



KTH-Sustainability Research Day, 18 oktober 2016

ConverStations

För att få igång diskussion och interaktion under KTH Sustainability Research Day kommer vi att använda oss av ett format vi kallar för ConverStation. Varje 25 minuters ConverStation består av både presentation av forskaren och diskussion med er deltagare. Det här är ett unikt tillfälle att få nya perspektiv och knyta nya kontakter.

Välj ämne

Efter fikapausen kommer forskare från KTH presentera deras arbete inom miljö och hållbar utveckling, du kommer att få chansen att välja tre stycken ämnen du vill lyssna på. Du gör ditt val på plats under fikapausen, genom att plocka en "biljett" till tre ConverStations som du vill delta i. Det går ej att boka biljetter i förhand, men du kan förbereda dig genom att läsa de korta beskrivningarna av varje ConverStation som medföljer dessa instruktioner. Notera gärna fler än tre ConverStations du skulle vilja delta i då platser till varje ConverStation är begränsade.

På nästa sida hittar du samtliga ConverStations.

Varmt välkommen!
KTH Sustainability Office

Lista över alla ConverStations

1. Integrering av hållbar utveckling i utbildning, forskning, samverkan och förvaltning – erfarenheter från KTH.....	3
2. Finance and Innovative Investment in Environmental Technology: The Case of Sweden.....	3
4. How can data support organic food shopping?	3
5. Ett bilfritt år– om tre barnfamiljer som bytt ut sina bilar mot lätta elfordon	3
6. Energy sustainability in information and communication technology.....	4
7. This is the 22nd century: Flourishing in low-energy just futures?.....	4
8. Antibacterial fibers - tomorrow's protection against bacteria	4
9. Protein nanomaterials from renewable resources.....	4
10. SmartCool or why is heat-transfer at the heart of societal challenges	5
11. KTH Live-In Lab – A testbed for sustainable housing.....	5
12. Kan älgens magbakterier hjälpa oss att effektivisera omvandlingen av biomassa till biodrivmedel och gröna kemikalier?.....	5
13. KTH Mobility Pool.....	5
14. Capturing feelings from experiences with smartphones methods and results	6
15. Energiframtider: Användarcentrerade bilder av den framtida energiomställningen	6
16. Circular Economy- From understanding the economic benefits to the implementation	6
17. Tools for a greener chemistry: Cheaper, greener, better: the BIOCASCADES vision for sustainable and scalable biocatalytic cascades reactions.	6
18. Elvägar	6
19. Fitting the analytical pieces together: How can ecosystem services assessments contribute to sustainability assessments?.....	7
20. Sensing Energy	7
21. KTH Campusplanen – ett levande Campus för en hållbar framtid.....	7
22. Hållbara Livsstilar	7
23. Do methodological choices really matter in the life cycle assessment of bioenergy systems?.....	8
24. Sea squirts (Ciona Intestinalis) cultivation as a way to reduce eutrophication and produce biofuels	8
25. Hur kan vi använda DNA-analys för miljöövervakning.....	8
26. Life-cycle based evaluation of a heat pump at KTH.....	8
27. Solceller – varför inte?	9
28. System proposal for the removal of pharmaceutical residues and other priority persistent substances in wastewater	9
29. Designing for sustainability: Breakthrough or suboptimisation?	9
30. Sputify – Storstadstrafik utan köer och trängsel.....	9

1. Integrering av hållbar utveckling i utbildning, forskning, samverkan och förvaltning – erfarenheter från KTH

Göran Finnveden, vicerektor för hållbar utveckling, professor i miljöstrategisk analys, KTH.

Sedan 2011 har KTH gjort en strategisk satsning på hållbar utveckling. Vi har velat stärka integrering av hållbarhetsfrågor i utbildning, forskning, samverkan och förvaltning. Vi har arbetat med en holistisk ansats där alla delar ingår. I denna presentation berättar vi om en del resultat och erfarenheter. Fokus ligger på undervisning, men även annat tas upp.

2. Finance and Innovative Investment in Environmental Technology: The Case of Sweden

Hans Lööf, professor i nationalekonomi, KTH. Kontakt: hans.loof@indek.kth.se

This report discusses how financing difficulties can affect private sector innovation investments in environmental technology applied to the Swedish setting. Innovative investments are often intangible, the outcomes are highly uncertain, and information asymmetries between entrepreneurs and outside investors are potentially severe. These factors make external finance costly and drive investment in environmental technology below its socially desirable level. Recent evidence from the literature on financing and innovation suggests that financing constraints on innovation are likely economically significant. Therefore, policies and financial developments that affect the availability of finance can have important effects on economy-wide rates of environmental technology innovation.

3. Modelling Tools for Sustainable Development Policies

Mark Howells, professor in energy system analysis, KTH Royal Institute of Technology. Contact: mark.howells@energy.kth.se

In their quest for sustainable development countries confront the need to harmonise policies in the economic, social and environmental dimensions. In doing so, it is critical to identify the inter-linkages that influence trade-offs and synergies across these dimensions. There is a need to develop a suite of tools to address the complex interrelations underlying sustainable development. Such an effort would need to introduce those tools to policy makers, practitioners and researchers. Such tools would need to span engineering, environment and the economy.

4. How can data support organic food shopping?

Cecilia Katzeff, researcher, KTH Royal Institute of Technology. Contact: ckatzeff@kth.se

I will present a study of the use of the EcoPanel, an eco-feedback visualization created in collaboration with a Swedish food retailer. The visualization uses automatic data gathering to provide consumers with detailed information and long-term trends about their organic food consumption. The results from a five months test with 65 users show an increase in organic purchases compared to the control group, especially for the users who overestimated their percentage of organic food before the test. From the results we point out the possibilities of using visualization as a way of creating insight on behaviors such as food consumption, that are difficult to grasp from individual actions. This insight can be a way of closing the gap between attitudes and actual behavior, helping users that are already aware and willing to change, to perform more sustainable.

5. Ett bilfritt år– om tre barnfamiljer som bytt ut sina bilar mot lätta elfordon

Hanna Hasselqvist, doktorand, KTH. Kontakt: hannaha@kth.se

I projektet undersökte vi vad som hände i familjernas vardag när bilen ersattes med lätta elfordon och hur alternativa transportsätt tillsammans med tjänster hjälpte till att lösa vardagspusslet. Baserat på familjernas upplevelser har vi tagit fram designkoncept som visar på hur staden bättre kan välkomna bilfria familjer och hur det kan bli lättare för fler att våga prova på hållbara transportlösningar.

6. Energy sustainability in information and communication technology

Dr. Yanting Sun, Researcher, KTH Royal Institute of Technology. Contact: yasun@kth.s

In the 21st century our society is facing great challenges in the increased demand of energy consumption. We are doing research in the monolithic integration of III-V semiconductors on Si with direct heterojunction and synergetic functionalities on cost effective platform, which will lead to the cost effective high efficiency photovoltaic technology for the energy security and the energy efficient photonic integrated circuits (PICs) to achieve energy sustainability in information and communication technology.

7. This is the 22nd century: Flourishing in low-energy just futures?

Eleonoré E. Fauré, PhD and **Ulrika Gunnarsson-Östling**, PhD, KTH Royal Institute of Technology. Contact: eef@kth.se

How could daily life turn out 2050 in normative scenarios for developments beyond traditional GDP growth for Sweden? Four scenarios have previously been developed: 1) collaborative economy, 2) local self-sufficiency, 3) automatisisation for quality of life, and 4) circular economy in the welfare state. They all fulfill a GHG-target in order to keep global warming under 1.5 °Celsius. The aim of this paper is twofold; to illustrate what a day could be like for a Swedish resident or groups of residents if the GHG target in Sweden is fulfilled, and then to discuss this from a degrowth and social-ecological justice perspective.

8. Antibacterial fibers - tomorrow's protection against bacteria

Anna Ottenhall, PhD student, KTH Royal Institute of Technology. Contact: aott@kth.se

Concerns about negative environmental impact have led to a new type of antibacterial materials- so-called contact-active materials with irreversibly attached cationic polymers. As a more sustainable alternative to the commonly used grafting processes, we have developed a water-based process based on adsorption of polymers in multilayers onto cellulosic fibres. In this way a material with >99.9 % antibacterial effect against bacteria such as *E. coli* is achieved. The technique shows great potential for e.g., water purification. We have also shown that it is possible to modify materials based on nanocellulose, which opens up for even more exciting applications.

9. Protein nanomaterials from renewable resources

Christofer Lendel, Docent, KTH Royal Institute of Technology. Contact: lendel@kth.se

Our extensive use of plastics is a major challenge in the development towards a sustainable society. Renewable bioplastics that can satisfy our need for high performance materials is urgently needed. In nature, proteins are used as building blocks for many materials with remarkable properties, such as muscles or silk. The key to copy these properties to man-made materials lies in controlling the hierarchical material structure, from molecular- to macroscopic level. We explore how protein-rich agricultural by-products can be used to produce new sustainable materials. In particular, we make use of the ability of proteins to form highly ordered nanofibers to produce protein-based nanocomposites with enhanced or novel properties.

10. SmartCool or why is heat-transfer at the heart of societal challenges

Christophe Duwig, PhD, KTH Royal Institute of Technology. Contact: duwig@kth.se

Heat production is inherent to all conversion processes. While the first industrial revolution abused of very high temperature processes, depletion of fossil resources and quest for sustainable societies pushes toward alternative solutions. In other words, engineers need to find solutions to handle wisely low temperature processes.

The smart cool effort aims at building a unique competence center focusing on smart solutions for heat-transfer in a multi-disciplinary perspective. These innovative solutions will leverage spectacular advances in industrial applications. They will contribute to address global societal challenges and enable the engineering of the next generation of vehicles and power-plants.

11. KTH Live-In Lab – A testbed for sustainable housing

Elena Malakhatka, PhD, KTH Royal Institute of Technology. Contact: elena.malakhatka@gmail.com

To build a sustainable and resource efficient society, we need to plan for the long-term. We need dynamic cities with flexible buildings that can fulfill the resident preferences of today as well as those of tomorrow. Yet, the current adoption rate of new technologies into the residential and construction industry is too low to meet society's targets with regard to energy efficiency. Greater investments are needed within research, development and commercialization, in order to produce new products and services that decrease resource use in buildings and provide new business opportunities in domestic as well as foreign markets.

KTH Live-In Lab is an open testbed, working under actual living conditions, for test and verification of innovative products and services for the future of the building industry and residential sector. The testbed consists of three buildings and is home to over 300 students.

12. Kan älgens magbakterier hjälpa oss att effektivisera omvandlingen av biomassa till biodrivmedel och gröna kemikalier?

Henrik Aspeborgs, Docent, KTH. Kontakt: aspe@biotech.kth.se

För att biodrivmedel och gröna kemikalier ska kunna konkurrera med fossila produkter måste sönderdelningen av växtbiomassan, som sker med hjälp av enzymer, bli billigare och effektivare. Även om vi vet ganska mycket om enzymatisk nedbrytning av t.ex. cellulosa kan vi genom studier av mikrobiella system i olika nedbrytningsmiljöer få ny kunskap och hitta bättre enzymer. Älgen klarar av att äta en mycket fiberrik föda tack vare de mikroorganismer som finns i vämmen, den första av älgens fyra magar. Därför har vi gått på genjakt och studerat vämmens mikroflora i sex olika älgar. Intressanta fynd kommer att presenteras.

13. KTH Mobility Pool

Olof Cerne, konsult Ecotraffic samarbetspartner i KTH Mobility Pool. Kontakt: olof.cerne@ecotraffic.se

KTH Mobility Pool har verksamhet i Älmhult och Botkyrka kommun. Bilpooler med små elektriska fordon (Light Electric Vehicles) på jobbet. Hur mycket energi och pengar kan vi spara på att byta ut våra fordon mot mindre elfordon? Hur lätt eller svårt det är att ställa om beteenden till att dela fordon på jobbet och att använda mindre och lättare fordon när det är möjligt? I projektet ingår också att prova en modell som hittills mest använts för hästar: fodervårdar för fordonen.

14. Capturing feelings from experiences with smartphones methods and results

Elena Mokeeva, research engineer and Elisabeth Ekener, PhD, KTH Royal Institute of Technology. Contact: mokeeva@kth.se

We are developing a methodology for assessing the use phase in Social Life Cycle Assessment (S-LCA) and testing it on a case of a mobile phone. We use two qualitative methods for data collection and capturing social impacts in the use phase:

- Grounded theory (GT) - interviewing
- The Day Reconstruction Method (DRM) – diary

Main services and impacts identified through GT will be linked to capabilities (Nussbaum). Direct impacts (feelings) will be retrieved directly from the DRM method. Results from the two methods will be compared, and applicability and feasibility of the methods for complementing S-LCA will be discussed.

15. Energiframtider: Användarcentrerade bilder av den framtida energiomställningen

Elina Eriksson, biträdande lektor, KTH. Contact: elina@kth.se

I projektet Energiframtider vill vi djupare studera frågeställningar kring framtidsbilder och beteendeförändringar. Ur ett användarcentrerat perspektiv vill vi utforska människors framtidsbilder, vilka förväntningar de har och vilka hinder som finns kopplat till framtidsbilderna. Vidare vill vi utforska hur människor skulle vilja gestalta sin egen hållbara framtid. Utifrån detta får vi kunskap som kan utveckla initiativ (policy, information, produktutveckling och tjänster), program och incitament som kan driva på de beteendeförändringar som behövs för att nå ett energieffektivt och hållbart samhälle.

16. Circular Economy- From understanding the economic benefits to the implementation

Farazee Asif PhD Student, KTH Royal Institute of Technology. Contact: aasi@kth.se

Circular economy is slowly taking off but still a long way to go before its benefits can be fully understood and mass implementation in industries can happen. The biggest challenge in implementing circular economy lies in the fact that it may require to bring change in four core areas of an organization which includes business model, product design, supply chain and information communication infrastructure. No organization will be willing to take the risk of bringing changes in these areas until they are sure what circular economy will bring to them. This presentation is about unfolding our scientific approach of promoting implementation of circular systems in industries.

17. Tools for a greener chemistry: Cheaper, greener, better: the BIOCASCADES vision for sustainable and scalable biocatalytic cascades reactions.

Federica Ruggieri PhD Student, KTH Royal Institute of Technology. Contact: ruggieri@kth.se

Biocatalysis poses itself as a promising alternative to classical organic synthesis for the large-scale production of compounds with pharmaceutical and agrochemical properties. It offers at the same time an answer to the increased request for safer and more efficient synthesis processes. The Marie-Curie BIOCASCADES project has created a network of PhD students, universities and companies working together to make biocatalysis a real alternative to classical synthesis routes. My project in particular is focused on the development of a novel one-pot multi-enzymatic de-racemization cascade to obtain enantiopure amines of pharmaceutical interest.

18. Elvägar

Peter Georén, föreståndare för Integrated Transport Research labs, ITRL, KTH. Kontakt: peterg@kth.se

Elvägar - att förse fordon med el direkt från vägbanan. Här kan tekniken potentiellt bidra till en stor omställning inom transportsektorn. Problemen med implementering handlar till största del om behov av nytt regelverk. Vem ska äga investeringar, underhåll och utveckling?

19. Fitting the analytical pieces together: How can ecosystem services assessments contribute to sustainability assessments?

Linus Hasselström, Research engineer, KTH Royal Institute of Technology. Contact: plh@kth.se

Ecosystem services assessment is generally a tool to bridge the biosphere with the anthroposphere. This can be understood as providing answers to the question: How does the ecosystem, or changes in it, affect us humans? Recent studies have suggested the use of a “balance sheet approach” to sustainability assessment, in which several assessment tools are used. The order and weight of different tools matter. I will give a brief presentation on ES assessments in relation to other common analytical tools such as cost-benefit analysis, multi-criteria analysis, life cycle assessment, ecological modelling, social impact assessment, etc. The aim is to provide input to the ever-long discussion on how various assessment tools could/should be used together to generate more holistic sustainability assessments.

20. Sensing Energy

Loove Broms, PhD, KTH Royal Institute of Technology. Contact: loove@kth.se

Sensing Energy is an interdisciplinary project aiming to explore and exemplify how design as a social agent can contribute to create and uphold more sustainable everyday practices, with a focus on how we produce, use and relate to energy. Looking at the Albano Sustainable Campus, the project incorporates a variety of different design and architectural approaches, combined with systems analysis, futures studies and critical/feminist theory. The design experiments carried out in this project are not intended to provide definite answers to how sustainable everyday practices could and should be achieved. They are not intended to deliver solutions, ready to be implemented. Instead, they are to be seen as materialised arguments and questions in a conversation over what design for sustainable everyday practices could be and what it could mean.

21. KTH Campusplanen – ett levande Campus för en hållbar framtid

Lejla Cengic och Emilia Nyblom, Projektledare på Miljö och byggnadsavdelningen, KTH. Kontakt: cengic@kth.se

KTH Campus ska utvecklas på ett långsiktigt hållbart sätt. Det innebär att Campusplanen tagit sin utgångspunkt i ekologisk, ekonomisk och social hållbarhet. Lägre energianvändning, medvetna materialval, förbättrade kommunikationer, flexibel användning av mark och byggnader är viktiga målsättningar.

22. Hållbara Livsstilar

Mia Hesselgren, doktorand, KTH. Kontakt: miahes@kth.se

Hållbara livsstilar är ett projekt som vill skapa förståelse för och kunskap om människors vanor, livsstilar och praktiker kring hållbar konsumtion. Projektet ska utveckla effektiva sätt att kommunicera och föra kunskap vidare till inblandade intressenter och målet är att utveckla metoder som kan utgöra en praktisk användbar grund för produktutveckling, utbildning, planering och forskning. I projektet kommer vi jobba med kvalitativt material (i huvudsak intervjuer och fokusgrupper) för att utforska vad en hållbar livsstil skulle kunna vara idag och i framtiden. Vi kommer att fokusera på hur vi kan locka fler människor att anta en hållbar livsstil.

23. Do methodological choices really matter in the life cycle assessment of bioenergy systems?

Miguel Brandão, Associate Professor, KTH Royal Institute of technology. Contact: miguel.brandao@abe.kth.se

Bioenergy systems have come under increasing scrutiny due to the urgent need for replacing fossil fuels in order to mitigate climate change impacts. The perceived benefits of bioenergy systems may not hold when a different set of methodological choices are adopted. During this presentation Miguel Brandão will talk how climate-change results depend on a variety of choices, such as the methods applied for time-accounting, inclusion of biogenic carbon flows, allocation, indirect land-use change, reference systems, soil carbon stocks, inventory-modelling approaches, etc., in both annual and perennial crops.

24. Sea squirts (*Ciona Intestinalis*) cultivation as a way to reduce eutrophication and produce biofuels

Roman Hackl, Phd researcher, IVL Swedish Environmental Research Institute Contact: roman.hackl@ivl.se

Eutrophication in the North and Baltic Seas is a major threat to the marine environment and communities depending on it. In order to improve the marine environment in the region a number of measures have been suggested by the Swedish Agency for Marine and Water Management. One of the suggested measures by the Swedish Marine and Water Authority involves financial support for measures that increase the uptake of nutrients in the water i.e. by marine organisms and also support the utilization of these organisms as value added products. The cultivation of *Ciona intestinalis* in the North Sea and its' subsequent use as substrate for biofuels and biofertilizer production is assessed in this work. The results of the study show that at full scale production of biogas from *C. intestinalis* GHG emissions are reduced by more than 70 % compared to fossil transportation fuels. In addition the results show that accounting for the systems consequences of other products and services such as biofertilizer replacing mineral fertilizers and decreased marine eutrophication as a result of *C. intestinalis* cultivation largely increase the environmental benefits provided by the concept

25. Hur kan vi använda DNA-analys för miljöövervakning

Anders Andersson, Universitetslektor, KTH. Kontakt: anders.andersson@scilifelab.se

Utvecklingen inom DNA-sekvenseringsteknologi har varit enorm de senaste åren och dagens instrument är både mycket snabbare och mindre än tidigare, de minsta mindre än en mobiltelefon. Denna teknologi är inte bara viktig för medicinsk forskning och diagnostik utan börjar allt mer tillämpas inom miljöforskning och övervakning. Jag kommer här att berätta om hur vi kan använda DNA-analys för miljöövervakning av bl.a. skadliga alger i Östersjön och för att spåra felkopplingar i Stockholms vattensystem. Jag kommer också ge er en inblick i hur vi kan lära oss om hur hela marina ekosystem fungerar genom att analysera stora mängder DNA från vattenprover.

26. Life-cycle based evaluation of a heat pump at KTH

Xenofon Lemperos, Research Engineer, KTH Royal Institute of Technology. Contact: lemperos@kth.se

A new heat pump system on KTH campus (2 MW cooling, 3 MW heating) recovers heat from campus server rooms and delivers it to the campus-wide space heating network. This replaces the former solution that used solely district heating and cooling. The aim of this work is to compare the global warming potential (GWP) from the current and the former systems taking into account embodied emissions from the new heat pump system. Preliminary findings show that embodied emissions for material production and estimated leakage of the heat pump's working medium (R134a) make non-negligible contributions to the system's overall GWP.

27. Solceller – varför inte?

Teo Enlund, universitetslektor, KTH. Kontakt: teoe@kth.se

Varför är det inte fler hushåll som skaffar solceller? I vår studie har vi intervjuat användare av solceller, men också ägare till hus lämpliga för solceller som ännu inte skaffat solceller. Vi fann då ett antal tydliga hinder för att skaffa solceller. Några av dessa har vi adresserat i dessa fyra filmer.

28. System proposal for the removal of pharmaceutical residues and other priority persistent substances in wastewater

Jörgen Magnér, Phd, Project manager, IVL Swedish Environmental Research Institute. Contact: jorgen.magner@ivl.se

Pharmaceutical products are essential for health and wellbeing in our everyday life. Medicines provide enormous benefits, such as improvement in quality of life, and the demand will likely increase in the future due to a growing ageing population, chronic/lifestyle diseases, emerging-market expansion, and treatment and technology advances. Unfortunately, benefits of the use of pharmaceuticals come with an environmental downside. Various studies have shown that the presence of pharmaceuticals can result in the evolution and dissemination of antibiotic resistance genes and other adverse effects, such as behavioral changes and skewed gender distribution of the aquatic wildlife. In the first part of presentation IVL will give a short background description regarding the problem with the presence of pharmaceutical residues in the environment and the demand of new treatment techniques to remove pharmaceuticals from the sewage effluent. In the second part of the presentation IVL will present their work from the project “System proposal for the removal of pharmaceutical residues and other priority persistent substances in wastewater”, such as the development and evaluation of the efficiency of different post-treatment techniques to remove pharmaceuticals from wastewater at the R&B facility Hammarby Sjöstadsvärk. KTH, Southwestern Stockholm region water and wastewater Ltd (SYVAB), Stockholm Vatten, IVL, HaV (Swedish Agency for Marine and Water Management).

29. Designing for sustainability: Breakthrough or suboptimisation?

Daniel Pargman, Lektor, CSC/MID/CESC, KTH. Kontakt: pargman@csc.kth.se

Technological developments in screen technologies pitches the thinner, brighter and energy-stingy OLED screen as a possible replacement for today’s television, computer and smartphone LCD screens. An OLED screen does not consume any energy at all when it displays the color black, but the potentially large energy savings can unfortunately evaporate and instead turn to losses when white is displayed. There is thus a mismatch between on the one hand the energy profiles of OLED screens and on the other hand user habits and current webpage design practices. This example thus raises important questions about system boundaries and about how to evaluate sustainable (or “sustainable”) technologies. We conducted a pilot study of user acceptance of alternative, OLED-adapted color schemes for webpages. We briefly discuss the results of the study, but primarily use it as a starting point for discussing the underlying questions of where, or indeed even if it makes sense to work towards realising the OLED screens’ potential for energy savings. Moving from LED to OLED screens is not only a matter of choosing between competing screen technologies, but would rather have implications for hardware and software design as well as for the practices of web designers, end users and content providers.

30. Spotify – Storstadstrafik utan köer och trängsel

Anders Gullberg, Docent, CESC/SAMS. KTH. Kontakt: anders.gullberg@urbancity.se

Genom att använda de framgångsrika internetföretagens sätt att arbeta inom transportsektorn – då måste offentlig sektor vara med – kan de flesta av sektorns problem hanteras. Den är Ineffektiv, Opålitlig, Miljöfarlig, Dödlig, Svårfinansierad, Orättvis.