

Ecotechnologies and sustainable development programme

List of the funded projects in 2008

Acronym and project title	page
AGRICLEANING – Development of new precision cleaning process for electronic parts based on vegetable solvent	2
AMPERA France – French contribution to the ERA-Net AMPERA programme. Improvement of methodologies for risk and ecological impact assessment of accidental marine pollution	3
BioFImE – Control of biofilms in paper mill process by combined actions of low environmental impact	4
CleanWasT – Sustainability assessment of waste management technologies	5
COTEDEM – Innovative combination of electrical and physicochemical treatments to improve the mechanical dehydration of suspensions and sludges from industries and urban areas	6
DEBACIEM – Bacterial Decontamination of Water by ultra-short electromagnetic Impulses	7
EMESTOX – Passive samplers for chemical substance monitoring and associated toxicity assessment in water and industrial effluents	8
EVALEAU – Integrated environmental and economic performance assessment of drinking water production processes	9
FLUXOBAT – Development of optimized tools for the evaluation of VOC transfer from soil to indoor and outdoor air	10
MIGR'HYCAR – Operational management of risks connected to oil spill drifts in continental waters	11
NANOSEP – Aggregation and separation processes of nanoparticles	12
PLASMAPHOTO – Development of Plasma Photocatalysis technology	13
POUDRABOIS – Development of powder coating technology on various wood substrates	14
RALF – Rapid detection of Legionella pneumophila by fluorescence measure of a secreted specific metalloprotease	15
SEGTEUP – Extensive systems for storm-water treatment and management of urban areas	16
TACSOL – Solar thermoacoustic refrigeration	17
VALDECO – Economic Assessment of ecological damages caused to the marine environment – Application to black tides	18
VALOPLUS – Reusing of used phosphor powders	19
VALORIA – Development of an innovating process for the recycling of organic biofeedstocks from wastewater treatment	20

Ecotechnologies and sustainable development programme

Year 2008

Title	AGRICLEANING - Development of new precision cleaning process for electronic parts based on vegetable solvent
Abstract	<p>The aim is to develop a new process using biosolvents for precision cleaning of electronic component and intended for companies faced with the need to replace the halogenated solvents covered by the European Directive on VOC emissions 99/13/CE of 11 march 1999, such as trichlorethylene, perchlorethylene, methylene chloride (classified CMR) and HCFC 141b which is a banned substance but which is still used for the manufacture for aerospace equipment until 31/12/2008. A pilot will be built and tested in ENSIACET/LCA laboratory and will comprise the entire cleaning line: removal of soiling with the vegetable ester-based biosolvent, successive rinsing operations with aqueous solutions containing or not a bioemulsifiant and drying of the substrates. The cleaning and rising formulations developed by LCA/ENSIACET will have to be able to meet the performance demands of specific use application (excellent cleanliness level controlled by LCA/ENSIACET) and to be recycled.</p> <p>The energy from the used vegetable ester will be recovered and the rising water will be recycled, with the goal "zero discharge". In a second step, the pilot will take place and tested in a plant of the SELCO company which assembles PCBs for third party customers. The THALES company (bidder) will provide the electronic parts to be cleaned along with the cleanliness targets and will run the pre-characterisation and the characterisation tests for the cleaned parts. BR Consultant, project coordinator, brings the expertise for the technologies choices and is responsible for the diffusion of project results. The originality of the project comes from the difficulty of the cleaning of electronic parts which is very different from a simple degreasing. The presence of organic and mineral pollutants (variety of the brazing products) in space of difficult aspects make the cleaning particularly difficult.</p>
Partners	BR CONSULTANT (coordinator) INPT - LCA/ENSIACET THALES SELCO
Contact point	M BERNARD RAYMOND - BR CONSULTANT bernard.raymond@wanadoo.fr
ANR funding	650 004 €
Start- duration	January 2009 - 30 months
Contract	ANR-08-ECOT-001

Ecotechnologies and sustainable development programme

Year 2008

Title	AMPERA France - French contribution to the ERA-Net AMPERA programme. Improvement of methodologies for risk and ecological impact assessment of accidental marine pollution
Abstract	<p>The AMPERA-FRANCE project concerns the French involvement in 4 multinational projects from the 8 that were selected by the AMPERA ERA-Net, which was established in 2005 as a consequence of ERIKA and PRESTIGE spills with the aim of improving response to accidental marine pollutions (AMP) in European waters thanks to a better co-ordination of European research and the development of collaborative projects. AMPERA-FRANCE involves 3 French partners, Cedre, Ifremer and GLADYS (Montpellier university), among 17 European partners, from 5 countries and a region, and a 205.775 Euros requested funding from a total budget of 1 193.000 Euros for the 4 projects: DRIFTER, ECORAID, OILDEBEACH and TOXPROF. The project includes prenormative and methodologic researches and development of methodologic tools and services. Being in the field of applied research it can be classified as industrial research. Grouping the French involvement in these 4 projects within a single project, AMPERA-FRANCE, coordinated by Cedre, the French technical center specialized on accidental water pollution will favour the operational exploitation by end users of the results of the research conducted within the projects, the more as Cedre, adviser of authorities and industries, is one of the end-users. The DRIFTER project addresses the following question: how to improve the localisation and follow-up of a slick at sea, and how to optimise its modelling to better predict its drifting. In fact, although the effectiveness of technologies that contribute to a better localization and follow up of slicks has been demonstrated during recent spills, limitations and gaps still remain and deserve additional efforts in terms of appropriate tools and methodologies. The French partner (Cedre) is mainly involved in lab and in situ experiments to study the interest of buoys and dyes for following the slick drift. The ECORAID project addresses the question: how do we best incorporate new and existing biotools into risk assessment methodologies for chemical spills? To answer this question, Cedre and its two European partners will conduct a desk top study to review the technical performance and fitness-for-purpose of different methods selected from across three previous European projects. The main output will be a recommendation on the construction of a manageable and cost-effective monitoring strategy for assessing the environmental impact of accidental marine pollution incidents. The project includes the dissemination of project recommendations to the scientific and end users community through publications and presentations. With the participation of Montpellier University, the OILDEBEACH project will study the mechanisms which control the evolution and degradation of oil deeply buried in sand beaches in case of pollution, in relation to it's physical state (layer or tarballs) and the morphodynamic behaviour of the beach. One of it's objectives is to extend the applicability of a conceptual model of oil evolution in the sedimentary column that established the importance of the key hydrodynamic processes implicated and the differen tways of degradation of the oil, from macroscopic point of view. The primary objective of the TOXPROF project is to toxicologically profile the major oil types transported within EU waters using the suite of bioassays and biomarkers recommended by the ICES WGBEC. The importance of undertaking this research is to establish the applicability of biological effects techniques (bioassays and biomarkers) for risk assessment, management and policy purposes after oil spill accidents. The French TOXPROF partner (Ifremer), assisted by two subcontracted laboroities (the Pasteur Intitute in Lille and the ISM fom the University of Bordeaux), will be more specially in charge of embryotoxicity tests on oyster larvae and analysis of PAH metabolites in fish and of PAHs bioaccumulated in mussels.</p>
Partners	Cedre (coordinator) IFREMER CNRS - GLADYS
Contact point	M Georges Peigné - Cedre georges.peigne@cedre.fr
ANR funding	203 601 €
Start- duration	January 2009 - 42 months
Contract	ANR-08-ECOT-002

Ecotechnologies and sustainable development programme

Year 2008

Title	BioFlmE - Control of biofilms in paper mill process by combined actions of low environmental impact
Abstract	<p>Water system closure to save water in paper mill industry generates conditions that favour biofilm growth : neutral pH, high nutrient concentrations, high temperature,... These biofilms are the source of clogging, corrosion, machine breakdown or contamination of the final product. To remove these biofilms, high and increasing amounts of biocides must be applied because microorganism resistance occurs. But these products are harmful to the receiving medium and their use is reglemented. This is why paper mill industries and biocide producers look for alternative solutions with low environmental impact.</p> <p>Therefore, the objective of this project is to reduce biocide consumption in paper mill industry while proposing to associate different complementary approaches based on the combination of physical (hydrodynamic constraints), chemical (surface treatment) and biological actions (enzymes, natural inhibitors). This project joins four research laboratories specialized in complementary scientific fields necessary to the combined approach proposed, the pulp and paper research and technical center (CTP), a world leading producer of paper and a water treatment service company producing biocides.</p>
Partners	INRA - LBE (coordinator) Institut National des Sciences Appliquées - LISBP INRA - BHM / INRA-AgroParisTech Université Toulouse III - LBAE CTP Aquaprox NSG
Contact point	M Nicolas BERNET - INRA - LBE bernet@supagro.inra.fr
ANR funding	900 121 €
Start- duration	January 2009 - 36 months
Contract	ANR-08-ECOT-003

Ecotechnologies and sustainable development programme

Year 2008

Title	CleanWasT - Sustainability assessment of waste management technologies
Abstract	<p>The pre-treatment of non-hardous waste offers considerable scope for political and technological choices. These choices are faced with the complexity of waste treatment systems and also the complexity of eco-efficiency assessment, taking into account the interactions between waste management and the industrial, agronomic and economic systems. Our project falls within thematic axis 2 of the Call for projects (tools and services for an integrated management of environmental performances). It aims at developing the methodological framework for the assessment of environmental performances of waste pre-treatment technologies in relation with the two main fields of public policy support: innovation support (short term) and sustainable development (long term).</p> <p>The work program is designed to focus the experimental research on new and necessary data to answer the demand of assessment methods, selected in relation to environmental criteria and policies. The task 1; "Frame and objectives" addresses the question "which assessment for which policies ?" while task 2 addresses the definition of impact assessment methods (which method for which assessment ?) and highlights the needs for data to complement the available LCA data. The task 3 (test of protocols and complementary data acquisition) provides guidance for implementing field measurement campaigns (technical, economical, social) prior to the assessments. These methods are tested, analysed and synthesised in task 4 in order to produce scores and recommendations for a wide diffusion (task 5). Task 5 culminates with the preparation of a common publication and a final conference.</p> <p>The main result of the project is a package of methods to identify and evaluate the « clean » technologies according to different temporal and geographical scales, supplying assessments based on a complete and non-biased scientific knowledge. This result is destined to a large diffusion towards the actors of waste management (decision-makers, operators, manufacturers, consultants, researchers...).</p> <p>From the point of view of policies in favour of eco-technologies, the assessment methods developed will allow a better demonstration of LCA capabilities in terms of supplying useful criteria and also a complete vision of environmental consequences. The expected impacts are, in addition to technology assessments, a progressive integration of LCA in the definition of environmental policies in France. From the point of view of scientific progress, the methods developed will improve the existing characterisation models used in LCAs.</p> <p>Expected impacts are the promotion of French research in this field and the proposal of new approaches of impact assessment. These progresses could be included in the near future in a recognised LCA method in Europe.</p> <p>Treize Développement, the SME participating in this project, will be in a position to promote the research outputs within local communities, including designers and operators of waste management. The developed methodologies will be used for improving the environmental assessment of the Bouches-du-Rhône waste management plans and for supporting local communities in their choice of treatment options, including the recycling of organic matter into soils. In a longer term, the gained experience will be communicated to institutional actors (DRIRE, DIREN, ADEME et MEEDDAT,...)</p>
Partners	BRGM (coordinator) INERIS 13 Développement Cemagref - Cemagref INRA - INRA Université de Provence - LCP Université de la Méditerranée - IDEP
Contact point	M Jacques Villeneuve - BRGM j.villeneuve@brgm.fr
ANR funding	787 749 €
Start- duration	January 2009 - 36 months
Contract	ANR-08-ECOT-004

Ecotechnologies and sustainable development programme

Year 2008

Title	COTEDEM - Innovative combination of electrical and physicochemical treatments to improve the mechanical dehydration of suspensions and sludges from industries and urban areas
Abstract	<p>This industrial research project mainly concerns aqueous suspensions liquid - solid (sludges) or final biological or physico-chemical wastes from the purification of industrial effluents. These suspensions usually contain a high content of water, which yields an important amount, involving higher costs for their transport, handling, stocking or for subsequent operations. Thus, there is a strong interest to desiccate them at maximum by mechanical way. The sludges are also an environmental risk ought to the presence of some toxical compounds such as heavy metals, PCB, dioxins, phosphorus, furanes and pathogenic microorganisms. Considering regulation evolutions in environment, treatments of decontamination will be more and more recommended.</p> <p>The last years, some research organisms have shown, at laboratory and semi industrial scale, the benefit of one physicochemical or electrical treatment, applied at the same time as a classical mechanical dehydration (filtration, centrifugation). These treatments improve the dehydration of suspensions and could besides have a positive impact on their decontamination. In spite of promising results on the mechanical separation assisted by one of these treatments, not enough studies concerned a combination of treatments. This project offers to develop original technologies where these treatments would be combined two by two during the mechanical separation (ex: chemical additives/electrical field, flocculants / dispersing agents, chemical additives/ thermal collapse of the cake, etc).</p> <p>The question is then to identify which combinations have a synergic effect on the mechanical dehydration and to develop new techniques suiting to decanters, filters and centrifuges. This project aims at promoting the partnership between different actors in the field of the treatment of water and techniques of separation. It will make possible to reinforce the skills of the partners on new ecotechnologies. Their knowledges will contribute to lift technological and scientific bolts which restrict the broadcasting of these technologies at present time. All the data and analyses will be exploited to establish on which kinds of suspensions these ecotechnologies will be competitive in regard to the commercial treatments already on the market.</p> <p>Devices of laboratory (filter - press, centrifuge and decanter) will be equipped to implement the aforementioned "hybrid" techniques. A parametric study will be carried out to optimize the most advantageous treatment combinations. The purpose of project is the design of an industrial pilot that will be used on one or several industrial sites to validate the laboratory results. This step will help in removing the last technological bolts ; in designing industrial machines and in assessing the risks inherent to physicochemical and electrical treatments (on machines and operators).</p>
Partners	<p>UTC - TIMR/UTC (coordinator)</p> <p>IFTS</p> <p>SNF FLOERGER</p> <p>Université de Pau et des Pays de l'Adour (UPPA) - LaTEP</p> <p>Anjou Recherche</p> <p>CHOQUENET</p> <p>CNRS Talence - TREFLE</p> <p>ECS</p>
Contact point	<p>M Eugène VOROBIEV - UTC - TIMR/UTC</p> <p>eugene.vorobiev@utc.fr</p>
ANR funding	1 064 567 €
Start- duration	January 2009 - 42 months
Contract	ANR-08-ECOT-18

Ecotechnologies and sustainable development programme

Year 2008

Title	DEBACIEM - Bacterial Decontamination of Water by ultra-short electromagnetic Impulses
Abstract	<p>The objective of the DEBACIEM project is to obtain at medium term a bacterial decontamination equipment, based on the application of ultra short electromagnetic pulse; this equipment must be reliable, with low operating cost, and compatible with the current guidelines establishment. This equipment uses purely physical processes and its represents an alternative solution to chemical biocides. Indeed, in the context of EU directives as BIOCIDES and REACH, the use of chemical agents will become much regulated. The aspects of environmental impacts associated with discharges are also to be taken into account and require selective limits in the use of biocides in the case of a tightening of the legislation. For their part, the thermal processes are likely to be prohibitively expensive. The UV treatments processes are far more environmentally friendly but impose costly maintenance.</p> <p>The basic principle of the DEBACIEM project consists of the application of ultra short electromagnetic pulse, by the nanosecond time scale. It has been shown scientifically to both biological cells and bacteria that such electromagnetic waveforms allows a direct action of the electromagnetic field on intra-membrane elements, without effect on the outer membrane which is not damaged as it is case with slower EM pulses. Recent experiments have revealed rates of destruction particularly important. The project will be implemented by bringing together a multidisciplinary team of biologists, specialists of electromagnetism and experts in electronics of the high-voltage pulses. During the project, a laboratory model will be carried out. It will enable the establishment of the optimal characteristics of functioning for the final decontamination system.</p> <p>A preindustrial prototype will then be integrated then tested on a pilot plant cooling tower. We seek decontamination rates on the order of 4 to 5 log. In case of the project DEBACIEM succes, it is envisaged the creation of an innovative company able to industrialize and commercialize the device studied.</p>
Partners	CERPEM (coordinator) CNRS - IPBS Université du MAINE - MMS ONERA Anjou Recherche - Véolia Environnement
Contact point	M Jean-Louis BOULAY - CERPEM jean.louis.boulay@free.fr
ANR funding	667 069 €
Start- duration	January 2009 - 36 months
Contract	ANR-08-ECOT-19

Ecotechnologies and sustainable development programme

Year 2008

Title	EMESTOX - Passive samplers for chemical substance monitoring and associated toxicity assessment in water and industrial effluents
Abstract	<p>The restoration of good ecological and chemical state for 2015, as requested in the Water Frame Work Directive (WFD) is an important stake. One of this directive goals is to improve water chemical quality by reversing, when necessary, the degradation trend of underground water and for surface waters by gradually reducing the discharges of pollutants that have been classified as priority substances; discharges should even be suppressed for substances classified as dangerous priority. The WFD requires a monitoring of all these substances in the various water bodies and in the effluents and more particularly in industrial ones. Environmental Quality Standards (EQS) have been established and detection limits in agreement with these EQS have been proposed for several substances. Although the knowledge of aquatic contamination has been improved those last years, it remains insufficient due to the important spatial and temporal variabilities of the studied ecosystems. Moreover the knowledge of sources remains insufficient for a good control and a reduction of emissions. The control of discharges should allow to satisfy statutory requirements of auto-controls and to control statutory emission limit values (ELV) in order to respect at the end the good chemical state in surface waters. It is thus necessary to develop monitoring methodologies allowing to quantify in various types of aquatic ecosystems (freshwater, brackish water, marine water) and in industrial discharges, priority substances as defined by the WFD and relevant substances for the national program of substance reduction. Classically, the analysis of contaminants in water is performed after sampling water in ultra-clean conditions (in order to avoid contamination of samples during sampling and treatment) and after several sample preparation steps in laboratory. These techniques are time consuming and require qualified staff. Moreover another drawback is that this approach just gives limited information about the contamination status (limited in terms of space and time representativeness). Finally the detection limits, that are linked to analytical techniques and sample preparation methodologies, are sometimes greater than the actual water concentrations of the various substances or even greater than concentrations corresponding to ELV and EQS values. The objective of this project is thus to propose an alternative method for monitoring discharges and water systems that improves this chemical survey, that allows to better consider the temporal variability of the contamination and that gives information on toxic and ecotoxic risks associated to substances that are present, these substances being identified or not. In the present project we propose to develop new passive samplers and to optimize and validate existing ones in the case of industrial effluents. We propose also to couple passive sampling to toxicity testing using bioassays. Finally we propose to test these physico-chemical and biological tools in mesocosms and to validate their use in field experiments.</p>
Partners	<p>Université Bordeaux 1 - LPTC (coordinator) MINISTERE AGRICULTURE - Cemagref Université de Nice-Sophia Antipolis - LRSAE IFREMER TOTAL Ecole nationale des ponts et chaussées - Cereve</p>
Contact point	<p>Mme Hélène BUDZINSKI - Université Bordeaux 1 - LPTC h.budzinski@ism.u-bordeaux1.fr</p>
ANR funding	<p>891 417 €</p>
Start- duration	<p>January 2009 - 48 months</p>
Contract	<p>ANR-08-ECOT-005</p>

Ecotechnologies and sustainable development programme

Year 2008

Title	EVALEAU - Integrated environmental and economic performance assessment of drinking water production processes
Abstract	<p>The environmental assessment of water treatment technologies is currently hampered by the intrinsic complexity and variability of treatment processes, which have not been fully and properly considered in the assessment tools so far. Three elements are of particular interest: 1) the actual and high variability of operational conditions of the treatment processes, depending on several variables and parameters, has to be better modelled in order to render reliable results 2) the link between the environmental and economical performances deserves to be studied further because of its relevance for the innovation processes and because of the reciprocal influence (leading to possible rebound effects) 3) sanitary risks need to be assessed in order to gather a coherent view of the real performances of a technology.</p> <p>The EVALUEAU project will include the development of methodologies for the modelling of water treatment process and of the related tools, leading to more accurate and realistic environmental and sanitary assessments. Through the integration of the costs of environmental damages, these tools will effectively support decision-making processes. The operational objectives of the project are: 1) detailed modelling of unit operations in water treatment systems 2) definition of a family of criteria for the assessment of the treatment systems: operation (using thermodynamic measures: exergy and emergy), environmental performances (through Life Cycle Assessment), sanitary issues for the consumers (human health risks) and costs related to environmental damages 3) the definition of a scheme to support the design and the operation of drinking water supply systems, through the application of the aforementioned multicriteria evaluation to specific case studies and the development of a computer tool.</p> <p>The main scientific innovation of the project consists in the integration of thermodynamics concepts (emergy and exergy) as criteria for the assessment of a technology. The novelty of the project is also provided by the approach to water treatment modelling, which is highly flexible thanks to the use of programming tools, parameterization and modular architecture (based on unit operations), This approach is fully open source and its development could be continued after the end of the project. The results of the project (tools and methodology) will allow the industrial partner to compare different water treatment systems, both at the design and operation level, in order to identify the best and more reliable systems, according to the criteria that have been set. The development of unit process modules and the integration of thermodynamic concepts will provide insightful inputs and contributions to the scientific community.</p> <p>The development of novel modelling approach and performance indicators and of a scheme for the support of ecodesign initiatives in the water treatment field will be of valuable help for EU pre-normative research (like the environmental technology verification) and, in general, will support industrial and LCA practitioners.</p>
Partners	INSA - LISBP (coordinator) CIRSEE Institut National de la Recherche Agronomique - LERNA CRP H. Tudor/CRTE
Contact point	Mme Ligia Barna - INSA - LISBP ligia.barna@insa-toulouse.fr
ANR funding	349 764 €
Start-duration	January 2009 - 36 months
Contract	ANR-08-ECOT-006

Ecotechnologies and sustainable development programme

Year 2008

Title	FLUXOBAT - Development of optimized tools for the evaluation of VOC transfer from soil to indoor and outdoor air
Abstract	<p>Health risk assessment related to the presence of volatile organic compounds in the subsurface are carried out under the pressure of regulations growing ever more aware to this issue. For such compounds, the main exposure pathway due to migration into indoor air is hard to estimate partly because of unrepresentative measurements and inappropriate modeling tools (many orders of magnitude are often observed between results of a model and on-site measured data). The complete deterministic description of the physics involved is hardly possible because of the coupling of multiphasic transfers in soil, concrete and air and because of the variability of space and time dependent parameters.</p> <p>FLUXOBAT aims to overcome both technical (role of the convection, diffusion, scale effects...) and methodological limitations (accounting for heterogeneities, time and space variations, coupled mass transfer in a soil-concrete-building system). The project will be investigated through experimentations at three different scales (laboratory columns, experimental pilots, industrial site) in order to better understand the physics at stake and to improve measurement protocols as well as inadequate modeling tools. Hence, the FLUXOBAT project consists in developing robust methodology for the assessment of volatils organic compounds transfer (petroleum hydrocarbons, aliphatic chlorinated solvents...) from the underground to the indoor air.</p> <p>The objective of the project is to propose methods and tools for a reliable assessment of transfers and health risks induced by volatils compounds coming from soils to the indoor air. This concerns thousands of sites in France. The secure of the assessments should lead to an effective and sustainable management of soils contamination (in accordance with health risk criteria for indoor air and by reducing the excavated soil volumes and off site treatments). The result of the project will be gathered in a methodological guide (mecanisms to account for, measurement and modeling protocols, advices for the interpetation...) and a final report (state of the art and main results of the studies) that will be diffused to private and public stakeholders on polluted soils through websites, publications, conferences and partners network.</p>
Partners	<p>BURGEAP (coordinator)</p> <p>CSTB/ DESE</p> <p>Université Louis Pasteur Strasbourg - IMFS</p> <p>INPT - IMFT</p> <p>INERIS</p> <p>TERA environnement</p> <p>Communauté Urbaine du Grand Lyon</p>
Contact point	<p>Mme SYLVIE TRAVERSE - BURGEAP</p> <p>s.traverse@burgeap.fr</p>
ANR funding	<p>912 431 €</p>
Start- duration	<p>January 2009 - 48 months</p>
Contract	<p>ANR-08-ECOT-007</p>

Ecotechnologies and sustainable development programme

Year 2008

Title	MIGR'HYCAR - Operational management of risks connected to oil spill drifts in continental waters
Abstract	<p>The application of the European Water Framework Directive (WFD) and the associated obligation to monitor water quality regarding the production of drinking water as well as the use of water resources for recreational and industrial activities, result in a strong request for water quality evaluation and monitoring systems.</p> <p>Whereas in case of big accidents, important means concerning crisis monitoring and management are quickly established, in particular for oceans and coast, the management of smaller accidents, although being much more frequent, are limited, notably for continental waters. However, accidental pollutions implying hydrocarbons represent about 50% of the incidents (next to 50 per year for the 3 big rivers in Paris region alone).</p> <p>In view of incidents like the recent pollution of the Loire estuary which occurred in spring 2008, water resource managers are often indigent restraining the impact of these accidents and managing them, because their extent and their dynamics are unknown. As a matter of fact, it concerns phenomena being complex to understand intuitively: dispersion in rivers and estuarine zones, return of the plume due to wind and tide, grounding at the flats followed by reuptake by the currents, etc. The project consists of the operational development of following elements of a pre-normative warning system: management of warning information, development of predictive modelling tools including important theoretical components (design of experimental data bases for model validation and quantification of uncertainties), automating of data integration into the modelling work, development of decision support tools for the water managers, pre-development of warning procedures for operators and intermediates and system validation at 2 representative sites.</p> <p>This system is completed by the more fundamental approach of the impact of certain physical phenomena being essential for a pre-normative tool with regards to its long-term deployment, notably in terms of climate change. These scientific issues concern the behaviour of hydrocarbons regarding physico-chemical water characteristics exceeding the actual limits of knowledge (water temperature, variation of salinity, turbidity and mineral concentrations).</p>
Partners	SOGREAH (coordinator) VERI Ecole des ponts - LHSV CEDRE Institut National Polytechnique de Toulouse - LCA EDF TOTAL RAFFINAGE MARKETING
Contact point	M OLIVIER BERTRAND - SOGREAH olivier.bertrand@sogreah.fr
ANR funding	903 589 €
Start- duration	January 2009 - 36 months
Contract	ANR-08-ECOT-008

Ecotechnologies and sustainable development programme

Year 2008

Title	NANOSEP - Aggregation and separation processes of nanoparticles
Abstract	<p>NANOSEP is future industrial process designed by industrial and academic experts on nanoparticles and water treatment to separate nanoparticles from effluents. NANOSEP fills an urgent environmental need: More than 1600 types of nanoparticles summing up to several tons are produced per year, yet there is no strategy to protect the environment and water resources from contamination by these materials (affest 2006).</p> <p>This remediation process, specifically addressing nanoparticles in aqueous suspension, is based on the formation of macroscopic aggregates and their removal from solution.</p> <p>The novelty of our project lies in the combination of 3 treatment options viz. flocculation, flotation and filtration. The work proposed within NANOSEP to develop this industrial treatment solution includes to following tasks:</p> <ul style="list-style-type: none">• Establishing a ranking of the nanoparticle pollution related to their environmental effect and ecotoxicity• Physical-chemical based destabilizing of the suspensions of nanoparticles with various shapes and surface properties. There will be a focus on developing coagulation/flocculation reagents compatible with green chemistry.• Improve the performance of flotation beyond its present limits, especially its efficiency with regard to the dynamics of nanoparticles. <p>Our analytical approach aims at elucidating cause-effect relationships so as to optimize each step of the process. For the first time, vertical Magnetic Resonance Imaging of undisturbed samples will be used to define the influence of hydrodynamics on the texture and consolidation of nanoparticle flocs.</p>
Partners	BRGM / EPI (coordinator) CNRS - CNRS / DR 12 INSA Toulouse - LISBP Laboratoire Central des Ponts et Chaussées - LCPC / LMSGC INERIS CIRSEE INPT - IMFT ARKEMA FRANCE
Contact point	M Mohamed BIZI - BRGM / EPI m.bizi@brgm.fr
ANR funding	800 000 €
Start- duration	January 2009 - 36 months
Contract	ANR-08-ECOT-009

Ecotechnologies and sustainable development programme

Year 2008

Title	PLASMAPHOTO - Development of Plasma Photocatalysis technology
Abstract	<p>Smells pollution and specifically with VOC is an important problem for population and surrounding workers.</p> <p>The odour perception result of gaseous compounds with low molecular weight in environment. The main scented organics compounds are sulfured, acids, H₂S, NH₃, Diffuse atmospheric effluents in surrounding or after system of treatment are difficult to eliminate. The problem is to develop a new technology to treat VOC with low consumption of energy, environment-friendly, easy to use, with a small investment.</p> <p>Several new technologies work on the problem. Plasma-photocatalysis technology gives interesting perspectives with low consumption of energy. The last studies and thesis on specific compounds show the interest to develop this technology</p> <p>The target of the project is to develop the plasma-photocatalysis technology to treat VOC, NH₃, H₂S,. to obtain knowledge on the mechanism of degradation and to evaluate the capacity to treat effluents in different industries.</p> <p>This project need to resolve different points :</p> <ul style="list-style-type: none">to develop knowledge on synergy plasma-photocatalysis,to develop laboratory prototype,to define the plasma appropriate,to define new photocatalytic web,to control degradation of effluents, process of treatment and compounds produce by plasma-photocatalysis technologyto evaluate the capacity of this technology to be used in industrial conditions and to evaluate the problem of mixed compounds <p>The project requires the collaboration of public and industrial research. The validation of this technology in equarrissage industry is appropriate, this type of activity produce lot of different effluents</p>
Partners	ARS (coordinator) Explorair Ecole Nationale Supérieure de Chimie de Rennes - CIP-SCR-ENSCR Ecole Supérieure d'Ingénieurs de Poitiers - LACCO CIAT
Contact point	M Joseph DUSSAUD - ARS joseph.dussaud@ahlstrom.com
ANR funding	1 099 616 €
Start- duration	January 2009 - 36 months
Contract	ANR-08-ECOT-010

Ecotechnologies and sustainable development programme

Year 2008

Title	POUDRABOIS - Development of powder coating technology on various wood substrates
Abstract	Within the framework of the reduction of the VOC emissions created during the finishing procedures of wood substrates, powder-based finishes are an alternative to liquid-based finishes used in the furniture and joinery industries. The POUDRABOIS project is planned for 3 years and it involves 7 partners. The expected results of POUDRABOIS will be as follows : (1) study and optimization of the process of application of a powder coating on various wood substrates in relation to the quality and the durability of the coating (indoor and exterior coatings); (2) development of new "dual cured" powders coating polymerizing under visible or solar light; (3) development of new powders coating with additional functions.
Partners	CRITT Bois (coordinator) Université Henri Poincaré - Nancy 1 - LERMAB Université de Haute Alsace - DPG AKZO OBER FRACHON
Contact point	M Eric MASSON - CRITT Bois eric.masson@cribois.net
ANR funding	757 223 €
Start- duration	January 2009 - 36 months
Contract	ANR-08-ECOT-011

Ecotechnologies and sustainable development programme

Year 2008

Title	RALF - Rapid detection of Legionella pneumophila by fluorescence measure of a secreted specific metalloprotease
Abstract	<p>Legionella testing can be undertaken as part of : (i) investigation of an outbreak; (ii) validation of the effectiveness of control measures and (iii) verification of the effectiveness of decontamination. For operational monitoring, risk management relies on measuring parameters that show whether systems are working properly, rather than relying on end-point testing, which often only shows whether a system worked at some earlier time. However, Legionella testing can be a useful component of monitoring to verify the performance of water safety plan (WSPs) and it is recommended for cooling towers, hot tubs and water distribution systems where people at high risk might be exposed. Traditional and standard Legionella testing is laboratory-based and requires 10-14 days to complete, providing only a historical snap-shot of the water system's condition.</p> <p>Today, there is no method for field monitoring of Legionella that can be performed nearly in real-time (<1-2 hours) directly on the water system site, allowing by this way to take immediate remedial actions in case of positive results. This project (called "RALF" for Rapid Analysis of Legionella by Fluorescence) aims at developing a so far unexplored methodological approach, based on the fluorescence detection of a specific L. Pneumophila metalloprotease. The metalloprotease (Major Secretory Protein, Msp) is the most abundant protein secreted by L. Pneumophila. The development of a fluorescence repressed substrate for the Msp will allow to set up an early warning system for quick and simple detection of alert contamination levels in order to supplement the existing monitoring plans.</p> <p>This technology has already been used successfully by Pharmaleads, a partner in the project, for the development of a kit for detecting botulinum toxins in water samples. The Institut Pasteur de Lille and Suez Environment will calibrate and evaluate the performances of the method on different types of water samples (tap water , sanitary hot water, cooling towers), artificially and naturally contaminated by L. pneumophila.</p>
Partners	Suez Environnement (coordinator) PHM - Pharmaleads IPL - Institut Pasteur de Lille
Contact point	Mme Sophie COURTOIS - Suez Environnement sophie.courtois@suez-env.com
ANR funding	422 144 €
Start-duration	January 2009 - 24 months
Contract	ANR-08-ECOT-012

Ecotechnologies and sustainable development programme

Year 2008

Title	SEGTEUP - Extensive systems for storm-water treatment and management of urban areas.
Abstract	<p>The treatment of storm water in urban areas is going to become a necessity to recover the good chemical and ecological state of the superficial waters. This project has for objectives to develop, to optimize and to validate a process of extensive treatment of the storm water and to achieve a deep analysis of its performances in term of hydraulic buffering as well as to assess the effectiveness of the purification for organic matter, ammonium and some specific compounds like metals and HAP.</p> <p>The survey is planned in a phase of experimentations on large pilots to study different types of conception as well as a phase in real size. The survey will widen the thought to the national context through different combined systems features (slope, proofing coefficient, ..). The conditions of the acceptability of this type of technical solutions by the users in the neighbouring area and by the technicians will be clarified also.</p> <p>In order to give some technical advises to the decision makers in charge of urban runoff, the survey will try to specify the impact of these devices on the improvement of the quality of the receiving bodies.</p>
Partners	Cemagref - Cemagref (coordinator) INSAVALOR-LGCIE-EDU-EVS SINT Grand Lyon EPURNATURE
Contact point	M Pascal Molle - Cemagref - Cemagref pascal.molle@cemagref.fr
ANR funding	873 566 €
Start- duration	January 2009 - 48 months
Contract	ANR-08-ECOT-013

Ecotechnologies and sustainable development programme

Year 2008

Title	TACSOL - Solar thermoacoustic refrigeration
Abstract	<p>This application for ANR funding deals with the achievement of a new cooling production process which does not involve greenhouse gases and that is based on the use of a thermoacoustic prime mover and a thermoacoustic heat pump coupled together. In the framework of this project, the hot heat source required to drive this unit will be solar energy. The use of this renewable energy allows:</p> <ul style="list-style-type: none">• obtaining nil CO2 impact during the machine runs• getting autonomous and highly reliable systems providing some out-of-the-way as well as common areas with cooling production• having a nil or quasi-nil energetic cost, beyond the investment costs. <p>This ANR gathers four partners having complementary thorough knowledge: three public statutory research bodies and a firm involved in thermoacoustic engineering and which will place the future products on the market. This experimental development, with industrial consequences, has to provide a solar thermoacoustic machine for the cooling production. The work will consist in:</p> <ul style="list-style-type: none">• gathering solar energy and thermoacoustics through the study and the achievement of a solar heat exchanger that will receive and transmit the energy required to drive the thermoacoustic prime mover;• studying the influence of the transient states, involved by the solar source intermittency or variability, on the machine run and on its energetic capabilities;• achieving, at the periphery of the system, a device dedicated to the cooling transport and to the adjustment (stocks) of the energetic supply with the energetic needs of the user;• studying experimentally the overall system: solar + thermoacoustics + energetic storage;• developing some designing tools which integrates the complexity of the different elements of the system (solar, thermoacoustic, heat transport and stocking peripheral) in order to allow the industrialization of those helio-acoustic systems;• achieving a socio-economic and environmental investigation about those thermacoustic solar machines for the cooling production.
Partners	CNRS - IPNO (coordinator) CNRS DR13 - PROMES-CNRS HEKYOM Université de Pau et des Pays de l'Adour - LaTEP
Contact point	M Patxi DUTHIL - CNRS - IPNO duthil@ipno.in2p3.fr
ANR funding	699 948 €
Start- duration	January 2009 - 36 months
Contract	ANR-08-ECOT-014

Ecotechnologies and sustainable development programme

Year 2008

Title	VALDECO - ECONOMIC ASSESSMENT OF ECOLOGICAL DAMAGES CAUSED TO THE MARINE ENVIRONMENT - Application to black tides
Abstract	<p>This research project involves a group of environmental scientists, economists and jurists who all have sound experience in the field of oil pollution. The aim of the research is to design a proposal of emergency plan for the use of national and local authorities in order to obtain better compensation for the impairment to the marine and coastal environment. This task is complex given that there is no unique approach in the compensation for such damage. Each of the various type of impacts of a pollution in the marine environment is very specific and needs to be considered separately, from the joint perspective of environmental science (what is possible to be quantified?), of economics (what monetary value?) and of law (under which legal rules?). The national instruction and the POLMAR emergency plans only deal with the issue of preventive and cleaning measures. They don't consider the issue of damage compensation and leave to the ministry of the environment the responsibility to carry impact assessment studies.</p>
Partners	<p>Cedre (coordinator) Université de Bretagne Occidentale - UBO ALLEGANS TOTAL</p>
Contact point	<p>M Michel Girin - Cedre michel.girin@cedre.fr</p>
ANR funding	<p>255 549 €</p>
Start- duration	<p>January 2009 - 24 months</p>
Contract	<p>ANR-08-ECOT-015</p>

Ecotechnologies and sustainable development programme

Year 2008

Title	VALOPLUS - Reusing of used phosphor powders
Abstract	<p>The lamps for economical energy (LEE) for domestic utilisation are in expansion. More that one lamp low consumption spends 5 to 7 times low energy than one classical lamp, and the life time is 6 to 12 times more, the interest of such substitution is clear. It is important to note that the management of the recovery and the recycling of these lamps is necessary if LEE will be ecologically used, considering the presence of mercury and the metals in their composition. For the moment, the most materials (glass, mercury, metals etc...) from fluorescent tubes are recovered, reaching the recycling rate more than 90%. Nowadays, only fluorescent powders representing 1 to 4% of lamps weight are deposit in special storages after mercury recovery. At this time, none techniques are available to separate these powders for recycling and utilisation the pure substances: Their physical and physico-chemical characteristics: Texture, fine particle size ($D_{50} < 5\mu\text{m}$), density and surface states. The project aims the definition of the innovative techniques adapted to these dusty materials.</p>
Partners	<p>Rhodia (coordinator) BRGM Institut National Polytechnique de Lorraine-INPL - LEM CREED</p>
Contact point	<p>M Jean Jacques Braconnier - Rhodia jean-jacques.braconnier@eu.rhodia.com</p>
ANR funding	<p>613 197 €</p>
Start- duration	<p>January 2009 - 36 months</p>
Contract	<p>ANR-08-ECOT-016</p>

Ecotechnologies and sustainable development programme

Year 2008

Title	VALORIA - Development of an innovating process for the recycling of organic biofeedstocks from wastewater treatment
Abstract	<p>The treatment of the industrial or urban effluents is responsible for the production of large quantities of waste and important carbon dioxide generation.</p> <p>As example, each year, France produces more than one million tons of dry matters resulting from sludge of urban waste water treatment plant. Since the application of the European directive of May 21, 1991 and law on the water of January 3, 1992, relating to urban waste water, the local government agencies were brought to reinforce the collection and the treatment of waste water. Thus, the increase in volume of collected effluents and the evolution of treatment performances lead to a large increase of sludge production (50% increase between 1991 and 2005 [1]). Together with this evolution the potential route to sludge disposal are more and more restricted.</p> <p>Until 1998, sludge were directed towards three disposal routes namely, agricultural valorization (60%), landfilling (20 to 25%) and the incineration (15 to 20%). The main actors of the water treatment have developed technologies to treat these sludges by physical oxidation (generally thermal), chemical (ozonolyse, liming,...) or biological. But, these treatments are expensive and require a lot of energy and are therefore reserved for a small part of suldge production. Moreover they are also responsible by definition of an increase in the production of carbon dioxide and other gaseous pollutants. One of the possible solutions to solve this problem would be to consider sludge and other by-products resulting from the wastewater treatment as renewable carbon source by proposing innovating routes of valorization to organic intermediaries with high added value. Thus, this project presents the possibility to produce biopolymers (of polyhydroxyalcanoates type or PHA) by using sludge as a raw substrate.</p> <p>This research project, implying several universities and private companies teams, will be based on the three key stages of the process, namely, (1) the pretreatment of waste, (2) their bioconversion and (3) the extraction/purification of polymer. A demonstration of the feasibility of this route, on an industrial scale, will be carried out thanks to the implication of a major industrial actor in the water treatment (Veolia Environnement). Lastly, the produced polymers will be subjected to life cycle analysis (LCA) a technological evaluation will also be performed (complete physicochemical characterization) in order to show their relevance towards the specification of various end users.</p> <p>[1] Rapport de l'Office Parlementaire d'Evaluation des Choix Scientifiques et Techniques n°215, déposé le 18 mars 2003 au Sénat</p>
Partners	Anjou Recherche - Véolia Environnement (coordinator) CNRS Délégation régionale Rhône Auvergne - IRCELyon Institut National des Sciences Appliquées - LISBP IUT A Paul Sabatier - Université Toulouse III - LBAE Créagif
Contact point	M Pierre-Alain HOFFMANN - Anjou Recherche - Véolia Environnement pierre-alain.hoffmann@veolia.com
ANR funding	899 892 €
Start- duration	January 2009 - 36 months
Contract	ANR-08-ECOT-017