



Sociedad de Científicos
Españoles en la República
Federal de Alemania

Symposium CERFA, 12 Nov. 2022
Hotel 25 Hours Das Tour, Düsseldorf
Louis-Pasteur-Platz 1, 40211 Düsseldorf

Sustainable ways to urbanism and mobility

09:00-09:45

Arrival

09:45-10:00

Welcoming words by

Mr Juan Sunyé Mendía, Spanish consul general in Düsseldorf
Delegate of Fundación Española para la Ciencia y Tecnología, FECyT, Spain
Dr Guillermo Pérez Hernández, CERFA president

Block 1. Mobility in the recent future

Moderators Dr Teresa Rincón Domínguez, BSc Daniel García Rodríguez

10:00-10:25

Transport inequality

Dr Celestino Sánchez, EURNEX Association, the European transport research provider, www.eurnex.org

The growing inequality in the West since the 80s and their effects on the society has led to a growing interest on the topic among researchers during the last decade, opening new research fields around inequality, such as in transportation sector. In this session we will introduce the concept of transport inequality and we will get an overview of the different perspectives on the topic. The goal of the session is to help us analyse the current and future changes on the European transport system from the prism of inequality.

10:25-10:40

Learnings from the German 9 € experiment

Mr Mark Peter Wege, Einfach Einsteigen e.V., www.einfacheinsteige.jetzt

Local and regional public transport for no more than 9 € per month. The German 3-month-experiment made headlines all over the world and was a great success, filling Germany's buses and trains. 62 million tickets were sold. The experiment came to an end but many people are demanding more: Petitions, manifestations, and campaigns pressure the government to continue with the 9 € ticket. They claim it is an important step towards sustainable mobility because, it supposedly tackles the problem of high CO₂-emissions in the transport sector and compensates for social injustice. Mark Wege is the founder and spokesman of the Bremen based organisation 'Einfach Einsteigen' (Engl.: 'just enter') which promotes a local fare free and extended public transport. He will provide a more complex perspective on the experiment and its possible continuation: What can we learn from the experiment? How can public transport play a significant role in a sustainable mobility transition? How is this connected to the financing and organisation of public transport? Since the topic of this talk is currently widely discussed and the federal government might soon decide how to continue after the experiment, the content may be adjusted accordingly.

10:40-11:05

Repositioning in free-floating vehicle sharing systems: the Mobility Science unsuccess story

Prof. Dr. Kevin Tierney, University of Bielefeld

Free-floating vehicle sharing systems have spread to all of Europe's large cities, allowing customers to use scooters, bikes, mopeds and cars for a short period of time for one way or round-trip journeys. One of the key challenges of running a vehicle sharing system is ensuring that vehicles are available for customers when and where they need them. We present an algorithm for repositioning vehicles in free-floating systems and tell the story of how we made a start-up to bring this algorithm to market.

11:05-11:30 **Smart Shipping: weather routing and WASPs for a safer, decarbonized and more efficient maritime transport**

Prof. Dr David Gómez-Ullate, IE University (Via-zoom)

Smart Shipping (<https://smartshipping.es/>) is a weather routing and performance monitoring project that aims to reduce the greenhouse gas (GHG) emissions and fuel consumption from vessels in the ocean, by a wiser choice of routes that takes into account weather and ocean forecasts. The key idea is that optimal routes need not follow the shortest path, and we have enough quality data to compute better routes than the ones that are mostly followed by the maritime industry. The project has an interdisciplinary nature and it requires coordinated input from naval engineers, oceanographers and weather scientists, mathematicians, data scientists, software developers and experts in maritime transport.

11:30-12:00



Refreshing-break (on site)



Block 2. Energy and the city

Moderators Dr Marta Méndez, Dr Onetsine Arrizabalaga de Mingo

12:00-12:25 **The effect of urban form changes on land surface temperature trajectories in cities with different background climates**

Dr Richard Lemoine, Würzburg University/German Aerospace Center-DLR (Via-zoom)

The current climate change trend urges the application of efficient spatial planning to mitigate the effects of urbanization on local urban warming. Nevertheless, how urban temperatures respond to urban form changes inside cities is still insufficiently understood. In this work, I analysed the relationship between urban form and diurnal space-time land surface temperature (LST) trends (2003–2019) in Beijing, China (continental climate), Cairo, Egypt (arid) and Santiago de Chile (temperate). We analysed changes in land cover, white sky albedo (WSA), night-time lights (NL) and the enhanced vegetation index (EVI) inside areas representing clustered thermal performance (steady cold and hot spots and warming cold and hot spots). The structure of local climate zones (LCZs) was assessed for each LST trend. To test the relevance of other urban form dimensions, I analysed the hierarchical influence of the employed 2D metrics (i.e., built-up footprint, WSA, NL and EVI) and additional 3D indicators (i.e., height and volume) on LST, applying machine learning classification and regression trees (CARTs) to Beijing's data. Despite diverse patterns of urban form change, cities in our sample present common LST trends, with thermal differences as a consequence of local climate. LCZs are composed of highly heterogeneous built-up areas inside LST trend categories. In the case of Beijing, LST is hierarchically driven by built-up footprint, WSA and EVI. Moreover, by adding height and volume, urban form differences between LST trend classes that are not evident with 2D data were found. Our findings suggest that a compact green urban tissue is necessary to cope with the current trends of urban warming, taking into account city-specific measures based on the local background climate.

12:25-12:40

Sustainable urban district development in Leipzig **Visionary energy concept and heating network 4.0 for 'Freiladebahnhof'**

Sebastian Kroemer, Tilia, www.tilia.info

Leipzig is currently the fastest-growing city in Germany and needs affordable housing. After the closure of the rail station 'Eutritzscher Freiladebahnhof' a new, innovative residential district will be developed on its grounds. The BMBF-funded joint urban project aims to show how a resource-efficient urban quarter can be designed. As a milestone from an energy perspective, the local public utility company Stadtwerke Leipzig, together with Tilia and water utilities *Leipziger Wasserwerke* have planned an innovative energy concept and a heating network 4.0 combining renewable energy and waste heat.

12:40-14:15



Lunch break (on site)

QUIZ session

Moderator Dr Julia Boix Tarín

14:15-15:15

CO₂ Footprint of mobility

Mr Philipp Lüßen, Climactivity, <https://climactivity.de/>

Flying is big by traveling, but there are other ways! Other countries are often closer than you think and they can be reached easily and in a more climate-friendly way, for example, through European train connections. Would you like to learn more about climate-friendly travel alternatives? We will exchange about it in a quiz and talk with interesting climate facts!

15:15-15:25



Minibreak



Block 3. Spiral economy

Moderators Dr Alejandra de Miguel Catalina and Dr Celia Escudero Hernández

15:25-15:50

Lithium-ion batteries: towards a circular economy Dr César Prados, CTO at Circunomics, www.circunomics.com

Lithium-ion batteries are widely used in advanced technological devices and Electric Vehicles. As a consequence, the production and use of Lithium-ion batteries will continuously increase focusing global attention on their lifecycle management. We present during the talk the current practices, techniques, and market opportunities that make possible the circular economy for Lithium-ion batteries.

15:50-16:15



Upcycling EV batteries into second-life mobile, modular and multi-purpose power solutions. Opportunities and challenges

Dr Núria González García, Betteries, www.betteries.com (Via-zoom)

Betteries is a profit for impact start up from Berlin aiming at closing the loop in the battery value chain by upcycling discarded EV batteries and remanufacturing them into affordable energy storage systems to accelerate the transition towards renewables.

We have brought to the market the first modular and multi-purpose energy storage system based on 2nd-life batteries to be used for both stationary and mobile applications. Additionally, our systems are fully digitalized and cloud-connected so that battery health and performance data is analysed and reported in real-time.

Our technology aims at on decarbonizing strategic sectors in developed economies that still rely on the use of fuel-based generators for their off-grid activities, as it is the case of the construction industry, and filming and recreational sector. In emerging economies, we focus on offering a portable and clean energy source for off-grid productive uses of communities that lack access to the grid. Finally, by extending EV batteries useful life, we support the implementation of a truly sustainable e-mobility, which has the potential to reduce the carbon footprint of EVs by up to 32%.

16:15-16:45		Refreshing-break (on site)	
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16:45-17:10 **Current situation of critical raw materials. Challenges for the energy transition**

Dr Abel Ortego, University of Zaragoza, www.betteries.com (Via-zoom)

Decarbonizing world economies is necessary to avoid the continuous increase of global temperature and its negative consequences for humanity. To get this ambitious target new advances in the fields of power generation with renewables and mobility with cleaner vehicles are being made.

Advances towards renewables and cleaner vehicles are encouraging the demand of a huge quantity of other kinds of natural resources being some of them even scarcer than oil. Some of these resources will be necessary to manufacture the following components: batteries (Co, Ni, Mn or Li); LEDs for lighting (Ga, Ge, Y); permanent magnets for motors (Nd, Dy, Pr); catalytic converters (Pt, Pd, Zr); electronic units (Au, Ag, Sn, Ta, Yb), different kinds of sensors (Ce, Tb, Se, La), infotainment screens (In); automotive high-performance steel and aluminium alloys (Nb, Mo, Cr, Ti, V, Sc, W) or PV modules (Ge, Ga, Te, Cd). Unfortunately, these resources are finite and some of them are very scarce being even considered as critical for the European Commission and other institutions from several perspectives such as vulnerability, economic importance, supply, or ecological risks.

One of the solutions to improve resource efficiency is to recycle these valuable metals. Nevertheless, there are two main problems around the recycling situation. On one hand, recycling rates are not growing up as faster as metal demand. On the other hand, current recycling policies define targets based on mass weight approaches, and even if they are ambitious, they fail in enhancing the recycling of minor but critical metals. The legislation compliance is achieved by means of applying mechanical separation techniques. These processes are effective to recycle those metals with the highest contribution in the vehicle weight (steel, aluminium and copper) but they are not effective for the recovery of minor metals like those that are scarce and/or critical. Consequently, minor metals end downcycled during steel or aluminium smelting or in the worst case they finish dispersed in landfills. This talk will present the current situation around the demand for critical materials and how the transition to a carbon-free economy is not possible under the current model.

17:10-17:50

Round table: how far can recycling bring us?

Moderator Dr Maite Ogueta Gutierrez

17:50-18:00 Closing words: Dr Gema Martínez Méndez, CERFA vice-president and treasury

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