

# CleanMed Europe

The International Healthcare Congress on Sustainable Products and Practices

**May 29-31 2006 · Stockholm, Sweden**



## **ABSTRACT BOOK**

## Day 1\* – Monday May 29

08.30-10.00	P1: Sustainable Strategies for Green Building		
10.30-12.00	P2: Opening Session		
13.30-14.45	S1: Energy Saving in Buildings	S2: Environmental Classifications of Buildings	S3: Alternative Waste Management
15.10-15.55	P3: "Revolution in Environmental Health Sciences: New Opportunities to Protect Our Health"		
16.00-17.30	S4: The Importance of Sustainable Materials in Buildings	S5: Design of Buildings and its Importance for Wellbeing	S6: Integration of Environment Into Everyday Management

\*Daycard Green Building available

## Day 2 – Tuesday May 30

08.30-10.00	P4: Pollution and Health		
10.30-12.00	S7: Green Transportation	S8: Green Chemistry: The New Chemistry	S9: Sustainable Food
13.30-14.45	P5: "What does 'sustainability' mean? And how do we do it?"		
	Visit exhibition and posters		
15.30-17.00	S10: Information and Training	S11: Ways to Green Procurement	S12: Working with Sustainability
18.00	Reception at the City Hall		

## Day 3 – Wednesday May 31

08.30-10.00	P6: Pharmaceuticals and the Environment I		
10.30-12.00	S13: Waste Management of infectious, pharmaceutical and other special waste	S14: Green Procurement: Examples and Experiences	S15: International Panel: The Global South Perspective
13.30-15.00	S16: Verification: Did We Really Do It?	S17: Alternatives to Hazardous Products	S18: Pharmaceuticals and the Environment II
15.15-16.15	P7: Closing Session		

## Welcome to 2<sup>nd</sup> CleanMed Europe!

Welcome to CleanMed Europe 2006 – the premier environmental conference for leaders and staff within healthcare. Learn about green construction of hospitals, environmentally preferable products, environmental impact of pharmaceuticals, alternative waste management, and many other ways of making healthcare sustainable. Meet environmental experts, decision makers, innovative companies, healthcare professionals and many others and take the opportunity to exchange experiences and knowledge.

CleanMed Europe aims to raise awareness of the environmental problems in the healthcare sector and to spread knowledge on how to solve these problems. CleanMed Europe also aims to be the meeting point for all healthcare professionals with an interest in improving the environmental performance of the healthcare sector.

The activities of healthcare facilities have a significant impact on the environment that contributes to the destruction of our natural ecosystems. And an unhealthy natural environment is a danger to human health. To be truly health-promoting healthcare systems must therefore be ecologically sustainable. CleanMed Europe will show you how to achieve this.

This programme contains the submitted abstracts for the presentations at the conference, as well as a graphic programme. Detailed information about the 7 plenary sessions, the 18 parallel seminars, the poster exhibition for "Best Practice", the vendor exhibition, as well as practical information that might facilitate your stay at the conference, is available in the Final Programme.

On behalf of the organisers – Apoteket, Health Care Without Harm and Stockholm County Council – it is my pleasure to say:

Welcome to the conference!



Anna Linusson  
Project Manager of CleanMed Europe 2006  
Stockholm County Council  
Chief Executive Staff

# P1: Sustainable Strategies for Green Building

## 1. A Sustainable Strategy for Healthcare in Stockholm

### **Ingemar Ziegler**

*CEO, Locum AB*

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Stockholm's Healthcare Structure or 3S works for long-term sustainable healthcare in networks that support patient participation and responsibility. Long-term sustainability requires that social/cultural, economic and ecological aspects are given the same weight. The work is to be characterised by transparency and objectivity combined with endeavours for constant improvement through systematic management.

The sustainability policy emphasises five aspects:

- To strive for a long-term sustainable healthcare structure, including accessibility, transparency, efficiency, high quality, and internationally competitive healthcare and research.
- To take social responsibility through professionalism, commitment, and participation, through ensuring an attractive, accessible, gender-equal and multicultural environment for employees and patients, through considering the ethical perspective and through promoting competition and counteracting corruption.
- To make strategic investments in long-term sustainable property structure, meaning locations and building designs appropriate for their purpose, flexible design that facilitates adaptation to new requirements, functional architecture, a healthy indoor environment, tried-and-tested technology, and environmentally friendly materials with good durability.
- To provide conditions for long-term sustainable passenger transports and goods flows, meaning well-functioning door-to-door patient passenger transport, sustainable patient and material flows, and effective logistics and quality assured deliveries.
- To offer safe provision of heat, electricity, water and media for healthcare without wasting resources, meaning a high level of recycling, self-sufficiency, and safety, and an energy efficient, ecocyclic approach emphasising renewability.

## 2. Sustainability in the Partnering Process

### **Gösta Fernström**

*Program Director, Fernia Consulting/Swedish Construction Client Organization*

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Partnering is a way of cooperation where all major participants in a construction project work together in a partnering team with common goals – the goals to achieve or exceed the objectives and demands of the customer or construction client. Partnering has also become a process from early stages of projects via procurement, workshops, risk elimination, problem/conflict solving within the team. The major advantage with partnering is to avoid conflicts, keep times and costs according to plans and also to create new innovative solutions for the client. Successful partnering is based on good relations (trust, honesty and openness), open book accounting, common goals and incentives, leadership, and teamwork with a partnering leader to head the project.

In a competitive environment, it is of increasing importance that clients spend more efforts on functionality, ethical considerations and sustainability to meet user demands. A successful client has to offer the customer a healthy, secure and attractive environment. A Partnering Team, representing all professions within construction, is well suitable for this task, as it may contribute a lot of knowledge and experience.

Investments in sustainability include:

- Energy saving with self-sufficient buildings including heating and air conditioning
- Waste handling and recycling
- Sustainable materials
- Avoiding hazardous materials and material combinations
- Focusing indoor climate
- Creating flexible solutions in a changing world

Such investments will result in a healthy, safe, comfortable and attractive environment in our buildings, and ensure that the buildings can be safely decomposed after their 50-100 year lifetime.

### **3. Moving from Sustainable Rhetoric to Reality: Hospital Design in Skanska UK**

#### **Matthew Janssen**

*Environmental Manager, Skanska UK  
matthew.janssen@skanska.co.uk*

Skanska is an accomplished designer, builder and operator of hospitals in the United Kingdom, continental Europe and the United States. This presentation focuses on Skanska's approach to green hospital design and construction, in particular:

- A summary of the need for green hospital design;
- The overall approach to sustainable development in Skanska;
- The green design requirements of one of our major clients, the UK National Health Service;
- Developing hospital sustainability strategies with measurable objectives and targets;
- Successful design for energy efficiency, for example designing the Coventry New Hospitals (UK) to use 22% less energy compared to a standard design;
- Design for water efficiency, for example equipment specification, green roofs and sustainable urban drainage systems;
- The use of off-site pre-fabrication;
- Materials procurement, for example incorporating high recycled content materials into the building design and the choice of environmentally friendly materials for Karlstad Central Hospital in Sweden;
- Seeking waste reduction through the design and the supply chain, for example by ordering plasterboard to size and minimising and re-using packaging;
- Working in partnership with clients, the supply chain and other stakeholders, for example at Karlstad Central Hospital;
- Barriers to sustainability in hospital development and how these can be overcome; and
- The way forward: how Skanska is planning to progress sustainable hospital design and construction.

## **P2: Opening Session**

### **4. Opening Speech**

#### **Lena Sommestad**

*Sweden's Minister for the Environment*

### **5. Sustainable Development in the European Union**

#### **Anders Wijkman**

*Member of the European Parliament  
anders@wijkman.nu*

### **6. Environmental Consideration in Healthcare – Why?**

#### **Gavin ten Tusscher**

*MD, PhD, paediatrician, Dept. of Paediatrics and Neonatology, Westfries Gasthuis, The Netherlands  
Chairman of the board, Health Care Without Harm Europe  
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Over the last decades, mounting evidence for serious adverse health effects of environmental pollutants has been published in professional and popular media. This has aided in focusing attention on the need for environmentally friendly alternatives to many aspects of our everyday lives, and this, in turn, has led to changes in our society and in our medical health care systems. Yet, the most vulnerable members of our society are still often the most exposed: the unborn, the prematurely born, the small for gestational age and the seriously ill child.

Looking back over the last two years since the previous CleanMed conference, much has been achieved by Health Care Without Harm, and HCWH has been involved in the successes of others. A few aspects will be highlighted. However, much still needs to be accomplished.

The lecture will elaborate on some of the potential dangers in everyday health care, the needs and various accomplishments to date. Health Care Without Harm's points of focus will be mentioned, and how they are aimed at diminishing and eliminating the major sources of environmental health risks in health care. Finally, some of the future challenges facing this generation and the next will be mentioned.

# **S1: Energy Saving in Buildings**

## **7. Energy Certification of Buildings**

### **Søren Aggerholm**

*PhD, Research Manager, Statens Byggeforskningsinstitut, Denmark*

The purpose of the directive on the Energy Performance of Buildings (EPBD) is to reduce the energy use of buildings without compromising the indoor climate. The EPBD has four requirements to be implemented by the Member States:

- General framework for a methodology of calculation of the integrated performance of buildings,
- Setting of minimum energy standards in new and existing buildings,
- Energy Certification of Buildings,
- Inspection and assessment of heating and cooling installations.

The 4th of January 2006 was the official deadline by which the Member States had to transpose the Directive into national law.

The EPBD is implemented in the Danish Buildings Regulations since 1st of January 2006. For new buildings there is an energy frame limiting the needed calculated energy supply to dwellings and to none domestic buildings. As result of the Danish action plan on energy the needed energy supply to new building has been tightened by 25-30 %. New buildings has to be energy labeled before been taken into use. For major retrofit of existing buildings there are requirements to insulation of constructions and to installations.

Denmark is the only country in Europe that has had obligatory labeling schemes of existing buildings in the past. The requirement in the EPBD on energy certification of buildings is to a large extend based on Danish experience. Denmark anyhow uses the possibility to improve the efficiency of the labeling scheme.

*For further information, visit [www.buildingsplatform.org](http://www.buildingsplatform.org) (EPBD), [www.ebst.dk](http://www.ebst.dk) (building regulations), and [www.ens.dk](http://www.ens.dk) (labeling schemes).*

## **8. HOSPITALS – Monitored Results and Lessons Learned from Five Energy Conscious European Hospitals and Health Care Buildings**

### **Olaf Bruun Jørgensen**

*MSc, Head of Energy and Indoor Climate Section, Esbensen Consulting Engineers  
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*No abstract was submitted. The contents of the presentation has been described as follows:*

Based on monitored results, user surveys and interviews from more than a one-year period, the lessons learned and the achieved results from energy conscious work at five European healthcare buildings will be presented.

The analyses will focus on innovative, energy conscious designs and the use of renewable energy systems integrated in the five projects. This includes effective use of daylight, natural ventilation, building integrated solar energy, active solar for production of hot water, the use of underground storage for heating and cooling and the use of indoor climate friendly materials and surface paints.

## 9. System Analysis and Procurement With a Life Cycle Perspective

### Anders Nilson

*Environmental Manager, Skanska UK  
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A building structure has a relatively long life, usually more than 50 years and often more than 100 years. The operating period is long, and includes periodic alteration and renovation. During the design phase, a structure's design, technical systems, materials, etc are selected on the basis of a building programme, a room function programme, etc for the particular property and its use. Far too often the focus today is mainly on the investment cost. Far too little consideration is paid to how design, installations, local climate, and use interact, and what the energy and maintenance costs will be for different choices. If greater consideration is given during planning to the operation phase than is the case today, environmental impact and even costs for the entire life cycle can often be reduced.

A methodology based on a system approach in early stages in the building design process will be presented. This approach includes system analysis and choice; life cycle cost (LCC), and simplified life cycle assessment (LCA). Procurement of HVAC-systems based on a de facto standard called the ENEU<sup>®</sup>-concept in Sweden is also included.

Examples from the World Culture Museum in Gothenburg and other buildings will be shown. This methodology also plays an important role in the dialogue project Building/Living ("Bygga/Bo") between the Swedish government and the building sector.

## S2: Environmental Classification of Buildings

### 10. Building Environmental Performance: Assessing Progress

#### Raymond J. Cole

*PhD, Professor, School of Architecture, Univ. of British Columbia, Vancouver, Canada  
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Voluntary building environmental assessment and labelling programs have the primary objective of stimulating market demand for buildings with improved environmental performance. Assessment methods have enjoyed considerable success and their widespread awareness has created the critical mass of interest necessary to cement their role in creating positive change. Almost all current assessment methods evaluate building environmental performance of buildings by scoring improvements relative to typical practice. There is an implicit assumption that by continually improving the environmental performance of *individual* buildings, the collective reduction in resource use and ecological loadings by the building industry will be sufficient to fully fulfil its role in the environmental sustainability agenda. But the notions of sustainability and lifecycle analysis have begun to extend the timeframe of decision-making from the immediate to the long-term, and to expand range of considerations.

An important indirect benefit of the use of assessment methods has been in enhancing the dialogue between the various members of design teams and establishing common ground. Addressing sustainability requires the development of new modes of public consultation and involvement that enable widely differing views to be expressed, debated and resolved. An emerging issue, therefore, is whether "assessment" tools can be used to negotiate the different expectations of a larger and broader group of stakeholders – financial institutions, policy and regulatory agents and user groups.

This presentation reviews the scope and emphasis of the several current building environmental assessment methods with particular reference to the ways they reference human health and wellbeing. Moreover, it will explore how emerging assessment methods are explicitly acknowledging sustainability and their role in facilitating communication and dialogue between the various stakeholders responsible for the production and operation of buildings.

### 11. Creating a National System for Environmental Classifications of Buildings: A Swedish Project

#### Göran Finnveden

*PhD, Professor, Div of Environmental Strategies Research, Royal Institute of Technology, Stockholm  
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Buildings are responsible for approximately 40 % of the environmental impacts in Sweden. On our road towards a more sustainable society, the construction and real estate sectors thus have tremendous challenges. In a unique dia-

logue project, the Swedish government and a number of companies and organizations have made an agreement in which they have committed themselves to take action in a number of areas. One of the agreements concerns environmental classification of buildings. The agreement states that by the year 2009, all new buildings and 30 % of the existing buildings should be classified. There are a number of systems for assessing and classifying buildings available, both nationally and internationally. However, none has reached such a large market penetration. Thus there is a need to develop a system that can be widely accepted and used.

In this paper\* we will present results from an ongoing project with the aim of developing a classification system that can be used within this dialogue but also in other contexts. We will present results from the first part of the project where we have made a number of inventories of national and international methods already developed, needs and expectations among different stakeholders, and the environmental policy context for the system. Furthermore we will discuss different aspects of a classification system such as choice of aspects to include in the system, choice of indicators, choice of criteria for classification, weighting of different impacts or classes, and presentation of results.

*\* This presentation is based on a paper by Göran Finnveden, Ola Eriksson, Mauritz Glaumann, Åsa Sundkvist, and Helene Wintzell.*

## **12. NCC Concept House – The House With No Electricity Bill**

### **Kristina Gabrielli**

*Project Coordinator, NCC Property Development  
kristina.gabrielli@ncc.se*

The entire project started with a question: Is it possible to pull out the plug? The answer is yes, but the cost is high compared to a "normal" building.

The Concept House comprises two parts, the building and an energy spoiler. The energy spoiler with solar cells integrated in the shell, also give the wind a "speed-up" effect before reaching the wind turbines. The solar cells and the wind turbines generates the electricity supply. Surplus energy is stored in batteries and in hydrogen tanks, for use at nighttime and during the winter months. The process to convert electricity to hydrogen gas (through electrolysis), as well as the reverse process to convert hydrogen gas to electricity (through fuel cells) gives us the surplus heat that is needed to heat the building. "Energy-wells" are used to produce cooling.

Through the whole project the project group with experts and coordinators from NCC, AIX Architects and ABB Corporate Research have been working very tight together. The design and the technical solutions together with the geographical location makes the building self sufficient. The holistic view is very important.

We have also used different solutions to show the latest technology, and also convertible rooms. In this way we can use the same area for meeting rooms and bedrooms, another way of saving energy.

## **S3: Alternative Waste Management**

### **13. Waste Management in Hospitals: General Trends from a Health and Community Perspective**

#### **Alan Watson**

*Public Interest Consultant  
alanwatson@p-i-c.org*

*No abstract was submitted. The contents of the presentation has been described as follows:*

Overview of legislation in the EU on waste treatment. Current trends on waste management. Implications on people's health and effects on impacted communities.

## **14. Improving Medical Waste Management and Disposal Practices in Central and Eastern Europe**

**Pawel Gluszynski**

*Chairman, Waste Prevention Association, Poland  
pawel@otzo.most.org.pl*

*No abstract was submitted. The contents of the presentation has been described as follows:*

Overview of current situation, projects and trainings on waste minimisation and segregation in the healthcare sector in the following Central and Eastern European countries: Poland, Czech Republic, Slovakia Belarus, Moldova, and Armenia.

## **15. Waste Minimisation Through Implementing Alternative Technologies for Medical Waste Treatment**

**Čestmír Hrdinka**

*PhD, Executive Director, HCWH Europe  
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Until recently, incineration was the almost exclusive method of treating hazardous medical waste. Although incineration is still widely used, non-incineration technologies are winning increasing support in Europe.

The problem of pollution caused by the incineration of medical waste has been recognised by the World Health Organisation (WHO). In its policy paper entitled "Health-care Waste Management" (March 2004) WHO states that a long-term goal shall be: "Effective, scaled-up promotion of non-incineration technologies for the final disposal of health-care wastes.

A waste analysis is an important step in selecting any non-incineration technology. Contrary to popular belief infectious medical waste is estimated to be approximately 15% or less of the overall waste stream in hospitals. By the introduction of efficient waste segregation and classification systems based on a real threat from infectious waste, this amount can be reduced in many cases to 3-5%.

Four basic processes are used in alternative medical waste treatment: thermal (low-heat), chemical, irradiative and biological. The majority of non-incineration technologies employ the first two processes listed above. Mechanical processes, such as shredders, mixing arms, or compactors, are added as supplementary processes to render the waste unrecognisable, improve heat or mass transfer, or reduce the volume of treated waste.

Costs are one important aspect in choosing non-incineration technology. Effort should be made to get an estimate of the full costs of the technology by accounting for all possible cost items. The high capital costs of one technology might be compensated by its very low annual operating costs, while the low purchase price of another technology may be offset by its high operating costs or by high installation costs. In general, non-incineration treatment technologies seem to have lower capital and operation costs than incinerators.

## **P3: Inspirational Lecture**

### **16. Revolution in Environmental Health Sciences: New Opportunities to Protect Our Health**

**John Peterson Myers**

*PhD, CEO, Environmental Health Sciences  
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A revolution is underway in the environmental health sciences. At the core of this revolution is the discovery that some contaminants at background levels of exposure alter the behaviour of genes that have been linked by genetic studies to human diseases and disabilities. This overturns the traditional "genes vs. environment" dichotomy, and points toward new opportunities to protect human health. This research also indicates that standard practices in toxicology and epidemiology will need major revisions if these opportunities are to be realized.

# S4: The Importance of Sustainable Materials in Buildings

## 17. Turning Green Into Gold

**Alan Whitson**

*President, Corporate Realty, Design & Management Institute*

*No abstract was submitted. The contents of the presentation has been described as follows:*

Materials are the substance of creation. Yet in environmental and economic terms, materials can dictate whether a building becomes an asset or a liability. In this session, Alan Whitson will address sustainable material strategies, techniques and technologies that can mitigate negative impact on occupant health and the environment.

## 18. How to Choose Materials from an Environmental Point of View

**Kerstin Isacson**

*Safety and Chemical Engineer, SundaHus AB*

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Many buildings set up before 1950 contain substances that are harmful for public health and for the environment. Consequently, building materials containing very harmful substances have had to be decontaminated following building demolition during the period of 1950-1980. Unfortunately, these dangerous substances have spread out in the environment and can be found in humans. Today there are still serious flaws in the rules that control the handling of chemicals within the EU. More than 30,000 chemical substances are available on the European market, and fewer than 1,500 of these have been thoroughly evaluated for health and environmental effects to a certain degree.

According to the Swedish Chemicals Inspectorate, the building industry uses the highest number of environmentally harmful products in Sweden. Generally, this industry has poor knowledge on the environmental consequences of the materials utilized in buildings. Today, information on the chemical content of building materials can be obtained from material safety data sheet and environmental declarations. This information is crucial since the indoor air quality in a building can be affected by high emissions from different building and decorating materials such as paint. Hence, information on the amount of emissions should be stated in the environmental declaration.

There are several evaluation systems available for supporting the building and construction industry in making healthy and environmental-friendly building material choices. When using a database based on building products that have been evaluated from a health and environmental life-cycle perspective, the building proprietors are in a position to make sensible safety demands on the building industry.

## 19. The Right Product Decisions Prevent Hazardous Effects and Save Cost

**Ethel Forsberg**

*Director General, Swedish Chemicals Inspectorate (KEMI)*

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Chemical substances with very hazardous properties, e.g substances that are carcinogenic, toxic to reproduction, very persistent or bio-accumulative, are not compatible with sustainable materials in buildings. To avoid using such substances it is needed to get information from the supplier which substances are present in building products and materials. It will be an obligation in REACH, the new chemicals legislation in EU, for suppliers to provide information if substances of very high concern are present in articles or materials.

The Swedish Chemicals Inspectorate offers a freely available web-based tool for substitution of dangerous substances called the Prioritizing tool, PRIO. The aim of PRIO is to facilitate for environmental managers, purchasers and product designers to assess chemical risks for health and environment and identify the need for risk reduction. A seven-stage model is also provided, that can constitute the basis for systematic work on choosing or replacing substances as a way of preventing and avoiding risks. Also changed technology or design can be an alternative to replacement of hazardous substances.

The Swedish Construction Federation has developed a useful tool, the BASTA system, for purchasers and users of building material. The construction sector has agreed to register products free from very hazardous chemical substances in the BASTA database, claims that are validated by a third party.

The right choice of building materials, free from very hazardous chemicals, also prevents high costs for severe health effects or restoration of the environment. This can be illustrated by the costs estimated to 4 million Euros for each of the 59 floors for renovation of the Montparnasse tower in Paris, which was totally contaminated by asbestos.

## **20. Methods for Inventory and Decontamination of Mercury in Hospital and Dental Clinic Sewers**

### **Stig Thörnvik**

*CEO, Aqua Konsult AB  
st@aquakonsult.se*

Since 1998 Aqua Konsult AB has been working with inventory and decontamination of mercury in hospital and dental clinic sewers. The first project was conducted together with Stockholm county council real estate and included eighteen existing and former dental clinics.

In 2006, Aqua Konsult has taken part in the decontamination of more than eighty dental clinics and five hospitals.

Sewers have been cleaned with water under high pressure. The water and sludge has been collected and taken care of. Normally, it has been sent away and taken care of at waste collection and handling facilities. In two cases wastewater and sludge have been taken care of locally.

The lecture will include methods and results, successful and less successful examples all aiming to give the audience the image of how this kind of projects should be carried out.

Due to this, and to other actions in Stockholm, the amount of mercury in sludge from the municipal wastewater treatment plants has been significantly reduced.

# **S5: Design of Buildings and its Importance for Wellbeing**

## **21. The Green Guide for Health Care and Wellbeing**

### **Robin Guenther**

*Architect FAIA, Principal, Guenther 5 Architects  
rg@g5arch.com*

The Green Guide for Health Care is a tool to assist hospitals and their design teams in consolidating strategies to achieve sustainable health care building. The Pilot phase has attracted more than 80 Pilot projects worldwide. This talk will focus on key strategies within the Green Guide that impact patient, community and global wellbeing.

## **22. The Constructed Environment's Influence on Wellbeing**

### **Thorbjörn Laike**

*PhD, Associate Professor, Dept of Architecture and Built Environment, Lund University  
thorbjorn.laike@arkitektur.lth.se*

The physical environment has been underestimated in its effects on wellbeing. However in environmental psychology, empirical studies have shown that the physical environment may contribute to the wellbeing of individuals. During the last ten years models have been proposed that are describing the environmental influence. One such model, where both the physical and social aspects as well as the individual's resources are taken into account, is presented.

The model has its root in stress-coping models but is elaborated concerning the environmental factors. It is interactionistic, that is, the individual are both affected by the environment, but has also the possibility to act upon the environment if the situation is not satisfactory. The relation between the individual and the environment is reflected in the basic emotional process, which works in four steps: activation, orientation, evaluation and control. The level of complexity in the physical environment also seems to be a crucial factor, to low complexity may result in dull and boring environments, while too high complexity may result in over stimulation.

Another environmental factor of importance is the unity of the environment, that is how well different parts of the environment fit together. It has been found that the complexity and unity of the environment are independent of each other, which makes it possible to create environments with high complexity and high unity. Recent studies suggest that those qualities of natural environments may have a beneficial impact on the individual.

## **23. How to Get Well Without a Doctor: Landscape Architecture as Rehabilitation Device**

### **Thorbjörn Andersson**

*Landscape Architect, SWECO FFNS Architects  
Professor, Swedish University of Agricultural Sciences  
thorbjorn.andersson@sweco.se*

This paper will discuss the reasons why health care in our western culture is so tied to a mechanistic approach, where the human body, if we use a metaphor, is seen as a used car and the exchange of spare parts is a common solution to many illnesses. Absence of sickness and invalidity seem to be the common ideal, when it should rather be a situation of physical, mental and social well being that we strive for.

This modernistic figure of thought creates a decisive background for the way we organize our health care and even build our hospitals, and has done so for fifty years. It is an approach that neglects the healing powers that every individual hosts. Historic examples dating from before modernism shows that already then society had greater understanding for the process of healing. The recent presentation of the mapping of the human genome shows that our efforts still today are directed towards purely technical solutions or solutions that benefit the international pharmaceutical industry.

It is the well-functioning balance between body and soul that creates the best premise for wellbeing. The built environment and the way it affects the human mind and body is here of importance. Studies have shown that landscape architecture, that is the built environment outside the hospital buildings and also the setting of them in the landscape, not only enhances wellbeing by both sick and healthy people but also can be used as a therapy in itself.

# **S6: Integration of Environment Into Everyday Management**

## **24. Step-By-Step Implementation of EMS**

### **Bruno Klausbruckner**

*Professor, Engineer, Environmental Department, Vienna Hospital Association  
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The basis of environmental work in a big enterprise such as the Vienna Hospital Association is a well-structured environmental organization and a comprehensive environmental development plan with clear targets. At present the main goal of the Vienna Hospital Association is the Implementation of Environmental Management Systems in all its Hospitals and Geriatric Clinics, resulting in reduced pollution, economically efficient performance, and employee involvement in target development.

The standard of environmental organisation on institution level in the Vienna Hospital Association has been enhanced by commitment to environmental protection by the entire co-operative leadership (environmental policy); nomination of environmental contact persons in the individual co-operative leadership units; environmental teams established in every institution; and co-operation and exchange of experience among the heads of the environmental teams in the environmental forum.

In 2005, the implementation of the environmental management systems has begun in all institutions, and every institution has established an environmental policy. The further course of action that is planned is the implementation of the basic EMS elements in every institution by the end of 2009 in a step-by-step procedure. These basic EMS elements will be designed according to the requirements of the EMAS Regulation and the ISO 14001 Standard, respectively, and will thus be eligible for certification according to these standards.

## **25. Benefits of ISO 14001:2004 Certification in Health Care and Research**

### **Ingemar F. Petersson**

*MD, PhD, Associate Professor, Lund University Hospital  
Senior Medical Officer, Spenshult Hospital  
ingemar.petersson@spenshult.se*

Being a private hospital in Sweden, you are under special pressure to be in the front line of development and research. The demands for quality standards on private care providers are also higher than on the general health care system. This all, combined with a devoted staff on a 60 bed hospital in the countryside with wonderful surroundings in the southwest of Sweden made the Spenshult Hospital a pioneer in Sweden in environmental ISO certification. Starting the process in 1999, we ended up with the first full organisation ISO 14001:1996 certificate for a hospital in Sweden. Being twice yearly re-certified, we achieved the full ISO 9001:2000 certificate in November 2003 and the new 14001:2004 certificate in 2005.

Experiences from the integrating environmental issues into the everyday work on a hospital gave us new insights and experiences. One was that there are no ISO standards on the handling of drugs and their effects on the environment. Furthermore, the scientific basis for such standards is weak. This led to an ongoing collaborative project with departments of environmental research at the Gothenburg University as well as Kemi & Miljö and Apoteket AB. We are now studying effects of pharmacological residues in the environment including development of new biologic screening methods for environmental hazards. Screening in fish bile of pharmaceutical residues in wastewater from our hospital is underway using new techniques on sewage samples before and after biologic treatment. Based on this, there will be suggestions for international standards and guidelines in environmental work on drugs in health care.

## **26. How To Make a Company's Manager Take Responsibility for the Improvements**

### **Anna Vesterberg**

*Head of Environmental and Sustainability Department, Karolinska University Hospital  
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In 1996 when the environmental management standard ISO 14001 arrived, a lot of people were hopeful that environmental issues finally would appear on the top management agenda and be integrated in the organizations everyday management system. ISO 14001 became a success in many organizations as a management tool for environmental issues but were not integrated in everyday management. Many companies were "forced" into special environmental management agendas/meetings where only environmental issues were discussed separately from regular management issues as economy, quality or working environment. A new line of work was born, the environmental coordinators, who did not only help the top management to decrease environmental impact but assumed complete responsibility regarding environmental issues and continual improvement.

During the merge between Karolinska hospital and Huddinge University hospital in 2004 the environmental manager Anna Vesterberg and the staff at the Karolinska environmental and sustainability department acknowledged past experience and seized the opportunity to rebuild the two existing environmental management systems into one. This management system is integrated with the everyday management system that supports top management, managers and other boards. There are a few processes in decision-making that are more important. I am going to address some of these processes.

# **P4: Pollution and Health**

## **27. Pollution and Health: A Global Perspective**

### **Tord Kjellström**

*PhD, Professor, Swedish National Institute of Public Health  
Professor, National Centre for Epidemiology and Population Health, Australian National University  
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Pollution of the living and working environment by hazardous agents contributes between 25 and 35 percent of the global burden of disease. A variety of biological, chemical and physical factors can create hazardous exposures at household, community or global level. This paper will review these issues and make reference to the health care

sector as a user of technologies and chemicals, a creator of waste, an energy consumer, a trip generator and a workplace.

Chemical pollution, energy waste and climate change are some of the greatest environmental health challenges of the future. Some health effects are already evident while the effects of climate change are in the main based on predictions: for instance, wider spread of vector-borne diseases, heat wave related mortality peaks, increased air pollution, and lack of drinking water and food in parts of the world.

Increasing heat in large parts of the world also reduces the ability to work and carry out daily activities. Already some areas are so hot that work and other physical activities are restricted. This situation will get worse with climate change and it will also affect the health services, as not all workplaces can be air-conditioned. This outlook has yet not caught the attention of decision-makers and the general public. Actions within the health sector and other sectors that can contribute to the reduction of health impacts of pollution will be presented. The ecosystem that sustains us all on this lonely planet is under great strain and requires urgent attention.

## **28. The 10 Most Important Actions Regarding Environment to Promote Health in the Population of Stockholm**

### **Magnus Svartengren**

*MD, Professor, Dept of Public Health Sciences, Karolinska Institute, Sweden  
Dept of Occupational and Environmental Health, Stockholm County Council  
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A working group with representatives for Centre for Public Health, and the Environmental Department within the Stockholm County Council has identified ten actions deemed by the working group to be the most important environmental measures that the Stockholm County Council should undertake to improve public health in the county. The working group considered only those environmental factors that have a scientifically proven effect on health in the Stockholm region, and identified the following ten measures (not in priority order):

- Continuously inform other action parties about the importance of air pollutants to public health.
- Ensure that organisations responsible for public transportation have necessary resources to reduce emissions of air pollutants from vehicles, e.g. by using alternative fuels in their vehicles.
- Ensure that organisations responsible for public transportation have the resources they need to reduce noise, e.g. through better muffling and noise-reducing facades.
- Implement an action plan for increasing the percentage of travellers who choose public transportation, by making it more customer-oriented.
- Continued support to ex-smokers, and campaigns to reduce the number of people recruited to take up smoking.
- Inform healthcare workers and the public about the risks of ultraviolet light, both outdoors and in solariums.
- Restrict products containing allergens in the County Council's procurement.
- Provide information, staff training, and public education about ways to avoid contact allergy and skin disease from wet work.
- Develop requirements for healthy working environments for operations carried out by the Stockholm County Council or its suppliers.

## **S7: Green Transportation**

### **29. The Ring to Ride Scheme: Transport of Healthcare Patients Through Public Transportation**

#### **Gunilla Wicktor**

*PA Manager, Västtrafik AB  
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According to Swedish law, all out-patients are entitled to allowance for travelling expenses when visiting hospitals. The cost of travelling is paid for by the County Council but patients may be charged for some of this cost. The most common means of transport used by out-patients is a private car or taxi.

The cost of patients' travels have increased dramatically and consequently, the County Council in the second largest county of Sweden, i.e. Västra Götaland, have for some years now successfully teamed up with local public transports to coordinate the transport of patients. The patient or hospital staff books the transport via a booking centre and

this is then coordinated with other patients requiring transport. Depending on the needs of the patient, the most appropriate means of transport is offered. Sometimes the patient can use regular public transport. At other times, the patient may for reasons of age or medical condition need extra service and care and is then collected from his/her home to travel jointly with other patients either by car or ambulance coach with space for a wheelchair or stretcher.

To date, the coordination of patients' travels has been very successful, alleviating the cost of travelling allowances. It is also less harmful to the environment and the County Council can spend more on the actual care rather than the cost of transporting patients.

## **30. Co-ordinated Deliveries of Goods to the Cities of Stockholm and Borlänge**

### **Jan Hultgren**

*Logistics Strategist, Dept of Development, City of Stockholm  
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### **Anders Bringborn**

*Purchasing Manager, Borlänge Municipality  
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On a local level, in the municipalities, a change is taking place in logistics and transportation. A growing awareness is leading to reduced transportation costs, stricter environmental requirements and improved road safety. The municipalities generate a large number of transports, primarily deliveries of consumables. Traditionally, delivery of the goods is part of price. There has been no control of costs and environmental impact. Only during recent years have we seen a debate about this, focusing on cost effectiveness. In practice, however, much remains to be done.

In Sweden a small number of wholesale dealers dominate the supply of provisions to the public sector. Due to logistic problems the small suppliers and local farmers cannot normally compete with the wholesale dealers, although they have ecologically raised and relatively cheap products.

In the municipality of Borlänge and three other municipalities we have given these suppliers an opportunity of taking part in the purchasing of provisions by a solution of their logistic problems. We have purchased the local provision transports separately from the provisions and all dealers only have one place for delivery to the approximately 150-200 different customers in the four municipalities.

This solution also has given us a possibility of environmental claims to the transport. Today the four municipalities have 15 different suppliers of provisions of which 7 are local or regional.

## **31. Eco-Driving and Efficiency Coaches: Save Environment and Money While Driving**

### **Lars-Eric Sjölander**

*CEO, GreenIt AB, Certified Efficiency Coach  
les@greenit.se*

Eco-Driving, a method to reduce fuel consumption and improve road safety, was first introduced in Sweden in 1998. Since then The Swedish Association of Driving Schools have developed three concepts: Eco-Driving (cars), Heavy Eco-Driving (lorries and busses) and Working Eco-Driving (construction equipment).

Eco-driving leads to several benefits: reduced fuel consumption and carbon dioxide emissions, reduced noise pollution and local air pollution, improved road safety, reduced stress and decreased accident risk as well as improved work environment, and less wear on engine, gears, tires and breaks.

The first years focus was on the education moment where the vehicle fuel consumption and the strict related carbon dioxide saving are 13 %. For construction equipment the saving can reach up to 40 %. Unfortunately, without any follow-up and motivation measurement, the drivers tend to return to their old driving behaviour. This makes it hard to evaluate the prolonged effects of the training lessons.

The Swedish Road Administration has therefore developed and educated so called efficiency coaches to assist companies to gain more prolonged effects of their courses in economical driving. The coach helps companies to develop routines and measurement for the follow-up of the fuel consumption. He also helps to motivate the drivers to maintain and develop their economical driving style. The purpose is that the efficiency coach will contribute with support and advices to avoid that the drivers revert to their old driving style.

Eco-Driving combined with the efficiency coach concept will increase the competitiveness of your company.

# S8: Green Chemistry: The New Chemistry

## 32. Green Chemistry for a Healthier Environment

### James Clark

*PhD, Professor, Clean Technology Centre, University of York, UK  
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Chemicals play an essential part of modern healthcare including pharmaceuticals, cleaning agents to provide a hygienic environment, and materials for construction of medical facilities. However, chemicals represent a risk and can also pose a threat to healthcare, either in the short term through exposure to toxic substances or in the long term through bioaccumulation or damage to the environment by the product or processes from which they were obtained.

Green Chemistry seeks to minimise risk associated with chemicals largely by reducing the hazards - through safer processes and products, as well as minimising exposure and moving towards a more sustainable "chemical world" through the use of renewable resources and environmentally compatible products.

In this talk I will look at all stages in the life cycle of a chemical product to identify the stages of greatest risk. By using examples of products of special importance to healthcare, I will then investigate how Green Chemistry can reduce those risks while not compromising the valuable effects that the chemicals produce. More sustainable solutions will also be investigated including the use of more "natural" materials.

## 33. Moving Towards More Sustainable Materials Requires a Shift to Safer and Less Wasteful Chemistries

### Ken Geiser

*PhD, Professor of Work Environment, Univ of Massachusetts Lowell, USA  
ken\_geiser@uml.edu*

The transition to a more sustainable economy requires significant re-thinking of the materials we produce, use and waste. Firms and countries around the world are initiating new chemical policies and programs that encourage the use of safer and less wasteful chemistries. Beginning with cleaner production, pollution prevention, and toxics use reduction programs these initiatives are now driving a search for greener chemistries and products designed to better fit into natural systems. Green chemistry is an emerging field of research and development in the material sciences that strives to reduce or eliminate the use and generation of hazardous substances. But safer chemistries generating cleaner products will not be enough. We must find ways to reduce material flows, close material cycles, and get more value out of the materials that we use.

The health care sector has become a gigantic materials processing engine, consuming and wasting large amounts of materials little of which has been designed with respect for its environmental effects. However, there are many strategies that health care activists and professionals can take to promote less dangerous chemistries, to slow the rate of material throughput, and to transition health care and health promotion to a more sustainable material base.

## 34. Legislative Means for Avoiding Dangerous Toxic Chemicals – REACH

### Per Rosander

*Director, International Chemical Secretariat, Sweden  
per@chemsec.org*

*No abstract was submitted. The contents of the presentation has been described as follows:*

Reducing the use of toxic chemicals: What is best done voluntary and when is legislation needed? What chemical laws are required to achieve a toxic free environment? And will the political system deliver what's needed, given the resistance from chemical manufacturers? Reflections from the heated debate around the new European chemicals policy (REACH).

# S9: Sustainable Food

## 35. Why Sustainable Food is Good Healthcare

### **Pia Lindeskog**

*MD, Head of Consumer Affairs, Swedish Cooperation Union  
pia.lindeskog@kf.se*

*No abstract was submitted. The contents of the presentation has been described as follows:*

What is a sustainable diet? Ecological products, the balance between animal and vegetarian products. Seasonal choice of products, etc. Is a healthy diet always sustainable? What are the most important changes we have to make in our diet, and how do they affect sustainability?

## 36. How to Increase Organic Food Within Healthcare

### **Bent Egberg Mikkelsen**

*PhD, Senior Scientist, Danish Institute for Food and Veterinary Research  
bem@dfvf.dk*

Organic foods now represent a significant share of the food consumption in western European countries, and idea that public food systems go forward as a role model and buy organic has obtained support in many countries.

In Denmark and other Northern European countries organic procurement projects has been going on for the past two decades in large scale foodservice including hospital food service and thus there is a number of experiences to draw on. In general however progress has been slow: whereas organic conversion has developed quite smoothly in smaller institutions, the introduction of organic foods in large-scale foodservice systems such as hospital food service has proven to be quite difficult.

Part of the explanation seems to be that large-scale foodservice has very complex planning, procurement and processing procedures, but also other factors can explain why real progress is still to be made. This paper presents and discusses the evidence and ends up with suggestions on how to increase organic within healthcare.

## 37. Sustainable Food Procurement

### **Mike Duckett**

*Catering Manager, Royal Brompton and Harefield NHS Trust, UK  
m.duckett@rbht.nhs.uk*

Achieving a high standard of food through a passion for high quality food and service is important and more importantly that this service is sustainable for the future. We have recognised that good food is important for the nations health and more especially when in hospital in recovery.

Caterers have a responsibility for being good corporate citizens in educating customers to eat a healthier and varied diet and in some areas change their eating habits to prevent heart disease and obesity. Customers should have the choice of a healthier option at every meal this we encourage in UK hospitals. This is a better way of introducing various different foods on the menus and also encouraging people to eat healthier by education.

High quality food normally means more expensive produce, but experience has shown that value for money comes from purchasing quality. Where there is a definite link between food and health this needs to be explored and fresh food needs to be used instead of expensive drugs. The use of organic and additive-free products is a must for the future sustainability of the food production and care of the soil.

The local economies are important for the community and encouragement of the small and local farmers and manufacturers. Local fresh produce must be better than purchasing from overseas and will have environmental benefits on reducing the transport and deliveries into larger cities.

The Royal Brompton Hospital has been successful in achieving a high percentage of procurement as either Organic Local or a fresher healthier option.

# P5: Sustainability Lecture

## 38. What does “sustainability” mean? And how do we *do* it?

### Alan AtKisson

CEO, The AtKisson Group  
[alan.atkisson@atkisson.com](mailto:alan.atkisson@atkisson.com)

Is “sustainability” a technical term, a global movement, a best practice, or a vision for the future? The answer is, “All of the above.” This keynote explores what one of the world’s most exciting and inspiring ideas – despite its awkward name, “sustainability” – means in practical terms, in today’s world, and in the health sector.

The keynote begins by tracing quickly the history and meaning of sustainability, which has emerged in response to growing awareness of a large collection of global trends – trends that are themselves unsustainable. Touching everything from large-scale energy and climate issues to the food and materials people use every day, understanding these trends has meaning all the way down to the level of individual behavior, and has impact on medical operations, the diseases being treated, and the effect of health care itself on the world around us.

A systems view is required, and taking a systems view results in vastly more innovative thinking and changes in practice – changes that are essential, changes that we are compelled to pursue with all possible speed.

The keynote sites success stories, cases, and methods, and grounds sustainability in the highly developed global consensus represented by the Earth Charter, increasingly recognized as a global reference document defining sustainable development, much as the Universal Declaration on Human Rights defines basic human freedom and dignity.

*More information on the keynote content is available at two websites: [www.AtKisson.com](http://www.AtKisson.com), and [www.EarthCharter.org](http://www.EarthCharter.org).*

# S10: Information and Training

## 39. It’s All About People – how to successfully engage people in positive change

### Lennart Bjurström

CEO, Agapo AB  
[lennart@agapo.se](mailto:lennart@agapo.se)

We all know that it doesn’t really matter how much we know we need our organization to change – it will require PEOPLE to actually change things. But HOW do we engage people in positive change?

Behind every action there is an emotional driver and if we were to boil down all the different emotions that make us do things or stop us from doing things, we come down to two basic driving forces: first, avoiding pain, and second, seeking pleasure. Pain is emotionally more intense than pleasure. So, in order to motivate someone to do anything, they need to feel the pain of not doing something and the pleasure of doing something. Give the people a big enough reason why they should engage, and they will! But remember that reasons are different to different people.

And in order to achieve this, you need to take the individual through a learning process, which Abraham Maslow defined in four steps:

1. Unconscious incompetence.
2. Conscious incompetence.
3. Conscious competence.
4. Unconscious competence.

In order to take the individual through this learning process you need to understand how important it is to base what methods of communication to use on the results you want to achieve.

If you don’t go to this seminar, you will miss out on critical success factors for your training effort. But, if you want to succeed, you are welcome!

## **40. Nursing, Environment and Health: Educating Nurses for Action on Environmental Health Practice and Policy**

**Susan Wilburn**

*Senior Advisor, International Council of Nurses  
susan.wilburn@att.net*

*No abstract was submitted. The contents of the presentation has been described as follows:*

Why nurse involvement in environmental health policy and practice?

Historical and organizational policy framework.

Toxicology compared with pharmacology and occupational exposure to chemical hazards as entrees to environmental health advocacy.

Case studies and best practices of environmental health in nursing in Europe and globally.

## **41. Programs for Environmental Training in Complex Groups**

**Daniel Eriksson**

*Environmental Coordinator, Malmö University Hospital  
daniel.eriksson@skane.se*

Malmö University Hospital, (UMAS), is a university and a regional hospital that provides basic and highly specialised medical care. On average, 2.000 patients visit UMAS every day. UMAS has approximately 7000 employees divided into about a hundred different categories.

Each of the 40 departments has its own environmental coordinator that, apart from their ordinary work, provides the department/clinic with environmental knowledge and know-how. Beside the 40 environmental coordinators, the hospital also has 200 environmental representatives, one in each workplace.

The basic environmental training is based on a three day course intended for all environmental coordinators and representatives. This basic training is held 2-4 times each year with 15-20 participants, the participant then inform/train their co-workers in their work-place. Environmental coordinators and representatives, who have attended the basic training, can after a couple of years attend another one-day training about environmental progress motivation. Environmental coordinators are also required to attend a one-day training in Environmental Management. Twice a year we also have an "environmental day" with interesting or/and famous speakers. Besides that we have shorter lectures in the clinics focusing on different subjects such as pharmaceuticals in the environment or infectious waste.

One important conclusion that we have drawn is that the message should be adjusted to the target group; a janitor does not need the same information as a doctor. Another one is that the message must be repeated, and a third one that environmental issues related to health and/or economics are effective icebreakers.

## **42. Interactive Education: Successful Experiences from 10,000 Employees at the National Corporation of Swedish Pharmacies**

**Maria Mårfält**

*Head of Pharmacy Academy, Apoteket AB  
maria.marfalt@apoteket.se*

Apoteket AB, the National Corporation of Swedish Pharmacies, is a large organisation consisting of more than 10,000 employees at approximately 1,000 working sites. Due to a widespread organisation, physical meetings result in high costs and difficulties to keep opening hours. Therefore, when a need for an environmental education aroused we looked for alternatives to face-to-face meetings.

We developed an e-learning program called "Apotekets gröna grund" (The Green Base of the Pharmacies). The program consists of three parts: theory, an interactive game with customer simulations, and a test questionnaire. The theory comprises basic ecology, pharmacies and the environment, pharmaceuticals, transportations, energy and materials, and goods and services.

In a very pedagogic way the participant can chose between the issues, repeat, take a break if needed and test their skills in a questionnaire. The content in the program is adapted to Apoteket AB but also presented in an amusing way and wrong answers to the customer's questions results in a longer queue in the pharmacy. All employees that have passed the test have been registered and the results have been followed continuously on the intranet, in the staff magazine, etc.

After 6 months 3,500 employees had passed the test, and by the end of 2002 that figure was as high as 9,600 employees. The evaluation of the program has been very positive. Apoteket AB has now created a follow-up version, with a broader perspective on environmental issues called "Apotekets hållbara grund" (the Sustainable Base of the Pharmacies) where also ethical, economic and social aspects are included.

## **S11: Ways to Green Procurement**

### **43. Green Public Procurement: A New Way of Greening the Supply Chain**

#### **Jill Michielssen**

*Administrator, Environment Directorate-General, European Commission  
jill.michielssen@cec.eu.int*

The purpose of the presentation is to explain why and how the European Commission promotes EU wide uptake of green public procurement policies. Based on facts and figures resulting from a recent GPP study, the presentation will focus on the four main barriers (legal uncertainty, lack of environmental knowledge, lack of political support and budgetary constraints) and explain what it is doing to overcome those barriers. This will include a presentation of the legal framework, of the EU Handbook on Green public procurement, of networking activities with the EU Member States in order to ensure the adoption of national action plans on Green public procurement, of proposed development of a knowledge base and training toolkit on green public procurement. The presentation will finally present some on-going projects on GPP in the field of construction.

### **44. A Model for Green Procurement**

#### **Per Dahlgren**

*Director Procurement, Stockholm County Council  
per.dahlgren@sll.se*

Stockholm County council and its procurement department started around year 1995 to develop environmental requirements to be used in the procurement process. We used external specialist to help us develop relevant environmental criteria. We were at that time most interested in minimizing the use of Polyvinyl Chloride (PVC) in the products that were used in close connection to our patients. The focus on the PVC problem was given from the political level. The experience from this period showed some difficulties to substitute the PVC in some of the products where the physical quality of the PVC had a major influence of the performance.

In other areas i.e. stationary supplies it was much easier to substitute the PVC to other materials.

The sets of environmental criteria that was developed during those days were later transformed to what today is the EKV – environment tool

Today we are more concerned about the greenhouse effect and we are now developing criteria that will minimize the disposal of carbon dioxide and to use fuels from renewable sources.

The work to continually improve our environment will proceed.

### **45. Value-Adding of Green Procurement**

#### **Viveca Reimers**

*Coordinator Green Procurement, Region Västra Götaland  
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Region Västra Götaland is a western Swedish region with wide-ranging self-government, responsible for health and medical care, and regional development. There are 1.5 million inhabitants in the region. Region Västra Götaland has 50,000 employees. The region purchases goods and services worth approximately 1 billion euro per year (contracting excluded).

The environmental policy of Region Västra Götaland says that all work carried out within the Region will be health promoting and contribute to sustainable development in which economical management of resources and adaptation to ecological cycles are guiding principles. We describe and assess the consequences for health and the environment, in accordance with our purchasing policy, before decisions are made about purchasing a product.

To succeed with green public procurement, it is important to have a close co-operation and communication between the purchasing organisation, the customers who are the users of the products, the suppliers and political support and political decisions. It is also vital that the purchasing organisation is well aware of green procurement and how to do. The customers or users within the organization also need to be well informed to be able to demand and purchase "green" products.

This method in Region of Västra Götaland has resulted in procurement with environmental, health promoting and in some cases economical benefits. Examples are within the areas of clean vehicles, eco-labelled furniture, green electricity, organic food, rechargeable batteries, low energy lamps, environmental adapted toner and PVC-free nasogastric tubes.

## **S12: Working with Sustainability**

### **46. The Sustainability Strategy of the EU**

**Christine Dalby**

*Sustainable Strategy Responsible, European Commission  
christine.dalby@cec.eu.int*

*No abstract or contents description have been submitted.*

### **47. An International Standard for Social Responsibility: Report from ISO**

**Staffan Söderberg**

*Acting Vice-Chair, ISO Working Group on Social Responsibility  
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ISO (International Organization for Standardization), the world's leading developer of international voluntary standards, began operating in 1947. It has a membership of 156 national standards bodies from countries large and small, industrialized and developing, in all regions of the world. ISO develops only those standards that are called for by the market and the work is carried out by experts nominated by each member.

After a request from the consumer representatives within ISO in 2001 a special advisory group was set up to investigate the possible need for a ISO standard on Social Responsibility. The resulting report was discussed at a conference in Stockholm 2004 and it was decided to go ahead. The new standard ISO 26000 Guidance on Social Responsibility is currently being produced through a balanced multi-stakeholder process and will finished by mid 2008. The resulting international tool will cover the three dimensions of sustainability, social, environmental and economic, and for example address core social responsibility issues, stakeholder involvement and implementation guidelines. ISO 26000 is not only aimed for corporations, will not be a management system and is not intended for ISO certification.

At the moment the ISO 26000 process involves more than 50 countries, out of which more than 50 % are developing countries, and some 30 liaison organisations. In total almost 300 experts from six different stakeholder categories meet every six months to further the process and the product. This lecture will be about both the process and the product.

*More information is available online at [www.iso.org/sr](http://www.iso.org/sr) and [www.iso.org/wgsr](http://www.iso.org/wgsr).*

## 48. Hindrances and Possibilities for Sustainable Reporting

### Sören Olofsson

*Executive Director, Stockholm County Council  
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Assignment: to integrate sustainability reporting with our traditional annual report.

We started by defining what sustainability included for us. Stockholm County Council's main mission is to provide our 1,9 million citizens with healthcare and public transportation. To do that is in itself to take social responsibility. To do it in a way that includes gender perspective, environmental thinking, social and environmental demand on suppliers, developing further knowledge by research, economic efficiency and good handling of human resources embraces the concept of sustainability. To show how we succeed in that should form our sustainability report.

Since the sustainability concept embraces the performance of the whole organisation including the economics my vision is that it must be possible and also highly relevant to integrate sustainability reporting with traditional annual reporting.

It is however a difficult process, with a lot of hindrances and obstacles. Some of the obstacles are emotional responses to sustainability but the most important obstacle is if a sustainability report is auditable or not. What should and should not be included in an annual report and the difficulty to define what parts of the annual report that should be included in the auditors report. Another challenge and opportunity is our effort to gradually develop good measurements of the effect of our services.

## P6: Pharmaceuticals and the Environment I

### 49. Human Pharmaceuticals in the Aquatic Environment

#### Klaus Kümmerer

*PhD, Professor of Environmental Chemistry and Environmental Hygiene, University of Freiburg  
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Pharmaceuticals are excreted into wastewater. Unused and out-dated medicaments and remainders are sometimes disposed of in drains. The drugs may enter the aquatic environment and eventually reach drinking water if they are not eliminated during sewage treatment. Antibiotics possibly disturb the wastewater treatment process and the microbial ecology in surface waters. Furthermore, resistant bacteria may be selected in the aeration tanks of sewage treatment plants, or other environmental compartments, by the antibiotic substances present. Cytotoxics are often carcinogenic or mutagenic and are reproductive toxicants. Hormones are active at very low concentrations. An over-view of the input and the concentrations of drugs in hospital effluents and municipal sewage, surface water and ground water will be given. Specific properties of pharmaceuticals will be addressed.

The concept of eco-pharmacology will be introduced. The elimination and degradation of some clinically important drugs and their effects against environmental organisms will be reported. Possible risks and strategies will be addressed to reduce the environmental risks associated with the use of pharmaceuticals. In general, it can be concluded that the emission of drugs into the aquatic environment should be reduced. Remainders should therefore not be disposed of via the drain. End-of-pipe solutions (e.g., wastewater treatment) are not sufficient. A combination of risk short-term to long-term management strategies is recommended.

The environmental significance of drugs should be included in the curricula of doctors and pharmacists; manufacturers should adapt package size. New compounds should be designed environmentally friendlier.

### 50. Environmental Classification of Drugs

#### Gisela Holm

*PhD, Ecotoxicologist, Environmental Committee, Swedish Association of the Pharmaceutical Industry  
gisela.holm@astrazeneca.com*

The possible impact of pharmaceutical substances on the environment is a subject that attracts increasing attention in Sweden as well as in other regions. As one of the consequences, the Swedish Association of the Pharmaceutical Industry (LIF) took the initiative to develop a voluntary classification system based on the environmental characteristics of pharmaceutical substances. A model for presenting environmental data was then developed by LIF in cooperation with interested parties. The model aims at presenting environmental information about pharmaceuticals so that it is easily accessible to the general public as well as to professionals in the health care system. On 10 October 2005, information on the first two groups of products was published on the web site [www.fass.se](http://www.fass.se) (the Swedish

medical products list). Since then, new groups of medicines have been introduced, and the idea is to gradually publish environmental information for all products on the Swedish market within the next five years.

Information on the environmental impact of pharmaceutical substances is presented on three levels:

1. The basic level gives short information on the environmental risk of the active pharmaceutical substance (API).
2. On the next level, information is given about the characteristics of the substance with regard to degradation and the potential to bioaccumulate.
3. All background data for the previous assessment of environmental risk, degradability and bioaccumulation are presented on the third level.

The presentation will cover the principles of the classification system, and also evaluate the implementation of the groups of products launched on *fass.se* so far.

## **S13: Waste Management of Infectious, Pharmaceutical and Other Special Waste**

### **51. Pharmaceutical Waste: Management Situation in Europe**

#### **Staffan Castensson**

*PhD, Associate Professor, R&D Department, Apoteket AB  
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The European legislative framework with respect to waste management planning is based on three directives that stipulate a planning obligation; the Directive on waste (75/442/EEC), the Directive on hazardous waste (91/689/EEC) and the Directive on packaging and packaging waste (94/62/EC). The Directive on waste (75/442/EEC) lays down requirements for all types of waste, unless they are specifically regulated by other directives. Pharmaceutical waste categories are coded in the list of wastes pursuant to the two first mentioned directives and are fully defined by six-digit codes under the two four-digit chapter headings separating human and animal health care. Cytotoxic and cytostatic medicines are considered as hazardous waste and consequently subject to special provisions.

The EU strategy for waste management includes the prevention and precautionary principle to secure a reduction in the impacts from waste on human health and the environment, especially to reduce the hazardous substances in waste. Directive 2004/27/EC amending Directive 2001/83/EC on the Community code relating to medicinal products for human use and Directive 2004/28/EC amending Directive 2001/82/EC on the Community code relating to veterinary medicinal products both consider precautionary and safety measures to be taken for the disposal of waste products, together with an indication of potential risks presented by the product for the environment. Member States shall ensure that appropriate collection systems are in place for products that are unused or have expired.

The pharmaceutical waste management history and structure in Sweden will be reviewed and compared to the evolution of collection systems in other parts of Europe.

### **52. Clinical Waste – an Irish Example**

#### **Michael McKeon**

*Lecturer in Nursing, Dublin City University  
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With a bleak picture of Ireland, and Irish medical waste increasing by 12% to 7000 tons in 2005, all is not lost when the full picture is viewed and it may not necessary be a bleak picture at that.

In the early 1970s many hospital incinerated their medical waste with little or no filter systems in placed. Following the increasing scientific evidence of the danger of this practice most of this incineration stop and medical waste became an exported product of Ireland and some waste ended in landfill sites which were legal in every sense of not having legislation to make it illegal.

In the 1990s, new EU Waste Directives forced Ireland into using a more appropriate and modern method of waste management and with the large cost of exporting medical waste and the apparent efficient economics of scale, an alternative technology to incineration became a reality for the island of Ireland. The non-incineration medical waste treatment technology, a steam-based system, is safer and cleaner than incineration, does not produce dioxin, and are just as effective at disinfecting medical waste. The end product is a sterile waste that is deep landfill.

While that could be the end of the story and the landfilled sterile medical waste lives happily ever after in the deep landfill site, it does not end there. Research is now using the principle of reduction and recovery by using enzymes to make fuel from this waste and reduce it in size by another 50%. So the story has to be continued...

## 53. Legislation and Good Practices for Safety and Practicality

### **Bertil Krakenberger**

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Some wastes in healthcare institutions may be able to spread infectious diseases, give toxic effects or cause disgust and horror. Therefore we need to treat those wastes differently than ordinary wastes.

To be able to compare legislation in different countries it is important to know the vocabulary. There is a significant ambiguity in the naming of these wastes and thus maybe also in the practices.

Legislation in this field is essentially absent at the European level, maybe rightfully so. The national regulations concerning special waste differ in some interesting instances. The principles for legislation and for good practices ought to be occupational safety, safety for the public, environmental safety, practicality, and economy.

To be able to formulate regulations or practices for taking care of health care special wastes you need good knowledge of the dangers or the ethical issues concerning the waste at hand, the techniques needed to assemble, store, package, transport and render the waste harmless, but also of the needs and obligations of the health care staff to fulfil their tasks. Legislation and practices should not demand actions that cannot be well motivated by the principles above.

There exist a resistance to incineration as a means to discard health care waste. This resistance is founded in knowledge that waste incinerators can produce large amounts of dangerous pollutants. Modern waste incinerators using the best available technology however, produce very small amounts, much less than normal energy plants and they also produce energy.

# S14: Green Procurement: Examples and Experiences

## 54. From PVC to Safer Alternatives: Green Procurement in Health Care

### **Mark Rossi**

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Polyvinyl chloride (PVC) plastic is a material of concern in the health care sector because of environmental concerns across its life cycle. PVC contributes to dioxin emissions during manufacture and incineration. PVC is made with carcinogenic chemicals, including the known human carcinogen, vinyl chloride monomer. And PVC medical devices leach plasticizers, unnecessarily exposing patients to chemicals like phthalates, which have been banned in toys in the EU. For these reasons, hospitals are targeting PVC for reduction. But what are the alternatives?

The ideal product would be "tree-like." It would be manufactured from renewable and healthy materials. Its energy source would be solar. It would be manufactured under ambient temperatures and atmospheric pressure. Its emissions would be healthy inputs into the atmosphere. And at the end of its useful life it would provide healthy nutrients for the soil.

Unfortunately in the health care sector, and all of the economy, there are very few "tree-like" products on the market. Yet, we have a number of options that are better than PVC. The environmentally preferred plastics use less toxic chemicals in manufacturing, pose less problems when burned, do not expose patients to hazardous chemicals, are easier to recycle, and ideally require less energy to produce. Products made from polypropylene and polyethylene are among the more preferred petro-based plastics. In most applications where PVC is prevalent in health care, including IV bags, medical tubing, and flooring, polyethylene and polypropylene alternatives are available.

## **55. PVC Free Neonatology: A Case Study from Children's Clinic Glanzing**

**Andreas Lischka**

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Polyvinylchloride (PVC) plastic is a synthetic polymer resin, originating from polymerisation of the monomer vinylchloride (VCM). 57% of the weight is caused by chlorine. Pure PVC is a stiff material, therefore low molecular softeners, mainly phthalates and adipates, are added in the polymer matrix.

Medical concerns focus on the migration of the softener DEHP (Di-(2-ethylhexyl) phthalate). PVC medical products contain 12 to 80 weight percent DEHP, which is volatile and can dissolve from PVC tubes into the patient's blood. DEHP is fat-soluble, may cause liver and skin diseases, impair the cardiovascular and reproductive system and may possess hormone function. Measurements of the British ministry of health show high values of DEHP in umbilical cord blood. EU-directive 2001/59/EC (August 6, 2001) classifies DEHP as "dangerous for reproduction". According to the EU-medical product guideline 98/79/EWG, PVC-free products should be used for indwelling lines. PVC is considered very dangerous in neonatology and dialysis, especially for repeated blood transfusions and TPN. They may lead to a considerable body burden.

In the Children's Clinic Glanzing, a marked reduction of PVC containing waste was achieved: PVC proportion of total waste was 10% in 1990, 2.5% in 1995 and 0.21% in 2005. The number of PVC containing products used per year in the NICU was 15,9% in 2001 and 5,1% in 2005, respectively.

Attempts of hospital organisations should be undertaken to force the industry to provide PVC free products at reasonable prices, to achieve complete avoidance of PVC containing (medical) products.

## **56. Possibilities and Obstacles with GPP and Medical Devices: From BFR's in Medical Equipment to Silver Compounds in Bandages**

**Kristina Mårtensson**

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The Swedish Environmental Management Council (EKU) offers criteria to be used in GPP at the website [www.eku.nu](http://www.eku.nu). In 2005 four working groups started to address GPP and to formulate criteria for EKG, defibrillators and diathermy equipment, examination gloves, bandages and incontinence and urology products. The possibilities for GPP vary between these different health sector products. Success or failure depends on a lot of aspects. The most important are market knowledge, number of stakeholders, number of customers requiring the same demands, and knowledge of the environmental and health aspects.

Only a few producers of medical equipment exist on a global scale. Successful GPP in the area of medical equipment therefore needs international cooperation and streamlining. Like all electronic equipment, medical equipment such as EKG contains BFRs, but is explicitly excluded from the scope of RoHS, the EU directive for restriction of the use of hazardous substances in electronic equipment. Buying medical equipment today means that only award criteria may be used in addition to compliance with relevant EU environmental directives.

For examination gloves and bandages, a broad range of different products, health aspects overshadow pure environmental aspects. Compulsory demands focus on avoiding additives with allergic properties and an award demand promote textile bandages containing less than 30 ppm formaldehyde. The use of silver compounds is discussed both from an environmental and clinical viewpoint.

For examination gloves a couple of alternative products without the phthalate DEHP exist on the Swedish market, and GPP in this area has proven successful. Compulsory demands in the EKU tool aim at avoiding unwanted hazardous properties in additives used in gloves.

# **S15: International Panel: The Global South Perspective**

## **57. Sustainability for Health Care: A Global Perspective**

**Joshua Karliner**

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While most developing countries have done little to date to address the environmental health impacts of the health care industry, significant changes are in the works. They include the development of sustainable health care waste management practices as alternatives to medical waste dumping or incineration; the substitution of environmentally sound products for hazardous ones such as mercury-containing medical devices and IV bags made of PVC; the adoption of green building initiatives and more.

These changes are taking place at the global, national and specific health care institution level. For instance, the World Health Organization has adopted a series of policies promoting sustainable health care. HCWH is collaborating with WHO and UNDP on a project based on the Stockholm Convention designed to promote sustainable health care waste management and mercury reduction in model hospitals in seven countries. The EU is considering a mercury export ban, that could include medical devices. UNEP and HCWH are working together to promote mercury reduction in the health care sector globally. IV Bag producers are introducing new PVC-free products in a broad array of countries, including China – which has mandated such a change.

The magnitude of the problem, along with the pace, direction and potential of these changes, as well as the role that Europe can play in promoting an environmentally healthy global health care sector will be discussed.

## **58. Challenges and Opportunities for a Sustainable Health Care Sector in Latin America**

**Veronica Odriozola**

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A quick overview to some environmental issues related to health care in Latin America, especially in Argentina, are outlined to show what is actually being done and what the main challenges are for the region. Medical waste dealt with by dumping in open sites, mercury being used and disposed of down the drain and incinerators with uncontrolled operating conditions are part of the daily reality of the countries in the region.

Some projects are underway to make the health care sector less of a source of new environmental health related problems. Those projects include: Coalition work held by community groups to fight incineration pollution and get alternative ways to manage waste in place; internationally sponsored projects for model hospitals to reduce mercury and dioxin emissions; on-the-ground work done by individual doctors promoting mercury replacement in their working environment; organisation of the Second Regional and First Latin American Conference on Mercury Elimination in Health Care; and policy changes oriented to prevent harm from uncontrolled emissions of toxics from incineration by setting up bans on this technology and to replace mercury use in health care.

Although much remains to be done, there's a growing movement of doctors, nurses, medical professionals, NGOs and policy makers that are motivated by the need to prevent harm and avoid using scarce resources that should go to provide good health care for all instead of being wasted in polluting technologies and toxics that create new likelihoods to become ill.

## **59. Current Issues Within Green Healthcare in Southeast Asia**

**Merci Ferrer**

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*Keeping the Incineration Ban alive: Millions of syringes safely disposed without incineration.*

In a first of its kind demonstration in the world, the Philippines, disposed of 19.5 million syringes used in a mass immunization campaign for children, using alternative non-incineration methods. The waste disposal complied with the ban on incineration under the Philippine Clean Air Act (the Philippines is the first country in the world to ban in-

cineration). Four basic methods were used to dispose the syringes: (1) treatment in centralized autoclaves, (2) treatment in centralized microwave facilities, (3) encasement in concrete vaults, and (4) burial in controlled waste pits with clay floors. No major problems related to transport and storage were reported in the documentation areas. The study showed the importance of planning, training, coordination, and waste tracking, and demonstrated safe and effective sharps management without incineration.

*Towards a Mercury Free Health Care: The First Mercury in Health Care Southeast Asia Conference*

In January 2006 the first Mercury in Healthcare Southeast Asia conference was held in Manila, Philippines, where more than 175 participants from eleven countries attended. Government officials, hospital directors and other professional organizations have signed the "Manila Declaration", in which they have affirmed mercury as a global pollutant, with a commitment to reduce and eliminate mercury use with the goal of mercury free healthcare. Among the key outputs was the issuance of an Administrative Order for the gradual elimination of use of mercury in hospitals, the introduction of a Mercury Pledge, which hospital can sign on to as an initial step to begin its mercury pollution prevention efforts, and the establishment of a multi-stakeholder South East Asian Working Group.

## **S16: Verification: Did We Really Do It?**

### **60. Environmental Audits as a Tool for Improvement**

#### **Torbjörn Brorson**

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There is a growing interest to implement environmental management systems (EMS) in the public healthcare sector in Sweden. Region Skåne introduced its first environmental programme in 2001 and one of the objectives was to implement EMS. In 2005-2006 environmental audits were carried out to evaluate the status of the EMS. 8 organisations were certified according to ISO 14001, 14 presented a certifiable system and 2 were in the initial phase of implementation. Among the positive results are the following:

- ISO 14001 is a useful tool for management of environmental issues at Region Skåne. Annual reporting of environmental performance data, internal audits, training programmes and networks are important elements of the overall EMS.
- Within the EMS Region Skåne manages significant environmental aspects such as energy consumption, hazardous chemicals, waste, purchasing and transports. Improved environmental performance was observed in many areas.
- Region Skåne's environmental programme provides guidance for the entire organisation.

There are however areas of improvements. For instance, indirect environmental aspects such as research and education and the environmental impact of drugs could be highlighted. The EMS could also become a more natural part of the overall management system.

In all, environmental auditing is a useful tool to achieve continual improvement in industry and the public sector. Audits should focus on the everyday environmental work, evaluation of legal compliance, assessment of the suitability of the EMS etc., but also on the strategic environmental issues. At Region Skåne, audits have given valuable input to the coming second environmental programme.

### **61. To Make It Happen in Reality**

#### **Thomas Bergmark**

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Is it possible to source at competitive prices while living up to our customers' demands on taking social and environmental responsibility?

But by placing demands on suppliers and by working together with them, we can help them to reach a higher standard of working conditions, a better environmental performance and at the same time develop sustainable competitiveness. Our approach is to look at business objectives on the one hand, social and environmental responsibility on the other. So how can we create conditions so that business objectives and social and environmental demands go hand in hand?

First of all, an important step is that all involved stakeholders understand and share the same picture of the situation. If we want to remain competitive companies like ourselves, suppliers, governments, labor organizations, employers' organizations, authorities and others must share the same view. We have to agree that over time we need to meet the demands on working conditions and the environment defined in legislation, global standards and company code of conducts.

So what is IKEAs contribution in this work? And how do we work in practice?

The long term work with our Code of Conduct that consists of requirements on social, working and environmental conditions, mainly based on UN and ILO declarations and conventions. These activities has the objective to raise standards while at the same time maintain competitiveness for our suppliers and ourselves. You can find these documents as well as our Sustainability Report on the Web.

## **62. The Importance of Environmental Reporting – Environmental Reporting in the Vienna Hospital Association**

**Herta Maier**

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In the Vienna Hospital Association the environmental reporting and the verification of important data are realised by the annual environmental report and by describing efficient projects in the hospitals and geriatric centres. The environmental report 2004 was the first attempt towards uniform design in order to depict environmental data more clearly over the years. An adequate form was designed for this purpose

The environmental report is divided in three sections: *The general part* gives an overview of all environmental measures taken in the last year and shows the main priorities of environmental work for the near future. *The reports by the hospitals and geriatric centres* consist of an illustration of environmental performance and environmental data as well as of a compilation of the environmental programme for the coming year. The ensuing environmental report evaluates the environmental programme and shows which objectives have been achieved. *The project description chapter* exemplifies successful projects.

Effective environmental projects should be made transparent to all interested staff. Therefore in addition to the environmental report project descriptions can be downloaded from the intranet and are presented at the environmental forum. Environmental pilot projects which prove ecological and economical impacts are recommended to be realised in all medical institutions of the Vienna Hospital Association.

The primary targets of the environmental report and the project descriptions are to learn from existing data to identify potentials of further improvement and realise them. Restructuring the environmental report constituted one great major toward this target.

# **S17: Alternatives to Hazardous Products**

## **63. The EU Mercury Strategy**

**Stina Andersson**

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The EU Mercury Strategy takes actions to further reduce the emissions and uses of mercury. A key aim is to reduce mercury levels in the environment and human exposure, especially from methylmercury in fish. It is an overall Strategy containing twenty actions, seven of which support and promote international actions.

Key actions in the EU Mercury Strategy are the export ban of mercury from the EU by 2011, a safe storage solution for surplus mercury from the chlor-alkali industry, and further restrictions for mercury in products. Coal combustion is the largest source of mercury emissions in the EU (and globally), accounting for about 50% of remaining EU emissions today. Further measures are investigated, e.g. there is still no legislation in place for small-scale combustion installations.

To solve the mercury problem, global action is needed. Measures need to be taken to phase out globally the production of new mercury from cinnabar, and to prevent mercury surpluses going back to the market. Co-operation with developing countries is planned and the EU is also supporting international initiatives, such as the UNEP Global Mercury Programme.

## 64. Measures to Remove Mercury from Sewer Systems in Stockholm

### Bernt Wistrand

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In spite of the fact that the use of mercury has decreased to a large extent in Sweden during the past 15 years, mercury still remains in many sewer systems long after the activity producing the mercury has ceased. The remaining mercury poses a potential threat to the environment. Sludge from wastewater treatment plants that contains greater amounts of mercury cannot be recycled as soil improvers, but has to be disposed.

In 1996, due to an accident in an amalgam producing plants more than 100 kg amalgam was flushed out to the public sewer problems. This resulted in considerable ecological, economical, and legal problems, and in order to prevent similar accidents, the Stockholm Water Company launched a project for the purpose of removing mercury from sewer systems in Stockholm. 386 dental clinics and 11 other activities (industries, laboratories etc) participated in the project.

The method was to clean the pipes with high-pressure wash and collect the sludge and wastewater in the basement pipe. The hazardous waste was transported to a site where it could be stored safely. This method to remove mercury has been found effective and relatively inexpensive. Almost *280 kilos of mercury was removed* from different sewer systems and thus taken out from the natural cycle. Since the beginning of the project, the mercury levels in the sludge from the wastewater treatment plant, Henriksdal, has decreased by 55 percent.

## 65. Silver in Hospital Products: A New Health and Environmental Problem?

### Åsa Melhus

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Silver is a rare but naturally occurring element, whose properties have been used in a wide variety of applications. Its antibacterial effect has been noted for centuries, but the scientific documentation of its toxicity, mechanisms of action and clinical usefulness is still limited. With the emergence of multi-resistant bacteria, the interest in silver has increased.

So far, the photographic industry has been the largest consumer of silver, but now a new market is developing. Silver has quickly spread from soaps to full room concepts in hospital wards. Silver is used in textiles, ceilings, walls, floors, furniture, clothes, shoes, telephones and accessories. It can be found in almost any medical device. The estimated yearly growth of the antimicrobial market is 40%, and silver is marketed as an alternative to antibiotics. However, bacteria can become resistant to both silver and antibiotics, and the use of silver can actually mediate the antibiotic resistance. The medical consequences of the use/misuse of silver are shortly reviewed.

# S18: Pharmaceuticals and the Environment II

## 66. Drug Residues in the Environment: Levels and Risks

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Stockholm County Council has adopted a strategy to diminish emission of drug residues into the environment. This strategy includes:

- contact with EG authorities to elevate the environmental ambitions in the current authorisation of medicines,
- contacts with pharmaceutical producers to stress the importance of involving environmental aspects in the development of new medicines,
- development of an environmental classification system for medicines and information to prescribers and other hospital staff about this system, and
- collaboration with Apoteket AB, owner of all Swedish pharmacy shops, on information to patients about environmentally safe handling of medicines.

The effect of the strategy is evaluated by annual assessment of drug residues in drinking water, in- and outgoing wastewater in the sewage treatment plants and regional surface waters. Residues of medicines are found in the regional tap (drinking) water, at levels of 1-3 ng/L, i.e. orders below therapeutic concentrations. In untreated wastewater several drug residues appear in the µg-mg/L range. The fate of these residues in the treatment plants varies considerably, sorption to sludge, partial or complete elimination and release into the effluent being the most important. Risk assessment demonstrated that 5 % of the classified medicines posed moderate, 10 % low, and 85 % insignificant risk to the environment. Hazard assessment revealed that 96 % of the medicines were persistent, 32 % bioaccumulating and 58 % toxic or very toxic to the environment.

## **67. Environmental Aspects in the Development of New Drugs**

### **David Taylor**

*Professor, Director of Environment and Sustainability, AstraZeneca Brixham Environmental Laboratory  
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In the last few years it has been recognised that residues of many pharmaceuticals can be detected in the aquatic environment at concentrations between 10 to 100 ng/l. It is generally accepted that these concentrations pose no threat to human populations and no immediate threat to aquatic life, however the possibility that some pharmaceuticals might have long-term impacts on the aquatic environment cannot yet be ruled out.

Substantial scientific effort by the research based pharmaceutical industry and academia is being deployed to investigate this issue. There is an increasing expectation that such issues should be addressed within a drug development process that at its core must yield medicines that deliver improved benefits to the patient.

This presentation discusses progress in drug discovery and development in AstraZeneca and in particular those factors that will reduce any residual environmental risk still further whilst nonetheless continuing to deliver improved patient benefit.

## **68. Pharmaceuticals in the Environment: A Perspective from the U.S.**

### **Christian Daughton**

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Pharmaceuticals comprise a large and diverse array of contaminants that can occur in the environment from the combined activities and actions of multitudes of individuals as well as from veterinary and agricultural use. As trace environmental contaminants in waters, sediments, and sewage sludge, they are largely unregulated in the U.S. The concentrations of individual active ingredients in environmental samples such as surface waters often range from micrograms to nanograms per liter. Multiple active ingredients, however, frequently occur together. The total, combined levels of these substances in a given environmental sample can be 1-2 orders of magnitude higher than the individual levels in waters, or up to the sub-mg/kg level in treated sewage sludge.

Concerted research that began in Europe about two decades ago was followed by studies in the U.S. beginning in the late 1990s. The pace of this work has greatly escalated in the last few years. Investigation now encompasses occurrence in various matrices (such as waters, sediments, sewage sludge, and biota) and considers the complexities involved with the range of unanticipated and subtle effects that might occur from low-dose, chronic exposure to multiple active ingredients for non-target organisms.

This presentation briefly summarizes some of what is known and not known about the occurrence of drugs in the environment, the potential for effects on wildlife, the relevance of drug residues in drinking water to consumer risk perception, and actions that can be taken to reduce environmental exposure.

*N.B. Although this work was reviewed by EPA and approved for publication, it may not necessarily reflect official Agency policy.*

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## About the organisers



**Health Care Without Harm** is an international coalition of 443 organisations in 52 countries, including hospitals and healthcare systems, medical professionals, community groups, labour unions and environmental organisations. The mission of Health Care Without Harm is to transform the healthcare industry so that it is never a source of harm to people and the environment.



**Stockholm County Council** offers public healthcare and transportation for the 1.9 million people living in the Stockholm region. The County Council runs several emergency hospitals, including the Stockholm Söder Hospital, the Danderyd Hospital, and the Karolinska University Hospital in Solna and Huddinge.



**Apoteket** is the National Corporation of Swedish Pharmacies. Owned by the state and with a non-profit orientation, it is the sole retailer of pharmaceuticals in Sweden. Apoteket also provides independent information about pharmaceuticals.