



## ICCCE 2018 INTERNATIONAL CONFERENCE ON CASCADE USE AND CIRCULAR ECONOMY

After five years of funding by the FONA research programme from the German Ministry of Education and Research (BMBF), the research group "Cascade Use" invited to their final conference **ICCCE 2018- International Conference on Cascade Use and Circular Economy**. The conference took place in Oldenburg, Germany, on September 24<sup>th</sup> and 25<sup>th</sup>, 2018, to discuss relevant topics on resource management and the related CO<sub>2</sub> emission reduction. Around 60 scientists from Germany, China, Canada and USA as well as interested students from the University of Oldenburg attended the ICCCE 2018. It was organised by Cascade Use, under the lead of Dr.-Ing. Alexandra Pehlken, supported by the Co-Hosts Shanghai Jiao Tong University - SJTU (Prof. Chen Ming) and the AARTI – Alliance of Automotive Recovery Technology Innovation. It follows a joint conference between SJTU and the University of Oldenburg last year in Shanghai: The first International Symposium on Cascade Use of Automotive Parts 2017.

Complementary to the ICCCE 2018 the **conference book "Cascade Use in Technologies 2018"** was published by Springer. The book is double peer reviewed and edited by Alexandra Pehlken, Matthias Kalverkamp and Rikka Wittstock. All seventeen included contributions were presented in the six sessions on the two days of the conference.



The conference book



The host Alexandra Pehlken

### Day 1

After the Welcome speech by the host Alexandra Pehlken, the **first session** started with the topics **"Life Cycle Assessment (LCA) and Material Flow Assessment"**. It was chaired by Mark Mennenga from the TU Braunschweig and included four speakers from Oldenburg. The two opening speakers are both part of the Cascade Use research group. Matthias Kalverkamp introduced his research on the *Comparability of Life Cycle Assessments: Modelling and Analyzing LCA Using Different Databases*. Fernando Peñaherrera presented subsequent a paper about the *Development and Application of Metrics for Evaluation of Cumulative Energy Efficiency for IT Devices in Data Centers*, framed within his research on resource consumption of German professional data centers in the TEMPRO Project

funded by the German Ministry BMWi. The following speaker Juan Camilo Gómez Trillos talked about his work at the DLR Institute of Networked Energy Systems in Oldenburg: *The Material Use of Perovskite Solar Cells*. Finally, Steffen Wehkamp from the OFFIS Institute for Informatics introduced the *Energy Flow Management in an Energetic Neighbourhood*. He highlighted the energy management of an upcoming neighbourhood in Oldenburg that serves as a living lab for innovative energy solutions.



Susanne Rotter

The **first Keynote on: climate action in the transport sector - or about the relationship of transition challenges and the Circular Economy** was given by **Susanne Rotter** from the University of Technology Berlin and Member of the Advisory Council on the Environment of the German Government. She stated that despite the set climate targets, the CO<sub>2</sub> emissions in the mobility sector increase. According to a report of the Advisory Council [source: **SRU 2017: German Advisory Council on the Environment: [Time to take a turn: climate action in the transport sector.](#)** SUMMARY. November 2017 ], the necessary measurements to apply include (in addition to a reduction and bundling of mobility) the support of E-Mobility. This transformation comes along with a new need for certain raw materials. Therefore, Mrs. Rotter explains the necessity and challenges of the recycling and reuse of electric vehicles to generate a secondary raw material stock.

After the lunch break the **president of the Carl von Ossietzky University Oldenburg, Prof. Piper** reopened the stage. He congratulated Cascade Use on the well-performed research performance and gave the official welcome speech for the ICCE.

The following **Keynote** speaker **Christian Hagelüken** (Director EU Government Affairs at the Umicore AG & Co. KG) presented *Closing the metals' loop - Recycling of electronics & Li-Ion batteries* and highlighted as Susanne Rotter the need of a circular economy in the upcoming market for e-mobility. Umicore functions as the world's leading recycler of complex waste streams. From this point of view, Mr. Hagelüken named requirements for a circular economy. They included innovative materials and products, sustainable use concepts and business models, a comprehensive collection of the products, a high quality recycling all over the process and stakeholder cooperation. This results in various relevant research foci in technology, economy, logistics as well as digitalization.



The president of the University: Prof. Piper

**Session 2 “Sustainable mobility Services”** was chaired by Benjamin Wagner vom Berg from the University of Applied Science Bremerhaven. In this session, different research projects were presented: Franziska Hanneken talked about *NaCl* a project analyzing *Sustainable Crowdlogistics*, Jürgen Knies talked about *ZMo - Target Group Based Mobility Chains in Health Care Systems* and Alexander Sandau presented *NEMo* a project about *Sustainable Mobility in rural areas*. Supara Grudpan from the BIBA Institute Bremen was finally introducing her research about the *Awareness of the necessity of stakeholders involved in the mobility planning process in order to improve sustainable mobility*. The last presentation of this session by Mahyar Moradi and his PhD advisor, Benjamin Wagner vom Berg focused on *German’s Autonomous Mobility Acceptance Model*.

**Session 3**, the last session of the first day, took then a closer look on **“WEEE”**: Waste Electrical and Electronic Equipment and was chaired by Kerstin Kuchta from the TUHH Hamburg University of Technology. Two speakers in this session came from the Hochschule Pforzheim: Jörg Woidasky gave an introduction in his *Empirical Research Results on Planned Obsolescence in Portable Computers* and Christian Klinke talked about *E-Book Reader Recyclability*. The two following speakers of this session pointed out the current WEEE situation in Latin America. Merle Heyken presented the joint research together with her colleague Nina Tsydenova about the *E-waste collection in Mexico City* and Sascha Diedler identified the *Gaps and Needs within the WEEE Management in Brazil*. Kerstin Kuchta closed the session and the presentations of the first day with findings of her research group on the *Extraction Potential of Tantalum from Spent Capacitors Through Bioleaching*.

The conference day ended in a nice ambiance with a dinner buffet. Special guest was the not prior announced Science Slammer Valentin Ludwig from the University of Bremen. He gave an entertaining introduction in his research in environmental physics in the context of climate change.



Science Slam at the conference dinner

Please note, that all photos of the ICCCE were provided by Roman Eichler.

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## Day 2

The program of the second conference day included just like the first day two keynotes and three sessions. The day started with a **Keynote** by **Henning Wilts** from the Wuppertal Institute for Climate, Environment and Energy, Germany. Following the previous keynotes, he picked up the connection between Mobility and Circular Economy with his presentation on *Circularity in the German ELV [End of Life Vehicle] recycling sector*. He explained that according to the statistical numbers, the recycling rate of end of life vehicles in Germany amounts up to 98%. Nevertheless, this number is not only a result of the functioning circularity, but also of the very high export rate of used cars outside of Germany. Therefore, primary raw materials still have to be imported here, whereas in other countries e.g. Poland the reuse is ensured. Hence, Mr. Wilts reflected on the definition of the considered cycle for the circular economy on a national, European or even global scale. To support a national cycle more information on used vehicles is needed. To improve the information asymmetry on material composition, use patterns, etc. digital transformation could function as an enabler for circular economy.



Lunch at the ICCCE 2018

After this keynote Marcel Weil from the Institute for Technology Assessment and Systems Analysis (ITAS) of the KIT, Germany took over to chair the **Session 4 on Industrial Ecology**. This session put a special focus on batteries: Nicolas Bognar from the TU Braunschweig with an *Evaluation of the Recyclability of Traction Batteries Using the Concept of Information Theory Entropy* and Jens F. Peters from the Helmholtz Institute Ulm Electrochemical Energy Storage with his presentation on *The Importance of Recyclability for the Environmental Performance of Battery Systems*. The last presentation of Rikka Wittstock was performed by her former supervisor Alexandra Pehlken on the *Assessment of the Demand for Critical Raw Materials for the Implementation of Fuel Cells for Stationary and Mobile Applications*.

**Session 5 (Re-) Manufacturing** was chaired by Host Alexandra Pehlken. Aleksandra Wewer from the TU Berlin started this session with a reflection on Remanufacturing itself: *Shifting Remanufactured Products from Used to New*. Two presentations followed on Remanufacturing in the automotive industry. Alexandra Pehlken presented her group's work on the *Assessment of Reusability of Used Car Part Components with Support of Decision Tool RAUPE* and Jinsheng Xiao brought in his Chinese perspective with his presentation *Reuse Recycling and Recovery of End-of-Life New Energy Vehicles in China*. Finally, Kalle Wulf from the Bremen City University of Applied Science indicated the potential of Remanufacturing in the wind energy industry with a *Comparison of Cascaded Utilization with Life Cycle Assessment – a Case Study of Wind Turbine Blades*. This presentation was a summary of Kalle's Bachelor Thesis that was honored with the Bremer Peter-Wefing Award 2017.



**Christoph Herrmann** from the Institute of Machine Tools and Production Technology (IWF) and Chair of Sustainable Manufacturing & Life Cycle Engineering from the TU Braunschweig delivered the last **Keynote** of the conference. With his presentation: *Can digitalization enable the Circular Economy? The case of Electric Vehicles* he resumed the topic of the prior keynotes and emphasized the potential of digitalization to promote circular economy in e-mobility. Additionally, he identified challenges and strategies of circular economy. While the challenges include a low collection rate, low recycling efficiency and the fixation of material in stock, the strategies imply better design, better business models and better behavior. Christoph Herrmann demonstrated how digital engineering tools can deal with the challenges or support the strategies at the same time, e.g. sensors increase the collection rate or recycling efficiency or condition monitoring fosters better business models or better behavior.



Christoph Herrmann

Finally, Matthias Kalverkamp chaired the last **Session 6**. It included various presentation under the title **Cascade Use and Waste Management 4.0**. The first speaker Marco Lewandowski brought in his perspective as an entrepreneur and business consultant from his company SWMS. He talked about *IoT and Industry 4.0 in the conflict between economical, ecological and social sustainability*. Lea Kuhlmann presented subsequent her master thesis on *Technology Assessment of Blockchain Technology - The sustainability perspective*. Muztoba Ahmad Khan completed the session with his research on *Cascade Utilization During the End-of-Life of Product Service Systems: Synergies and Challenges*. Due to the success of the conference it was agreed with the co-chair that the ICCCE should continue and the 2<sup>nd</sup> ICCCE will take place in China in 2020.

The entire program as well as the presentations from the conference are available on the ICCCE 2018 homepage: <https://icce2018.com/>. To download the presentations please use as username as well as password "icce2018".



Group picture with the participants of the ICCCE 2018