

**ANNUAL MEETING REPORT OF
THE NATO CCMS PILOT STUDY ON
CLEAN PRODUCTS AND PROCESSES**

**May 11-15, 2003
Cetraro, Italy**

The 6th annual meeting of the NATO CCMS Pilot Study, Clean Products and Processes, was held in Cetraro, Italy, from May 11 to 15, 2003. This was also the first meeting of its Phase II study. 24 country representatives attended this meeting. This meeting was very ably run by the host Prof. Enrico Drioli of the University of Calabria. The meeting was sponsored by NATO CCMS, US EPA, the Italian National Research Council (CNR), and the University of Calabria. This was a larger meeting than the previous one in Vilnius, both from the viewpoint of representation and agenda. We started in the afternoon with introduction and a technical symposium on Sustainability Metrics. The early start of the technical agenda was necessitated by the need to still finish at noon on Thursday.

As before we had a great get-together among the delegates who benefited from frequent exchanges of ideas for collaboration. Several proposals were made for multi-country collaborations (shown later). We visited several plants that practice cleaner production and were received by the Rector of the University of Calabria and the Mayor of Cosenza. We also visited the laboratories of the Center for Membrane Research at the University of Calabria. The goals of Phase II were reaffirmed:

- S To support the development of eco-efficiency and sustainability indicators and promote consistency and harmonization of their application;
- S To examine and exchange information on state-of-the-art advancements in product design and process development in service and industrial sectors of importance to participating nations;
- S To develop a web-based portal for the dissemination of pilot study results and improved awareness of related global developments; and
- S To stimulate and facilitate productive collaboration among all participating nations.

Here is the summary of the various activities:

1. On Sunday May 11 the program started at 2 pm with the introduction of the delegates, overview of the meeting agenda, a report of the 2002 meeting report (by Jurgis Staniskis, Lithuania), a look to the future with Phase II (by Subhas Sikdar, USA) and a technical

workshop on Sustainability Metrics. This special workshop was suggested by Horst Pohle (Germany) and Annik Fet (Norway). These were the presentations:

- Selection and use of environmental indicators in different NATO member states by Horst Pohle (Germany)
- Life cycle impact factors by invited speaker David Pennington (UK)
- Sustainability reporting in European regions by Annik Fet (Norway)
- The role of environmental management accounting (EMA) in corporate environmental management by Gyula Zilahy (Hungary)
- TRACI- tool for the reduction and assessment of chemical and other environmental impacts by Dan Murray (USA)

This workshop was followed by general discussion and identification of future topics. We concluded Sunday's meeting at 7:30 pm.

2. On Monday we heard some pilot project updates and talks on selected technical topics. These were:

- Design and simulation of environmentally conscious chemical processes by Teresa Mata (Portugal). This is the report of collaborative research done by Mata with Ray Smith of US EPA. The work represents Mata's Ph.D. thesis at the University of Porto.
- A report on the program on sustainable industrial development in Lithuania by Jurgis Staniskis (Lithuania).
- A report of the activities of clean products and processes at the University of Natal, South Africa by one of our newest member Christopher Buckley (South Africa).
- A report of a pilot project, Breakthrough of water reuse in textile industry through development of generic water recycle schemes by Henrik Wenzel (Denmark). This work was conducted in collaboration with the USA and Lithuania.
- Prof. Jim Swindall of the Queen's University of Belfast, Northern Ireland (UK) gave an update on the topic of ionic liquids. This presentation was requested by the Director.

The Monday afternoon field trip was to the University of Calabria and the CNR Membrane Center. We were received by the Rector of the University and later by the mayor of Cosenza.

3. Tuesday was set aside for plant visits. We visited these these manufacturing sites:

- Amarelli Liquorice
- OSA Agro-Foods
- Mediterranea R&S

4. On Wednesday we had the one-day Topical Symposium on Process Intensification. These were the talks delivered:

- Process intensification at the European Union level: current projects and future plans by G. Gallios (Greece)
- Wettability determination as an important factor in design an environmental performance of some industrial processes by A. Doniec (Poland)
- Development and integration of new processes for greenhouse gases management in multi-plant chemical production complexes by invited speaker Ralph Pike (USA)
- Studies on the purification of nonwater media by ceramic membranes by G. Kagramanov (Russia)
- Several alternatives for the separation of organic acids as examples of process intensification by J. Coca (Spain)
- Process intensification by modeling and modifying packed bed reactor by A. Martin (Portugal)
- New technologies for improving gas liquid transfer processes and catalytic reactions by A. Criscuoli (Italy)
- Slovakian industry byproducts in intensification of wastewater treatment processes by M. Vaclavikova (Slovakia)
- Reuse of waste materials from zinc industry for sorption of hydrogen sulfide in gas clean-up by A. Atimtay (Turkey)
- Setting up waste minimization clubs by Chris Buckley (South Africa)

5. On Thursday two more technical presentations were made:

- Sustainable development using macroeconomic and microeconomic indicators by P. Glavic (Slovenia)
- Chemical dispersants for the remediation of oil spills by Jose Coca (Spain).

The rest of the time was spent in evaluating the status of the Pilot and discussing topics for future focus as well as selecting projects. Others who spoke in the meeting are Thomas Chapman (USA), Prof. David Wolf (Israel), Stefka Tepavitcharova (Bulgaria), William Zadorsky (Ukraine) and Frantisek Bosek (Czech Republic). Enrico Drioli provided detailed guidance on how to seek funding for collaborative research from sources in Europe. Tom Chapman (NSF, USA) provided similar guidance for collaborating with US partners. We selected Budapest, Hungary as the site for 2004 meeting. Two other proposals were made, one for Moscow and the other for Lodz, Poland. Next year's topical symposium will be on Sustainability Metrics.

Several topics were proposed and selected for study by member country delegates. These are:

- Sustainability metrics and reporting mechanisms. Leader: A. FET (Norway). Cooperating nations: USA, Turkey, Greece, Slovenia, Lithuania, Germany, Hungary, Romania, UK, Portugal, and Italy
- Train the trainers, implement environmental management accounting (EMA). Leader: G. Zilahy (Hungary). Partnering nations: Slovenia, Ukraine, and Lithuania

- Education and training in sustainable development. Leader: Peter Glavic (Slovenia). Partners: USA, Portugal, Germany, Poland, Spain, Bulgaria, Israel, Denmark, Italy, South Africa, Turkey, and Lithuania
- Cleaner Production policy in transition economy countries. Leader: William Zadorsky (Ukraine). Partners: Germany, Hungary, Romania, Sweden, Bulgaria, and Norway.
- Indicators for potential new sustainable technologies. Leader: E. Drioli (Italy). Partners: USA, Russia, Israel, Portugal, Slovenia, Romania, Denmark, Poland, Greece, Hungary, Turkey, and Spain.
- Waste Minimization Clubs. Leader: Christopher Buckley (South Africa). Partners: Ukraine, Portugal, Israel, Slovenia, USA, Czech Republic, Bulgaria, and Turkey.

Significant Developments before the meeting:

1. Two new nations joined the Pilot study. Christopher Buckley representing South Africa, and Thomas Lindquist representing Sweden.
2. Jose Coca (Spain), G. Kagramanov (Russia), and Subhas Sikdar (USA) received a funding from NATO Science Program to conduct research on the removal of sulfur from diesel oil using membranes.
3. Aysel Atimtay was confirmed by Turkey to represent the country officially in the Pilot meetings. This was her first meeting as the country delegate.
4. Two NATO supported “fellows” attended the meeting: Miroslava Vaclavikova (Slovak Republic) and Antonio Martins (Poland)
5. Two speakers were invited to this meeting. David Pennington from the UK, and Prof. Ralph Pike from the USA.

Twenty four countries were represented in the Cetraro meeting. These are: Bulgaria, Czech Republic (two attendees), Denmark, Germany, Greece, Hungary, Israel, Italy (5 attendees), Lithuania, Norway, Poland, Portugal (two attendees), Romania, Russia, Slovak Republic, Slovenia, Spain, South Africa, Sweden, Turkey, Ukraine, United Kingdom (two attendees), United States (four attendees).

