

# Fraunhofer Institute for Silicate Research ISC – materials development for tomorrow's products

Marie-Luise Righi, 9. May 2016



Pictures: K. Dobberke and F. Zürn for Fraunhofer ISC

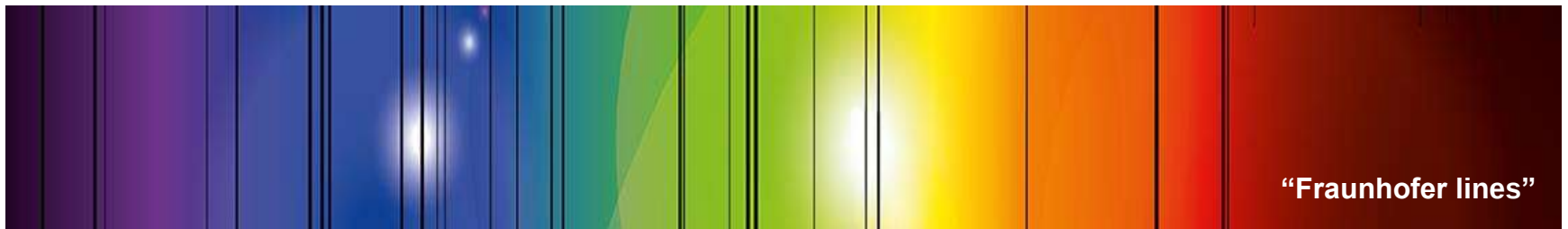
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MATERIAL SOLUTIONS  
by Fraunhofer ISC

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# Mission Statement

- **The Fraunhofer-Gesellschaft promotes and conducts applied research in an international context, to benefit private and public enterprise and is an asset to society as a whole.**
- **Fraunhofer Institutes help to reinforce the competitive strength of the economy in their region, throughout Germany and in Europe.**
- **As an employer, the Fraunhofer-Gesellschaft offers a platform that enables its staff to develop both professional and personal skills.**

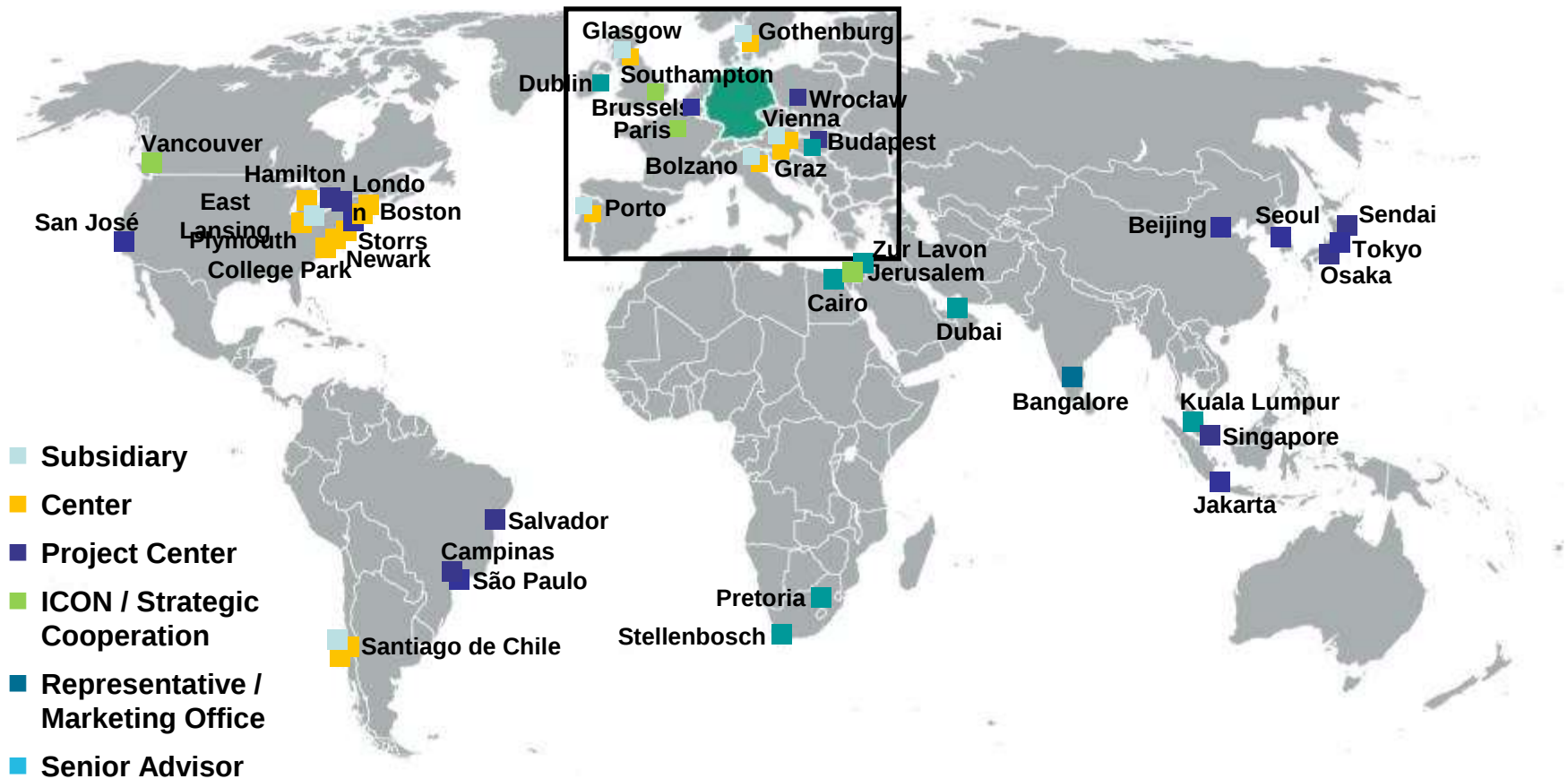


# The Fraunhofer-Gesellschaft – Locations in Germany



- 67 Institutes
- 24.000 staff
- Budget :  
more than 2,1 Mrd € (incl. 1,8 Mrd €  
from contract research)
- 2015 within TOP 100 Innovators  
worldwide (Thomson Reuters)

# Fraunhofer worldwide



# Fraunhofer ISC – energy and resource efficiency



**Project group IWKS**  
**Alzenau, Hanau**  
**Ressource strategies**  
**Recycling**  
**Substitution**



**Fraunhofer ISC**  
**Headquarter Würzburg**  
**Materials development**  
**Process development**  
**Analytics**



**Center HTL**  
**Bayreuth**  
**Energy efficient**  
**processing**  
**High temperature**  
**materials design**

Pictures: K. Dobberke, K. Heyer, L. Haber für Fraunhofer ISC

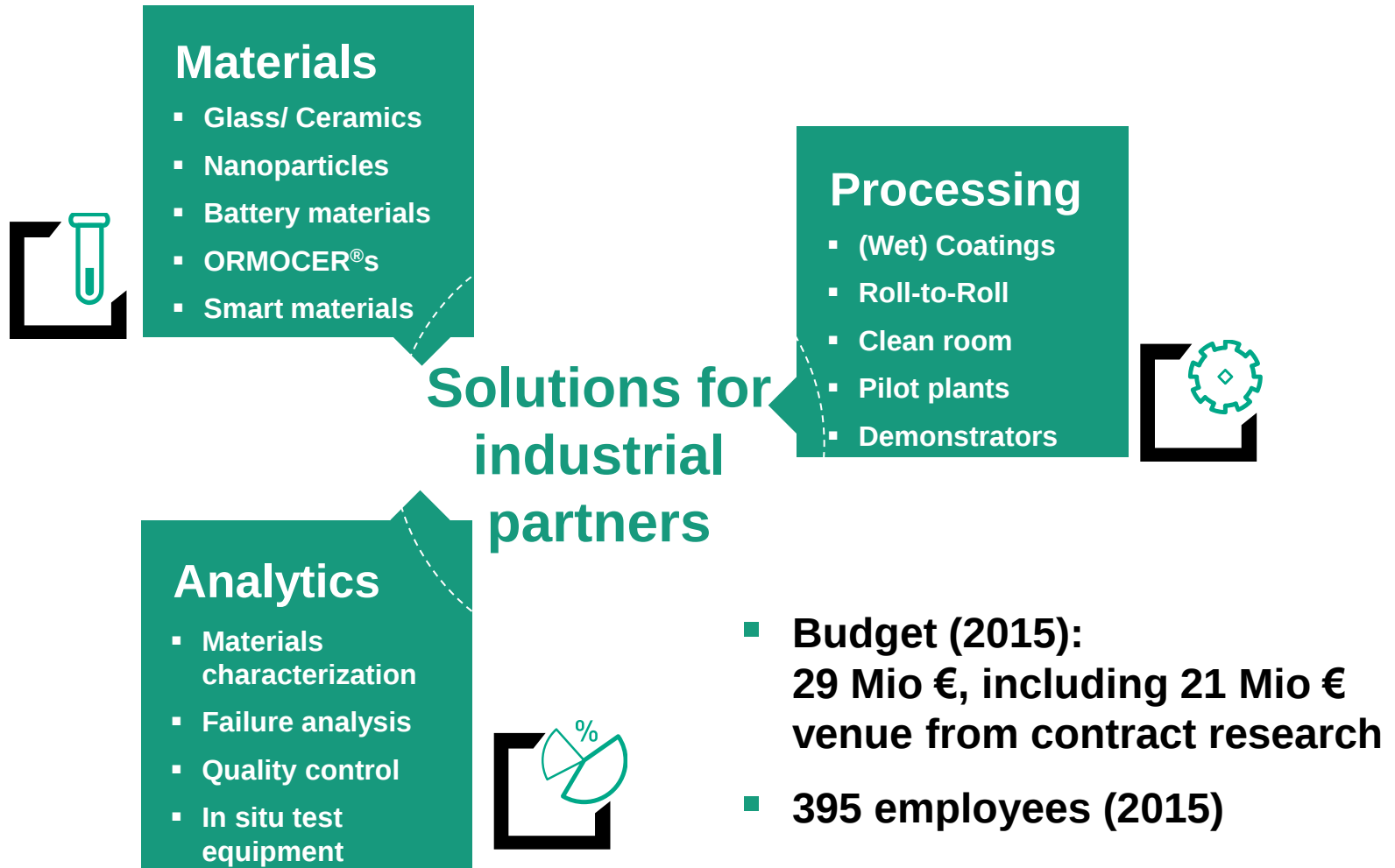
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# Fraunhofer ISC

## Our core competencies



# Examples of our R&D concerning the Energy Revolution

# Research and testing infrastructure: Batterie development

Empowering the energy revolution needs better storing technologies.

Funded by the Bavarian government, Fraunhofer ISC extends the Research and Development Center Electromobility Bavaria

- New materials for electrochemical storage
- Process development
- Characterization/Post-Mortem-Analytics
- Recycling concepts for next battery generations – »Design for Recycling«



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Funded by the Freistaat Bayern

# New ways of Energy harvesting

**Dielectric elastomer generators make emission-free use of wind and water**

- Direct conversion from kinetic energy to electric power
- Up to 1 KW output

## Benefits

- High flexibility and variability
- without critical elements
- Simple design
- Local use
- Low-cost production

Funded by the Freistaat Bayern



# Product development: Nanostructures for efficient solar energy conversion

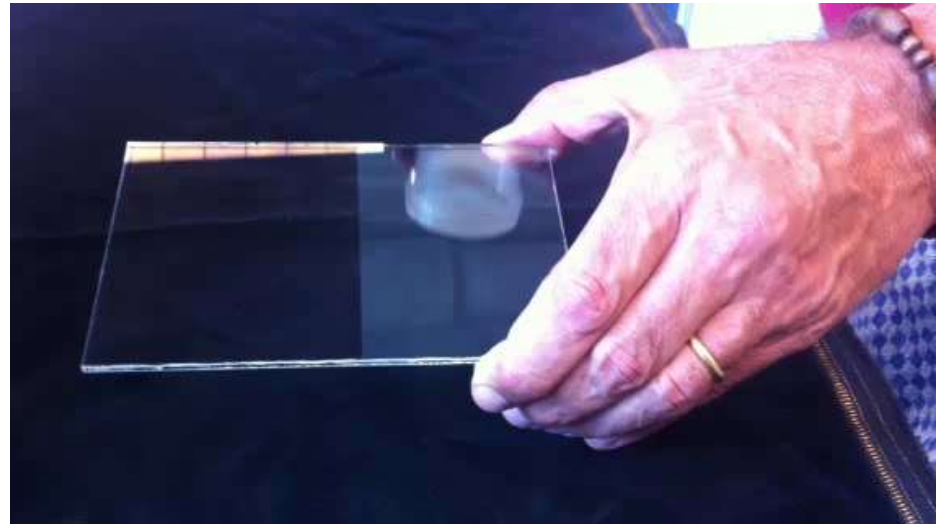
Dust repellent and transmission enhancing coatings for solar glazing and architectural glazing

## Properties

- Sustainable self cleaning even in aride climates without rainfall
- Antireflective effect
- Weather-resistant and long-term stable

## Benefit

- Increase of solar conversion annual performance up to 8 percent
- Optimization of indoor illumination – esp. in the blue spectral range



# Energy aspects within our own building

## Technikum III



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# Planned by Zaha Hadid (1950 – 2016)

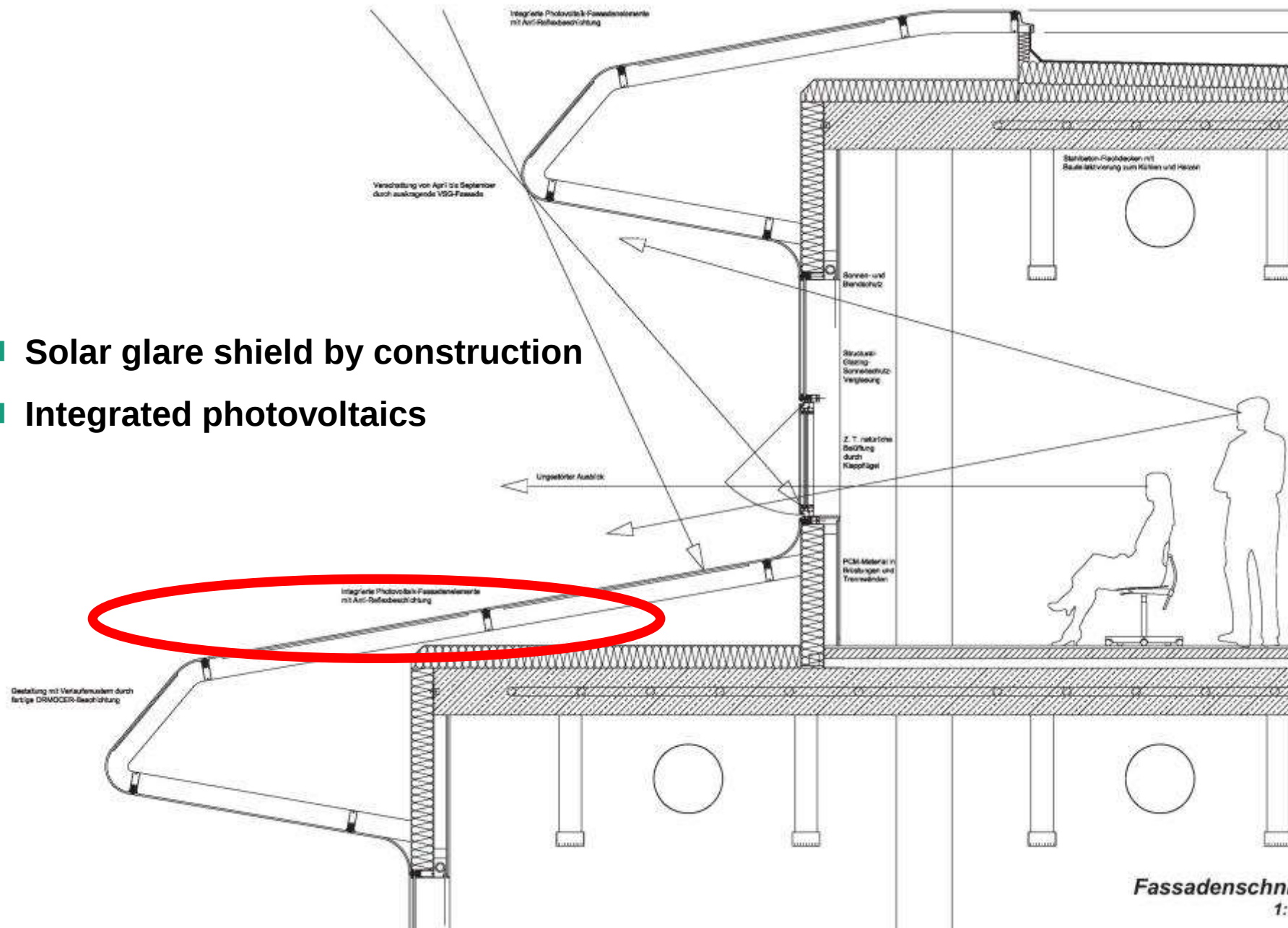


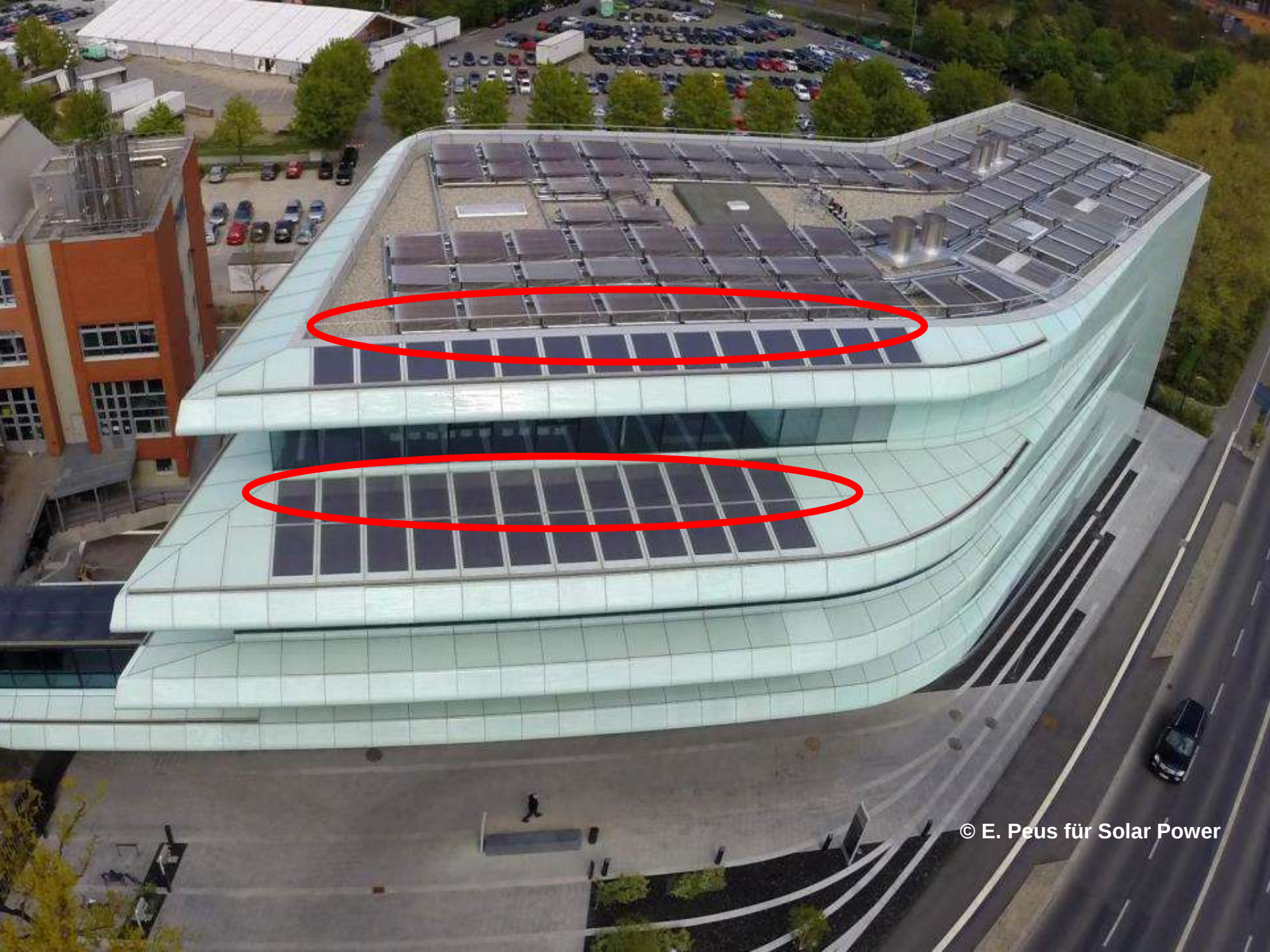
Bildquelle: [www.theguardian.com](http://www.theguardian.com)



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- Solar glare shield by construction
- Integrated photovoltaics





# The German Energy Revolution – spotlights

- Germany aims to reduce green house gas emissions until 2050 to 20 percent from the 1990th emissions. Therefore power generation is to become decarbonized.
- The end of the nuclear power generation is enacted, the last nuclear power plant is to be shut down in 2022.
- Since the late 1980th, various public funding programmes enhanced the renewable energy conversion.
- In 2015 Germany produced 190 TWh out of renewable energy sources (solar, wind, water, biomass) – 35 percent of the total public power generation and 20 percent more than in 2014.
- In July 2015 the monthly power generation of photovoltaics first time overrides nuclear power generation.

# The Energy Revolution – hurdles

- **Political volition vs. different interest groups**
- **Regulatory conditions**
- **Public opinion shizophrenia**
- **High investments for the transformation**
- **Wind and solar energy are not available continuously! Even water energy is not available at any time → technical challenges**
- **Centralized vs. decentralized energy conversion**
  - **Business models focused on centralized energy conversion**
  - **Infrastructure power supply system**
  - **Infrastructure storage/buffer to unload the grids**

# The Energy Revolution – needs

- Sustainable concepts with transparent public participation to bring centralized and decentralized power generation in balance
- New business models (making investment in decentralized renewables more attractive)
- Regulatory conditions
- Efficient and sustainable conversion systems
- Efficient and safe storage systems
- Energy saving products and buildings

Find more at Fraunhofer ISE: [www.energy-charts.de](http://www.energy-charts.de)

What will the energy transformation cost? (Study)

<https://www.ise.fraunhofer.de/en/publications/veroeffentlichungen-pdf-dateien-en/studien-und-konzeptpapiere/study-what-will-the-energy-transformation-cost.pdf>



**Thank you for your attention!**

**[www.isc.fraunhofer.de](http://www.isc.fraunhofer.de)**