



LeAF Letter

Number 7, July 2007

With this newsletter Lettinga Associates Foundation aims at informing the reader on its projects, courses and other activities performed in the field of implementation of environmental protection and resource conservation technologies

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Dear Readers,

The first half-year of 2007 has been very exciting and motivating. We could not think of a better present for our 10th anniversary than the news that Gatze Lettinga was awarded the 2007 Tyler Prize for Environmental Achievement 'in recognition of his research and development of an environmentally sound novel process for the treatment of polluted wastewater and its implementation worldwide, especially in developing countries.' We feel encouraged to move on in this direction.

We will do so with the help of Miriam van Eekert, who joined LeAF last May. Miriam is specialized in microbial conversion processes and previously worked at Wageningen University and TNO.

Inside this issue of the LeAF Letter we look back at the past ten years and our anniversary symposium, and you can read about a number of new and the results of a few running projects. A list of upcoming events is included and we are pleased to announce the winner of the 2007 Lettinga Award.

Marjo Lexmond
Managing director

LeAF 10 years of sustainable anaerobic technology

When LeAF was founded 10 years ago, the main aim was to consolidate the anaerobic knowledge. Activities therefore mainly focused on the proper implementation of the anaerobic technology in practice. Gradually this aim has changed into the more holistic aim to implement sustainable solutions for environmental issues, like the implementation of proper sanitation and the use of renewable energy. Of course anaerobic processes continue to play a key role but nowadays

we consider other options and complementary technologies too if we think that is more sustainable.

LeAF's activities focus on training and teaching, the execution of feasibility and other desk studies, consultancies, making conceptual designs for sustainable treatment systems, and the performance of biological tests as part of our expert advice. You can read more about our activities on our website. The profits we make with our commercial activities are used to perform less profitable projects in regions where people can not afford expensive experts.

In addition to this, LeAF facilitates the research chair of Jules van Lier on Anaerobic Wastewater Treatment for Reuse and Irrigation at the Sub-department of Environmental Technology of Wageningen University. This chair is being funded by Shell Netherlands, Paques Natural Solutions, Biothane Systems International and Royal Haskoning.



Photograph taken after the Tyler Prize ceremony (Courtesy of Elias Razo)

LeAF also administers the Lettinga Foundation, an idealistic fund that was initiated in 2001 after the donation of funds of the Royal/Shell Prize for Sustainable Development and Energy in 2001 to Gatze Lettinga. The Lettinga Foundation aims at enabling scientists or young professionals to further qualify themselves in the field of sustainable environmental technology and to further improve the implementation of sustainable environmental technology in practice. Gatze Lettinga will also donate the majority of the funds that he received with the 2007 Tyler Prize for Environmental Achievement. I would like to invite you all to follow Gatze's example.

Marjo Lexmond



LeAF 10 year anniversary symposium "Sustainable Technology – now and in the future", 8 June 2007, WICC Wageningen

To celebrate its birthday and the fact that Gatze Lettinga was awarded the prestigious Tyler Prize for Environmental Achievement in Los Angeles in April this year. LeAF organized a symposium in cooperation with 6 PhD students from the research school Sense.

Despite the short preparation time, the symposium attracted over 100 participants, originating mainly from the Netherlands, but also from abroad (Belgium, Spain, Portugal, Russia and South Africa).

Marjo Lexmond opened the symposium with a presentation about the history of LeAF and an overview of its activities. Thereafter, Gatze Lettinga gave his point of view on sustainable protection of the environment (SUS-EP). SUS-EP comprises proper collection and transport of waste streams, the integration of biological anaerobic, aerobic and if necessary physico-chemical treatment methods and the use of recovered by products. He gave DESAR and "the greenhouse village" as examples of SUS-EP. During the remainder of the morning session, Ronald Mulder (Paques), Jules van Lier (WU/LeAF) and Fons Stams (WU) reviewed the future of anaerobic industrial wastewater treatment, the use of anaerobic processes for closing water and resource cycles with special emphasis on energy recovery, water reuse and use of nutrients in waste streams, and the novel insights in sulfur biotechnology.

The afternoon session of the symposium was dedicated to the future of sanitation both in the Netherlands as well as in developing countries. Bert Palsma (STOWA) ensured the participants of the symposium that there is a future for new sanitation concepts in the Netherlands in the 21st century provided that certain criteria are met. Kees Kwant (SenterNovem) discussed the role of biomass in reaching the goal to use 20% renewable energy in 2020. The state of affairs in reaching the Millennium Development Goal nr 7 was discussed by Dick Bouman (Aqua for All). The last speaker Noor van Andel (Fiwihex) presented the concepts and the changes for



Panel discussion during the symposium

implementation of the Greenhouse Village. After the presentations there was a vivid discussion between speakers and audience.

LeAF will donate the profits of the symposium to the Aqua for All/UNEP sanitation project at the prison of Mombasa, Kenya. This project aims, as Ruud Kampf explained the audience, at the

development of a sustainable sanitation system in a country that would otherwise not easily try out this concept. More information about the project can be obtained via the web-site (http://www.waterharmonica.nl/cases_waterharmonica/shimo_la_tewa.htm).

At the end of the day, almost all participants joined the reception organized by Wageningen University in honor of Gatze Lettinga.

All in all we look back at a successful symposium both on the environmental and social level during which we met a lot of our old and new friends.

The presentations are now available on the web site (<http://www.leaf-water.org/>).

2007 Lettinga Award

It is our pleasure to announce that Dr. Francisco Cervantes from the Instituto Potosino de Investigación Científica y Tecnológica (IPICYT) in Mexico is the winner of the 2007 Lettinga Award! Dr. Cervantes will receive the prize of € 25000 for his proposal entitled "Immobilization of redox mediators in nanostructures for the anaerobic treatment of industrial wastewaters". On behalf of the Lettinga Foundation Ronald Mulder will hand out the prize during the Anaerobic Digestion congress 11 in Brisbane, Australia on 23-27 September 2007.

The Lettinga Award was initiated in 2001 and is financed by three Dutch Environmental Engineering companies: Paques Natural Solutions B.V., Royal Haskoning and Biothane Systems International. The purpose of this Award is to stimulate innovation in the field of anaerobic technology for wastewater treatment aiming at cleaner production or recycling, sustainable development and/or resource conservation.

The 2007 Lettinga Award special focus was on the anaerobic treatment of wastewater from the chemical industry. Twelve proposals were submitted for review by applicants from four different continents. The independent jury had a difficult task to select only one project proposal as the winner, because the proposals one and all were of high quality. Ultimately, the judging committee awarded the project that best fit into the special focus, with an innovative approach of the problem at hand, and with a good chance of successful applicability within a realistic time frame.

Innovation vouchers for SME

To stimulate innovation within the Dutch Small and Medium Sized Enterprises (MKB) the Innovation voucher regulation was developed in 2006 by the Ministry of Economic Affairs. The administration of this regulation lies with SenterNovem. Innovation vouchers of 2500 (once) or 7500 euro (one each year) can be obtained by the Dutch MKB for free and used to contract a knowledge



centre for a small research that may lead to an innovative concept. LeAF is recognized as knowledge centre within this regulation (www.senternovem.nl/innovatievouchers/). Several innovation vouchers already have been used to come to small or larger innovations, like the development of new technologies and finding solutions for specific problems in practice.

Contact Marjo Lexmond (marjo.lexmond@wur.nl) for more general information on the use of innovation vouchers for Dutch MKB or contact one of the project leaders for the exploration of concrete projects.

LeAF involved in a new international project ANTINOMOS

In May 2007 in Bari, Italy, the kick-off meeting of the project ANTINOMOS took place. ANTINOMOS aims at contributing to global and local knowledge networks with the aim of solving real-life water supply and sanitation problems in less developed countries and reaching the MDGs.

Next to LeAF, the participants in this project are: Polytechnic University of Bari, Italy; University of Natural Resources and Applied Life Sciences, Vienna, Austria; Center for Environmental Management and Decision Support, Vienna, Austria; School of Water Sciences at Cranfield University, U.K.; Swedish Institute for Infectious Disease Control, Sweden; Ecole National du Génie Rural, des Eaux et des Forêts, Montpellier, France; University of Kwazulu-Natal, South Africa; Instituto Mexicano de Tecnología del Agua, Mexico; Indian Institute of Management, India; UNESCO - Institute for Water Education.

The project duration is three years. For more information, please contact: Adrie Veeken (adrie.veeken@wur.nl)

Managing water scarcity: Intelligent Tools and cooperative strategies (MAI-TAI)

In April this year the EU project "Managing water scarcity: Intelligent Tools and cooperative strategies" (acronym: MAI-TAI) took off with a kick-off meeting in Beijing, China. Mai-Tai is a coordination action with a duration of 3 years. The project deals with integrated water resources management in China and India, and focuses on one sub-river basin in each country. The project's aim is to develop innovative, relevant and cooperative policy and management strategies. The project includes two main parts; the first one focused on technologies and the second one, building up on the first part, dealing with policy and management strategies.

A dialogue will be established between researchers and practitioners dealing with the technologies and practices generally accepted and promoted as "state of the art" on the one

hand, and researchers and practitioners of local (including indigenous) technologies and practices on the other hand. The consortium believes that modern systems alone are not capable of solving water needs of the people in many developing countries, and there is a strong need for generating innovative water management tools and strategies through cross fertilisation between both "worlds". The innovative policy options and management strategies developed based on the cross-fertilisation of technologies will be evaluated by means of a multi-stakeholder interaction, supported by intelligent knowledge management tools. As a large variety of actors will be involved in the project, each with specific knowledge, it is expected that a wealth of information will be generated.

In total five partners from the EU, four from the People's Republic of China and 3 partners from India are involved in MAI-TAI. LeAF is work package leader for the work package entitled "Innovation potential of state of the art technologies and practises". The objectives of this specific work package are:

1. Reviewing state of the art technologies and practises that may lead to increasing water use efficiency as well as recycling, re-use of treated wastewater, pollution control and water source protection.
2. Inventory of technologies and practices used in the river basins of the partner countries
3. Developing a framework for evaluation of these technologies and practices
4. Highlighting the innovation potential in partner regions.

For more information please contact: Henri Spanjers (henri.spanjers@wur.nl)
A website for the project is under construction.

Powerful digestion: biogas under pressure

Anaerobic digestion can be performed at high pressures, which opens the way to connect anaerobic biogas reactors to local gas networks, thereby contributing to the development of decentralized energy production. In fact anaerobic conversion at elevated pressure occurs since millions of years at the bottom of the deep-ocean, but this natural process has not been applied in anaerobic reactors on an



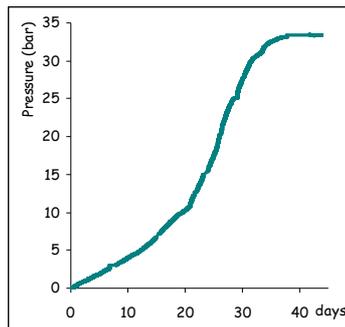
High pressure laboratory digester (photograph by Kirsten Zagt, Barreau)



industrial scale with the purpose to produce biogas as an energy source. In the nineties at the department of Environmental Technology of Wageningen University an anaerobic reactor was operated at artificially elevated pressure. However, in this research the pressure was only 5 bar and the focus was on the assessment of anaerobic kinetics.

From 2004 onwards, as part of LeAF's efforts to stimulate decentralized anaerobic waste treatment and energy production, we started to undertake attempts to initiate research on high-pressure digestion aimed at feeding biogas to local gas networks. These attempts lead to the start of a project: A team lead by Kirsten Zagt of Bareau and consisting of Gasunie Engineering & Technology, Technologiecentrum Noord Nederland, Reinders BV, van Hall Instituut, NHL University, Technometrica and LeAF is now completing a demonstration project supported by the province of Groningen. In this project LeAF contributed to the preliminary work, design of the reactor, guidance during the experiments and interpretation of the results.

In this one-year project a gas-tight laboratory batch digester was fed with acetate and was run while the pressure was allowed to increase as a result of the increasing volume of produced biogas. No external pressure was applied. A pressure of up to almost 35 bar (see figure on the left) was attained without noticeable effect on the activity of the anaerobic micro-



organisms. Moreover, biogas with a very high methane content was obtained: whereas anaerobic digestion under atmospheric pressure produces biogas with about 70% methane and 30% carbon dioxide, the high pressure digester produced almost pure methane gas with only 5% carbon dioxide.

Recombinant DNA analysis of the reactor microorganisms was performed to identify the different species of bacteria and archaea present in the system before and after the different experiments, and to see possible population changes caused by the high pressure. These tests showed that during the digestion at high pressure the fraction of archaea increased while the fraction of bacteria decreased.

The project team is currently investigating various ways to proceed with the research options and practical implementations. Among the remaining challenges are the use of other substrates such as organic waste, and the continuous operation of the reactor. The availability of compressed biogas as a mechanical energy carrier, allows the operation of certain devices such as pumps and reversed osmosis membranes without external

energy input. The exciting prospect is that decentralized anaerobic waste treatment and energy production in combination with water reuse may become reality in the near future.

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For more information, please contact:
Henri Spanjers (henri.spanjers@wur.nl)

New phase of the integrated water management program in Matagalpa, Nicaragua.

A new, 3 year, program has been launched in June for improving the water situation near the city Matagalpa, Nicaragua. The program is based on the outcomes of a participatory stakeholder meeting held in November last year. The program is a collaboration of the municipality of Matagalpa, Waterschap de Dommel, Hoogheemraadschap de Stichtse Rijnlanden and LeAF. In addition, there will be close cooperation with local stakeholders that play a role in sustainable watershed management.

LeAF is responsible for the coordination of the program and will provide consultancies within the various themes of the project. Dutch students from Wageningen University and Hogeschool Vliissingen play a vital role on the implementation and the continuation of various parts of the program.

The focus of the program will be on the watershed of the river San Francisco. By reducing the pollution of the rivers, this river will become available again as a valuable source of water for the inhabitants of the city and the surrounding rural areas. The program has three key components:

1-Improvement of drinking water and wastewater facilities in 6 rural communities. The 6 communities have no or only partial access to safe drinking water while appropriate sanitation facilities are absent or in very bad condition. In addition to improvements in the infrastructure the program will provide training to local engineers and introduce guidelines for operation and maintenance.

2-Reduction of coffee wastewater to the river San Francisco. The main pollution of the watersheds is coming from the coffee sector. At the same time this sector is of great importance for the regional (and national) economy. The negative impact of the coffee wastewater is due to high organic matter and nutrient loads and low pH-values. The program will work on the implementation of 6 (partially anaerobic) wastewater treatment systems.

3-Development of an Integral Watershed Management program focussing on sustainable access to drinking water for the city Matagalpa on the long term. This part is aimed at forming a 'task force' that will work on the improvement of



the quality of the river San Francisco, strengthening of the capacities of the involved stakeholders with respect to watershed management and implementation of a strategy for monitoring river water quality and quantity.



Participants of the 2006 stakeholder meeting

Next visit

A delegation of LeAF and the Waterboards has visited Matagalpa during the first week of July this year. Besides the necessary formalities, field visits and stakeholder meetings were planned. The delegation was subdivided into three groups, each working on one of the themes mentioned above. Some people of the project team left one week earlier in order to meet the Dutch Minister of Development Affairs, his excellency Mr. Koenders, who was in Nicaragua at that time. This was a great opportunity to involve Nicaraguan politicians and evoke the importance of good water management.

The program is financed by Aqua for All, the Nederlandse Waterschaps Bank (NWB) and in-kind contributions of the two water boards and LeAF. Also the Municipality of Matagalpa will contribute financially with a yearly input.

For more information, please contact Adriaan Mels (e-mail: adriaan.mels@wur.nl)

Upcoming events

November 21 and 22, 2007

Second PAO course on source separated collection, transport and treatment of household wastewater
Course on source separated collection, transport and treatment of household wastewater

For more information please contact:

Grietje Zeeman (grietje.zeeman@wur.nl) or
Adriaan Mels (adriaan.mels@wur.nl)

Autumn 2007

E-course on Wastewater Reclamation for Agricultural Reuse

If you are interested to participate in this course, please send an e-mail to info@leaf-water.org and we will provide you with a registration form and course details.

May 19-21, 2008

Sanitation Challenge

An international conference on new sanitation concepts and models of governance

For more information please contact the congress secretariat at leaf@wur.nl

Colophon

Lettinga Associates Foundation is a non-governmental, not for profit organisation that does not receive donor funding. The foundation earns its income from projects related to applied research, consultancy tasks, organisation of courses, biological tests, etc.

Twice a year Lettinga Associates Foundation will distribute this LeAF Letter amongst its clients, relations, and others interested in environmental technologies for waste and wastewater treatment.

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