INTERNATIONAL CONGRESS

ELECTRONICSEGG GOES GREEN 2016+

SEPT 7-9, 2016 | BERLIN, GERMANY INVENTING SHADES OF GREEN

Final Program

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ORGANIZED BY Fraunhofer Institute for Reliability and Microintegration IZM, Berlin

IN COOPERATION WITH Technische Universität Berlin, Research Center for Microperipheric Technologies

CONTENT

Welcome	1
International Board	2
Programm at a Glance	4
Sponsors	6
Keynote Speakers	8
Conference Hall Plan	10
Pre-conference program Tuesday, Sep 06	11
Plenary • Wednesday, Sep 07	12
Session 1 • Wednesday, Sep 07	13
Session 2 • Wednesday, Sep 07	14
Session 3 • Wednesday, Sep 07	16
Session 4 • Thursday, Sep 08	18
Session 5 • Thursday, Sep 08	20
Session 6 • Thursday, Sep 08	22
Session 7 • Thursday, Sep 08	24
Session 8 • Friday, Sep 09	26
Session 9 • Friday, Sep 09	28
Session 10 • Friday, Sep 09	30
Poster Session	32
Teardown On-Site	35
General Information	36
Electronics Goes Green – A truly green event!	38
Supporter	39
Evening Program	40
Catalyst Award	41
Thursday Evening Tours	42
Art Goes Green	46
Notes	48
Imprint	50



WELCOME

It is my pleasure to welcome you to the fifth Electronics Goes Green conference! Organized by Fraunhofer IZM with support from the Technical University of Berlin and many other partners, this year's Electronics Goes Green conference has again received outstanding submissions from around the world. 167 oral and 32 poster presentations have been organized into 50 sessions, covering a wide range of aspects of green electronics, electronics recycling, and the shift to a circular economy.

In fact, the circular economy is covered in three of the five conference tracks. Closing the material loops and prolonging the lives of products are not the only topics of relevance. The research also explores broader concepts of sustainability for the electronics industry. As with our previous conferences, we are confident that the mix of end-of-life specialists with designers, compliance managers, policy makers, researchers, and NGOs will be a great value to all participants.

This program has been designed as your navigator for the conference. It includes not just all of the sessions, presentations, and evening events, but also the timetable and crucial information to help make the most of your stay in Berlin. The program is also available online and as a new option there is a conference app, where you can click together your individual schedule (see inside front cover of this program for details).

Apart from thanking the authors for their presentations and posters, we would like to express our gratitude to the members of the program committee for organizing and selecting the right mix of contributions and our sponsors for supporting us. We hope you enjoy the scientific program of Electronics Goes Green 2016, the conference venue, the social events, and the city of Berlin itself. Last, but not least, we hope you meet old and make new friends in our green electronics community.

Thank you for joining us at Electronics Goes Green 2016!

au - Rir Lang

Klaus-Dieter Lang Electronics Goes Green 2016+ Conference Chairman



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Klaus-Dieter Lang, Technische Universität Berlin and Fraunhofer IZM



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Martina Creutzfeldt





Stefan Ast

Gergana Dimitrova

PROGRAM AT A GLANCE

TUESDAY, SEPT. 6	14.00-18.00				iNEMI Forum	
	18.30-20.00	Get To	gether		Get Together	
WEDNESDAY,	9.30-10.45	Opening (Ceremony		Opening Ceremony	
SEPT. 7	11.00-12.30		A.1 Greening ICT		D.1 Actions for Circular Economy	E.1 REACH/Chemicals Restrictions
	13.30-15.30	A.2 Mobile ICT	B.2 Understanding Stacks and Flows of Critical Metals	C.2 WEEE Towards Circular Economy	D.2 Business Models for Circular Economy (1/2)	E.2 Solutions for Chemicals Supply Chain Management (1/2)
	15.30-16.30	Poster	Session		Poster Session	
	16.30-18.00	A.3 Green ICT @ Home	B.3 Using Critical Metals Efficiently	C.3 Guiding Principles for WEEE Policy	D.3 Business Models for Circular Economy (2/2)	E.3 Solutions for Chemicals Supply Chain Management (2/2)
	19.00-22.30	Conference Dinne	er at Wasserwerk	Con	ference Dinner at Wasserw	verk
THURSDAY, SEPT. 8	8.30-10.00	A.4 Applications: Improving Electronic Products	B.4 Recycling of Complex Metal Mixes	C.4 Plastics – Sorting and Recycling	D.4 Measuring the Product Lifetime	E.4 Eco-Design Requirements / ErP Regulation
	10.30-12.30	A.5 Applications: Automotive and Transportation	B.5 Recycling of Critical Metals – Pathways	C.5 Plastics – Closing the Loop	D.5 Extending the Product Lifetime	E.5 Tools for Environmental Assessments
	13.30-15.00	A.6 Provoquium	B.6 Recycling of Critical Metals – Technologies	C.6 Smart Disassembly	D.6 Measuring and Improving the Recyclability (1/2)	E.6 Governance to Promote Eco-Innovative Products
	15.00-16.00	Poster	Session	Poster Session		
	16.00-18.00	A.7 Applications: Photovoltaics	B.7 Recycling of Critical Metals – Hydrometallurgical Processes	C.7 Workshop: Closing the Information Gaps	D.7 Measuring and Improving the Recyclability (2/2)	E.7 Social Responsibility
		The night	is yours!	See page 42 of	the program for proposals	from the team.
FRIDAY, SEPT. 9	8.30-10.00	A.8 Measuring and Communication Green ICT (1/2)	B.8 Metals for Soldering	C.8 Forecasting Volumes of WEEE	D.8 Remanufacturing and Repair	E.8 RoHS / Chemicals Restrictions
	10.30-12.30	A.9 Measuring and Communication Green ICT (2/2)	B.9 Conflict Minerals – Governance	C.9 The two Worlds of WEEE Treatment (1/2)	D.9 Reuse Workshop part 1: Understanding and Improving the Framework	E.9 Governance for WEEE Management
	12.30-13.30	Poster	Session		Poster Session	
	13.30-15.30	A.10 Green ICT Infrastructure	B.10 Management of Critical and Conflict Minerals in Production	C.10 The two Worlds of WEEE Treatment (2/2)	D.10 Reuse Workshop part 2: Understanding and Improving the Products	E.10 Looking into the Future
	15.45-16.45	Closing H	(eynotes		Closing Keynotes	
		Room A Cambridge	Room B Sorbonne	Room C Oxford	Room D Harvard	Room E Stanford

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Electronics Goes Green 2016+ gratefully acknowledges the sponsorship of:

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The European Recycling Platform (ERP) was founded in 2002 in response to the introduction of the European Union's Waste Electrical and Electronic Equipment (WEEE) Directive. ERP's mission is to ensure cost effective implementation of the directive. As of June 2014, the Landbell Group, an independent German recycling and resource specialist, has become a shareholder of ERP SAS.

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ERP SAS | 94 rue St-Lazare | 75009 Paris | France www.erp-recycling.org





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KEYNOTE SPEAKERS



INTRODUCTORY KEYNOTE TRACK A: GREEN ELECTRONIC PRODUCTS AND APPLICATIONS

Miquel Ballester Salvà | Fairphone, The Netherlands

Miquel Ballester Salvà, co-founder and responsible for Operator Relations and Product Management at Fairphone, a social enterprise which uncovers complex production systems to change how things are made. Fairphone opens up the supply chain of a mobile phone, developing projects with suppliers, consumers and other influencers to create a fairer economy and improve the life cycle. After graduating in Industrial Design Engineering specialising in technologies for sustainable development, Miquel has contributed to Fairphone in both product and system design. He participated in the exciting process of turning this organization from a non-profit to a social venture and is researching how to integrate circular economic models within Fairphone.



INTRODUCTORY KEYNOTE TRACK D: HOW IS CIRCULAR ECONOMY INFLUENCING PRODUCT DESIGN AND BUSINESS MODELS?

Conny Bakker | TU Delft, The Netherlands

Dr. Conny Bakker is associate professor at the TU Delft, faculty of Industrial Design Engineering. Her research field is Circular Product Design. She explores strategies such as product life-extension, reuse, remanufacturing and recycling, and the business models that enable these strategies. A second research interest is the field of user centred sustainable design, which focuses on exploring the relationships between consumer behaviour, sustainability and design. Conny Bakker coordinates and teaches several courses in Sustainable Design and Circular Product Design, as well as an edX MOOC on the Circular Economy.



INTRODUCTORY KEYNOTE TRACK B: CIRCULAR ECONOMY: FOCUS ON CRITICAL, CONFLICT AND PRECIOUS METALS

Fabrice Mathieux | European Commission, Joint Research Centre, Italy

Fabrice Mathieux is research staff at in the European Commission Joint Research Centre (DG JRC). He works on life cycle based assessment methods and data applied to materials / products / systems, and on their use for decision making (e.g. concerning Ecodesign, raw materials). Fabrice graduated in Mechanical engineering and holds a Master Degree in waste Management and LCA. His Industrial Engineering PhD Thesis concerned design for recycling of electr(on)ics. Before joining the EC, he led research in various universities in France and beyond (e.g. UK, Fiji islands).



INTRODUCTORY KEYNOTE TRACK E: DOES GOVERNANCE HELP ELECTRONICS TO GO GREEN?

Deepali Sinha Khetriwal | Sofies, India

Deepali has over 12 years of experience on e-waste and has published several papers in peer-reviewed journals on the topic. Currently based in Mumbai, she heads the Indian office of Sofies, working on e-waste projects in India, Africa and Europe across policy development, compliance support, audits and assessments, technology transfer and strategic pilots, specially with the informal sector. She is also an Associate Program Manager with the Sustainable Cycles team at the United Nations University, where she has been instrumental in setting up capacity building activities, in particular the E-waste Academy. She holds a PhD and MSc from the University of St.Gallen, Switzerland, where her thesis was on forecasting waste flows of end-of-life consumer durables.



INTRODUCTORY KEYNOTE TRACK C: CIRCULAR ECONOMY PUSHING INNOVATIVE WEEE RECYCLING AND BUSINESS MODELS

Norbert Zonneveld | European Electronics Recycling Association | The Netherlands





CLOSING KEYNOTE: THE INSECURITY OF EVERYTHING: BALANCING GREEN RESPONSIBILITY WITH THE NEED FOR TRUE CYBERSECURITY DATA DESTRUCTION

John S. Shegerian | Electronic Recyclers International, United States of America

John S. Shegerian is the Chairman, CEO and co-founder of Electronic Recyclers International (ERI), the nation's leading recycler of electronic waste. He is a member of the University of Pennsylvania Wharton School of Business' Initiative for Global Environmental Leadership (IGEL) Advisory Board and is host and founder of "Green is Good," the nation's leading environmental radio show and podcast program. Prior to his work at ERI, Shegerian co-founded FinancialAid.com, one of the most successful student loan companies in the country. He is a winner of the Clean Tech Entrepreneur of the Year Award by Ernst & Young and recipient of the prestigious Dr. Martin Luther King Jr. Award, presented by the Rev. Dr. Martin Luther King Jr. Unity Committee.

6:00 pm





Second Floor (Opening & Closing)



Guided Tour of the IFA Trade Show 1:00 pm -

For conference participants interested in visiting the IFA fair - the leading trade show for Consumer Electronics & Home Appliances in Germany - we have organized an afternoon tour. This will allow you to visit specific company exhibits with a green touch. Time permitting, you will have some free time left to explore the fair before heading back to the conference hotel for the get together.

See www.b2b.ifa-berlin.com/

for more details about the IFA in general.

Please note that the entrance fee of €17 will have to be paid on site (not included in the conference package). To join the tour, drop us an email in advance to egg2016@ izm.fraunhofer.de or simply be there on time in the conference lobby at 1 pm on Tuesday.

iNEMI Forum 2:00 pm -6:00 pm



PROGR A

CONF.

Recycling electronics alone won't save the planet (or make you rich)

Recycling of electronics has reached a point of diminishing monetary returns and new ideas and solutions for recovery are necessary. What can be done now, before regulation is established, to support a sustainable, circular economy for electronics?

iNEMI is hosting a discussion forum on the value recovery approach that needs to be implemented for the reuse and recycling of electronics and the community necessary to support maximizing the value of recovered electronics that will be essential for creating a sustainable and circular economy.

6:30 pm -8:00 pm

Get together at Seminaris

Early arrival to the conference is recommended, as we will be kicking off this year's program with a welcome reception at event hotel Seminaris on the Tuesday night, September 6. Weather permitting, the event will be held outside with a BBQ to make the most of Berlin's legendary but all too short summer weather. Don't miss the chance to get the lay of the land and meet some of the other delegates before heading into the hustle and bustle of the conference program.



		Plenary 1: Opening Session	A.1	Greening ICT
	9:30 am	Welcome Klaus-Dieter Lang Conference Chair Electronics Goes Green 2016+	11:00 am	Session Chair: Markus Stutz, Dell, Germany Is "Software Eco-design" a Solution to Reduce the Environmental Impact of Electronic
	9:40 am	Introduction of the Catalyst Award 2016 Nancy Gillis Green Electronics Council, USA		Equipment? <u>Marc Vautier</u> ¹ , Olivier Philippot ² ¹ Orange, France; ² Greenspector, Nantes, France
ISDAY	9:45 am	Conference Overview and Announcements Nils F. Nissen Technical Conference Chair Electronics Goes Green 2016+	11:30 am	Material Selection Impact on Wearables <u>Albert Tsang</u> Google Inc., United States of America
N 1 • WEDEN	9:50 am	Introductory Keynote Track A A Green Electronic Products and Applications Miquel Ballester Salvà Fairphone. The Netherlands	12:00 am	Modular Products: Smartphone Design from a Circular Economy Perspective <u>Karsten Schischke</u> ¹ , Marina Proske ¹ , Nils F. Nissen ¹ , Klaus-Dieter Lang ^{1,2} ¹ Fraunhofer IZM, Berlin, Germany; ² Technische Universität Berlin, Berlin, Germany
ESSIO	10:00 am	Introductory Keynote Track D	D.1	Actions for Circular Economy
0		How is Circular Economy Influencing Product Design and Business Models? Conny Bakker TU Delft, The Netherlands	11:00 am	Session Chair: Perrine Chancerel, Technische Universität Berlin, Germany Maturing Abilities to Embrace the Circular Economy Daniela C. A. Pigosso ¹² , Tim C. McAloone ¹²
	10:10 am	Introductory Keynote Track C Circular Economy Pushing Innovative WEEE Recycling and Business Models Norbert Zonneveld European Electronics Recyclers Association, The Netherlands	11:30 am	¹ Technical University of Denmark, Kgs. Lyngby, Denmark; ² essensus, Kgs. Lyngby, Denmark Cleaning, Closing and Slowing the Loop: the Environmental Imperative for Innova- tion in the IT Sector Maddy Cobbing ¹ , Gary Cook, Iza Kruszewska ³ , Chih An Lee ⁴ , <u>Manfred Santen⁵</u> , Melissa Shin ⁶
	10:20 am	Introductory Keynote Track B Circular Economy: Focus on Critical, Conflict and Precious Metals Fabrice Mathieux European Commission, Joint Research Centre, Italy	12:00 pm	 Greenpeace Detox Campaign, stroud, UK, "Greenpeace US, san Francisco, US, "Consultant, Lewes, UK; ⁴Greenpeace East Asia, Taipei, Taiwan; ⁵AGreenpeace e.V., Hamburg, Germany; ⁶Greenpeace International, London, UK An Action Plan on Circular Economy: Outlook for the Portable Power Industry Hans Craen EPBA – European Portable Battery Association, Belgium
	10:30 am	Introductory Keynote Track E Does Governance Help Electronics to Go Green? Deepali Sinha Khetriwal		
		Sofies, India	E.1	REACH / Chemicals Restrictions
			11:00 am	Session Chair: Yifaat Baron, Oeko-Institut e.V., Germany The EU Chemical Policy, Innovation and Circular Economy – Can the Trade-off Be Solved? Riccardo Corridori COCIR Brussels, Belgium
			11:30 am	Managing Compliance with New REACH Obligations in the Electrotechnical Industry Aidan Turnbull BOMcheck, United Kingdom
			12:00 pm	How to Avoid Regrettable Chemical Substitution Hans Wendschlag Hewlett-Packard Inc., Stockholm, Sweden
P			12:30 pm – 1:30 pm	LUNCH BREAK
	1-1			

Mobile ICT

Session Chair: Nils F. Nissen, Fraunhofer IZM, Germany 1:30 pm **Determination of Potential Environmental Impact of Smart Phone** Youngchai Heo¹, Daesik Bae¹, David Scuderi², Chiyoung Oh¹, Youngjin Suh¹ ¹Samsung Electronics, Korea; ²Samsung Eletronics, Europe Experts View on the Sustainability of the Fairphone 2 2:00 pm Marina Proske^{1,3}, Karsten Schischke¹, Philipp Sommer², Tina Trinks⁴, Nils F. Nissen¹, Klaus-Dieter Lang^{1,3} ¹Fraunhofer IZM, Berlin, Germany; ²Deutsche Umwelthilfe, Berlin, Germany; ³Technische Universität Berlin, Berlin, Germany; ⁴Fairphone B.V., Amsterdam, The Netherlands 2:30 pm A Case Study in Quantitative Evaluation of Resource Efficiency Nozomu Mishima, Tomoaki Kitaiima Akita University, Akita, Japan Water Footprinting for Electronic Products: Lessons Learned from a Water 3:00 pm Footprint Case Study of a Notebook Markus Stutz¹, Stephanie Schafer², Michael Spielmann³, Melissa Zgola⁴ ¹Dell, Germany; ²Dell, US; ³Quantis, Germany; ⁴Quantis, US **B.2 Understanding Stocks and Flows of Critical Metals** Session Chair: Jason Dean Linnell, National Center for Electronics Recycling, Vienna, WV, United States of America 1:30 pm ProSUM: Prospecting Secondary Raw Materials in the Urban Mine and Mining Waste Jaco Huisman¹, Sarah Downes², Lucia Herreras³, Patrick Wäger⁴, Daniel Cassard⁵, Susanne Rotter⁶, Maria Ljunggren Söderman⁷, Perrine Chancerel⁶, Paul Mählitz⁶ ¹United Nations University, Germany; ²Repic Ltd, United Kingdom; ³WEEE Forum, Brussels, Belgium; ⁴EMPA, St. Gallen, Switzerland; ⁵Bureau de Recherches Géologiques et Minières (BRGM), Orléans, France; ⁶Technische Universität Berlin, Berlin, Germany; ⁷Chalmers University, Gothenburg, Sweden 2:00 pm Trends in Electronic Products – The Canary in the Urban Mine? Colton E. Bangs, Christina E.M. Meskers, Thierry Van Kerckhoven Umicore Precious Metals Refining, Belgium 2:30 pm Critical Metals in Embedded Electronics from Swiss Passenger Vehicles Eliette Restrepo^{1,2}, Amund N. Løvik¹, Patrick Wäger¹, Rolf Widmer¹, Daniel B. Müller² ¹Empa, Dübendorf, Switzerland; ²Norwegian University of Science and Technology (NTNU), Norway 3:00 pm Flows and Stocks of Critical Materials in Batteries: Data Collection and Data Uses Perrine Chancerel¹, Paul Maehlitz¹, Claude Chanson², Peter Binnemans³, Jaco Huisman⁴, Nils F. Nissen⁵, Klaus-Dieter Lang^{1,5} ¹Technische Universität Berlin, Berlin, Germany; ²Recharge, Brussels, Belgium; ³Eucobat, Brussels, Belgium; ⁴United Nations University, Bonn, Germany; ⁵Fraunhofer IZM, Berlin, Germany



.2	WEEE	Towards	Circular	Economy
				j

Session Chair: Norbert Zonneveld, EERA, The Netherlands

- 1:30 pm What Hampers WEEE from Becoming Circular Norbert Zonneveld European Electronics Recyclers Association (EERA), The Netherlands
- 2:00 pm Is the Present Business Model for WEEE Recycling Working in the Circular Economy? Rasmus Bergström European Electronics Recyclers Association (EERA), The Netherlands
- 2:30 pm WEEE Plastics Going Circular.... Chris Slijkhuis Müller-Guttenbrunn GmbH. Amstetten, Austria

C

3:00 pm iNEMI Project for Value Recovery from End-of-Life Electronics William L. Olson², <u>Wayne E. Rifer</u>¹, Carol Handwerker³ ¹Green Electronics Council, United States of America; ²Seagate Technology, United States of America; ³Purdue University, West Lafayette, IN, United States of America

D.2 Business Models for Circular Economy (1/2)

Session Chair: Max Marwede, TU Berlin, Germany

- 1:30 pm Building Extended Value Chains: Lessons from Swedish ICT Repair and Resale 'Gap Exploiters' for Original Equipment Manufacturers Julia L.K. Nußholz, Katherine A. Whalen Lund University, Lund, Sweden
- 2:00 pm Closed-Loop Innovation for Mobile Electronics the Business Model Innovation Approach of the sustainablySMART Project Max Regenfelder ReUse e.V. (gemeinnützig), Berlin, Germany
- 2:30 pm The (il)logic of Ownership Exploring Alternative Commercial Offers for Mobile Devices Flora A. Poppelaars¹, Conny A. Bakker¹, Jo M.L. van Engelen^{1,2} ¹TU Delft, Delft, the Netherlands; ²University of Groningen, Groningen, the Netherlands

3:00 pm Front-Running Circular Economy: the Medical Imaging Devices Sector – What it Takes to Move from a Linear Economy to a Circular One Zhen Wu COCIR, Brussels, Belgium

Solutions for Chemicals Supply Chain Management (1/2) **E.2** Session Chair: Michael Riess, VDE Testing and Certification Institute, Germany 1:30 pm Integrating Toxicological Assessments in Material Selection for Apple Products Rob Guzzo¹, Mike Werner¹, Art Fong¹, Lida Tan¹, Thomas Ebert² ¹Apple Inc., Cupertino, United States of America; ²Apple Inc., Munich, Germany 2:00 pm Automated Chemical Hazard Assessment Kristopher Wehage², Panan Chenhansa², Julie M. Schoenung¹ ¹University of California-Irvine, United States of America; ²University of California-Davis, United States of America 2:30 pm Using EN 50581 Risk Based Approach to Manage Compliance to the Four New RoHS Phthalates by July 2019 Aidan Turnbull¹, Lutz-Guenther Scheidt², Lucas Dann² ¹Thinkstep Compliance, United Kingdom; ²Thinkstep AG, Leinfelden-Echterdingen, Germany 3:00 pm Evolution of U.S. Chemicals Regulation: Updating the Toxic Substances Control Act for the

00 pm Evolution of U.S. Chemicals Regulation: Updating the Toxic Substances Control Act for the 21st Century Fern Abrams IPC - Association Connecting Electronics Industries, United States of America

A.2

15

A.3 Green ICT @ Home

Session Chair: Marina Proske, Fraunhofer IZM, Germany

- **4:30 pm** Intelligent Occupancy-Driven Thermostat by Dynamic User Profiling <u>Yannick De Bock</u>¹, Andres Auquilla^{1,2}, Karel Kellens¹, Ann Nowé³, Joost R. Duflou¹ ¹KU Leuven, Department of Mechanical Engineering, Belgium; ²University of Cuenca, Department of Computer Science, Ecuador; ³Vrije Universiteit Brussel, Computational Modeling Lab, Belgium
- 5:00 pm Environmental Impact of Personal-Use ICT Services for Different Lifestyles <u>Tomomi Nagao</u>, Minako Hara, Shinsuke Hannoe *NTT, Tokyo, Japan*
- 5:30 pm Assessing ICT's Enabling Effect Through Case Study Extrapolation the Example of Smart Metering Jens Malmodin¹, Vlad Coroama², Pernilla Bergmark¹, Craig Donovan¹ ¹Ericsson Research, Sweden; ²KTH Royal Institute of Technology, Stockholm, Sweden

B.3 Using Critical Metals Efficiently

Session Chair: Christian Hagelüken, Umicore, Germany

- 4:30 pm Substitution as a Strategy for Reducing the Criticality of Raw Materials for Environmental Technologies Matthias Buchert¹, <u>Winfried Bulach¹</u>, <u>Stefanie Degreif¹</u>, Siddharth Prakash¹, Siegfried Behrendt² ¹Oeko-Institut, Darmstadt, Germany; ²Institut für Zukunftsstudien und Technologiebewertung IZT, Berlin, Germany
- 5:00 pm Circular Economy as a Means to Efficient Use of Scarce Metals? Hampus Korhan André, Maria Ljunggren Söderman, Anne-Marie Tillman Chalmers University, Gothenburg, Sweden
- 5:30 pm The Material Profiles of Current Generation Smartphones Thorsten Hartfeil, <u>Sven Grieger</u>, Arne Grünewald, Anna-Lisa Bachmann, Konrad Güth, Carsten Gellermann, Rudolf Stauber Fraunhofer Project Group Materials Recycling and Resource Strategies IWKS, Germany

C.3 Guiding Principles for WEEE Policy

Session Chair: Eelco Smit, Philips International BV, The Netherlands

4:30 pm – 6:00 pm Guiding Principles to Develop e-waste Management Systems and Legislation Eelco Smit¹, <u>Federico Magalini²</u> ¹Philips International B.V., The Netherlands; ²United Nations University

Step – Developing Legislative Principles for e-waste Policy in Developing and



Emerging Countries Jonathan Perry¹, <u>Eelco Smit²</u> ¹Dell, United Kingdom; ²Philips, Netherlands

Open Loop Recycling and Disposal Options for Leaded Glass from Cathode Ray Tubes Eliette Restrepo¹, <u>Rolf Widmer</u>¹, Mathias Schluep² ¹Empa, Dübendorf, Switzerland; ²World Resources Forum, St. Gallen, SwitzerlandModerated

Moderated Discussion on Guiding Principles for WEEE Policy

D.3 Business Models for Circular Economy (2/2)

Session Chair: Daniela Pigosso, Technical University of Denmark, Denmark

- 4:30 pm The Circular Economy and Service-dominant Logic in the Electronics Sector Scott Butler European Recycling Platform
- 5:00 pm Business Models: Innovative Value Creation Malcolm Waddell WRAP, Banbury, United Kingdom
- 5:30 pm Circular Economy in the Electronics Sector: A Holistic Perspective <u>Margarida Gama</u>¹, Constantin Herrmann², Tamara Fisher² ¹thinkstep AG, Berlin, Germany; ²thinkstep AG, Leinfelden-Echterdingen, Germany

E.3 Solutions for Chemicals Supply Chain Management (2/2)

Session Chair: Julie M. Schoenung, Univ. of California-Irvine, United States of America

- 4:30 pm The Philips Supply Chain Solution Joins the Global Circular Economy Daniel Patrick Cronin Pooling Partners, Eck en Wiel, The Netherlands
- 5:00 pm Combination of Data Base Systems and Material Assay Testing: Answer Increasingly Complex Material Related Questions with Confidence <u>Michael Riess</u>¹, Peter Müller² ¹VDE Testing and Certification Institute, Frankfurt, Germany; ²Hewlett Packard Enterprise, Böblingen, Germany
- 5:30 pm Comply with Existing and Evolving Environmental Legislation Reduce Effort for the Supply Chain (Including Your Company) – Mitigate Risk of Non-compliance Andreas Schiffleitner¹, Torsten Gerl², Katie Boehme² 'KERP Center of Excellence Electronic & Environment GmbH, Vienna, Austria; ²iPoint-systems GmbH, Reutlingen, Germany



Conference Dinner at Wasserwerk (see also p. 40)

Busses to the evening reception at Wasserwerk leave from the front of the hotel, starting at 6:30 pm. The last bus leaves at 6:50 pm. Please make sure to be there on time as otherwise you will have to make your own way to the conference dinner.

If you go there on your own please be at Wasserwerk at 7:00 pm. The reception will begin once all the busses have arrived.

A.4 Applications: Improving Electronic Products

Session Chair: Olaf Wittler, Fraunhofer IZM, Germany

8:30 am Smart Electrical Connectors and Connecting Technologies for Industrial Applications and its Assessment of Relevant Environmental Impacts Christian Wegener¹, Frank Schiefelbein¹, Frank Ansorge², M. Eng. Christian Baar², Oliver Meier³, Jan Stefan Michels⁴, Roland Mödinger⁵ ¹Siemens AG, Berlin, Germany; ²Fraunhofer IZM, Oberpfaffenhofen-Weßling, Germany; ³Finke Elektronik GmbH, Waldkirch, Germany; ⁴Weidmüller Interface GmbH & Co. KG, Detmold, Germany; ⁵ERNI Production GmbH & Co. KG, Adelberg, Germany

9:00 am Re-Design of a Digital Voice Recorder to Meet the Needs of Circular Economy – Status Analysis

Rainer Pamminger¹, Stefan Kuso¹, Wolfgang Wimmer¹, Gerhard Podhradsky² ¹Technische Universität Wien, Wien, Austria; ²Speech Processing Solutions GmbH, Wien, Austria

9:30 am Designing Major Appliances: a Decision Support Model <u>Eleonora Fiore</u>, Paolo Tamborrini, Maria Franca Norese Politecnico di Torino, Turin, Italy

B.4 Recycling of Complex Metal Mixes

Session Chair: Toon Ansems, TNO, The Netherlands

- 8:30 am Challenges for Critical Raw Material Recovery from WEEE the Case Study of Gallium Maximilian Ueberschaar, Sarah Otto, <u>Vera Susanne Rotter</u> Technische Universität Berlin, Berlin, Germany
- 9:00 am Future Perspectives for WEEE Recycling Dynamic Evaluation of the Mobile Phones and Smartphones Waste Stream Nicoleta Gurita, Jan C Bongaerts, Magnus Fröhling TU Bergakademie Freiberg, Freiberg, Germany
- 9:30 am Resource Efficient and Certified Recycling of Copper and Precious Metals Fractions from WEEE material at Aurubis Andreas Nolte

Aurubis AG, Hamburg, Germany

C.4 Plastics – Sorting and Recycling

Session Chair: Otmar Deubzer, Fraunhofer IZM, Germany

- **Evaluation of Plastic Sorting for Recycling** Jef R. Peeters¹, Paul Vanegas^{1,2}, Wim Dewulf¹, Joost R. Duflou¹ ¹KU Leuven, Department of Mechanical Engineering, Belgium; ²University of Cuenca, Centre for Environmental Studies, Cuenca, Ecuador
- 9:00 am PC/ABS from Shredded Waste Electrical and Electronic Equipment Arthur Schwesig², <u>Brian Riise¹</u> ¹MBA Polymers Inc., USA; ²MBA Polymers Austria Kunststoffverarbeitung GmbH, Austria
- 9:30 am Recovery of PC/ABS from WEEE Plastic Shred by CreaSolv Process Martin Schlummer, Fabian Wolff, Andreas Mäurer Fraunhofer IVV, Freising, Germany

D.4 Measuring the Product Lifetime

Session Chair: Ines Oehme, German Environment Agency, Germany

- 8:30 am Analysis of Durability and Repairability of Dishwashers Paolo Tecchio¹, Fulvio Ardente¹, Fabrice Mathieux¹, Laura Talens Peiro¹, Sepp Eisenriegler² ¹European Commission - Joint Research Centre, Italy; ²Reparatur-und Service-Zentrum R.U.S.Z., Vienna, Austria
- 9:00 am Durability and Cycle Frequency of Smartphone and Tablet Lithium-ion Batteries in the Field

Christian Clemm¹, Christoph Sinai², Christian Ferkinghoff¹, Nils Dethlefs¹, Nils F. Nissen³, Klaus-Dieter Lang^{1,3}

¹Technische Universität Berlin, Berlin, Germany; ²coconutBattery, Frankfurt a.M., Germany; ³Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration, Berlin, Germany

9:30 am Consumers' Expectations for Product Lifetimes of Consumer Durables <u>Masahiro Oguchi</u>¹, Tomohiro Tasaki¹, Ichiro Daigo², Tim Cooper³, Christine Cole³, Alex Gnanapragasam³ ¹National Institute for Environmental Studies, Tsukuba-City, Ibaraki, Japan; ²The University of Tokyo, Tokyo, Japan; ³Nottingham Trent University, Nottingham, UK

E.4 Eco-Design Requirements / ErP Regulation

Session Chair: Knut Sander, Ökopol GmbH, Germany

- 8:30 am Ecodesign with Extended Product Scope on the Example of Enterprise Servers <u>Anton Berwald</u>¹, Benoît Tinetti¹, Lutz Stobbe², Nils Nissen², Hannes Zedel² ¹Deloitte, France; ²Fraunhofer IZM, Berlin, Germany
- 9:00 am A Regulatory Approach for Potential Energy Efficiency Requirements on Computer Servers Davide Polverini, Paolo Tosoratti European Commission, Brussels, Belgium
- 9:30 am Slashing the Hydra: Reducing Allowances in MEPS for Complex Set Top Boxes Hans-Paul Siderius Netherlands Enterprise Agency, The Netherlands

10:00 am – COFFEE BREAK 10:30 am



8:30 am

A.5	Applications: Automotive and Transportation	D.5	Extending the Product Lifetime
	Session Chair: Martin Schneider-Ramelow, Fraunhofer IZM Berlin, Germany		Session Chair: Masahiro Oguchi, National Inst. for Environmental Studies, Japan
10:30 am	Autonomous Electric Vehicles – Research Perspectives Focusing on Eco-Reliability Requirements Andreas Middendorf ¹ , Stefan Straube ² , Stefan Wagner ¹ , Klaus-Dieter Lang ^{1,2}	10:30 am	Mind the Gap Exploiter; Circular Business Models for Product Life Extension Marcel C. Den Hollander, <u>Conny A. Bakker</u> , E.J. Hultink <i>TU Delft, Delft, Netherlands</i>
11:00 am	Development of a Demand Forecasting Model for Automotive Electric Component Remanufacturing <u>Mitsutaka Matsumoto¹</u> , Yasushi Umeda ² , Shuto Tsuchiya ²	11:00 am	Service Lifetime and Disposal Pathways of Business Devices <u>Esther Thiébaud</u> ¹ , Marie Brechbühler Peskova ² , Lorenz M. Hilty ^{1,3} , Mathias Schluep ⁴ , Martin Faulstich ⁵ ¹ Empa, St. Gallen, Switzerland; ² BFH, Bern, Switzerland; ³ UZH, Zurich, Switzerland; ⁴ WRF, St. Gallen, Switzerland; ⁵ CUTEC Institute, Clausthal-Zellerfeld, Germany
11:30 am	'AISI, Isukuba, Japan; 'The University of Tokyo, Tokyo, Japan Automotive Lighting Facing the Design Trend: From Former Basic Conception to Reliable and Sustainable Advanced Development. Wes Dubois Thomas Krzesai	11:30 am	Obsolescence of Electronics - the Example of Smartphones <u>Marina Proske</u> ^{1,2} , Janis Winzer ¹ , Max Marwede ² , Nils F. Nissen ¹ , Klaus-Dieter Lang ^{1,2} ¹ Fraunhofer IZM, Berlin, Germany; ² Technische Universität Berlin, Berlin, Germany
12:00 pm	Valeo, Meslin l'Evèque, Belgium Environmental Analysis as a Basis for Ecodesigned Products <u>Mélanie Bordignon</u> , Vanessa Lhopital Alstom, Villeurbanne, France	12:00 pm	Paradigm Shift in Green IT – Extending the Life-Times of Computers in the Public Authorities in Germany Siddharth Prakash ¹ , Andreas Köhler ¹ , Ran Liu ¹ , Lutz Stobbe ² , Marina Proske ^{2,3} , Karsten Schischke ² ¹ Oeko-Institut e.V., Freiburg, Germany; ² Fraunhofer IZM, Berlin, Germany; ³ Technische Universität Berlin, Berlin, Germany
B.5	Recycling of Critical Metals – Pathways	E.5	Tools for Environmental Assessment
10:30 am	Liam – An Innovation Story		Session Chair: Kun Mo Lee, Ajou University, Korea, Republic of (South Korea)
	<u>Charissa Rujanavech</u> , Joe Lessard, Sarah Chandler, Sean Shannon, Jeffrey Dahmus, Rob Guzzo Apple Inc., Cupertino, United States of America	10:30 am	Spreadsheet Based LCA of Electronics: Case Study of a Smart Home Device Julian Christoph Maruschke, Matthias Harsch LCS Life Cycle Simulation GmbH, Backnang, Germany
11:00 am	Critical Raw Materials Closed Loop Recovery Malcolm Waddell WRAP, Banbury, United Kingdom	11:00 am	Developing Carbon Footprint Calculation Software for Display Industry in Taiwan Jahau Lewis Chen ¹ , Wang-Chih Chen ¹ , Andy Kuo ² ¹ National Cheng Kung University, Taiwan; ² Innolux Corporation, Taiwan
11:30 am	Environmental and Economic Assessment of Critical Metals Recovery <u>Toon Ansems</u> , Arjan van Horssen, Stijn Dellaert TNO, Utrecht, the Netherlands	11:30 am	Methods to Calculate GHG Reduction Contributions of Electronic Components <u>Ryo Yokoyama</u> , Tetsuya Kuwashima, Yasuyuki Fujioka, Masaru Hirose TDK Corporation, Japan
12:00 pm	Recycling LED Retrofit Lamps Xavier Lantoinette, Laure Morice, Romain Lesage RECYLUM, Paris, France	12:00 am	openLCA Suboot – a Collaborative System for Data Collection and Exchange for Making Supply Chains More Sustainable Andreas Ciroth ¹ , Chui Wan Cheung ¹ , Jutta Hildenbrand ² ¹ GreenDelta, Berlin, Germany; ² Swerea, Sverige
C.5	Plastics – Closing the Loop	12:30 pm –	LUNCH BREAK
	Session Chair: Chris Slijkhuis, Müller-Guttenbrunn GmbH, Austria	1:30 pm	
10:30 am	A Concrete Success of Circular Economy: Closing the Loop on Plastics from WEEE <u>Ingrid Tams</u> ¹ , Marianne Fleury ² , Thomas Van Nieuwenhuyse ² ¹ Groupe SEB, Écully, France; ² Eco-systèmes, Courbevoie, France		N N
11:00 am	Electrostatics Overcomes the Limits for WEEE Plastics Recycling		

Rainer J. Koehnlechner Hamos GmbH, WERSAG GmbH & Co KG, Germany

11:30 am Guidelines Designing with Recycled Plastics-increasing Resource Efficiency in High-end Applications

Tanya Nimalasuriya¹, Ingeborg Gort², Eelco Smit³, Abel Gerrits⁴ ¹Océ, Venlo, the Netherlands; ²Partners for Innovation; ³Philips; the Netherlands, ⁴Universiteit Twente, Twente, the Netherlands

12:00 am Closing the Loop on Carbon Fiber: Using Recycled Carbon Fiber in Laptop Applications Markus Stutz¹, Stephanie Schafer², Sreepad Karanam³, Matthew Morrison³, Naji Kasem³ ¹Dell, Frankfurt, Germany; ²Dell, United States of America; ³SABIC, Riyadh, Saudi Arabia SESSION 5 • THURSD

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ELECTRONICS

A.6 Provoquium

Session Chair: Otmar Deubzer, Fraunhofer IZM, Germany

1:30 pm -3:00 pm This session will challenge commonly held convictions on environmental issues and encourage us to come up with better solutions by taking a fresh look at things we believe to be true. In short 5-minute-presentations, the speakers will brain-shake traditional thinking about the environment. Will you agree with what they have to say? Or will the speakers provoke objections?

Attend the Provoquium, if you like controversial discussion, and if you believe that such discussion is the motor for progress in science and society.

B.6 Recycling of Critical Metals – Technologies

Session Chair: Wayne E. Rifer, Green Electronics Council, United States of America

1:30 pm A Green Method for Recycling Materials from Liquid Crystal Display Panel En Ma

Shanghai Polytechnic University, Shanghai, China

- 2:00 pm Recovery of Bromine and Antimony from WEEE Plastics Martin Schlummer, Lorenz Popp, Fabian Trautmann, Andreas Mäurer Fraunhofer IVV, Freising, Germany
- 2:30 pm RECLAIM Project: Recovery of Yttrium and Europium from Electronic Waste, a New Hydrometallurgical Process Vicente Lopez¹, Carlos Alvarez¹, Serena Sgarioto², Dorleta Guarde³ ¹Tecnicas Reunidas, Madrid, Spain; ²Relight, Rho, Italy; ³Indumetal Recycling, Asua-Erandi, Spain

C.6 Smart Disassembly

Session Chair: Jef Peeters, KU Leuven - University of Leuven, Belgium

- 1:30 pm Intelligent Disassembly of Components from Printed Circuit Boards to Enable Re-use and more Efficient Recovery of Critical Metals Bernd Kopacek SAT, Vienna, Austria
- 2:00 pm Remote Operation Experiment towards Implementation of Remote Recycling <u>Akihiro Oikawa</u>, Jun Oki, Kenta Torihara, Yuta Adowaki, Nozomu Mishima <u>Akita University</u>, Japan
- 2:30 pm Towards Smart E-Waste Demanufacturing Systems Exploiting Cyber-Physical Systems (CPSs) Capabilities Nicoletta Picone¹, Marcello Colledani^{1,2}, Giacomo Copani¹, Marco Diani¹, Tullio Tolio^{1,2}

¹/TIA-CNR Institute of Industrial Technologies and Automation, Milan, Italy; ²Politecnico di Milano, Milan, Italy

D.6 Measuring and Improving the Recyclability (1/2)

Session Chair: Fabrice Mathieux, European Commission, Italy

 1:30 pm
 Eco-Design for Recycling: Developing Life Cycle Inventories on the End-of-Life of Electr(on)ic Products

 Xavier Lantoinette¹, Laure Morice¹, Romain Lesage¹, Marianne Fleury², Pierre-Marie Assimon², Thomas Van Nieuwenhuyse²

 'RECYLUM, Paris, France; ²ECO-SYSTEMES, Courbevoie, France

2:00 pm Recycling Vendor Audit Program in Compliance with EPEAT End of Life Management in Europe Andreas Bohnhoff, Dora Caria ERP SAS, Paris, France

2:30 pm Innovative Product Design for Innovative Recycling of Technology Metals <u>Max Marwede</u>¹, Perrine Chancerel¹, Maximilian Ueberschaar¹, Vera Susanne Rotter¹, Nils F. Nissen², Klaus-Dieter Lang^{1,2} ¹Technische Universität Berlin, Berlin, Germany; ²Fraunhofer IZM, Berlin, Germany

E.6 Governance to Promote Eco-Innovative Products

Session Chair: Janis Winzer, Fraunhofer IZM, Germany

- 1:30 pm EU Revised Public Procurement Directive Hans Wendschlag Hewlett-Packard Inc., Stockholm, Sweden
- 2:00 pm Public Procurement Barriers in Promoting Market Uptake of Innovative LED Lighting Andrius Plepys, Jessika Luth Richter IIIEE/ Lund University, Lund, Sweden
- 2:30 pm Influencing Green Electronics Design in a Circular Economy Erin Margaret Gately Green Electronics Council, Portland, United States of America

3:00 pm – POSTER SESSION (Extended Coffee Break) 4:00 pm



A.7 Applications: Photovoltaics Session Chair: Stephan Benecke, Fraunhofer IZM, Germany 4:00 pm Photovoltaic Power Goes Green Nouha Gazbour¹, Carole Charbuillet², Christian Schaeffer¹, Guillaume Razongles¹ ¹CEA-INES, French National Institute of Solar Energy, Chambéry, France; ²Institut Arts et Métiers de Chambéry, LCPI, Chambéry, France 4:30 pm Analysis of Photovoltaic Deployment Scenarios for Low-carbon Futures Yusuke Kishita The University of Tokyo, Tokyo, Japan Third Generation Photovoltaics: Early Intervention for a Circular Economy and a 5:00 pm Sustainable Future Rhys Gareth Charles¹, Matthew Lloyd Davies², Peter Douglas^{3,4} ¹COATED Engineering Doctorate, Swansea University, UK; ²Materials Engineering, College of Engieering, Swansea University, UK; ³Chemistry Group, College of Medicine, Swansea University, UK; ⁴School of Chemistry and Physics, University of KwaZulu-Natal, South Africa.

A Possibility of Open Zero Energy Plant Factory 5:30 pm

Hiroshi Kubo¹, Shun Murayama¹, Masaki Tanimoto², Kazuki Okoso², Shizuo Maeno³ ¹Chiba Institute of Technology, Chiba, Japan; ²Septenary Agriculture Inc., Chiba, Japan; ³mSe Corporation, Chiba, Japan

Recycling of Critical Metals – Hydrometallurgical Processes

Session Chair: Bernd Kopacek, SAT, Austria

- 4:00 pm **Recovery of Critical Metals from Lamps and CRTs** Valentina Innocenzi¹, Ida De Michelis¹, Bibiana Ferrari², Serena Sgarioto², Daniele Gotta², Bernd Kopacek³, Francesco Vegliò¹ ¹Department of Industrial Engineering, of Information and Economy, University of L'Aguila, L'Aguila, Italy; ²RELIGHT S.R.L, Rho (Milan), Italy; ³ISL-Kopacek KG, Vienna, Austria
- **Recovery of Critical Metals from LCDs and Li-Ion Batteries** 4:30 pm Alessia Amato¹, Laura Rocchetti¹, Viviana Fonti¹, Thomas Abo Atia², Pietro Altimari², Emanuela Moscardini², Luigi Toro², Francesca Pagnanelli², Francesca Beolchini¹ ¹Università politecnica delle Marche, Ancona, Italy; ²Sapienza Università di Roma, Rome Italy
- 5:00 pm Recovery of Base and Precious Metals from Waste Printed Circuit Boards and Spent Catalysts by Hydrometallurgical Processes Ionela Birloaga¹, Valentina Innocenzi¹, Ida De Michelis¹, Bernd Kopacek², Francesco Veglio¹ ¹Department of Industrial and Information Engineering and Economics, University of L'Aguila, L'Aquila, Italy; ²ISL-Kopacek KG, Vienna, Austria
- 5:30 pm Practical Experiences Operation Stationary and Mobile Hydrometallurgical Plants Serena Sgarioto¹, Bibiana Ferrari¹, Ida De Michelis², Bernd Kopacek³ ¹RELIGHT S.R.L, Rho (Milan), Italy; ²ECORECYCLING S.R.L, Rome, Italy; ³SAT, Vienna, Austria

C.7 Workshop: Closing the Information Gaps

Session Chair: Gergana Dimitrova, Fraunhofer IZM, Germany

4:00 pm -6:00 pm

Information from Producers to Recyclers and Vice Versa: a Missing Link in the Circular Economy Arjen Wittekoek Coolrec BV, Eindhoven, the Netherlands

Short discussion statement by John Shegerian, ERI, USA

Recycler Information Center – A Tool for Initiating Paradigmatic Change in the EU's Treatment of E-Waste?

Matthias Huisken¹, Markus Spitzbart², Thomas Opsomer¹, Elisabeth Herbeck² ¹iFixit GmbH, Stuttgart, Germany; ²Demontage- und Recycling-Zentrum D.R.Z., Vienna, Austria

PCB 4.0 – The Smart Backbone of the Circular Electronics Industry 4.0 Alexander M. Schmoldt Murata Electronics Europe, Hoofddorp, the Netherlands

Short discussion statement by Miguel Ballester Salvà, Fairphone, the Netherlands

Moderated Discussion on improving the Information Flow Between Producers and Recyclers

D.7 Measuring and Improving the Recyclability (2/2)

Session Chair: Carl Johan Dalhammar, Lund University, Sweden

- 4:00 pm Repair and Recycling Metrics – Applicability and Drawbacks of Current Methods Wayne Rifer¹, Lisa Dender², Max Marwede³, Mark Schaffer⁴ ¹Green Electronics Council, United States of America; ²IBM, United States of America; ³Technical University of Berlin, Berlin, Germany; ⁴iNEMI, Pflugerville, United States of America
- 4:30 pm Would the Setting-up of Reference Values to Support the Calculation of Recyclability Rates Help Improving the Material Efficiency of Electronic Products? Perrine Chancerel¹, Max Marwede¹, Fabrice Mathieux², Laura Talens Peiro² ¹Technische Universität Berlin, Berlin, Germany; ²European Commission - Joint Research Centre, Ispra, Italy
- 5:00 pm REEECYC'LAB: Assessing and Improving the Recyclability of Electrical and Electronic Equipments Thomas Van Nieuwenhuyse, Pierre-Marie Assimon Eco-systèmes, Courbevoie, France
- 5:30 pm Method to Assess Ease of Disassembly for Electrical and Electronic Equipment for Ecodesian and Treatment Cost Evaluation Paul Vanegas^{1,2}, Jef R. Peeters¹, Dirk Cattrysse¹, Paolo Tecchio³, Fulvio Ardente³, Fabrice Mathieux³, Wim Dewulf¹, Joost R. Duflou¹ ¹KU Leuven, Belgium; ²University of Cuenca, Ecuador; ³European Commission - Joint Research Centre, Ispra, Italy

Social Responsibility E.7

Session Chair: Manfred Santen, Greenpeace e.V., Germany

- 4:00 pm The Changing CSR: Evolving Language, Metrics and Mission Charles Michel Proian Lexmark International EMEA, France
- 4:30 pm Assessing Corporate Sustainability in Taiwan on the Basis of UN Sustainable Development Goals Allen H. Hu, Lance HongWei Huang, Yen-ling Chang National Taipei University of Technology, Taiwan, Republic of China
- Sustainability Indicators for Information and Communication Technology Solutions and Services 5:00 pm Minako Hara, Tomomi Nagao, Xiaoxi Zhang, Machiko Shinozuka, Shinsuke Hannoe NTT, Tokyo, Japan
- 5:30 pm Arrow Value Recovery and Close the Gap partner to Close the Loop for Electronic Barbara Toorens¹, Isabelle Servant¹, Edwin Koolwijk², Carol Baroudi², Inge Knapen¹ ¹Close the Gap, Brussels, Belgium; ²Arrow Value Recovery, Austin, USA

B.7

Interactive

Session

A.8	Measuring and	Communicating	Green ICT	· (1/2)
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Session Chair: Eduard Wagner, Technische Universität Berlin, Berlin, Germany

- 8:30 am Environmental Standards Development for Electronics: The Evolution and Future of EPEAT Pamela Brody-Heine, Jonas Allen Green Electronics Council, Portland, United States of America
- 9:00 am The Evolution of IEEE 1680.1 Environmental Assessment of Computers, Tablets and Displays <u>Walter Jager</u> ECD Compliance, Stittsville, Canada
- 9:30 am UL 110 Sustainability for Mobile Phones, Description and Status William F. Hoffman III UL Environment, Northbrook, United States of America

B.8 Metals for Soldering

Session Chair: Carol Handwerker, Purdue Univ., United States of America

- 8:30 am Options to Eliminate Lead From Die Attachments in Power Electronics Jürgen Wilde¹, <u>Eike Möller¹</u>, Adeel Bajwa² ¹University of Freiburg, Freiburg, Germany; ²University of California Los Angeles, Los Angeles, USA
- 9:00 am Thermodynamic and Theoretical-Based Modeling and Assessment of an Energy-Efficient Performance Measurement System in the Soldering Process Alireza Esfandyari, Sven Kreitlein, Elias Schmidt, Dominique Thomas, Joerg Franke Institute for Factory Automation and Production Systems (FAPS), Friedrich-Alexander Universität Erlangen-Nürnberg, Nürnberg, Germany
- 9:30 am Recycling, Supply Chain Interventions, or Alternatives for Fair Soldering Tin? Cosima Stahr, Lukas Rüttinger, Astrid Lorenzen adelphi, Berlin, Germany

C.8 Forecasting Volumes of WEEE

Session Chair: Jaco Huisman, UNU, Germany

- 8:30 am Forecasting Waste Compositions: A Case Study on Solar Energy Systems Jef R. Peeters¹, Paul Vanegas^{1,2}, Wim Dewulf¹, Joost R. Duflou¹ ¹KU Leuven, Department of Mechanical Engineering, Leuven, Belgium; ²University of Cuenca, Centre for Environmental Studies, Cuenca, Ecuador
- 9:00 am Future Generation of WEEE in Developing Countries: An Estimation Model and Case Studies in Asia <u>Masahiro Oguchi</u>¹, Atsushi Terazono¹, Masaaki Fuse² ¹National Institute for Environmental Studies, Tsukuba, Japan; ²Hiroshima University, Hiroshima, Japan

9:30 am The US Electronics Recycling Landscape

Jason Dean Linnell¹, Carole Mars², Christopher Nafe² ¹National Center for Electronics Recycling, Vienna, WV, United States of America; ²The Sustainability Consortium, Arizona State University, United States of America

D.8 Remanufacturing and Repair

Session Chair: Mitsutaka Matsumoto, AIST, Japan

- 8:30 am Developing a Repairability Indicator for Electronic Products <u>Sebastiaan, FJ Flipsen</u>^{1,2}, Conny, A. Bakker¹, Guus, LA van Bohemen¹ ¹TU Delft, Delft, the Netherlands; ²iFixit Europe, Stuttgart, Germany
- 9:00 am Remanufacturing and Upcycling of an Industrial Robot Handheld Terminal Independently from the Original Equipment Manufacturer Rolf Steinhilper, Joachim Kleylein-Feuerstein Fraunhofer IPA, Bayreuth, Germany
- 9:30 am Building the Circular Economy: A Case Study in Repair Kyle Wiens *iFixit, San Luis Obispo, United States of America*

E.8 RoHS / Chemicals Restrictions

Session Chair: Hans Wendschlag, Hewlett-Packard Inc., Sweden

- 8:30 am Challenges and Difficulties Deriving from Extension of Annex II of the RoHS Directive Eva Susanne Hink, Nadiia Kaiun 1cc GmbH, Holzgerlingen, Germany
- 9:00 am Status of the RoHS Directive and Exemptions <u>Otmar Deubzer</u>¹, Nils F. Nissen¹, Yifaat Baron², Klaus-Dieter Lang³ ¹Fraunhofer IZM, Berlin, Germany; ²Oeko-Institut e.V., Freiburg im Breisgau, Germany; ³Technische Universtät Berlin, Berlin, Germany
- 9:30 am Lessons Learned from Medical Device Refurbishment in the Context of the RoHS Directive <u>Yifaat Baron</u> Oeko-Institut e.V., Freiburg im Breisgau, Germany

10:00 am - COFFEE BREAK 10:30 am



SESSION 8 • FRI

A.9 Measuring and Communicating Green ICT (2/2)

Session Chair: Conny A. Bakker, TUDelft, The Netherlands

Energy Efficiency of ICT: Further Improvement Through Customized Products 10:30 am Lutz Stobbe¹, Marina Proske¹, Severin Beucker², Ralph Hintemann², Klaus Dieter Lang^{1,3} ¹Fraunhofer IZM, Berlin, Germany; ²Borderstep Institut, Berlin, Germany; ³Technische Universtät Berlin, Berlin, Germany

- Strengthening Material Efficiency of Electrical and Electronic Equipment 11:00 am Ines Oehme¹, Kristine Sperlich¹, Regina Kohlmeyer¹, Siddharth Prakash², Knut Sander³, Christian Clemm⁴ ¹German Environment Agency, Dessau-Roßlau, Germany; ²Oeko-Institute e.V., Berlin, Germany; ³Ökopol GmbH, Hamburg, Germany; ⁴Technical University Berlin, Berlin, Germany
- 11:30 am Best Environmental Management Practice for the Electrical and Electronic Equipment manufacturing sector Martin Möller¹, Ioannis Antonopoulos², Yifaat Baron¹, Paolo Canfora², Marco Dri², Pierre Gaudillat², Andreas R. Köhler¹, Andreas Manhart¹, Katja Moch¹, Siddharth Prakash¹, Rasmus Prieß¹ ¹Oeko-Institut e.V., Freiburg, Germany; ²European Commission - Joint Research Centre, Spain
- 12:00 am Green Technology; Green Computing in a Sustainable Context Stephen Kaboggoza

Azam Media Uganda Limited, Sky Tower Technologies, Uganda

B.9 Conflict Minerals – Governance

Session Chair: Christina Bocher, DEKRA Assurance Services GmbH, Germany

- 10:30 am ISO Guidance Principles for the Sustainable Management of Secondary Metals Sonia Valdivia¹, Maria Sureda¹, Mathias Schluep¹, Rolf Widmer² ¹World Resources Forum, St. Gallen, Switzerland; ²Swiss Association for Standardisation, Winterthur, Switzerland
- Ethical Risks in the Supply Chain of Electronic Devices: Potentials and Limits of an 11:00 am EU Regulation on Conflict Minerals and Further Governance Approaches Johanna Sydow, Antonia Reichwein Germanwatch, Berlin, Germany
- 11:30 am Automating Conflict Mineral Business Processes, RCOI and Due Diligence Andreas Schiffleitner¹, Katie Boehme² ¹KERP Center of Excellence Electronic & Environment, Vienna, Austria; ²iPoint-systems, Reutlingen, Germany



12:30 pm – POSTER SESSION (During Lunch Break) 1:30 pm

The Two Worlds of WEEE Treatment (1/2) **C.9**

Session Chair: Marcos Pimentel, Centro de Tecnologia da Informação Renato Archer (CTI), Campinas, Brazil

10:30 am Bridging the Gap Between Informal & Formal E-waste Processors Deepali Sinha Khetriwal, Olivia Godeluck, Laura Burger, Deeksha Rao Sahib, David Rochat, Ulrike Voett Sofies International SA, Mumbai, India

11:00 am Survey of Material Recovery by Informal E-waste Processing in the Philippines Atsushi Terazono¹, Masahiro Oguchi¹, Shunsuke Kuzuhara², Ruji P. Medina³, Florencio C. Jr. Ballesteros⁴ ¹National Institute for Environmental Studies, Tsukuba, Japan; ²Sendai National College of Technology, Tsuruoka, Japan; ³Technological Institute of the Philippines, Manila, Philippinen; ⁴University of the Philippines Diliman, Manila, Philippinen

11:30 am E-waste Implementation Toolkit – EWIT Bernd Kopacek¹, Isabella Capurso² ¹SAT, Vienna, Austria; ²Remedia, Milano, Italy

12:00 pm Methodological Approach to Improving E-Waste Assessment in Emerging Economies Karima Hamouda, Vera Susanne Rotter, Nathalie Korf

Reuse Workshop Part 1: Understanding and D.9 Improving the Framework Interactive Session

Session Chair: Colin Fitzpatrick, University of Limerick, Ireland

- 10:30 am **Reuse of EEE: Limits to Growth?** Roland Hischier, Heinz Böni Empa, St. Gallen, Switzerland
- 11:00 am Product Or Waste? Criteria To Determine Re-usability Markus Spitzbart, Elisabeth Herbeck Die Wiener Volkshochschulen GmbH, Vienna, Austria

Technische Universität Berlin, Berlin, Germany

- 11:30 am Extending Product Lifetimes Through WEEE Reuse and Repair: Opportunities and Challenges in the UK Christine Cole, Tim Cooper, Alex Gnanapragasam Nottingham Trent University, Nottingham, United Kingdom
- 12:00 pm Reuse of (W)EEE in Germany – Product Flows and Environmental Impacts Henning Wilts¹, Nadja von Gries¹, Markus Meissner² ¹Wuppertal Institute, Wuppertal, Germany; ²Pulswerk, Vienna, Austria
- **E.9 Governance for WEEE Management**

Session Chair: Thomas Van Nieuwenhuyse, Eco-systèmes, France

- Business Benefits of Authorised Representative Arrangements to Manage WEEE Compliance 10:30 am on Behalf of Importing Distributors Howard Stimpson EC4P, Corsham, United Kingdom
- 11:00 am "Make the most of it." - Experiences from the Danish Voluntary Agreement on WEEE Christina Busk¹, Uffe Sønderhousen², Karin Klitgaard¹, Kristoffer Hvidsteen³, Annette Gydesen⁴, Mette Andersson² ¹The Confederation of Danish Industry; ²NIRAS A/S, Fredriksberg, Denmark; ³Accenture, Berlin, Germany; ⁴Viegand and Maagoe, København K, Dänemark
- 11:30 am Li-Ion Batteries: a Nuisance or a Blessing in Disguise? Daniel Patrick Cronin European Electronics Recyclers Association (EERA), the Netherlands
- Projecting the Split Between Historic and Non-Historic WEEE in Ireland 12:00 pm Michael Johnson¹, Colin Fitzpatrick¹, Jaco Huisman² ¹University of Limerick, Limerick, Ireland; ²United Nations University, Bonn, Germany

SESSION 10 • FRIDAY

A.10	Green ICT Intrastructure	D.1
	Session Chair: Lutz Stobbe, Fraunhofer IZM, Germany	
1:30 pm	Energy Efficiency of Data Centers - A System-oriented Analysis of Current Develop-	I
	Ralph Hintemann ¹ , Severin Beucker ¹ , Jens Clausen ¹ , Lutz Stobbe ² , Marina Proske ² , Nils F. Nissen ² ¹ Borderstep Institute, Berlin Germany; ² Fraunhofer IZM, Berlin, Germany	1:30
2:00 pm	Concept for Telecom Network Production Sites Towards Sustainable and Energy-Effi-	2.00
	CIENT Operation <u>Christoph Lang</u> e ¹ , Norbert Casott ² , Dirk Kosiankowski ¹ , Michael Schlosser ³ , Ralph Schlenk ⁴ ¹ Deutsche Telekom, Berlin, Germany; ² Deutsche Telekom, Berlin, Germany; ³ Berlin Institute for Software Defined Networks GmbH, Berlin, Germany; ⁴ Alcatel-Lucent, Nuremberg, Germany	2:00
2:30 pm	Improved Sustainability in Wavelength-Division Multiplexing Network Elements Klaus Grobe	2:30
2.00	ADVA Optical Networking SE, Martinsried, Germany	
3:00 pm	Energy Efficient Ethernet in Practice <u>Sebastian Porombka</u> University of Paderborn, Paderborn, Germany	3:00
B.10	Management of Critical and Conflict Minerals in	
	Production	
	Session Chair: Johanna Sydow, Germanwatch, Germany	E.1
1:30 pm	Supply Chain Transparency in the Electronics Industry Christina Bocher ¹ , Susan Herbert ² ¹ DEKRA Assurance Services GmbH, Stuttgart, Germany; ² Green Electronics Council, Oregon, USA	1:30
2:00 pm	On-line Supply Chain Sustainability Engagement John Spear epi Consulting, London, United Kingdom	
2:30 pm	Developing an Indicator Setup to Measure Life-Cycle Conditions of Electronic Products Janis Winzer ¹ , Eduard Wagner ² , Otmar Deubzer ¹ , Max Marwede ² , Lena Reichgardt ¹ , Rafael Jordan ¹ , Nils F. Nissen ¹ , Klaus-Dieter Lang ¹ ¹ Fraunhofer IZM, Berlin, Germany; ² Technische Universität Berlin, Berlin, Germany	2:00
3:00 pm	When Agendas Align: Critical Materials and Green Electronics	
	Alexander H. King The Ames Laboratory, Ames, United States of America	
C.10	The Two Worlds of WEEE Treatment (2/2)	
	Session Chair: Deepali Sinha Khetriwal, Sofies, India	3:4
1:30 pm	Creating Viable Business from Electronic Waste Recycling Ebipuado Sapre-obi, Ife Adewumi, Sulaiman Adekola Niger delta University, Yenagoa, Nigeria	
2:00 pm	The Brazilian Government Efforts to Support Electronic Recycling Facilities to Comply with Environmental Sound Practices Arthur Braga Lima, Tiago Rocha, Marcos Pimentel	4:1
	Centro de Tecnologia da Informação Renato Archer (CTI), Campinas, Brazil	4:30
2:30 pm	The Person-in-the-Port Project: Volume and Quality of Used Electronics Imports into Nigeria	
	Nnorom ² , Percy Onianwa ² , Gilbert Adie ² , Stephanie Adrian ³ , Klaus Willke ⁴ ¹ United Nations University, Shibuya, Tokyo; ² BCCC Africa, Nigeria; ³ EPA, Washington D.C., USA; ⁴ Senior Expert Service, Germany	
3:00 pm	Research – The Final Component to Improve e-Waste Recycling Industry in Ecuador Bicardo Andres Montero Bermudez, Juan Carlos Escobar Mova	

D.10 Reuse Workshop Part 2: Understanding and Improving the Products

Session Chair: Colin Fitzpatrick, University of Limerick, Ireland

:30 pm Policies to Support Reuse and Remanufacturing of IT Carl Johan Dalhammar, Leonidas Milios Lund University, Lund, Sweden

2:00 pm Repurposing of Notebook Computers: Demonstrating A Hybrid Reuse and Dismantling End of Life Strategy Damian Coughlan¹, Colin Fitzpatrick¹, Muireann McMahon²

¹Department of Electronic & Computer Engineering, University of Limerick, Limerick, Ireland; ²Department of Design & Manufacturing Technology, University of Limerick, Limerick, Ireland

2:30 pm Challenges of Re-use and Re-manufacturing of Modern Chips in Smart Mobile Devices Janusz Sitek, Marek Koscielski, Aneta Arazna, Wojciech Steplewski, Kamil Janeczek Tele and Radio Research Institute, Warsaw, Poland



3:00 pm Moderated Discussion on How to Encourage Good Reuse Practices

E.10 Looking into the Future

- Session Chair: Nils F. Nissen, Fraunhofer IZM, Germany
- 1:30 pm A Framework of Stock-based System Design and Management Toward a Steady-state Society Hideki Kobayashi Osaka University, Osaka, Japan

2:00 pm A Review of Green Electronics Research Trends <u>Nils F. Nissen</u>¹, Lutz Stobbe¹, Hannes Zedel¹, Karsten Schischke¹, Klaus-Dieter Lang^{1,2} ¹Fraunhofer IZM, Berlin, Germany; ²Technische Universität Berlin, Berlin, Germany

Plenary 2: Closing Session

3:45 pm Closing Keynote The Insecurity of Everything: Balancing Green Responsibility with the Need for True CyberSecurity Data Destruction (Some say that you can't do both. John Shegerian says we HAVE to do both!) John Shegerian Electronic Recyclers International (ERI), United States of America 4:15 pm Partner Conference Announcements 4:30 pm Closing Remarks Klaus-Dieter Lang¹, Nils E. Nissen², Andreas Middendorf², Perrine, Chancerel²

Klaus-Dieter Lang¹, Nils F. Nissen², Andreas Middendorf², Perrine Chancerel² ¹Conference Chair Electronics Goes Green 2016+, ²Technical Chairs Electronics Goes Green 2016+

POSTER PRESENTATIONS

The poster session is located on the ground floor. You are very welcome to meet the poster authors during the poster session times.

Poster Session time slots

 Sept 7, 2016
 3:30 - 4:30 pm

 Sept 8, 2016
 3:00 - 4:00 pm
 Sept 9, 2016 | 12:30 - 1:30 pm

Poster Session

- Recycling Line for Neodymium-iron-boron (NIB) Magnets from Different 0 **Electronic Wastes** Claudio Fernández¹, Luis Martínez de Morentin¹, Alex Branderhorst², Gijs Schouten³, Andy Lobb⁴ ¹Lurederra Research Centre, Spain; ²Coolrec BV, The Netherlands; ³Machinefabriek Otto Schouten B.V., The Netherlands; ⁴Magnet Sales & Service Limited, United Kingdom
- Development of Critical Resource Demand in Wireless Sensing and Design **Strategies for Reducing Material Consumption** Stephan Benecke¹, Nils F. Nissen¹, Klaus-Dieter Lang^{1,2}

¹Fraunhofer IZM, Berlin, Germany; ²Technische Universität Berlin, Berlin, Germany

On the Way to Future Recycling Routines for LED-Lamps: A Study of End-of-Life 03 Lamps on the Design and the Materials Used

Andrea Gassmann¹, Fabian Brückner¹, Jörg Zimmermann¹, Roland Gauß¹, Rudolf Stauber¹, Oliver Gutfleisch^{1,2}

¹Fraunhofer Institute ISC, Project Group IWKS, Alzenau, Germany; ²Technische Universität Darmstadt, Materials Science, Darmstadt, Germany

The Non-recyclability of Critical Metals in WEEE: The Smartphones Case Study

Fanny Lambert, David Bastin University of Liège, Liège, Belgium

Prospecting Secondary Raw Materials in the Urban Mine: Data Quality and Uncertainty of Product Compositions

Amund Nordli Loevik¹, Arthur Haarman¹, Arno Scheepens², Matthias Rösslein¹, Patrick Wäger¹, Jaco Huisman³

¹EMPA, St. Gallen, Switzerland; ²Delft University of Technology, Delft, the Netherlands; ³United Nations University, Bonn, Germany

Prospecting Secondary Raw Materials in the Urban Mine – The Case of Laptops and 06 Tablets in Germany

Hina Habib¹, Jaco Huisman¹, Michelle Guzman Brechu¹, Cornelis Peter Balde^{1,2}, Susanne Rotter³, Paul Mählitz³, Perrine Chancerel³

¹United Nations University, Bonn, Germany; ²Statistics Netherlands, Den Haag, The Netherlands; ³Technische Universität Berlin, Berlin, Germany

Liquid Based Enrichment of Critical Metals from Separate WEEE Fractions

Martin Schlummer, Arthur Berrang, Fabian Trautmann, Andreas Mäurer Fraunhofer IVV, Freising, Germany

Advanced Strategies to Study Bromine Contents on WEEE Plastics Through Online **8**0 Detection Systems by Means of Spectroscopic Methods for Recycling Purposes Mikel Barriuso¹, Asier Asueta¹, David Iribarnegaray¹, Sixto Arnaiz¹, Alex Branderhorst² ¹Gaiker, Spain; ²Coolrec, The Netherlands

Chemical Breakdown and Dismantling Data for E-Waste 09

Carsten Dietsche^{1,2}, Frank P. Mehlich^{3,4} ¹FernUniversitaet Hagen, Germany; ²Inter-Industrial Material Data Working Group, Germany; ³Giessen University, Institute for Anorganic and Analytical Chemistry, Germany; ⁴Chemie Consulting, Germany

10	Business Plan Calculation Tool for Manual Dismantling Facilities Elisabeth Herbeck ¹ , Markus Spitzbart ¹ , Mathias Schluep ² ¹ Die Wiener Volkshochschulen GmbH, Vienna, Austria; ² World Resources Forum, St. Gallen, Switzerland
11	Analysis of e-Waste Flows in the Electrical Electronic Equipment (EEE) Sector, Nigeria Innocent Chidi Nnorom ^{1,2} , Olusegun Ayodeji Odeyingbo ³ , Oladele Osibanjo ² ¹ Abia State University Uturu, Nigeria, Nigeria; ² BCCC Africa, Nigeria; ³ United Nations University
12	Overcoming Challenges to Ensure Green Management of e-Waste in Nigeria Innocent Chidi Nnorom ^{1,2} , Olusegun Ayodeji Odeyingbo ³ ¹ Abia State University Uturu, Nigeria, Nigeria; ² BCCC Africa, Nigeria; ³ United Nations University
13	Challenges of Reverse Logistics Activities for Lithium-Ion Batteries Moritz Neuffer, Lisa Gruber, Antonia Ottahal TechProtect GmbH, Holzgerlingen, Germany
1/	What Are the Environmental Benefits of Increasing the WEEE Treatment in
14	France ? Rachel Horta Arduin ¹ , Carole Charbuillet ² , Françoise Berthoud ³ , Nicolas Perry ⁴ ¹ IPT - Instituto de Pesquisas Tecnológicas do Estado de São Paulo, Brazil; ² Institut Arts et Métiers de Chambéry, Le Bourget du Lac, France; ³ Université Grenoble Alpes, CNRS, Grenoble, France; ⁴ Arts et Métiers - I2M, Talence, France
15	The Application of Bioleaching Technology in Recycling Metals from the
15	Jianfeng Bai ^{1,2} , Weihua Gu ¹ , Xuning Zhuang ¹ , Jin Zhao ¹ , Kaimin Shi ² , Chenglong Zhang ¹ , Jingwei
	Wang', En Ma' 'Shanghai Cooperative Center of WEEE Recycling,Shanghai Polytechnic University, People's Republic of China; ² The University of Hongkong, Hongkong
16	Application of Life Cycle Models in R&D of Electronic Products to Evaluate New
10	Authias Harsch, Julian Christoph Maruschke LCS Life Cycle Simulation GmbH, Backnang, Germany
17	A Life Cycle Assessment of Waste Management: A Case Study of Used ICT Products Sold in the BoP Markets Sheng-Lung Lin, Jian-You Wu, Syuan-Liang Huang Chaoyang University of Technology, Taiwan, Republic of China
18	Integrated Evaluation of Functional and Visual Design towards Sustainability Tsubasa Naito, Tomoaki Kitajima, Nozomu Mishima Akita University, Akita, Japan
19	Promotion of High-voltage DC for Power Supply Systems in Telecommunication Buildings Atsushi Sakurai, Minako Hara, Takeshi Iwato, Yuriko Tanaka NTT Nippon Telegraph and Telephone Corporation, Japan
20	Eco-Design Trade-Offs for Wavelength-Division Multiplexing Network Elements Klaus Grobe ADVA Optical Networking SE, Germany

- **Environmental Performance of Reusing Small Electrical and Electronic** 21 **Equipment: Case Study of Vacuum Cleaners** María D. Bovea, Victoria Pérez-Belis, Valeria Ibáñez-Forés, Pilar Quemades-Beltrán Universitat Jaume I, Castellón de la Plana, Spain
- New Technology to Improve the Efficiency of Photovoltaic Cells for Producing 22 Energy Bertrand Laratte, Tatiana Perminova

University of Technology of Troyes, Troyes, France

POSTER SESSIONS

Solar House

23

POSTER SESSIONS

	Satoko Nasu, Yasuo Sugai Chiba University Graduate School of Engineering, Chiba, Japan		
24	Carbon, Binder, and Solvent Free Anodes for Lithium Ion Batteries Using Silicon-based PECVD Fernando Gómez-Baquero, Bruce Toyama, Doug Grose BESSTECH LLC, Albany, NY, United States of America		
25	Ecodriving: A Driving Style to Optimise the Use Phase of Our Vehicles Santiago González Ocón Eco-efficient Design, Switzerland		
26	Case Studies of Innovative Eco-Design - Focusing on Development Background, Technical Features and Sustainable Points Youngdo Jung, Hyunjung Im Korea Environmental Industry & Technology Institute (KEITI), Republic of South Korea		
27	PBW (Proton Beam Writer) application for EcoDesign of Electronics Hidetaka Hayashi ^{1,2} , Hiroyuki Nishikawa ¹ ¹ Shibaura Institute of Technology, Tokyo, Japan; ² EcoDesign Promotion Network, Tokyo, Japan		
28	WEEE with Value: Experience, Opportunities, and Implications for Legislation Jessika Luth Richter, Naoko Tojo, Thomas Lindhqvist IIIEE/ Lund University, Lund, Sweden		
29	WEEE Legislation in Africa - Status and Current Developments Arne Campen, Eva Hink, Wolfram Kühn, Stefanie Enders 1cc GmbH, Holzgerlingen, Germany		
30	Understanding Waste Diversion Claims and UL2799 Zero Waste to Landfill Certification William F. Hoffman III UII Environment Northbrook United States of America		
31	Registration and Reporting Duties of EEE in EU Member States Jens Becker Bitkom Servicegesellschaft mbH, Berlin, Germany		
32	The Future of Environmental Product Compliance – Industrial Manufacturing Megatrends and Their Implications for Compliance Officers to Manage Compliance in the Next Decade Lutz-Guenther Scheidt ¹ , Kerri Doyle ² , Tedie West ² , Lucas Dann ¹ , Michael Betz ¹ ¹ thinkstep AG, Leinfelden-Echterdingen, Germany; ² Siemens PLM Software, USA		

Evaluation of Simultaneous Consumption of Electrical Energy at Energy-Efficient

TEARDOWN AT EGG2016+

The first modular smartphone in the market is made by Fairphone, an Amsterdam-based social enterprise that is committed to further its movement for fair electronics; from better materials, to fighting product obsolescence.

Come to our table and get to know all the environmental benefits of Fairphone 2 and get to change a screen in less than 10 seconds. In addition, iFixit and Fairphone will take you on a tour inside the latest electronics. See what's inside everything from the iPad, LG and Huawei's competing Nexus phone designs, Nespresso coffee machines, hear firsthand from the designers of the modular Fairphone. What design characteristics make some devices harder to repair and recycle? Our engineers will discuss the tradeoffs and decisions made by the product designers.

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Wed, Sept 7 3:30 pm - 4:30 pm Thu, Sept 8 3:00 pm - 4:00 pm

GENERAL INFORMATION

Door Registration Fees

Regular€ 1,100Student€ 500Participation in iNEMI DiscussionForum on Tuesday, September 6, 2016€ 50Additional conference dinner forstudents or accompanying persons€ 80

http://electronicsgoesgreen.org/registration/

The registration fee includes all lunches, daytime refreshments, evening events, and WiFi access for regular participants, speakers, poster presenters, co-chairs, and members of the program committee.

Student fees are only available for undergraduate and master students; they do not apply to PhD students. Student bookings include everything except the conference dinner; this can be booked separately.

Internet Access

The Seminaris Hotel is providing all conference delegates with complementary wireless internet access throughout the conference from September 7th, 8 am to September 9th, 8 pm. You will find the access code in your conference package and at the registration desk.

Please remember to log out when not using the Internet in order to avoid jammed lines.

Technical Equipment for Presentations

Using personal laptops for presentations is not possible. All speakers are kindly asked to bring a flash drive with their presentation to the session room during the break directly prior to their session, so that the technical support staff can copy the file onto the presentation laptop. For morning sessions, please arrive ten minutes before the start of the session.

Conference Evaluation

Please note that the conference package includes an evaluation questionnaire. We encourage participants to share their assessment and ideas for future Electronics Goes Green conferences. Completed questionnaires can be handed in at the conference counter at any time.

Conference Venue & Accommodation

The Electronics Goes Green 2016+ Conference will be held at the Dahlem Cube Seminaris Hotel. The conference center in the shape of a glass cube is a masterpiece of modern architecture by Helmut Jahn, Chicago. It is situated in the southwest of Berlin, in the district of Dahlem.

Seminaris Campus Hotel Berlin

Takustraße 39 | 14195 Berlin, Germany Phone: +49 30 557797-0 | Fax: +49 30 557797-100 www.seminaris.de/hotels/seminaris-campushotel-berlin.html

Lunch and Coffee Breaks

Coffee breaks will be held in the poster exhibition hall on the ground floor. Lunch will be provided both there and at the restaurant of the Seminaris hotel.

Dietary Requirements/Allergies

All food both at the conference venue and at the conference dinner will be served as a buffet and all vegetarian, vegan, and/or gluten-free food will be clearly marked as such in English. When in doubt, please consult one of the chefs serving the food, who will be able to give you detailed information.

Conference Office

The conference office will be available at the registration desk throughout the conference. We are there to help you, so do not hesitate to contact us in if you have questions or need help with finding your way around, printing your train tickets, or interpreting the menu.

Just drop by or give us a call at

Counter:	+49 30 557 797-484
BackOffice 1st floor:	+49 30 557 797-475

Conference Language and Proceedings

The official language of all presentations is English. The conference proceedings are available for download before and after the conference, but not between September 7-9, 2016, in order to avoid jammed lines during the conference. The conference proceedings consist of two parts:

1. Official Conference Proceedings (ISBN 978-3-00-053763-9)

All full papers that were handed in for oral or poster presentations are made available to all registered conference participants before the conference.

Optional publication of papers on IEEE Xplore

Authors of papers contained in the official conference proceedings can opt to have their paper uploaded to IEEE Xplore. The papers will be uploaded after the conference when copyright has been transferred.

2. Conference Documentation Packagage

The conference documentation package will be made available for download to all registered participants approx. three weeks after the conference. It will consist of:

- all full papers, including those that missed the original deadline
- the slides and poster pdfs of ALL presentations made available to the conference, including those that are supplied after the conference (note that this is only mandatory for presenters not submitting a full paper)

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Sustainability is highly valued in the Seminaris Campus Hotel. From details like the responsible handling and saving of waste and the use of local products, the house also uses about 50% regenerative energy. Located in one of the greenest districts of the city, green thinking has its home here. To guarantee a just as green journey for you, discounted conference tickets with Deutsche Bahn can be provided, just like bikes for rent for the shorter trips.

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We have taken great pains to make Electronics Goes Green 2016+ a "green event" in every sense of the word. To give but a few examples:

- All printed matter were printed on eco-certified materials
- All conference materials were produced at exact numbers to avoid waste
- The buffet choices both at the conference venue and at the evening dinner are predominantly seasonal, regionally sourced, organically produced with as little packaging as possible. There is a clear focus on vegetarian dishes. • We are using fair-traded organic conference t-shirts
- All articles are produced and printed in an eco-friendly manner (the lanyards, for example, are made of plant fibers)
- Choice of environmentally conscious cooperation partners
- A conference venue that can easily be reached by public transport and puts great emphasis on responsible handling and saving of waste and the use of local products. The house also uses about 50% renewable energy. • We could avoid long hauls after the production.

Our thanks go to our cooperation partners who have helped us keep our ecological footprint as small as possible.













EVENING PROGRAM

TUESDAY SEPTEMBER 6 / 6:30 - 8:00 PM

Get Together at Seminaris

Early arrival to the conference is recommended, as we will be kicking off this year's program with a welcome reception at event hotel Seminaris on the Tuesday night, September 6. Weather permitting, the event will be held outside with a BBQ to make the most of Berlin's legendary but all too short summer weather. Don't miss the chance to get the lay of the land and meet some of the other delegates before heading into the hustle and bustle of the conference program.

WEDNESDAY, SEPTEMBER 7 / 7:00 - 11:00 PM

Gala Dinner at Wasserwerk

Join us for the Electronics Goes Green 2016 gala dinner at Wasserwerk. Built in 1906, Wasserwerk, which translates as water pump station, kept water flowing through Berlin's pipes throughout the 20th Century. The iconic red-brick building is very typical of turn-of-the-century Berlin and Brandenburg architecture and has now been transformed into a beautiful event location. Guests marvel most of all at the stunning, industrial-chic interior, which features the pumping station's original giant piston pumps.

The evening promises to be a lively highlight of the conference and an excellent opportunity for mingling and networking with conference delegates from all over the world. Discuss hot topics, controversial presentations or just shoot the breeze with experts from a wide range of disciplines to make the most of your conference participation.

Gala Dinner: Wasserwerk-Berlin Hohenzollerndamm 208a | 10717 Berlin



CATALYST AWARD

Green Electronics Council (GEC) Catalyst Award

The Green Electronics Council (GEC) Catalyst Awards seek to inspire innovation in the design, manufacture and use of electronics to advance sustainability principles. By recognizing transformative yet scalable advances, GEC highlights innovative best practices throughout the supply chain that move society ever closer to a world in which only sustainable electronics are designed, manufactured, purchased and processed at the end of their useful life.

The 2016 Catalyst Award winner will be publicly recognized in September at the Electronics Goes Green Conference in Berlin, Germany, as well as being publicized via media. Nominations were accepted worldwide from any organization, individual or combination thereof collaborating to achieve sustainability. Nominations were accepted for products, processes, policies and programs launched within the past five (5) years and that exist in the public domain at the time of submission.

The Catalyst Awards are managed by the Green Electronics Council, a mission-driven 501c(4) non-profit that seeks to achieve a world in which only sustainable electronics are designed, manufactured, bought, used and recycled. Founded initially to manage EPEAT, the definitive global rating system for greener electronics, GEC advocates for sustainable electronics by facilitating both manufacturers and large-scale purchasers to understand the challenges facing sustainable electronics; to commit to address those challenges; and to act and change internal operational, manufacturing and procurement behaviors. GEC collaborates with stakeholders of all types to facilitate the adoption of sustainable manufacturing and procurement behaviors.

Further information: http://greenelectronicscouncil.org/sustainable-solutions/awards



THURSDAY EVENING TOURS

THURSDAY, SEPTEMBER 8

The night is yours – and no city has longer nights than Berlin!

Coming to a conference in Berlin is a great chance to get to know the city. On Thursday evening, conference participants get to swap workshops and seminars for a refreshing dip into Berlin's cultural life. A concert, a boat trip, a museum visit or maybe just an evening in one of Berlin's many parks, enjoying the sunset with the locals?

Please note that these tours are not included in the conference fee, the individual ticket prices are indicated at the end of the tour descriptions. Each tour will be accompanied by a member of the organizing team.

For most tours the number of participants is limited to 20. If you want to join one of the tours, please sign up on the corresponding list in the reception area. Vouchers for the tours are available at the counter.

Starting point and time for all tours – except tour 1 – is 6.30 pm at the registration counter. There you can get a public transport ticket for free.

TOUR 1

Boat Tour on the River Spree registration



Let the city lights of Berlin enchant you on a sunset cruise along the river Spree. See out the day in peace and quiet and enjoy the sun setting over Berlin with a nice glass of wine in your hand.

Travel past the Treptowers with Jonathan Borofsky's Molecule Man, the MTV building, the Universal Hall, pass the famous Eastside Gallery, and then on to the historical Nikolaiviertel city centre, Berlin's cathedral, and the Museumsinsel, before ending up at Berlin's impressive new Central Station.

Altogether, you will spend a fantastic two hours experiencing Berlin by night in comfort from the boat. If you are interested in taking part, please let us know as soon as possible. The trip is limited to 30 passengers. A member of our staff will accompany you, so you won't get lost.

Cost: 15 € (catering and drinks are extra)



TOUR 2

Dark Worlds – Experience WW2 bombing raids through the eyes of civilians

The nerve centre of the Third Reich, Berlin was a key target for allied bombing raids. By the time the war was over, up to 80% of the city centre were destroyed, and those who survived did so by hiding in overcrowded public bunkers or improvised basement shelters.

Our expert guides will take you through a museum exhibition behind an inconspicuous green door to explore one of the last remaining civilian air raid shelters left in Berlin. In the dark passages and confined rooms of the shelter you will learn about the experiences of the average Berliner before, during and after the war. Countless wartime artefacts, buried for decades, will help us bring the subject to life.

Cost: 15 € for the guided tour



TOUR 3 Discover Berlin's City Centre on foot

After hours spent in conference venues and hotel rooms, a breath of fresh air can be ... a breath of fresh air. Come and join us and our local guide for a stroll through Berlin's historic centre. Hear the stories hidden in the nooks and crannies of the city. See the Reichstag, the Berlin Cathedral, Checkpoint Charlie, the Brandenburg Gate or the Holocaust Memorial – there is so much to see and discover. Come along and be captivated!

Cost: 7 € for the guided tour



TOUR 4

Experience Berlin's tallest landmark – join us for a visit of the TV tower

The TV tower defines the silhouette of Berlin – a symbol of the reunified Germany, just like the Brandenburg Gate. With its height of 368 metres, it is the tallest structure in Germany, and the second tallest in the European Union. The tower was built in the 1960s, initiated by the East German government, with the aim of demonstrating the strength and efficiency of the socialist system. Germany's fastest elevator takes you up the 203 metres to the visitor platform in only 8 seconds... make sure your stomach is not left behind! From up here the visibility can reach 42 kilometres on a clear day. On the way back an optional stop at a Hofbrauhaus opposite the TV tower can be arranged.

Cost: 11 € entrance fee for the tower



TOUR 6

Take a guided bike rickshaw tour through Berlin's City Centre

Three wheels, two strong legs, and lots of history all around: Probably the best way to get to know Berlin. Sit back and let your knowledgeable guide take you for a tour of Berlin's city centre. Whether you come as a couple or on your own, just make yourself comfortable in the rickshaw and listen to the stories that your guide has to tell. Stop anywhere along the route for a closer look or just to get your feet on the Berlin ground.

Cost: 35 €/h and Rickshaw



TOUR 5 Hackescher Markt Brewery

The brewery on the Hackescher Markt has been in operation since 1999, when Oli Lemke turned the tram bridge arches into his very own beer palace. After causing a big splash in his first few months on the scene with a full fifty beers on offer, the beer empire has expanded to two other locations for good craft beer from Berlin. It's the perfect place if you want to see out the evening with a new taste of Berlin. Join us on a tour to the brewery and get immersed in Lemke's world of craft brewing. Follow the sommeliers and learn all about the beers on offer. The tour ends with a special tasting of three unique beers.

Cost: 15-20 € for brewery tour and tasting





Allow me to introduce myself:

My name is Muharrem Batman. I was born in Istanbul in 1965. I have been living in Berlin for over 40 years now, where I run "Batman Elektronik", buying, selling, and repairing computers, consumer electronics, and lots of other electronic devices. I think I can call myself an electronics fanatic.

My interest in music and lighting first brought me to computers. My first machine was an Amiga 500, one of the early home computers. I taught myself what I needed to know, and now people see me as an expert. In the end, I turned a hobby into a job, and I now make my living from and with computers.

How I came to be an artist:

Ever since I was a young body, I had always been playing and working with mechanical or electronic bits and pieces, trying to express the many ideas that I have in my mind. The idea of using electronics came to me in the basement of my first shop (a former fashion store) in Berlin, where the shop decorations (like mannequins and styrofoam heads) were kept. I made these pieces with the help of my sister Ayse and Judith Brun. Several of the sculptures on display here were made by my friends and fellow artists (Kemal Cantürk, Ernst Richter, Steve Studinski and Mahir Duman - video art) from Berlin's old art and culture hub Tacheles.

We started using electronics in our artworks more than 15 years ago. Initially, it was just playful decoration, but, over time, more and more people came to speak to us about these pieces. We then took them on the road to shows and exhibitions, and we've met so many other artists in the field. With my technical knowhow, I have been able to contribute to lots of art projects, and I am still keeping in contact with many creative minds, like Dirk Israel and Ayse Batman.





Why I am using old electronics in my art:

I believe there is no such thing as waste. I see the entire material, not just as a resource, but as art in itself. With my passion for electronics and technology, it comes naturally to me to make art of the things I consider too dear and too beautiful to end up as landfill.

I have been working hard to teach people about waste electronics with my work – artwork that makes people understand that old computers and broken bits of electronics are not waste.

Creativity knows no limits. We use circuit boards, valves, processors, and any other piece of electronics we can get our hands on.

I am a great proponent of combining steel and electronics, as one can see in the objects that are on show and on sale in my gallery.

My message:

Being normal is overrated! In fact, call me normal, and you insult me. Being not normal, a bit off-kilter, and getting creative is much more fun.

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