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5th

INTERNATIONAL WORKSHOP

ADVANCES IN CLEANER PRODUCTION

"CLEANER PRODUCTION TOWARDS INTO SUSTAINABLE TRANSITION"

Advances In Cleaner Production

CONFERENCE PROCEEDINGS

São Paulo - Brazil - May 20th-22nd - 2015

Universidade Paulista - Campus Indianópolis

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Conference Proceedings

May, 20th to 22nd 2015
São Paulo, SP, Brazil

organized by

UNIP UNIVERSIDADE PAULISTA | Programa de Pós Graduação em Engenharia de Produção
Mestrado e Doutorado

in participation with

P2 National Prevention Polution Roundtable

"El saber de mis hijos hará mi grandeza"

Cleaner Production

THE UNIVERSITY OF WINNIPEG

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Organizational Experiences Reports

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Organization

PPGEP-UNIP – Post-Graduate Program in Production Engineering of the Paulista University
NPPR – National Prevention Pollution Roundtable
UNISON – Universidad de Sonora
JCP – Journal of Cleaner Production
The University of Winnipeg

Support Agencies

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Acknowledgments

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Hans Schnitzer
Graz University of Technology, NAWI – Austria

Jeremy Hall
Beedie School of Business, Simon Fraser University - Canada

Donald Huisingh
University of Tennessee - USA

Steve DeVito
Environmental Protection Agency – USA

Sergio Ulgiati
Parthenope University - Italy

Marcus Emmanuel Mamana da Matta
EcoAdvisor Associated - Brazil

Massimo Gastaldi
University of L'Aquila – Italy

Weslynne Ashton
IIT Stuart School of Business| Illinois Institute of Technology

Thank you the authors and to all the participants who have made this event possible. Special thanks are addressed to the UNIP's support committee. We could not refrain from expressing our gratitude to the FAPESP, and CAPES for the financial support.

Special thanks are addressed to Dr. Yugo Okida, the Vice-Rector of Post Graduation and Research of Universidade Paulista, Dr. Marília Ancona-Lopez, the Vice-Rector of Graduation of Universidade Paulista, and to Dr. Marina Soligo, Main Coordinator of Post Graduation and Research of Universidade Paulista, for their unconditional support.

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Message of Welcome

On behalf of the Organizing Committee, I have the honor to welcome for this opportunity to 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 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

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Presentation

The Post-Graduate Program in Production Engineering of the Paulista University (**PPGEP - UNIP**) is the organizer of **5th International Workshop Advances in Cleaner Production** (in São Paulo, Brazil, 2015 May 20th to 22nd) in participation with **NPPR, UNISON, JCP and The University of Winnipeg.**

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.

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, companies, 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 the discussion of crucial importance on "**Cleaner Production Towards a Sustainability Transition**".

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Objectives

The event has as central theme **Cleaner Production Towards a Sustainability Transition** with the aim to promote:

- The exchange of academic information
- The presentation of recent results
- The discussion of common problems and their possible solutions
- The increase of the contact among academic knowledge and corporative experiences
- The discussion of the event's theme "Cleaner Production Towards a Sustainability Transition"

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Program

Time	May 20th, 2015 (Wednesday)	May 21st, 2015 (Thursday)	May 22nd, 2015 (Friday)
8:00 to 9:40	**Reception**	**Oral Presentation (5A)**	**Oral Presentation (6A)**
9:40 to 10:00	**Opening ceremony**	**Break**	**Break**
10:00 to 10:30		**Workshops:** How Does the Recent Base of the Pyramid (BoP), Social innovation and Entrepreneurship Discourse Align with, contributes toward and/or conflict with Sustainable Development? **Jeremy Hall** Good/Best Practices for Waste Prevention, Reuse, Recycling **Sergio Ulgiati** Can We Achieve Sustainability? How to Build Utopian Ideals **Asher Kiperstok**	**Workshops:** How to Measure/Assess Sustainability in the Future Post-Fossil Fuel Society? **Donald Huisingh** Towards a sustainable transition in cities **Hans Schnitzer** Advancing the Use of Pollutant Release and Transfer Register (PRTR) Data and Information: What PRTR Data Users Really Want! **Steve DeVito and Marcus da Matta** Occupational Health and Safety: towards a sustainable production **Nora Elba Munguia Vega**
10:30 to 12:00	**Opening Conference:** Resource efficient and clean urban technologies **Hans Schnitzer** *(Graz University of Technology, NAWI, Austria)*		
12:00 to 13:30	**Lunch**	**Lunch**	**Lunch**

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Program

Time	May 20th, 2015 (Wednesday)	May 21st, 2015 (Thursday)	May 22nd, 2015 (Friday)
13:30 to 15:00	**Conference:** Developing and Diffusing New Technologies through Eco-value Propositions **Jeremy Hall** *(Beedie School of Business, Simon Fraser University – Canada)*	**Conference:** Why do YOU think YOU can change the future of society? **Donald Huisingh** *(University of Tennessee – USA)*	**Conference:** Defining the Role of Pollutant Release and Transfer Registries (PRTR's) in Global Sustainability **Steve DeVito** *(Environmental Protection Agency - USA)*
15:00 to 16:30	**Oral Presentations (4B)**	**Oral Presentations (5B)**	**Oral Presentations (6B)**
16:30 to 16:50	**Coffee break**	**Coffee break**	**Coffee break**
16:50 to 18:50	**Plenary Presentations:** Pollutant Release and Transfer Register in Brazil **Marcus E. M. da Matta** *(EcoAdvisor Associated - Brazil)* A WTE Strategic Analysis in Italy **Massimo Gastaldi** *(University of L'Aquila – Italy)* Cleaner production in the Americas: Education Challenges and Outlook **Weslynne Ashton** *(Illinois Institute of Technology (IIT) Stuart School of Business - USA)*	**Launching of the Advances in Cleaner Production Network**	**Closing Conference:** Growth, De-growth and Circular Economy. A Resource-based Perspective on Sustainability **Sergio Ulgiati** *(Parthenope University of Naples – Italy)*
18:50 to 19:50			**Closing Ceremony and Cocktail**

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Conferences

and

Oral Presentations

20th May 2015

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

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20th May 2015

10h30-12h00 **Opening Conference**

Hans Schnitzer

Graz University of Technology, NAWI - Austria

Resource efficient and clean urban technologies

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Resource efficient and clean urban technologies

Hans Schnitzer
Graz University of Technology, NAWI - Austria

Cities will be the power plants of the future. Over 50% of the world's population life in cities, about 65% of the resources are used there and 70% of the emissions are caused by them. And more and more people move to cities for employment and livelihood. It is obvious therefore that the transition to sustainable energy systems has to start here. So far cities have been getting energy from outside. All power plants and refineries are situated far away from the largest consumer. This system is both expensive and volatile. While discussing the possibilities of energy transition in urban areas, reduction in energy demand has to be considered first. It is not mainly technologies that have to be developed, but overwhelmingly the systems that need to be considered. These systems require short distances to minimize energy transportation. Above all, houses have to be energy effective (with a minimum of heating and cooling). Next, renewable energies have to be harvested on site. Solar systems on roofs and facades go hand in hand in integrated small-scale wind turbines. The development of smart energy grids for power and heat/cold including storage facilities will be one of the main system-related challenges.

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20th May 2015

13h30-15h00 **Conference**

Jeremy Hall

Journal of Engineering and Technology Management and Beedie School of Business, Simon Fraser University - Canada

Developing and diffusing new technologies through eco-value propositions

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Developing and diffusing new technologies through eco-value propositions

Jeremy Hall
Journal of Engineering and Technology Management and Beedie School of Business, Simon Fraser University - Canada

The presentation will investigate legitimization processes and organizations' strategies for developing and diffusing new technologies. Strategies that fail to consider legitimization processes, especially in controversial social environments, could result in costly delays or promising technology left sitting on the shelf. Conversely, socially beneficial attributes of a new technology may provide an 'eco-value proposition' that may act as compensation for what could otherwise be initially unviable commercially. Drawing on cases in transgenic technology for agriculture, forestry regulations, resins, carbon fibers and food additives, I provide a framework to help managers develop eco-value propositions for more efficient technology development and diffusion. Identifying key technological, commercial, organizational, and societal uncertainties during the early phases of the technology's development can help identify deficiencies as well as providing propositions how they might be overcome.

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20th May 2015

15h00-16h30	Session 4B	Room 1

Design of Cleaner Production Frameworks: an Operational Tool for Sustainable Transition

Diagnostic of Cleaner Production in the Industrial Sector

Energy Efficiency; A Step Towards Cleaner Production. An Integrative Case Study of the Meat Processing Industry in Hermosillo, Sonora

Cleaner Energy Production and Sustainable Investments: A Portfolio Analysis in the Italian Electricity Market

Tendencies of Environmental Performance of Brazil

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Design of Cleaner Production Frameworks: an Operational Tool for Sustainable Transition

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Abstract

Growing out of macroeconomic agenda, streamlined resource efficient cleaner production guidelines emphasizes more than ever on the importance of organizational sustainability. The cohesion between resource efficient cleaner production and social and environmental responsibility policies also suggests that if institutionalized, cleaner production guidelines rooted in the concepts and depositions of sustainability could result in development of strategic managerial frameworks with micro and macroeconomic benefits. Appropriately, and in support of such principle, this paper suggests development of an interconnected managerial framework that can translate general principles of sustainability into formulation of the resource efficient cleaner production guidelines. The applicability of the proposed approach was tested in a pilot study in Costa Rica. While emphasizing on the importance of the local policies and perceptions of the internal and external stakeholders, results highlighted the need for institutionalization and customization of the frameworks according to organizational type, size, culture, capability, capacity and location. Although universal, the proposed framework could be specifically instrumental to the developing nations aiming at a sustainable transition.

Keywords: *Sustainable development goals (SD), Sustainable transition, Corporate social responsibility (CSR), Cleaner production (CP), Costa Rica.*

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Diagnostic of Cleaner Production in the Industrial Sector

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Abstract

This report sets out the findings, recommendations and benefits expected for the industry, through developed CP studies, at eleven companies from different industrial sectors, made by Engineering Students from Rafael Landívar University, to strengthen their knowledge and skills in CP applied to their discipline and increase the adoption of best practices in cleaner production and sustainable development, participating at small and medium-sized enterprises (MSMES). The activity is part of the program Academic Social Responsibility (RSA), and the research areas of the Faculty: productivity, energy, environment and food security. This should apply the students' knowledge acquired during their career, evaluating and proposing improvements with solutions focused on cleaner production and sustainable development in different companies, as well as recommendations to be followed in the future for its implementation and/or continuity. The authors acknowledge the support of the "Pathways to Cleaner Production in the Americas" project in development of CP activities at University. This initiative is funded by the U.S. Department of State, under the "Pathways to Prosperity in the Americas" initiative, through Higher Education for Development (HED). The authors are solely responsible for the contents of the article. The development of this activity was supported by the technical cooperation agreement signed between the University (URL) and the Guatemalan Cleaner Production Center (CGPML), with the aim of promoting and facilitating the implementation of better practices for cleaner production and sustainable development. The students participated in CP training activities and sustainable development. Diagnosis gave the participants opportunities for production improvement, achieving integration between the industry and Academia.

Keywords: *academic social responsibility, cleaner production, sustainable, small and medium enterprises development, production practices and environmental performance*

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Energy Efficiency; A Step Towards Cleaner Production. An Integrative Case Study of the Meat Processing Industry in Hermosillo, Sonora

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Abstract

The efficient use of resources within industrial systems is a key aspect to consider in order to achieve sustainability, this perspective leads to the necessity to integrate production practices that incorporate economical, ecological and social perspectives limiting the negative impact of industries toward the environment (Blenginin and Shields, 2011). In matters of resource efficiency, energy to empower production processes is now a priority, correspondingly, there is a relevance on the reduction of the use of energy and its negative impacts towards the environment such as carbon emissions. Therefore the intersection of cleaner production and energy efficiency is reinforced as a more integrative approach to achieve sustainability (UNEP, 2004). This work shows the results of the application of energy efficiency audit with the objective to reduce the negative impacts to the environments due the operation of a meat processing industry. In order to increase efficiency and upgrade its competitiveness.

Keywords: *energy efficiency, cleaner production*

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Cleaner Energy Production and Sustainable Investments: A Portfolio Analysis in the Italian Electricity Market

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Abstract

The recent climate change, global warming, environmental disasters and the economic crisis are only the first signs of the failure of an economic system that, for too long, shows an uncontrolled utilization of the planet wealth. The Italian electricity market, which is strongly dependent on hydrocarbons, only in recent years has seen a first attempt to change towards renewable resources for electricity production aimed at self-consumption and for feeding into the grid. This paper presents an economic analysis whose purpose is to evaluate the sustainability of investments in renewable technologies for the production of electricity. Each renewable source has its own profitability dependent on a number of factors and subject to market fluctuations, cost and frequent changes on the incentive policies. Applying Portfolio Theory is it possible to select the right mix of renewable energy sources to be included within the renewable energy balance and simulate its evolution. Moreover the presented analysis can be useful for energy planners to select future green scenarios finalized to the reduction of emissions and energy imports through the increasing use of renewable energy.

Keywords: *Renewable Energy Sources, Portfolio Analysis, Sustainability, Sharpe Index.*

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Tendencies of Environmental Performance of Brazil

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Abstract

The regional systems depend on natural resources and resources from the economy to produce goods and services, however,such systems have been sustained by the use of natural resources, which putstheirsustainability at risk. The process depletes the environmentalresources, thus causing divergence between economic development and environmental protection. Thus, it becomes necessary to create policies that can minimize the use of those resources without compromising economic growth. This paper aims to monitor the environmental performance of Brazil by using environmental accounting indicators in emergy, in order to provide subsidies to the development of sustainable public policies that are geared towards economic and environmental sustainability. The results of the environmental accounting in emergyof Brazil for 2011 were compared with those published by Demetrius (2011);such results show that the nation's environmental performance has worsened from 2007 to 2011 as the use of renewable resources fell from 41% to 22%; the use of non-renewable resources has been intensified to a rate of 43%; the environmental load rose from 3.5 to 1.5, and the sustainability index rose from 4.6 to 2.2. In addition, the use of renewable resources, non-renewable and economy was monitored using the emergyternary diagram. It wasverified that the Brazilian economy has been developingeconomically underan increasing use of non-renewable resources.

Keywords: *Environmental accounting emergy.Use of natural resources, Environmental performance of Brazil, Regional systems.*

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20th May 2015

15h00-16h30	Session 4B	Room 2

Green Seal and Cleaner Production for the Furniture Sector: A Theoretical Discussion

Cleaner Production Criteria and Project Management Maturity: A Structural Equation Modeling Analysis in Brazilian Industries

Ecological Cost Account Application in a Lean Manufacture Brazilian Automotive Project

The Influence of Services on the Environmental Accounting of a Small Business Manufacturer of Auto Parts in São Paulo State

Energetic Inventory in Automotive Industry

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Green Seal and Cleaner Production for the Furniture Sector: A Theoretical Discussion

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Abstract

The furniture companies start to adopt a new approach incorporating the environmental variable in their strategic decisions as a way to gain competitive advantage in the market. Thus, the pursuit of sustainability shall constitute a new market opportunity. Obtaining a Green Seal has been one of the ways that companies found to present themselves as green companies. In Brazil, the furniture sector is at a more advanced stage due to be a sector with export profile and have to meet the new requirements of international trade. This work aims to discuss the prospects of the adoption of green seal for the furniture sector based on Cleaner Production methodology as a way to adapt and obtain green label. The theoretical discussion presented in this paper will serve as a basis for the research project of the Industrial Engineering Program at Federal University of Bahia - PEI / UFBA with the Clean Technology Network - TECLIM aiming to get the Doctor's degree in Industrial Engineering from *one of the authors.*

Keywords: *Green Seal, cleaner production, furniture sector.*

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Cleaner Production Criteria and Project Management Maturity: A Structural Equation Modeling Analysis in Brazilian Industries

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Abstract

Cleaner Production (CP) is an important mean to systematic reduce losses of both product reuse and manufacturing processes. For the successful implementation of CP is essential to ensure effectiveness of factors that can influence this process, such as identification of used decision criteria together with an effective methodology for managing the implementation strategies of projects in order to reach the expected results. Based on the relevance of the themes, this research has the objective of measuring relationships and correlations between constructs criteria of CP, Project Management Maturity and Success CP, considering the moderating effect of Business size. This study tested 238 manufacturing industries. For the analysis and data interpretation we used the Structural Equation Modeling methodology, which was implemented by a descriptive research method. The survey results show relationships strength and correlations between the constructs, contributing to the research of CP as well as presenting a new research area that can support the assertiveness of management actions.

Keywords: *Cleaner production, Decision criteria. Project Management Maturity, Brazilian Industry, Structural Equation Modeling*

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Ecological Cost Account Application in a Lean Manufacture Brazilian Automotive Project

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Abstract

Currently, the society has demanded attitudes from companies to reduce environment impacts derived from manufacturing processes and to reduce emissions from greenhouse gases. The Ecological Costs Accounting (ECA) is a theory for the companies to measure these impacts and then apply practices to solve them in an economically feasible, with social attitude and environmentally friendly. Thus, this study aimed to apply the Lean Manufacturing practices together with ECA's theory in an automotive company, in order to verify their gains in Economic, Social and Ecological Dimensions. Thus, a study of case was developed in a Brazilian automotive company, in which was implemented a Lean Manufacturing project and their economic, social and environmental gains in seven years period. The obtained results show that it is possible to mix Lean Manufacturing practices with ECA's theory, in order to minimize company's social and ecological impacts. It was verified that the company obtained a cost reduction about R$ 118 thousand/year, improving their image for the society and reducing employees efforts, reducing their emissions in 481 t of CO_2, which can be commercialized as carbon credits and there was a reduction of electrical energy consumption over 2.803 thousand kW/year.

Keywords: *ecological costs accounting, lean manufacture, environmental credits, reduction of environmental impacts*

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The Influence of Services on the Environmental Accounting of a Small Business Manufacturer of Auto Parts in São Paulo State

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Abstract

Small companies usually have no influence on the decisions taken along the supply chain and have to adapt their production processes in accordance with the decisions taken by the chain leading companies. The idea of evaluating products in the supply chain perspective to help reduce the environmental and socioeconomic impacts associated with manufacturing has been explored. So far, there are no studies considering the various types of small businesses that arise in the sphere of influence of large supply chains in order to fill the gaps or serve customers with special needs. This study evaluates two products, using emergy synthesis and regarding the use of environmental resources and energy of a small company operating in the Brazilian market of automotive replacement, with special attention to the influence that services provided by third parties have on the production model.

Keywords: *Emergy. Automotive aftermarket. Use of resources. EmPrice.*

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Energetic Inventory in Automotive Industry

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Abstract

The constant automobile production growing in Brazil has lead the society and industries to review the concepts of product and process development, including environmental concerns. In Brazil, automotive industries develop their products using tools like Eco-Design (DfE – Design for Environmental), (DfR – Design for Recyclability), (DfD – Design for Disassembly) in a shy way. However, lean tools that reduce the production time are widely used. For environmental impact process researches Life Cycle Assessment (LCA) is the methodology that best adapts to this kind of approach for allowing ecological and economic feasibility studies. The main objective of this paper was to perform a Life Cycle Inventory (LCI), restricted to electric power consumption, in a needle roller bearing manufacturing process. The manufacture of this roller bearing comprises 3 production steps: internal and external rings manufacturing, needle manufacturing and cage manufacturing. Considering only the power consumption of the equipment used in the roller bearing manufacturing, the rings production represents 69%, needle manufacturing 27% and cage manufacturing 4%. The heat treatment furnaces used consumes 58% of all electricity used inf the roller bearing production and should be the main focus concerning environmental impact reduction.

Keywords: *Life Cycle Assessment, Life Cycle Inventory, automotive industry, Roller bearings*

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20th May 2015

15h00-16h30	Session 4B	Room 3

Ambiental Valoration and Energy Generation with System Subproduct of Urban Solid Waste for Pirolysys

Sustainability in the Process of Sugar Cane of Reception in Plant Sugarcane

Environmental Performance Comparison of Two Microalgae Oil Production Routes

Renewable and Sustainable Clean Energy Technology Managment of Biomass Waste for Fuel and Food

Dynamic Model for Evaluation of Sustainability of Brazilian Ethanol Production: Elements for Modeling

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Ambiental Valoration and Energy Generation with System Subproduct of Urban Solid Waste for Pirolysys

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Abstract

The biosphere's capacity to absorb the waste generated by society has been long overcharged. Every year it is generated around 1.8 billion tons of urban solid waste (USW) in the world. Brazil produces 7.5 million tons and disposes 58.3% in landfills, and the rest is deposited in controlled landfills and open dumpsites. The appropriate USW management problem has showed to be a challenge, as factors such as quantity, volume, variety and complexity of waste entail risks for human health and the environment. Regulations implanted in Brazil in 2010 encourage the adoption of new alternatives for waste treatment and the development of clean technologies as a way to minimize environmental impacts, as well as technologies that aim to the urban solid waste's energy recovery. In this sense, this study uses the emergy synthesis to evaluate a pioneer USW treatment system in Brazil – the Natureza Limpa Project – installed in the municipality of Unaí in Minas Gerais state, where the slow pyrolysis treatment for urban solid waste is applied. The indicators justify that the system is capable of performing gains in joules of energy (J) and emergy (sej) and presents great potential not only for waste treatment in Brazil, but also as a promising energy source, which is capable to assist on the energy demand by means of the exceeding production of 2.3 tons of charred urban waste, which is capable of producing $3.25x10^3$ joules of energy per gram of treated waste.

Keywords: *Emergy, USW treatment, pyrolysis, Natureza Limpa Project*

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Sustainability in the Process of Sugar Cane of Reception in Plant Sugarcane

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Abstract

This study identified the gaps of the segments of the industries with the largest application opportunities of Lean Thinking (PE), so that it could deepen this opportunity effectively by the sugarcane segment, which is included among those who make intensive use of water for the development of their activities, relies largely on the use of water resources, requiring the management of agribusinesses enter the theme in their corporate strategic priorities. This article covered the production process of the plant and the attention back to the sugarcane cleaning procedure on receipt of this raw material, and straw, if separate from reception, could possibly be used as an energy source and, once separated, may also improve the performance of the production process. In this sense, the search for alternatives that eliminate waste in the factories is of strategic importance, and reuse wastewater or replace it with another sugarcane cleaning option becomes a requirement for the development of a sustainable business. The research method used came from an exploratory literature review for the survey of the main concepts of lean production in order to provide the necessary basis for the implementation of Lean Thinking to eliminate waste. For the applicability was conducted a study of multiple cases. The contribution of this work is to point out that the integration of Lean Manufacturing with the Green Manufacturing is a successful way for companies, and analyze through comparative studies, the procedures adopted in the production system that could possibly indicate viable economic solutions in order to support environmental and social gains.

Keywords: *Sustainable Production, Lean Manufacturing, sugarcane plant.*

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Environmental Performance Comparison of Two Microalgae Oil Production Routes

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Abstract

Among the various types of biodiesel surveyed, one type is biodiesel produced from biomass of microalgae oil. It has potential to be a promising biomass in the production of biodiesel since microalgae present great accumulation of lipids and fast photosynthetic growth when compared to other vegetable crops. Its production includes four main steps: cultivation of microalgae, biomass separation, oil extraction and transesterification. The present study aims to compare the environmental performance of the extraction step by wet and dry route. It was used the life cycle assessment (LCA) technique for comparative decision-making in case of the practice being adopted on a large production scale. In addition, simulations identified the points of environmental improvement of processes. The scenarios created and the analyses carried out indicated that the most critical point of the dry route is the great amount of electricity involved in step of biomass drying and this must be targeted for optimization. In the wet route, the use of citric acid was shown to be more problematic and is recommended to find alternatives for replacing this substance by another with the same function and lower impact. On both routes, the recovery of the solvent hexane showed environmental benefits and additionally in the wet route, ethanol recovery must occur in order to improve the performance of the process. For decision-making about which route to take, it is evident that the dry route presents major advantages.

Keywords: *Life Cycle Assessment (LCA), Microalgae Oil, Biodiesel*

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Renewable and Sustainable Clean Energy Technology Managment of Biomass Waste for Fuel and Food

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Summary

Sustainable Development using waste disposal problems should reach acceptable limit of technology impact within the period of assured economic coverage. then also the obtained results of the project developed need to be more relevant that can be used in real scale evaluations bioeconomy from waste.Energy demand and the price for energy is increasing day by day everywhere as global economic problems. Renewable energy from waste is one of the alternative source which can be use parallel to conventional energy resources. Agro industrial wastes pose a major concern today due to the increase of production with time and thus needs ecological solution using principle of closed loop via reuse, recycle and renewal of the material and nutrient flows. This paper deals with tools and methods used to make the small process system design for power and gas production , and also the process optimization for waste minimization using biodrying, biomethanation and bioscrubbing integrated to autothermal gasification process developments.The overall objective of the project is to make possible an internationally oriented collaborative Brazil and India research competency in biomass waste based zero emission biofuel technology with co-products valorization. The project aim is also to study both technological feasibility and economic prospects for new zero emission waste to power .Also the power to biomethane gas was focused with the help of networking and big data of integrated digital incubator of process technology researchers. viable projects design development using google online real time team work using google online tools The system design use Bio thermal process, hydrogen and methane biofuels and internal combustion (IC) engine. For this problem an integrated system, industrial and ecological using the clean Small Integrated Process Systems (SIPS) was used.The Zero Waste,, cleaner product design and green chemistry concept was also applied to the process design using the three basic principles. The first principle is to use all components of the biological organic materials of the wastes. The second principle is to obtain more co-products from the wastes.The third principle is to close the loop via reuse, recycle and renewal of the material and nutrient flows made possible using google spreadsheet and software superpro designer v.4.9.New synergetic concepts of integrated closed loop innovative bio thermal process system have been developed in this work for the integration of renewable power methane plants in biogas plants as wel as bio electrcity power . Pyrolysis system integrated with fuel cell need more investment compared to internal exhaust engine heat recovery systems l as well as bioelectrcity , biogas , feed for animal from micro algae .Thus this integrated biosystem developed will improve the bio economy local development based on the aquatic plants to reduce significantly carbon using the solar energy available in tropical country.

Keywords: *Bioenergy, biogas, biosystem, Bioeletrcit ,biohydrogen.*

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Dynamic Model for Evaluation of Sustainability of Brazilian Ethanol Production: Elements for Modeling

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Abstract

System dynamics is an approach to analyze the behavior of complex systems, such as the productive chains, strictly considering the inherent characteristics. This approach is based on mathematical concepts of nonlinear processes developed in mathematics and physics and consolidated in engineering. The concepts inherent in this approach assists in creating a mathematical model which represents a production chain by using computer simulation. Thus, the main objective of this paper is to present the formalization of the dynamic model of assessing the sustainability of Brazilian ethanol production, its borders (external environment) and the scenarios needed for a deeper understanding of relation of cause and effect, causal loops and diagrams of flows and stocks as a result of the awareness stage, with regard to understanding the problems involved, the survey methodology known as design science.

Keywords: *ethanol, system dynamics, sustainability*

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20th May 2015

15h00-16h30	Session 4B	Room 4

Geochemical of Volcanic Rock Powder Sample from Serra Geral Formation: An Important Remineralizer

Assessment of Soil Fertility and the Elements Nickel, Chromium, Lead and Cadmium in Soil Cultivated with Coffee for Ten Years using Limestone Compared to the Use of Agrosilício® and these Two to Soil Under Natural Vegetation

Evaluation of a Wastewater Treatment System for Constructed Wetland with Aeration Step

Fenton's Reaction by Sulphide Oxidation on Coal Mining Rejects

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Geochemical of Volcanic Rock Powder Sample from Serra Geral Formation: An Important Remineralizer

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Abstract

Geochemical and mineralogical characteristics of volcanic rock residue, from a crushing plant in the Nova Prata Mining District, State of Rio Grande do Sul (RS), Brazil, in this work named rock powder, were investigated in view to define its potential application as soil amendment in agriculture. About 52,400 m^3 of mining waste are generated annually in the city of Nova Prata without a proper disposal. The nutrients potentially available to plants were evaluated through leaching laboratory tests. Nutrient leaching tests were performed in Milli-Q water; citric acid solution 1% and 2% (AC); and oxalic acid solution 1% and 5% (AO). The bulk and leachable contents of 57 elements were determined by Inductively Coupled Plasma Mass Spectrometry (ICP-MS) and Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP-AES). Mining waste was made up by CaO, K_2O, SiO_2, Al_2O_3, Fe_2O_3, and P_2O_5. The analysis by X-ray diffraction (XRD) showed the major occurrence of quartz, Ca-plagioclase, cristobalite, sanidine, and augite. The water leachable concentrations of all elements studied were lower than 1.0 mg/kg, indicating their low solubility. Leaching tests in acidic media yield larger leachable fractions for all elements being studied are in the leachate of the AO 1%. These data demonstrates that volcanic rock powder is a potential natural fertilizer for agriculture in the Mining District of the Nova Prata, Rio Grande do Sul, Brazil.

Keywords: *mining waste, volcanic rock, particle characterization, leaching of nutrient, nutrient availability*

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Assessment of Soil Fertility and the Elements Nickel, Chromium, Lead and Cadmium in Soil Cultivated with Coffee for Ten Years using Limestone Compared to the Use of Agrosilício® and these Two to Soil Under Natural Vegetation

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Abstract

Before Christ, the application of residues in agriculture was already a common practice. steel slag can be used for acidity correction. However, the soil contamination is a problem. The objective of this study was to analyze an area where Agrosilício® (steel slag) was applied comparing to two areas (one with no correction and another one with limestone application). The soil samplings were done in native forest areas and coffee plantations, one area managed only with limestone application and another with Agrosilício®, both with ten years of application of the products. The sampling depths were 0-5; 5-10; 10-15; 15-20; 20-30; 30-40; 40-60; 60-80 and under 80 centimeters, in two repetitions. It was analyzed routine fertility and the elements: boron, chromium, nickel and cadmium. Limestone and Agrosilício® showed similar results for the analyzed features.

Keywords: *heavy metals, native forest, silicon, steel slag, soil amendments*

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Evaluation of a Wastewater Treatment System for Constructed Wetland with Aeration Step

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Abstract

The constructed wetlands (CW) represent an increasingly used way around the world for the wastewater treatment, this technology is based on natural processes of nutrient cycling and degradation of organic matter in the wastewater at similar rates found in nature. The CW have satisfactory efficiencies in the removal of compounds such as organic matter, has low power consumption and operational simplicity, however, may require significant areas for construction and show instability in the removal of nutrients like phosphorus and nitrogen. The objective of this work is to demonstrate the initial performance of a wastewater treatment system by evaluating the physical and chemical parameter settings carried out in a bench scale apparatus treating synthetic substrate. The system consists of septic tank, decanter, free aerated flow wetland and wetland drowned vertical subsurface flow. Efficiencies were obtained up to 89% removal of organic matter in terms of TOC, 87% of total nitrogen removal and 8% free of phosphorus.

Keywords: *constructed wetlands, aeration, wastewater treatment, nitrogen removal.*

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Fenton's Reaction by Sulphide Oxidation on Coal Mining Rejects

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Abstract

Fenton's reaction is used in acceleration weathering test for sulphides associated with Brazilian Coal Mining Residues (CMR), that are vulnerable to oxygen and water during the mining of coal. TEM and SEM/EDX were used to determinate the origin, occurrence and ordering of minerals in remaining coals and other lithological units, before and after applying the test. Oxidation of CMRs was analysed by determination soluble sulphur (sulphate) and dissolved metals by ICP-MS or ICP OES. As dissolved sulphate increases, dissolved Zn, Cd, Cu and Co concentrations increase, conducting to undetectable amounts in the remaining solid phases; dissolved Ni and Mn also increase with the mobilized sulphur, but the remainder in the solids is the most relevant fraction; Fe and Pb are not mobilized due to precipitation as jarosite or hematite in the case of Fe or as sulphate in the case of Pb. Agreement between the observed results and the predictions by geochemical modelling is discussed. The accelerated weathering procedure based on Fenton's Reaction has shown the release of toxic metals from the sulphide fractions associated with coal residues. The use of SEM/EDX, TEM, XRD, ICP-MS and ICP OES analyses were conducted on various samples from the Santa Catarina coal region with the aim of improving the understanding of the mineralogy and geochemistry of CMRs. The measurements were conducted on the original materials as well as on the materials left after applying the accelerated oxidation by hydrogen peroxide. Accordingly with the theoretical predictions by geochemical modelling, the experimental results demonstrate the effective oxidation of pyrite, as well as the other metal sulphides, by hydrogen peroxide within a short time period complete after 72 h. In terms of relative mobility (% of total metal released during the test), Cu, Co, Cd and Zn appear as metals of high mobility, liberating practically all total content. The released concentration of Ni and Mn increases as sulphate increases but a considerable concentration of both metals remains immobile in the solid phases. The Fe presentes a relatively lower release, because it suffers processes of further immobilization after pyrite oxidation, even at lower pH values, due to secondary mineral precipitation, such as jarosite; this fact considerably limits its mobility. Finally, Pb presents a practically null mobility and it does not represent a risk of potential contamination even in samples with high sulphide concentrations due to the possible formation of insoluble lead sulphate.

Keywords: *Fenton's Reaction, accelerated weathering, coal mining residues, environmental impact*

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20th May 2015

15h00-16h30	Session 4B	Room 5

Backcasting and Sustainability: A Bibliometric Contribution

Cleaner Production : A Bibliometric Study in Scopus Data Base

The Peasantry and Environmental Management: Limits and Perspectives

Study Notes on the Brazilian Amazon Countryside

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Backcasting and Sustainability: A Bibliometric Contribution

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Abstract

Given the global needs for sustainable movement aligned to the concept of the Triple-Bottom-Line of Elkinton (1998) emerges the need for strategic planning and real engagement of stakeholders groups regarding the turning actions towards visions of the future, this is the approach known as backcasting. From these references, this paper aims to give an overview of the academic literature on backcasting for sustainability, describing trends, authors and the main topics discussed. The methodological approach used was a literature review with bibliometric analysis techniques and content analysis. Searches were conducted in the scientific database *ISI Web of Knowledge*. The initial sample for analysis consisted of 101 published articles between 1985 and 2014, expanded to the references cited in these articles. The sample was analyzed with respect to the evolution of publications, citations, identification of key journals, authors and works. To content analysis and main themes, proceeded to a selection based on the categorization promoted by the database and reading the abstracts, resulting in a total of 31 articles. The results indicate a significant increase of published papers and citations over the period. Models of backcasting studies identified in the literature converge: commitment and involvement of stakeholders; use of interactive modeling tools, workshops, questionnaires, interviews, etc. as well as efforts to monitor and stimulate the dissemination of social learning. Most studies focus on countries like the United Kingdom, Canada, the Netherlands, Spain and Sweden

Keywords: *Backcasting, Sustenability, Framework, Stakeholders, Bibliometric study.*

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Cleaner Production: A Bibliometric Study in Scopus Data Base

GIACCHETTI, M. C. M. [a*], AGUIAR, A. O.[a]

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Abstract

Environmental issues have influenced the industry regarding changes in their production processes to minimize environmental impacts. The growth of this concern has enabled many researchers to develop scientific research on cleaner production practices, making enough frequent theme. In order to understand the scientific literature on this topic, we performed a bibliometric study. The analysis was divided into three periods: until 1999, from 2000 to 2009 and from 2010 to 2014. Information on the articles were obtained from Scopus. It was possible to evaluate the main authors of published works, the main journals, the productions took place a year and the keywords associated. Among the most productive authors, there is a great permeability of the area because only one of the authors figured in the list of the most productive in the three periods. The application of Lotka's law that the distribution of articles by authors adheres to the model, although over time there is a change in the shape of the curve due to changing patterns. Among the journals there was a significant predominance of the Journal of Cleaner Production and a scattering among periodicals related areas, showing the interdisciplinary aspect of the area. The study of keywords indicated a recent increase approach of practical issues and specific environmental issues such as biodiesel and biofuels.

Keywords: *clean production, bibliometrics, scopus, lotka*

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The Peasantry and Environmental Management: Limits and Perspectives

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Abstract

The peasantry is a political force; perhaps the most important force which obstacles capital expansion in agriculture. Historically, the peasantry has demonstrated that the transformative and revolutionary force developed by capital advance in agriculture could not solve economic, social, political and cultural problems. The peasantry needs to recreate itself in order not to submit to the laws of capitalist accumulation, as well as not to see its original potential environmental and social effectiveness supplanted and destroyed. This work aims to broaden the understanding of the environmental management principles historically developed by the peasantry as a way to expand the alternatives through which obstacles are turned into levers that unblock paths through the strength of their autonomy, their independence, their leading role and their resistance. This paradigmatic debate is a necessary condition for the reading of the agrarian status for trying to understand how the autonomy of the peasantry production is established. The self management developed in small production is a result of accumulated knowledge transmitted from generation to generation in relation to access to land, water, seeds and local skills. This allows the peasant to perform agriculture his own way, using low external inputs, favoring the use of local resources, as well as the effective use of land, water and biodiversity. Based upon a dialectical approach, it was possible to clarify the evolutionary trends of agriculture, the development of the peasantry and its strategies and mechanisms for social, cultural and economic reproduction.

Keywords: *peasantry, environmental management, remake strategies.*

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Study Notes on the Brazilian Amazon Countryside

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Abstract

Since June of 2003 we have worked as consultant in native Amazonian communities. Our goal with this article is to describe our experiences as a consultant and researcher in the largest tropical forest on earth. To that end, we organized our arguments describing the authoritarianism of the development policies in the Amazon, the top to bottom policies, the reverse accountability, the reproduction of poverty hand in hand with the environmental destruction and, finally, on new paths, we make our final considerations. Our methodology is based on facts witnessed over these years, without subtracting the viewpoint of an economist as a social scientist. Our in loco experiences allowed us to observe how the development institutions operate, how the social-political game is played in the interior of the Amazon, and how the communities deal with their limitations in political and economic representation. Our final considerations work toward bringing greater autonomy to the people who live in the communities. Even though they are poor, the people who live in the native Amazonian communities don't need philandering NGOs, inefficient development institutions and shameless policies. Thus, we work toward policies without middlemen, dealing with the families directly, without necessity of bookers or Amazon experts.

Keywords: The Amazon, Communities, Governance, Environment.

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20th May 2015

15h00-16h30	Session 4B	Room 6

Analysis of Metal Chip Recycling Methods Contaminated Considering Approaches to Eco-Efficiency and Eco-Effectiveness

Absence of the Impact of the Loss of Biodiversity in LCA Studies of Sustainable Construction: Unfamiliarity or Leniency?

Life Cycle Assesment – Comparative study of extruded Aluminium profile and Polyvinyl Chloride (PVC)

Sustainable IT: Waste Reduction through Technological Innovation - ATM CX3 Project

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Analysis of Metal Chip Recycling Methods Contaminated Considering Approaches to Eco-Efficiency and Eco-Effectiveness

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Abstract

The Brazilian law requires that the proper disposal of industrial solid waste is mandatory of the generator. However, due to ignorance or lack of professionals in the environmental area on business, this issue becomes one of the main difficulties encountered in order that the manufacturing process generates, in most cases, waste and environmental impacts, which do not receive the due attention. In other hand, this waste can be utilized as an alternative source to increase eco-efficiency and as a larger object to eco-effectiveness, reducing the impacts, increasing the economic and environmental efficiency and contributing to sustainability. The metal-mechanical sector also faces the problem of environmental management, need urgently adapt to the production process, innovative technologies to act in order to achieve sustainability. Thus, the aim of this study is to evaluate the eco-efficiency and eco-effectiveness of the methods used in the cleaning of metallic chips contaminated with cutting fluid metallurgical enterprises. So, a study on the reuse of aluminum chips was done by analyzing the cleaning methods used, the method efficiency, the allocation if cannot be reused and evaluated within the aforementioned characteristics, which is the most eco-efficient and/or eco-effective. This review was performed by criteria identified in the literature, to which you can evaluate methods as eco-efficient and eco-effective. In practice found only eco-efficient methods, and among them, some with eco-effective practices. The results show that the culture of repair, reuse, recycle and intended instead to promote actions such as the remodeling of a production system in a closed cycle where no waste generation is now even more practical and realistic. Nonetheless, it is clear that eco-efficient and eco-effective principles improve the environmental performance of companies, reducing expenses related costs for inputs, raw materials and disposal of waste, and contribute to achieve higher levels of sustainability.

***Keywords**: Eco-efficiency; Eco-efectiveness; Metalurgy; Metallic Chips*

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Absence of the Impact of the Loss of Biodiversity in LCA Studies of Sustainable Construction: Unfamiliarity or Leniency?

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Abstract

Fundamental part of the LCA methodology, the definition of environmental impact categories does not usually incorporate in studies related to constructive sustainability, biodiversity loss. Among the reasons, it can superficially suppose a few reasons: the complexity of the issue, the difficulty of valuation, the anthropocentric view of society, ignorance of the importance of ecosystem services for the maintenance of the balance of the planet, among others. This paper recognizes the complexity of the issue and understands that there is no way to ignore the responsibilities of the Brazilian construction sector by the large participation in the deterioration of the natural environment framework. In this sense, using the exploratory research, seeks to deepen another possible cause: the lack of experts in sustainable buildings.

Keywords: *Biodiversity, Sustainable Building, LCA, Environmental Impact*

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Life Cycle Assesment – Comparative study of extruded Aluminium profile and Polyvinyl Chloride (PVC)

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Abstract

The growing concern about the quality of the environment has driven the development of new techniques to support decision-making in companies, aimed at creating new models of production and selection of materials that are environmentally sustainable and economically viable. Among these new techniques, stands the Life Cycle Assessment (LCA). The LCA identify and quantify is a systematic form the materials flows, energy, wastes, and emissions caused during the product life cycle, allowing quantify previously the potentials environmental impacts. In this paper was made a comparative LCA between two materials used in the automotive industry: Aluminum profile Vs. Polyvinyl Chloride (PVC). Those materials were compared using the bulkhead's profile manufacturing process, showing the characteristics of each one and the most relevant importance about the mains environmental indicators: Energy Consumption, and potential environmental impacts. For this, were modeled two scenarios of product´s manufacturing process, having as main variable the number of recycling aluminum and PVC. The results showed that the energy consumption in the aluminum life cycle was 494 times higher than for PVC. Additionally, the impacts categories Ecotoxicity water acute, Ecotoxicity water chronic, Human toxicity air, Human toxicity soil, Human toxicity water, Human toxicity water, Photochemical oxidant potential, were responsible for 90% higher impact for on the aluminum comparatively with the PVC, considering the recycling scenarios modeled. These results are presented gave mainly due to the amount of resources required for the production of aluminum. Therefore, the bulkhead profile for use in the studied (Automotive Industry) should be produced in PVC, so that environmental impacts are minimized in support of environmental sustainability.

Keywords: *Life Cycle Assessment, PVC, Aluminum, Environmental Performance, Automotive Industry.*

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Sustainable IT: Waste Reduction through Technological Innovation - ATM CX3 Project

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Abstract

Sustainable Information Technology, also called Green IT, has become known for its applicability mainly to reduce energy consumption; nevertheless, its practices and principles cover other pillars such as the equipment disposal and life-cycle analysis of IT products in order to reduce possible environmental damages. Thus, this paper aims to analyze how sustainable innovations or eco-innovations offered by Green IT can contribute to reduce the generation of waste hazardous to both health and the environment. To do so, this study, based on a literature review, used as its object of study the ATM CX3 Itautec Project, awarded by Industry Federation of São Paulo State (FIESP) in 2007, and listed as case of success, according to Benchmarking Brazil, ranking of the best Brazilian environmental management initiatives. The main results point out that the company has followed the most important international guidelines and practices related to sustainability in this industry, and the company has been acknowledged by this, however the adoption of these initiatives has caused an increase on production costs.

Keywords: *Information Technology (IT), Sustainable IT, Green IT, Ecoinnovation, Life-Cycle Analysis*

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20th May 2015

15h00-16h30	Session 4B	Room 7

Sustainability in the Process of Nail Care and Beauty in Beauty Salons in São Paulo

Analysis on the Status for Cleaner Production in China

Pathways to Cleaner Production in the Americas: Educational initiatives towards a Sustainable Transition

A Cleaner Production Process of Sodium Dichromate Via Pressure Oxidative Leaching of Chromite

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Sustainability in the Process of Nail Care and Beauty in Beauty Salons in São Paulo

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Abstract

In the last decade, there has been an increase in the number of salons that perform the service of beauty and care of the nails. This economic activity has many benefits, but it is not without negative impacts, because during their development both occupational and environmental hazards are generated, so prevention is an important task; however, there are factors that limit and/or prevent the practice of this prevention. This paper presents the implementation of the first two stages of a Sustainable Services Program, based on the approach of Cleaner Production and Pollution Prevention in seven salons in the city of São Paulo. During the first stage, the culture of sustainability was fostered in salon owners, same that was embodied in the environmental policy developed. During stage two, inventories and procedures were analyzed for identifying hazards; the results showed physical (lighting), chemical (volatile organic compounds), biological, and ergonomic risks; during the final phase of this stage a Sustainable Plan Services was written where various measures were proposed for prevention, elimination and/or reduction, as well as training on occupational health and environmental care of the people who work within salons, thus contributing to the formalization of this type of business, and conducting their activities in a sustainable manner.

Keywords: *Nails, beauty, risks, sustainability, cleaner production.*

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Analysis on the Status for Cleaner Production in China

CHANGBO,Z. [a], ZI, L. [a,*], JINGJUN, L. [a], XIAOAO,WANG. [a], YANYING, B.[a], GANG, F.[a]

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Abstract

Cleaner production (CP), especially in the field of industry, is a key factor in achieving sustainable development in China. Chinese government made great efforts on implementing the strategy of sustainable development. Cleaner production has made remarkable achievements, and gained recognition world widely. Cleaner production has become a core policy of pollution prevention in China, while its meaning and connotation are continuously developing. After being implemented for more than 20 years in China, great progresses have been made in CP policies, capacity building and technical support system. In this study, unique set of practices of CP in China, including were analyzed, to summarize the main experience of CP implementing for other developing countries.

Keywords: *Cleaner production; Pollution prevention; Cleaner production policy*

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Pathways to Cleaner Production in the Americas: Educational initiatives towards a Sustainable Transition

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Abstract

The Pathways to Cleaner Production in the Americas project is a multinational effort aimed at facilitating the transition to sustainable industrial development in the region. The project incorporates multidisciplinary education in business, engineering, and environment as a collective response to the need for awareness of sustainability, technical competencies and innovative skills in industry across the Americas. Overall, this alliance helps generate a modern workforce to implement cleaner production practices, while also directly benefiting micro, small and medium enterprises (MSMEs) participating in the activities. Faculty members collaborate with industry professionals in their respective countries to lead their students in conducting energy, process and material audits, developing strategies for improving financial and environmental performance, and helping companies to implement these strategies. In addition, the universities host workshops for industry participants to learn about best practices developed through the project. In this report, we describe the project and the results obtained thus far, including faculty capacity building, student training and work with MSMEs in seven countries from Latin America and the Caribbean. We discuss the challenges, successes and lessons learned achieving the goals of the project.

Keywords: *Cleaner Production, Multidisciplinary education, Higher education, Sustainable Industrial Development*

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A cleaner production process of sodium dichromate via pressure oxidative leaching of chromite

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Abstract

Chromium compounds are important basic chemicals and find application in various industrial fields. The environmental problems resulted from the traditional production process of sodium dichromate have spawned worldwide public concerns. With a design objective to eliminate pollution at the source, a cleaner production process of sodium dichromate was developed, and the cleaner process has successfully achieved higher resource utilization efficiency and zero emission of the chromium-containing residue. In the cleaner process, the conversion from chromite ore to sodium dichromate includes four steps: (1) the pressure oxidative leaching of chromite ore with concentrated NaOH solution; (2) the extraction of NaOH with CH_3OH from the solid mixture of chromite ore leaching residues (COPRs) and sodium chromate crystal; (3) the distillation and recovery of CH_3OH from aqueous concentrated NaOH solution; and (4) the manufacturing of sodium dichromate from the COPR containing sodium chromate crystal. It was found that, under the optimal conditions, the chemical conversion ratio of trivalent chromium in chromite through Step (1) can be up to 95% or higher, the trivalent chromium content in COPRs is below 1.2% by weight (counted as Cr_2O_3), and the hexavalent chromium content in COPRs is even lower than 0.1% by weight (counted as Cr^{+6}). In Steps (2) and (3), the recovery efficiencies of NaOH and CH_3OH are as high as 96% and 98%, respectively. Especially, the final emission amount of COPRs is only 750 kilograms per ton of sodium dichromate product, much lower than that in the traditional soda-ash roasting process and no higher than that in the calcium-free roasting process. Based on the cleaner process, a demonstrative pilot plant with an annual capability of 5000 tons of sodium dichromate is to be built up in Huangshi City, Hubei Province, China. The cleaner process has exhibited a promising prospect in the industrial production of sodium dichromate.

***Keywords**: chromite, pressure leaching, sodium dichromate, extraction, CH_3OH*

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Conferences

and

Oral Presentations

21st May 2015

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

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21st May 2015

8h00-9h40	Session 5A	Room 1

Incorporation of Industrial Wastes in Bricks

Industrial Solid Waste Management and Cleaner Production, Case Study in Red Ceramic Industry

Incorporation on Expanded Polystyrene (EPS) Post-Consumer Packaging in Production of Concrete Blocks

More Sustainable Production of Concrete: Replacement of Natural Sand for Brita Powder Concrete Simple Cooking

Cleaner Production and Environmental Management as a Sustainable Product Innovation Antecedents: A Survey in Brazilian Industries

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Incorporation of Industrial Wastes in Bricks

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Abstract

This article presents a case study conducted as an experiment with the incorporation of different kind of wastes in the production of bricks (red building ceramics). Three types of wastes were directly mixed with clay: automotive waste sludge (AWS) containing concentrations of heavy metals, glass waste (GW) consisted primarily of microspheres (from a galvanic plant) and wood ash (WA) from a pottery furnace. The materials used in the formulation were analyzed by X-ray diffraction (XRD), X-ray fluorescence (XRF) and scanning electron microscope (SEM). They were separately dried, milled and then dry mixed. Water was added to contribute to the compaction process, to obtain the samples. Samples were dried and then heated to similar temperatures to those used in firing kilns bricks. The resulting ceramics were analyzed for dimensional and then subjected to flexural resistance test which presented results above of 4 MPa. To assess the environmental impact caused by the samples obtained, they were analyzed by XRD, XRF and SEM. At the end, leachability and solubility were realized to evaluate the chemical aspect of the obtained ceramic. According to Brazilian standards, the tested sample achieves the conditions to be classified as inert. In conclusion, it means that this new ceramic has conditions to be classified as capable to be produced. However, it is necessary to evaluate how a production in large-scale will behave.

Keywords: *industrial waste, recycling, environmental friendly materials,*

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Industrial Solid Waste Management and Cleaner Production, Case Study in Red Ceramic Industry

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Abstract

Waste management is a great importance tool for a company to get a cleaner production in the process . The importance of the application of this tool is given by the fact that, in addition to providing lower costs due to lower generation losses , contributes to the preservation of the environment. Therefore, in quantitative and qualitative, in the present study , we sought to quantify the loss in the production process of a ceramic industry . With that aimed to show the relationship that these data losses have with the generation of industrial waste, and identify the main waste generated in the production process. In addition, we sought to associate the management of solid waste with cleaner production. Thus, it was revealed the company has sought eco- efficiency in order to get better results during your process.

Keywords: *environmental management, environmental impact, red ceramic, cleaner production*

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Incorporation on Expanded Polystyrene (EPS) Post-Consumer Packaging in Production of Concrete Blocks

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Abstract

The worldwide production of expanded polystyrene (EPS) is over 92.95 million tonnes each year. The reuse or recycling of EPS still considered uneconomic due to its low market value, by taking up too much space and there are just a few recycling plants. Find an economically attractive solution for EPS is extremely necessary. The process of incorporate waste is one way to minimize environmental damage and reduce waste also providing cleaner production. With that in mind, this work aimed to evaluate the incorporation of post-consuming packaging of this material in the production of concrete blocks without structural purposes in construction. Samples were produced with triturated EPS from electronics packaging and food. Incorporating the waste produces concrete with compressive strength lower compared with the reference sample, it is observed that the incorporation of 50% of waste reduces by about 20% to 30% of the resistance bodies. However, the produced samples are in accordance with the values established by NBR7173, also produce lighter concrete blocks which can serve to seal and to be of great utility in construction.

Keywords: *Portland cement, expanded polystyrene, waste*

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More Sustainable Production of Concrete: Replacement of Natural Sand for Brita Powder Concrete Simple Cooking

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Abstract

The work in this paper was to analyze the technical and economic feasibility of substitution of natural river sand by crushed powder in the mixture of conventional concrete, checking to reduce the environmental impact through the use of crushed stone powder, show the feasibility of using the crushed powder conventional concrete dosage and present a more sustainable concrete dosage environmentally. The crushed powder has the advantage, in addition to being more economical in the composition of services, also because of its use delete a waste of crushing process giving a meaningful way, to reduce the damage caused by the exploitation of sand in riverbeds.

Keywords: *gravel, sustainable, concrete, sand, viability.*

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Cleaner Production and Environmental Management as a Sustainable Product Innovation Antecedents: A Survey in Brazilian Industries

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Abstract

Cleaner production (CP) methods and environmental management practices are tools that strive for production process efficiency, the use of its input and the generation of industrial waste. These tools can significantly contribute to sustainable product innovation, due to the rational use of natural resources and the minimization of generated wastes. This study aims to measure the relations between the conditions for sustainable product innovation, considering the constructs of CP and environmental management. It also examines the relationship between sustainable conditions and product innovation and financial performance as well as the size of the moderating effect of the companies on the relationship between the constructs. In this context, a Survey in 762 companies of different sizes was carried out in the metal-mechanic sector in Brazil. Structural Equation Modeling methods were used for results analysis. The results show that the constructs of CP and environmental management are important antecedents for sustainable product innovation, and relevant mediator of financial performance. Accordingly, the way for companies to produce new environmentally sustainable products is through the presence of cleaner production and environmental management practices. For the academic field, the make-up of a framework for the analysis of the relations of the categories constitutes the main contribution, as well as providing management information to decide on the implementation of sustainability programs, resulting in higher financial gains through product innovations sustainable.

Keywords: *Cleaner production. Environmental management. Innovation sustainable product. Financial performance. Brazilian Industry.*

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

21st May 2015

8h00-9h40	Session 5A	Room 2

Assessment of Energy, Global, and CO2 Emission Efficiencies of Sand Production from Construction and Demolition Materials

Contribution to the Electric Matrix of Brazil in 2050 - Decentralized, Cleaner, Efficient and Renewable

Global and Local Environmental Issues in Brazilian Semiarid, a Study Sertão of Moxotónning

Gas Mitigation Strategies Greenhouse In Brazilian Livestock

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Assessment of Energy, Global, and CO_2 Emission Efficiencies of Sand Production from Construction and Demolition Materials

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Abstract

At the same time in which the market of building construction generates gross domestic product (GDP) and collaborates with social-economical growth, it generates large load on environment due to materials and energy use as well as the waste generated. Among others, the building construction waste (BCW) deserves special attention because it corresponds to about 50% of total solid waste generated in the Earth. Specifically for the São Paulo city, Brazil, the BCW corresponds to about 66% in mass of total solid waste generated within the city, which demands high economic and energetic cost for its transport to landfills. In an attempt to overcome the resources wasteful, the use of BCW as raw material in producing sand for building construction could be considered as a good alternative, because usually sand corresponds up to 50% of total recycled BCW in mass. On the other hand, recycling BCW to produce sand also demands resources as materials, energy and labor to transport the BCW until recycling plant and in all other related processes as separation, size reduction, classification, and sand transport until final user. This work aims to assess the energetic-environmental performance of BCW recycling process in producing sand for building construction in São Paulo city. For this, energy analysis, emergy accounting (with an "m"), and global warming potential (GWP) are the methodologies used. Results indicate that energy efficiency (0.12 MJ/kg sand), global efficiency (3.09E10 seJ/kg sand) and the GWP (0.016 $kgCO_{2\text{-eq.}}$/kg sand) of recycled sand from BCW have better performance when compared to referenced values of sand produced traditionally from natural extraction. It is recognized the need of higher amount and diversity of referenced values for comparison, but these preliminary results indicate that recycling sand from BCW suggests, a priori, a good alternative in comparison with sand obtained from natural extraction.

Keywords: *Embodied energy; Emergy accounting; Global warming; Recycled sand.*

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Contribution to the Electric Matrix of Brazil in 2050 - Decentralized, Cleaner, Efficient and Renewable

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Abstract

There is an aggravated prospect in the Brazilian electricity production, due to a shortage of affluent energy in the hydric production, requiring a greater thermal use. For the future, the insertion of hydroelectric power plants predominantly without reservoirs will make this need even more evident. Due to the thermal structuring, there will be more emissions of greenhouse gases (GHGs) and consumption of fossil resources per unit of electricity produced. A model that does not align with the search for sustainable development. The objective of this paper is to present an alternative future scenario, elected 2050, of electricity supply in the country, beaconed on the acceleration in the use of renewable sources, premise postulated in alignment with the pursuit of sustainable development for the country. The "research, analysis and synthesis" is adopted, with a systemic approach, and applying the indicators elected the paramount to reach the goal. Part of author's doctorate thesis is synthesized, this systematized from data and information from different types of documents produced by international and national authors and organizations as well as governmental plans of expansion of electric energy production. From the theoretical and methodological framework adopted, the results obtained have shown that it is possible to establish a long term plan, based on the use of the available resources, with decreased social and environmental pressure, fossil consumption, and emission of GHGs per unity of energy produced. A greater participation of renewable sources is achieved, while the participation of hydric sources, the emissions of GHGs and consumption of oil-fuels are reduced. There is no increase in the production costs. The result is a decentralized, hybrid system with larger expansion of renewable thermal, wind and solar sources, larger participation of independent production – co-generation, auto-generation and distributed generation – and a diminished load on the transmission network, compared to the current scenario.

Keywords: *renewable energy; sustainable development; energy planning; energy efficiency; emissions of greenhouse gases.*

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Global and Local Environmental Issues in Brazilian Semiarid, a Study Sertão of Moxotó

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Abstract

Global environmental problems and local shape in daily challenges to the adaptation potential of people, by changes in their *modus operandi* and the advance of technology focused on possible solutions. However, to do so, there´s an initial need, realize and understand these changes. Among the identified areas that suffer greater consequences fruit climate change, we highlight the Brazilian semiarid region, which is to have lower rainfall and higher concentration of rainfall, which will set a worsening water security problems, food and nutrition present in the region. This article studies the environmental perception in the semiarid through a time series from 2009 to 2013, also seeking to understand the impact of university extension activities.

Keywords: *Environmental perception, Climate change, Social empowerment, Environmental management.*

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Gas Mitigation Strategies Greenhouse In Brazilian Livestock

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Abstract

Efficient practices for reducing emissions has a direct link between the intensity of greenhouse gas emissions and the efficiency with which producers use natural resources. Possible interventions to reduce emissions are largely based on technologies and practices that improve production efficiency levels in animals and herd. They include the use of a better quality and power balancing to reduce breakthrough emissions. Breeding improvement and animal health helps reduce flock overhead and related emissions. Management practices of waste to ensure the recovery and recycling of nutrients and energy contained in manure and improvements in efficiency of energy use over supply chains can further contribute to the mitigation.

***Keywords*:** *mitigation, greenhouse gases, livestock*

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21st May 2015

8h00-9h40	Session 5A	Room 3

Cleaner Production in a Steel Industry

Mitigation of Barriers to Implement Cleaner Production in a Small Metallurgical Company

Environmental and Economic Assessment of the Replacement of Grease based on Mineral Oil for Fiberglass fabric with Teflon® as Release Agent in Dubbing Process

Training in Cleaner Production Company in the Furniture Sector in the State of Alagoas

Your Role in Society

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Cleaner Production in a Steel Industry

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Abstract

This paper focuses on the efficiency of steel production process of a steel industry located in the Northeast of Brazil through the eyes of eco-efficiency that integrates the three aspects of sustainable development which are economic, environmental and social. Aims to analyze the critical inputs and residues from the point of view of industrial eco-efficiency according to the Cleaner Production program on your electric steelworks. It is work based on information obtained directly in the industry. Although steelworks (unit where it becomes pig iron or scrap in liquid steel) is one of the most critical units of the steel plant, where the slag is formed, which represents the largest amount of residue generated and the greatest financial waste, it was observed that the industry in question the use of slag as a co-product for the cement industry was the choice for process improvement. Considering that the scrap, pig iron and lime are the inputs with more expensive costs in steelworks, the process temperature control is a practice that allows the reduction of these inputs, and lower energy consumption. Another practice adopted in the steelworks is the purification of scrap. It follows, therefore, that the application of the Cleaner Production program provides a significant improvement in industrial processes, particularly the steel industry.

Keywords: *steel industry ,steelwork, sustainable development, eco-efficiency, Cleaner Production.*

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Mitigation of Barriers to Implement Cleaner Production in a Small Metallurgical Company

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Abstract

The Cleaner Production is an interesting approach to be applied in small and medium sized enterprises, providing viable alternatives for improvements in their manufacturing processes, generating both economic and environmental gains. It is a strategy that prevents environmental risks, allowing an increase in the efficiency of production processes, improving product quality and services. The aim of this study is to analyze if the opportunity to obtain economic performance with the adoption of Cleaner Production principles could motivate the managers of a small metallurgical company to deploy them. Specifically it aims to analyze the main barriers that affect the decision of implementing cleaner production and assess the possible economic and environmental advantages that this company could get. A case study using semi-structured interviews and analysis of data through environmental and economic evaluation was developed. For the environmental impact assessment it was applied the Mass Intensity Factor (MIF). The results showed that the economic, financial and technical barriers are the most striking ones. Furthermore, with the implementation of the Cleaner Production principles it was possible to reduce 83.8% of the losses in terms of water and oil consumption, resulting in cost savings of around 25%. This would make it possible to obtain economic gains for investment in machinery and equipment for reducing the environmental impact.

Keywords: *Cleaner Production, Barriers, Small and Medium Business, Economic and Environmental Advantage*

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Environmental and Economic Assessment of the Replacement of Grease based on Mineral Oil for Fiberglass fabric with Teflon® as Release Agent in Dubbing Process

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Abstract

The search of the companies by cleaner and more sustainable technologies has grown considerably. An alternative is the Cleaner Production actions (CP), aimed at non-generation, minimization or recycling. In this sense, this work aims to seek and apply CP concepts in the dubbing process of a company located in the metropolitan region of Porto Alegre. In this particular case, dubbing, also known as collage, is held in a cabine with cubic format, whose sticky material is polyurethane adhesive. As the adhesive is applied onto the substrate, which is done with a specific gun, as a result of that a mist formation occurs and therefore its deposition concentrate on the walls of the cabin. Eventually adhesive layers are formed which must be removed and discarded as waste. In order to prevent sticking and facilitate removal of this residue, the walls were covered with grease based on mineral oil, and which turned the contaminating residue as class I (dangerous). With stocks of CP, we sought to eliminate the need of grease. To assess the feasibility of modifying the bonding process, the economic and environmental evaluation was performed. A better option would be to remove grease by a product that act in the same way. A release agent was tested: fiberglass fabric with Teflon, an excellent non-stick. As the tests showed satisfactory results, the product was applied to the walls of the cabin and began to replace the grease. Thus, we observed a reduction of costs, reduction in cabin cleaning time, not generating waste grease, possibility of reuse of polyurethane residue, eliminating contact between the operator and grease, transforming a residue class I (dangerous) in a residue class II (not inert) and financial return of the amount invested in 1.1 months.

Keywords: *Cleaner production, Collage Booth , polyurethane adhesive, grease, Teflon®.*

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Training in Cleaner Production Company in the Furniture Sector in the State of Alagoas

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Abstract

Environmental management has assumed a prominent position on the concerns of society, making people rethink their attitudes towards the environment. In business, the concern with the production processes has great importance. It is assumed that the key to sustainable development lies in the implementation of programs aiming to empower your employees so they can contribute to the preservation of nature and the implementation of a management focused on social and environmental needs, reinforcing the concern for the environment. Given this context, the objective of the research is to develop training tool with the Cleaner Production (CP), given its importance in a possible organizational culture change process. The training tool will focus on employees of small companies in the furniture sector in the State of Alagoas, now structured as Local Productive Arrangement (APL), with approximately 300 Micro and Small Enterprises. The methodology adopted for this research is qualitative in nature. Armed with data from non-participant observation, as well as those obtained after questionnaires, far-there will be a tabulation of the data as the basis for creating the training tool. The instrument created should be tested in company of the furniture sector in the State of Alagoas. The research project is part of the Industrial Engineering Program at Federal University of Bahia - PEI / UFBA, aiming to obtain a Master's Degree in Industrial Engineering from one of the authors.

Keywords: *Cleaner Production, clean technology, training, micro and small enterprises, furniture sector.*

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Your Role in Society

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Abstract

"Your role in the Society" is a project that has as the purpose to bring awareness to UNIOESTE – Campus of Foz do Iguaçu academic community, which englobes servers, professors and students; about the reuse and rational use of paper and other office supplies, mainly through paper recycling. For both, was conducted: (1) first a handcrafted paper recycling course was given, so the team could learn and act as replicators; (2) bring awareness to all institution departments for the better use of paper and its separation; (3) production of recycled paper. With these actions the servers were sensitized to decrease the use of paper, and yet to decrease the use of financial resources to buy materials a project might provide, such as bookmarks, business cards, notebooks, among others.

Keywords: *environmental management; environmental responsibility; paper recycling.*

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21st May 2015

8h00-9h40	Session 5A	Room 4

A Multidisciplinary Approach Towards the Introduction of Cleaner Production in Higher Education Curricula: A Case Study from TEC de Costa Rica

An International Review of Sustainability in Higher Education Studies: A Messy Concept with Contradictory Attitudes

Sustainability Assessment in Higher Education Institutions: Perspectives and Global Experiences

Mobile Computation to Contribute to Education and Sustainability - Case Study

Emergy Accounting of a Course of Management at the Federal Institute of Southern Minas Gerais: A Case Study

Experiential Learning: Lessons Learned from Global Higher Education Programs for Cleaner Production in Latin America

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

A Multidisciplinary Approach Towards the Introduction of Cleaner Production in Higher Education Curricula: A Case Study from TEC de Costa Rica

ROA-GUTIERREZ, F. [a,*], ARIAS, A. L. [a], CHAVES-ABARCA, R. [a], JAUBERT-SOLANO, W.[a], ROBLES-OBANDO, N.[a], VALERIO-VINDAS, J.J.[a], ASHTON, W. S. [b], HURTADO-MARTIN, M.[b]

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Abstract

During the execution of the project "Pathways to Cleaner Production in the Americas through the integration of Business, Engineering and Environmental Education", the Instituto Tecnologico de Costa Rica (ITCR) established a multidisciplinary team including 6 professors from 4 departments (Environmental Engineering, Industrial Production Engineering, AgriBusiness, and Business Administration). Some courses of the above mentioned career programs originally included contents covering principles and concepts from Cleaner Production (CP) from a specific field perspective disregarding a multi and transdisciplinary approach of the CP. The academic profiles in terms of capacities and competences were analyzed to evolve towards a multidisciplinary approach by converging different professional capacities to achieve an improved implementation of CP in industries through a practicum. Presently, a pilot plan is being carried out using a multidisciplinary team of 6 advanced student from different programs. The methodology proposed includes short training in CP principles and concepts, data collection through visits to industries, data analysis in group sessions, improvement opportunities identification, and financial analysis. The recruitment of students for the pilot plan was carried out under voluntary and extracurricular terms, and supervised by the professors contributing in the Pathways project. The pilot plan will work with agrochemical formulation and distribution businesses located in Cartago. It is foreseen that in the near future, the methodology of CP implementation described in this paper could be formalized as an alternative modality to fulfill the professional practice required for most of ITCR programs. It is expected that the students would not only improve their CP knowledge and professional profile but also team work capacity. This paper presents the results of the project as a case study for ITCR.

Keywords: *Cleaner Production, Multidisciplinary Education, Higher Education*

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An International Review of Sustainability in Higher Education Studies: A Messy Concept with Contradictory Attitudes

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Abstract

Sustainability in Higher Education (SHE) represents a comprehensive and complex set of plans and initiatives involving institutional context (universities and their management board for "greening the campuses"), and educational actors (students, teachers, community stakeholders) in pursuit of suitable ways for a sustainable environment in teaching, learning and promoting community values. This paper reviews 26 international selected studies on SHE from a pool of 137 identified in academic databases, published between 2000 and 2014. The analysis identified five constructs that pervade such studies: (i) students' views on sustainability; (ii) students' literacy; (iii) students' attitudes; (iv) main pedagogies employed; (vii) universities' roles. Based on these constructs it was found that: (i) students have a broad and confused view of sustainability, although they associate it with practice and attitudinal change, mainly towards the environment; (ii) they present low level of literacy for sustainability; (iii) their attitudes tend to be contradictory when compared with their beliefs, as they are inclined to remain in a comfort zone of no change; (iv) they are typically trained by technical means or business modules on sustainability, but criticise lectures and tutorials, preferring participatory activities; (v) universities' roles are seen as promotion of sustainability awareness and adoption of environmental management, although these are not clear missions for the managers of these institutions.

Keywords: *Sustainability in Higher Education (SHE); environmental literacy; environmental learning; environmental attitudes.*

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Sustainability Assessment in Higher Education Institutions: Perspectives and Global Experiences

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Abstract

Sustainability assessment has been showed as a challenge for Higher Education Institutions (HEI). Assessing goes beyond simple choosing, developing and tracking indicators and includes strategic planning in HEI. The assessment framework choice is strategic during the assessment process, and its choice generally differs from one institution to another. While some HEI prefer develop their own sustainability assessment framework, others feel more comfortable in using well-known frameworks as the Global Reporting Initiative (GRI). Even though GRI was originally develop to assist private corporations, several HEI have been using GRI to assess sustainability. This fact arouses interest about reasons for adopting and framework adaptations of GRI to educational institutions. The results showed that although those adaptions in GRI indicators to HEI scenarios are possible, they are limited to environmental management area in general. Besides, the results indicate a group of environment management themes and topics that were recurrent in HEI's GRI reports.

Keywords: *Sustainability, assessment, Higher Education Institutions, Global Reporting Initiative, strategy*

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Mobile Computation to Contribute to Education and Sustainability - Case Study

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Abstract

A research conducted in the School of Architecture of the Federal University of Minas Gerais (UFMG), sought tools to assess the environment of your campus, in Pampulha. In this research a mobile app and a website were developed to enable users to make georeferenced reports about the quality of the space. In addition, there search also sought the formation of a focused awareness of environmental education of his members, and the opportunity to achieve advances in citizenship, co-responsibility and sense of belonging of these people.

Keywords: *Education, Ambiental, App, Citizenship.*

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Emergy Accounting of a Course of Management at the Federal Institute of Southern Minas Gerais: A Case Study

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Abstract

The aim of this work is to carry out the environmental accounting of a technicians' level programme of Management given by the Federal Institute of Education, Science and Technology of the South of Minas Gerais (IFSULDEMINAS) at an external unit in Jacutinga, MG using the emergy accounting method. This work is an integrating part of a broader case study featuring a comparison between the implicit environmental costs behind this programme and the Distance Teaching version of a similar course carried by the same institution.

Keywords: *emergy, information, CO2.*

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Experiential Learning: Lessons Learned from Global Higher Education Programs for Cleaner Production in Latin America

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Abstract

Environmental education is linked to both business and engineering in a multinational partnership called *Pathways to Cleaner Production in the Americas.* In this partnership, faculty from seven Latin American universities are collaborating on the development of curriculum, and practicum/internship experiences that will equip engineering, environmental science and business students with the technical knowledge, skills and expertise required for the promotion of cleaner production in micro, small, and medium enterprises (MSMEs) in each country. The anticipated outcome is to generate a workforce equipped with new knowledge, skills and attitudes toward sustainability through cleaner production, and capable of facilitating and implementing sustainable industrial development. The partner universities modified or developed new courses, conducted workshops for capacity building of faculty and businesses in their communities, and incorporated experiential learning in practicums and internships. This paper focuses on the following research questions generated for determining the impact of the experiential learning: What technical competencies do the students gain from the courses/practicum/internship? What social responsibility competencies do the students gain? What workplace competencies do the students gain? A student survey was developed and administered to 72 students from six participating countries. The results reflect gains in knowledge, skills, and attitudes toward cleaner production; the challenges of the experience in the context of working with a business; teamwork, communication and problem-solving work skills; and the changes in perceptions of cleaner production, social responsibility, and their role in a work setting. The survey results for the question regarding what was learned from teamwork indicate that the students perceived that they gained skills in multiple areas attributable to their experience in the practicum or internship when working as a team. Particularly strong across all participants were responses indicating increased skills in collaboration, communication, commitment to the project tasks and work ethics. Students indicated that the experiential learning changed their perceptions of teamwork and the value of working with others. The students also overwhelmingly reported that the biggest challenge of teamwork is miscommunication. The second most common response was lack of similar backgrounds within an interdisciplinary field such as sustainability in cleaner production. It is clear that students successfully gained technical skills from the course work but the experiential learning provided the context for gaining and applying social skills needed for working with others in the workplace.

Keywords: *Experiential Learning, Cleaner Production, Sustainable Development, Education, Practicum, Internship, Global Partnership*

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21st May 2015

8h00-9h40	Session 5A	Room 5

Mineralogical and Leaching Characteristics of Beneficiated Coals

Assessment of the Performance of Cajanus cajan in the Phytoextraction and Translocation of Lead

Comparative Study of Methods for the Synthesis of Silica Gel from Biomass Residue Ash of Sugarcane

Influence of the Urea in the Colour Intensity on Digital Printing

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Mineralogical and Leaching Characteristics of Beneficiated Coals

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Abstract

Petrographic, mineralogical and geochemical studies have been carried out on beneficiated coal products from mines and preparation plants in the Santa Catarina Basin, southern Brazil, to investigate the range of characteristics exhibited by the materials and the potential impact of their stockpiling and storage on the environment. The coals contain varying proportions of vitrinite and inertinite macerals, and have vitrinite reflectance values ranging from 0.44 to 1.38%. With the exception of one material blended with peat from an external source, they have relatively high percentages of ash (30–58%) and mineral matter (36–66%). The mineral matter consists mainly of clay minerals (kaolinite, illite and illite/smectite), together with 15–25% quartz, up to 10% feldspar, up to 5% calcite and/or dolomite and up to 5% pyrite, and around 1% anatase and/or rutile. Most of the trace elements in most of the coals have higher concentrations than average values for world coals generally, probably due to the relatively high mineral matter content. A lower-ash product representing a blend of coal and peat has similar to lower concentrations of most elements, but higher concentrations of B, Ba, Be, Cd, Ge and Mn, which may be associated with the peat component. Interaction of relatively fresh coals with water in laboratory tests produces leachates with near-neutral to mildly acid pH values, but leaching of oxidized, jarosite-bearing coal produces a strongly acid leachate, with higher concentrations of Cd, Co, Cu, Ni and Zn. Leachates derived from coals in which the pyrite has been oxidized during storage would thus be expected to have a more adverse environmental impact than leachates derived from coals in which such oxidation has not had an opportunity to develop.

Keywords: *Coal petrology, Mineral matter, Trace elements, Leaching, Environmental impact*

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Assessment of the Performance of *Cajanus cajan* in the Phytoextraction and Translocation of Lead

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Abstract

Heavy metals are high molecular weight elements that, in high concentrations, put in risk all biodiversity. Lead (Pb) is one of the most soil contaminant heavy metals and one of the biggest environmental problems of the modern world. Hence, the development of methods and techniques are required for controlling the harmful effects resulting from contamination, especially in the soil. The technique that stands out most is the phytoremediation, which aims to decontaminate the soil and water through the use of plants. *Cajanus cajan*, also known as pigeon pea, is an annual or semi-perennial shrub legume with several uses, among them, as improving plant soil, due to its phytoremediation capacity, mainly through phytoextraction technique, since its potential in removing metals from soil by absorption and accumulation in roots and aerial part. The objective of this study was to evaluate the performance of *Cajanus cajan* in phytoextraction and translocation of lead. We selected 50 *Cajanus cajan* seeds and put to germinate in a container containing chemically analyzed soil. The samples were dried in an oven and stored in identified paper bags. The dry matter production of root, aerial part and whole plant (root + aerial part) were determined using analytical scale. In laboratory the levels of lead in roots and aerial part were determined by atomic absorption spectrophotometry. The experimental design was completely randomized and the results were submitted to analysis of variance, applying the Scott-Knott test at 5 % significance level. Comparing the averages of fresh and dry weight of *Cajanus cajan*, in general, it was observed that they decreased, both aerial part and root, as increased the lead contents the samples were exposed to. The concentration of Pb in these compartments increased with increasing concentration of the solution added to the soil. Phytotoxicity symptoms were observed in some samples, such as yellowing and leaf drop. There was also a reduction in the growth of plants exposed to 1000 μmol L^{-1} of lead acetate in comparison with the other samples and the amount of Pb present in the roots was much higher than that amount translocated to the aerial part. As the roots showed a higher amount of lead, it is recommended that in the case of the process being used at larger scales, they must be incinerated or disposed of in appropriate trenches in landfills. The specie *Cajanus cajan* showed good efficiency in lead phytoextraction, proving its considerable importance and practical applicability in the recovery of areas contaminated by that element.

Keywords: *phytoremediation, pigeon pea, heavy metals, contaminated sites, bioremediation*

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Comparative Study of Methods for the Synthesis of Silica Gel from Biomass Residue Ash of Sugarcane

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Abstract

Biomass residue ash of cane sugar (ACS) was used on synthesis of silica xerogel (SG) by three different routes. SG was produced using alkaline extraction followed by acid precipitation. The process of synthesis was optimized by applying a wide range of experimental conditions. No SG was obtained using classic hydrothermal treatment for silica extraction. SG was successfully synthesized via fusion with NaOH followed by hydrothermal reaction used to prepare sodium silicate solution. The best condition for silica gel production was achieved with gelation of silica carried out at 80 ºC. Our experimental data suggest that the ACS could be converted into a value added product, minimizing the environmental impact of disposal problems.

Keywords: *Silica xerogel; Biomass residue ash; Sugarcane.*

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Influence of the Urea in the Colour Intensity on Digital Printing

BARROS, A.A.R.C. [a], TAMBOURGI, E.B. [a], FILETI, A.M.F. [a], ROSA, J.M. [a,b*], BEZERRA, R.N. [c], ARAÚJO, M.C. [c], SANTANA, J.C.C. [d],

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Abstract

It was studied the influence of urea in the digital printing of cotton in yellow, red and blue colours. In the first tests, the amount used were in the preparation recipes was 0 (without), 50 and 100 $g \cdot L^{-1}$, demonstrating high influence in medium (60 %) and dark shades (90 %), in the all three colors assessed. Therefore, another test was performed in order to verify the minimum possible amount to be used, without detriment in the colour intensity ($K \cdot S^{-1}$), concluding that the quantities above 80 g·L-1 does not influence in a significant increase in the $K \cdot S^{-1}$.

Keywords: *urea, colour intensity, digital printing*

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21st May 2015

8h00-9h40	Session 5A	Room 6

Reverse Logistic Implementation: First Phase of Sao Paulo State Experience

Public Policies: Their Contribution to Reuse and Recycling Process of Small and Electronic Medium-Sized Enterprises

The Design within the Contexts of National Policy for Solid Waste, Cleaner Production and Sustainability

Global Productivity and Ecoefficiency on Sustainable Performance of Agroindustrial Chains

Cleaner Production and Aspects of National Policy of Solid Waste in the Clothing Manufacturer Sector

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Reverse Logistic Implementation: First Phase of Sao Paulo State Experience

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Abstract

Reverse Logistics is part of most modern waste policies throughout the world. Considered essential in expanding the recycling rates for many waste streams, is a fundamental tool for creating means of restoring to the productive sectors various products and post-consumer packaging as raw material. Within this context, the present research details a case study of São Paulo State, Brazil, which since 2010 has implemented a deployment strategy of reverse logistics through pilot projects with business sectors, using as an instrument an agreement called "Terms of Commitment". After presenting the regulatory environment, the article describes the vision and the strategies adopted for the first phase of this initiative, then detailing how the Terms have been established and demonstrating the results to date, including the consolidation of the evaluation of participants in 13 meetings conducted at 2014. At the end these results are analyzed and the outlook for the second phase of the initiative is presented

Keywords: *reverse logistics; waste management; extended-producer responsibility; environmental regulation; environmental public policy*

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Public Policies: Their Contribution to Reuse and Recycling Process of Small and Electronic Medium-Sized Enterprises

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Abstract

It is estimated that 80% of companies in the electronics industry are micro and small enterprises. Waste production processes of these companies have similar characteristics to electronic equipment (WEEE). These wastes require proper disposal in order to minimize environmental impacts. Public policies and government programs could be the link to leveraging the reuse and recycling of waste from production processes of the electronics industry. This study examined how public policies contribute and encourage reuse and recycling process of waste generated in micro and small enterprises in the electronics industry. A multiple case study was conducted with 12 micro and small enterprises located in southern Brazil. It is observed that: (i) companies are unaware of the legislation on the treatment and disposal of waste; (ii) do not notice the presence of financial and non-financial incentives that could encourage reuse and recycling practices, (iii) their wastes are predominantly sell for the informal market of scrap; and, (iv) interviewers do not observe a proactive role of officials in charge of public policy. The current public policies for micro and small enterprises studied do not consider the needs of businesses. Besides, they are not easily accessible. Interviewers commented that laws are punitive instead of instructive. It was not observed stimuli to the articulation of each member of the production chains to induce the use of best practices of reuse and recycling processes. On the other hand, companies consider that their waste have little commercial value, which generates little commitment to seek information about reuse and recycling alternatives.

Keywords: *WEEE, electronic wastes, small and medium-sized enterprises, public policy.*

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The Design within the Contexts of National Policy for Solid Waste, Cleaner Production and Sustainability

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Abstract

The awareness about the natural resource limits and the effects of mankind activities over the atmosphere and planet climate are increasing among countries government, industries and societies, provoking reflections in a worldwide basis and are generating new concepts and compromises, such as Sustainability, as defined by the 96th General Assembly of the United Nations in 1987, Cleaner Production as the Declaration of Seoul in 1998, Agenda 21 from Rio 92 among others, creating a fertile field for public policies addressing of environmental subjects, aiming for conscious consumption of goods, better management of production resources, reduction of residues generation, post consumed goods recycling or its final disposition in a proper way as well. Above trend early leaded mostly by developed countries, is being followed by others and, in the Brazilian case, after more than twenty years of discussion at the Congress, the National Policy for Solid Waste (NPSW) was published and covers: principles, objectives and instruments for solid waste treatment and its correct final disposition, aside of addressing responsibilities for all parts involved, such as: government, industry, commerce, importers, service providers and consumers. Enforces the polluter-pay principle, introduces the provider-receive concept, as well as the shared responsibility for end of life products with implementation of Reverse Logistic System (RLS) mechanism for several goods, aiming, at the same time, for material and energy recovery, social inclusion of waste pickers cooperatives, subject to act as partners in the RLS processes, aside of showing important synergies with CP Compromises, Life Cycle Thinking and Sustainability concepts either. Thus, the NPSW combined with the CP Compromises, creates a challenging new endeavor for designers, engineers and managers in charge of products, processes and management models conception as they have to consider; aside of the Quality Function Deployment (QFD) tool for better understanding of consumers demands; other tools and strategies to address properly the economic, social and environmental aspects, such as: the Design for Environment (DfE), Design for Manufacturing (DfM), Design for Recycling (DfR), Life Cycle Assessment (LCA) among others briefly discussed in this work of exploratory and deductive survey on applied social sciences and production engineering. Therefore, this work is lacking of pretension to exhaust these themes, but mostly intend to generate reflections on above provocative and creative subjects and, at the same time, provide a broad view on concepts, models, standards and references for beginners and, perhaps, some hints for peers deeper researches.

Keywords: *design. public policies. life cycle thinking. cleaner production. sustainability.*

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Global Productivity and Ecoefficiency on Sustainable Performance of Agroindustrial Chains

PREVEZ, L.[a*]; BONILLA, S. H. [a]; GIANNETTI, B. F. [a]

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Abstract

The aim of this paper is to evaluate the performance of two green coffee supply chains for export. Results show that there is a compromise between the efficient of direct and indirect use of fossil fuels included in the whole process and reflected in the global Eco efficiency index, developed during this work, and the global productivity that accounts for the total services of biosphere. The combination of both indices seems promissory as a tool to assess economic, social and environmental performance of agro-industrial supply chains.

Keywords: *Global Productivity, Global Eco-efficiency, supply chain, coffee*

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Cleaner Production and Aspects of National Policy of Solid Waste in the Clothing Manufacturer Sector

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Abstract

It is estimated that Brazil annually manages more than 8,000 tons of waste originated from the clothing industry, of which more than 80% may be irregularly arranged in landfills and dumps. The National Solid Waste Policy (PNRS) requires a change of this scenario by establishing management tools for all waste generated in productive and service sectors. The proposal brings ambitious goals for public and private managers for non-generation and proper disposal of waste at all stages of the production process. The aim of this work is to demonstrate that the Cleaner Production (CP) can contribute to the development of a culture that seeks elimination, reduction and reuse of scraps generated in the clotting industry, with actions that encourage efficiency in the production process. Unlike traditional management methods that focus on stocks of generated waste, the CP seeks improvements in the process itself, increasing the potential for reducing the generation of waste and minimizing the amount to be allocated. Implementation of Cleaner Production in seven (7) Clothing industries in the state of Paraná reduced around 12% of the generation and the possible re-use of up to 100% patchwork generated in the industrial process, exceeding the goals established by PNRS.

Keywords: *Sustainability. Process. Textile. Environmental Indicators.*

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21st May 2015

8h00-9h40	Session 5A	Room 7

Environmentally Sustainable Innovation: Attributes Expected in the Purchase of Green Vehicles and Furniture

Projection of Energy Efficiency Gains by Using the Hybrid System in the Public Transport of Passengers

Sustainable Supply Chains and Carbon Footprint, the Costa Rican Case

Mapping the Stockholm Vehicle Gas Supply Chain using Network Theory to Assess Local Upgraded Biogas Supply and Demand Relations

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Environmentally Sustainable Innovation: Attributes Expected in the Purchase of Green Vehicles and Furniture

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Abstract

This article investigates the perception of potential consumers regarding the offer of environmentally sustainable products. Employing projective techniques for sentence completion, it sought to discover which attributes of green products and processes are expected by automobile and furniture consumers, along with the risks associated to the offer of said characteristics. Considering the completions made, it was possible to observe that the 12 respondents are aware of the product and process attributes that the studied industries provide in terms of environmentally sustainable innovations. Nevertheless, it is inferred that green innovations in automobiles may generate a perception of functional risk among consumers, that is, that the product does not offer the desired performance. By the other hand, the completions revealed that the respondents perceive lower social and financial risk in green automobiles and furniture. The results obtained allow companies of the analyzed sectors to steer their innovation and communication efforts towards the attributes listed as qualifiers, while also assisting the theoretical investigation about the decision-making process for purchasing green products.

Keywords: *Consumer Behavior, Environmentally sustainable Products, Choice Attributes.*

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Projection of Energy Efficiency Gains by Using the Hybrid System in the Public Transport of Passengers

SILVA, H. R. O. [a*], PARIZI, C. C. [a], ABRAHAM, E. R.[a], MACHADO, S. T.[a], COSTA NETO, P. L. O.[a], VENDRAMETTO, O. [a], MEDINA, F. A. S. [a]

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Abstract

Although the concept of sustainability be placed in the context of cities with emphasis on balance of economic, ecological and social dimensions, the collective passenger transport in urban centers of large cities is a major challenge for public management, both for mobility urban as for the reduction of pollutant emissions and respiratory diseases. For example, the majority of vehicles for public transport are operated with diesel fuel and / or biodiesel which generally raises a concern due to adverse effects on human health caused by the emission of particulate matter. In this sense, the public transport of passengers performed by hybrid vehicles can be an alternative to reduce the emission of pollutants. This work aims to analyze the feasibility of replacing the vehicle fleet diesel for hybrid vehicles in the city of São Paulo. Thus, there was the projection calculation for renewal of the bus fleet of the city of São Paulo from conventional vehicles to hybrids considering a renewal rate of 10% per year. The results showed that the planning of replacement for hybrid vehicles by 2024, would reduce CO2 by 77.5%, thus contributing to the environment, better air quality in the São Paulo city center and reduction of respiratory diseases and cardiovascular.

Keywords: *Fossil Fuels, urban centers, cleaner transport, Sao Paulo.*

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Sustainable Supply Chains and Carbon Footprint The Costa Rican Case

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Abstract

In this paper the sustainability of the supply chain is investigated and the main conditions required for its accomplishment are defined, including the importance that collaboration among the actors has in order to achieve it. In addition an overview of the industrial sector of Costa Rica is presented, with the characteristics of its supply chains and the main proposals for their sustainability. The usefulness of the carbon footprint indicator scope is analyzed in terms of sustainability, and some estimations of carbon emissions for situations derived from a supply chain network design are presented, demonstrating how worthwhile it is to analyze the network when promoting initiatives for sustainability. Finally, the paper proposes improvement options and challenges that industrial companies will need to affront in Costa Rica in order to achieve sustainability in the manufacturing sector and even more in the country.

Keywords: *sustainability, supply chains, carbon footprint*

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Mapping the Stockholm Vehicle Gas Supply Chain using Network Theory to Assess Local Upgraded Biogas Supply and Demand Relations

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Abstract

The paper uses Stockholm County as a case study to guide our analysis. The region not only concentrates the largest number of inhabitants in Sweden but also holds alone around 35% of the Swedish fleet of passenger cars using gas as fuel. The region's potential vehicle gas demands are 460 GWh by 2020 and 1202 GWh by 2030. The methodological approach relies on Network Theory to guide the numerical analysis of the vehicle gas supply chain in the region. Our results indicates that local vehicle gas supply chain is a rigid structure that might be averse to new entrants such as new distribution companies but, at the same time, it offers opportunities for biogas producers. Distribution companies, especially those placed in the 1st-tier segment are averse to new entrants because they present high homophily and strong ties. Hence, they are more prone to maintain the network's *status quo* since the Swedish vehicle gas market is not yet well developed, which results in a lack of multiple players, which leads to cluster formation.

Keywords: *Biofuels; upgraded biogas; vehicle gas supply chain; network analysis, Stockholm County.*

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21st May 2015

13h30 -15h00	Conference

Donald Huisingh

Editor-in-Chief of Journal of Cleaner Production and University of Tennesse - USA

Why do YOU think YOU can change the future of society?

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Why do YOU think YOU can change the future of society?

Donald Huisingh
Editor-in-Chief of Journal of Cleaner Production and University of Tennesse - USA

The presenter will explore the possibilities of holistic and integrated approaches to achieve equitable, post- fossil carbon societies, which are truly sustainable. He will pose fundamental questions we need to answer in seeking ways of making urgently needed changes: What can we learn from history? What roles have crises had as motivators for making changes? What are roles of 'good examples' as motivators for making changes? What roles can alternative paradigms and values have as motivators for making changes. What can be accomplished if we integrate all four approaches to guide and stimulate the transformations that are needed? The presenter will explore the following illustrative challenges we must address:

- Increasing global warming and pollution: It is estimated that net quantity of GHG (Greenhouse Gases – including CO2, NH3, NF3,CFS, NOx,and O3,which collectively are being added to the atmosphere at the rate of 100,000,000 to 1,000,000,000 t/d!) The global GHG equivalents continue to increase rapidly, thus catalyzing present and future climatic and eco-system changes with numerous anticipated and unanticipated consequences.
- Continuing growth of the human population: The global population is increasing at the rate of more than 70,000,000 people per year.
- Shrinking of the Earth's bio-capacity: Annually, 9 million hectares of forests are being cut and 104 species become daily.

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- Economic disparities: The largest part of the world's income is distributed among 20% of the richest people, 25 % of the world's population is impoverished and malnourished.

Despite these threatening figures, there is hope as more and more preventive environmental protection concept, tools, processes and products are implemented, among them: pollution prevention pays, the Melbourne Principles, sustainable consumption and production, the Equator Principles for Sustainable Finance, The Earth Charter, Corporate Social Responsibility, Ethical Investments, and many exciting 'Bottom-up changes.'

Given the trends around productivity and the lack of equitable employee remuneration, numerous models are evolving to create more equitable and sustainable communities such as: place-based companies, worker ownership, social enterprises, traditional Co-ops, B-corporations, community development corporations, land trusts. More and more crowdfunded creative solutions are emerging, supported by websites like Indiegogo and Kickstarter.

Important approaches that are helping to catalyze societal changes are enhanced energy and material's efficiency due to process integration, which increasingly rely upon advances in bio-mimicry, green chemistry, green engineering, green buildings, green investments in renewable energy and advanced engineering approaches.

The easiest and most effective approaches for reducing GHG footprints and to improve equity for present and future generations in materials, energy and water are focussed upon preventing or reducing their wastage. Shifting from fossil carbon-based energy systems to renewable energy systems is essential but because they also have GHG footprints, only expanding their usage without integrated approaches for prevention or reduction of wastage

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during all phases of product and service life cycles will not be sufficient to effect the changes that are urgently needed.

Therefore, governmental and industrial policies and practices must integrate concepts and approaches such as the 'Circular Economy' and must make systematic, 'Carbon Structural Adjustments' throughout all industrial and societal sectors.

Our educational systems must become more multi-disciplinary to educate scholars of today and tomorrow in holistic and integrative educational, research and out-reach approaches designed to stimulate finding, testing and implementation of innovative ways of meeting short and long-term societal needs to live equitably within our global eco-system's boundaries.

Each of us must become role models for change and change agents to catalyze others to also become change agents to help to make the essential societal changes that are needed to make in order to transition to truly sustainable, equitable, post fossil-carbon societies.

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

21st May 2015

15h00-16h30	Session 5B	Room 1

Bird Survey as an Indication of Environmental Integrity in Preservation Areas

Strawberry Pulp Supply Chain Performance Assessment on Local Level

Characterization of Organic Coffee in Mexico

The Organic Agriculture and New Conscious Consumption Patterns

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Bird Survey as an Indication of Environmental Integrity in Preservation Areas

SANTOS, E. N. [a*], VENDRAMETTO, L.P. [a], VERAS, D.S. [a], CHRISTOFFOLETI, P.J. [b], RODRIGUES, R.S.O. [a]

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Abstract
Preservation areas are mandatory for all Brazilian farmers, according to Forest Act – Law 12.651 of May 25th, 2012. The purpose of these areas is the maintenance of the flora, fauna quality of the soil and water. A Bird Survey was performanced on a preservation area of a small agricultural property in Holambra – São Paulo - Brazil. This property follows the good agricultural practices so that erosion, soil and water contamination are avoided. The preservation areas, including native vegetation and reforestation areas, are maintained without any anthropogenic activities. Bird survey was made in the preservation area in 2003, 2005, 2010 and 2013. The data indicated a trend of increasing diversity and species richness over the years. Despite the intense use of agricultural fertilizers and pesticides, no dead or intoxicated birds were found. These data demonstrate that the agricultural activities were not impacting the birds diversity and richness. The careful maintenance of the preservation area and its surroundings also contribute to the conservation of local biodiversity.

Palavras-chave: *boas práticas agrícolas, área de preservação, aves*

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Strawberry Pulp Supply Chain Performance Assessment on Local Level

SILVA, C. C. [a,b*], GIANNETTI, B. F. [a], ALMEIDA, C. M. V. B.[a]

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Abstract

This paper intends to analyze one link of the strawberry pulp supply chain in Southern Minas Gerais, individually assessing this link on in natura strawberry producers for a pulp industry on Southern Minas. The presented reference model considers local conditions of the family based systems that do not possess specialized logistics system and a territorial approach of rural development incuiding equity among the genres, food security, risk management, environmental management and support programs. Identifying and comprehending the obstacles that restrain the development of such link on the supply chain has great importance either for better definiton and adjustment of support public policies or for ackowledgement and sustainable decision-making of the companies of this sector.

Keywords: *Supply chain, sustainable, reference model, agroindustry, strawberry.*

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Characterization of Organic Coffee in Mexico

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Abstract

Organic agriculture, considered by many researchers as sustainable by their production processes and their environmental advantages, as being opposed to using technological packages of the Green Revolution - use of transgenic seeds, high use of Agrochemicals, loans with high interest rates, peasants exclusion of markets and their traditional knowledge of crop management -. In rising from organic agriculture, either it creates new specialized marketing channels, by direct purchase of the property or by retailers and processor networks; however expectations of participating in the international market were slim to none. In this sense, certifying bodies create conditions to include the products of small producers in international market and create trust with consumers. The Mexican organic coffee is a good example of the organic production incentive policies and as organizations working on certifications, as is the case of Unión Ejidos de la Selva. However, it is necessary to generate information on current standards of certification and specialized public policies in organic production. The objective of this paper is to present certification of organic product models and how the Mexican organic coffee is within the international market. For the preparation of this work, were performed bibliographic research on the organic handling procedures, certifications, certifying bodies and the Mexican public policy specialized in organic production. Some data were obtained by the authors in 2013 at the professional residence in the Unión Ejidos de la Selva organization

Keywords: *Unión Ejidos de la Selva, Production Clean, Ley organic products, Organic Agriculture*

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The Organic Agriculture and New Conscious Consumption Patterns

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Abstract

The aim of this work is analyze the influence of consumers in food sustainable production. Hence, this research explores the relationship of food organic production and consumer behavior, with the development of a "quilombola" community in Dourados, Mato Grosso do Sul, Brazil. Therefore, a qualitative approach was conducted using literature review and a case study method. The data were collected using semi-structured questionnaires. The results showed that the organic production has potential to leverage the rural production due to factors like human health and consumer awareness about environmental issues and sustainable development. Furthermore, the organic production has represented an important way of generating income for families that living in rural areas of Brazil.

Keywords: *consumer behavior; organic products; quilombola community.*

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21st May 2015

15h00-16h30	Session 5B	Room 2

Cleaner Production Opportunities in Furniture Manufacturing Process Custom-Made: a Case Study of a Wardrobe

Action of Chemical Leasing in Production Processes aimed at Sustainability

Opportunities for Implementation of Just In Time (JIT) on Reverse Logistics Of E-Waste: Green Factory Case Study

CP as a Competitive Advantage of the Product: The Consumer's Point of View

Physical Arrangement (layout) and Cleaner Production (CP): A Theoretical Discussion

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Cleaner Production Opportunities in Furniture Manufacturing Process Custom-Made: a Case Study of a Wardrobe

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Abstract

This article aims to present cleaner production opportunities in furniture manufacturing process custom-made from a case study of a wardrobe. The method applied in this mapping was the UNIDO / UNEP for the implementation of Cleaner Production Programs from simplified model of the Clean Technology Network of Bahia report (Teclim), Polytechnic School of the Federal University of Bahia (UFBA). The results indicate significant production losses, that generated suggestions for improvement in the areas of planning, metal cutting, physical layout, safety, inventory of raw materials. Also identifies strategies to increase the eco-efficiency of processes and products in several orders of magnitude (factor 10). One is the creation and implementation of software to optimize the process of project design and budget.

Keywords: *cleaner production, furniture production, custom-made furniture, opportunities.*

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Action of Chemical Leasing in Production Processes aimed at Sustainability

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Abstract

The Chemical Leasing is a model geared to the activities of buying and selling of chemicals, where the manufacturer seeks to develop productivity, through the efficient use of chemicals and the interest of the parties involved. The aim of this study is to evaluate the proposal of chemical leasing as a more sustainable alternative of the manufactures and consumers of chemical in its manufacturing process. The attention turns to acceptance of a partnership model between manufacturer and consumer of chemicals attention turns to acceptance of a partnership model between manufacturer and consumer of chemicals with the provision of chemical solution service, consisting of orientation, process optimization and rationalization of usage, that shifts the focus from the increase in sales volume, to a value-added approach aiming to achieve sustainability. The approach used was the exploratory study designed from already published material. To the relationship between the traditional models oriented to sales volume, and the products and services-oriented model. The contribution is in possibly point out that companies using management model aimed at the sharing of responsibilities in the interests of sustainability, can expect a reduction of costs compared to traditional systems, and that this format of shared management saves natural resources. And so, possibly reducing the quantities of chemicals, which can have a negative impact on human health and the environment.

Keywords: *Cleaner Production, Sustainability, Chemical Leasing, Industry, Green Chemistry.*

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Opportunities for Implementation of *Just In Time* (JIT) on Reverse Logistics Of E-Waste: Green Factory Case Study

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Abstract

This article shows a Case Study in Green Factories. The Green Factory Project, of Computer Recycling, of the Secretary of State for the Environment (SEA) of the State Rio de Janeiro aims to develop initiatives to encourage social inclusion in poor communities allowing young adults to develop professionally, creating jobs green and thus generating alternative income for local. The Green Factory was established in 2011 in the "Complexo do Alemão". It was conducted a field research to obtain data of input and output of E-waste. Interviews were too conducted with owners of cooperatives. The SEA Project stimulates the reverse logistics, which became mandatory with the approval of the National Solid Waste Policy (PNRS). In the supply chain, to improve the efficiency and effectiveness of the logistics process, should improve the quality of demand forecasting. An accuracy forecasting is a constant challenge for organizations, because is possible to obtain efficient operations and high levels of customer service, while inaccurate forecasts inevitably, leads to inefficient and costly operations. Demand forecast needs in any segment allows managers to plan their actions. Both the philosophies Just in Time and Reverse Logistics are concerned about the environment. The customer-supplier relationship is explored in this paper because there are stakeholders involved. A bibliometric survey of Scopus Base, only 7 papers were presented using the strings "Just in Time" and "Reverse Logistics". This shows that the theme is new and challenger.

Palavras-chave: *Just-in-time, Logística Reversa, Lean Manufacturing, E-waste, Fábrica Verde*

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CP as a Competitive Advantage of the Product: The Consumer's Point of View

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Abstract

Producing quality and competitive price does not guarantee the success of the product. The new consumer has specific needs and starts charging industries social and environmental responsibilities. The industries engaged in society in which they operate, begin to worry about processes Cleaner (CP). The CP deployment opportunity of CP deployment, besides cost reduction, can become a competitive advantage of the product. Being a cleaner industry and portray it in the packaging appears as an opportunity to beat the competition and get into the consumers houses. More demanding consumers are aware of the industries pollution and are willing to consume cleaner products. Thus, the CP becomes not only improvements in the production process and becomes a communication tool with the society and the consumer.

***Keywords**: CP, Differential, Product, Consumer.*

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Physical Arrangement (layout) and Cleaner Production (CP): A Theoretical Discussion

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Abstract

The design of the physical arrangement (layout) for the small business can reduce waste during processing, reduce the distances in the production and increase business productivity. These three practices can be matched with the principles of cleaner production (CP) to minimize waste. This study is a theoretical discussion about methods of physical arrangement planning and cleaner production (CP) and your integration possibilities to improve the quality of small business production. The main result is an overview of existing research on the two issues.

Keywords: *Sustainability; Cleaner Production (CP); physical arrangement (layout); integration methods; small business.*

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21st May 2015

15h00-16h30	Session 5B	Room 3

The Contribution of Sustainability In Project Success: Managers's Perpective in Brazilian Companies

The Contribution of the NGOs, Associations and Foundations to Promote Production and Consumption of Green Products

From the Amazon's Traditional Knowledge to Innovation: An Study of SME Natural Medicines Producers in Manaus

Knowledge and Understanding of Cleaner Production Theme in Specialized Courses: A Case Study

Sustainability Practices in Educational Secondary Education Schools

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

The Contribution of Sustainability In Project Success: Managers's Perpective in Brazilian Companies

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Abstract

This quantitative research aims to identify the contribution of sustainability in project management on project success. As methodology was used the survey method. Questionnaires online were sent to professionals responsible for project management, and it was obtained 143 valid answers. Research data were treated with multivariate statistical analysis through Structural Equation Modelling using SmartPLS Software. The results confirm the hypothesis that sustainability in project management contribute to project success with 95% of probability. The economic dimension of sustainability has been the dimension most used when we compare with the environmental and social dimension, especially in industrial sector. In the sample, the social dimension has been the second dimension most applied. In addition, the study highlight the lack of research about sustainability in project management as well as the need of improvements on business practices.

Keywords: *sustainability, project management, sustainability in project management, project success.*

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The Contribution of the NGOs, Associations and Foundations to Promote Production and Consumption of Green Products

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Abstract

The objective of this study is to analyze the actions taken by NGOs, associations and foundations, which have a focused approach to environmental sustainability, to promote consumption and production of green products. A multiple case study was conducted in the South state of Brazil with x organizations and the data were analyzed using content analysis. The constructs were considered involvement in public policy, partnerships, social responsibility and economic development. The results suggest that interviewed are contributing to the development of laws and working in partnership with government agencies in search of incentives for green products. Interviewed also pointed the difficulty in obtaining financial resources, but on the other hand, little is observed partnerships with companies. It was also observed that there is a lack of educational projects for children. The studied organizations do not evaluate the economic development of the place where they work and therefore not directly measure the impact of their actions in this light. The appointed results indicate aspects that effectively contribute to promote consumption and the production of green products such as involvement in the drafting of laws and certification of organic products. It indicates, however, that there is potential to improve the actions of the studied organizations by strengthening partnerships with companies and by analyzing the actual financial return and nonfinancial of these actions.

Keywords: *green product, NGOs, consumption green*

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From the Amazon's Traditional Knowledge to Innovation: An Study of SME Natural Medicines Producers in Manaus

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Abstract

Using the approach of Local Productive Arrangement we did a case study on innovation in Manaus (Amazonas/Brazil) with the goal of researching Micro and Small Companies which, together with local research and fostering institutions, make up an agglomerate which produces cosmetics and medicines based on indigenous knowledge and natural prime materials from the Amazon. Considering the neo-schunpeterian methodology, we found that there are product and process innovations, and at the same time we find characteristics of an underdeveloped economy. In spite of the difficulties we show that it is possible to innovate in regions on the periphery of global capitalism, such as the Amazon. There is a need for more robust institutions to increase feasibility of cooperation based on mutual trust. We conclude that to intensify the innovation processes in the value chains we need greater local content and not only prime materials, thus including specialized services and products and capital assets. Notwithstanding, even recognizing recent conquests, we finalize this Project also mentioning huge barriers in the regulatory apparatus (legislation) that need to be overcome.

Keywords: *Micro and Small Companies, Amazon, Traditional Knowledge, Innovation.*

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Knowledge and Understanding of Cleaner Production Theme in Specialized Courses: A Case Study

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Abstract

For new solutions in engineering education, as subjects or corporate social responsibility and sustainability courses do not have a mere decorative function in the curriculum, become necessary to define more clearly the methodology and content of the courses offered. Thus this study came from an academic need, and proved the need for further discussion of the topic in the different courses and areas. The objective of this study was to assess the knowledge of students Specialization course in Production PUCRS sore it. As a result it was noted the need for further study and the creation of a more detailed project to understand and possibly assist in the various academic curricula.

Keywords: *academic training , cleaner production , specialization*

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Sustainability Practices in Educational Secondary Education Schools

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Abstract

This article aims to present initiatives to enhance the teaching-learning process in the development of a sustainable society through work reports made by Unisul in secondary schools, with water and solar energy topics. For the work development were developed two pedagogical practices: rainwater recovery and solar heating system with low cost materials. The results were evaluated, on the perspective of schools and students (teaching / learning) and in the case of schools, the advantages involved in saving water and electricity bills and greater environmental awareness among teachers, students and employees using the built systems during practice for high school students. From the high school teaching/learning process' point of view , students were unanimous in their assertion that the theoretical contents in practice, stimulates learning and that the developed themes (water and solar energy) awaken to awareness about the preservation of the planet.

Keywords: *Pedagogical practices; Secondary schools; Rainwater recovery; Solar heating system.*

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21st May 2015

15h00-16h30	Session 5B	Room 4

Green Issues in the Supply Chain Management Training

Analysis of Externalities in Production Services under Cleaner Production Model Perspective

Transaction Costs in Environmental Purchasing: Analysis Through Two Case Studies

Business Cooperation Networks: Contributions to Sustainable Production

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Green Issues in the Supply Chain Management Training

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Abstract

Green Supply Chain Management is an important issue for organizations that spend significant yearly investments on personnel training. Although these investments present positive effects, the manner to assess the effectiveness of training is unclear. A research that carries out multi-criteria training assessment for Green Supply Chain Management through the process and presentation of the model based on the Supply Chain Operations Reference Model is hereby depicted. Analytic Hierarchy Process was applied in the solution considering Plan, Source, Make and Deliver as criteria, and individual and organizational benefits are identified alternatives in a chemical industry. The modelling considered pairwise judgments for criteria and ratings or absolute measure for alternatives. The main result of the analysis revealed that training essentially contributes to the organization, resulting in the perception of 88% for organizational benefits, and 78% for individual benefits. This result was presented to managers of the company, and they validated it as consistent and applicable in practice.

Keywords: *Analytic Hierarchy Process, Green Supply Chain Management, Supply Chain Management, Training*

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Analysis of Externalities in Production Services under Cleaner Production Model Perspective

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Abstract

This article aims to describe as the application of the methodology of Cleaner Production (CP) interferes with externalities arising out of a process of production services. Therefore, we attempted to as instruments the exploratory research with qualitative approach, ie, based on bibliographic and documentary research built the categories of analysis and subsequent construction of a model for the assessment of production services. In this case it was used to study the provision of receiving invoices services by a bank. Thus, when dealing with this process from the perspective of PML verified the existence of regressive and progressive positive externalities to adopt an electronic system of invoice payments.

Keywords: *externalities; Clear Production; PmL; service; Production.*

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Transaction Costs in Environmental Purchasing: Analysis Through Two Case Studies

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Abstract

The concern about corporate environmental performance has progressively extended the scope from the company to embrace its supply chain. Thus, supply chain management (SCM) has been adjusting itself to the so-called Green Supply Chain Management (GSCM), for which the environmental purchasing has been one of its most significant elements. By doing so, companies adopt additional criteria for evaluating suppliers, which, as argued, generates additional transaction costs. From the SCM theoretical basis and their specificities regarding GSCM, and looking through the analytical lenses of Transaction Cost Economics (TCE), this article aims to discuss the transaction costs involved in the supplier selection process with the environmental purchasing approach. As a result, the research contributes to further develop the discussion on the application of TCE within the GSCM, developing and analyzing, in the light of two cases, six propositions that relate the environmental purchasing with transaction costs.

Keywords: *Green supply chain management (GSCM), Environmental purchasing, Transaction cost economics (TCE), Supplier selection*

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Business Cooperation Networks: Contributions to Sustainable Production

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Abstract

Cooperation between companies in the form of networks, has been highlighted as an alternative organizational configuration in response to recent economic and technological change. Is also evident from the literature that the pursuit of sustainability and Cleaner Production (CP) contributes to increased flexibility and capacity in the case of this study, as guiding the Enterprise Cooperation Networks. Thus, it is studied two approaches Enterprise Cooperation Networks, produced by researchers from Rio Grande do Sul and São Paulo, from the perspective of the contributions of networks on sustainability and Cleaner Production. A literature review that allowed us to compare the approaches of establishment and operation of networks has been carried out with the proposed focus, concluding that the networks have in their essence the necessary elements to create opportunities to adopt the methodologies and methods of sustainability and Cleaner Production (P + L).

Keywords: *Cleaner Production, Sustainability, Business Cooperation Network. Competitive advantage.*

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21st May 2015

15h00-16h30	Session 5B	Room 5

Evaluation of Estrogenic Activity on Raw Influents and Treated Efluents on Urban Area

Assessment of the Viability of Production of Ceramic Tiles from Waste Generated in the Casting Process Using Plasma Electrolytic Oxide of Aluminum Alloy

Chemical Characterization and Minerals of Roasted Pyrite Ash of an Abandoned Sulphuric Acid Production Plant

Adsorption of Rhodamine B Dye from Aqueous Solution by Surfactant Modificed Zeolite from Coal Bottom Ash

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Evaluation of Estrogenic Activity on Raw Influents and Treated Efluents on Urban Area

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Abstract

The wastewater raw influent have a high pollutants concentration and conventional wastewater treatment plant (WWTP) may be not enough to remove endocrine disruptors compounds. This study evaluates estrogenic activity on samples of urban area and viability of Blyes (Bioluminescent Yeast Estrogen Screen) bioassay on these matrices. Were collected raw influent, treated effluent and recycled water of two WWTP. This assay were able to detected estrogenic activity about 14,66 a 24,41 ngE2equiv.L^{-1} On treated effluents were observed a significant reduction on estrogenic activity comparing to influent, one of the ETEs presented 2,44 ngE2equiv. L^{-1} and on the other it was under the limit of detection (0,10 ngE2equiv. L^{-1}), as well on reclycled waters. These results may indicate that this bioassay may be useful for monitoring wastewater treatment process and removal of micropollutants on effluents that can achieve environment.

Keywords: *wastewater treatment plant, estrogenic activity, water quality, recycled waters.*

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Assessment of the Viability of Production of Ceramic Tiles from Waste Generated in the Casting Process Using Plasma Electrolytic Oxide of Aluminum Alloy

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Abstract

The casting process is the production of metal parts when a metal or molten metal alloy is placed on a hollow mold made of sand. During fabrication of sand molds is generated as a byproduct dust exhaust. Disposal of this waste has several environmental damage as a modification of the natural landscape and occupation of large areas with landfilling, beyond this material is potentially toxic if disposed in uncontrolled areas. In order to use this waste, this work proposes the use of this waste for the production and characterization of coatings, such as protection film on an aluminum alloy surface plasma electrolytic oxide (PEO). The PEO is a process where the atmospheric plasma and conventional electrolysis are combined for the change of metal surfaces in ceramic oxides. In this work, the coatings were obtained in aluminum alloys by means of plasma electrolytic, electrolyte solution prepared using an exhaust dust and distilled water in concentrations of 5g / L and 20g / L. The electrolytic plasma was obtained by applying a potential difference of 650V, 300Hz frequency, duty cycle of + 60% to -20% and utilizing deposition time of 600s and 1200s. Were asked the exhaust powder analysis and film analysis using Scanning Electron Microscopy (SEM), Energy Dispersive Spectrometry (EDS), X-Ray Diffraction (XRD) and Infrared Spectroscopy (FTIR). The composition of the coatings showed the presence of O, Al, Si, Fe, K, Mg, Na, C, where all concentrations increased with longer deposition. This study also showed that the coatings obtained from concentration of 20g / L and 1200s deposition produce uneven coatings and low adhesion, the condition being discharged for further studies.

Keywords: *casting residue, ceramic coating, plasma electrolytic oxide, aluminum.*

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Chemical Characterization and Minerals of Roasted Pyrite Ash of an Abandoned Sulphuric Acid Production Plant

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Abstract

The obtention of sulphur generte a hematite-rich waste, known as roasted pyrite ash, which contains significant amounts of environmentally sensitive elements in variable concentrations and modes of occurrence. Whilst the mineralogy of roasted pyrite ash associated with iron or copper mining has been studied, as this is the main source of sulphur worldwide, the mineralogy, and more importantly, the characterization of submicron, ultrafine and nanoparticles, in coal-derived roasted pyrite ash remain to be resolved. In this work we provide essential data on the chemical composition and nanomineralogical assemblage of roasted pyrite ash. XRD, HR-TEM and FE-SEM were used to identify a large variety of minerals of anthropogenic origin. These phases result from highly complex chemical reactions occurring during the processing of coal pyrite of southern Brazil for sulphur extraction and further manufacture of sulphuric acid. Iron-rich submicron, ultrafine and nanoparticles within the ash may contain high proportions of toxic elements such as arsenic, selenium, uranium, among others. A number of elements, such as arsenic, cromium, copper, cobalt, lanthanum, manganese, nickel, lead, antimony, selenium, strontium, titanium, zinc, and zirconium, were found to be present in individual nanoparticles and submicron, ultrafine and nanominerals (e.g. oxides, sulphates, clays) in concentrations of up to 5%. The study of nanominerals in roasted pyrite ash from coal rejects is important to develop an understanding on the nature of this by-product, and to assess the interaction between emitted nanominerals, ultra-fine particles, and atmospheric gases, rain or body fluids, and thus to evaluate the environmental and health impacts of pyrite ash materials.

Keywords: *coal rejects, sulphuric acid production, nanomineral impacts, potentially hazardous elements*

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Adsorption of Rhodamine B Dye from Aqueous Solution by Surfactant Modificed Zeolite from Coal Bottom Ash

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Abstract

Zeolitic material synthesized from coal bottom ash was modified by surfactant hexadecyltrimethylammonium bromide. Surfactant modified zeolite (ZMSPB) was used as alternative low cost adsorbent for removal of Rhodamine B (RB) dye from aqueous solution. The adsorption equilibration was attained after 40 min of the contact time. The adsorption kinetics was tested for models of pseudo-first order, pseudo-second order and Elovich. The adsorption isotherm was analyzed using non-linear equations of the model Langmuir, Freundlich, Temkin and Dubinin-Radushkevich (D-R) and the criterion of best fit was evaluated using error functions. The obtained adsorption data were better described by the D-R model. The results showed that ZMSPB is a good adsorbent for the removal of RB from aqueous effluent.

Keywords: *Zeolite, Adsorption, Rhodamine B, Coal bottom ash.*

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21st May 2015

15h00-16h30	Session 5B	Room 6

Conceptual Framework and Principles for Selection and Definition of Sustainability Indicators: An Study Applied at Ecoinnovation in Smartparks Project (Spain and Brazil)

Environmental Sustainability Indexes'assessment for Water Supplying and Sewage Treatment Companies Listed on BM&FBOVESPA in 2014

Data Envelopment Analysis in the Sustainability Context - a Study of Brazilian Electricity Sector by Using Global Reporting Initiative Indicators

Proposal for a Value Stream Mapping Method Integrating Sustainability Indicators

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Conceptual Framework and Principles for Selection and Definition of Sustainability Indicators: An Study Applied at Ecoinnovation in Smartparks Project (Spain and Brazil)

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Abstract

This study is inserted in jointly developed project (Eco-innovation in Smartparks) with researchers from Spanish and Brazilian universities (Universidade de São Paulo, Universidade Federal de São Carlos e Universitat Autònoma de Barcelona), aiming to define and to propose specific tools and indicators to contribute for addressing sustainability from the perspective of Ecoinnovation in Smartparks. The concept of Eco-innovation in Smartparks is a proposal that seeks to develop and to apply (in an innovative, integrated and significant way, with an improvement of production processes) new sustainable approaches of conceiving planning and territorial management, integrating symbiosis on industrial, urban and agricultural fields. The concept of Eco-innovation in Smartparks includes new ideas, actions and operations in order to reach: the optimization of the efficiency of processes; the reducing of consumption and use of natural resources; the reuse of supplies and materials; and the reduction and/or proper disposal of wastes. Smartparks require indicators that are appropriate for addressing sustainability from the perspective of Ecoinnovation and, today it was observed the insufficiency or even the absence of indicators in comprehensive scales that consider the planning and management of Smartparks, and incorporate the various relations of symbiosis and practical approaches and applied sustainability. Thus, the research has studied approaches and principles for Smartparks conception, as well models, criteria and frameworks of sustainable indicators, in order to define and to stablish a Indicators framework for Smartparks application. The framework is composed by three categories representing stages of a Smart Park development (Planning, Monitoring and Management): "Infrastructure and services"; "Activities and Operation"; and "Interactions and symbiosis between institutions and Smartpark". Twenty one aspects of these categories detail and help to guide the development of a set of indicators for Eco-innovation in Smartparks. It is expected that these results support the improvement and implementation of specific indicator systems for parks with industrial, agricultural and urban symbiosis, providing scientific basis for future researches on Eco-innovation and SmartParks.

Keywords: *indicators, Smartparks, Ecoindustrial Parks, Eco-innovation, Symbiosis*

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Environmental Sustainability Indexes'assessment for Water Supplying and Sewage Treatment Companies Listed on BM&FBOVESPA in 2014

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Abstract

The critic level of the water in the storages of the brazilian hydroelectrical power plants represents the breaking point of the first condition for sustainability. The total affluence volume minus the total effluence volume results in 6,418 m³ of water per second, which is unfavourable for the national system. The investors of BM&FBOVESPA acnowledge and perceive positive value of the companies labeled as sustainable. In the period between 2006 and 2013 the ESI obtained a performande index of 190% above the Ibovespa index. The clients of the companies CASAN, COPASA, SABESP and SANEPAR paid in theis fees for water and sewage treatment, in R$ average value, 72,5% of the total eMergy they have received. There is a disadvantageous relation between the biosphere and the water and sludge treatment system that is operated by the companies that were assessed. Every company assessed in the present work violates the first conditio for sustainability due to the reduced volume of rain in the last 84 years, but shows to be sustainable in the long range if the defluence ever balances with the affluence at some point.

Keywords: *Environmental sustainability; Water supplying companies; BM&FBOVESPA; eMergy.*

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Data Envelopment Analysis in the Sustainability Context - a Study of Brazilian Electricity Sector by Using Global Reporting Initiative Indicators

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Abstract

A set of stakeholders (customers, employees, suppliers, public authorities, investors and others) pursuing different economic, environmental, and social interests determines the performance of an organization. In an effort to understand the corporate sustainability performance, this research focuses an analysis of sustainability indicators published in the reports of Global Reporting Initiative, disclosed by 24 Brazilian electricity sector in 2012. Indicators were identified and analyzed following: (i) a communication of economic, environmental, and social performance; and (ii) efficiency determined through the Data Envelopment Analysis (DEA) model. The results indicate that disclosures are often incomplete, and lack a pattern for similar indicators. Based on DEA, there is no direct relationship between economic value generated and distributed and efficiency, given that there are efficient large-scale hydroelectric plants and medium. In general, partial results are consistent with the conceptual assumptions that informal systems of enterprises promote sustainability, but their formal systems apparently have a very traditional focus on financial performance.

***Keywords**: Global Reporting Initiative; Data Envelopment Analysis; Triple Bottom Line; Brazilian electricity.*

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Proposal for a Value Stream Mapping Method Integrating Sustainability Indicators

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Abstract

In the current scenario, in generally the companies are increasingly looking to the use of sustainable practices in their business processes in order to maximize their profits, with best environmental practices, and especially the company's image enhancement to the community through actions social. Given these variables today and other of the past, operations management models have evolved over time due to the need imposed by society. However there are many challenges in the quest for sustainability, but this work of the emphasis in the manufacturing process in the pursuit of sustainable products and sustainable transformation. In the process of transformation practices and initiatives LM (lean manufacturing) has been used to reduce waste, minimize environmental impacts and provide better social conditions. The use of the VSM tool (Value Stream Mapping) developed by the LM is used to map a process flow in order to highlight the seven major waste losses. However some studies have added social and environmental indicators by the VSM, evaluating them independently. This work aims to present a methodology for developing a method of value stream mapping integrating sustainability indicators, in order to assess the level of sustainability of a manufacturing process as a whole (economic, environmental and social). With the proposed method was possible to measure the sustainability level of grip in the manufacturing process.

Keywords: *sustainability indicators, lean production, operations management.*

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21st May 2015

15h00-16h30	Session 5B	Room 7

Energy Efficiency in Maquiladoras of Electronic Components: A Cleaner Production Approach

Environmental Friendly Food. Choice Experiment to Assess Consumer's Attitude Toward "Climate Neutral" Milk: The Role of Information

Stimulating the Market: Incentives for Cleaner Production and Energy Efficiency in Latin America

Renewal of the Fleet of City Buses: Reduction of Energy Consumption and Environmental Impacts

Sustainable Development, the Cleaner Production and Higher Education

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Energy Efficiency in Maquiladoras of Electronic Components: A Cleaner Production Approach

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Abstract

Estimates by the International Energy Agency show that the world's demand for energy will increase 1.6% annually until 2030; this is mostly due to the rapid growth in the economies of developing countries. Currently, almost two thirds of the world's energy resources are used in production lines; therefore, not only is energy management an operational and administrative priority for entrepreneurs, but has also become a matter of public and governmental concern. Given the fact that the manufacturing industry is a powerful energy consumer, energy efficiency has become a key element to maintaining competitiveness and core advantages, since not only it does contribute to cut costs and reduce the emission of greenhouse gasses (GHG), but it also aids maquiladoras in their efforts to build an image of prestige and repute in the eyes of the competitors, the employees and other stakeholders. It also helps them developing strong policies to grow as a socially responsible company and paves the way to true sustainable development. Despite the obvious economic and social benefits that efficient energy management means for companies and entrepreneurs, the manufacturing industry in developing countries still lacks strong energy policies. It is usually the international corporation that adopts and adapts energy conservation measures in host countries; if only as an extension of similarly built management techniques used by the parent company in the countries of origin. Energy audits in Mexican maquiladoras have shown diverse results, this is mostly due to lax regulations and lack of rigor in compliance, poor employee training and significant differences in infrastructure and in the size of the plants. Nonetheless, opportunities for improvements have been identified in all maquiladoras audited and could, potentially, greatly reduce energy costs and GHS emissions.

Keywords: *energy audits, maquiladora, energy efficiency, energy management systems, cleaner production.*

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Environmental Friendly Food. Choice Experiment to Assess Consumer's Attitude Toward "Climate Neutral" Milk: The Role of Information

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Abstract

The livestock sector has a high impact in terms of carbon footprint. Lowering GHG emission from the livestock sector deals with implementing climate neutral production techniques in a cost effectiveness way and with developing market communication to make carbon free milk competitive with alternative products. This study aimed at analyzing how information and communications could impact on the consumer's attitude toward climate neutral fresh milk. The research focused on a case study carried out in Tuscany among a sample of supermarket customers, to assess consumer attitude toward fresh climate neutral milk using choice experiments methods. The participants were asked to attend a focus group meeting made of four different sessions. During the first session participants were asked to fill a background questionnaire and to watch a short documentary video showing the climate change risks. A second session consisted in a choice experiment in which participants were presented with 12 choices, each describing a scenario in which the milk key attributes were planned at different levels (price, organic labeling and carbon footprint labeling). During a third session the focus group discussions was developed following a semi-structured debate about environmental labeling, climate neutral labeling and the environmental impact of individual's purchasing behavior. In the last fourth session participants were asked to express their preferences on the choice-sets with the same scenarios presented in the second session, in order to assess variation in individual WTP toward climate neutral and organic milk. Results show that information could play a role in changing consumer attitude toward carbon free products.

Keywords: *carbon footprint, choice experiments, food, consumer behaviour. Multinomial discrete choice models*

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Stimulating the Market: Incentives for Cleaner Production and Energy Efficiency in Latin America

ASHTON, W. S. [a,*], IZQUIERDO-CRUZ, C. A. [b], PANERO, M. A.[c], ARIAS, A. L.[d], BELFIELD, J.[f] BENTIN, J.[i] DE LA CRUZ, G.[f], DUECKER-AGUILAR, S.[a] SALAZAR de TOBAR, Y.[e] , HURTADO, M.[a], MARTINEZ-GREEN, T.[g] , PANCHAME, S.[g], URIARTE, M.[h] ,

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Abstract

Resource efficiency, including cleaner production and energy efficiency (CP/EE), is thought to be an important strategy for developing countries to grow their economies in a sustainable manner. However, in many regions the private sector, particularly smaller enterprises, has been reluctant to adopt such strategies due to a combination of informational, technical and economic barriers. A variety of players in Latin America, including international aid agencies, governments, banks and national cleaner production centers, have introduced market-based mechanisms to encourage enterprises to adopt resource efficient practices. In this paper, we conduct a comparative analysis of the availability and utilization of different types of market-based instruments for cleaner production and energy efficiency in micro, small and medium size enterprises in Central America. We surveyed 19 programs in 5 countries (Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua) to examine how effectively these instruments are being utilized, complementary barriers that prevent their adoption, and best practices for increasing their uptake. We find that most programs are focused on energy efficiency, are financed by international donors, offer grants and awards to companies for pursuing CP/EE, but are not specified towards MSMEs.

Keywords: *cleaner production, resource efficiency, Small and Medium Enterprises, market-based mechanisms, energy efficiency*

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Renewal of the Fleet of City Buses: Reduction of Energy Consumption and Environmental Impacts

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Abstract

This article describes the current stage of studies developed by the Environment Committee of the National Association of Public Transportation — ANTP, whose goal is to estimate the magnitude of the impacts, in terms of reduced emissions of local pollutants and greenhouse gas emissions, resulting from the replacement of the current urban fleet of conventional diesel buses in Brazilian cities for less polluting vehicles and lower energy consumption, represented by technological and energy alternatives available commercially. In addition, shows an application of the methodology developed by the Commission to simulate a replacement program of urban bus fleet of the city of São Paulo. The results of this simulation show that the replacement of the fleet by less polluting vehicles and lower energy consumption would reduce in 73% the emission of CO, 90% of HC, 71% of NOx, 92% of MP and in 26% of CO2 emissions.

Keywords: *city bus; vehicular technology; environmental impact; public transport; transportation planning*

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Sustainable Development, the Cleaner Production and Higher Education

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Abstract
In this paper some ideas and realities on Sustainable Development, the Cleaner Production and the Higher Education as well as the link between these three elements are discussed. On the one hand, the Cleaner Production as the most appropriate and current tool to achieve sustainable development and, moreover, provide students and university graduates environmental education commensurate with the level of higher education, tools that allow them both to identify and solve the socio-economic and environmental problems related to their training and their professional work.

Keywords: *Sustainable development, Cleaner Production, Higher Education.*

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Conferences

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Oral Presentations

22nd May 2015

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22nd May 2015

8h00-9h40	Session 6A	Room 1

Evaluation of Cleaner Production in the Mechanical Metal Sector of the Central Region of Rio Grande do Sul

Identification of Opportunities for Cleaner Production in Plastic Covers Alagoas Industry

Building an Ecodesign Transition Framework toward Sustainable Product Innovation

Flexible PVC, Plasticizers and New Trends

Trends for use Niobium in the Sector of Microelectronics

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Evaluation of Cleaner Production in the Mechanical Metal Sector of the Central Region of Rio Grande do Sul

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Abstract

More and more companies should be alert to trends imposed by the market, such as fitness for clean technologies. In this context, there are tools such as Cleaner Production (CP), which help organizations to suit their processes and products. Given these aspects, it is important that companies adopt environmental policies solidified in its corporate culture. Thus, research to identify how the CP tool could be applied to companies belonging to the mechanical metal sector of the central region of the state of Rio Grande do Sul. Therefore, we identified which PML actions are used and analyzed the impact of the same in the companies surveyed. We used an assessment of the use of CP, characterized as a study of case of qualitative-quantitative character. It was concluded that the companies surveyed follow the CP premises more directly at levels 1 and 2, through reduction actions at source and internal recycling, showing an engagement of the sector in accordance with environmental policies.

Keywords: *CP; Mechanical Metal; Central Region of Rio Grande do Sul*

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Identification of Opportunities for Cleaner Production in Plastic Covers Alagoas Industry

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Abstract

In Brazil, in 2012, the industry of plastic processing comprised 11,690 companies and employed 348,000 direct workers. In this important sector, it's important understand the productive process and ally it to a purpose that hold a realistic view of sustainability. In this sense, the present work is a study of case that aims to assess the opportunities in improvement of productive process into a plastic industry located in the state of Alagoas – Brazil. This company is specialized in manufacturing of plastic caps. The data were collected through direct non-participant observation to the production line; together with unstructured interview with the operator of the process. The concepts of "cleaner production" and eco-efficiency" were used like base to construct the analysis. These concepts were employed in the present study because they promote the idea of generate mutual benefits to the both sides (industry and environment). The findings indicated that the investigated company potential to increase its operational efficiency and also reduce its costs. The production process had been evaluated and it was constructed some purposes to improve the operational efficiency, costs optimization and reduction of wastes. This study indicates that the evaluation developed in this work can be replicated to other companies with similar characteristics to the company in this study, even in different sectors. For future works this study indicates the analysis of the costs of waste reuse generated by this industry, especially the "galhas"; the comparison between investments in the redesign of machines used by this sector and the increase on productivity and operational efficiency of this industry; and the repair of defective products generated.

Keywords: *industrial ecology, cleaner production, production of plastic caps*

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Building an Ecodesign Transition Framework toward Sustainable Product Innovation

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Abstract

In order to effectively integrate environmental aspects into product development processes, companies have to significantly change some of the practices and habits of all involved stakeholders and organisation. To complement earlier research and the (technical) "hard side of ecodesign", this article explores the promising "soft side" that considers company culture and human factors, through a multiple steps literature review. Whereas a consistent prescriptive change model is still lacking in ecodesign literature, a strong convergence and synergy is shown with the emerging Transition Management approach designed for sustainability issues facing organisations. The principles of an "ecodesign transition framework" are proposed, combining a three-level systemic approach, complementary top-down planning and bottom-up innovation, through new types of interaction and cycles of action and learning, with a deeper stakeholder management. This new combination could be capable to address change management issues and help companies evolve toward a more effective sustainable product innovation process, in the context of evolving business management practices.

Keywords: *ecodesign, integration, change management, transition, sustainability*

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Flexible PVC, Plasticizers and New Trends

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Abstract

In 2011, the polyvinyl chloride (PVC) consumption in Brazil was more than double than the total of polyethylene terephthalate (PET), reaching more than 1.16 million tons. From this, almost 38% were employed in flexible application such as packaging (films, mainly), laminates (e.g. floorings), wire, cables and hoses. In this application, it is common the use of plasticizers, chemical components that stay between polymeric chains, decreasing the attraction between them by diminishing the strength of the secondary bonds that, and consequently, decreases the material resistance to deformation. The objective of this paper was to present the national and international trends related to the replacement of plasticizers employed in flexible PVC, mainly the most consumed of them, the dicotylphthalte (DOP). This plasticizer, despite the excellent cost/performance ratio, presents restrictions related to its use in some applications (for instance, packaging, toys and school supplies), due to the possibility of contaminating the products in which they are employed. Outside Brazil, one of the most common options is dioctylterephthalate, that can be produced from chemical recycling of PET bottles and does not present any restrictions.

Keywords: *PVC, PET, DOP, DOTP, plasticizer*

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Trends for use Niobium in the Sector of Microelectronics

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Abstract

The economic management and production, in the semiconductor industry, can give the companies in sector microelectronic opportunities to be more competitive. To be competitive, business management requires planning, research, developing manufacturing processes, especially in technology. New models of production and the increase in technologies are becoming more specialized to industries of microelectronics sectors increasing the added value to the product and / or process. The increase of these processes and improved and strategically well-defined production projects may provide greater technical advantage. Recent research points to the development of alternative materials for the production of semiconductors such as niobium, in replacement of silicon, which due to its property of high tolerance to extreme temperatures can significantly increase processing speed, converging to a revolution in technology computational.

Keywords: *Semiconductor; superconductivity; silicon; niobium*

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22nd May 2015

8h00-9h40	Session 6A	Room 2

Sustainable Management of the Steel Industry from the Premises of Industrial Ecology

Process Management to Obtain a Cleaner Production in Discrete Manufacturing

Coals Industrial Beneficiation Processes from Santa Catarina, Brazil: Inorganic Components Geochemical

Analysis of Bordering Counties in Sao Paulo State and Oil Exploration from the Perspective of Integral Sustainability

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Sustainable Management of the Steel Industry from the Premises of Industrial Ecology

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Abstract

Industrial Ecology (IE) proposes that the industrial system be studied in an aligned way with the environment in order to improve industries environmental, social and economic performance. Industrial Symbiosis (IS), one of IE tools, refers to the interaction between nearby industries, looking for possible waste, energy, water synergies. In Brazil, the National Solid Waste Policy was enacted in 2010 through Federal Law 12.305. This Law brings a new model for waste management. The steel industry production process is a major waste generator. Therefore, this study aims to analyze the steel industry production process in accordance with the industrial ecology principles. In this scenario, this study first presents the IE and IS concepts. Following, the steel industry in Brazil is presented in order to understand its alignment with the Law 12.305/2010. In addition, the knowledge of the steel production process is presented in order to identify waste generated and possible destinations. As a result, it is understood that the integration of industries from different segments with the steel industry and a greater articulation between the actors involved may result in environmental, social and economic benefits, which are presented in this study. Finally, it is suggested that both the public and the private sector should, similar to what already happens in the academia, should encourage and invest in the practice of Industrial Symbiosis in Brazil.

Keywords: *Industrial Ecology, Industrial Symbiosis, Waste, Steel***.**

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Process Management to Obtain a Cleaner Production in Discrete Manufacturing

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Abstract

In the national scene and the imminent presence of the water crisis in Brazil, it becomes mandatory to debate of environmental issues in the production environment as well as in its various sectors of activity. Human interference leads to a scarcity of natural resources caused, in most cases, poor management of these resources and the lack of proper management of waste generated in all processes. This article presents a case study of the implementation of a cleaner production methodology (CP) through the management processes of the existing workflows in a cleaning products company, aimed at implementing practical solutions to reduced consumption of water. These solutions, which include changes in the physical structure of the machines, alongside a joint work with the PPC and other areas involved, combining market strategies and productivity in order to reduce the setups of machines and use of water resources.

Keywords: *Sustainability, Cleaner, Water Resources Production.*

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Coals Industrial Beneficiation Processes from Santa Catarina, Brazil: Inorganic Components Geochemical

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Abstract

Comparative research of the mineral matter and trace elements in 12 pairs of run-of-mine (ROM) and clean-coal products from beneficiation plants in Santa Catarina, southern Brazil, have been developed out using low-temperature oxygen-plasma ashing, X-ray diffraction and chemical analysis techniques with the aim of estimate the effect of coal preparation on the mineralogy and chemical composition of the final coal products. The results showed that substantial reductions in mineral matter and ash levels are associated with beneficiation of coals mined from the different deposits. These reductions are accompanied by changes in the levels of Fe2O3 in the respective coal ashes, due to the reduction in the proportion of pyrite in the mineral matter, and also by a reduction in the level of Na2O, possibly due to ion exchange within the clay minerals. The relative proportions of quartz, clay minerals, and minor phases such as calcite and feldspar (mainly albite) within the mineral matter are not, however, significantly changed by the beneficiation processes. The concentrations of most trace elements in the beneficiation products are similar to the respective concentrations in the relevant ROM materials, or are reduced to an extent similar to that of the total mineral matter level for the respective coal samples. This indicates an association mainly with the clay-rich mineral matter. The concentrations of As and Pb, however, are reduced to a greater extent for most samples by the beneficiation processes, in accordance with a pyrite association. Concentrations of Ge, U and Zr are higher in many of the clean coals than in the respective run-of-mine materials, indicating the possibility of preferential association, at least for some deposits, with the organic-rich fractions of the coals concerned. Comparison of ROM and clean coal products from Santa Catarina preparation plants shows significant reductions in ash, mineral matter and total sulphur percentages associated with beneficiation, and also in the relative proportions of pyrite within the mineral matter. With the exception of pyrite, the mineral matter of the clean coals, as determined by quantitative X-ray diffraction, is similar to that of the respective ROM materials, with abundant quartz, kaolinite, illite and interstratified illite/smectite, and minor proportions of calcite and other accessory phases, and appears to have been little changed by coal preparation.

Keywords: *mineral matter, X-ray diffraction, coal preparation, pyrite, trace element*

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Analysis of Bordering Counties in Sao Paulo State and Oil Exploration from the Perspective of Integral Sustainability

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Abstract

After the discoveries of the region known as "pre-salt" in 2007, the Brazilian government has changed some of the Brazilian laws with the aim of capturing the maximum of the rents arising from the exploration and production of hydrocarbons in this area. The topic discussed here is crucial for the country because the wealth coming from national oil reserves are finite. The oil and natural gas wealth can make a big difference in countries which use those natural resources wisely, for example, Norway has been seen as a good example of how an efficient and clear oil and natural wealth management can become sustainable over time. In this sense, this article aims to analyze the institutional profile of the bordering counties in Sao Paulo state, one of the areas that possibly receive greater amount of income within Brazil in the coming years. The methodology is based on case study by qualitative analysis of development with a focus on socioeconomic profile and potential of the region studied. As a result, the article points out that each beneficiary city should look its own public needs, calling its inhabitants to conduct educational and health programs that are important to that county in order to make the wealth derived from oil sustainable.

Keywords: *Pre-salt´s rules, oil and natural gas government takes, bordering counties in Sao Paulo State*

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22nd May 2015

8h00-9h40	Session 6A	Room 3

Analytical Ability and Participation for Sustainable Environmental Projects

Challenges of Inter-Municipal Public Sector Consortia in the Management of Solid Residue in Brazil: Case Study of Public Sector Consortia Santa Tereza Valley - ConVALE and Serra Dourada Valley – VALEcon

Multi-Infra Curbs – New Model for Urban Infrastructure

Exploring the Potentialities of Emergy Accounting in Studying the Limits of Growth for Urban Productive Systems

The Leading Role of Local Governments in Achieving a Sustainable City

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Analytical Ability and Participation for Sustainable Environmental Projects

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Abstract
The article discusses the changing in research on the space of cities considering some new paradigms introduced by the Information Technology (IT) seeking for a cleaner, sustainable and smarter production. It also discusses the current conditions of the use of IT, confronting new opportunities for analysis and interactivity applied in environmental management. Finally, it tries to deduct an evolution of strategies aiming the sustainability-oriented production, with the spreading of those resources through transdisciplinarity

Keywords: *architecture, urban design, environmental management, sustainability and Information Technology.*

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Challenges of Inter-Municipal Public Sector Consortia in the Management of Solid Residue in Brazil: Case Study of Public Sector Consortia Santa Tereza Valley - ConVALE and Serra Dourada Valley – VALEcon

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Abstract

This paper studies the challenges of federal entities interested in constituting public sector consortia with a proposal to solve issues related to solid residues in Brazil, following the requirements by the National Policy on Solid Waste. This analysis was based on a case study regarding public sector consortia: the Inter-municipal Consortium of Santa Tereza Valley – ConVALE – constituted by municipalities of Santa Tereza (state of Goiás) – Trombas , Formoso, and Montividiu do Norte; and the Inter-municipal Consortium of Serra Dourada Valley (state of Tocantins) – VALECon – constituted by municipalities of Paranã – Palmeirópolis, Jaú do Tocantins, and São Salvador do Tocantins. Our analyses, researches, interviews and training course led us to conclude that the development of regional solidarity, the formation of paradigms through investments in professional training, the service of consulting and training managers would solve the major problems in public sector consortia.

Keywords: *Public sector consortia, solid residues, National Policy on Solid Waste*

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Multi-Infra Curbs – New Model for Urban Infrastructure

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Abstract

Active now for over 20 years in the civil construction market we have always been aware of an enormous material waste which has generated large amounts of debris. Focusing on this fact we searched for alternative uses for this residue and began to study ways in which to incorporate the debris as a recycled aggregate in the concrete used to fabricate curbs and gutters for street right-of-ways, in accordance with NBR 15116/2004 regulations. After we began to develop and analyze the utility of this new piece of urban equipment we realized the enormous potential of a novel way in which to use it. We are aware that curbs and gutters sit in parallel with all the utility networks necessary to supply our cities. It was along these lines that we developed a project for a curb able to double as a support for these distribution networks as presented below. We also became aware of the necessity for connections with the sewage system and concluded that these connections have to be adapted to the city's new necessities in improving the use of our water supply as well as that of collecting and reusing rainwater and reusable sewage waters, the concepts of which we will present here. We are a private entity and as such always interested in the economic viability of our projects in order to attain to our objectives. To this end we have drafted a contract and cessation model for the distribution of these utilities, as well as processes for metering and charging for consumption, monitoring methods and distribution control, connectivity with consumer units and other innovations to be presented herein. Keeping in mind that a solution such as this depends on high investments as well as the political will to implement them we are unable to present any effective projection of results of implementation. We do however believe that what we propose below will be easily understood and its benefits easily comprehended.

Keywords: *curb, precast, cogeneration, water, reuse, rainwater*

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Exploring the Potentialities of Emergy Accounting in Studying the Limits of Growth for Urban Productive Systems

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Abstract

Cities are important urban productive systems in which its main goal could be considered as the innovation supplier to generate economic growth. As well as all social organization managed by economies of scale, cities have a tendency of eventually reduce or even stop its growth. In this scenario, public policies are essential to avoid a potential collapse of society. The sustainability of cities have been studied through different methodological approaches, but few scientific works assessed the limits of its growth. This work aims to explore the potentialities of emergy accounting (with an "m") in the discussions about the limits of growth for urban productive systems. The cities named Araraquara, Bragança Paulista, Campinas, São Paulo, and Taubaté were considered as case study due to their socio-economic importance within São Paulo State boundaries, Brazil. Time leg considered was from 1999 to 2011. Results indicate that all assessed cities have the same development pattern as showed by the dynamics of "empower" (in seJ/yr), in which the differences are related to current development degree of cities. In parallel, all assessed cities showed an increase in their efficiency estimated by the conversion of input materials and energy (measured in seJ) into outputs of goods and services (measured in $), however, the efficiency stabilization along all evaluated period was not observed. This suggests that limits of growth as hypothesized in this work does not exist, or it was not reached yet, or even the time leg considered was not long enough to observe that stabilization. Although results did not allow to verify the limits of growth for the assessed cities, this work can be considered important due to its methodological approach used in assessing urban productive system, including the top-down approach, the input-output model of systems functioning, and the proposition of rainfall transformity calculates as the thermal exchange (14,150 seJ/J).

Keywords: *Cities; Emergy; Empower; Limits of growth; Rainfall transformity.*

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The Leading Role of Local Governments in Achieving a Sustainable City

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Abstract

There is a clear link between the actions of the cities about climate change and the larger goals of being a low-carbon economy, poverty eradication and global environmental governance. The role of cities in this new institutional architecture, as defined by the Unites Nations, is a unique opportunity for cooperation. Shares of cities serve as a catalyst for national governments, aiming to provide support to public policies, creating a virtuous circle. The purpose of the present work is to demonstrate that, faced with a troubling and urgent climate reality, local governments have taken responsibility and have been working in the formulation of public policies with the participation of various actors in society.

Keywords: *sustainable city, local governments, government policy*

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22nd May 2015

8h00-9h40	Session 6A	Room 4

Case Study BrazilGlass - New Business Patterns

Potential of Generation and Recovery of Hospital Solid Reject in the Western Paraná Region

Comparative Study Between the per Capita Generation of Solid Residues of two buildings - Lago and Caraíbas, Goiania, Goias

Reverse Logistics of Electronic Equipment Waste: A Comparative Evaluation of Regulatory Instruments

Potential of "Urban Mining" Arising from the Reverse Logistics of Electronics, a Case Study of iPhone and iPad from Apple

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Case Study BrazilGlass - New Business Patterns

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Abstract

This report is produced in accordance with the method of SWOT analysis of the company BrazilGlass, the strengths identified throughout the study suggest that the company has a good vision and strategy practice new standards. The research is made of numerous interventions in the company throughout its existence in search of a Cleaner Production. The company is technologically updated and seeks to offer products with new materials, better design, energy saving and respect for the environment. It knows the importance of airtightness, insulation and durability in its products and therefore moves towards a new phase within the universe of locks of facades made in the industry. The company provides its products in good lighting, minimizing the inconvenience caused by the incidence of the sun, wind and rain and developing systems that have gone through various stages of evolution. For this innovation in the production of laminated glass, tempered glass, screen printing, insulating glass and window frames and coatings. It is important that investments in advertising campaigns and reducing the cost of goods is on the order-paper in the company to make the process more sustainable and have more possibilities in front of their direct competitors. We highlight environmental responsibility and cleaner production aiming for sustainability of their processes, including a margin of 100% reuse of materials and waste released into production

Keywords: *Glasses and Cleaner Production.*

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Potential of Generation and Recovery of Hospital Solid Reject in the Western Paraná Region

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Abstract

In Brazil, the recovery of hospital solid reject (HR) is rare or, in the most of cases, non-existent. Recent studies show that HRs can be used in pyrolysis processes to obtain coal and liquid and solid hydrocarbons. However, to size them the qualification and quantification of HRs are required. In this context, the paper presents the generation potential of HR in the 50 municipalities of the western Paraná region and proposes a new management model for these rejects. The methodological design is based on the possibility of recovery through its transformation into value-added products. Therefore, a prospective survey was conducted and its quantitative values were obtained from correlations that depend on different variables, being the main of them the number of hospital beds available in each municipality. Through thematic maps, a subdivision of the municipalities in five HR management regions is proposed. In each region, an anchor municipality would receive the installation of an HR processing center. Thus, the HR processing plant installed in the city of Campo Bonito would be responsible for processing 0.90 ton per day; in Marechal Cândido Rondon 0.75 ton per day; in São Miguel do Iguaçu 0.64 ton per day; in Iracema do Oeste 0.22 ton per day; and in Céu Azul 0.19 ton per day. From this perspective, the HR would be converted into raw material and the products of its recovery would return to the production cycle.

Keywords: *hospital solid waste; health services solid waste; management models.*

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Comparative Study Between the per Capita Generation of Solid Residues of two buildings - Lago and Caraíbas, Goiania, Goias

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Abstract

The objective of this study is to conduct a comparative research between horizontal and vertical buildings in middle-class condominiums in the city of Goiânia regarding their respective *per capita* residues by assessing the specific weight of solid residues in the location and indicating the factors of possible influence on their production. Using the collected data, we quantified the *per capita* generation of these residues in Condominium *do Lago* (Horizontal) as well as in *Caraíbas* Building (Vertical). The methodology employed in this study was divided into five stages: bibliographical review; definition of the area of research with technical visits; information; collection *in loco*, residue quartering. The results led to the conclusion that both buildings generate practically the same amount of residue; it is required to enable alternative destinations for urban solid residues as well as to develop effective and permanent programs for environmental awareness and improve the management of solid residues in the location.

Keywords: *Urban solid residues, gravimetric composition, quartering.*

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Reverse Logistics of Electronic Equipment Waste: A Comparative Evaluation of Regulatory Instruments

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Abstract

Considering the environmental issues related to e-waste caused by excessive consumption and early disposal of Electrical and Electronic Equipment - EEE, this paper aims to analyze the regulatory instruments in force for e-waste management, in Brazil and in selected geographies with a higher incidence of e-waste (USA, China India, Japan and EU Members States). The comparison matrix is presented and, within this context, Brazil appears as the second in terms of number of regulatory instruments, however, with unknown recycling rate. As a contrast example, Japan and EU Member, with few regulatory instruments, stand out in recycling rates, proving their effectiveness. For instance, the European EPR system (Extended Producer Responsibility) as such, it serves as a basis for creation regulations in many other countries. This work can conclude that it is not the amount of regulatory instruments that influence the rates of return, but its effectiveness. This paper is theoretical and based on the results of literature reviews.

Keywords: *EEE, E-waste, REEE, Regulatory Instruments, Reverse Logistics,*

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Potential of "Urban Mining" Arising from the Reverse Logistics of Electronics, a Case Study of *iPhone* and *iPad* from *Apple*

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Abstract

Mineral extraction is one of the primary sector activities that most impacts the environment. Arising of waste electrical and electronic equipment, various noble minerals such as gold, silver, palladium and cupprum are discarded, causing environmental and public health problems, and configure a waste of process of such metals. This article is studying the possibility of reuse such minerals, here called "urban mining", from the case study of the iPad and iPhone, using general data minerals laptops and cell phones, crossing these data with information from the worldwide sales of these products in the period of 2007 to 2014, reaching measurements that can give a first look at the potential of such activity. This study is a reflection of "urban mining", in order that this theme is focal for the sustainability sector.

Keywords: *Planned obsolescence, Waste Electrical and Electronic Equipment, Precious metals*

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22nd May 2015

8h00-9h40	Session 6A	Room 5

A Lean & Green Model for a Value Stream

Lean and Green: Study on Integrated Practices

The use of Lean Manufacturing Practices in Cleaner Production: A Systematic Review

Lean Maintenance: Perspective of Competitive and Sustainable Manufacturing

The Utilization of Lean Manufacturing Tools to Complement the Design for Environment for Reducing the Environmental Impact

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

A Lean & Green Model for a Value Stream

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Abstract

Following the paper "A Lean & Green Model for a production cell", published by Journal of Cleaner Production in December, 2014 (Pampanelli et al., 2014), the main objective of this paper is to propose the extension of the Lean & Green Model for the second level of flow, the Lean & Green Business Model (L&GBM) for a value stream (VS), understanding its main characteristics and differences. Studies developed confirmed that traditional VS thinking (divided by product families) is not applicable for solving with environmental problems in a manufacturing environment. Following this finding, the L&GBM for second level flow was developed and tested in a single multi-national engineering company, including the results of the model application at the value stream level. Such findings confirm that the Lean & Green Model can reduce resources use in a VS level from 2 to 40% and save R$ 1,5Mi.

Keywords: *Lean, Lean and Green, Kaizen, Value Stream*

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Lean and Green: Study on Integrated Practices

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Abstract

Context: Increasingly, organizations find themselves forced to expand their productivity by reducing costs and ensuring quality. In addition, the strong scarcity of resources and high levels of pollution have led the government to interfere in this process, by creating laws to control the environmental impact that these companies generate. Firms willing to reduce waste have already adopted lean manufacturing and also environmental management as an approach to control impacts. **Gap:** The joint action of both models leads to the new management approach called Lean and Green (LG). However, it appears that studies on LG are few, not showing how organizations can act in order to achieve results for both models. **Purpose:** This paper aims to propose a list of practices that companies could adopt in case it wishes to lean and to be environmentally friendly at the same time. **Methodology:** For this purpose, an exploratory research was carried out, resulting in 43 papers related to Lean and Green practices. Secondly, all practices found in each paper were listed up, to finally filter those that can be classified as LG, in agreement with previous studies. **Results:** As a result of the research, a table of LG practices is presented. It can be consulted by organizations wishing to reconcile the two theories in their production routines. It happens that some lean practices need to be adapted in order to be classified as LG. **Conclusions:** The results show being possible to apply the LG management model in practice, with only the adoption of lean manufacturing and environmental management practices that converge on purpose. There is a wide gap in the field of how environmental management can influence on lean manufacturing, since most of the analysis presented are given in the opposite direction. Finally, the implementation of lean practices itself do not guarantee outcomes enough to meet the requirements of environmental laws.

Keywords: *Lean and green, lean manufacturing, environmental management, practices.*

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The use of Lean Manufacturing Practices in Cleaner Production: A Systematic Review

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Abstract

Lean manufacturing aims to eliminate waste in the production chain for cost reduction, quality improvement, delivery time, i.e. it seeks to make the most efficient production process. The Cleaner Production (CP) aims at environmental improvement of production processes, adopting a precautionary approach and seeking to reduce environmental waste and waste generation. Several studies have indicated that when applying the Lean companies can reduce environmental impacts. Given this context, the objective of this research is to investigate, through a Systematic Literature Review, which ones and how the Lean practices and tools are being used for improvements in environmental performance. The results show that the literature indicates a strong synergy between Lean and Cleaner Production and that many Lean tools can contribute positively to environmental sustainability.

Keywords: *Lean Manufacturing, Cleaner Production, practices, tools.*

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Lean Maintenance: Perspective of Competitive and Sustainable Manufacturing

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Abstract

This article focuses on the integration of operations management processes and with the paradigm of Lean Maintenance, specifically models of production systems in the context of a competitive and sustainable manufacturing. The research method is based on a critical analysis of the literature using two complementary approaches. The research also has shown that adopting the paradigm "Lean Maintenance" in businesses and organizations is still in its embryonic state; however our results suggest that the implementation of the paradigm "Lean Maintenance" can act as a catalyst for operational performance, i.e. making competitive and sustainable manufacturing, especially providing synergy to corporate sustainability. It is important to note that this research will be the basis for a more detailed for medium and small project.

Keywords: *Environmental, Operations, Production, Sustainability.*

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The Utilization of Lean Manufacturing Tools to Complement the Design for Environment for Reducing the Environmental Impact

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Abstract

This paper explores the DfE (Design for Environment) as one of the environmental management practices and Lean Manufacturing. The proposal is to present how Lean tools can complement DfE tools in reducing environmental impact. Through literature search with the contribution of several authors on the theme, is analyzed that the Lean Manufacturing aims to improve the quality and productivity and the DfE is aimed at eco-efficiency, which prevents pollution and the degradation of the environment in product development and process. This relationship contributes to sustainable development suggesting the existence of an enabling environment for the realization of people's efforts to reduce waste: by eliminating these wastes, also eliminates part of the environmental problems because of the garbage accumulation and all contamination from him. A brief review of the literature on DfE and Lean Manufacturing is displayed showing their concepts, features and applications in support of waste reduction.

Keywords: *Design for Environment. Lean Manufacturing. Tools.*

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22nd May 2015

8h00-9h40	Session 6A	Room 6

Solid Waste Management Plans in the City of Londrina: A Longitudinal Analysis

Linking Sanitation to Agriculture: Recycling Nutrients from Human Excreta in Food Production

Cooperative Recycling as a Tool for Social Inclusion and Reduction of Urban Solid Waste

Waste from Eucalyptus Wood Steaming as a Natural Dye Source for Dyeing Cotton

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Solid Waste Management Plans in the City of Londrina: A Longitudinal Analysis

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Abstract

Our environment is undergoing increasingly accelerated and intense changes such as climate tragedies and the inadequate use of natural resources. These facts have led to adverse impacts on both men and nature. Thus, this study aims to analyze the Solid Waste Management Plans (SWMP) of companies located in the city of Londrina. This is a documentary, qualitative and quantitative research in a longitudinal approach. Data has been collected and added up in a form. The research involved all organizations that submitted the document attached to the Municipal Department of Environment and Natural Resources of the city of Londrina from 2010 to 2013. From the data analysis it was possible to identify wide variations in the number of companies that made the SWMP and high dispersion of business activities. It has also been noticed that the professional profile of people in charge of drafting the document has changed over time. The results point out to the need to review the municipal legislation regarding the metrics used to submit data by companies, as well as the need for better effectiveness of the Municipal Department in the monitoring of the municipal legislation.

Keywords: *Environment; Residues; Solid Waste Management Plans; Environment Management.*

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Linking Sanitation to Agriculture: Recycling Nutrients from Human Excreta in Food Production

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Abstract

Poor sanitation services and water scarcity have become a global issue and not only a problem relevant to arid zones. In addition, hunger and malnutrition, poverty and limited energy access that constrain the achievement of human wellbeing and economic growth are worldwide problems, including Brazil. Large conventional municipal wastewater treatment plants are often expensive to establish and difficult to operate. As a result many cities and villages in developing countries are unable to set up such facilities and operate them. Decentralized wastewater treatment systems have proved to be successful in many communities, particularly in peri-urban settlements in Asia and Africa. This approach is based on the principles of decentralization of responsability, simplification of technology and the focus is on recycling the waste and nutrients.

Palavras-chave: *human urine, ecological sanitation, unfertilized soil, urban agriculture, permaculture.*

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Cooperative Recycling as a Tool for Social Inclusion and Reduction of Urban Solid Waste

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Abstract

The recycling cooperatives have been considered as a good alternative for removal of solid waste from the cities and also as a way to create a source of income for these workers. The present study demonstrated the difficulties and the contributions that this cooperative promotes to removing the solid waste from the city through a case study based on a survey carried out in the Cooperativa Central de Reciclagem da Zona Norte (CRZN) located in Sorocaba-SP. As the survey results showed that the cooperative must operate consistently and be managed properly can result as increasing the efficiency of collecting, segregation and selling the recyclable material can be resulting in higher income for workers. During the 2011 for 2014 period the average income grow to R$ 785,29 to R$ 1.409,49 and in the same period, the amount of waste removed from the city, grew three times at least. This result was possible by applying an organized management and due to use of a quality tool known as the Ishikawa diagram. The adoption of the tool also, contributed to increase the productivity and workers began to participate more actively in the strategic decisions and therefore improved self-esteem and provide good relationship with other workers.

Keywords: *Recycling, Cooperative, Management.*

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Waste from Eucalyptus Wood Steaming as a Natural Dye Source for Dyeing Cotton

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Abstract

Textile Industry is increasingly researching for cleaner production improvements, such as new processes and materials. Natural dyes are gaining interest due their expected low risk to human health and the environment. In this study, the potential for using colored liquid waste produced in the steam treatment of eucalyptus wood as a natural coloring matter for textile cotton was investigated. Specifically, eucalyptus wood extract from waste eucalyptus wood steaming was used to dye cotton in an exhaust dyeing process without the addition of traditional mordanting agents. The resulting dyed fabrics were evaluated for color fastness. It was found that wash fastness of waste dyed fabrics was very good, while light fastness was typical of natural dyes. It ws also found excellent rubbing fastness ratings. In this regard, the waste from eucalyptus wood steaming is accepted as a new material on Cleaner Production strategies in Textile Industry applications in cotton dyeing.

Keywords: *textile industry, natural dyes, cotton, waste, eucalyptus.*

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22nd May 2015

8h00-9h40	Session 6A	Room 7

Life Cycle Impact Assessment Panels Obtained from Green Coconut Husk

Sustainable Bio Economy of Food and Fuel Based on the Industrial Ecology of Innovative Process Design of Biomass Solid Wastes Technology Management

Confection and Evaluation of Properties of Polyurethane Plaques with Waste Recovery from Surfboard Fabrication

Nonwoven Slipper: a Sustainable Alternative

Cradle to Cradle: An Analysis of Certified Cleaning Products and Clothes Washing

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Life Cycle Impact Assessment Panels Obtained from Green Coconut Husk

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Abstract

This study evaluates the environmental impact of coconut husk panel with dimensions 11 cm x 11 cm x 5 mm with a mass of 0.071 kg, density 1.29 g / cm3, whereas their life cycle. The product system comprises the processes: opening the coconut, husk processing, transportation of raw material (dust and fiber), energy production and panel production. The panel production is a macro process unit comprises the following processes: sieving the powders and kiln-drying, grinding fiber, fiber oven drying, and pressing of the panel. The impacts were evaluated by the CML method (2001), for the categories: depletion of abiotic resources, acidification, eutrophication, global warming, depletion of the ozone layer and human toxicity. The results indicate the panel pressing as the largest contributor to the analyzed impact categories. The production of electrical energy required in the press is responsible for these impacts. The processing of the bark contributed 71% to the eutrophication category, given the high organic content of the effluents. The transport contributed 18.9% of impacts on acidification categories and depletion of abiotic resources by truck operation and fuel use. The results show three critical points: Energy consumption in the panel pressing stage, transportation of raw materials and the effluents generated in the processing step of the shell. To improve the environmental performance of the panel suggests to evaluate: i) reduction of energy consumption in pressing, ii) and evaluation of wastewater reuse in irrigation of plants.

Keywords: *evaluation of the life cycle (LCA), environmental impact, green coconut husk panel*

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Sustainable Bio Economy of Food and Fuel Based on the Industrial Ecology of Innovative Process Design of Biomass Solid Wastes Technology Management

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Abstract

Energy demand and the price for energy is increasing day by day everywhere as global economic problems. Renewable energy from waste is one of the alternative source which can be use parallel to conventional energy resources. Agro industrial wastes pose a major concern today due to the increase of production with time and thus needs ecological solution. For this problem an integrated system, industrial and ecological using the clean Small Integrated Process Systems (SIPS) based on the Zero Waste, Industrial ecology, cleaner industrial design and green chemistry concept was studied using the three basic principles. The first principle is to use all components of the biological organic materials of the wastes. The second principle is to obtain more co-products from the wastes. The third principle is to close the loop via reuse, recycle and renewal of the material and nutrient flows.This paper deals with tools and methods used to make the small process system design using innovative process equipment design and the process optimization for waste minimization. The main objective is not only small scale energy production, but as well as with the co-production of hot and cold thermal energies from agro wastes along with small electric power. The SIPS approach has many benefits and potentials. The system design use Biodigestion process, hydrogen and methane bio-fuels and internal combustion (IC) engine. The project was developed using simulation system tools for the process analysis (synthesis, modelling and design) of two stage anaerobic bio process and its integration. Super Pro Designer Process simulation software was used to make synthesis and evaluate these options and performs material balance, environment impact analysis. Towards the economical valorisation product development from municipal solid wastes (MSW), agro wastes and municipal waste water sludge solid wastes as the raw material biomass ,the H2 rich gas (H2, CH4 etc.) was found to be the main product using the two stage process design of anaerobic bio digestion from liquids, where as the ammonium and water recovered as liquid fertilizer and carbon dioxide are co products . The economic viability reports, environmental emissions reports, systems tools and methods used for several preliminary project developments of clean SIPS are obtained. The integrated biosystem system design are under developments of industrial ecological production using solar energy as base case ,yet this system designed need to adopted for the present and future need of optimized clean production of bio energy production with the economic and ecological sustainability from biomass wastes to the local energy and bioeconomy demand.

Keywords: *Biomass, Bio energy, Municipal Solid Waste, Auto thermal, IC Engine*

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Confection and Evaluation of Properties of Polyurethane Plaques with Waste Recovery from Surfboard Fabrication

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Abstract

This study allowed information to be obtained regarding the most important aspects which affect the production process of polyurethane (PU) surfboards in Florianópolis, Santa Catarina State, Brazil. It was observed that the main residue from the production process is PU solid waste. The intended reuses of this solid residue it as raw material for the manufacture of new polyurethane sheets for making surfboards. Polyurethane sheets were prepared by incorporating different percentages of the PU waste collected, with two particle sizes (9 mesh and crude), into the matrix. The results showed that the mechanical properties the tensile strength of the sheets are influenced by the particle size and the percentage of PU incorporated. The degradation of the material begins at 200 oC and thus this material is stable in environmental temperature for use surfboards. Finally, in addition to the experimental results, it is noted that the production process of surfboards in Santa Catarina has sought ways to reuse their waste, aiming at cleaner production.

Keywords: *Productive process. Polyurethane. Waste. Recycling.*

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Nonwoven Slipper: a Sustainable Alternative

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Abstract

It was studied the possibility of obtaining a nonwoven slipper made from scraps of clothing coming from the Bom Retiro neighborhood. The product was approved by a population of volunteers, who proposed to use the product and then answer a questionnaire with closed questions. The score for the product was 217, out of 250 points, with 86.8% approval.

Keywords: *nonwoven, patchwork, slippers modeling*

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Cradle to Cradle: An Analysis of Certified Cleaning Products and Clothes Washing

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Abstract

High economic growth and the growing demand for materials are jeopardizing the balance between the planet and human life. Thus, several innovative management models have been developed to rethink the usual production process and the lifecycle of products. Therefore, this article seeks to know companies, general cleaning products and the process of clothes washing that have the Cradle to Cradle certified program. The research involved desk research with secondary data and analyzed the official website of The Cradle to Cradle Products Innovation Institute, as well as the email addresses of the producing industries. Information was collected on the production process, certification level, products characteristics and the strategic profile of companies. This is an exploratory, descriptive study using a convenience sample including 29 products. The analysis showed that the products are produced by a small number of industries seeking to stand out by environmental positioning from technological innovation. It was possible to notice concerns with the use of green chemistry, the reduction of the anthropogenic load on the aquatic environment and the paradigmatic break with the conventional cleaning products and clothes washing.

Keywords: *life cycle, circular economy, sustainable production.*

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22nd May 2015

13h30 -15h00 **Conference**

Steve DeVito

Environmental Protection Agency, USA

Defining the Role of Pollutant Release and Transfer Registries (PRTR's) in Global Sustainability

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Defining the Role of Pollutant Release and Transfer Registries (PRTR's) in Global Sustainability

Steve DeVito
Environmental Protection Agency - USA

Pollutant Release and Transfer Registry (PRTR) systems have been established throughout the world to track emissions and other industrial waste management quantities (e.g. quantities recycled or burned for energy recovery) of potentially harmful chemicals. Currently, at least 50 countries have either established their own PRTR or implemented a pilot PRTR. More PRTRs are expected to come into existence in the coming years.

PRTRs have long been recognized and used as practical and powerful pollution prevention tools. The use of PRTR data as a means to measure the effectiveness of industrial pollution prevention practices within a country is increasing. For example, in recent years the United States Environmental Protection Agency has promoted the use of its Toxics Release Inventory (TRI) database (the U.S.' PRTR) to identify and publically recognize facilities, companies, and industry sectors that are implementing green chemistry and engineering practices that reduce emissions or other waste quantities of toxic chemicals, and encourages other facilities or companies to do the same.

The use of PRTRs as a pollution prevention tool on a global scale, however, is not as widespread. This is primarily due to differences among countries in regard to their respective PRTR reporting (legal) requirements, sector coverage, and chemical coverage. These differences make the

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comparability and integration of data collected by multiple PRTRs difficult, and confounds use of the data for global-scale analyses.

Nonetheless, as a result of the ever increasing emphasis on sustainable development as an international priority, there is a growing need to evaluate progress towards reducing emissions and other waste management quantities of harmful chemicals at the global level, not just at the country-specific, regional, or continental levels. Hence, more attention is being placed on the use of information collected and made available by PRTRs to assess progress towards worldwide sustainable development, since data from multiple PRTR systems that can be harmonized or combined enables the tracking of releases and other waste management quantities of toxic chemicals globally. Efforts are underway within international organizations such as the North American Commission for Environmental Cooperation (CEC) and the Organization for Economic Cooperation and Development (OECD) to improve the comparability and integration of data collected by multiple PRTRs for use in global scale analyses.

This presentation will provide background on the evolution of PRTRs, how PRTR data are being used at the country level to assess green manufacturing processes, and an overview of efforts within international organizations to improve the comparability and integration of data collected by multiple PRTRs for use in global scale analyses to assess progress towards sustainable development.

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22nd May 2015

15h00-16h30	Session 6B	Room 1

Energetic Inefficiency and Environmental Unsustainability in a Brick Making Industry in Alagoas

Toxicity Identification in Textile Industry: Methodological Proposal for Cleaner Production

Life Cycle Assessment of Composite Wood-Based Panels: Case Study in OSB

Mass Balance of Wood Cut to Manufacturing Sofa Grid With Retractable Seat

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Energetic Inefficiency and Environmental Unsustainability in a Brick Making Industry in Alagoas

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Abstract

Some brick making industries in Alagoas are still using outdated technics and types of kilns. This situation was seen in an enterprise visited in the county of Matriz de Camaragibe which uses a typology of intermittent kiln, locally known as "caieira". This paper tries to evaluate how and if the performance of this type of kiln could be seen as a model that widely wastes energetic resources. The study dimensions the losses and tries to understand how an industry could keep this equipment operating. The study faced problems, basically, in obtaining data from the operators of this type of kiln. These gaps were filled by the bibliography and data borrowed by similar cases seen in industries located in the same region. The study concluded two convergent aspects: that the losses were derived from the precarious structures of the industry itself; and that, economically and environmentally, the poor performance of the kiln is unbearable. At last, the study considers the necessity of knowledge about how is the energetic and environmental performance of the different types of kilns used by the brick making industry in Alagoas. These data could be used not only to mitigate the damages produced in the environment but, mainly, for limiting the usage of kilns by the brick making industry. That perspective can be decisive for the developing of a technology in which the bricks could be made without usage of a significant amount of heat.

Keywords: *kiln, brick making industry, sustainability, energetic efficiency.*

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Toxicity Identification in Textile Industry: Methodological Proposal for Cleaner Production

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Abstract

The TIE technique (Toxicity Identification Evaluation) allows to reduce or eliminate the toxicity of effluents from industries, the technique when applied allows to improve the quality of effluent decreasing contamination capacity. The Textile Industry has great potential polluter, then the application of TIE technique confirms that the activity has a cleaner production, seeking to reduce environmental impacts mainly for the bodies of water, helping to preserve this natural resource of high importance for the preservation of life helping with the possibility of increasing the reuse of water for at the end of the process will achieve an effluent with less contamination.

Keywords: *Toxicity, Textile Industry, Cleaner Production.*

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Life Cycle Assessment of Composite Wood-Based Panels: Case Study in OSB

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Abstract

The use of wood panels has grown in Brazil, and one panel that could be highlights is the OSB (Oriented Strand Board), which could replaces, in many cases, the plywood. At the same time, is also growing environmental concerns related to products, from it manufactured, use and disposal. Life Cycle Assessment (LCA) is an important technique for environmental assessment of entire products life cycle, in holistically way. Thus, combining the increasing of OSB use and environmental concerns, this study makes an LCA crade-to-gate for OSB panels. The aim of this study was to identify the main potential environmental impacts related to the OSB manufacture in laboratory scale and to propose some opportunities for environmental improvements to their life cycle. The functional unit as well as the flow reference adopted was 1m³ of uncoated OSB manufacture. For the environmental impacts assessment, it was used the EDIP-97 method for 12 impact categories. The LCA results indicated that the Laboratory Manufacture stage was responsible for the greatest environmental impacts (from 0.38% to photochemical ozone formation to 100.00% for ozone depletion, and 100.00% for Ecotoxicity by air), and was also where there are the largest consumption of renewable resources and energy. Finally, based on the identified environment hotspot, environmental improvements have been suggested for the OSB panel life cycle manufacture.

Keywords: *Life cycle assessment (LCA), Oriented Strand Board (OSB), environmental performance, environmental impact.*

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Mass Balance of Wood Cut to Manufacturing Sofa Grid With Retractable Seat

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Abstract

The purpose of this article is to analyze the production efficiency of wood cut for manufacturing sofa grid with retractable seat through mass balance. On the sofa manufacturing process there are three steps, namely: structure and strap; upholstery; and coating / assembly. The study was conducted in the wood cutting process in step on the structure and strap on a company in the furniture industry of the State of Alagoas. The result showed 25.86% loss material; waste of one plank and a half every 6 tablets of 3 meters long acquired for the production and financial loss.

Keywords: *mass balance, productive efficiency, wood cut, retractable sofa.*

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

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22nd May 2015

15h00-16h30	Session 6B	Room 2

Multicriteria Analysis Applied to Alternate Study of Environmental Control in Agro-Industrial Sector: Qualho Cheese Production

Emergy Accounting of Milk Production System: Is the Organic Label a Synonymous with Sustainable Production?

Study of Integrated System Technology and Bioeconomy: Tropical Fruit Product Innovation and Bioenergy

Assessing the Application of Cleaner Production Techniques in a Dairy in Southern Bahia

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Multicriteria Analysis Applied to Alternate Study of Environmental Control in Agro-Industrial Sector: Qualho Cheese Production

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Abstract

This article is a case study that is being conducted in Agroindustrial production sector (Cheese Qualho production), located in Sao Luis - Maranhao. Adopting the tools of Analysis and Multicriteria Decision Support, which enabled the identification of the best alternative for environmental control, whose purpose is also the record for the production, marketing, economic viability of new product in Sao Luis, capital of Maranhão. The result found was satisfactory because the criteria showed that the serum of the problem from the qualho cheese, was resolved by promoting the best alternative, the production of yoghurt, avoiding whey disposal in groundwater and soil

Keywords: *multicriteria, cheese, environmental control, viability*

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Emergy Accounting of Milk Production System: Is the Organic Label a Synonymous with Sustainable Production?

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Abstract

Agricultural production under organic handling can be found in different regions of Brazil and it is still under continuous expansion. Organic handling is an alternative production system which produces healthier food compared to chemical traditional agriculture. To be labeled as organic, the production system must comply with requirements of Law no. 10,832/03 which supplies definitions and rules aiming to constrain the use of some inputs into the production system. Notwithstanding, organics are usually considered as synonymous of sustainable products, but quantitative information supporting this statement is rarely found in literature. This raises doubt about the sustainable label associated to all organics. This work aims to evaluate the relation of binomial organics-sustainable by considering as case study a certified organic milk production system located in São Paulo State, Brazil. Emergy accounting (with an "m") is the scientific methodology used to quantify sustainability. Results indicate that organic system (OS) has low renewability (%R of 19%), it explores natural resources in an inefficient way which results in high demand for resources from economy (EIR of 3.63 and EYR of 1.23), it demands high amount of non-renewable resources which causes moderate load on environment (ELR of 4.07), and finally it has low sustainability (ESI of 0.30). All these obtained emergy indices show lower performance when compared to values for agricultural ecological systems found in literature. In this sense, the OS evaluated should not be labeled as sustainable, overthrowing the thesis of which organics are synonymous of sustainable. Anyhow, it is suggested that other methodological approaches be used simultaneously with emergy accounting to assess sustainability under different perspectives of scale and time.

Keywords: *Emergy; Organic milk production; Sustainable indicators.*

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Study of Integrated System Technology and Bioeconomy: Tropical Fruit Product Innovation and Bioenergy

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Abstract

The growth of the production of functional food in northeastern Brazil has an important position of the tropical fruit such as melon, papaya, pineapple and cashew, because it has good production managment and good acceptance in diverse climate and region. Production in the region of Mato Grande / RN is characterized by the production of tuberculos yam and cassava, fish,srimp and recently sorghum sugar, better productionsat national and international level. The processi developed of local production is an opportunity to create jobs, increase income and sustainable development. The marketing of fresh product derived from fruit is the most common form of marketing, due to lack of technological capacities of the producers on how to add value. The activity of fruit processing waste generated in the form of peels and bagasse which for human consumption, have good nutritional contents, with composition ranging from 15 to 20% protein, 25 to 40% pectin and 40 to 55% fibers and carbohydrates. Currently fruit waste presents a serious environmental problem, as is the case of shrimp shells that generate about 150 tons per day only on RN. The objective of this project is the application of technological innovation in the total use of fruits, transforming raw materials into nutritional products with high profitability, viability and also has sustainable development as objective. Good results were obtained in structured fruit product and the processes associated with the use of clean energy and alternatively from various waste. These processes based on the products and processes already developed together with some communities RN. The innovative integration system outlined in this work points to high economic prospects for sustainable development, aimed at the proper reuse of waste and the application of concepts of industrial ecology total utilization of fruits.The clean production technology was made possible in this work , but requires significant investment ,but lower cost of production using solar energy and biogas.

Keywords: *structured fruit, biogas, micro algae, bioenergy, innovation*

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Assessing the Application of Cleaner Production Techniques in a Dairy in Southern Bahia

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Abstract

The dairy products are of great importance for southern Bahia, because they contribute to the development and regional economic diversification, but it is necessary to be aware of the possible environmental impacts arising from its activities. Given this, the adoption of preventive practices such as Cleaner Production (CP) can contribute the improvement of production processes and provide economic gains, environmental protection and better work environment. Thus, this study aimed to identify techniques and opportunities for cleaner production (CP) in a dairy of the region. For this, we carried out a literature review, technical visits and questionnaires, obtaining information about characterization, CP and Environmental Management, environmental aspects and impacts. The study indicated that the dairy has a high potential polluter, mainly due to the lack of structured environmental programs. However, it was already adopting some environmental practices, such as pluvial water reuse, treatment stations and standard techniques adoption. Furthermore, the study has given the opportunity to find Cleaner production actions that could improve production conditions and organization for long and short lines, associated with the interest of the company in knowing others actions and methods that might contribute to minimizing its impact and propitiate economic gains. Thus, the opportunities presented themselves for CP adequate to company for its level.

Keywords: *Sustainability, environmental impacts, eco-efficiency.*

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

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22nd May 2015

15h00-16h30	Session 6B	Room 3

Verification of Outcomes from Carbon Market Under the Solid Waste Sector

Energy Generation from Biomass Residues in the Municipality of Xapuri /AC

Recyclability in Wind Power Area and the Consequent Economic and Environmental Impact

Clean Development Mechanism (CDM): Prospects for Production of Bioelectricity by the Brazilian Sugarcane Industry

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Verification of Outcomes from Carbon Market Under the Solid Waste Sector

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Abstract

The paper addresses the verification of outcomes from Clean Development Mechanism (CDM) in landfills. Our research focuses on the São Paulo Metropolitan Area and outlines six CDM projects: Bandeirantes, São João, Caieiras, Itapevi, Pedreira, and Lara. 23 indicators are proposed, organized in the social and environmental dimensions.The process of construction of indicators was participatory, taking into account also the validation by experts, through the Delphi technique. Those dimensions are subdivided into five themes: participation, emphasizing the participation of associations and cooperatives surrounding landfills; articulation among agents involved, which have different interests; benefits, focusing on the CDM application for solid waste sector (especially waste pickers cooperatives and technology transfer); environmental quality monitoring, highlighting the issue of odor; and gas emissions monitoring related to the efficiency of biogas capture system. The aforementioned results corroborates the relevance of the indicators developed based on interdisciplinary and multi-agent approaches, considering the different stakeholders.

Keywords: *co-benefits indicator, Clean Development Mechanism, landfill.*

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Energy Generation from Biomass Residues in the Municipality of Xapuri /AC

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Abstract

The municipality of Xapuri is located in a region characterized by a diverse logging and agricultural expansion. As a result, Xapuri has a great potential for power generation from biomass residues so as to foster its local development. This study estimates the theoretical biomass volumes available in the region that has a potential for energy generation. For this, we used a 4 MW steam cycle turbine (Rankine cycle) as the baseline equipment. Our results show that local biomass residues are able to supply the energy demand of 26 households.

Keywords: *Xapuri municipality, Biomass, Residues, Electricity generation.*

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Recyclability in Wind Power Area and the Consequent Economic and Environmental Impact

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Abstract

Wind power plays an important role as sustainable energy source, but some technical issues of wind power area can be a severe drawback on the development of wind farms in the short term. One important question is repairing of wind turbines, huge and high technological equipment which recycling poses crucial environmental and economic problems. Thus, this work aims for a better understanding of material balance and specification regarding recyclability and usability of wind turbines that suffer corrective maintenance. The applied methodology was the case study. The case study site chosen has a specific area only to deal with repairing and recycling. Process audit shows several steps that, if correctly managed, could save for recycling a large amount of metallic material. Considering the high cost of the discharged material, this can be an excellent opportunity for medium and small enterprises.

Keywords: *wind power, waste minimization, flow analysis, industrial symbiosis*

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Clean Development Mechanism (CDM): Prospects for Production of Bioelectricity by the Brazilian Sugarcane Industry

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Abstract

The Bioelectricity is the most recent and promising product of Brazilian agribusiness. The new activity, the importance of which was recognized in recent years in the Brazilian scenario, is far removed from conventional industry standard for production, ie, requires new forms of knowledge and management before little used, especially in agricultural industry. Thus, through an exploratory research this paper aimed to identify the current situation in the Brazilian cogeneration plants identifying the potential for energy generation from all Brazilian plants and possible opportunities for creation of certificates for Clean Development Mechanism projects in the sector. As conclusions can be observed that the current technological capacity to generate bioelectricity from sugarcane bagasse is in the initial stage, but with potential to increase installed capacity.

Keywords: *CDM, sugarcane industry, sustainability, biomass, energy, cogeneration*

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

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In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

22nd May 2015

15h00-16h30	Session 6B	Room 4

Air Treatment Station: A Proposal Air Pollution Reduction

The Reduction of Waste Generated in Water Treatment. A Study on the Viability of Using Hypochlorite in Tablet in Manaus

Strategic Alignment: Case Study of the Mandaqui Stream Basin's Depollution

Life Cycle Assessment of Wastewater Treatment Systems for Conventional Activated Sludge and UASB Reactor followed by Activated Sludge

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Air Treatment Station: A Proposal Air Pollution Reduction

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Abstract

Evaluate the implementation of a project to build Air Treatment Station (ATS's) that are designed to filter out polluting particles suspended in the air and humidifies it. Although the city of São Paulo is used as a reference for research, air pollution is a global issue that is the cause of serious problems to man, characterized as a public health problem. An ATS can be built in different scales and can contribute to improving air quality both indoors establishments like hospitals and underground stations subway as in open areas such as roads and industrial zones.

Keywords: *Air Treatment Station; Air Pollution; Particles in suspension; soot; Public health.*

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

The Reduction of Waste Generated in Water Treatment. A Study on the Viability of Using Hypochlorite in Tablet in Manaus

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Abstract

The treatment for water disinfection requires the use of products such as hypochlorite, which is generally used in liquid form. The use of this product type generates waste as packaging and empty bottles that need to be properly disposed not to pollute the environment. An alternative to this product is the hypochlorite in tablet, which allows reduction waste without compromising water treatment. The objective of this research was to evaluate the tablet hypochlorite use of viability in the city of Manaus, considering the direct acquisition in city of São Paulo. The Research has shown that the choice of hypochlorite in tablet may be advantageous, since transportation costs are reduced in relation of the costs for transportation of hypochlorite in liquid form. Furthermore, there is a reduction in the generation of empty containers, which reduces the costs of treating this type of waste.

Keywords: *Reduction; Hypochlorite; Water treatment.*

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Strategic Alignment: Case Study of the Mandaqui Stream Basin's depollution

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Abstract

During its yearly planning process, Sabesp (São Paulo State Water and Sewage Service Agency) reassesses its corporate vision and mission and sets its strategic guidelines that are deployed into action plans for its Operating Business Units. Thus, this study aims to analyze the implementation of the strategy related to the Clean Stream Program in the operational planning of Sabesp´s Northern Business Unit (MN). The empirical research was based on a case study of Mandaqui Stream Basin through document analysis. The main aspects in the study include the identification and analysis of the main indicators related to the Clean Stream Program, highlighting the importance of stakeholders' interests and also the description of environmental initiatives involving local community in the process of operational planning. The results indicate an evolution of program performance over the years and the success of the Mandaqui Stream depollution program suggests efficacy in both formulation and implementation of strategy.

Keywords: *strategy, implementation, planning, depollution, stream*

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Life Cycle Assessment of Wastewater Treatment Systems for Conventional Activated Sludge and UASB Reactor followed by Activated Sludge

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Abstract

Concern about the environmental dimension of sustainability has gained increasing importance in society, however, studies that make a comparative analysis of the technological wastewater treatment alternatives in the design stage of the treatment systems still show up incipient and restricted with regard to the to the consideration of environmental variables in decision making. Life Cycle Assessment (LCA) a tool initially designed for the analysis of the environmental performance of products, has been very efficient to evaluate the potential environmental impact of sewage treatment plants. In this context, in the present work, the Life Cycle Assessment tool was used in order to evaluate the potential environmental impacts of two sewage treatment systems: conventional activated sludge and UASB reactor followed by activated sludge. The modeling of systems and calculations involved in the evaluation of the impact of the life cycle have been achieved by the use of OpenLCA software, in order to be identified the most significant environmental issues and make a comparison of the environmental performance of the systems. Of the ten categories of the environmental impact evaluated by the CML method, LAC system showed worse environmental performance than UASB reactor followed by activated sludge system in eight of them. Through sensitivity analysis, it was found that for the impact categories acidification and marine ecotoxicity, the electricity required for aeration systems had a great influence on the results.

Keywords: *Wastewater treatment; LCA; Conventional Activated Sludge System; UASB reactor; Sensitivity Analysis*

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

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In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

22nd May 2015

15h00-16h30	Session 6B	Room 5

Sustainable Performance: A Paradigm Inducing New Needs of Interoperability Between Maintenance and Scheduling Activities in Manufacturing

Early Stage Investment and Cost Calculation Methodologies for NOx Reduction Measures in Large Combustion Plants

Sustainable Operations and Process Safety Management Systems: Implications for the Offshore Oil Industry and Petrobras

University-Industry Interaction on Cleaner Production. The Case of the Cleaner Production Center at the University of Cienfuegos (Cuba)

Green Manufacturing Process of Vanadium Pentoxide Via Ammonium Leaching of Vanadium Slag

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Sustainable Performance: A Paradigm Inducing New Needs of Interoperability Between Maintenance and Scheduling Activities in Manufacturing

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Abstract

Sustainability, or more precisely the sustainable performance as the social, economic and environmental balance, is a new paradigm for production systems having consequences on their management. In this context, the split of performance in the three dimensions efficiency-effectiveness-relevance, find a new utility to build decision supports for this management. In this paper, we firstly show what are the new stakes related to these three dimensions. We then point the impact of two short-term activities on these dimensions of sustainable performance: scheduling of manufacturing tasks and maintenance of manufacturing systems. We review some scientific works on these subjects, and we show how some of them could contribute to needed efficiency, effectiveness and relevance. This review leads us to discuss the needs of interoperability of maintenance activities and manufacturing scheduling, to underline scientific issues related to this interoperability, and to propose future research directions to improve it.

Keywords: *sustainability, manufacturing scheduling, maintenance, interoperability, ontology.*

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Early Stage Investment and Cost Calculation Methodologies for NO_x Reduction Measures in Large Combustion Plants

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Abstract

The worldwide energy demand, especially in terms of electricity, has been rising significantly over the last few years. Even though the total share of renewable energy supply is growing, the global amount of fossil energy is still not declining. To lower at least the environmental effects of fossil fuel burning, the demand for emission reduction measures, especially in combustion plants, is becoming more prominent, in industrial as well as in emerging countries. The various implemented technologies differ in many technical and economic parameters. Consequently, their suitability depends on the specific application. A detailed estimation of investments and operating costs is an essential basis for plant operators in the early stages of an investment decision. Furthermore, policies may massively influence a national energy market and the depending industries by defining thresholds for emission levels and other technical parameters. In industrial countries detailed simulation models are used for this purpose on a micro- and macroeconomic level. In less developed regions, however, information on costs of large combustion plants and especially of emission reduction measures is scarce. Nevertheless, policy makers have a deep interest in methods for assessing possible effects of their decisions. The Task Force on Techno-Economic Issues (TFTEI, formerly known as EGTEI – Expert Group on Techno-Economic Issues), being part of the UNECE/CLRTAP (United Nations Economic Commission for Europe/ Convention on Long-Range Transboundary Air Pollution) has therefore been working on a problem oriented cost and investment estimation tool for fossil fueled large combustion plants for the last few years. Its goal is to support policy makers to implement reasonable environmental protection standards by evaluating the microeconomic effects thereof. But TFTEI is not the only group working on that issue, other methods are in use as well, like (amongst others) the one published by the US Environmental Protection Agency (EPA) in 2003. The aim of this paper is to compare the two methods and show the specific advantages and disadvantages for cost and investment calculation of secondary NO_x reduction measures. The two methods shall be introduced in detail, followed by a quantitative and qualitative comparison of the calculation results with regard to the usability of each method in the given context. The TFTEI method is based on specific investments of established plants that can be adapted to the needs of the considered application. The EPA method consists of a more detailed technical description of the process, which is then translated into investments and costs components via empirically determined conversion factors. Subsequently, the strengths and weaknesses of the methodologies in the context of a cost calculation tool such as the one developed by TFTEI are discussed with a special focus on the characteristics and needs of the target group. The main outcome is that a calibration of the EPA method seems reasonable, as the calculation results are a lot lower than those of the TFTEI method, but within a steady proportion. Due to a lack of data, however, a calibration is not feasible at the current state. Further surveys are recommended to improve the data base and to reduce the uncertainty of the results.

Keywords: *Techno-economic assessment, Emission Reduction, Emerging Countries, SCR, SNCR*

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Sustainable Operations and Process Safety Management Systems: Implications for the Offshore Oil Industry and Petrobras

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Abstract

Recently, new processing dynamics of potentially dangerous products has increased flows, pressures, temperatures and other variables used in the process industries. With these new processing dynamics, the risk of major accidents around the world also increased. Due to the occurrence of major accidents, laws and regulations have been created to try to prevent this type of events, aiming to protect people, assets, the environment and corporate image. Management systems for process safety are used as a series of blocking barriers to prevent the development of major accidents. For the oil industry, there are some recommended practices from multiples institutes and government agencies. By employing a descriptive case study and documental analysis, the present study aims to compare the existing Process Safety Management Systems with the Health, Safety and Environment management system of a world leader energy company. More specifically, this research maps, compares and verifies which elements of these established management systems have been incorporated to the organization's HSE management system and provides a series of recommendations for practice and policy as well as contributions to the literature.

Keywords: *Process Safety Management; Major Accidents; Loss Prevention, Environment Protection.*

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University-Industry Interaction on Cleaner Production. The Case of the Cleaner Production Center at the University of Cienfuegos (Cuba)

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Abstract

Universities are key stakeholders in teaching, researching and supporting the implementation of cleaner production activities. This case study discusses the experience of establishing and operating the Cleaner Production Center at the University of Cienfuegos (Cuba). Establishing, starting-up and running the center during its first four years of activity was supported by two projects targeted to inter-university cooperation. The collaboration allowed to establish a master program on cleaner production which acts as a bridge between the university, and the production industry and the services sector in the province of Cienfuegos. Currently 32 students from the first two promotions graduated and the program of two other promotions is ongoing. The master thesis research works are defined improving the environmental performance of the companies or organizations the student originate from. This results in a measurable improvement of the air and surface water quality in Cienfuegos city. An estimated yearly reduction of the emission of 60 000 ton of carbon dioxide equivalents and of 400 MWh at a cement plant have been realized. Research activities currently target the pollution inventory of Cienfuegos, energy production from local biomass, and establishing indicators for sustainable development for Cienfuegos. The inter-university collaboration resulted in several publications in international peer reviewed journals. The successful inter-university North-South collaboration between Cuba and Belgium, targeted at capacity building, transfer of experience and expertise, proved to be most crucial during these first years the center was active. It allowed generating the necessary funds which are often difficult to raise in developing countries. Therefore this is a unique case of building academic experience on Cleaner Production.

Keywords: *cleaner production center, inter-university cooperation, master training, research*

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Green Manufacturing Process of Vanadium Pentoxide Via Ammonium Leaching of Vanadium Slag

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Abstract

As the major resources for vanadium extraction, vanadium slag is typically obtained from the oxygen blowing of the molten pig iron during steelmaking process using titanomagnetite ores. At present, sodium salt roasting is the most commonly used process for extracting vanadium from vanadium slag. Unfortunately, serious environmental problems are created through discharging sodium sulfate waste residue, ammonium-nitrogen waste water, and caustic gases from the roasting process. Besides, the overall vanadium recovery is no higher than 85%. A green process has been developed at the laboratory scale for the extraction of vanadium and the manufacturing of vanadium pentoxide from vanadium slag. The process involves the following steps: (1) the selective oxidization of vanadium by roasting the vanadium slag in oxidative atmosphere; (2) the extraction of vanadium from the roasted slag by ammonium leaching; (3) the separation of the leach liquor from the extracted vanadium residue; (4) the cooling crystallization of ammonium metavanadate from the liquor; (5) the manufacturing of vanadium pentoxide by calcination of the ammonium metavanadate; and (6) the recovery of ammonium salt solution. In comparison with the sodium salt roasting technology, the new process is environmentally friendly and cost efficient. The ammonia gas was absorbed and recycled as ammonium salt solution by carbonation. The crystallization mother solution and the washing water could be recycled in the leaching step. Therefore, the low value-added sodium sulfate waste residue and ammonium-nitrogen waste water can be eliminated. Besides, as chromium in the roasted slag was remained trivalent attributed to the selective oxidization, only vanadium could be extracted out in the ammonium leaching step. Consequently, the puzzling problem for separating chromium and vanadium was settled, and the reduced vanadium-chromium precipitate in the sodium salt roasting process was eliminated. Moreover, the extracted vanadium residue obtained in this process, with a relatively low sodium content, was mainly comprised of chromic oxide and iron oxide and can be utilized economically via recycling in the blast furnace or manufacturing chromium-iron alloy. The overall vanadium recovery could reach 95% or higher. The purity of the vanadium pentoxide product was even higher than 99.5%.

Keywords: *vanadium slag, leaching, ammonium, ammonium metavanadate, vanadium pentoxide*

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22nd May 2015

15h00-16h30	Session 6B	Room 6

Production of Bio-Fertilizer (biol) from the Bio-Digestion Effluent to Improve the Emergence and Growth of Seedlings of Agronomic Interests

LCA of MSW Management. The Environmental Impacts of Wrong Choices

A Multi-Sectorial Analysis of a Waste to Energy Plant

Ecoefficiency in Portuguese WWTP

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Production of Bio-Fertilizer (biol) from the Bio-Digestion Effluent to Improve the Emergence and Growth of Seedlings of Agronomic Interests

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Abstract

The use of bio-digesters is a clear example of Clean & Sustainable Technology, transforming disposals in biogas and solid and liquid fertilizer, both at domestic and commercial scales. The bio-digestion is a natural process that corresponds to the anaerobic cycle of carbon, actioned and combined with different groups of bacteria in complete absence of oxygen, using organic material to feed and reproduce. In this digestion is possible to identify two types of products as fertilizers, the liquid bio fertilizer which is called "biol" and the solid fertilizer which is called "biosol". The biol is the liquid effluent which is frequently discharged from the digester; and through filtering and flocculation the liquid and solid parts are separated. This bio-factor promotes vegetable growth and can be applied to the seed through imbibition. The objective of this paper is to evaluate the reutilization of the effluent from the bio-digestion as bio-fertilizer in the states of germination and seedling. The following treatments were proposed: 1: 100% water; 2: 75% water and 25% Biol; 3: 50% Water and 50% Biol; 4: 25% Water and 75% Biol; 5: 100% Biol. The diluted biol to the fourth part (2) turned to be an improver of germination power and of the seedling growth of agronomic interest.

Keywords: *effluent, bio-fertilizer, germination, seedling growth.*

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LCA of MSW Management. The Environmental Impacts of Wrong Choices

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Abstract

The management of municipal solid waste (MSW) is currently one of the most serious and controversial issues faced by the local and regional authorities of a country. The member countries of the European Union (EU) are required to propose waste management systems that comply with the hierarchy of options, based on the following order of priority: prevention (in waste generation), preparing for reuse, recycling, other types of recovery (including energy) and, finally, the disposal of waste. To demonstrate the performance of management alternatives in the decision-making process, authorities, communities, industry and waste management companies should consider environmental aspects in addition to the evaluation of technical and economic aspects. Life Cycle Assessment (LCA) has been demonstrated to be a suitable tool for evaluating waste management systems, although its performance strictly depends on the detailed knowledge of the state of the art and on the "localness" of data used. This paper summarizes the main results of the application of LCA methodology to the MSW management system currently adopted in Naples (Italy), affected in the past years by a waste disposal emergency, not yet completely solved. The main streams of MSW generated in Naples are assessed in terms of their environmental impacts and a general picture of the management system is drawn through a detailed collection of local data concerning all waste streams' routes and destinations. In such a way, LCA allows the identification of criticalities and bottlenecks of the complex issue of waste management, thus highlighting the effects that wrong choices can generate as a starting point for future improvements.

Keywords: *Waste Management, Life Cycle Assessment, Municipal Solid Waste*

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A Multi-Sectorial Analysis of a Waste to Energy Plant

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Abstract

Currently waste management is a critical issue for several countries. Separate collection and recycling activities are growing; Germany, Netherlands, Belgium, Sweden, Austria and Denmark have drastically reduced the use of the landfill while Italy, United Kingdom and Spain give half of their waste to landfill. Real case studies and scientific papers have demonstrated the benefits of the waste to energy (WTE) facilities compared to the traditional incinerators. Typologies of waste suitable for the energy recovery are: unsorted waste, dry fraction from mechanical biological treatment, refuse-derived fuels (RDF) and also some special waste (e.g. medical). To focus on waste management in Italy, this study uses a multi-sectorial analysis for a region, Abruzzo, reporting a high rate of landfilling. Plant dimensioning, comparison between WTE strategies, centralized or decentralized solution, location of plant are proposed and economic, environmental, financial and social analysis verify the sustainability of the suggested solution. The outcomes deriving from the present research could be extended in developing countries where ever-increasing amounts of solid waste accompany rapid economic and population growth. Relevant is the municipalities ability to sustainably manage it all and solutions to these problems may be found in the results of the present research.

Keywords: *quantitative analysis, sensitivity analysis, sustainability, waste to energy, multi-sectorial analysis*

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Ecoefficiency in Portuguese WWTP

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Abstract

Cleaner Production is a strategy that supports companies on their way towards sustainability by focusing their efforts mainly on the reduction of materials' and energy's use, on processes' improvement, on cycles' closing and on waste flows' valorisation or elimination. This approach was used in Waste Water Treatment Plants (WWTP) by considering their running as an industrial process. In a flowchart all the inputs and outputs were identified. Energy was quantified and the associated costs were allocated. Special attention was paid to energy use in the treatment processes and therefore the higher electricity consumptions were measured. In each WWTP the efficiency in the removal of the pollution load was related to the energy consumption. For each WWTP an indicator (Value) relating removal efficiency to cost (or energy consumed) was established and used for benchmarking between the target WWTP. Possibilities, of reduction of materials and energy consumption in the normal functioning of the WWTP, were identified. Other improvement opportunities were detected in what concerns the inputs related to population training and information, namely those related to water savings, internal housing water reclamation and chemicals use.

Keywords: *Cleaner Production, Sustainable Value, wastewater treatment plant, energy efficiency, eco-efficiency*

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22nd May 2015

15h00-16h30	Session 6B	Room 7

Landfill Leachate Treatment by Constructed Wetland: Operation Strategies

Potential of Generation and Recovery of Domiciliary Solid Reject in the Western Paraná Region

Study of the Appropriateness of the Plastics Industry in the State of Goiás to Integrated Management Actions of Post-Consumer Waste

The Measurement of Environmental Performance in Hospitals: A Framework and Process

Reflections on the Management of Household Hazardous Waste in the Context of Urban Environment Policy

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Landfill Leachate Treatment by Constructed Wetland: Operation Strategies

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Abstract

Landfill leachate is an important issue related to waste management, due to its high contaminants concentration and toxicity, making treatment by conventional technologies and operational parameters more difficult. Thus, this study aimed the evaluation of leachate treatment, focused on organic matter and ammonia nitrogen, by constructed wetlands, an alternative and low cost technology, using different operational strategies. The leachate taken from a landfill located in the city of Guarulhos, Metropolitan Region of Sao Paulo, has been treated in a laboratory scale horizontal flow constructed wetland (HF-CW) system (total volume of 30.8 L). The units were filled with calcareous gravel and planted with *Cyperus papyrus*, *Heliconia psittacorum* and *Gynerium sagittatum*, and a control was maintained without vegetation. The system was fed with leachate diluted in water with different proportions (between 10% and 30%) with mean Chemical Oxygen Demand (COD) concentration between 336 and 750 $mg.L^{-1}$ and ammonia nitrogen (NH_4-N) between 47 and 199 $mg\ L^{-1}$. The operation was divided in three stages: (1st) continuous feeding with mean Hydraulic Retention Time (HRT) between 2.7 and 5.3 d; (2nd) regime of effluent recirculation to evaluate the effect of increasing the HRT to 21 days; (3rd) continuous feeding with two wetlands units in series, aiming HRT increasing (between 8.1 and 9.9 d) without recirculation. The COD removal was low, with averages below 40%, resulting in effluent concentration between 270 and 750 $mg.L^{-1}$. However, there was removal of NH_4-N, especially in the 2nd and 3rd stages, with average removal between 43% and 81%, resulting in concentration between 20 and 223 $mg.L^{-1}$, showing HRT influence. The low efficiency for COD is probably related to the recalcitrance of the leachate, or due to inhibition of microorganisms by toxicity. For NH_4-N, it is inferred that the increase of the HRT provided greater time for oxygen diffusion to the wetland system, meeting the demand of heterotrophic bacteria, which allowed the use of excess oxygen by nitrifiers, culminating in the oxidation of NH_4-N. Thus the HRT is an important parameter that must be taken into account during dimensioning of HF-CW, since it influences the treatment efficiency and is related to the area demand.

Keywords: *landfill leachate; constructed wetlands; recalcitrance; nitrification; Hydraulic Retention Time.*

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Potential of Generation and Recovery of Domiciliary Solid Reject in the Western Paraná Region

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Abstract

Recovery techniques have been employed for organic and reusable/recycable domiciliary solid waste.However, the recovery of the third type of waste, comprising the domiciliary solid reject (DR), is rare or, in the most of cases, non-existent. Recent studies show that DRs can be used in pyrolysis processes to obtain coal and liquid and solid hydrocarbons. However, to size them the qualification and quantification of DRs are required. In this context, the paper presents the generation potential of DR in the 50 municipalities of the western Paraná region and proposes a new management model for these rejects. The methodological design is based on the possibility of recovery through its transformation into value-added products. Therefore, a prospective survey was conducted and its quantitative values were obtained from correlations that depend on different variables, being the main of them the urban population of each municipality. Through thematic maps, a subdivision of the municipalities in five DR management regions is proposed. In each region, an anchor municipality would receive the installation of an DR processing center. Thus, the DR processing plant installed in the city of São Miguel do Iguaçu would be responsible for processing 48,50 ton per day; in Campo Bonito 48,29 ton per day; in Marechal Cândido Rondon 15,48 ton per day; in Céu Azul 3,11 ton per day; and in Iracema do Oeste 4,93 ton per day. From this perspective, the DR would be converted into raw material and the products of its recovery would return to the production cycle.

Keywords: *household solid waste; management models; potential generation of rejects.*

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Study of the Appropriateness of the Plastics Industry in the State of Goiás to Integrated Management Actions of Post-Consumer Waste

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Abstract

This article aims to report the study to learn about the actions of adequacy of plastic Industry in Central Goiás State, Brazil the Brazilian solid waste policy (PNRS). This study involved a survey of statistical data of the plastics industry, bibliographic research and documentary analyses, being characterized as an exploratory qualitative study. Through the interview was identified by the Union of industries of the State of Goiás plastic Material (Simplago) there are no effective action for the implementation of the PNRS for the sector, with the exception of educational actions. With the statistical analysis it was found that in Brazil 22% of plastic waste generated are intended for mechanical recycling and 13.5 percent of those go to dumps and landfills. There was also a trend in reduced production of plastic packaging in Brazil in recent years at the expense of packaging produced by other materials.

Keywords: *plastics industry, packaging, plastic recycling*

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The Measurement of Environmental Performance in Hospitals: A Framework and Process

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Abstract

Since the publication of the Brundtland Report (1987), academics and practitioners have raised concerns on the measurement of environmental sustainability performance. In the healthcare sector, especially in hospitals, measuring environmental performance relates to the reduction of environmental impact and continuous improvements in the quality of processes and outcomes. The literature review highlighted concerns on the lack of strategic focus of performance indicators, relevance and robustness of metrics and difficulties for the deployment of measures within different hierarchical levels. New frameworks are necessary to define relevant and meaningful indicators for monitoring and assessing environmental performance if healthcare systems and operations are to be improved. Moreover, field studies conducted with 10 hospitals in the Southern region of Brazil underlined the scarcity of consistent frameworks applied in practice to measure, monitor and improve environmental performance. Considering this context, the study seeks to propose an alternative framework drawn from the review of literature and current legislation. The proposed framework is operationalized through a 'process approach' and evaluated in terms of feasibility (can the process be followed?), usability (is the approach easily followed?), utility (are the results useful for managers?).

Keywords: *Healthcare Operations. Environmental Performance. Measurement. Hospitals. Framework*

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Reflections on the Management of Household Hazardous Waste in the Context of Urban Environment Policy

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Abstract

This work aims to contribute to the reflection on the management of household hazardous waste, specifically fluorescent lamps, harmless to the home user while intact. The problem is the inadequate handling and disposal of these bulbs, once they contain mercury, which is extremely harmful to health and the environment. The methodology used was the bibliographic research exploratory descriptive of qualitative approach, seeking to identify and discuss the legislation on the subject: fluorescent lamps. In legal terms, to support the discussion, it was analyzed the urban environmental policy of the City Statute and the National Policy on Solid Waste (PNRS, in Portuguese) established by Law n. 12.50/10. Although Brazil has a regulatory framework for solid waste management on an equal level to the main developed countries, it was observed that environmental laws do not guarantee the effectiveness of local actions, necessary for the proper disposal of fluorescent lamps as well as other household hazardous waste.

Keywords: *Household waste. PNRS. Urban Environmental Policy. Disposal of fluorescent lamps.*

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22nd May 2015

16h50 -18h50 Closing Conference

Sergio Ulgiati

Parthenope University of Naples, Italy

Growth, De-growth and Circular Economy. A Resource-based perspective on Sustainability

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

Growth, De-growth and Circular Economy. A Resource-based Perspective on Sustainability

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Production and consumption activities of human societies are always accompanied by airborne, waterborne and solid waste generation processes, so that the basic environmental issue worldwide still is how to best identify, prevent and manage waste streams. The increased waste generation is certainly a consequence of increased purchasing power, improved standard of life and more technological choices becoming available. However, the rapid urbanization and change in people's lifestyles - especially in countries with higher per-capita incomes - boosts the production and consumption of products characterized by shorter life spans and higher volumes, in so contributing to increased resource consumption and waste-to-disposal flows. Surprisingly, societies still have problems identifying a precise strategy for prevention and management of household and industrial emissions and waste. Consensus is shared worldwide about the fact that prevention is the most cost-effective waste management strategy, crucial to making progresses toward more sustainable societal patterns. De-growth patterns and sufficiency lifestyles are also advocated in order to achieve decreased resource use and environmental impact. Efficiency increase is also claimed to be a key pattern towards waste prevention and decoupling of resource consumption and economic production. Yet, downsizing of the economic process and doing more with less are not the only available choices and may be synergically reinforced by increased integration of production and consumption sectors, through so-called "circular economy patterns", where

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energy and material flows are exchanged by means of appropriate planning of integrated agricultural, industrial and urban activities. Industries and companies can proactively propose new ways to avoid (reduce, valorize, dispose of) emissions and waste by explicitly addressing organizational issues, both on intra-company and inter-companies levels, including sustainable supply chain management and reverse logistics.

In this study we deal with a systems view of society. The interaction and integration among a system's components, the internal exchange of resources and services, the identification of matter and energy flows to, from and within a system, the demand for environmental support, and finally the efficiency of resource use for maximum power output and decreased emissions, are discussed and their importance for more sustainable production patterns is highlighted. According to this perspective, case studies (sustainable clothing, cooking oil recycling, biorefinery designs, integrated dairy and energy production, sludge treatment and cement production, innovative waste management, energy from slaughtery residues) are evaluated and discussed. Environmental benefits, income and job opportunities, waste prevention, circular resource use and innovative resource management are highlighted out by means of integrated Life Cycle Assessment and Emergy Accounting methods.

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Index of Contents

In Giannetti, B.F.; Almeida, C.M.V.B.; Agostinho, F.; Bonilla, S.H. (editors): Advances in Cleaner Production, Proceedings of the 5th International Workshop, UNIP, São Paulo, SP, Brazil. May 20th - 22nd, 2015.

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