

## Einladung zum Vortrag

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### **Role of Solar Photovoltaics for 100% Renewable Energy in a Local-Global Perspective – From the Power Sector to all Energy Demand**

**Prof. Christian Breyer**  
Lappeenranta University of Technology, Finland

am **Montag, 12. März 2018** um **13:00 Uhr**  
im Institut für Festkörperphysik, Appelstraße 2, Raum 3701-267

#### **Abstract:**

The power sector is faced with strict requirements in reducing harmful emissions and substantially increasing the level of sustainability. Renewable energy (RE) in general and solar photovoltaic (PV) in particular can offer societally beneficial solutions. The LUT Energy System Transition model is used to simulate a cost-optimized transition pathway towards 100% RE in the power sector by 2050 in the demand structure as of 2015. The model is based on hourly resolution for an entire year, the world structured in 145 regions, high spatial resolution of the input RE resource data, and transition steps of 5-year periods. The global average solar PV electricity generation contribution is found to be about 69% in 2050, the highest ever reported. Batteries are the key supporting technology for solar PV. Storage output covers 31% of the total demand in 2050, and 95% of which is covered by batteries alone. Battery storage provides mainly short-term diurnal storage, and renewable energy based gas provides seasonal storage, in parallel to dispatchable biomethane and hydropower from reservoirs. The global average energy system levelized cost of electricity gradually declines from 70 €/MWh in 2015 to 52 €/MWh in 2050 throughout the transition period, while deep defossilisation of more than 95% around 2040, referenced to 2015, would be possible. The targets of the Paris Agreement can be well achieved in the power sector, while increasing societal welfare, given strong policy leadership. The global energy transition to a 100% renewable electricity system creates 36 million jobs by 2050 in comparison to 19 million jobs in the 2015 electricity system. Total solar PV installed capacity in 2050 for the power sector is estimated to about 22.0 TWp. Latest research on the mobility sector added estimated 25.6 TWp for a full defossilisation by 2050 leading to an additional demand of 6.5 TWp for by-products usable as valuable feedstock for defossilising the chemical industry. The total solar PV demand in 2050 for a fully defossiliated and sustainable energy system is estimated to about 60-70 TWp, as a least societal cost case. Climate change research emphasizes that negative emission technologies (NETs) will be needed from 2040 onwards. This new energy sector for CO<sub>2</sub> removal will further increase PV demand, the least cost source of energy in 21st century.

#### **About the lecturer:**

Christian Breyer is Professor for Solar Economy at Lappeenranta University of Technology (LUT), Finland. His major expertise is the integrated research of technological and economic characteristics of renewable energy systems specialising in energy system modeling for 100% renewable energy, on a local but also global scale. His team published the most studies on 100% renewable energy for countries or major regions globally. He worked previously for Reiner Lemoine Institut, Berlin, and Q-Cells (now: Hanwha Q.Cells). He is member of ETIP PV, IEA-PVPS, scientific committee of the EU PVSEC and IRES and Chairman for renewable energy at the Energy Watch Group.



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