



1st
INTERNATIONAL WORKSHOP
ADVANCES IN CLEANER PRODUCTION

“The role of Cleaner Production in the
Sustainable Development of Modern Societies”

CONFERENCE PROCEEDINGS

São Paulo - Brazil - November 21st-23rd





Conference Proceedings

November, 21st to 23rd 2007
São Paulo, SP, Brazil

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JCP - Journal of Cleaner Production
ABEPRO - Brazilian Association of Production Engineering

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Donald Huisingh

Editor-in-Chief of Cleaner Production, Elsevier Science. Senior Scientist in Sustainable Development. University of Tennessee

Oswaldo Luiz Gonçalves Quelhas

Associated Professor of Universidade Federal Fluminense and President of ABEPRO - Brazilian Production Engineering Association

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We could not refrain from expressing our gratitude to the SABESP, FAPESP, FINEP, and CNPq for the financial support.



Message of Welcome

On behalf of the Organizing Committee, I have the honor to welcome all participants, and to express my greatest wishes that the event will serve to establish fruitful collaborations among participants.

The extensive program, the representative number of participants, the quality of the conferences and contributions allows this event to be considered the most important event held in Brazil addressing the Cleaner Production. It is the consequence of contributions from several colleagues scattered in different parts of Brazil and of the World. Colleagues who are working for several years in different types of institutions: academic, business and government.

You are responsible for the size and quality of the **International Workshop on Advances in Cleaner Production**. The impact will largely depend on the interaction and discussion that will occur among you, encouraged by the organization of this event.

Welcome!

Bienvenidos!

Bem-Vindos!

I wish a fruitful participation, a pleasant stay, and that you have a good return to your home institutions. I hope also that you continue contributing to the Advance of Cleaner Production and Sustainable Development.

Biagio F. Giannetti
Conference Chair



Presentation

The Post-Graduate Program in Production Engineering of the Paulista University (**PPGEP - UNIP**) is the organizer of **1st International Workshop the on Advances in Cleaner Production** (in São Paulo, Brazil, 2007 november 21st to 23rd) in participation with Paulista Cleaner Production Roundtable (**MRPP + L**), the Brazilian Association of Production Engineering (**ABEPRO**) and the Journal of Cleaner Production (**JCP**).

The International Workshop is a multi/interdisciplinary forum for the exchange of information and research results on technologies, concepts and policies based on Cleaner Production and conceived to assist the desired transition to a sustainable society.

The Workshop includes events that engage Brazilian and regional experiences on Cleaner Production:

IV Paulista Week of Cleaner Production IV Paulista Conference of Cleaner Production

and the

Brazilian Forum of Cleaner Production

These initiatives are designed to encourage industrial innovation, new cleaner products, product improvements and the implementation of cleaner processes and services. These initiatives also aspire to stimulate the development and the implementation of governmental policies and educational programs oriented to cleaner production and sustainable development.

Cleaner Production is a concept that goes far beyond the simple pollution control. It includes research and development of new



processes, materials and products directed to promote the efficient use of resources and energy. Prevention must be the first approach of governments and corporations concerning sustainable development, and for this, environmental friendly strategies allied to economical robustness of products and services must be assured.

The adoption of Cleaner Production by governments and universities is getting speed with technical assistance and training programs, but it is worthy of attention that all these initiatives, even if implemented by all governments and corporations, do not guarantee the achievement of sustainable development. There is still a lack of a science, and consequently of a consolidated engineering devoted to the sustainable development. The Workshop's theme intends to stimulate this discussion of crucial importance **"The role of Cleaner Production in the Sustainable Development of Modern Societies"**.



Objectives

The event has as central theme **The role of Cleaner Production in the Sustainable Development of Modern Societies** with the aim to promote:

- The exchange of academic information;
- The presentation of recent achievements;
- The sharing of knowledge among emergent and developed economies
- The discussion of common problems and their possible solutions
- The increase of international partnership;
- The contact among academic knowledge and corporative experiences
- The discussion of the event's theme "The role of Cleaner Production in the Sustainable Development of Modern Societies";
- The reunion of **Paulista Cleaner Production Roundtable** members.
- The reunion of **Brazilian Forum of Cleaner Production** members.

To achieve these objectives efficaciously, preparatory regional events were held in São Paulo 's regions: Campinas/São Carlos and Paranapanema (organized, respectively, of Campinas CIESP and SINDIPAR).



Conferences

and

Oral Presentations

21st November 2007



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21st November 2007

10h30-12h **Opening Conference**

Donald Huisingh

Senior Scientist in Sustainable
Development & Editor-in-Chief of
the Journal of Cleaner Production
Institute for a Secure and
Sustainable Environment
University of Tennessee

**"Why is the Cleaner Production
of Cleaner Products and
provision of Cleaner Services
INSUFFICIENT FOR ACHIEVING
SUSTAINABLE
SOCIETIES?????"**



Why is the Cleaner Production of Cleaner Products and provision of Cleaner Services INSUFFICIENT FOR ACHIEVING SUSTAINABLE SOCIETIES?????

Prof. Dr. Donald Huisingh

Senior Scientist in Sustainable Environment
The University of Tennessee

During recent decades, as societal members have become increasingly aware of the negative impacts humans are causing upon each other and upon our ecological life support systems, they/we worked to develop and implement approaches for controlling, reducing and preventing them from occurring.

In the early era of environmental protection, most countries established pollution control regulations designed to 'force' industrial leaders and society, more broadly to treat pollutants at the 'end-of-the-pipe' after they were produced. This pollutant treatment approaches led to a mentality of, "it does not matter what we do as long as we treat the pollutants that we produce after you produce them!"

This led to the development of a vast array of 'end-of-pipe' pollutant control/treatment technologies. These technologies have helped to reduce the negative impacts of many human activities. However, all are expensive to buy, install and to operate at the corporate and municipal levels and they always treat the SYMPTOMS OF INHERENT INEFFICIENCIES within the system rather than challenging the corporate or municipal leaders to ask the following questions: a. What resources am I wasting? b. Why am I wasting them? c. How much are these inefficiencies costing me? d. How can I reduce or totally eliminate these inefficiencies by seeking to prevent them at



their sources, rather than treating them when they become wastes?

The process of making the paradigm shift from treating the symptoms of inefficiency via diverse pollution control to prevention-oriented approaches are helping companies and municipalities to improve their economic, environmental and social bottom lines; this is sometimes called the 'Triple Bottom Line (TBL).' These approaches are promoted and implemented under terms such as: a. Pollution Prevention, b. Cleaner Production, c. Green Productivity, d. Eco-Efficiency, e. Green Chemistry, f. Green Engineering, g. Eco-Products, h. Green Buildings.

Much TBL progress has been made within individual companies in changing their production processes, products and services. Similarly, progress in improvement of eco-efficiency of clusters of companies via the concepts of Industrial Ecology are being implemented and documented, world-wide.

The Journal of Cleaner Production (JCLP) is one of the international journals that are serving as a forum for the on-going documentation of and debate about the array of 'prevention oriented approaches.' The JCLP is now in its 15th year of publication and is now published in 20 issues per year.

A study of the results published in this and other journals reveals that although much progress has been made, much remains to be done.

Some of the crucial questions that should be addressed include:

a. If the exciting and proven successes in the prevention-oriented approaches in some companies in industrial sectors, worldwide are so positive, why have such a relatively few company leaders implemented them?



- b. What approaches are needed to accelerate and to expand the number of companies that are benefiting from prevention-oriented approaches?
- c. What can/could/should be done at municipal, regional and national levels to promote widespread implementation of prevention-oriented approaches?
- d. How can regional sustainability initiatives (RSIs) be used to catalyze and coordinate the implementation of prevention-oriented approaches within and among companies as well as within and among municipalities and regional governmental organizations?
- e. What needs to be done in regard to urgent challenges such as 'Global Climate Change', poverty, species diversity losses and work to achieve the Millennium Development Goals?
- f. How can holistic approaches to global, national, regional, local, corporate and private citizen empowerment help us to help us make the transition so truly 'Sustainable Societies'?
- g. What if we succeed? What if we don't????



13h30-14h30**21st November 2007****Sessão 4A
Sala 1**

"Ecodesign in productive chain of sugar cane: cooperative mobilizations" - Presenter: Ieda Kanashiro Makiya (UNIP)

"Quantitative and Qualitative analysis in a Study-Case for the use of agricultural and animal waste, production of sugar and alcohol, generating electricity in Araçatuba - São Paulo" - Presenter: Silva, C.C (USP)

"Sustainability Assessment of Ethanol Production from Sugarcane" - Presenter: Consuelo L. F. Pereira (UNICAMP)



Ecodesign in productive chain of sugar cane: cooperative mobilizations

Ieda Kanashiro Makiya

Universidade Paulista, São Paulo, iedakm@unip.br

The productive chain of sugar-cane presents a strong potential of ecologically maintainable solutions, in manner to incorporate conquests for a larger number of companies and groups producing of sugar-cane, sugar and alcohol of Brazil. Thus, researches in cane varieties; the Genoma project to identify 50 thousand genes of the cane; the production of biodegradable plastic; creation of the sugar type VVHP (White pollen) that requests less effort in industrial and technology process for using residues of the cane agro-industry in co-generation of electric energy, they are some of the countless conquests obtained by research centers that contributed decisively to the national alcohol cane-sugar segment reaches the world leadership.

In that way, public politics, organizations of the first and second sector have been looking for alternatives in a cooperative way for emerging solutions to this segment, based sustainability on the long term, due to future positive perspectives, including programs of alternative sources of energy, as etanol, biodiesel and biomassa; alternative sources of biodegradable packings, and in the ecoefficient re-design of the productive chain as a whole.

Keywords: ecodesign, sugar-cane, alternative energy



Quantitative and Qualitative analysis in a Study-Case for the use of agricultural and animal waste, production of sugar and alcohol, generating electricity in Araçatuba - São Paulo

Silva, C.C.^a, Silva, H.A.P.^b, Grimoni J.A.B.^c

a. Universidade de São Paulo, São Paulo, cezaradts@gmail.com

b. Universidade de São Paulo, São Paulo, haps@iee.usp.br

c. Universidade de São Paulo, São Paulo, aquiles@iee.usp.br

The Integrated Small Alcohol Plant (ISAP) is an agriculture industry which produces not only alcohol for the car and pharmacy industries as in the traditional plants, but it integrate the additional production of electricity and food for the surrounding cities which has between 10.000 to 18.000 inhabitants. The sugar cane and sweet sorghum are the basic products from agriculture which are used for the production of 40.000 liters/day of alcohol and 7,13 MW of electricity as well. In the proposed solution, presented in this paper, the period of operation of the plant can be extended up to 10 to 12 months per year, against the usual 6-8 months. The productivity is around 630 tons of sugar cane or sweet sorghum per day. On the sweet sorghum area, during the eight months period between the harvest and the plantation, it is used to grow crops and vegetables as another income for the plant. There are also beef cattle and milk production, as well as the introduction of pig farming. The total area of the ISAP is 4.360 ha including the rural and industry area. The ISAP's solution, which is proposed in this work, for the Administrative Region of Araçatuba in the Northeast of the State of São Paulo-Brazil, is based on the maximum environmental and social efficiency, which eliminates the burning practice after harvest. The vinasse is treated in an anaerobic process to use in the agriculture area, resulting in a good fertilizer mixed with the pig farming and cattle dejects which are also used for electricity generation in the plant. The ISAP project may be a way to economic development, fixing population complying with the highest demands of environmental care and with a sustainable development.

Keywords: Agro-Industry, Alcohol, Renewable Energy, Emery, Externaties.



Sustainability Assessment of Ethanol Production from Sugarcane

Consuelo L. F. Pereira ^a and Enrique Ortega ^b

a. Universidade Estadual de Campinas, Campinas, clfp@fea.unicamp.br

b. Universidade Estadual de Campinas, Campinas, otavio@fea.unicamp.br

The present study assesses the sustainability of ethanol produced from sugarcane and examines the environmental feasibility of a large-scale production through the use of: fossil fuel embodied energy analysis and Emergy Assessment adopting Life Cycle concept. The study indicates that about 1.82 kg of topsoil eroded, 18.4 liters of water and 1.52 m² of land are needed to produce 1 liter of ethanol from sugarcane. Also, 0.79 kg of CO₂ is released per liter of ethanol produced. The energy content of ethanol is 7.2 times greater than the fossil-based energy required to produce it. The transformity of ethanol is about the same of those calculated for fossil fuels. The Renewability of ethanol is 31%, a very low value; other emergy indices indicate important environmental impacts as well as natural resources consumption. The results obtained indicate that sugarcane and ethanol production adopting large scale systems present low sustainability.

Keywords: Emergy Analysis, Life Cycle Assessment, biofuels, ethanol.



13h30-14h30**21st November 2007****Sessão 4A
Sala 2**

"Dissemination of Cleaner Production Tool In the Brazilian Public Universities" - Presenter: Flávia pinheiro Faria (UFRJ)

"Challenges in the integrated management of health and the environment: the case of a university campus" - Presenter: Miranda, Zoraide Amarante I. (SENAC)

"The Function of the University and the Cleaner Production as generating of innovation in Local Productive Arrangement - Furniture Sector" - Presenter: Marzely Gorges Farias (UDESC)



Dissemination of Cleaner Production Tool in the Brazilian Public Universities

Flávia Pinheiro Faria e Elen B. A. V. Pacheco

Universidade Federal do Rio de Janeiro, Instituto de Macromoléculas Professora Eloisa Mano (IMA/UFRJ)

Caixa Postal 68525, 21945-970 - Rio de Janeiro, RJ – Brasil - flaviapf@ima.ufrj.br e elen@ima.ufrj.br

The chemical industry can be considered one of the most responsible for dispersion of toxic substances in the environment, due to nature and to the amount of residues generated along its productive processes. It is not enough to attenuate and control the pollutants of this industry, but prevent or minimize their generating source. Cleaner Production (CP) is a good tool for environment management, mainly in small and medium-sized companies which are the majority in Brazil, and it is considered an option for economical and environmental benefits, which can be tangibles and intangibles. Case studies in the industrial sector are being carried out by universities or governmental institutions, observing that independently of the branch of performance of the companies, the chemical processes are the ones that receive greater attention. A bibliographical research was done to verify the dissemination of the concept of CP in Brazilian universities through academic works. These studies showed that entrepreneurs' awareness have been improved in relation to the environmental preservation. The digital libraries of the public universities were accessed, concluding that Rio Grande do Sul, Santa Catarina and Bahia states concentrated 63% of the documents found up to 2006. The majority case studies were developed in chemical companies and they were from master dissertations.

Keywords: Cleaner Production, chemical industry, Brazilian universities, case studies



Challenges in the integrated management of health and the environment: the case of a university campus

MIRANDA, Zoraide Amarante I.

*Coordenadora – SGA - Centro Universitário Senac – 01/08/2007
zoraide.amiranda@sp.senac.br*

In this article we can see the experience of the implantation and certification of an Environment Management System in a different atmosphere from the usual undertakers atmosphere. This is the Santo Amaro Campus of the SENAC University Center, settled in an area of approximately 120 thousand square meters, which has 21 undergraduate courses and 7 graduate, in the health and environment areas, fashion and art, hotel management and tourism, exact sciences and design. Almost 4.000 people, among pupils, employees and teachers, 1/4 of this total is renewed during the year, this fact brings an additional difficulty to be certain that there will be a good level of participation and knowledge of these people.

The Ecoefficiency Program was created by SENAC/SP in 2002, with the purpose of committing all its 60 units to the environment, beyond its formal obligations of attending legal rules. 2005 was the beginning of the implantation of the SGA of the Campus, with the direct participation of 14 people, among directors, employees, teachers and pupils. In December of 2006 the campus concluded an exhaustive and well succeeded process of audit, as a way to guarantee its adjustment to the settled rules. The examined case presents peculiarities and changes relative to the usual processes of implementation and certification of environment management systems which are identified and discussed in this article. It is detachable that the adopted model anticipates 3 certification levels, with the purpose and growing, complexity, attending to a NBR ISO 14001:2004, and incorporating components of health and occupational security, creating an integrated management system.

It was decided that to begin the certification process at once required the level II, because of the complexity of its activities and by the necessity to incorporate the participation of the pupils to give credibility to the SGA.

Keywords: environment management, auditing, certification.



The Function of the University and the Cleaner Production as generating of innovation in Local Productive Arrangement - Furniture Sector

Marzely Gorges Farias ^a, Arlindo Carvalho Rocha^b, and Maria Julia Leite Hulmann^c

a. Universidade do Estado de Santa Catarina, Santa Catarina, marzely@sbs.udesc.br

b Universidade do Estado de Santa Catarina, Santa Catarina, e2acr@udesc.br

c. Universidade do Estado de Santa Catarina, Santa Catarina, maju_leite@yahoo.com.br

This article has as objective to demonstrate the importance and the results of the process of integration of the University of the State of Santa Catarina with the governmental issues, the business sectors and the society - in special, by means of the companies nets called "Local Productive Arrangements", in the advances of the use of the concept in the education of the cleaner production for the endorsement of the Sustainable Regional Development.

Keywords: Sustainable development, local productive arrangement, cleaner production, Furniture Sector, innovation



13h30-14h30**21st November 2007****Sessão 4A
Sala 3**

"Practice and Procedures in Agroecology" - Presenter: Leitão, M. R. F. A, (UFRPE)

"Instruments for environmental management in Espírito Santo do Pinhal, SP" - Presenter: Amires Antenesca Fusco da Silva (Geosystec)

"Urbanistic-Environmental Regularization of Anthropic Occupation in Water Source Protection Area of the Billings dam: A Public Policy Proposal" - Presenter: Luiz C. Ribas (UNESP)



Practice and Procedures in Agroecology

Leitão, M^a R. F. A^a, Silva, E. de S^b.

^a Universidade Federal Rural de Pernambuco (UFRPE), rosario@dlch.ufrpe.br, PhD in 'Estudios Iberoamericanos por la Universidad Complutense de Madrid'

^b Agronomist, specialized in Rural Family Agriculture and Education/UFRPE – works at the NGO 'Casa da Mulher do Nordeste', edvanciasouzasilva@hotmail.com

All the data for this article have been collected and organized during the specialization course in Rural Family Agriculture and Education offered by 19 Universities in Brazil. In this course, the student Edvânia de Souza Silva wrote, under my supervision, the thesis 'Formation for the Transition of Conventional Agriculture to Agroecologic Agriculture: The case of the diffusing family of Pajeú Mirim-Tabira/PE. Our research environment is the community of Pajeú Mirim, located 18 km away from its main city of Tabira. From the gathered data and debates developed there, we produced this article in order to raise thoughts about the speeches and practices built through our research process. Our main proposal is to contribute to the formation of a new professional in the family agriculture scenario in the countryside of the Pernambuco State. Thus, we gave priority to the learning experience of techniques, methodologies and acquaintance among the 'true authors' of this history - the agriculturists - in a way to develop actions together, therefore contributing to the formation and understanding of the current transition from a conventional agriculture to a process based on agroecology. To achieve that, we focused on the use of different alternatives to help in the production system recovery, managing plagues and diseases with natural defenses, rational use of water through an irrigation system by micron-aspersion and dripping. Our main research question relates to the agriculture scenario in the countryside that involves less diversification and lack of hydric infrastructure. In areas for agricultural production, families who own lands nearby the dam of 'Brotas' and the Pajeú river, plant fruits and vegetables using agrochemicals. In such manner, the debate on economical and environmental sustainability raises questions about changing the current planting culture to an agrochemical-free environment. Our methodology was based on the community needs and demands, considering the importance of theoretical approach for the farmers. Hence, the following activities were carried through: - Mobilization within community reunions, for a better interaction between agriculturists and researchers so they could preview and understand their own problems and demands; - Informal interviews with people from the community; - Trainings related to the negative impact of agrochemicals usage; - Trainings related to agroecologic alternatives as a preparation for the natural defenses in the handling of plagues and diseases; - Experience and knowledge exchange between agriculturists and researchers. Our research sample consisted of three families with a certain level of awareness, following these criteria: to have access to their own water in their properties, which is an important requirement for proper production. That was possible because the families are located near the Pajeú river.

Keywords: agroecologic, economical and environmental sustainability, natural defenses, rural Family agriculture and education



Instruments for environmental management in Espírito Santo do Pinhal, SP

Amires Antenesca Fusco da Silva ^a, Adriana Cavallieri Sais ^b, Aulus Roberto Romão Bineli ^c

a. Geosystec, Espírito Santo do Pinhal, antenesca@hotmail.com

b. Geosystec, Espírito Santo do Pinhal, acsais@geosystec.com.br

c. Geosystec, Espírito Santo do Pinhal, aulusrrb@terra.com.br

From the facts and trends, the high rate of urbanization, the increasing problems of environment and the reduced capacity of the municipal government to solve these problems, take the necessity to create instruments for environmental management, which will assist the change for a sustainable society. Actions that embody the reforestation of the riparian forest, the forestation of streets and squares, the recovery of degraded areas and the environmental education are being developed to strengthen the city of Espírito Santo do Pinhal, SP, Brazil.

Therefore, this paper intends to show the viability of these solutions in such away of the ambient point of view, as economic and social, and at the same time, to use activities in the scope of the Clean Development Mechanism to promote the sustainable development local.

Keywords: environmental education; management; reforestation; riparian forest; urban forestation.



Urbanistic-Environmental Regularization of Anthropic Occupation in Water Source Protection Area of the Billings dam: A Public Policy Proposal

Luiz C. Ribas ^a, Rodrigo T. F. Cagini ^b

a. Doctor Assistant Professor of Universidade Estadual Paulista, Botucatu, icribas@fca.unesp.br

b. Student of the 4th graduation year in Forest Engineering of the Universidade Estadual Paulista, Botucatu, rodrigocagini@hotmail.com

Properties located in water source protection areas, in spite of the severe restrictions and expressive environmental attributes (multiple usages of water, as an example of the public supply of water in the metropolitan region of the City of São Paulo), are several times object of (precarious and generalized) irregular anthropic occupations for housing purposes. In this study, an area around the Billings dam was analyzed, where in 1996, occurred a deforesting for the irregular implementation of land parceling. Once occupied, the reversal of the environmental and urbanistic impacts of such areas of water source protection is somewhat complex, difficult, time consuming and practically unfeasible. Any way, attempts were made with this purpose (demolition of constructions, payment of indemnities and the integral undoing of the land parceling with the environmental recovery of the impacted area) without reaching a final and satisfactory success (demolition request was refused by the Judge, although the owners had been prohibited to continue the sale of land lots). At the end, this legal adjudication did not come into effect and, in addition, not only streets were opened but also additional deforesting, land locations were identified and the area was even fenced. The unique alternative was its urbanistic-environmental regularization. The Department of Metropolitan Ground Usage, of the Environment State Department, submitted technical guidelines for regulation of the area (areas for Transportation System, Green Areas and Institutional Area were defined among others) however, the owners have applied for an appeal, postponing the regularization process. New technical inspections were undertaken and the environmental problems increased. The number of technical recommendations also increased for regulation of the area (minimum size of the land lots and submittal of technical projects covering the land parceling). The present study tried to indicate guidelines aiming at a public policy for urbanistic and environmental regulation of similar cases as well as the elimination of urbanistic and environmental liabilities already accumulated in the Billings dam water source protection area (creation of spaces that establish recreation and environmental education areas, basic sanity system, enhancement in life quality, in water quality and dwelling quality, facilities - removable - that can provide support to eventual cultural and sports events, prioritization of the irregular occupation adaptation, prevention and correction of erosive processes, incentive to eventual remaining farming activities, fomenting the practice of organic agriculture, public access to the dam, among others). Environmental compensation measures were also suggested (as an alternative to the indemnifying scope of the Department of Justice of the State of São Paulo, such as for example, donation to the Public Institutions of land located in Areas with Occupation Restriction, of other areas indicated by the authorities as priorities to assure preservation of the water source, creation of a Conservation Unity and/or environmental recovery of areas located in the Billings hydrographic basin).

Keywords: Occupation, anthropic, irregular, Water Source Protection Area, Billings dam, urbanistic-environmental regularization.



13h30-14h30**21st November 2007****Sessão 4A
Sala 4**

"The Water Reuse at the context of the Industrial Ecology" -
Presenter: Fabíola Maria Gonçalves Ribeiro (UNICAMP)

"Performance Assessment of a UASB Reactor of an Industrial
Wastewater Treatment Plant" - Presenter: B. I. Silveira (UFPA)

" Case Study of Domestic Effluent of Treatment Systems with
the Use of Environmental Index " - Presenter: Silva, C.C (USP)



The Water Reuse at the context of the Industrial Ecology

Fabiola Maria Gonçalves Ribeiro ^a and Alcir Vilela Junior^b

*a. Universidade Estadual de Campinas, Campinas/SP,
fabiolamaria@msn.com*

*b. Universidade Estadual de Campinas, Campinas/SP,
alvila@uol.com.br*

The water reuse, which is practiced individually for the many industries, has limitation when it demands advanced treatment techniques, and produces residues which are difficult to dispose. At the context of the Industrial Ecology the reuse may have the possibility of enlarging the application, in doing so, the effluent from one industry can be used directly by another or by adopting a treatment process less sophisticated and compatible with the receiver's necessities.

Keywords: Industrial Ecology; Industrial Symbiosis; Water Reuse.



Performance Assessment of a UASB Reactor of an Industrial Wastewater Treatment Plant

B. I. Silveira ^a, M. S. Penafort ^b, C. D. L. Alves ^c

^a Faculdade de Engenharia Química, Universidade Federal do Pará, inacio@ufpa.br.

^b Faculdade de Engenharia Química, Universidade Federal do Pará, menyklen@click21.com.br

^c Faculdade de Engenharia Química, Universidade Federal do Pará, charles_denys@yahoo.com.br

Wastewaters of beverage industries are rich in carbohydrates, easily biodegradable, and with low suspended solids content. A UASB reactor, characterized by flocculated, compact and decantable granules of methanogenic sludge, has high degradation rate, and is adequate to treat effluents with these characteristics. This work was developed with the main objective of evaluating a UASB reactor performance used as part of an industrial wastewater treatment plant of a beverage industry of medium size. The reactor was monitored by a period of sixty nine days, being evaluated the physiochemical properties of the influent and effluent and the results were expressed as efficiency of the reactor in the COD removal. The results showed that COD in the inlet of the reactor varied between 700 and 2450 mg/L, with an average value of 1520 mg/L and in the exit varied between 12 and 115 mg/L, with an average value of 66 mg/L. The oscillations in the inlet were due to the changes of the organic load of the influent and in the exit it was a function of the reactor efficiency. The pH was evaluated in five point of the reactor content and the averages of these values varied from 6.4 to 6.9, within the range that the methanogenic bacteria have good performance, between 6.0 and 8.0. The temperature within the reactor varied from 28 °C to 31 °C, with an average value equal to 30.4 °C. These data evidenced that the UASB reactor operated in the mesophilic range, between 25 and 40 °C, and close to the range that is observed the best results of the COD removal efficiency, from 28 °C to 34 °C. The values of the COD removal efficiency varied from 90.8 to 98.9%, with an average value of 95.5%. From these results it can be concluded that the pH and temperature stability of the reactor content was decisive in the maintenance of the high efficiency in the COD removal of the system, and that the UASB reactor performance during the monitored period was highly satisfactory in terms of sustainability of an anaerobic treatment system.

Keywords: Wastewater, Efficiency, UASB, COD, Anaerobic treatment.



Case Study of Domestic Effluent of Treatment Systems with the Use of Environmental Index

Silva, C.C.^a, Almeida, C.M.V.B.^b, Bonilla, S.H.^c

a. Universidade de São Paulo, São Paulo, cezaradts@gmail.com

b. Universidade Paulista, São Paulo, cmvba@unip.br

c. Universidade Paulista, São Paulo, bonilla@unip.br

This work presents the results obtained on the energy account of domiciliary effluent treatment systems' comparison. Two systems were compared: the first one uses a Biodigestion system installed at Comunidade Independência in Petrópolis, Rio de Janeiro. The second operates with an Activated Sludge system on the Effluent Treatment Station-Campo Galvão in Guaratinguetá, São Paulo. The indicators were splitted in four groups. The traditional indicators proposed by ODUM (1966) are in the first group; on the second there are the performance indicators, that are specific to evaluate the sludge treatment. On the third and fourth groups the systems were evaluated using indicators that establish a relation between Energy and the Ecological Footprint. In these latter groups, it was possible to compare the resources' use of both systems and to evaluate the scope of the indicator. From the first group's study, that considers the workforce and the brazilian electrical renew abilities, it's possible to infer that the Biodigestion system is the best one. The performance indicators for sludge treatment systems indicate that the biodigestion system is more efficient that the activated sludge system to reduce the same amount of OBD. The indicators from third and fourth groups showed that the Activated Sludge's Ecological Footprint in 400 times bigger than the biodigestor's for each m³ of treated sludge.

Keywords: Energy, Effluent, Activated Sludge, Biodigestor, Environmental Indicators.



13h30-14h30**21st November 2007****Sessão 4A
Sala 5**

"Cleaner Production on Bakeries: Perspectives and Opportunities" - Presenter: Erly M. M. A. Nóbrega (CEPIS)

"Simulation of the Use of the Methodology of Cleaner Production for the Minimization of the Emission of Organic Volatile Products in the Printing Sector of a Graphical Industry" - Presenter: Maria Bernadete Pinto dos Santos (UFF)

"Evaluation of the Environmental Management System at Industry of Leather" - Presenter: Charles Schimunek (UNISC)



Cleaner Production on Bakeries: Perspectives and Oportunities

Eryl M. M. A. Nóbrega^a, Thalita Christina Brandão Pereira^b, Christian Buser^c,
Alessandra Farias Formiga Queiroga^d, Ester Pires de Almeida^e, Luhana Reis
Porto^f

*CEPIS – Centro de Produção Industrial Sustentável, Campina Grande,
erlyl@sebraepb.com.br.*

*c. Universidade de Ciências Aplicadas do Noroeste da Suíça, Bern,
christian.buser@fhnw.ch*

The relationship between mankind and nature has suffered many mutations a long of the years, leaving different marks in the landscape with different effects. Among these marks, one can emphasise the desertification process which is caused by predatory anthropic actions and the exploitation of natural resources in very fragile environments, generating desert-like areas which affect, as a result, the life quality of thousands of people in the entire world. In the State of Paraíba, firewood is nearly disappearing and is becoming rare for it has been used in an unplanned and random way by many industries. The intense use of firewood in the State of Paraíba justifies and motivates CEPIS – Centro de Produção Industrial Sustentável (Centre of Sustainable Industrial Production) which is an action of SEBRAE-PB and the State Secretariat for Economic Affairs of Switzerland (SECO), and is technically supported by the University of Applied Sciences of Northwestern Switzerland (Fachhochschule Nordwestschweiz). CEPIS aims at taking C+P actions in the bakery sector in order to reduce the environmental impacts through the rationale use of energetic resources and through the optimization of the productive process. The main goal of the project is to identify opportunities to improve the productive process of bakeries, applying the Cleaner Production Methodology. To achieve this goal, data is collected (Quickscan), the results are analysed (EcoInspector), there is a discussion and identification of potential opportunities of improvements, and suggestions of Cleaner Production are raised. After analysing the obtained results, it is observed that the identified options may be considered the first step to find feasible Cleaner Production solutions, However, it is important to emphasize that some options such as good housekeeping practices may be identified and implemented straight away to bring economic and environmental benefits to the company in a short time.

Keywords: Bakeries, Cleaner Production, Wood and Energetic Efficiency.



Simulation of the Use of the Methodology of Cleaner Production for the Minimization of the Emission of Organic Volatile Products in the Printing Sector of a Graphical Industry

Maria Bernadete Pinto dos Santos e Fátima de Paiva Canesin

a. Universidade Federal fluminense, Niterói, Rio de Janeiro. berna@vm.uff.br, macanesin@yahoo.com.br

The main purpose of this essay was to simulate the application of the methodology of Cleaner Production in the printing sector of a Graphic Industry, located at Rio de Janeiro, Brasil, for the minimization of the emission of organic volatile products. The Cleaner Production program was implemented during a 6 months period, consisting of phases and steps which were established by UNEP. The present study used data of the production of Folder/Sheets, color 1/0, size A4, with a production of 25000 sheets, three times a week, using an Aurélia 500 Bi printer. Environmental diagnosis of the process showed several opportunities of improvement by changing technology and substituting the row materials. A mass balance simulation showed significant reductions in emissions of volatile organic products (90%). The obstacles found within this study were based on lack of budgetary forecast implementation of these changes; an organizational culture not fully directed toward the efficient use of the resources and the difficulty in implantation of projects that generate expenditure increase.

Keywords: Cleaner Production, Graphic, Atmosphere Emissions.



Evaluation of the Environmental Management System at Industry of Leather

Paulo Cesar Setter ^a, Charles Schimuneck ^b e Jorge André R. Moraes ^c

^a Universidade de Santa Cruz do Sul, Santa Cruz do Sul-RS,

paulocesar.setter@clariant.com

charles_schimuneck@yahoo.com.br

jorge@unisc.br

The present study of case it searched to evaluate a system of ambient management of a company of the leader sector of the city of New Hamburg, where the productive process of this company was analyzed, since the arrival of leathers and chemical products until the adjusted final destination of each residue generated in the process. This study it was based on method GAIA considered for Leripio (2000), being that the company already adopts an ambient management in its processes, what facilitated to the analysis and interpretations of the questions for the involved staff with the research.

Keywords: evaluation of impacts, ambient management, leather



13h30-14h30**21st November 2007****Sessão 4A
Sala 6**

"Sustainable Development and Utilization of coal-fired power plant residues" - Presenter: Juliana C. Izidoro (IPEN)

"Sludge Composting" - Presenter: Hidejal Santos (Rhodia)

"Waste Zero - 3 R" - Presenter: José Faria Moraes (Rhodia)



Sustainable Development and Utilization of coal-fired power plant residues

Denise A. Fungaro ^a, Juliana C. Izidoro ^a, and Anderson O. Andrade ^a

a. Instituto de Pesquisas Energéticas e Nucleares, São Paulo, dfungaro@ipen.br, julianaizidoro@yahoo.com.br, oandrade@ipen.br

The combustion of high ash content coals promotes a serious environmental problem in southern Brazil. It is in the south, in the States of Rio Grande do Sul, Santa Catarina and Paraná, that the coal mines coal-fired power plants are located. The States of Rio Grande do Sul and Santa Catarina show areas that are already environmentally degraded with the resulting contamination of both surface and ground waters.

Brazilian coals are characterized, among others things, for very high ash content ranging between 45 and 60%. This represents 4.0×10^6 tons/year of ashes produced in 2005. Most of these ashes are deposited randomly in landfills and has contributed to the deterioration of the surrounding environment. Since just 30% of that total is commercialized for the production of building materials (bricks, blocks, cement), it is necessary to search for new alternative uses for this abundant residues and give a high added-value to coal ash.

The Brazilian coal ashes consist, basically, of aluminosilicate with high silicon and aluminium oxide contents. Depending on its origin, the iron oxide contents can vary over a wide range. Since coal ashes are composed of a large amount of silica e alumina and also due to a low ratio $\text{SiO}_2/\text{Al}_2\text{O}_3$, they can be converted into zeolite by alkaline hydrothermal activation. Various types of zeolites can be obtained by changing the source of ashes or activation parameters. The zeolitic material obtained contains a non-converted part of coal ash and the zeolite content in the conversion product varies as a function of the coal ash properties and the conditions selected. The optimization of synthesis studied was specific for Brazilian coal ashes.

Zeolites have uniform pore sizes and large surface area that make them very useful materials for a wide range of applications such as ion exchange, molecular sieves, adsorbents and catalysts.

The coal ash samples were obtained from a coal-fired power plant located in Figueira county, in the North of Paraná State, Brazil. The utilization of synthetic zeolites as adsorbent for the treatment of the electroplating effluents, immobilization of heavy metals in soil, decontamination of actual acid mine drainage and removal of dye from aqueous solution has been evaluated. The results obtained in the project showed a great reduction in the pollutant concentration in treated waters and soil and demonstrated the high potential of the zeolites synthesized from Brazilian coal ashes as low-cost adsorbent material.

The production of synthetic zeolites from coal ashes constitutes an alternative and noble use for a residue that has historically contributed for the degradation of large areas located in the Brazil. The environmentally-friendly use of coal ash is important from the viewpoints of energy, economy and environmental strategy in order to realize the concept of sustainable development.

Key words: zeolite; coal ashes; low-cost adsorbent



Sludge Composting

Anivalte Freiria^a, Hidejal Santos^b,

*a. Rhodia Poliamida Especialidades LTDA,
anivalte.freiria@br.rhodia.com*

*b. Rhodia Poliamida Especialidades LTDA,
hidejal.santos@br.rhodia.com*

The productive units of Rhodia were spending more than 1,26 Million of Euros to incinerate 6.000 tons of sludge from the wastewater treatment system. Because the high percentage of humidity and the strong odour of the sludge, its manipulation and transportation was very complex and expensive.

After Studies, the compositing was chosen as solution, because it presented the best cost-benefit.

The development of the technology was a result from a partnership between Rhodia and Best Service Consulting, and was realized from 2000 to 2003, when it was started.

Keywords: sludge, compositing, ETE



Waste Zero – 3 R

José Faria Moraes^a, Nelson Aquino^b, Renato Ferreira^c, Tadeu Varella^d

- a. Rhodia Poliamida Especialidades LTDA, jose.faria@br.rhodia.com
b. Rhodia Poliamida Especialidades LTDA, nelson.aquino@br.rhodia.com
c. Rhodia Poliamida Especialidades LTDA, renato.ferreira@br.rhodia.com
d. Rhodia Poliamida Especialidades LTDA, tadeu.varella@br.rhodia.com
-

This project was initiated in 1989, when all the amount of consumed water from Rhodia was provided by the public system or artesian wells. These artesian wells had a low capacity of supply and the constant raise in the costs of the public water service were important limiting facts to the industrial activities.

A group of work was created to solve this problem. The group aimed three central goals:

- Reduce
- Reuse
- Recycle

The specific goals were:

- Reduce the volume, variability and contamination of effluent
- Use clean technologies
- Improvements in the collection system

The general goal of the project was to find the best possible interaction between profit, investments and environment.

Keywords: reuse, recycle, ultrafiltration, waste



21st November 2007

14h30-16h Conference

**Oswaldo Luiz Gonçalves
Quelhas**

Associated Professor of
Universidade Federal Fluminense
President of ABEPRO - Brazilian
Production Engineering Association

**"Reflections on CP
development in Brazil and the
Production Engineering
actions"**



Reflections on CP development in Brazil and the Production Engineering actions

Osvaldo Luiz Gonçalves Quelhas

Associated Professor of Universidade Federal Fluminense
President of ABEPRO - Brazilian Production Engineering Association

Over the years, the evolution of environmental awareness is improving practices of corporate governance. Driven by the requirements of government, society and the production chain, organizations are adapting to search for sustainability in their business. The Cleaner Production methodology, created by UNIDO/UNEP in 1989, is gaining strength in this direction, allowing the implementation of sustainable practices in micro and small enterprises. Providing preventive practices, Cleaner Production fosters innovation, adding tangible and intangible benefits, and generating competitiveness and profitability for companies.

Performance in Production Engineering needs to focus on Skills considering a broader view of business competitiveness facing services, and according to the principles of sustainable development of the internal and external organizations' requirements.

Development

Due to major environmental disasters and to the pressure of the interested parts, the concept of managing the quality has been enhanced in recent decades. In 1960, the control was achieved through pure and simple inspection of the final product. Then, this concept was a purely statistical control where techniques of products sampling were used; in a third phase, called quality assurance. All functions of the company



were designed as part of the success-failure in the search of quality. In the current concept, the quality is treated as a strategic function of the organization and known as TQM (Total Quality Management). The implementation of management practices is directly related to the improvement of procedures regarding customer satisfaction.

Environmental issues were incorporated in the organizations management since February 12, 1988, with the Law nº 9605 - Law of Environmental Crimes, which "provides for criminal and administrative penalties derived from activities detrimental to the environment". The environment gained companies, regulators and control organs respect, especially their leaders, who felt "encouraged" by this law to value the environment, answering for their acts or omissions.

Given the society mobilization, companies began to internalize environmental issues in their business. Environmental issues are now seen as strategic areas within many companies. In some cases, companies have adopted their own specific strategies.

Currently, the major challenge for companies' executives is to identify the best strategy to maximize environmental opportunities related to their business. Government and financial institutions initiatives are providing good opportunities and benefits to establish environmental and social projects, especially for companies that already have this culture. Therefore, environmental methodologies were created to facilitate the implementation of these strategies, and among others, Cleaner Production is getting success.

Cleaner Production strategies are defined as preventive approaches to products and processes that allow progress through the objective of minimizing the waste; reducing the use of raw materials and energy; maximizing the efficiency of energy consumption and minimizing environmental impacts in



all stages of production and consumption, through changes in the design, production, distribution, consumption and disposal of final products. The methodology is made up of the technical, economical and environmental evaluation of a production process through its detailed analysis and subsequent identification of opportunities, enabling to improve process efficiency. The application of Cleaner Production (CP) methodology shows to businesses that the environmental issues are strategic for competitiveness.

For the success in the implementation of sustainable practices through Cleaner Production, a stage of awareness of the Ecoteam (the project team) is essential. The human being is the driver force of the change. The actions direction is proportional to the degree of knowledge and awareness on the issue under questioning.

In 2005, the Cleaner Production Nucleus of FIRJAN's Department of Environmental Systems assisted 28 companies of various sectors and sizes: 18 micro and small, 4 medium and 6 large companies. The results were condensed into four main groups: reducing the electricity/gas consumption, reducing waste generation, reducing water and raw materials consumption. Results were quite significant and meaningful. The average payback time was about 5 months, with the total economic benefit of more than \$ 2 millions.

These data evidence that Cleaner Production methodology allows changes in the production process conjugating economic growth with environmental preservation, through the creation of technological solutions focused on pollution prevention. For this, investments in machinery and equipment are not enough. It is also necessary to invest in good managerial, planning and training techniques, as people are those who generate innovations with ideas and creativity, providing the competitive differential for businesses.



Conclusion

Organizations under Production Engineering actions need to gain skills for creating macro optimization of production operations from the following:

- Analyzing conjunctural pressures exerted on the Product Design and Organizational Design operations, in the context of two vectors: (1) top-down and bottom-up perspectives within the internal stakeholders and (2) Social Responsibility and Environmental perspectives of market, and the existing reserves of external stakeholders.
- Settling Product Design and Organizational Design operations in the context of a business broader view, through a Systemic View influenced by new competitive and regulatory parameters (carbon emission; image associated with the cleaner production; ecoefficiency and cleaner technologies; operation permissions).
- Defining responsibilities for Product and Organizational Design with respect to the modeling of strategic contexts associated with cleaner technologies and ecoefficiency.
- Establishing models for planning, implementing, controlling and improving Organizational Design operations, and placing the consequences in Product Design.
- Studying the interface between Product Design and Organizational Design operations, in order to refine decision-making process through joint decisions.
- Modeling Organizational Design operations, by setting and balancing supply chains, allied with improved Product Design operations, accordingly to concepts of ecoefficiency, cleaner technology and processes rethinking from the Cleaner Production view.



- Constructing performance indicators matrices for Product Design and Organizational Design operations considering the needs of internal and external stakeholders.
- Thinking the dialogue with parts impacted by the process of business organization, permanently and openly.
- Structuring the governance associated with an ethical nucleus, actuating on impacted parts by its internal and external processes.
- Taking as principles of operational and strategic decisions those associated with sustainable development.



16h30-17h30

21st November 2007

**Sessão 4B
Sala 1**

"Advantages of Cleaner Production Implementation" -
Presenter: Geraldo Oliveira Neto (UNIP)

"Study on Hídrica Economy in a based University Campus in
the principles of Reduction in the Source" - Presenter: Marlos
Ferreira Silva (Uniminas)

"Cleaner Production and Ergonomics: a case of waste
minimization and improvement of work conditions" -
Presenter: Eduardo Concepción Batiz (SOCIESC)



Advantages of Cleaner Production Implementation

A. Osvaldo D. Perretti, B. Nivaldo Palmeri, C. Geraldo Oliveira Neto, D. Rosangela Kronig, E. Prof. Dr. Oduvaldo Vendrametto.

- a. Universidade Paulista, São Paulo, osvaldo.dp@uol.com.br
- b. Universidade Paulista, São Paulo, nivaldoluz@uol.com.br
- c. Universidade Paulista, São Paulo, geraldo.prod@ig.com.br
- d. Universidade Paulista, São Paulo, rkronig@uol.com.br
- e. Univesidade Paulista, São Paulo, oduvaldov@uol.com.br

The increasing ecological awareness, ambient preservation, social justice and concern with the future generations are directly related to the sustainable development of the companies. This article approaches the concept of Cleaner Production organized for activities of production and the positive effect to the environment. Through examples of improvement of packings, applied in a big multinational company installed in Brazil and in a small national industry, it is demonstrated the search for the improvement in its processes and the phases of the production cycle that can adjust the ambiently acceptable criteria

Keywords: Cleaner production, Sustainable Development, Environment.



Study on Hídrica Economy in a based University Campus in the principles of Reduction in the Source

Jorge Wilson Pereira da Silva ^a, Mara Rúbia da Silva ^b, Marlos Ferreira Silva ^c, Rômulo Rondinely Mendes Freitas ^d, and Samuel Batista de Almeida ^e.

a. Uniminas, Uberlândia, jwps@uniminas.br

b. Uniminas, Uberlândia, mararubia@ep.uniminas.br

c. Uniminas, Uberlândia, marlosfs@hotmail.com

d. Uniminas, Uberlândia, romuloengt@yahoo.com.br

e. Uniminas, Uberlândia, batistalmeida1@yahoo.com.br

The objective of the work is quantitatively to identify the sources of water consumption in a university campus characterizing them, and from these surveys to consider measured for reduction of the consumption of these natural resources. In this context they will be proposals action of ambient education involving all the population of the campus. Beyond these actions they will be proposals corrective actions in the direction to perfect the internal processes that use water. The reduction of 30% of the costs caused for the high water consumption inside of the campus expects approximately with this project.

Keywords: University campus, Hídrica Economy, Reduction.



Cleaner Production and Ergonomics: a case of waste minimization and improvement of work conditions

Eduardo Concepción Batiz ^a, Salete Martins Alves ^b, Osnildo Gallo ^c,
Antenor José de Souza ^d

a. Sociedade Educacional de Santa Catarina, Joinville, Santa Catarina,
eduardo.batiz@sociesc.org.br

b. Sociedade Educacional de Santa Catarina, Joinville, Santa Catarina,
salete.martins@sociesc.org.br

c. Sociedade Educacional de Santa Catarina, Joinville, Santa Catarina, galo@sociesc.org.br

d. Whirlpool, Joinville, Santa Catarina, jsantenor@yahoo.com.br

This paper was made in thermal treatment area, in salt bath oven of an enterprise of North of Santa Catarina. Its goal was to determinate the factors that influence to waste generation of salt used in process. It was observed that mean cause of wastefulness is the position which the workers are obligated to adopt due to pre-determinate procedure, as well, the layout and tools used. The impossibility of workers maintains the workpiece draining of salt inside of oven, that due to weight, tool characteristics and the area conditions, causes an additional worker position problem. With direct observation technique, mo, filming, pictures and spaghetti diagram verified that due to layout the workers walk 430 m daily and this is one of the causes of salt quantity that is waster. This quantity is around 2.1 ton/year. With use of ergonomic and cleaner production principles were eliminated the detected problem of worker position, as well the unnecessary passage of workers and workpieces. It was proven the existence of strong synergy between ergonomic and cleaner production. Also both can be applied to improve the environment and to preserve the health, as well, to guarantee the workers safety.

Keywords: Work conditions, Waste minimization, Cleaner production.



16h30-17h30**21st November 2007****Sessão 4B
Sala 2**

"Air Pollution Emissions Trade of State of São Paulo" -
Presenter: Fabricio Dorado Soler (Pedro Pinheiro Advogados)

"Adequacy to environmental law and to economic production:
a study of Missal municipality (PR) - 2005-2007" - Presenter:
Loana Bergamo dos Santos (UTFPR)

"The International Impacts of Environmental Requirements of
the European Union on the Electrical and Electronic Equipment
Sector" - Presenter: Stela Luiza de Mattos Ansanelli (UFRRJ)



Air Pollution Emissions Trade of State of São Paulo

Antonio Fernando Pinheiro Pedro¹, Simone Paschoal Nogueira² e
Fabricio Dorado Soler³

1. Advogado sócio diretor do escritório Pinheiro Pedro Advogados fernando@pinheiropedro.com.br
2. Advogada sócia e coordenadora do Departamento Ambiental do escritório Pinheiro Pedro Advogados, simone@pinheiropedro.com.br
3. Advogado do escritório Pinheiro Pedro Advogados fabricio@pinheiropedro.com.br

The necessity of compatible economic-social development with a minimization increasing effects of the pollution levels, and the degradation of air quality took the Estate of São Paulo to publish Decrees number 48.523/04 and number 50.753/06, "Decrees of Aerial Basin".

Those norms conjugate instruments of command and economic control for environment management of emissions, supporting in strong ness of the market to change the behavior of the industrious.

In this way, sprouting the Atmospheric Emission Reduction Units (CEAR's), like instrument of market which aim to guarantee economic and environment efficiency for the control of the air pollution, stimulating new sources already created to investing in technologies to generate credits and later sell it.

After that, was necessary creating the Paulista Market of Atmospheric Emission (MPEA), aim of this study, which is an environment of negotiation of right to use the credits.

This market now, is in phase of consolidation and is a simplified system, with aim the transmit credibility and transparency to the transference processes of CEAR's, everything according to the environment protection and Brazilian Civil Code.

The Paulista's Atmospheric Emission Market aims the act of captivating founds more efficiently, as the enterpriser decides about the most convenient strategy, investing in the atmospheric polluter emission reduction in the industrial plant or acquiring rights with sellers who produced and detain CEAR's.

Keywords: emission market; aerial basin; economical instruments; atmospheric emission reduction units (CEAR's)



Adequacy to environmental law and to economic production: a study of Missal municipality (PR) - 2005-2007

Fred Leite Siqueira Campos ^a, Patrícia Garcia da Silva Carvalho Mena Gomes ^b, Daniela Mondardo ^c, Karini Somine Fernandes ^d, Loana Bergamo dos Santos ^e

a. Faculdade Anglo-Americano, Foz do Iguaçu, fredlsc@terra.com.br

b. Faculdade Anglo-Americano, Foz do Iguaçu, patricia@mged.net

c. Universidade Federal Tecnológica do Paraná, Medianeira, daniela_mondardo@yahoo.com.br

d. Universidade Federal Tecnológica do Paraná, Medianeira, karini_fernandes@yahoo.com.br

e. Universidade Federal Tecnológica do Paraná, Medianeira, loana_santos@yahoo.com.br

The occupation of the Brazilian territory was always accomplished without planning, causing great damage to the environment. This study intends to compare the economical losses with the adaptation to the environmental legislation (Brazilian Law 4.771, of 15/09/1965), of the realized economic activities in the municipal district of Missal (PR), in the period of 2005-2007, with the earnings of the environmental improvement and the "sale" of quotas of CO₂. After visits to the studied area, the use of GPS and economical calculations and you adapt, it could be concluded that the environmental and economical earnings are larger than the costs associated to the environmental handling.

Keywords: Environmental legislation; Economic production; Missal.



The International Impacts of Environmental Requirements of the European Union on the Electrical and Electronic Equipment Sector

Stela Luiza de Mattos Ansanelli

Universidade Federal Rural do Rio de Janeiro, RJ, stelansa@yahoo.com.br

European Union, concerned about the rise of waste electrical and electronic equipment containing hazardous substances, published two requirements in 2003: directives on waste management (Waste Electrical and Electronic Equipment-WEEE) and the use of hazardous substances (Restriction of the Use of certain Hazardous Substances in Electrical and Electronic Equipment-RoHS). These requirements have caused impact over main countries, in and out European Union, stimulating technological innovation, especially involving replacement of hazardous substances. Developed countries are more ready and have reacted in a more innovative way than the Asian new industrialization countries.

Keywords: RoHS, WEE, environmental policy, innovation



16h30-17h30

21st November 2007

**Sessão 4B
Sala 3**

"Ecodesign Methods focused on Remanufacturing" - Presenter:
Evelyn T. Zanette (USP)

"Reasons for introducing Ecodesign: a case study in the
automotive industry" - Presenter: Miriam Borchardt
(UNISINOS)

"The Environmental Accounting in the Methodology of
Ecodesign: Using Emergy as a Quantitative Measure of the
Evaluation of Environmental Stress. The Case of the PET
Packages." - Presenter: Antônio José Monteiro Rodrigues
(UNIP)



Ecodesign Methods focused on Remanufacturing

Daniela C. A. Pigozzo ^a, Evelyn T. Zanette ^b, Américo Guelere Filho ^c
and Aldo R. Ometto ^d

a. Universidade de São Paulo, São Carlos, daniela.pigooso@gmail.com

b. Universidade de São Paulo, São Carlos, evelyn.zanette@gmail.com

c. Universidade de São Paulo, São Carlos, agf@sc.usp.br

d. Universidade de São Paulo, São Carlos, aometto@sc.usp.br

The consumption and production of products throughout its lifecycle is at the origin of the most pollution and resources depletion that our society causes. The environmental impact at the products' end-of-life can be considerably reduced by the application of remanufacture. Encouraged by environmental legislation, such as the WEEE in Europe, and motivated by aftermarket reasons, the importance of remanufacture industry has increased recently worldwide. Remanufacturing is defined as the transformation of an end-of-life product into a product with an 'as good as new' condition. The remanufacturing process includes several stages, among them product disassembly, cleaning and identification of parts, parts recovery, testing and product re-assembly. To successfully implement remanufacturable products, they should had been designed for this purpose previously. Thus, the initial phases of the product development process must consider the aspects of remanufacturing such as disassembly opportunities, facilities and reverse logistics. The consideration of these aspects can be made by means of Ecodesign, which is a proactive posture of environmental management that, by integrating environmental concern to the product development process, aims to reduce the total environmental impact of products throughout its entire lifecycle, without compromising other important aspects as quality, costs, ergonomics, aesthetics, etc. There are several Ecodesign' methods that focus on the remanufacturing process and can be successfully applied in order to obtain more sustainable products, minimizing its adverse environmental impacts. The aim of this paper is to present some Ecodesign methods which focus on end-of-life strategies, including, among others, remanufacturing. It is important that all end-of-life strategies are related once not all products' components can be remanufactured. Hence other end-of-life strategies, such as recycling and reuse, should be made possible and viable.

Keywords: Ecodesign, Remanufacture, methods.



Reasons for introducing Ecodesign: a case study in the automotive industry

Miriam Borchartd ^a, Leonel A. C. Poltosi ^b, Miguel A. Sellitto ^c and Giancarlo M. Pereira^d

a. UNISINOS, São Leopoldo, miriamb@unisinós.br

b. Leonel Poltosi, São Leopoldo, lpoltosi@gmail.com

c. UNISINOS, São Leopoldo, sellitto@unisinós.br

d. UNISINOS, São Leopoldo, gian@unisinós.br

This paper aims to present a case study in the automotive industry, which object is to identify the reasons for introducing ecodesign techniques. Ecodesign searches for innovative solutions in designing and developing new products, taking into account, at the same time, environmental and economics issues along the life cycle of products, which can contribute for sustainability. The paper presents the research methodology and a review about ecodesign. Then, we describe the findings. The report contains some environmentally accepted practices in the automotive industry, search for the motivation of the company for implementing ecodesign and concludes with the process of implantation, design policies and a preliminary assessment of the results yet yielded. We remark that, for technical difficulty with data basis, the company did not implanted yet the life cycle analysis, which could be made along with the ecodesign. The paper comes to an end with final comments and directions for further research.

Keywords: ecodesign, life cycle analysis, green products, environmental management.



The Environmental Accounting in the Methodology of Ecodesign: Using Emergy as a Quantitative Measure of the Evaluation of Environmental Stress.

The Case of the PET Packages.

Antonio José Monteiro Rodrigues, Biagio F. Giannetti, Cecilia M. V. B. Almeida, Silvia H. Bonilla

Universidade Paulista, São Paulo, antonio.rodrigues@belasartes.br

The present scenery indicates a collapse situation of the natural resources, and there is the need of significant changes of the production and current consumption models reach the sustainable development. Ecodesign comes as an important instrument for the accomplishment of the environmental requirements. Recently, several proposals were presented to aid the designer in the development of more ecological products. These proposals supply general parameters and are not capable to analyze an specific product or process. Searching for new forms of design contribution to the development of sustainable products, the introduction of the environmental accounting in the methodology of product design is proposed, through the use of sustainability indicators. This work aims to present a simplified tool to aid decision-making in the methodology of the design of products in the in the process of materials selection and of industrial processes.

Keywords: Sustainable Development, Ecodesign, Environmental Accounting, Emergy.



16h30-17h30

21st November 2007

**Sessão 4B
Sala 4**

"Cleaner Production Application in a Wood Industry in Amazon State" - Presenter: Bianca G. Pereira (INPA)

"The Influence of Human Labor on the Environmental Sustainability of the Commercial Cultivation of Bamboo" - Presenter: Rodrigo Luiz Guarnetti (UNIP)

"Stakeholder Management and Organizational Sustainability Process: A Brazilian Case Study from Forestry Sector" - Presenter: Mariana Galvão Lyra (FGV)



Cleaner Production Application in a Wood Industry in Amazon State

Bianca G. Pereira ^a, Ivan R. Neto ^b, Kaoru Yuyama ^a,
Hugo G. Pereira ^c e Célio L. P. de Matos ^d

a. Instituto Nacional de Pesquisas da Amazônia, Manaus-Am, bianca@inpa.gov.br e kyuyama@inpa.gov.br

b. Universidade Católica de Brasília, Brasília-DF, ivan@pos.ucb.br

c. Kali-Umwelttechnik GmbH Sondershausen – Alemanha, Hugo.Galucio@k-utec.de
d. Serviço de Apoio às Micro e Pequenas Empresas do Amazonas, Manaus-AM, celio@am.sebrae.com.br

This study shows the proposal of implantation of the Clear Production program (PmaisL) in a company Portela Industry and Commerce of Wood, located in Manaus-Am. Currently, the Portela company, wood floor producer for the external market, operate only with 25% of capacity, because their have difficulties for to acquire more legalized raw material. In current situation view, have been suggested practical of PmaisL with low costs, and Sebrae-AM subsidy at Technological Consulting Program, with economic and Environmental benefits. From the application of PmaisL methods and on the basis of the identified chances, were opted to working with improvement of operational practical in the wood drying sector, for also having a direct relation with the quality control and for being the initial plant process, it is a basic process for the wood improvement. As intervention proposal, was created and used one accompaniment time-table of temperature and humidity that controlling and programmer the best time of drying, to be followed by an employee detached for this function. This measure generated a reduction of four days in the setting time/heater, with reduction of 1,4% in raw material with defect, 50% of water consumption in the heater, 25% of energy consumption, 25% of exploitation of residues in the ovens, diminishing in 25% of pollutant gases emission. Other generated benefits had been: generation of a new job; reduction of risks with burning equipment and accidents caused for the lack control and the time increase of the drier. The good acceptance of the PmaisL by the manager was attributed for any cost for the company, therefore the implemented action was gave for actions changes and insertion of procedures in the tasks application.

Keywords: Environment management, residues reduction in the source, good practical, wood company, Amazon.



The Influence of Human Labor on the Environmental Sustainability of the Commercial Cultivation of Bamboo

R. L. Guarnetti, S. H. Bonilla, C. M. V. B. Almeida, B. F. Giannetti*

*LaFTA, Laboratório de Físico-Química Teórica e Aplicada
Programa de Pós-Graduação em Engenharia de Produção, Universidade Paulista.
R. Dr. Bacelar, 1212, Cep 04026-002, São Paulo, Brasil.*

**Contato: biafgian@unip.br*

The present study uses emergy environmental accounting for cultivation of bamboo with culms* production management, in order to identify the resources which involve the major emergy flows. The most significant resource is the labor input representing about 35% of all emergy value. By using the ternary diagram it was possible to identify significant differences on the environment sustainability value when the cultivation local is modified. This variation is associated with the differences on the transformity values of the labor among the countries.

*Culms: bamboo's stalks that grow up only horizontally and get with the same diameter for all your life.

Keywords: bamboo; ternary diagram; emergy; sustainability



Stakeholder Management and Organizational Sustainability Process: A Brazilian Case Study from Forestry Sector

Mariana Galvão Lyra^a, Ricardo Correa Gomes^b, Laércio Antônio Jacovine^c

a. Fundação Getúlio Vargas, Vitória, mglyra@gmail.com

b. Universidade Federal de Viçosa, Viçosa, ricardo@funarbe.org.br

c. Universidade Federal de Viçosa, Viçosa, jacovine@ufv.br

Sustainability is at the top of the agenda of high impact organizations since ecological concerns have raised the attention of the media..

This paper presents an investigation which has been carried out through a case study with one Brazilian organization at the forestry sector in order to devise viable indicators of sustainable production (ISP) for measuring sustainability and try to generate strategic information for managing the relations with the key-stakeholders.

In this way, we intend to describe each stakeholder involved with the organization focusing on how to manage the relationships with them. Furthermore, we intend to test some ISP in order to figure out whether this specific type of organization can walk toward sustainability.

The theoretical framework comprises three international models: A five levels of ISP tool, a model for identifying the most important stakeholders, and a model for identifying how to manage the relationship with key-stakeholders by threaten or cooperation.

Keywords: Indicators of Sustainable Production. Social Corporate Responsibility. Stakeholder Management. Sustainability.



16h30-17h30**21st November 2007****Sessão 4B
Sala 5**

"Are Sustainability Management Systems (SMS) really promising?" - Presenter: Javier Esquer-Peralta (University of Sonora - Mexico)

"The System for Cleaner Production Innovations Development and Implementation in Industry (APINI - SPIN)" - Presenter: Jurgis Staniskis (Kaunas University of Technology - Lithuania)

"Disrupting the Business of Producing Automobiles: Technologies for Cleaner Production" - Presenter: Clovis Zapata (ESRC BRASS Centre - Cardiff University & University of California - UK)



Are Sustainability Management Systems (SMS) really promising?

Javier Esquer-Peralta ^{a*}, Luis Velazquez ^a, and Nora Munguia ^a

^a *University of Sonora, Industrial Engineering Department.
Blvd. Rosales y Luis Encinas, C.P. 83000. Hermosillo, Sonora, México.
e-mail: javierep@rtn.uson.mx*

The concepts of Sustainable Development (SD) and Management Systems (MS) are finding increasing acceptance in a variety of fields, including academy, politics, and non-governmental organizations. These concepts are also being used by the general population. This paper describes the perception of different experts by discussing about the usefulness of Sustainability Management Systems (SMS) as holistic systems which might integrate environmental, social, and economic elements. Fourteen interviews have been conducted to several experts around the world. Some of them are professional persons in Sustainability issues in general, and some of them in environmental, health and safety (EHS) issues in particular. The results have shown that, although there is a continuous debate on the sustainability approach, several core elements can be addressed through Sustainability Management Systems (SMS).

Keywords: Sustainability Management System (SMS), Performance-based approach, Sustainable Development.



The System for Cleaner Production Innovations Development and Implementation in Industry (APINI – SPIN)

Prof. hab. dr. Jurgis Staniskis^a, Assoc. prof. dr. Zaneta Stasiskiene^a

a. Institute of Environmental Engineering, Kaunas University of Technology, Lithuania justa@ktu.lt; zastas@ktu.lt

Role of industry in the process of sustainable industrial development is obvious. It relates to changes in production processes, products and services aimed at reduction of impact to the environment in the entire life cycle perspective that result in improvement of environmental, economic and social performance of enterprises. To ensure sustainable industrial development, systematic application of the following measures is needed:

- Cleaner production (CP),
- Environmental and integrated management systems,
- Product related measures of sustainable industrial development (e.g. eco-design, life cycle approach),
- Sustainability reporting.

CP should be an essential part of any comprehensive environmental management system at an enterprise or national level. In many cases the adoption of CP improvements can reduce or even eliminate the need for end-of-pipe investments and therefore can have both environmental and economic benefits. Experience shows, that often companies having identified cost-effective and technically-feasible CP options, may still not be able to make necessary CP investment to realise the financial benefits and environmental advantages. Financing of CP projects varies among countries and types of the projects. Domestic and international efforts to strengthen environmental financing still face a number of serious obstacles, many of which are related to profound economic, political and social problems.

In 1997, Institute of Environmental Engineering (APINI) developed a system for CP innovation development / implementation. The system consists of the pool of experts (on CP innovation generation, financial engineering, implementation and monitoring), the financing source – soft credit line at Nordic Environment Finance Corporation (NEFCO) and industrial companies. The system is based on company's material and energy flows, and properly evaluated environmental costs based on Environmental Management Accounting (EMA). The methodologies employed in the system are flexible, can be applied to different company levels and enable decision-maker to obtain information in terms of the intended economic and environmental purposes. The system has been used for development of 141 innovations in 69 Lithuanian industrial companies. These innovations enabled reduction of energy consumption by 30 365 MWh/year. APINI experience was successfully disseminated in Africa, South East Asia, Central America and CEE.

This article presents an overview of activities and experience of APINI in development of CP innovations in industry and lessons learned in terms of strengthening corporate commitment in sustainable development.

Keywords: Cleaner Production, Preventive Innovation, Material and Energy Balance, Environmental Management Accounting, Financing



Disrupting the Business of Producing Automobiles: Technologies for Cleaner Production

Clovis Zapata¹ and Paul Nieuwenhuis²

1 - The ESRC BRASS Centre, Cardiff University and University of California, Davis,
zapatac@cardiff.ac.uk

2- The ESRC BRASS Centre and CAIR, Cardiff University, UK

The concept of innovation has been used in a wide range of contexts and the theoretical development has proven to be extremely valuable to provide important insights into intra-market competition and strategy. The automotive industry offers a fertile terrain for the progress of the uncompleted theory building process of innovation, especially with the introduction of alternative fuels and alternative powertrain technologies. The application of these concepts is fundamental for the sustainability of the entire industry.

This paper will look at the concept of innovation in the context of the modern automotive industry focusing on the notion of regulatory innovation of alternative fuels and alternative powertrain. For the purpose of analysing this issue, special attention will be given to the concepts of radical and incremental innovation, which will be applied to existing alternative fuels and alternative powertrain technologies, including hybrids, biofuels and hydrogen power. The article will explore these three categories looking at representative case studies: the Brazilian ethanol experience with biofuels, the development of the Toyota hybrid vehicle and the technological development of hydrogen fuel cells.

Keywords: Automotive Industry, Alternative Technologies, Innovation, Biofuels, Hybrids, Hydrogen Fuel Cells.



16h30-17h50**21st November 2007****Sessão 4B
Sala 6**

"Experience of Recycled Paper Use in Certification Exams: on the Impacts of Convincing Suppliers to Improve Environmental Management" - Presenter: Luiz Roberto Calado (Rheinischen Friedrich-Wilhelms-Universität - Germany)

"Decrease Environmental Impact in Printed Circuit Board Manufacturing Process" - Presenter: Givaildo Alencar Costa (Tecnol Eletrônica)

"Environmental efficiency as generating factor to enhance productivity - Presentation of the results obtained in a ceramic industry from Ceará State" - Presenter: Rossana B. Silveira (SENAI-CETAE)

"Environmental accounting: the change of zinc plating for organometallic coatings to enhance performance and to minimize emissions" - Presenter: J. F. Faro (UNIP)



Experience of Recycled Paper Use in Certification Exams: on the Impacts of Convincing Suppliers to Improve Environmental Management

Luiz Roberto Calado

Rheinischen Friedrich-Wilhelms-Universität Bonn, Bonn, luizcalado@gmail.com

Paper-Based test application is a field in which environmental sustainability has a long path to improve before reaching desirable standards, especially at the light of techniques such as the Tree Savings Formula, whereby this Organizational Experience Report show a definite example of such statement. This paper presents a case study in which the organization that runs a countrywide test was able to convince the examination manufacturers, thereby increasing the environmental efficiency of the exam at a national scale. This result provides evidence that in persuading the agent responsible for the actual production of the exam's paper copies to use recycled paper the leading organization executive responsible for the test achieved its goal of enhanced sustainability, with several known general benefits.

Keywords: cleaner production, recycled paper, company culture.



Decrease Environmental Impact in Printed Circuit Board Manufacturing Process

Givaildo Alencar Costa

Tecnel Eletrônica Ltda, São Paulo, givaildo@terra.com.br

Due to the huge technological development and globalization phenomenon, Brazilian society was pushed towards new alternatives in order to maintain competitiveness on a global market. One possible alternative is the use of standardization, especially ISO 9000, ISO 14000 and IEC standards. However, Brazilian market is far from the international scenario and that causes several losses on local and global market share. Nonetheless this situation can be reverting by the adoption of Quality as a tool and also providing small changes on the entrepreneurship attitudes. Therefore, that is the most important characteristic of standardization. This report shows preliminary results regarding the benefits acquired with the standardization, for process, project, product, service, etc., if the target is not only economical benefits but also environmental protection. The methodology used was the case study. The process evaluated was Printed circuit board, single-face. The improvements achieved with this case study showed: a) significant environmental impact reduction, with less water and energy consumption; b) process efficiency increase; c) less raw material losses; d) less waste formation. Thus, a standardized process is useful for several stakeholders; it is a way to increase security for stock brokers, clients and society in general. It is clearly a way to increase revenues because it is a way to diminish costs, to improve technological skills and to decrease environmental impact.

Keywords: circuit, PCB, environmental, standards and process.



Environmental efficiency as generating factor to enhance productivity - Presentation of the results obtained in a ceramic industry from Ceará State

Cândido H. A. Bezerra ^a, Josimeire A. Gomes, Ms. ^b, Kassandra M. A. Morais ^c, Irani C. Mattos, Dr. ^d e Rossana B. Silveira Ms. ^e

a. SENAI-CETAE, Fortaleza/Ce, chbezerra@sfiec.org.br

b. Universidade Federal do Ceará, Fortaleza/Ce, josimeireaq@hotmail.com

c. SENAI-CETAE, Fortaleza/Ce, kmmorais@sfiec.org.br

d. Universidade Federal do Ceará, Fortaleza/Ce, ic-mattos@uol.com.br

e. SENAI-CETAE, Fortaleza/Ce, rsbarros@sfiec.org.br

The research was carried through in the *Cajazeiras* Ceramics, industry of the ceramic sector situated in *Cascavel-Ceará*. The main products produced and commercialized for the company are structural blocks of prohibition, flagstone and blocks. The main substance used cousin is the clay. Effluent liquids, solid residues and atmospheric emissions during the productive activities are generated. The solid residues are generated from the loss of materials for defect in the finished product. A production of more than 2500 *milheiros* of blocks damaged per year is esteem. The consumption of water, raw material, energy and of solid residues for product had been defined as indicating ambient with the objective to identify the consumption for produced ceramics block, besides identifying the economic loss generated by wastefulness of blocks damaged in the production. With this analysis some alternatives for *minimização* of the production of residues, effluent had been suggested and emissions inside of the Program of Cleaner Production, such as, Modification in the product, Modification of technology, I reuse and recycling, *Compostagem*, Alterations in the process, among others. From the evaluation of the raised data the company was divided by sectors (preparation, drawing and burn) for identification of chances and/or problems, plan of action and strategies, barriers and necessities, beyond the identification of the priority level. Had the inadequate use of *boquilha* the drawing process of the ceramic blocks presented an index of *retrabalho* verified in up to 30%. With the equipment exchange for *boquilhas* new and balanced a decrease in the index of re-work in 12% was verified, generating one better exploitation of the natural resources and energy and consequently better indices of productivity and prescription. Associated the technological improvement of the equipment exchange of *boquilha*, a survey of impurities was carried through that allowed to the planning of a handling of the extration and preparation of the clay most adequate, allowing the clay entrance in the cleaner productive process of resulted impurities and this form providing better in the production. Through surveys in I lease was evidenced that the use of simple door more generates a consumption of 0,08m³/milheiro of the one than with the use of double doors in the ovens hoffmans. With relation to the ambient improvements it is had: Lesser consumption of firewood for produced part, to the end of one year we will have an area of 36Ha of bushes of *bioma caatinga* that they had not been deforested, considering that 1ha of bush of *bioma caatinga* produces 52m³ of native firewood (given of the FIERN), providing a lesser ambient impact of that the previous a implantation of the Program of Cleaner Production.

Key words: Cleaner production, ambient impact, solid residues, generation of effluent.



Environmental accounting: the change of zinc plating for organometallic coatings to enhance performance and to minimize emissions

J.F. Faro, Antonio José Monteiro Rodrigues, Biagio F. Giannetti,
Cecília M. V. B. Almeida, Silvia H. Bonilla

Universidade Paulista, São Paulo, fernando_faro@hotmail.com

This work evaluates the use of resources by two different surface finishing processes for metallic pieces, using environmental accounting. Organometallic finishing is gradually substituting the traditional electrolytic zinc finishing, as it improves corrosion resistance and diminishes effluent emission. Moreover, organometallic coatings do not use chromium in their composition. Results show that organometallic coatings are environmentally friendlier than zinc coatings.

Keywords: coating, zinc, organometallic, chromium, environmentally friendlier.



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**Conferences
and
Oral Presentations
22nd November 2007**



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"THE ROLE OF CLEANER PRODUCTION IN THE SUSTAINABLE DEVELOPMENT OF MODERN SOCIETIES"

São Paulo - Brazil - November 21-23 - 2007



13h30-14h30

22nd November 2007

**Sessão 5A
Sala 1**

"Additional Step in PET Recycling to Enhance Properties" -
Presenter: Sandro Donnini Mancini (UNESP)

"Ecological Construction a Model for the Sustainable
Development" - Presenter: Rodrigo César Kanning (UTFPR)

"Bottle-to Bottle PET recycling" - Presenter: Alexandre
Formigoni Formigoni (UNESP)



Additional Step in PET Recycling to Enhance Properties

Sandro Donnini Mancini^a, Jonas Age Saide Schwartzman^b, Alex Rodrigues Nogueira^c, Dennis Akira Kagohara^d

a. Universidade Estadual Paulista, Sorocaba-SP, mancini@sorocaba.unesp.br

b Universidade Estadual Paulista, Sorocaba-SP, jonas_unesp@yahoo.com.br

c Universidade Estadual Paulista, Sorocaba-SP, alexrnogueira@yahoo.com.br

d. Universidade Estadual Paulista, Sorocaba-SP, dennao_unesp@yahoo.com.br

Poly (ethylene terephthalate) –PET– recycling usually involves grinding, washing, drying and reprocessing. This study presents the results of an extra step in PET recycling: a chemical washing after the conventional one, aiming the production of more valuable recycled polymers. Oil PET bottles flakes were washed only with water and then submitted to reaction with aqueous solution of sodium hydroxide 5M at 90°C for 10 minutes (chemical washing). After rinsing and drying, the flakes were characterized by thermogravimetric and elemental analysis tests. The results indicated a higher purity of the chemical washed material in comparison with PET washed only with water: 99,3% and 96,7%, respectively.

Keywords: recycling, PET, washing.



Ecological Construction a Model for the Sustainable Development

Rodrigo César Kanning ^a, Ely Costa Cardona de Aguiar ^b

a. Universidade Tecnológica Federal do Paraná, Curitiba, rckanning@yahoo.com.br

b. Universidade Tecnológica Federal do Paraná, Curitiba, cardona@utfpr.edu.br

The materials that constitute the urban garbage, the home deficit, the raised consumption of natural resources and generation of residues for the civil construction are subjects of great importance and concern for all the nations. The project Unit Knowledge is presented as a proposal to minimize these problems, therefore the EPS (styropor), the plastic bottles PET, tire and bombonas beyond reducing the use of natural resources as the sand and the crushed rock, propitiates not the use of the nesting mortar, supplies to raw materials the production of blocks and mortar, reducing the volume of the garbage to be made use; it has low cost of production and under orientation technique they allow to the living futures the execution of the units in reduced time.

Keywords: Unit knowledge, ISOPET, EPS, bottles PET, tire



Bottle-to Bottle PET recycling

Alexandre Formigoni Formigoni^a, Ivan Pêrsio de Arruda Campos^b

a. UNESP – Campus Guaratinguetá, SP, a_formigoni@yahoo.com.br

b. Universidade Paulista, São Paulo, ipdacamp@uol.com.br

Population growth and the continued incentive to consumption of discardable industrial products has led nowadays to a non-stop growing of the amount and the diversity of the urban waste. The option to just dispose of industrial, commercial and home waste in landfill sites has led to their near saturation. Employment of these residues as raw materials has been adopted as a solution to this problem, but is young as an activity and thus, still not recognized as the best alternative. In the present dissertation a critical analysis of the problems posed by the bottle-to-bottle recycling of PET, for use in the food industry, in the general context of PET recycling is presented. The loss and recovery of the desired material properties, chemical and biological contaminations are discussed herein, as well as the fundamental question what the law about it is nowadays, and why, and how it might be better formulated. At this point in time, the Brazilian market recycles *ca.* 50% of the total produced PET, and this means that there is still potential for a lot to be done in what regards to PET recycling.

Keywords: Recycling; environmental impact; PET; bottle to bottle.



13h30-14h30**22nd November 2007****Sessão 5A
Sala 2**

"The Development of Cleaner Production Actions Through an International Agreement Sealed Between Brazil And Switzerland" - Presenter: João Batista de Freitas (UFPB)

"Sustainable Logistic: An Amplified Concept in behalf of Sustainable Development" - Presenter: Eliane Martinez Mota Fukunaga (SENAC)

"Analysis of the Influence of Evaporation Temperature and Condensation Pressure, at the Coefficient of Effectiveness of an Absorption Cycle Designed to Produce Ideals Conditions to Store Fishes Using as a Hot Source the Heat from Burned Biomass" - Presenter: Carvalho. Paulo Sergio G. (UNIP)



The Development of Cleaner Production Actions Through an International Agreement Sealed Between Brazil And Switzerland

Joao Batista de Freitas ^a, Ivani Costa ^b, Marcio Luiz de Almeida ^c and Jailma Araújo dos Santos ^d

- a. Universidade Federal da Paraiba, Paraiba, joaosousa@oi.com.br*
b. Universidade Federal da Paraiba, Paraiba, ivani@pb.sebrae.com.br
c. Universidade Federal da Paraiba, Paraiba, bonfogoventura@hotmail.com
d. Universidade Federal da Paraiba, Paraiba, jailma@pb.sebrae.com.br
-

Search for environment preservation became to be a crucial tool to enterprise that wish to keep in global market. On this context, this article aim to present and discuss the international agreement of technical cooperation and scientific between Swiss Government and SEBRAE-PB, that results in diffusion and implementation of clean technologies. To reach the purpose objective, was done a bibliographic and documental research to explore aspects related with technologies turn to clean production and their relation with sustainable development. Besides, were arise information through technical visits to institution and companies involved with the search to optimizing their productive process by clean production technologies. The utilization of this observation non participant contribute to a better understand with respect to firmed agreement. This agreement represents a value instrument to sustainable development process by the possibility to propitiate to productive agents qualification and advice that contribute to modify rudimental methods utilized that cause on natural resources degradation and environment problems to Paraibano Semi-arid.

Keywords: Clean Production, Environment Management, Social Responsibility



Sustainable Logistic: An Amplified Concept in behalf of Sustainable Development

Eliane Martinez Mota Fukunaga ^a, Marcel Oda ^b.

*a. Centro Universitário Senac – Campus Santo Amaro, São Paulo,
eliane.mota@terra.com.br*

b. Centro Universitário Senac – Campus Santo Amaro, São Paulo, marcel.oda@saint-gobain.com

The Logistics have been essential to reduce costs in service operations those are so important than productive operations. Tools to prevent the production processes impacts such as P+L, it was not enough for requirements related to external logistic. Industries are rethinking their processes but they are affected for negative images caused for carbon emissions of truck wich transport their products, for example. Sustainable Logistic concept it is an inviting to new sectors discuss solutions for sustainable development.

Keywords: social responsibility, logistic, sustainability, transport system.



Analysis of the Influence of Evaporation Temperature and Condensation Pressure, at the Coefficient of Effectiveness of an Absorption Cycle Designed to Produce Ideals Conditions to Store Fishes Using as a Hot Source the Heat from Burned Biomass

Carvalho. Paulo Sergio G.

Universidade Paulista, São Paulo, psgc@uol.com.br

There are many ways of to obtain low temperatures being absorption cycles one of the possibilities. It operates from hot sources and can generate temperatures near -20°C . This article analyses the influence of evaporation temperature and condensation pressure in the coefficient of cooperation performance of a absorption cycle that get energy from a process that burns biomass, and the cycle is projected to be able to store fishes in good condition. In the development of this article, the author user the software named Engineering Equation Solver (E.E.S).

Keywords: refrigeration systems; fish conservation



13h30-14h30**22nd November 2007****Sessão 5A
Sala 3**

"Environmental Impacts Assessment of Biodiesel Production from Soybean in Brazil" - Presenter: Otávio Cavalett (UNICAMP)

"Financial analysis of the substitution of the electric shower for the heater under the optics of the final user" - Presenter: Silva, C.C. (UNIP)

"Sustainability in the Bioenergy Industry" - Presenter: Lopes, José Rafael Nascimento (SENAI)



Environmental Impacts Assessment of Biodiesel Production from Soybean in Brazil

Otávio Cavalett^a; Enrique Ortega^b

a. Universidade Estadual de Campinas, Campinas, otavio@fea.unicamp.br

b. Universidade Estadual de Campinas, Campinas, ortega@fea.unicamp.br

This paper presents the results of the environmental impacts of biodiesel production from soybean in Brazil. For this objective it were used the environmental impact indicators provided by emergy accounting method, the embodied energy analysis and the material flow accounting method. One of the in findings of the study are that energy content in a liter of biodiesel is only 2.3 times greater than the fossil-based energy required to produce it. The transformity of biodiesel ($4.59\text{E}+05$ seJ/J) is higher than those calculated for fossil fuels (coal, $6.70\text{E}+04$ seJ/J; natural gas, $8.04\text{E}+04$ seJ/J; oil $9.05\text{E}+04$ seJ/J; gasoline and diesel, $1.11\text{E}+05$ seJ/J) and also for other biofuels (Ethanol from sugarcane, $3.15\text{E}+05$ seJ/J; Biodiesel from sunflower, $2.31\text{E}+05$ seJ/J) indicating a higher demand for resources. Similarly, the biodiesel emergy yield ratio was only 1.46, while it ranges from 3 to 7 for fossil fuels indicating lower net emergy that is delivered to consumers. When crop production and industrial conversion to fuel are supported by fossil fuels (considered non renewable energy sources) in the form of chemicals, goods, and process energy, the fraction of fuel that is actually renewable is very low (around 25%). In this way, the future of biodiesel production is very likely to be linked to the ability of clustering biofuels production with other agro industrial activities at an appropriate scale and mode of production to take advantage of the potential supply of valuable co-products.

Keywords: Emergy accounting, Energy balance, Material flow accounting, Biodiesel; Soybean.



Financial analysis of the substitution of the electric shower for the heater under the optics of the final user

Silva, C.C.^a, Marques, F.M.R.^b

a. Universidade de São Paulo, São Paulo, cezaradts@gmail.com

b. BSP-Business School, São Paulo, fernando.marques@bsp.edu.br

The natural gas has gained eminence as a multiple-use fuel, and one as the possibilities is its use as substitute of the electrical shower bath. This study aims to financially compare the most common domiciliary water heating systems, from the consumer's view, it means, the instantaneous electrical heating (the electrical shower bath) and the instantaneous gas heating.

Keywords: Electrical Shower Bath; electrical Heating and Gas Heating.



Sustainability in the Bioenergy Industry

Ávila, Salvador Filho ^a, Lopes, José Rafael Nascimento ^b, Torres, Adriana Cazelgrandi^c and Machado, Alexandre dos Santos^d

a. SENAI, Bahia, salvador@fieb.org.br

b. SENAI, Bahia, jrafael@fieb.org.br

c. Universidade Federal do Rio de Janeiro, acazelgrandi@terra.com.br

d. SENAI, Bahia, amachado@fieb.org.br

Cleaner production uses techniques to prevent pollution; reduce the use of energy, water and material resources; and minimise waste, risks and negative environmental impacts in the production process. Then, the introduction of a renewable energy, like biodiesel, involves challenges and uncertainties. The use of those techniques allows organizations analyse systems and activities together with the environment. However, it's necessary a great effort under many points of view to include a new source to produce energy in a country. The Multi-Objective Analysis establishes relationships among the project and its several drivers. It will help and show the best way to follow. This work suggests a methodology that aids the implementation process, fixation and discussion around the biodiesel industry taking into account the aspects economical, social, environmental, technician and ethical.

Keywords: Biodiesel, Multi-Objective Analyze, Sustainability, Cleaner Production.



13h30-14h30**22nd November 2007****Sessão 5A
Sala 4**

"Sustainability tools using as support to Environmental Impact Assessment (EIA) elaboration" - Presenter: Cláudia Viviane Viegas (UFSC)

"Study on the Implementation of Cleaner Production in a Company of Sector of Reinforced Plastic with Fiberglass" - Presenter: Gabriel Sperandio Milan (UCS)

"Environmental sustainability in small enterprises: interactive implementation of cleaner production. Study in an automotive section company" - Presenter: Marlúcio de S. Borges (UNICAMP)



Sustainability tools using as support to Environmental Impact Assessment (EIA) elaboration

Cláudia Viviane Viegas ^a, Paulo Maurício Selig ^b

a. Universidade Federal de Santa Catarina, claudiav@egc.ufsc.br

b. Universidade Federal de Santa Catarina, selig@egc.ufsc.br

Sustainability is a concept based on principles. Environmental Impact Assessment (EIA) are practical kind of projects, settled by law in order to identify, forecast, avoid and/or mitigate potentially harmful effects of enterprise with significant pollution potential. Even arised under sustainability principles, EIA are regarded as fail, mainly in point out technological alternatives and assessment. This paper presents and discusses tools for EIAs elaboration and evaluation proper considered to the sustainability purposes.

Keywords: sustainability, Environmental Impact Assessment, tools.



Study on the Implementation of Cleaner Production in a Company of Sector of Reinforced Plastic with Fiberglass

Gabriel Sperandio Milan ^a, Deise Borges Grazziotin ^b, and Marcos Ricardo Pretto ^c

a. Universidade de Caxias do Sul, Caxias do Sul (RS), gsmilan@ucs.br

b. Universidade de Caxias do Sul, Caxias do Sul (RS), deise@futureutilidades.com.br

c. Universidade de Caxias do Sul, Caxias do Sul (RS), mrppretto@terra.com.br

The demand for a larger social and ecological responsibility, the pressure of the international market and the production costs have been taking the companies to adopt preventive environmental strategies to give them a competitive distinction. In this context, this study intends to contribute for the debate regarding the appearance of a new production model that seems to answer the current needs of the companies in search of a better environmental acting, the model of Cleaner Production. The objective of this work is to evaluate the use of the techniques of Cleaner Production in a company that produces pieces and molds with reinforced plastic with fiberglass, through the adoption of a system of environmental administration that tries to join value to the manufactured products and to minimizing the waste during the industrial process. The residue of the process of manual molding of fiberglass in the company in study is 19,5%. As proposal of reduction of this indicator for 4%, was evaluated the change of the present process molding by RTM Light - Resin Transfer Molding.

Keywords: cleaner production, residues, minimizing of residues, reduction of wastes.



Environmental sustainability in small enterprises: interactive implementation of cleaner production. Study in an automotive section company

Marlúcio de S. Borges^a, Emília Rutkowski^b

a. Universidade Estadual de Campinas-UNICAMP, Campinas, marlucio.borg@uol.com.br

b. Universidade Estadual de Campinas-UNICAMP, Campinas, emilia@fec.unicamp.br

The Brazilian metals sector and, mainly its automotive section, is mostly composed by small enterprises which are exposed to a competitive global demand: permanently improve their environmental quality standard. However, for such enterprises, there is still a meaningful discrepancy in participation as far as self-regulatory environmental management instruments adoption is concerned when compared, for instance, to large companies. Amongst these instruments, the cleaner production stands out as a vigorous environmental management approach based on an integrated platform with a preventive focus. Under this point of view, this study proposes to develop and to apply an interactive cleaner production implementation methodology. This methodology is built by a cleaner production implementation program, especially conceived and created for the small enterprises profile and by a set of questions and answers structurally connected to the phases and activities of such program allowing its interactive implementation as well as increasing value for the human capital, the knowledge and the language in small enterprises.

Keywords: environmental management, prevention, interactive methodology, human capital, cleaner production implementation program



13h30-14h30**22nd November 2007****Sessão 5A
Sala 5**

"Firewood Consume Reduction Trough Cleaner Production: A Red Ceramic case" - Presenter: Erly M. M. A. Nóbrega (CEPIS)

"Development of Pro Active Sustainable Positions in Activities of Ambient Management in Busca of the Profitability. Application and Development of the Concept of Cleaner Production in Company of Casting in the Rio Grande Do Sul." - Presenter: Marcelo Carlotto Nehme (UCS)

"Application of the Methodology of Cleaner Production in the pré-Printing and Printing Phase in the Graphical Industry in the State of the Rio de Janeiro - Brazil" - Presenter: Fátima de Paiva Canesin (UFF)



Firewood Consume Reduction Trough Cleaner Production: A Red Ceramic case.

Alessandra Farias F. Queiroga ^a, Eryl Maria Medeiros de Araújo Nóbrega^b, Ester Pires de Almeida ^c, Luhana Reis Porto^d, Thalita Christina Brandão Pereira^e and Christian Buser^f

a. Centro de Produção Industrial Sustentável, Campina Grande-PB, alessandrafarias@sebraepb.com.br, erly@sebraepb.com.br, ester@sebraepb.com.br, luhana@sebraepb.com.br, thalita@sebraepb.com.br

f. . Universidade de Ciências Aplicadas do Noroeste da Suíça, Bern, christian.buser@fhnw.ch

In some companies, the consumption of firewood is the third highest production cost so that the misuse of this energetic resource may cause many economical and/or environmental losses. With this in mind, a tunnel kiln of a red ceramic manufacturer was analysed through energy and mass balance, which is one of the steps of the Cleaner Production Methodology, in order to optimize the use of this resource and reduce the environmental impacts generated by this fuel. From the assessment of the main inputs and outputs of the company – ‘green’ (unfired) bricks, fired bricks, firewood, energy and gas - it was perceived that there are some opportunities of implementation of options so that companies may achieve economical and environmental benefits such as: heat recovering of the chimney; standardization of the heat distribution in the heated zone, and an increase in the air flow from the cooling area to the firing zone.

Keywords: tunnel kiln, firewood and heat.



Development of Pro Active Sustainable Positions in Activities of Ambient Management in Busca of the Profitability. Application and Development of the Concept of Cleaner Production in Company of Casting in the Rio Grande Do Sul.

Marcelo Carlotto Nehme^a, Carina Quissini^a, Júlio Slovinski^c

a. Universidade de Caxias do Sul, Caxias do Sul, carina.quissini@metalcorte.com, julio.slovinski@metalcorte.com

This article searches to identify sustainable model, developed through a system of ambient management pro-asset, implanted in organization, with polluting potential, that it looks to remain itself competitive, in emergent markets and extremely disputed. To ahead recognize the new positions of these questions and as the organization will be able to extend its participation in the market, as much as for the visibility before the most varied customers, as well as in its adaptations to the costs demanded in this dispute. To detach the importance of the incorporation of the productive chain in the analysis of ambient costs that will be able to as well as increase the value generated for the shareholder being based on not the generation of wastefulnesses and residues in the productive process in the returns come of the one powders-sell and powders-consume.

This article tells to the results gotten with the application of active systems of ambient management pro in company of the branch of casting in the state of the Rio Grande do Sul, where by means of the use of sustainable tools the concepts of PmaisL had been applied.

Keywords: Sustainable Development, cleaner production



Application of the Methodology of Cleaner Production in the pré-Printing and Printing Phase in the Graphical Industry in the State of the Rio de Janeiro – Brazil

Fátima de Paiva Canesin ^a e Maria Bernadete P. dos Santos ^b

*a. Universidade Federal fluminense, Niterói, Rio de Janeiro.
fatimacanesin@yahoo.com.br*

b. Universidade Federal fluminense, Niterói, Rio de Janeiro. berna@vm.uff.br

The main purpose of this essay is describe the implementation of Cleaner production method in a Press Enterprise named Gráfica A, located in the state of Rio de Janeiro-Brazil, in order to improve its productive process. The Cleaner Production program was put into practice in a six month period, consisting in phases and steps which were established by UNEP. For this study the production of two printed products was considered: individuals sheets with an annual production of 3,9 million and books, with 232 pages, with an annual production of 12600 units. Environmental diagnosis of the process showed several opportunities in the pre-printing and printing phases of Gráfica A in water and energy consumption, solid waste generation, effluents and emissions. Practice of the method of Cleaner Production revealed that implementing certain changes, there should be a reduction of 37% in effluent generation; 45% in water consumption and 45% in plate solution reagent use. The obstacles found within this study were based on lack of budgetary forecast implementation for these changes; an organizational culture not fully directed toward the efficient use of the resources and the difficulty in implantation of projects that generate expenditure increase.

Keywords: Cleaner Production, Press Enterprise, Waste



13h30-14h30

22nd November 2007

**Sessão 5A
Sala 6**

"Organizational Experience Report on the Industry Butzke" -
Presenter: Marina Otte (FURB)

"System BACON" - Presenter: Jorge Galgaro (Rhodia)

"BSH and 20 years of Montreal Protocol" - Presenter: Ivana
Ribeiro (BSH Continental)



Organizational Experience Report on the Industry Butzke

Marina Otte

Universidade Regional de Blumenau, Blumenau, marina_otte@hotmail.com

This report refers to the interventions on the cleaner production proceeded on the industry Butzke that produces certified wood furniture. The company needed to decrease their products cost and make the process more sustainable, during the intervention another problem would come up: due to Us dollar currency fall, the sales had reduced considerably on the furnishing market, and that was the key point to enhance more efficient upgrades that could lower the costs and raise the sales. The problems identified focus in two fronts: design and production line. The main enhancements proceeded on the production line were: layout remodeling, the produced parts started to go through a logical and sequential path, residual exhaustion and drainage systems were installed; which resulted on a 15% productivity raise. Along were studied the destination of all residues produced by the company like, sandpapers, tows, sawdust and firewood. After the intervention 100% of these residues started to be sold generating extra profits. Regarding the design, new product lines were designed to utilize the bigger wood retails and the old models gone through a re-design process that, besides making them more contemporaneous, contributed to the best usage of the raw material with smaller wood gauges and incorporated the use of retails on your drawings. This changes resulted in a 76,85% reduction on the retails generated on the furniture production and decreased in 93,37% the quantity of retails in stock that the company had. Enhancements procedures on the production had decreased the costs and in addition to the new designs, aggregated value to the products, making it more competitive and sustainable. To inform and guarantee even more the efficiency of the process, the company started to invest on environmental education for their workers. It's important to say that all interventions were extremely simple and had a relatively low cost, what doesn't means inefficiency, proved by the raise on productivity, sales and re-hiring of employees after the US dollar crisis that keeps with market currencies low, there was even another favoring point, the conscience of sustainability that already existed inside the company and the fact that the products do not use water in its producing process. The intervention may serve as reference to this important productive sector from Brazil that has 14.400 companies that generates 227.600 direct jobs. Its important to detach that still exists a prejudice that this interventions which change the process to make them more efficient and cleaner have high costs, are complicated and take too long to give a return to the company. This report relates an example of how the enhancements can be simple, low-cost, but efficient, resulting in profits to the company and benefits to the community and environment.

Keywords: design, sustainability, cleaner production.



System BACON

Alexandre Toledo^a, Jorge Galgaro^b

a. Rhodia Poliamida Especialidades LTDA, alexandre.toledo@br.rhodia.com

b. Rhodia Poliamida Especialidades LTDA, jorge.galgaro@br.rhodia.com

The Atibaia and Anhumas rivers are part of the Piracicaba and Capivari hydrologic region, which supplies more than 3 million of people and has a very intense agricultural activity.

The chemistry plant of Rhodia is located around these rivers and the consequence of possible accidents/incidents would be very negative to the aquatic life and the people located down the river.

The BACON project is a protection system to the Atibaia and Anhumas rivers; it prevents drippings, firefight water and contaminated rainwater to reach the rivers.

The project construction was initiated in 1997 and finalized in 2000.

Keywords: Rivers, Drippings, Protection, BACON



BSH and 20 years of Montreal Protocol

Ivana Ribeiro

BSH Continental Eletrodomésticos Ltda, Hortolândia – SP, ivana.ribeiro@bshg.com

In 1987, in Montreal, the United Nations (UN) established a global action program called the Montreal Protocol, about substances which deplete the ozone layer. Ten years after the Montreal Protocol, the UN signed the Kyoto Protocol, which aims at reducing the emission of gases that contribute to the greenhouse effect.

In alignment to these Protocols and confirming its environmental responsibility, since its opening in 1997, BSH Continental Home Appliances group – Hortolândia, incorporated the Hydrocarbon (HC) Cyclopentane as an isolating and expander agent.

Following this continuous improvement philosophy and in tune with the Federal Government and the Ministry of the Environment, BSH Continental once again innovated and implemented, for the first time in the country, another HC in its production, the R600a refrigeration gas also known as Isobutane. The R600a is composed by carbon and hydrogen and it is considered a “natural fluid” similar to LP (Liquefied Petroleum), largely used in Europe, specially in Germany.

The hydrocarbons – natural gases produced from petroleum totally harmless to the ozone layer and with a global warming potential value similar to the CO₂.

The hydrocarbons are refrigeration fluids intrinsically more efficient than the HFCs. It means that, with technological advances, the possibility for future reductions in the energy consumption of the refrigerators is more likely to happen than with the use of HFCs.

For a country such as Brazil, with a significant potential for the increase of the number of household appliances per resident, the choice for more economic technological lines in the energy consumption, protection of the ozone layer and with the preservation of the global environment is, without a doubt, the challenge and the objective for the refrigeration industries that aim at manufacturing innovative products with clean technology and that contribute for the sustainability of the planet.

Aware of the harmful effects to the Environment caused by the gases used in industrial processes that contribute for the depletion of the ozone layer and the global heating, BSH Continental, anticipating the implementation of more restrictive requirements for the use of these gases, included the isobutane gas (also known as R600a) in its production line or also call of R600a, which combined with the cyclopentane used as an insulator and expander, will form what we can call the 100% Ecological refrigerators.

Keywords: global warming, ozone layer, Isobutane, hydrocarbons



22nd November 2007

14h30-16h Conference

Jeffrey Burke

Executive Director - National
Pollution Prevention Roundtable

**"The Role of Pollution
Prevention in Sustainable
Development"**



The Role of Pollution Prevention in Sustainable Development

Jeffrey J. Burke

Executive Director

National Pollution Prevention Roundtable

Benjamin Franklin is credited with making the statement, “an ounce of prevention is worth a pound of cure” almost 250 years ago. Although society has changed substantially since Dr. Franklin’s time, the importance of using a prevention approach to solving problems has not. While prevention is often forgotten in favor of command and control approaches, ultimately it makes the most sense from an economic and societal standpoint. There is an accepted rule of total quality management that it takes ten times the unit cost to fix a problem in-house and one hundred times the unit cost to fix a problem that has left the facility. The value of the pollution prevention approach to addressing environmental problems is the main focus of this presentation.

In the United States, the term pollution prevention, (or P2), is defined as “any practice which avoids, eliminates, or reduces any pollutant prior to recycling, treatment or disposal.” This has been expanded to include the efficient use of raw materials, energy, water and other natural resources, as well as the creation and conservation of natural habitats. While it seems intuitive that no organization would want to encourage, initiate or increase the waste that it generates, the fact is that this occurs routinely as a result of new products, business growth or expansion, new technology or using a less experienced labor force. It is important to realize that the opportunities for P2 are in the inputs and activities of all



processes and that once a waste is generated it must be recycled, treated or properly disposed.

The productivity equation (materials + labor + equipment + energy + time = products + waste) serves as a basis for determining opportunities to reduce the waste term to zero. The DuPont Company has a “Goal is Zero” program which addresses product defects, worker safety and pollution. A corollary equation has the first five terms equal “assets and liabilities.”

The management of assets is what most businesses are familiar with and comfortable doing. They have established systems to manage their financial assets, production and service assets, and personnel. In order to achieve sustainable development, organizations are developing environmental or natural resource management systems as well as community involvement systems. These five systems form the basis for a sustainable development program since they address the three aspects of sustainable development: economic, environmental and social. The five asset management systems are interdependent, so that the consequences from decisions that are made in one area are addressed in the other areas.

The first step that an organization must take in developing an environmental management system is to obtain support from senior level management. This usually comes from a mission statement that identifies the company’s commitment to environmental excellence. The mission statement should include the use of pollution prevention as the remedy of first choice in addressing environmental issues. Also, the mission statement should be signed by all of the senior managers, thus insuring its credibility and commitment of resources. Once the environmental mission of the organization is clear, the remaining steps of identifying aspects and impacts, prioritizing activities, establishing teams, collecting baseline data, testing



alternatives, and implementing improvements follow more easily.

There are six basic pollution prevention approaches that businesses can utilize in addressing the highest priority environmental impacts. These are: process efficiency improvements; material substitution; inventory control; preventive maintenance; improved housekeeping; and closed-loop recycling. Examples of successful implementation of all of these approaches will be included in the presentation.

Businesses are also realizing that there have been substantial changes over the past few decades which affect the value of their company. Instead of simply using the bottom line as the indicator of a company's value, other factors, such as environmental footprint, reputation, and other intangibles play a greater role in determining a company's value. The stakeholder dynamic is being more closely monitored by organizations, especially given today's internet access and information transfer. There are several examples of "successful" companies that have ignored this change to their own detriment.

It was Albert Einstein who said, "The significant problems we have cannot be solved at the same level of thinking with which we created them." Therefore, innovative approaches to current environmental problems are needed. This begins with the basic processes within an organization. Once the wastes from these processes are eliminated or reduced to near zero, then the forward-thinking company looks at their waste generation from within their facility. Examples would be reducing the energy usage from lighting and water usage from lavatories. Again, once these issues have been addressed, a company's entire property is evaluated for opportunities to reduce landscaping costs, water usage and to increase natural habitat.



The community involvement system discussed earlier can be utilized at this point to create positive relationships with the local community. Projects which provide positive benefits to the community, such as stream restoration and environmental education, are being underwritten by US companies regularly. This eventually leads to actions which have local impacts as well as global results. Reduction in CO₂ emissions by promoting car pooling or telecommuting or increasing the capture of CO₂ by creating more forested areas are examples of successful projects that have been implemented in the US. The phrase "think outside the box" has become very popular. However, in the P2 world, we promote the idea of making the box bigger, until it encompasses the entire planet.



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"THE ROLE OF CLEANER PRODUCTION IN THE SUSTAINABLE DEVELOPMENT OF MODERN SOCIETIES"

São Paulo - Brazil - November 21-23 - 2007



16h30-17h30**22nd November 2007****Sessão 5B
Sala 1**

"Determining CO₂ emissions and storages in a commercial bamboo plantation" - Presenter: Luiz Ghelmandi Netto (UNIP)

"Alternative Fuels and Cogeneration for Reducing CO₂ Emissions" - Presenter: José Antonio Perrella Balestieri (UNESP)

"Perspectives of the Treatment of Swines Manures Using Bio Digestion in Carbon Market" - Presenter: Fernando Mario Rodrigues Marques (BSP)



Determining CO₂ emissions and storages in a commercial bamboo plantation

Luiz Ghelmandi Netto, Biagio F. Giannetti, Cecília M. V. B. Almeida,
Sílvia H. Bonilla

Universidade Paulista, São Paulo, luiznetto@unip.br

This work aims to quantify emissions and storages of CO₂ in a commercial bamboo plantation using a CO₂ eq. mass balance. The species of bamboo examined in this work is *Bambusa vulgaris*, the main bamboo species cultivated in northeastern Brazil.

Labor inputs were not taken into account as they do not emit CO₂.

In both sceneries considered in this study to perform the CO₂ balance, and the CO₂ captured in the bamboo plantation exceeded that emitted.

Keywords: CO₂, commercial bamboo plantation, CO₂ emissions and storages



Alternative Fuels and Cogeneration for Reducing CO₂ Emissions

José Antonio Perrella Balestieri

Universidade Estadual Paulista - UNESP, Guaratinguetá, SP, perrella@feg.unesp.br

Cogeneration is growing worldwide based on the burning of fossil fuels – especially natural gas. Although its low emission factors, it is important to consider that the availability of natural resources must be taken into account for a long-term investment in the energy generation sector. The identification of alternative renewable fuels and the integration of cogeneration to certain industrial processes that produce some of these alternative fuels are evaluated in this paper.

Keywords: cogeneration – alternative fuels – CO₂ emissions minimization.



Perspectives of the Treatment of Swines Manures Using Bio Digestion in Carbon Market

Fernando Mario Rodrigues Marques^a, Virgínia Parente^b, Carlos Cezar da Silva^b

a. Fernando Mario Rodrigues Marques - Professor da BSP-Business School São Paulo e Doutorando do Programa de Pós-Graduação em Energia do Instituto de Eletrotécnica e Energia da Universidade de São Paulo-USP, fernando.marques@bsp.edu.br

b. Virgínia Parente - Professora do Programa de Pós-Graduação em Energia do Instituto de Eletrotécnica e Energia da Universidade de São Paulo-USP, vparente@lee.usp.br

c. Carlos Cezar da Silva - Doutorando do Programa de Pós-Graduação em Energia do Instituto de Eletrotécnica e Energia da Universidade de São Paulo-USP, cezaradts@gmail.com

The Clean Development Mechanism (CDM) projects foreseen in the Kyoto Protocol constitutes an interesting way of protecting the planet environment and at the same time promoting the sustainable economic development in emerging economic countries. Among the possible CDM projects, the treatment of swines manures using bio digestion is seen as an opportunity for Brazil to participate actively in the carbon market. Today Brazil is the third worldwide producer of swines with 36 million animals. The present study aims to show that the treatment of swine manure using bio digestion, besides minimizing the environment impact, may contribute to eliminate the emission in the atmosphere of around 19 millions of tons of equivalent carbon dioxide per year, generating around US\$ 78 annual millions in carbon credits for Brazil.

Keywords: Swine culture, carbon market, greenhouse, biodigestion, CDM.



16h30-17h30**22nd November 2007****Sessão 5B
Sala 2**

"The valuation of auto-sustain of the company through G.A.I.A Tool" - Presenter: Maria Fernanda Preussler (UNISC)

"Indicator of Environmental Development as auxiliar instrument of controlling in the program of Clean Production of the Painting Sector in a company of the wood furniture local productive arrangement" - Presenter: Marzely Gorges Farias (UDESC)

"Continuous Improvement of Processes on the Electronic Sector: obtaining Environmental Indicators using Software" - Presenter: Maria Lúcia Pereira da Silva (USP & FATEC)



The valuation of auto-sustain of the company through G.A.I.A Tool

Dulce Lubenow Delavy ^a, Maria Fernanda Preussler ^b, Jorge André R. Moraes^c e Diosnel Rodrigues Lopez^d

*Universidade de Santa Cruz do Sul, Santa Cruz do Sul-RS, dulced@italnet.com.br,
jorge@unisc.br, dlopez@unisc.br*

The necessity of a company to present a level of auto-sustain has become a great necessity, starting with the symptoms presented for the climatic variation of the planet. Actions are being planned and implanted to minimize the impact caused by the uncontrolled usage of the natural resources. At the same time the legislations become stricter related to the productive sector, making them responsible for the production of waste and its correct destination. The search for the usage of clean technology makes the difference for the companies. The instrument used to measure de index of auto-sustain is the GAIA Tool, scientifically developed based on the improvement of the environmental performance of the organizations and the achievement of the full auto-sustain. With the basic principles of respect to the legislation, continuous improvement and prevention of the pollution. The metal-mechanical sector is presented as an impacting activity for using great amount of water for cleaning pieces and for producing class I waste, dreg of oils and grease.

Keywords: Sustentability, prevention of the pollution, environmental management, metal-mechanical



Indicator of Environmental Development as auxiliar instrument of controlling in the program of Clean Production of the Painting Sector in a company of the wood furniture local productive arrangement

Marzely Gorges Farias ^a, Elane Paul^b, and Carolina Ana Garbe^c

a. Universidade do Estado de Santa Catarina, Santa Catarina, marzely@sbs.udesc.br.

b. Móveis América, Santa Catarina, elianepaul@yahoo.com.br

c. Móveis América, Santa Catarina, Carolinagarbe@yahoo.com.br

This article has as objective to demonstrate the importance and the results of the process of integration of the University of the State of Santa Catarina with the business sectors and the society - in special, by means of the companies nets called "Local Productive Arrangements", in the advances of the use of the Environmental indicators and of the cleaner production for the endorsement of the Sustainable Regional Development.

Keywords: Sustainable development, local productive arrangement, cleaner production, Furniture Sector, Environmental indicator



Continuous Improvement of Processes on the Electronic Sector: obtaining Environmental Indicators using Software

Emanuel F. de Queiroz ^a, Maria Lúcia Pereira da Silva ^{b,c}

a. CPMBraxis IT Services, São Paulo, emanuel.queiroz@braxis.com.br

b. Escola Politécnica da USP, São Paulo, malu@lsi.usp.br

c. Faculdade de Tecnologia de São Paulo, São Paulo, malu@lsi.usp.br

The need for sustainability on human entrepreneurship leads to changes in management. Some changes can be aided by Industrial Ecology concept and enterprise planning (ERP) software. Therefore, the aim of this work was obtaining appropriate methodology to use enterprise software on the implementation of Industrial Ecology concept. The electronic sector was chosen to be evaluated and case studies analyzed any part of this sector. The software is used on definition of sustainability indicators and on identification of processes improvement due to Industrial Ecosystems formation. Due to the high value of electronic products, several cost reductions, social and environmental improvements were detected. The improvements came from the reuse of non products, inside or outside the entrepreneurship, and some efforts should be done on Industrial Ecosystem formation on this sector. Case studies showed as main parameter the distance between the enterprises and as one of most important environmental parameter the carbon dioxide emission. Nowadays, the sector is an open cycle production with high emission. However, on Microeletronics raw material production, the use of quartz fragments and sugar cane bagasse is an interesting approach that requires changes on production site due to the distance. Microeletronics can reuse water in closed cycle or with galvanic enterprise combination, other reactants and aqueous solutions are useful on metallurgical sector. Printed circuit board can be favored by joint venture and waste commercialization. Finished equipment can be recycled but the main drawback is the legal structure. The use of software for improvement on sustainability is feasible and can be implemented in small and medium enterprise using only database and electronic frameworks. This approach is low cost and assures the implementation of Industrial Ecology concept on the enterprise.

Keywords: Industrial Ecology, Electronic Sector, Software ERP, Industrial Ecosystem



16h30-17h50**22nd November 2007****Sessão 5B
Sala 3**

"Bioaccumulation and Biosorption of Chromium VI by different Fungal Species" - Presenter: Dhara Bajpai (FEAT - India)

"Evaluation of Aerobic Biodegradation from Polymers Poli(3-hidroxybutirate) and Synthetic Based on Additives by Action of Activated Sludge" - Presenter: Fernanda S. M. de Souza (UTFPR)

"Biopaper obtained from microorganisms" - Presenter: Pierre Basmaji (Inovatecs)

"Evaluate the Quality of the Nickel Sulfate Obtained from a wastes of Hydrogenation of Vegetable Oils" - Presenter: Fatima de J. Bassetti (UTFPR)



Bioaccumulation and Biosorption of Chromium VI by different Fungal Species

Padma S Vankar^a, Dhara Bajpai^b

- a. Facility for Ecological and Analytical Testing, (FEAT) Indian Institute of Technology, Kanpur 208 016, India, psv@iitk.ac.in
- b. Facility for Ecological and Analytical Testing, (FEAT) Indian Institute of Technology, Kanpur 208 016, India, dhara@iitk.ac.in
-

Biosorption of the hexavalent chromium ion (Cr (VI)) onto the cell surface of different sized fungal species in aerobic condition was investigated. The assessment of the metal-binding capacity of new biosorbents has been discussed. Batch experiments were conducted with various initial concentrations of chromium ions to obtain the sorption capacity and isotherms. The results obtained at pH 5.5 of chromium solution were 97.39% reduction by *Trichoderma* and 100% reduction by *Agaricus*. It was found that the sorption isotherms of fungi for Chromium (VI) appeared to fit Freundlich and Langmuir's models. The results of FT-IR analysis suggested that the chromium binding sites on the fungal cell surface were most likely carboxyl and amine groups. The fungal surfaces showed efficient biosorption for Chromium in Cr⁺⁶ oxidation state. Biosorption isotherm curves, derived from equilibrium batch sorption experiments, were used in the evaluation of metal uptake by these fungal biosorbents.

Keywords: Biosorption, Trichoderma and Agaricus, Chromium VI, sorption isotherms, FT-IR spectroscopy.



Evaluation of Aerobic Biodegradation from Polymers Poli(3-hidroxybutirate) and Synthetic Based on Additives by Action of Activated Sludge

Fernanda S. M. de Souza^a, Marco A. Henning^b e Fátima de J. Bassetti^c

a. Universidade Tecnológica Federal do Paraná, Curitiba, fer_2612@yahoo.com.br

b. Universidade Tecnológica Federal do Paraná, Curitiba, marco.henning@gmail.com

c. Universidade Tecnológica Federal do Paraná, Curitiba, bassetti@utfpr.edu.br

The main purpose of this study is to evaluate the aerobic biodegradation of two different polymers by the action of activated sludge. This aim is reached bringing face to face a biopolymer, poly(3-hydroxybutirate), and a synthetic polymer based on additives. The present work has been conducted in two batches, employing an Activated Sludge System with extra aeration. The evaluation of biodegradation was based on polymers analysis – weight loss and scanning electron microscopy - and on microbial development - production of CO₂ and substrate analysis. Based on the results it was possible to conclude that the biopolymer was completely degraded. On the other hand, the results observed with synthetic polymer based on additives do not allow qualifying it as biodegradable in tested conditions.

Keywords: biodegradable polymers, biodegradability, activated sludge.



Biopaper obtained from microorganisms

Lauro Xavier Filho ^a, Pierre Basmaji ^b, Carlos Vicente Córdoba ^c

^a *Biotechnology and Natural Products Laboratory, ITP/UNIT, Aracaju-SE, Brazil.*
xavierfilho@infonet.com.br

^b *Innovative Technologies of Sao Carlos-Innovatecs, 13560-300-Sao Paulo-Brazil, nanoexpertise@yahoo.com.br*

^c *Faculty of Biology, Complutense University, 28040 Madrid, Spain, cvicente@bio.ucm.es*

We propose to produce biopaper from microorganisms' biosynthesis of cellulose and hemicellulose. The potential capacity of microorganisms to form biocellulose and hemicellulose fibers was analyzed. Biocellulose/biohemicellulose is expected to be a new biodegradable biopolymer.

Keywords: Biopolymer, Fermentation, microorganisms, Acetobacter xylinum.



Evaluate the Quality of the Nickel Sulfate Obtained from a wastes of Hydrogenation of Vegetable Oils

Priscila D. Finato, Luciano F. S. Rossi, Fatima de J. Bassetti e Pedro R. da C. Neto

Universidade Tecnológica Federal do Paraná, Curitiba, bassetti@utfpr.edu.br

The aim of this work is to evaluate the quality of the nickel sulfate obtained from a recovering process of nickel sulfate from wastes of hydrogenation of vegetable oils. In the sulfate, were quantified Cu, Cr, Pb, Zn and Ni, using Atomic Absorption Spectroscopy (AAS). After that the nickel sulfate was submitted to purification process using active carbon. It was observed that the metals Cu and Cr presented concentrations below the allowed limit to the commercial nickel sulfate, whereas the Zn and Pb concentrations were above that limit. The Pb was removed by complexacion with EDTA followed by adsorption in active carbon, and the Zn didn't show removal with the employed methodologies. The Ni quantification in the sulfate using AAS showed better results in 352,4 nm. The effluent in the process was analyzed and treated with active carbon, being removal 98,6 % of the Ni concentrations existing in it.

Keywords: Nickel sulfate, waste recovery, active carbon



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"THE ROLE OF CLEANER PRODUCTION IN THE SUSTAINABLE DEVELOPMENT OF MODERN SOCIETIES"

São Paulo - Brazil - November 21-23 - 2007



16h30-17h30**22nd November 2007****Sessão 5B
Sala 4**

"Diagnosis of the Cleaner Production in Amazonas State" -
Presenter: Bianca G. Pereira (INPA)

"Detailed Evaluation of Cleaner Production in a Red Ceramic
Industry in the State of Paraíba" - Presenter: Erly Maria
Medeiros de Araujo Nóbrega (CEPIS)

"The Implementation of a Cleaner Production Program in a ISO
14001 certified Steelmaking Company" - Presenter: Lisiane
Kleinkauf da Rocha (UNISINOS)



Diagnosis of the Cleaner Production in Amazonas State

Bianca G. Pereira ^a, Ivan R. Neto ^b, Kaoru Yuyama ^a,

Hugo G. Pereira ^c e Célio L. P. de Matos ^d

a. Instituto Nacional de Pesquisas da Amazônia, Manaus-Am, bianca@inpa.gov.br e kyuyama@inpa.gov.br

*b. Universidade Católica de Brasília, Brasília-DF, ivan@pos.ucb.br
c. Kali-Umwelttechnik GmbH Sondershausen – Alemanha, Hugo.Galucio@k-utec.de
d. Serviço de Apoio às Micro e Pequenas Empresas do Amazonas, Manaus-AM, celio@am.sebrae.com.br*

This study, shows a diagnosis of the application of the Cleaner Production (CP) in Amazonas State. From the analysis of reports from the Nucleus of Clean Production (NPL) and open interviews with managers and consultants of the NPL, was verified that the program generates economic, environment advantages, of health and occupational security. The results demonstrate that, in Amazonas, the culture of Clean Production is spread out by SEBRAE/AM for the NPL, since 2003. Up to 2006, 25 companies had implemented the CP program, and these majority is classified as micron and small companies. Twenty and four of these companies are located in Manaus and take care of the local market. Almost all of these companies are finds in the commerce segment, the representation type and also in the segment of the transformation industry. 75% of the companies who had applied the PmaisL are part of the Productive Group of Oil and Gas in Amazonas. About the implemented techniques of PmaisL, 72% represent the adoption of good practical, including operational and management action, with improvements in the administrative system, storage, election and preservation of the solid residues and elimination of obsolete materials that can be recyclable. These practical had reduced residues and normally have being implemented with low cost and Sebrae-AM subsidy at Technological Consulting Program. In this case, was considered ambient regulation (fines, penalties, etc.), searching the conformity of these companies, to prevent serious cuts in the profitability caused by harmful actions to the environment. The work conditions improvements, like small reforms, implantation of security systems and selective collection and equipment purchase are some examples of these applied technological measures (22%). Another example observed was the care with health and occupational security. Was observed that one of the biggest challenges of the involved companies is the continuous improvement of the processes from the program of PmaisL, since is a program that does not certifies yet. The PmaisL concepts and potentials are obscure for the most part of the society and government; in this case it is being necessary to build a new politics for spreading and use of Cleaner Production (CP), as well as application in micron and small companies. This will generate for the companies one better strategical vision front environment questions and consumer requirements.

Keywords: Environment management, residues reduction, good practical, companies, Amazonas



Detailed Evaluation of Cleaner Production in a Red Ceramic Industry in the State of Paraíba

Luhana Reis Porto ^a, Ester Pires de Almeida ^b, Christian Buser ^c, Alessandra Farias Formiga Queiroga ^d, Erly Maria Medeiros de Araujo Nóbrega ^e and Thalita Christina Brandão Pereira ^f

a. CEPIS – Centro de Produção Industrial Sustentável, Campina Grande, luhana@sebraepb.com.br, ester@sebraepb.com.br, alessandrafarias@sebraepb.com.br, erly@sebraepb.com.br, thalita@sebraepb.com.br

c. Universidade de Ciências Aplicadas do Noroeste da Suíça, Bern, christian.buser@fhnw.ch

This paper is based in technical, economic and environmental strategies application integrated to process and products from a red ceramic industry with the objective to increase the efficiency in the use of raw materials, water and energy, through reduction, no generation or recycling of wastes and emissions generated, with environmental, economic and occupational health benefits. The Cleaner Production program aims to identify actions of ecoefficiency in the areas, process and machines of companies, a way of to bring economic results, to reduce the consumption of resources and to prevent environmental impacts generated from inputs of process. Based in this, was developed a evaluation methodology by University of Applied Sciences Northwestern Switzerland to determination of the potentials through the QuickScan Report and the software EcoInspector. After this was made the quantification of inputs and outputs and the mass and energy flow, identification of opportunities to improvement of performance through research, presentation of the best alternatives of technical, economic and environmental feasibility. The stages of the productive process that had been detached as eventual potentials of Cleaner Production had been: preparation of the raw material, drawing, cutting and burning. It was identified a total of 28 options, had been 01 option rejected, 21 options of immediate implementation, 06 feasible options, 03 options was implemented by company, being: to cover the clay with canvas, to use cut wire of 0,9 mm and levelling of drying área. One of the options of immediate implementation was to arrange a employee to clean the clay, this option presented a economics in electric energy, and an increase in the production. After the approval of the options by the company, was mounted an action plan in order to certify and to follow the implementation of them.

Keywords: Red Ceramic, Cleaner Production, Energetic Efficiency, Ecoefficiency.



The Implementation of a Cleaner Production Program in a ISO 14001 certified Steelmaking Company

Lisiane Kleinkauf da Rocha¹, Carlos Alberto Mendes Moraes², Ana Cristina Garcia³,
 Feliciane Andrade Brehm⁴, Rodrigo Crippa Gaspar⁵, Joice Brochier Schneider⁶,
 Paulo Rafael Zambelan⁷, Liza Zotz Jaworski⁸, Gianna Buaszczyk⁹, Marcele
 Moreira Nickhorn¹⁰

*Universidade do Vale do Rio dos Sinos/UNISINOS, e-mail: lisiane.rocha@terra.com.br,
cmoraes@unisinos.br, feliciane@unisinos.br, rcgaspar@terra.com.br,
joice_brochier@yahoo.com.br, paulozamber@bol.com.br*

*3. Ms. Pesquisadora NITECGA/EA/UFRGS e NucMat/UNISINOS. e-mail:
anagarcia@feevale.br*

*8. Gestora de Meio Ambiente da Gerdau AEP, Engenheira Química, e-mail:
liza.jaworski@gerdau.com.br*

*9. Funcionária da Área de Meio Ambiente Gerdau AEP, Engenheira Química, e-mail:
gianna.buaszczyk@gerdau.com.br*

*10. Funcionária da Área de Meio Ambiente Gerdau AEP, Engenheira Química. e-mail:
marcele.nickhorn@gerdau.com.br*

About 90 to 95% of metallic alloys produced in whole world are steel, at the same time the impact to the environment from this production can be high. This work intends to discuss how a cleaner production program implemented in an already certified ISO 14001 steelmaking company can contribute to processes and products in a more environmentally sustainable steel.

As the cost of end-of-pipe technologies and disposal in the industrial landfill has grown fast, the pollution prevention and minimization of waste generation become a more attractive investment. However, all collaborators from the steel plants must be capacitated in cleaner production to incorporate this knowledge in process and product projects, and participating as responsible to achieve better performance of the process in a continuous way.

Keywords: iron and steelmaking process, cleaner production, waste minimization.



16h30-17h30**22nd November 2007****Sessão 5B
Sala 5**

"Inertialising Thermal Reactor" - Presenter: Rojas Veloso,
Emilio Arturo (Super Zinco)

"Cleaner Production in Construction Sector" - Presenter: Liana
Sampaio Goron (PPGEM)

"Cleaner Production: the report of an experience" - Presenter:
Clementino, F. C. F (SEBRAE)

"Environmental labelling - a study on NR's" - Presenter: Maria
Fernanda Preussler (UNISC)



Inertialising Thermal Reactor

Rojas Veloso, Emilio Arturo

Super Zinco Tratamento de Metais.

Brazil generates around three million tonnes of industrial residues per year, which are qualified as Class I – Dangerous and Class II – Not dangerous. Activities considered potentially pollutant can only occur after the obtaining of the environment license. The residues can be deposited in waste disposal with ACIR – Approval Certification of Industrial Residues. The Brazilian environment legislation imposes administrative, civil and criminal responsibilities on federal, state and municipal ambits. The companies of the galvanic sector generate galvanic mud compound of heavy metals as chromium, nickel, zinc, copper, iron and others. Super Zinco is the Brazilian leader in processes of plastic galvanization with production of more than a million square decimeter per month and generates 1400 tonnes of galvanic mud per year. It adopted the use of Inertialising Thermal Reactor projected by the author of this work. It reduces the volume and inertialises the mud that becomes qualified as Class II – A, resulting in an annual economy of more than three hundred ninety thousand dollars.

Keywords: Galvanic mud, Heavy metal



Cleaner Production in Construction Sector

Liana Sampaio Goron⁽¹⁾; Rejane Maria Candiota Tubino⁽²⁾

⁽¹⁾ Chemical Engineer – Master student of the Post Graduation Program of Mines, Metallurgy and Materials Engineer - PPGEM. E-mail: lianasg@terra.com.br;

⁽²⁾ Dr., professor, LEAMET- DEMET/UFRGS (Porto Alegre- RS). E-mail: rejane.tubino@ufrgs.br

Brazilian National Environmental Council created, in July 2002 the 307 resolution, which started to be value in January, 2005. Since then the construction sites had to adequate their site works. Because of it, trying to reduce the environmental impacts and a better efficiency of the construction process, it was created in Porto Alegre, Brazil, a group of 7 contractors partially sponsored by SEBRAE and supported by National Center of Clean Technologies- CNTL and Federal University of Rio Grande do Sul- UFRGS, with the objective of the application of the Clean Production methodology. This paper reports this experience of the construction sector, with very good economical results to the participants enterprises.

Keywords: construction solid waste; Clean Production; environmental impacts.



Cleaner Production: the report of an experience

Clementino, F. C. F. ^a, Pereira F. J. P. ^a

a. SEBRAE, Rio Grande do Norte, clement@ufrnet.br

The SEBRAE of RN, in partnership with CNTL/SENAI-RS carried out a course to form consultants in cleaner production for small and micro companies. As a participant, I carried out the practical part of the consultancy in cleaner production in the company Tecniplas Nordeste Plásticos Reforçados Ltda., situated in Natal/RN. Therefore, it was used a computer program involving several determinations, being presented in this narrative some information regarding cleaner production and the reduction of waste as: case study and economics and environmental results. *Key words*: use maximum of 5 key words.

Keywords: Cleaner Production, Waste Reduction, Environment.



Environmental labelling - a study on NR's

Maria Fernanda Preussler ^a, Marquion Vaz ^b, Jorge André R. Moraes ^c,
Diosnel Antônio Rodrigues Lopez ^d

^a Universidade de Santa Cruz do Sul, Santa Cruz do Sul-RS, ferpre@ibest.com.br

^b Universidade de Santa Cruz do Sul, Santa Cruz do Sul-RS, marquion@gmail.com

^c Universidade de Santa Cruz do Sul, Santa Cruz do Sul-RS, jorge@unisc.br

^d Universidade de Santa Cruz do Sul, Santa Cruz do Sul-RS, dlopez@unisc.br

Currently the valuation in the society in consuming correct and ambiently healthful products is noticed. Some countries, as manifestation of ambient conscience, the products adopt voluntary mechanisms of environmental labelling with attribution of "green stamps" to products that take care of criteria of control previously established. In this direction, the environmental labelling is if becoming a powerful instrument of market, suggesting the importance of to analyzing its laws and elaborated studies of this subject, because the Programs of Ambient Labelling had appeared, mainly, like a result of a change in the standards of consumption and production. It is noticed, by the analyses, that the ambient labelling can help to contribute for the formation of the conscientious consumer, in sight of the standards of production and consumption. The ambient labels configure a system to information the origin of the product, the studies of evaluation of the life cycle and if a process that uses clean technologies.

Keywords: Environmental Labelling; Green Stamp; Ambiental Education.



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"THE ROLE OF CLEANER PRODUCTION IN THE SUSTAINABLE DEVELOPMENT OF MODERN SOCIETIES"

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22nd November 2007

17h30-19h Conference

**Gilberto Huet de Bacellar
Sobrinho**

Sea-and-War Captain (RM1)

Environmental Management
Assessor.

Harbor and Coast Directory –
Brazilian Navy

**"Brazilian Navy initiatives for
environmental pollution
prevention"**



Brazilian Navy initiatives for environmental pollution prevention

Gilberto Huet de Bacellar Sobrinho

Sea-and-War Captain (RM1)

The concerns and national initiatives directed to the environmental conservation and preservation have grown significantly in the last years, enhanced by the promulgation of the Law 9,605/1998 (that determines administrative and criminal penalties derived from harmful behavior to the environment) and of the Law 9,966/2000 (that determines the prevention, the control and the fiscalization of the pollution caused for oil launching and other harmful or dangerous substances in waters under national jurisdiction).

Brazilian Navy follows with special interest this process, exercising its legal attributions, by means of representatives participation in the Environmental Management, of the Harbour and Coasts Direction (DPC, *Diretoria de Portos e Costas*), in the work in Interministerial Work Groups, instituted by the Ministry of the Environment, for regulation of a series of new legal instruments resulted from these legislations. Among these new instruments, the Individual Emergency Plan (PEI, *Plano de Emergência Individual*) for episodes of oil pollution in waters under national jurisdiction, the Area Plan (Pará, *Plano de Área*) and the Contingency National Plan (PNC, *Plano Nacional de Contingência*) can be cited, the last still in elaboration phase.

With the knowledge of these command and control instruments, the Brazilian Navy - understanding the necessity to prevent the environmental pollution proceeding from industrial activities and the support to its fleet, developed in the of Rio De Janeiro Navy Armory and in its Bases and Naval



Stations distributed throughout all national territory - promoted, since 2001, Environmental Technical Visits into these organizations, guided by specialized staff from the Environmental Management of DPC, with the intention to trace an environmental diagnosis of them.

Navy's ships when docked generate solid waste, sewage and oily waste, which must be subjected to procedures for handling, packaging, collection, pre-treatment (when applicable) and appropriate final disposal, to be conducted by the support Bases or Naval Stations.

Maintenance and repair services, developed in the Rio de Janeiro Navy Armory and in the Navy bases, also result in the generation of wastes and effluents, sometimes classified as toxic or hazardous that may include, among others, oily substances, contaminated water, paint dregs and heavy metals, which need to be characterized, quantified, collected, packaged, and transported to have a final disposal environmentally appropriate.

In view of the environmental diagnosis, raised in 2001, the Commander of the Navy pointed the DPC, in AGO/2002, as the Navy Environmental Management organ, with the purpose of carrying out normative, technical and supervision activities, to implement and monitor the Environmental Management System (EMS) of Navy's military organizations.



In JUL/2003, the DPC has consigned the Standard Technical Environmental n° 2 (NORTAM-02), based on NBR ISO 14,001, focused on the EMS implementation in the Navy, not only in those organizations identified as potentially polluting, but also in all other land organizations, as well as procedures for the energy reduction and cleaner production (CP).

Therefore, Brazilian Navy voluntarily took the initiative to promote the implementation of Environmental Management System (EMS) in all its organizations in land, in order to minimize, or even prevent, the occurrence of negative environmental impacts arising from their constitutional activities.



Conferences

and

Oral Presentations

23rd November 2007



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"THE ROLE OF CLEANER PRODUCTION IN THE SUSTAINABLE DEVELOPMENT OF MODERN SOCIETIES"

São Paulo - Brazil - November 21-23 - 2007



13h30-14h30**23rd November 2007****Sessão 6A
Sala 1**

"Eco Industrial Park Development in Rio de Janeiro, Brazil: Paracambi EIP" - Presenter: Lilian Bechara Elabras Veiga (UFRJ)

"Industrial Ecology, Production and Environment: a discussion about interconnectivity of production" - Presenter: Alessandro Sanches Pereira (UNICAMP)

"Industrial Ecology: are there companies without symbiosis possibility?" - Presenter: Valéria Madeira (UNICAMP)



Eco Industrial Park Development in Rio de Janeiro, Brazil: Paracambi EIP

Lilian Bechara Elabras Veiga, D.Sc^a, Alessandra Magrini, D. Sc^b.

^{a,b} *Programa de Planejamento Energético, Instituto de Pesquisa e Pós Graduação em Engenharia Alberto Luiz Coimbra, Universidade Federal do Rio de Janeiro (PPE/COPPE/UFRJ), Rio de Janeiro, Brasil.*

E-mail: lveiga@ppe.ufrj.br; ale@ppe.ufrj.br

This paper presents the Eco Industrial Park (EIP) concept, an environmental management tool that is being spread in many nations around the world as an industrial model that can reconcile the three "Es" of sustainability – environment, social equity and economic efficiency - as it reorganizes industrial practices and activities in order to meet sustainable development goals.

Although being an emerging concept, there are many EIP projects being implemented, and many of them already operating in North America, Europe, Asia, Central and South America, including in Rio de Janeiro State (RJS), Brazil.

In Rio de Janeiro State (RJS) industrialization has brought wealth and development; however it has also brought many externalities. One of these externalities is the high level of industrial concentration, resulting in increasingly urban concentration, the damage and destruction of many environmental areas and in a high level of soil, air and water pollution. This unsustainable economic growth has increased resource consumption and environmental degradation. RJS government, looking for possible solutions to the disorderly industrial settlement and for possible ways to minimize waste management problems, inspired by international experiences, began to consider EIPs as a possible strategic planning alternative to achieve sustainable development. The EIP Program (Programa Rio-Ecopolo) was launched in RJS through the State Decree 31.339/2002, as a mean to foster sustainable development and to ameliorate the environmental, economic and social distress caused by unplanned urban and industrial development. The objective of this paper is to present the development of EIPs in RJS focusing on Paracambi EIP, located in Paracambi municipality, the only pilot project to be developed in a greenfield site. This paper also presents a methodology developed for planning Paracambi EIP. This methodology was developed based on studies and projects developed worldwide. The United States Environmental Protection Agency US-EPA software Facility Synergy Tool (FaST) was a major tool used in order to plan this EIP.

Today, five years after the EIP Program was launched, unlike what was expected, collaboration among the actors involved (government, public agencies, private institutions, industries, communities and university) has not evolved the way it should have. Changes in political administration interrupted public sector participation. From what has been accomplished to date, EIPs are at an early stage of development. We argue that RJS has the potential to create a sustainable industrial system in the near future. However, the continuity of EIPs will only be successful if we have a convergence of the actors' interests.

Keywords: Eco Industrial Parks, Sustainable Development, Industrial Ecology, Paracambi Municipality.



Industrial Ecology, Production and Environment: a discussion about interconnectivity of production

Alessandro Sanches Pereira ^a, Juliana C. Fontes Lima^b, and Emilia Wanda Rutkowski ^c

a. Universidade Estadual de Campinas, Campinas/SP, asanches@fec.unicamp.br

b. Universidade Estadual de Campinas, Campinas/SP, julianacfl@fec.unicamp.br

c. Universidade Estadual de Campinas, Campinas/SP, emilia@fec.unicamp.br

Industrial Ecology (IE) initiatives are presented by isolated strategies. As a result, there is a need to understand the eco-efficiency of approaches in order to plan strategically the IE implementation and to correct potential imperfections. One of the approaches is the Industrial Symbiosis (IS). This concept is based on synergy between different productive activities, which lead to a greater efficiency of resources uses allied with environmental and economical benefits. Contrarily to the IS concept, where all integrant are benefited locally, the Brazilian approach is based on supply/demand relations. Thus, the necessary information for this interrelation are: the logistic and the market information.

Keywords: Industrial Ecology; Industrial Symbiosis; Eco-efficiency.



Industrial Ecology: are there companies without symbiosis possibility?

Valéria Madeira

Universidade Estadual de Campinas, Campinas/SP, valeria.madeira@uol.com.br

Besides the majority of the definitions indicate that the geographical proximity is a key factor for Industrial Symbiosis, there are examples of synergetic relations between companies independently of their proximity. Some examples are presented in this paper allowing the conclusion that pursuing the environmental performance improvement at all activities, a company contribute in its pathway to sustainable development, independently of its geographical localization.

Keywords: Industrial Ecology; Industrial Symbiosis; Sustainable Development.



13h30-14h30**23rd November 2007****Sessão 6A
Sala 2**

"The Environmental and the Productive Process, the Worried About the Energy Management and the Productives Resources in São Paulo Organizations" - Presenter: Cristiane Jaciara Furlaneto (IMES)

"Industrial Ecology in the Environmental Public Policies Context" - Presenter: Alcir Vilela Junior (SENAC)

"Assessment of the Environmental Sustainability of a Coffee Farm" - Presenter: Ogura, Y. (UNIP)



The Environmental and the Productive Process, the Worried About the Energy Management and the Productives Resources in São Paulo Organizations

Celso Machado Junior^a, Cristiane Jaciara Furlaneto^a

a. Universidade Paulista, São Paulo, Universidade Municipal de São Caetano do Sul, São Paulo, cmachado@imes.edu.br, crisjaciara@unip.br

This article proposes to do a survey in some companies in São Paulo city and its surroundings in order to identify if their management resources, like a raw materials for example, have social- environment view. A social-environment view is possible to be identified by actions to control and reduce the resources used in the productive process or in some normal activities of the people who works there. The resources, subjects in this article are: the electric energy, the gas, the water. To do this article was necessary to known the approach off some writers concerning the evolutions states of environmental management in organizations to offer a condition to understand the main idea about this study. The methodology was developed in such a way to get a panorama from management environment to control and reduce the resources used in the productive process or in some normal activities. The information is showed in a set of graphics to enable an interpretation that a representative part of companies practices and its resources to improve the environment.

Keywords: Management practices, Enviromental Control, Social-Environment View



Industrial Ecology in the Environmental Public Policies Context

Alcir Vilela Junior¹, Fabíola Maria Gonçalves Ribeiro², Alessandro Sanches Pereira³

1. Centro Universitário Senac, São Paulo/SP, alcir.vilela@sp.senac.br

2. Universidade Estadual de Campinas, Campinas/SP, fabiolamaria@msn.com

3. Universidade Estadual de Campinas, Campinas/SP, asanches4@fec.unicamp.br

Industrial ecology offers a number of methods and approaches which offer much potential for the environmental public policies. The adoption of a systems perspective in environmental analysis and decision making could significantly improve environmental policies effectiveness. Therefore, adjustments in the legal and organizational framework as well a deep change in the public environmental management would be necessary.

Keywords: industrial ecology, environmental policy, environmental management.



Monitoring the Environmental Sustainability of a Coffee Farm

Ogura Y.^a, Giannetti B.F.^b, Almeida C. M. V. B.^c, e Bonilla S.H.^d

a. Universidade Paulista, São Paulo, yohisuke.ogura@pascaltec.com.br

b. Universidade Paulista, São Paulo, biafgian@unip.br

c. Universidade Paulista, São Paulo, cecivbg@terra.com.br

d. Universidade Paulista, São Paulo, shbonilla@hotmail.com

The Cerrado, a savannah region, is Brazil's second largest ecosystem after the Amazon rainforest and is also threatened with imminent destruction. A graphical tool was employed to assess the environmental performance of the production of coffee in a traditional farm in Cerrado region, Brazil. The graphical tool allies the properties of the equilateral triangle and the emergy concepts. The present study presents the environmental assessment performed in the farm located in Coromandel, Minas Gerais, Brazil. Results indicate that Brazilian green coffee production is adequated to environment index evaluated by other academic studies, about agriculture. They also allow to analyze production's data relative to environment indicators, in which can be observed an optimized production range with fine environment performance.

Keywords: coffee production, environmental account, emergy, ternary diagram



13h30-14h30**23rd November 2007****Sessão 6A
Sala 3**

"Environmental Management Promotion through Collaborative Activities: the Project Quatro+ Experience" - Presenter: Carina Henkels (FURB)

"The Industry and Environment" - Maria da Graça Saraiva Nogueira (UFPeI)

"Environmental Performance Evaluation as a Tool for Environmental Management" - Presenter: Marcelo Montaño (COC)



Environmental Management Promotion through Collaborative Activities: the Project Quatro+ Experience

Carina Henkels¹, Beate Frank ²e Anja Grothe-Senf ³

1. Universidade Regional de Blumenau, Blumenau, chenkels@terra.com.br

2. Universidade Regional de Blumenau, Blumenau, beate@furb.br

3. Escola Superior de Economia de Berlim, Berlin, angrothe@fhw-berlin.de

This paper describes the Project Quatro+, an experiment designed to promote cleaner production in small and medium size companies around the city of Blumenau. The project develops collaborative activities between university and companies, mainly workshops and consultancy. Production Engineering students take part in all steps of the project. The project is developed as part of a cooperation program between German and Brazilian Universities, financed by CAPES and DAAD. At the local level it is supported also by Municipal Environmental Foundation of Blumenau and by Regional Labor Agency. The results shown that the project succeeded in having management and technical improvements in the companies, and also in the organizational learning among the eco-teams. But the experience also had shown that the environmental laws are difficult to be understand and used by small and middle size companies.

Keywords: clean production, environmental management, learn organization.



The Industry and Environment

Jaqueline Dilly ^a, Maria da Graça Saraiva Nogueira ^b e Gilmar Casalinho ^c

a. Universidade Federal de Pelotas, jaquedilly@hotmail.com

b. Universidade Federal de Pelotas, graça.nogueira@ufpel.tche.br

c. Universidade Federal de Pelotas, gilmarcasalinho@gmail.com

The present work consists in the study of Sustainable Production Philosophies that, being used by Productive Organizations, in this case, the Transformation Industry, contributes with the environmental issue. As another priority, this work aims to emphasize facts and possible solutions to the environmental issues, having as background, the differences between environmental priorities according to countries development level. This work shows the relation between Industry and Environment, focusing the improvement of the production processes control in order to get a sustainable development that brings as consequence the reduction of left-overs as well as the important collaboration with the environmental issue. The importance of the Transformation Industry to the industrial sector and to the Brazilian economy is also discussed. As a result of this work it is possible to conclude that industries will only be able to contribute definitely with the environment when all of them re-evaluate their productive processes and adopt sustainable production philosophies.

Keywords: Sustainable Production; Transformation Industry; Environment.



Environmental Performance Evaluation as a Tool for Environmental Management

Danilo Fiori^a, Marcelo Montaña^b

a. Faculdades COC – Ribeirão Preto, danilo.fiori@gmail.com

b. Faculdades COC – Ribeirão Preto, marcelo_montano@coc.com.br

The present paper brings a discussion about the use of Environmental Performance Evaluation (EPE) as a tool for environmental management. Due to its characteristics, EPE can be coupled to other management instruments focused at the improvement of the efficiency at using raw materials and energy, like cleaner production. The paper presents a case study applied to a beverage company, sited near Ribeirão Preto, a large-sized district of São Paulo estate (Brazil). The paper concludes that the use of EPE as a support at decision-making process is helpful to organizations, especially if integrated to cleaner production methods.

Keywords: Environmental Performance Evaluation, environmental management, cleaner production.



13h30-14h30

23rd November 2007

**Sessão 6A
Sala 4**

"Improving Product's Environmental Performance by Integrating Ecodesign Methods into a Reference Model for Product Development Process" - Presenter: Daniela C. A. Pigosso (USP)

"Ecodesign and Cleaner Production: Production Innovation at the Furniture Sector" - Presenter: Marzely Gorges Farias (UDESC)

"Product Ecodesign model based on Life Cycle Assessment" - Presenter: Jurgis Staniskis (Kaunas University of Technology - Lithuania)



Improving Product's Environmental Performance by Integrating Ecodesign Methods into a Reference Model for Product Development Process

Daniela C. A. Pigosso ^a, Américo Guelere Filho ^b and Henrique Rozenfeld ^c

a. Universidade de São Paulo, São Carlos, daniela.pigosso@gmail.com

b. Universidade de São Paulo, São Carlos, agf@sc.usp.br

c. Universidade de São Paulo, São Carlos, roz@sc.usp.br

The rising consumption of products is at the origin of most of the pollution and resources depletion that our society causes. The environmental impacts observed throughout a product lifecycle are, to a large extent, determined during its development phase. Hence, taking environmental aspects into consideration during the product development process (PDP) phase plays an essential role in reducing product lifecycle-related environmental impacts.

Ecodesign can be defined as the systematic introduction of environmental concerns into PDP throughout the application of specific methods and tools. Despite the fact that the number of available ecodesign methods and tools has been increasing in the last decade, its implementation has not reached companies worldwide mainly due to the gap between eco-oriented and product-oriented researchers. The eco-oriented researchers fail to see PDP as a business process crucial to competitiveness, leading to partial and poor integration of ecodesign methods and tools into PDP, not generating the expected ecodesign competitive advantages. On the other hand, product-oriented researchers pay too little attention to environmental aspects, focusing generally on legal compliance and 'end-of-pipe' solutions due to little knowledge about ecodesign methods. This gap generates a lack of systematic use of ecodesign methods and tools in NPD leading companies to low levels of environmental performance.

This paper aims at proposing a systematic approach to bridge the aforementioned gap by introducing some ecodesign methods and tools into the early phases of a reference model for NPD, which is a way to structure activities in a business process. The ecodesign methods to be integrated have been selected through literature review using a structured classification method. The reference model, used as integration baseline resulted from experiences accumulated since 1990. The expected result is a set of NPD-oriented structured activities that can successfully combine environmental and business perspectives to help companies worldwide to follow the path of sustainability by making new and "green" products successful into the market. This paper presents some preliminary results conducted by the authors.

Keywords: Product development process, reference model, ecodesign, methods.



Ecodesign and Cleaner Production: Production Innovation at the Furniture Sector

Marzely Gorges Farias^a, Ângela da Silva^b, and Roberto Langer^c

a. Universidade do Estado de Santa Catarina, Santa Catarina, marzely@sbs.udesc.br.

b Moveis Neumann, Santa Catarina, angelasilva.neumann@terra.com.br

c. Universidade do Estado de Santa Catarina, Santa Catarina, betolanger@yahoo.com.br

This article has as objective to demonstrate the importance and the results of the process of integration of the University of the State of Santa Catarina with the business sectors - in special, by means of the companies nets called "Local Productive Arrangements" at Furniture Sector, in the advances of the use of the concept of the Innovation, Ecodesign and Cleaner Production for the endorsement of the Sustainable Regional Development.

Keywords: cleaner production, innovation, Ecodesign, local productive arrangement, Furniture Sector



Product Ecodesign model based on Life Cycle Assessment

Prof. hab. dr. Jurgis Staniskis ^a, MSc. Visvaldas Varzinskas ^a

*a. Institute of Environmental Engineering, Kaunas University of Technology, Lithuania
justa@ktu.lt; visvarz@ktu.lt*

Product life cycle thinking is essential in the path to sustainability by expanding the focus on the production site to the whole product life cycle facilitates the links between the economic and environmental dimensions within a company. Life cycle thinking is about widening views and expands the traditional focus on manufacturing processes to incorporate various aspects associated with a product over its entire life cycle.

Implementation of environmental requirements into product development is important both from an environmental and business perspective. The most directly achieved benefit is the reduction of environmental impacts from increased levels of consumption, in other words the mitigation of causes of environmental problems both at global and local level. Ecodesign (also design for the environment, life cycle design, environmentally-conscious design) is the systematic methodology that incorporates environmental considerations into the design process of products.

At the heart of eco-design is the concept of the product life cycle. Product life cycle starts with resources taken from nature, goes on to the production of materials and manufacturing processes, packaging and transport, the use and maintenance of a product and finally concludes at the end-of-life stage. The term life cycle thinking refers to the integrated approach that has to be applied with the aim of designing more environmentally compatible products.

The investigation studies of applying Eco-design model in Lithuanian industry have been done in the framework few international projects, academic and scientific research. The main objectives of the study were to make analysis of eco-design situation in Lithuania, to create dynamic model for systematic use of different tools for the environmental product development and to apply this model in the process of creation of new products in Lithuanian industry.

Keywords: Life Cycle, Ecodesign, Product development, Environmental performance



13h30-14h30**23rd November 2007****Sessão 6A
Sala 5**

"Management of Aspects and Environmental Impacts in the Production and Transport of Chemical Products: Study of Case"
- Presenter: Sara Regina Allebrandt (UNISC)

"Cleaner Production Program in the cut sector of a textile industry" - Presenter: Flávia F. Rubino (UFF)

"Sustainable Development Under the Optics of the Vectors of the Sustainability: Case Study in an Company of Perfumery and Cosmetics" - Presenter: Marcos Macri Oliveira (UFPB)



Management of Aspects and Environmental Impacts in the Production and Transport of Chemical Products: Study of Case

Jonas Álvaro Kaercher ^a, Sara Regina Allebrandt ^b, Jorge André R. Moraes ^c e Ênio Leandro Machado ^d

^a Universidade de Santa Cruz do Sul, Santa Cruz do Sul-RS, jonaskaercher@hotmail.com,
sallebrandt@gmail.com, jorge@unisc.br,

This work had as objective, to evaluate and to provide an improvement in the ambient performance in a line of production of one determined organization, located the 100 km of Porto Alegre, Brazil, manufacturer and transporter of chemical products. For this method GAIA was applied, in order to evaluate the ambient management of aspects and impacts. The proposal of the method was to offer to the organization an instrument of management for the improvement of the ambient performance of the same one, since the focus of the GAIA is to develop a critical conscience in the people who compose the organization on the levels of wastefulness of substances cousins and insumos of the productive process and on the effect to the environment and the people. The method consisted of the application of a questionnaire that was the base to suggest alternative of improvements.

KeyWords: Method GAIA, Environment, Environmental Aspects, Environmental Impacts, Continuous Improvement.



Cleaner Production Program in the cut sector of a textile industry

Flávia F. Rubino ^a, Juacyara C. Campos ^b,
Lídia Yokoyama ^c, Dilri S. A. Batista ^d

a. Universidade Federal do Rio de Janeiro, Rio de Janeiro, ffrubino@yahoo.com.br

b. Universidade Federal do Rio de Janeiro, Rio de Janeiro, juacyara@eq.ufrj.br

c. Universidade Federal do Rio de Janeiro, Rio de Janeiro, lidia@eq.ufrj.br

d. FIRJAN, Rio de Janeiro, dbatista@firjan.org.br

One of the largest challenges of the organizations is to keep the competitiveness in the global market in a sustainable way and to assist the need to minimize the environmental impacts. Like this, this paper has as objectives the application of the Cleaner Production in the section of cut of a big textile industry, in way to modify old habits of the company. Through the minimization of the generation of residues and better use the raw material, they are obtained environmental and financial benefits. So, the enterprise will be fortified. Cleaner Production in the cut sector of the textile industry reached the economic benefit about R\$ 550 thousand; improvements in the system of information; beyond the awareness on the part of the company of the importance of the employees training.

Keywords: Cleaner production, Sustainable development



Sustainable Development Under the Optics of the Vectors of the Sustainability: Case Study in an Company of Perfumery and Cosmetics

Aline Cristina de Araújo F. Silva^a, Marcos Macri Olivera^b, Hilton Freire do Nascimento^c, Sônia Feitoza^d

a. Universidade Federal da Paraíba (PPGEP), João Pessoa, alinelibaraujo@yahoo.com.br, macri.uniul@gmail.com, hiltonfreire@gmail.com, sonia.feitosa@gmail.com

The business management based on the sustainability is one of the great challenges of the enterprises inserted in the Capitalist System. In this context, the objective of this article is to describe a case study on as a private organization observes and uses the concepts of the sustainability, treating it like stout beginning of his actions. This one presents a checking of the theory that permeates the sustainable development, based on the vectors of the sustainability: economical, social and environmental, co - making a list of such a checking to posture taken for the studied enterprise, in adherence to this strategy of survival in the long term. For so much, there was launched hand of bibliographical inquiry and collection of secondary data, of public character, which, analysed, gave a description aligned with the objective of the article. As result, one identified that the enterprise carries out actions that contemplate all the vectors of the sustainability.

Keywords: Sustainable development; Sustainability; Vectors of the Sustainability.



23rd November 2007

14h30-16h Conference

Pedro A. Ochoa George

Cienfuegos University, Cuba.

**“The Cleaner Production as tool
for the development of the
environmental strategy of a
Centre of Higher Education”**



The Cleaner Production as tool for the development of the environmental strategy of a Centre of Higher Education.

Pedro A. Ochoa George

Cienfuegos University, Cuba.

This conference has as objective to share the experience of the University of Cienfuegos, Cuba, to promote similar strategies in diverse scenarios linked to the socio-environmental problem that you/they propitiate the exchange and improvement of ideas, concepts and actions guided to achieve a sustainable development.

The Agenda 21 is a call to the application of strategies of sustainable development and the realization of participative processes with the purpose of reaching the necessary social consent for the environmental improvement of the environment.

Anything impedes, but just the opposite that other institutions, as the own University, begin similar processes in their respective intervention spaces.

The concretion of the scientific thought in useful elements for the humanity is achieved, in the fundamental thing, by means of the work of the graduate university students. But it is in fact the result of that work, or the associated collateral effects, what impacts negatively from diverse ways to the environment and the society. It is imperative then to provide to the students and graduates of the universities an environmental education chord with the level of the Higher Education that allows them, so much to identify as solving the socio-environmental problems related with their professional chore. The Environmental Strategy of the University of Cienfuegos is conceived keeping in mind the Mission of the University, the



relationship between Science-Technology-Society and the Cleaner Productions as the tool that allows solving, from the curriculum of the students, the mentioned problems.

The Environmental Strategy of the University Cienfuegos tries, therefore, of linking the performances in environmental matter from the institution to the spirit and the letter of the Calendar 21 of the United Nations, opening a participative process dedicated to guide the curricular activities toward the sustainable development. With this goal the Environmental Strategy of the University of Cienfuegos precise a series of objective that the university community can assume to develop, within the campus and outside, the corresponding tasks for the sake of the sustainable development.

The Cleaner Productions (CP) of goods and services are essential so that the concept of sustainable development becomes reality. For such a reason, the principles of the CP have been declared explicitly like centre of the Environmental Strategy of the University of Cienfuegos.

On the other hand, a social responsibility of the consequent university institutions exists with its paper of space of the knowledge, researching and teaching that it cannot be ignored and that it is exemplified in its environmental responsibility. The university can and it should have an own role in the diffusion of the environmental concern and in the contribution of solutions to the socio-environmental conflicts within the campus and outside. The focus that the CP offer in the solution of such environmental conflicts also allows to obtain economic benefits. From the perspective of the University of Cienfuegos (UCf) this focus non single search reduction of costs and of environmental impacts, but rather leaving a vision of the relationship Science-Technology-Society (CTS) it implies, also, to keep in mind to the social actors that intervene in these processes.



One of the most complex challenges that faces the society is related with the preservation of the ecosystems in that is inserted, since the activity antrópica is an important component of environmental degradation. This determines cultural, given behaviour patterns the man's participation in all the production systems and of administration of the services, as well as their implications in the current problems and of the future planning of the social and economic development in the particular region in that they unwrap their activities, reason why is of the biggest importance the study of the interaction relationships between the tecnospher and the society in the search of the knowledge of such interactions to be able to face successfully, and to give him appropriate solution, to the contradictions arisen among these elements, coordinating this way the sustainability of the development with the social and environmental impacts that it causes.

It is in this complex scenario that the Environmental Strategy of the Ucf is framed guided to achieve the long term sustainability of the activities, so much of the own campus as of the Sector of Production and Services (SPS), looking for a bigger life's quality of the inhabitants' of the province of Cienfuegos, by means of solutions that they allow systematically to improve the use of the raw materials, the materials, the water and the energy entered to the processes, at the same time that they reduce the generation of residuals that cause a negative environmental impact.

The Environmental Strategy of the Ucf was conceived and it elaborated starting from the diagnosis of necessities of the socio-environmental problem, and the reorganization of the theoretical and methodological treatment of the possible ways of solution of this.

In the development of such a strategy students, professors and workers of the university are involved, as well as scientific



experts of institutions of the territory and of the own companies of the province. This transdisciplinary conception of the strategy looks for, to increase the environmental awareness of the professionals in the province, as well as to provide to the graduates of the universities a such knowledge that allows them so much to identify the environmental problems related with its professional chore, as giving solution to such problems by means of the systematic application of the principles of the CP, what contributes to the reduction of the costs of the Higher Education and of the SPS and to the reduction of the environmental impacts of the own University like of the SPS in the province and to the increase of its profitability, that which, additionally, fix the bases for the development of a net of experts in CP in the province to maintain a comprehensive and systematic work in this sense.



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"THE ROLE OF CLEANER PRODUCTION IN THE SUSTAINABLE DEVELOPMENT OF MODERN SOCIETIES"

São Paulo - Brazil - November 21-23 - 2007



23rd November 2007

16h30-18h Closing Conference

**Fernando Cardozo Fernandes
Rei**

Director President

Company of Technology of Ambient
Sanitation-CETESB

**"São Paulo State's Initiatives
Towards Achieving Sustainable
Development Through Cleaner
Production "**



São Paulo State's Initiatives Towards Achieving Sustainable Growth Through Cleaner Production

Fernando Cardozo Fernandes Rei

President CETESB - Companhia de Tecnologia de Saneamento Ambiental

Since the time of its inception, almost forty years ago, CETESB – Companhia de Tecnologia de Saneamento Ambiental [São Paulo State's Environmental Agency] has always adopted a strategic vision aimed at implementing the most up-to-date environmental policies possible to achieve its mission of safeguarding the State's environmental quality. In this way, the most modern approaches available have been periodically introduced, once its adaptability to the local conditions was acknowledged.

Thus, there was a first phase in which CETESB had to opt for a heavy emphasis on Command and Control actions, in order to be able to cope with a scenario of high regional environmental degradation levels, stemming from São Paulo State's haphazard industrial and populational growth process taking place along the early 20th Century. Today, certain names such as “Operação Branca” (Operation White-out) , “Caça-fumaça” (Smoke Busters) or “Projeto Cubatão” (The Cubatão Project) are considered as important landmarks in the history of Brazil's environmental initiatives, having achieved outstanding results. Meanwhile, it is also becoming obvious the Command and Control framework presents some limitations, be it regarding to the high costs involved, the tendency to just concentrating or transferring pollutants among the different media (solid liquid or gaseous), to bring increased resource wastage, or due to its potential for causing serious conflicts among its several stakeholders. Additionally, it may also occur instances in which



the application of those methods alone are not being deemed effective enough to safeguard environmental quality.

Following this rationale, from the 1990's on, the State Government (through CETESB) started to show increased interest on Cleaner Production (CP) initiatives as an effective and non-regulatory way to promote environmental sustainability, to be used in scenarios or situations in which the traditional approach alone would not yield satisfactory results. In this way, several important initiatives took place during 1996, including the institution of a dedicated CP unit within its structure, and cooperation agreements with the USEPA and with the Canadian Government involving staff training on the theme. From the program's inception on, its philosophy has always been towards cooperation with the productive sectors, be they industrial or otherwise. One of the main strategies used has been the direct work with trade associations of those sectors deemed most important for contributing to improve the State's environmental conditions.

Another important step has been the founding of the São Paulo Cleaner Production Roundtable. In just about five years, the Roundtable has been serving as an important forum for discussions and information exchange on the theme. The validity and legitimacy of its initiatives are ensured by its condition of being an assembly of multi disciplinary stakeholders, permeating all the society sectors involved on this issue.

Important achievement milestones have been the enactment of the São Paulo Letter on Pollution Prevention/Cleaner Production – which functions as an important incentive to sustainable development initiatives – as well as the sponsorship of numerous meetings, workshops and conferences that during the last few years, which have helped



disseminate the CP themes and concepts throughout the State's society.

The São Paulo Cleaner Production Roundtable is now on the threshold of a whole new phase in its development, since the accomplishment of its mission is currently requiring some degree of structural and institutional changes, which will serve to optimize its functioning. This is going to include its effective formalization process and the official consolidation of its operational rules, which – as expected – is going to greatly improve the scope of its services to society.

A retrospective analysis on this last decade clearly shows the progress achieved in terms of posture changes of several of the Brazilian industrial sectors, which are now much more proactively searching for ways to manage their environmental issues. They have understood that effective resource management strategies are the key to the improvement of their image to several strategic consumer markets. In this way, it is now possible for us to watch the onset of numerous valuable CP initiatives, either individually or through joint ventures, be they industrial sector-to-government or partnerships between two sectors, or even between industrial sectors and NGO's. Today are becoming commonplace such activities as joint CP Programs, waste exchange markets, etc.

It is also now very easy to see an increasing number of businesses whose environmental policies are clearly aimed at an environmentally excellent condition, going much beyond the requirements stipulated on the environmental legislation. The NGO's also tell us about victorious environmental initiatives, the result of work by many young organizations whose work has actively contributed towards the increased conscience about the importance of the Sustainable Production and Consumption concept.



Taking into account this scenario, the State authorities – cognizant about its role to foster environmental improvement – are currently being challenged to fully incorporate CP as an environmental policy instrument.

The first step in this way has been the enactment of legislation to incorporate CP requirements to the environmental permitting process. According to that stipulated on State Decrees #47397/2002 and #47400/2002, which rule on renewable environmental permitting activities in São Paulo State, the verified application of CP measures to an industry's processes (when checked with environmental performance evaluation indicators) may qualify that industrial unit for grants of extended permits. This is going to serve as an important incentive for businesses to revise their environmental policies in order to include even more conservation practices. In this way, it is expected there is going to be an ample revision of the State permitting process, with the implementation of the "Unified Environmental Permitting Process" (as stipulated on SMA Resol. #22, of 05/16/2007) and the adoption of the "Simplified Environmental Permitting System" (SILIS). It is expected the use of those new simplified procedures will eventually become a very healthy habit. In retrospect, CP initiatives such as those discussed along this Conference clearly vindicate the concept; together, concepts like CP and Sustainable Consumption are but two facets of a same process that in time may lead to São Paulo State's sustainable development.



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