	Execution (01.01.11-31.12.12)		Project focused in the utilization of microalgae for waste treatment of effluents from aquaculture and fish industry in Galicia. Relevant technologies that has been previously reported will be compared with new technologies in order to produce energy from these processes as sustainable as possible. http://interreg-sudoe.eu/
Real-Time Non-Invasive Characterization and Selection of Oil-Producing Microalgae at the Single-Cell Level	FUEL MAKING ALGAE	256526	FP7-PEOPLE	CZECH REPUBLIC	Execution (01.04.10-31.03.13)	95036	Relevant to taxonomy/Biotech: Monitoring nutrient efficiency in PBR with a view to selecting the best possible algal strains for the mass production of commercial bio-fuel
Marine Algae as Biomass for Biofuels	MABFUEL	230598	FP7-PEOPLE	IRELAND	Execution (01.06.09-31.05.13)	90637	Co-ordinator Dr Julie MAGUIRE Tel:+353-2761276 (Fax:+353-2761264) http://www.dommmrc.com ; Nick Tierney, from Green Biofuels Ireland (EBB member) is involved

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Renewable Hydrogen from Sun and Water	SOLAR-H2	212508	FP7	SWEDEN	Execution (01.02.08-31.01.12)	85749	Relevant to Biology & Biotech. Co-ordinator: Margareta UVHAGEN ANTONI Tel: +46-18-4716312; Fax: +46-18-4711982; UPPSALA UNIVERSITET
Biotechnological Exploitation of Marine Products and By-Products	BIOTECMAR		ERDF ATALANTIC AREA	FRANCE	Execution (01.01.09-31.12.11)		The objective of Biotecmar is to set up and incorporate a fully integrated chain for the production of value added compounds derived from the Atlantic Marine resources. Biotecmar's overall aim is to help the companies of the Atlantic Area to take advantage of the use of modern biotechnological tools and contribute to a diversification of the activities derived from marine biomass exploitation within the strict framework of sustainable management of marine natural sources. www.biotecmar.eu
European Multilevel Integrated Biorefinery Design for Sustainable Biomass Processing	EUROBIOREF	241718	FP7-ENERGY	FRANCE	Execution (01.03.10-28.02.14)	93922	Recommended by Project Officer Dr. Schild as a project to coordinate with on Bio-Refineries ; Imperial College and Oleon (EBB member) are partners
Genetic Improvement of Algae for Value Added Products	GIAVAP	266401	FP7 KBBE	ISRAEL	Execution (01.01.11-31.12.13)	97420	The consortium will adapt genetic engineering techniques to various algal strains of economic interest focusing on carotenoid and PUFA production and the over-expression of peptides of commercial value. In parallel we will develop cultivation technologies, harvesting and extraction methods for lipids, carotenoids and proteins using existing model algae strains that will then be adapted to suitable improved strains. Furthermore products will be tested for energy, pharmaceutical, nutritional or medical applications for economic evaluation of the production processes and their economic exploitation. Coordinator: Dori Schneider; Tel: +972-86472435; Fax: +972-86472930

<u>Title</u>	<u>Project Acronym</u>	<u>Project Reference</u>	<u>Programme Acronym</u>	<u>Coordinator Country</u>	<u>Status (dates)</u>	<u>RCN</u>	<u>Relevance</u>
Control of Light Use Efficiency in Plants and Algae - From Light to Harvest	HARVEST	238017	FP7-PEOPLE	NETHERLANDS	Execution (01.10.09-30.09.13)	92454	Potentially relevant to Biology / Biotech: Focus on the molecular mechanisms of biological light adaptation: The Max Planck Institute, CEA and Wageningen University are involved
Towards a Better Sunlight to Biomass Conversion Efficiency in Microalgae	SUNBIOPATH	245070	FP7-KBBE	BELGIUM	Execution (01.10.10-31.12.12)	92954	Relevant to Biology & Biotech, in particular for Chlorophycean microalgae, <i>Chlamydomonas reinhardtii</i> and <i>Dunaliella salina</i> ; Co-ordinator: Prof. Claire REMACLE Tel:+3243663812 Fax:+3243663840 ; http://www.ulg.ac.be ; Jos Teunissen from Wageningen University is involved (+31-317485313)
Sustainable Production of Biologically Active Molecules of Marine Based Origin	BAMMBO	265896	FP7-KBBE	IRELAND	Execution (01.03.11-28.02.14)	97837	The project aims to provide innovative solutions to overcome existing bottle-necks associated with culturing marine organisms in order to sustainably produce high yields of value-added products for the pharmaceutical, cosmetic and industrial sectors. A detailed life cycle analysis of the production pathways developed in the project will be undertaken to fully evaluate the sustainability of production of biologically active products from marine organisms. LIMERICK INSTITUTE OF TECHNOLOGY (DR. DANIEL WALSH)
Enabling European SMEs to Remediate Wastes, Reduce GHG Emissions and Produce Biofuels via Microalgae Cultivation	BIOALGAESORB	243752	FP7-SME2	Norway	Execution (01.08.10-31.07.13)	95350	Aims to: Increase knowledge on the bioconversion of effluents to microalgae biomass, as a sustainable raw material for biofuels and other value added applications; Provide new carbon neutral fuel sources for biomass power plants and biodiesel manufacture; Provide new sources of sustainable and carbon neutral high quality fine chemicals extracted from microalgae biomass; Reduce the discharge of CO ₂ to the atmosphere; Reduce the nutrient loading of effluent waters from livestock production systems; Increase know how and competence within a range of European SME-dominated industries http://www.bioalgaesorb.com/

1.3.2 National and International projects (with no EU funding)

Title	Project Acronym	Country	Status	Partners	Relevance
Biofuel Production from Algae	SHAMASH	FRANCE	Started in 2006	Funding: National Research Agency (ANR), Bioenergies National Research Program (PNRB) Partners: INRIA; CNRS - Université Paris VI; IFREMER; CNRS-CEA; VALCOBIO; CIRAD - Université Montpellier 2; Université de Nantes - CNRS; Université Paul Cézanne - CNRS	French research project intended to assess the potential of micro-algae for biodiesel production; recommended by Prof. Tredici for research co-ordination ; IFREMER (EABA member) is a partner. Coordinator: Olivier Bernard http://www-sop.inria.fr/comore/shamash/wwweng/engindex.html
Algohub-Roquette	ALGOHUB	FRANCE	Execution	Validated and supported by OSEO Partners: Roquette Frères; Setubio; Igienics; Bonduelle; Calliai; Eco-solutions; Etap; Evialis; GrenSea; Groupe Glon; Institut Pasteur del Lille; Patis France; Paul Ricard; Pierre Fabre; Separex Sub-contractors: Algobank-Caen; Fotosintetica & Microbiologica; University of Florence; Green Pharma; INRA; Matis; Per4mance; PFT; Setup	Aims of the program: Study biodiversity; Produce microalgae in quality and quantity; Extract and purify nutritional compounds of interest contained in microalgae; Demonstrate the benefit of these compounds in nutrition/health; Set up a concentrated and integrated microalgae processing sector. http://www.algohub-roquette.com/
Algae Biofuels Challenge	ABC	UNITED KINGDOM	Execution (2008-2011)	Funding: Carbon Trust Partners: Plymouth Marine Laboratory; University of Southampton; Queen Mary, University of London; University of Manchester; University of Sheffield; Newcastle University; Scottish Association of Marine Sciences; Coventry University; Swansea University	ABC is a two phase programme with the first phase addressing fundamental R&D challenges and the second phase moving to large scale production of algal oil. Phase 1 topics: Isolation and screening of algae strains suitable for open pond mass culture; Maximising solar conversion efficiency in mass culture; Achieving both high oil content and high productivity in mass culture;

<u>Title</u>	<u>Project Acronym</u>	<u>Country</u>	<u>Status</u>	<u>Partners</u>	<u>Relevance</u>
					<p>Sustained algae cultivation in open ponds; Design and engineering of cost effective mass culture systems. Phase 2 will involve the construction and operation of a multi-hectare test and demonstration plant, and will provide the facilities required to address the challenges of large scale production in open ponds.</p> <p>http://www.carbontrust.co.uk/emerging-technologies/current-focus-areas/algae-biofuels-challenge/</p>
<p>VICI:Photosynthetic Cell Factories</p>		<p>The Netherlands</p>	<p>Execution</p>	<p>Funding: STW Partner: Wageningen University</p>	<p>Relevant to Biology and Biotechnology; (Prof. Dr. R. Wijffels, Wageningen University) http://www.algae.wur.nl/UK/Programs/default.htm</p>
<p>Lipid-based, high value products and renewable energy from microalgae</p>	<p>Sunlight</p>	<p>Belgium/ The Netherlands</p>	<p>Execution (01.02.09-31.01.13)</p>	<p>Funding: IWT Partners: Ghent University (PAE, PSB, LabMET, CEEM); University Leuven – Campus Kortrijk (IRC); Wageningen University (BPE)</p>	<p>This project aims to create and to validate new biological resources and technologies for microalgae cultivation in outdoor closed photobioreactors. The primary targets for the proof-of-concept of the technologies will be lipids derived from diatom microalgae. Genome based metabolic flux models will be developed and used to determine strategies to increase lipid productivity. In parallel, an economic analysis will identify the full potential of diatom based products and technologies, in particular their pollution abatement potential, using an integrated economical life-cycle analysis; and guide the interaction with a diverse user committee through a market-driven project management.</p> <p>(POWER-LINK: PROF. DR. IR. GREET VAN EETVELDE)</p>

Title	Project Acronym	Country	Status	Partners	Relevance
Biofuels from Microalgae		The Netherlands	Execution	Wetsus; Wageningen University	Relevant to Biology & Botechnology, Processing, Economic assessment. (Prof. Dr. R. Wijffels, Wageningen University) http://www.algae.wur.nl/UK/Programs/default.htm
Advanced Water Treatment		The Netherlands	Execution	Wetsus; Wageningen University	Relevant to Biology & Botechnology, Economic assessment. (Prof. Dr. R. Wijffels, Wageningen University) http://www.algae.wur.nl/UK/Programs/default.htm
Recycling of Nutrients from Wastewater with Microalgae		The Netherlands	Execution	Landustrie, Hubert, Wageningen University	Relevant to Biology & Botechnology, Economic assessment. (Prof. Dr. C. Buisman, Wageningen University)
Optimal Design for a Tubular PBR		The Netherlands	Execution	Funding: Zeeuwse Tong Partners: Hogeschool Zeeland, Wageningen University	Relevant to Biology & Botechnology. (Prof. Dr. R. Wijffels, Wageningen University) http://www.algae.wur.nl/UK/Programs/default.htm
Maximization of Photosynthetic Efficiency of Microalgae Outdoor Sunlight Conditions		Spain/The Netherlands	Execution	Univeristy of Huelva, Wageningen University	Relevant to Biology & Botechnology. (Prof. Dr. R. Wijffels, Wageningen University) http://www.algae.wur.nl/UK/Programs/default.htm
Algicoat		The Netherlands	Execution	Funding: EOS Partners: FBR Wageningen UR, Wageningen University, Ingrepro, Akzo Nobel, Essent	Relevant to Biology & Botechnology. (Dr. H. Mooibroek, Wageningen University) http://www.algae.wur.nl/UK/Programs/default.htm
Algae for Chemicals Production and Emission Abatement	Alchemis	Belgium/ The Netherlands	Execution (01.04.10-31.03.12)	Funding: IWT Partners: Proviron Holding NV;Orineo; Desmet Ballestra; Gea Westfalia Separator; Essencia Vlaanderen; Intercommunale Vereniging Hooge Maey; Ghent University; Wageningen	This project aims at: Developing and building of a large-scale demonstration installation (500 m ²) for algae biomass production in Flanders; Use of CO ₂ and NO _x from waste gases and nutrients from wastewater for algae production and determination of the

<u>Title</u>	<u>Project Acronym</u>	<u>Country</u>	<u>Status</u>	<u>Partners</u>	<u>Relevance</u>
				University	influence of contamination on the use of the algae and thus on the product development; Combine different concentration methods to achieve the best and most economical method; Design a marketing plan for algae biomass in different production quantities. Coordination: VITO (Ir. Bert Lemmens)
Natural Food Colorants from Algae		The Netherlands	Execution	Funding: FND Partners: Feyecon, Wageningen University, Algae Biotech	Relevant to Biology & Botechnology, Economic assessment. (C. Akkermans, Wageningen University)
Algobioloop		The Netherlands	Execution	Funding: Innowater Partners: NIOO, Wageningen University, Ingrepro, Desah. Waterschap Vallei&Eem, Evers & Manders	Relevant to Biology & Botechnology, Economic assessment. (Prof. Dr. R. Wijffels, Wageningen University) http://www.algae.wur.nl/UK/Programs/default.htm
Emerald Oils		The Netherlands	Execution	Funding: FND Partners: Unilever, FBR-Wageningen UR, Wageningen University	Relevant to Biology & Botechnology, Economic assessment. (Prof. Dr. R. Wijffels, Wageningen University)
Refining of Microalgae		The Netherlands	Execution	University of Twente, Wageningen University	Relevant to Biology & Botechnology. (Prof. Dr. S. Kersten, Wageningen University)
AlgaeParc		The Netherlands	Execution	Funding: Ministry of Agriculture, Nature and Food Quality, Provincial Government of Gelderland and industry Partners: Wageningen UR-FBR, Wageningen University + 15 companies	Relevant to Biology & Botechnology, Economic assessment. (Dr. M. Barbosa, Wageningen University) http://www.algae.wur.nl/UK/Programs/default.htm
Microalgae, Starting Material for Biooil	MAMBO	Italy	Execution (2009-2011)	Funding: Novaol S.r.l., Cereal Docks S.p.A., DP Lubrificanti S.r.l., Ecoil S.r.l., Fox Petroli S.p.A., Oil.b S.r.l., Oxem S.p.A, part of the Italian Biodiesel Manufacturers Association - Assocostieri.	Main goal of the project is to demonstrate the economical, technical and environmental feasibility of algae oil to feed the biodiesel production process.. The first phase deals with strain selection, comparative analyses of existing algae cultivation systems, and

Title	Project Acronym	Country	Status	Partners	Relevance
				Partners: DiBA and CREAR -Università degli Studi di Firenze; Fotosintetica & Microbiologica s.r.l.; Stazione Sperimentale per le Industrie degli Oli e dei Grassi (SSOG) di Milano	testing in small and innovative pilot units of microalgae performances to analyse energetic costs and preliminary design of a demonstration plant. The second phase foresees the building of the demonstration plant and microalgae cultivation for the final technical, economical and environmental assessment of the process. Scientific coordinator: Prof. Mario Tredici; Coordination: Novaol s.r.l.
NutraMara, The Marine Functional Foods Research Initiative	NutraMara	Ireland	Execution (2009-2013)	Teagasc Ashtown Food Research Centre, Ashtown, Dublin; Teagasc Moorepark Food Research Centre, Fermoy, Co. Cork; The Ryan Institute, NUI, Galway; Biomedical Sciences Research Institute, School of Biomedical Science, University of Ulster (UU), Coleraine, Co. Derry; University of Limerick, Department of Life Sciences, Limerick; University College Cork, The Department of Food and Nutritional Sciences, Cork; University College Dublin, School of Agriculture, Food Science and Veterinary Medicine, Belfield, Dublin	The NutraMara project aims to provide seed capital to develop this emerging area of marine origin functional foods and create a sustainable network of researchers dedicated to high-class innovative research in this area. (Dr. Maria Hayes, Teagasc Ashtown Food Research Centre, Ashtown, Dublin 15) Tel. +353 (1) 805 9957 E-mail: maria.hayes@teagasc.ie
Seaweed Biorefinery		The Netherlands/Ireland	Execution (2010-2013)	Irish Seaweed Research Group (Formerly ISC), ECN, WUR	The project Seaweed Bio-refinery is dedicated to the bio-refinery of seaweed into products, bio-fuels and bio-energy. Jaap van Hal: vanhal@ecn.nl
SUPERGEN Bioenergy - Phase II		UK/Ireland	Execution (09.07-09.11)	SUPERGEN Bioenergy is a consortium of academic, research and industrial organisations. SUPERGEN Initiative was created by the EPSRC (Engineering and	The SUPERGEN Initiative aims to encourage the development of sustainable power generation and supply, studying the production of different types of biomass and

Title	Project Acronym	Country	Status	Partners	Relevance
				Physical Sciences Research Council in the UK)	investigating their behaviour in thermal conversion processes, with particular emphasis on the interaction and interface between production and conversion. Prof., Tony Bridgwater - Technical Director of SUPERGEN Bioenergy Aston University, Birmingham, B4 7ET www.supergen-bioenergy.net
Sustainable and Cost-Efficient Production of Marine Micro-Algae for Aquaculture Use	Halosydne	Belgium	Execution (01.05.09-30.04.11)	Funding: IWT Partners: SBAE Industries NV; Ghent University (PAE, ARC); University Leuven – Campus Kortrijk; Institute for Agricultural and Fisheries Research (ILVO)	This project aims to identify science-based production, processing and storage procedures for a sustainable and cost-efficient way to produce microalgae for aquaculture. Methods will be identified for the reuse of raw materials such as CO2 and culture medium. Algae diets with a positive influence on growth, survival, bacterial load and nutritive value on 5 aquaculture species will be identified. Coordinator: SBAE industries NV (Peter Pelicaen, CEO)
Integrated New Concept(s) for the Production of SCO on an Economic Scale	Bi-Cycle	Belgium/ Germany	Execution (2008-2011)	EraSME Project funded by IWT Flanders (Belgium) and VDI-VDE (Germany) Partners: Department IWT, Karel de Grote hogeschool, Antwerpen; Dep. Mech. Eng., Katholieke Hogeschool, Sint-Lieven, Gent; Dep. Biology, Lab EBT, Universiteit Antwerpen; Dep. Life Sciences, TeBi, Universität Karlsruhe; Dep. Life Sciences, BVT, Universität Karlsruhe	Optimization of oil producing algae: productivity, illumination; Optimization of oil producing yeasts: productivity, C-source; Optimized 'similar' down stream process for both cycles; Reuse of the side streams: process waters, cell mass, minerals & CO2; Check on the benefits of a combined system by linking both cycles ('Bi Cycle') http://bicycle.wtbk.org/
Combined Algal and Bacterial Waste Water Treatment for High	ALBAQUA	Germany	Execution (03.09-	ERA-NET CORNET project funded by national agencies members of the	In this project, the potential of algae regarding effluent treatment in paper

Title	Project Acronym	Country	Status	Partners	Relevance
Environmental Quality Effluents			09.11)	CORNET Network Partners: PAPRIQUA network: Papiertechnische Stiftung (PTS), Germany (coordinator); CELABOR, Belgium; Federation of Hungarian Printers and Paper Makers (FHPPM) Hungary; Pulp and Paper Institute Ljubljana – Technological centre for papermaking (ICP-TCP) Slovenia; Paper Research Institute (PRI) Hungary; Institut für Abwasserwirtschaft, TU Hamburg-Harburg TUHH (Germany)	industry is evaluated. In particular: Cultivation of suitable algae species; Testing of suitable kinds of fixation of algae in mixed algae-bacteria biomass; Operation of single algae-bioreactor; Degradation performance; Utilisation of excess mixed algae-bacteria biomass; Pilot plant trial; Evaluation of the benefits of effluent treatment by single algae bioreactor or mixed algae-bacteria bioreactor; Evaluation of Economics (Gabriele Weinberger Phone: +49-89-12146-463; Mail: gabriele.weinberger(at)ptpaper.de http://www.cornet-albaqua.eu/
Capture and Valorization of CO₂ from Power Station Using Microalgae	AlgaPlanE	Spain	Execution	Endesa Generacion, Leia, Innovamar, Univ. Almería, AITEMIN,	Spanish research project intended to assess the potential of micro-algae for the capture and valorization of CO ₂ from power stations. Consortium included public and private companies. The coordinator is Silvia Burgos from Endesa
Utilization of Industrial Effluents (Gases and Liquids) for the Production of Microalgae Biomass	MicroAqua	Spain	Execution	Acciona Biocombustibles, Innovamar, Univ. Almería, IBVF,	Spanish research project focus in the production of microalgae biomass from industrial effluents rich in nutrients and carbon dioxide. Consortium included public and private companies. The coordinator is Miguel de la Parra from Acciona
Production of Biofuels from Microalgae with High Content of Starch and Lipids Using Flue Gas CO₂ as a Source of Carbon		Czech Republic/Portugal/Switzerland/Germany	Execution (28.06.09-30.09.12)	EUREKA Project OE09025 Alganol	Combustion CO ₂ from municipal waste incinerator will be converted into microalgal biomass. The thin-layer cultivation system will be modified to produce microalgal biomass with a high content of starch. Production conditions will be modified to

<u>Title</u>	<u>Project Acronym</u>	<u>Country</u>	<u>Status</u>	<u>Partners</u>	<u>Relevance</u>
					<p>enhance biosynthesis of reserve compounds (starch, lipids) of the microalgae. The starch-enriched biomass will be treated to obtain fermentable sugars for bioethanol production. The lipid fraction will be separated and utilized for biodiesel production. The downstream process includes optimisation of cell disintegration, starch and cellulose hydrolysis, ethanol fermentation, lipid extraction, and esterification etc. The utilisation of protein-rich biomass residues will be investigated. Dr. Vilem Zachleder, Institute of Microbiology, Academy of Sciences of the Czech Republic, e-mail: zachleder@alga.cz</p>
<p>Adhesion of Microalgae onto Solid Surfaces</p>		<p>Czech Republic</p>	<p>Execution (2010-2012)</p>	<p>Funding: Ministry of Education, Youth and Sports. Partners: Institute of Chemical Technology Prague and Institute of Microbiology, Czech Academy of Sciences</p>	<p>The essence of this project is to study the impact of factors (nutritive, growth conditions) influencing adhesion of industrially promising microalgae to solid surfaces. The project is based on comparison of experimental data on adhesion intensities of microalgae, grown under different conditions to solid materials (glass, plastics, steel etc.), with predictions of adhesion made according to mathematical models using physicochemical properties of interacting surfaces. The conclusions will be used to predict and affect the course of adhesion by adjusting the growth conditions of cells and surface properties of solids. The results will be applicable both in cases when suppression of algal adhesion is desired (inner wall of photobioreactors) and in</p>

Title	Project Acronym	Country	Status	Partners	Relevance
					<p>processes (biodegradation, biotransformation) where algal biofilm formation (immobilization) is wanted. (Tomás Brányik, Ph.D., Institute of Chemical Technology Prague, branyikt@vscht.cz)</p>
<p>Competence Centre for Bio-refining and Bio-energy (CCBB)</p>	<p>CCBB</p>	<p>Ireland</p>	<p>Execution (2009-2016)</p>	<p>Competence Centre for Biorefining and Bioenergy is an organisation of industry members, academic experts, institutions and government agencies working together to expedite the commercial development of the vast potential of the Irish biomass resource</p>	<p>The CCBB has been established to provide Industry members with the ability to leverage the extensive expertise, knowledge, research skills and facilities available in Irish third level institutions in order to create energy and valuable industrial materials from sustainable sources of biomass. Bart Bonsall - Technology Leader (bart@bartbonsall.com); Dr. Ramesh Babu - PI, Trinity College Dublin www.cccb.ie</p>
<p>VAP – Vlaams AlgenPlatform (Flemish Algae Platform)</p>	<p>VAP</p>	<p>Belgium</p>	<p>Execution</p>	<p>This platform is founded in 2009 on initiative of VITO, KULeuven, Universiteit Gent (Diacel, Power-Link), Orineo, Desmet Ballestra en Essenscia</p>	<p>The objectives are: preparing a roadmap for Flanders on the potential of algae to industry, bottlenecks that need to be removed, short-and long-term opportunities etc. to make clear to the government the importance of further research and investment; define research based on this roadmap; possibly expand cooperation abroad; demonstration of algae biorefinery; dissemination to government, industry and the general public to gain sufficient support in Flanders.</p>

1.3.3 Other projects with indirect relevance

<u>Title</u>	<u>Project Acronym</u>	<u>Project Reference</u>	<u>Programme Acronym</u>	<u>Coordinator Country</u>	<u>Status</u>	<u>RCN</u>	<u>Relevance</u>
Acoustic Imaging of Macrophytes and Habitat Investigation (AIM-HI)	AIM-HI	251832	FP7-PEOPLE	UNITED KINGDOM	Execution (08.11.10-07.11.12)	96402	
Application of Environmental-Friendly Agents with Antimicrobial Properties in Aquaculture	AQUACURE	Q5CR-2002-71272	LIFE QUALITY	BELGIUM	Execution (01.11.02-31.10.62)	91376	
Disease and Immunity in Marine Brown Algae	DIMBA	230865	FP7-PEOPLE	UNITED KINGDOM	Execution (01.09.08-31.08.11)	89763	Potentially relevant to Biology: focus on algal host-pathogen interaction with state-of-the art molecular approaches (Elaine Walton, Scottish Association for Marine Science)
Precedents for Algal Adaptation to Atmospheric CO₂: New Indicators for Eukaryotic Algal Response to the Last 60 Million Years of CO₂ Variation	PACE	240222	FP7-IDEAS	SPAIN	Execution (01.12.09-30.11.14)	92216	Focused on the role of eukaryotic organisms as a carbon pump
Algal Toxins, their Accumulation and Loss in Commercially Important Shellfish, Including Larval Mortality and Appraisal of Normal Sampling Procedures	TALISMAN	Q5AW-2000-00315	LIFE QUALITY	UNITED KINGDOM	Execution (26.11.1999-25.11.2029)	91362	Relevant to co-product valorisation (1999-2029) contact Dennis Stephen GOWLAND, North Bay Shellfish

1.4 Relevant projects already finalised (2000-2010)

1.4.1 EU-funded projects (recently finalised)

<u>Title</u>	<u>Project Acronym</u>	<u>Project Reference</u>	<u>Programme Acronym</u>	<u>Country</u>	<u>Status</u>	<u>RCN</u>	<u>Relevance</u>
Trophic Carbon Transfer Efficiency under Carbon Dioxide Stress	CARBON TRANSFER	41606	FP6-MOBILITY	DENMARK	Completed	83724	Potentially relevant to Biology (effect of atmospheric CO2 increase and pH decrease on carbohydrate production in plankton) Dr Sigrun HULD JONASDOTTIR, DANISH NATIONAL INSTITUTE OF AQUATIC RESOURCES; Tel:+45-33963427 Fax:+45-33963434
Production and Processing of Algae for Industrial Applications	N.A.	FAIR969201	FAIR	NETHERLANDS	Completed	55167	Relevant to co-products valorisation (chemicals) Algaetec BV, Mr. Van de Water ; Tel:+31-18-3443244 ; Fax:+31-18-3443938 see also: http://ec.europa.eu/research/agriculture/pdf/p33.pdf
Production of Polyunsaturated Fatty Acids (Pufas) by Algae : a Complete Bioprocessing Concept for the Large-Scale Production of High Quality DHA-Containing Oils.	PUFATECH	FAIR973146	FAIR	NETHERLANDS	Completed	48033	Relevant to co-products valorisation (human nutrition) Agrotechnological Research Institute (ATO-DLO) Dr. Lolke SIJTSMA, Division of Industrial Agrobiotechnology, Department of Industrial Microbiology Tel:+31-317475324 ; Fax:+31-317475347
Underpinning Sustainable Ecosystem Management of Seaweed Resources in Africa: Expanding the Seaweed Database	SEAWEED AFRICA	ICA4-CT-2001-10030	INCO 2	IRELAND	Completed	58503	Relevant to Impact on 3rd countries http://www.seaweedafrica.org/ The Co-ordinator is Dr. Watson, from the Irish Seaweed Center
Biofuels Networks in the Community	BIONIC	IEE		UNITED KINGDOM	Completed		Relevant to downstream markets: biofuel supply and use in transport specifically from the perspective of local authorities.
Euroserv'er Barometer (2008-2010)	EUROBSERV	IEE		FRANCE	Completed		Relevant to downstream markets: established survey

<u>Title</u>	<u>Project Acronym</u>	<u>Project Reference</u>	<u>Programme Acronym</u>	<u>Country</u>	<u>Status</u>	<u>RCN</u>	<u>Relevance</u>
	ER						of bio-energy at EU level; also relevant to dissemination; EABA co-ordination with the next Euroobserver
Effective and Low-Disturbing Biofuel Policies	ELOBIO	IEE		THE NETHERLANDS	Completed		Relevant to D1.6 Mapping and to the environmental sustainability assessment: the aim is to help reduce the information gap by collecting and reviewing the available data and developing 'low-disturbing' policy options which promote biofuels with as few side-effects on other markets as possible
Demonstration of Microalgae Cultivation as a New Agro-Industrial Activity Linked with Urban Wastewater Reuse and CO2 Biofiltration from Combustion Gases	BIOALGAE	LIFE97ENV/E/000252	LIFE 2	SPAIN	Completed	39379	Relevant to the economic assessment (WP3) : focus on economic viability of the a microalgal cultivation unit using CO2 from a combustion unit and water from urban sewages ; the co-ordinator is Guillermo Garcia-Reina
Microalgae as Cell Factories for Chemical and Biochemical Products	ALGINET	QLK3-CT-2002-02132	LIFE QUALITY	GERMANY	Completed	68982	Relevant to Biotech & Biology ; BGU and UAL participated in the project; Co-ordinator Werner MLODZIANOWSKI, Hochschule Bremerhaven
Feed for Aquatic Animals that Contains Cultivated Marine Microorganisms as Alternatives for Fish Oil	PUFAFEED	Q5RS-CT-2000-30271	LIFE QUALITY	NETHERLANDS	Completed	63235	Relevant to co-products valorisation ; co-ordinator Anton Franken (ATO B.V., Wageningen), Necton and Instituto Canario de Ciencias Marinas are partners
Development and Technico-Economical Optimization of a Photobioreactor Suitable for Industrial Production of Flocculated Photosynthetic Microorganisms	MICROALGAE	QLK5-CT-2001-42087	LIFE QUALITY	FRANCE	Completed	61797	Potentially relevant to Biotech : objective is developing a photobioreactor with high performances ; contact Danielle Attali, Evaflor S.A.
Application of Environmental-Friendly Agents with Antimicrobial Properties in Aquaculture	AQUACURE	Q5CR-CT-2002-71272	LIFE QUALITY	BELGIUM	Completed	69201	Relevant to co-products valorisation ; development of natural biocides based on algae ; University of Gent (Guy WOUTERS)
Supercritical CO2 Extraction of	N.A.	QLK1-CT-	LIFE	FRANCE	Completed	72651	Relevant to Biotech; located in the same municipality

<u>Title</u>	<u>Project Acronym</u>	<u>Project Reference</u>	<u>Programme Acronym</u>	<u>Country</u>	<u>Status</u>	<u>RCN</u>	<u>Relevance</u>
Polyunsaturated Fatty Acids from Microalgae		2001-42250	QUALITY				as Greensea, EABA member
Algae as Raw Material for Production of Bioplastics and Biocomposites Contributing to Sustainable Development of European Coastal Regions	IOPAL	QLK5-CT-2002-02431	LIFE QUALITY	FRANCE	Completed	67536	Relevant to co-products valorisation; Co-ordinator: Dominique BRAULT, CEVA; FIAT Research Institute is a partner
Biological and Biochemical Diversity of Hydrogen Metabolism	N.A.	FA Action 841	COST	HUNGARY	Completed	69370	Relevant to biology, biotechnology and processing. http://www.cost.esf.org/domains_actions/fa/Actions/Biochemical_Diversity_of_Hydrogen_Metabolism
Development of a Generic Approach to Sustainable Integrated Marine Aquaculture for European Environments and Markets	GENESIS	IPS-CT-2000-00102	INNOVATION-SME	ISRAEL	Completed	58289	Relevant to Economic Assessment/co-products valorisation: integrating algae cultivation and aquaculture Co-ordinator: Muki Shpigel, National Centre for Mari-culture Integrated Systems, Eilat, Israel

1.4.2 National or international projects (with no EU funding and recently finalised)

Title	Project Acronym	Country	Status	Partners	Relevance
From Waste to Energy through Algae	WATERGY	Italy	Concluded 2010	Funding: Fondazione per la Ricerca e l'Innovazione Partners: DiBA Università degli Studi di Firenze; DICEA Università degli Studi di Firenze; Publiacqua; Fotosintetica & Microbiologica; Agroils	Relevant to Biology and Biotechnology; Economic Assessment. Use of wastewaters as nutrient source for algae cultivation; use of membrane concentration technology to reduce harvest cost. (Prof. M. Tredici, DiBA Università degli Studi di Firenze) http://www.provincia.fi.it/fileadmin/assets/Economia/31_PROGETTI_Fond._Ricerca_e_Innovazione.pdf
Hydrogen Production from Biological Processes	IDROBIO	Italy	Concluded 2009	Funding: MIUR FISR	Relevant to Biology and Biotechnology, Processing. Hydrogen production through algae and photosynthetic bacteria and development of photobioreactors for H2 production. http://www.idrobio.it/
Produzione di Integratori di Mangimi a Base Planctonica per la dieta di Specie Ornamentali [Production of microalgal feed supplements for ornamental fish diet]		Italy	Concluded 2006	Funding: ARSIA Partners: DiBA Università degli Studi di Firenze; Guppy Italia	Relevant to Biology and Biotechnology Production of algae feed supplements for ornamental fish pigmentation. (Prof. M. Tredici, DiBA Università degli Studi di Firenze)
Feasibility Study of a Low-Cost Photobioreactor for the Cultivation of Microalgae	AFBR	Belgium	Concluded 2009	Proviron Holding nv (coordinator) Matthys nv Wageningen Universiteit en Researchcentrum, onderzoeksgroep Bioprocestechologie (WUR-BPE) Universiteit Gent, Power-Link	Through the AFBR –project, Proviron developed a protected conceptual reactor design that eventually can be produced and operated at low cost. The innovation study therefore aimed to develop a proof of concept and then test and evaluate. Both energy consumption and CO2 uptake by the algae is optimized and production capacity is modeled. In addition, a feasibility study is

Title	Project Acronym	Country	Status	Partners	Relevance
<p>Technologies for the Capture and Utilization of CO₂ From Power Stations</p>	<p>CENITCO2</p>	<p>Spain</p>	<p>Concluded 2010</p>	<p>Funding: Endesa Generacion, Unión Fenosa, CDTI: Partners: more than 20 companies and research centers (public and privates)</p>	<p>conducted of an automated production line with determination of lifespan. Finally, a micro-and macro-economic evaluation of the whole was made.</p> <p>Relevant to improve the development and utilization of new technologies for the capture and utilization of CO₂ from power stations. New technologies has been identified, one of them being the use of microalgae.</p>
<p>Use of Carbon Dioxide from Flue Gas for Production of Microalgae</p>		<p>Czech Republic/Germany</p>	<p>Concluded 2010</p>	<p>EUREKA Project OE 221 BIOFIX</p>	<p>The aim of the project is to work out a procedure for algal biomass production and test the resulting biomass quality using the thin layer culture technology, where the source of CO₂ for growth of algae is derived from the combustion of municipal solid waste processed by the TERMIZO company. Use of this CO₂ can reduce the price of the algal biomass and extends its utilization in human and animal nutrition. Besides, it can serve for reducing waste CO₂ emitted in flue gases into the atmosphere.</p> <p>Dr. Vilem Zachleder, Institute of Microbiology, Academy of Sciences of the Czech Republic, e-mail: zachleder@alga.cz</p>

1.6.3 Other projects with indirect relevance (recently finalised)

Title	Project Acronym	Project Reference	Programme Acronym	Country	Status	RCN	Relevance
Interactions between Marine Algae and Bacteria	ALGBACT	220732	FP7-PEOPLE	GERMANY	Completed	90160	Potentially relevant to Biology / Biotech: interactions between bacteria and marine algae ; Ms. Catherine Audebert, :+49-47148311339
Algae for Naturally Iodized Salt	ANIS	FAIR950584	FAIR	FRANCE	Completed	34927	Co-ordinator: CEVA, Dr. Serge Mabeau +33-29-6229350; Relevant to co-products valorisation (human nutrition, salt iodinisation)
Production of Tensioactives from Oleaginous Plants Fatty Chains and Polysaccharides from <i>Ulva</i> sp.	N.A.	EVK3-CT-2001-35002	EESD	FRANCE	Completed	61580	
Life History of Microalgal Species Causing Harmful Blooms	LIFEHAB	EVK3-CT-2001-80002	EESD	SPAIN	Completed	60449	
Physiological Stress Indicators in Marine Macrophytes	N.A.	EVK3-CT-2000-50003	EESD	SPAIN	Completed	56682	
Breeding Improvement of <i>Crassostrea Gigas</i> by Nutritional and Gametogenesis Control	GIGANUGA	FAIR961852	FAIR	BELGIUM	Completed	36135	
Biological Consequences of Global Climate Change. The Effects of Salinity and Temperature in Extremophilic Algae.	EXTALGAE	10694	FP6-MOBILITY	SWEDEN	Completed	78910	
Diversity of Marine Microplankton	DIVERPLAN	24235	FP6-MOBILITY	UNITED KINGDOM	Completed	83779	
Morphological Responses and Interactions of Clonal Marine Macrophytes with their Nutrient Environment	CLONMACM ORPH	6385	FP6-MOBILITY	PORTUGAL	Completed	82099	
How Plants Can Live on Solar Energy and Water; Biophysical Investigations of O2 Evolution in Photosystem II, the Key	O2FROMPSII	514817	FP6-MOBILITY	SWEDEN	Completed	80938	

<u>Title</u>	<u>Project Acronym</u>	<u>Project Reference</u>	<u>Programme Acronym</u>	<u>Country</u>	<u>Status</u>	<u>RCN</u>	<u>Relevance</u>
Reaction in Photosynthesis							
Development of an Automated Innovative System for Continuous Live Feed Production in Aquaculture Hatchery Units	ALFA	512789	FP6-SME	NORWAY	Completed	86542	
Water Quality and Sustainable Aquaculture: Links and Implications	AQUAS	15105	FP6-SUSTDEV	SPAIN	Completed	78491	Focused on impact of aquaculture on environment, in particular potential algae blooms and associated fish diseases ; Prof. Sánchez-Arcilla AGUSTÍN, CENTRO INTERNACIONAL DE INVESTIGACIÓN DE LOS RECURSOS COSTEROS ; Tel:+34-93-2806400 ; Fax:+34-93-2806019 ; http://lim-ciirc.upc.es
Coccolithophores Morphology, Biogeography, Genetic and Ecology Database	COMBINE	220104	FP7-PEOPLE	UNITED KINGDOM	Completed	87656	
Identification and Toxic Potential of Cyanoprokaryota in the Bulgarian Water Bodies. Environmental Health Risks	CYANOIT	210514	FP7-PEOPLE	BULGARIA	Completed	89828	
Natural and Anthropogenic Modifications of the Si Cycle Along the Land-Ocean Continuum: Worldwide Ecological, Biogeochemical and Socio-Economical Consequences	SI-WEBS	HPRN-CT-2002-00218	HUMAN POTENTIAL	FRANCE	Completed	67698	
Allelopathic Interactions between Algae and Bacteria	N.A.	HPMF-CT-2002-01751	HUMAN POTENTIAL	NETHERLANDS	Completed	72486	Past event, though relevant to Biology/Biotech
Mediterranean Usage of Biotechnological Treated Effluent Water	MEDUSA WATER	ICA3-CT-1999-00010	INCO 2	PORTUGAL	Completed	52792	
A New Approach to Combat Macro-Algae Blooms - An Integrated Coastal Zone Management Demonstration Project	N.A.	LIFE96ENV/S/000380	LIFE 2	SWEDEN	Completed	39259	

<u>Title</u>	<u>Project Acronym</u>	<u>Project Reference</u>	<u>Programme Acronym</u>	<u>Country</u>	<u>Status</u>	<u>RCN</u>	<u>Relevance</u>
Demonstration Plant of Recycling for Vegetable Wastes and Algae	N.A.	LIFE96ENV/E/000269	LIFE 2	SPAIN	Completed	39190	Building up of a composter for algae and other bio-waste intended to produce fertiliser for organic farming ; not applicable to biofuels or biogas
Development of an Animal Feedstuff Additive on the Basis of Micro Algae and Essential Oils to Stabilise the Immune Status of Agricultural Livestock	N.A.	QLK5-CT-2001-42300	LIFE QUALITY	GERMANY	Completed	64541	
Species Diversification And Improvement Of Aquatic Production In Seaweeds Purifying Effluents From Integrated Fish Farms And From Other Waste Sources	SEAPURA	Q5RS-2000-31334	LIFE QUALITY	GERMANY	Completed	91389	
Hydroacoustic Tools for Rapid Industrial Interest Algae Location	HYTRIAL	Q5AW-CT-2000-01222	LIFE QUALITY	SPAIN	Completed	63129	
Seaweed Antioxidants as Novel Ingredients for Better Health and Food Quality	SEAHEALTH	QLK1-CT-2002-02433	LIFE QUALITY	FRANCE	Completed	67272	
Natural Preservatives Produced by Macro-Algae and their Use in Cosmetic Application	NATURE	QLK3-CT-2001-70571	LIFE QUALITY	ITALY	Completed	64352	
A Closed Cultivation System of High-Quality Algae for Greenhouses in Moderate Climates Based on Thermal Retrieval	N.A.	QLK5-CT-2001-42499	LIFE QUALITY	BELGIUM	Completed	61807	