HOW CAN POLICY MAKERS HELP CREATE THE RIGHT FRAMEWORK FOR INNOVATION?

Dr. Mario Ragwitz, Fraunhofer ISI

IEA Working Party on Renewable Energy Technologies

© Fraunhofer ISI

Fraunhofer ISI

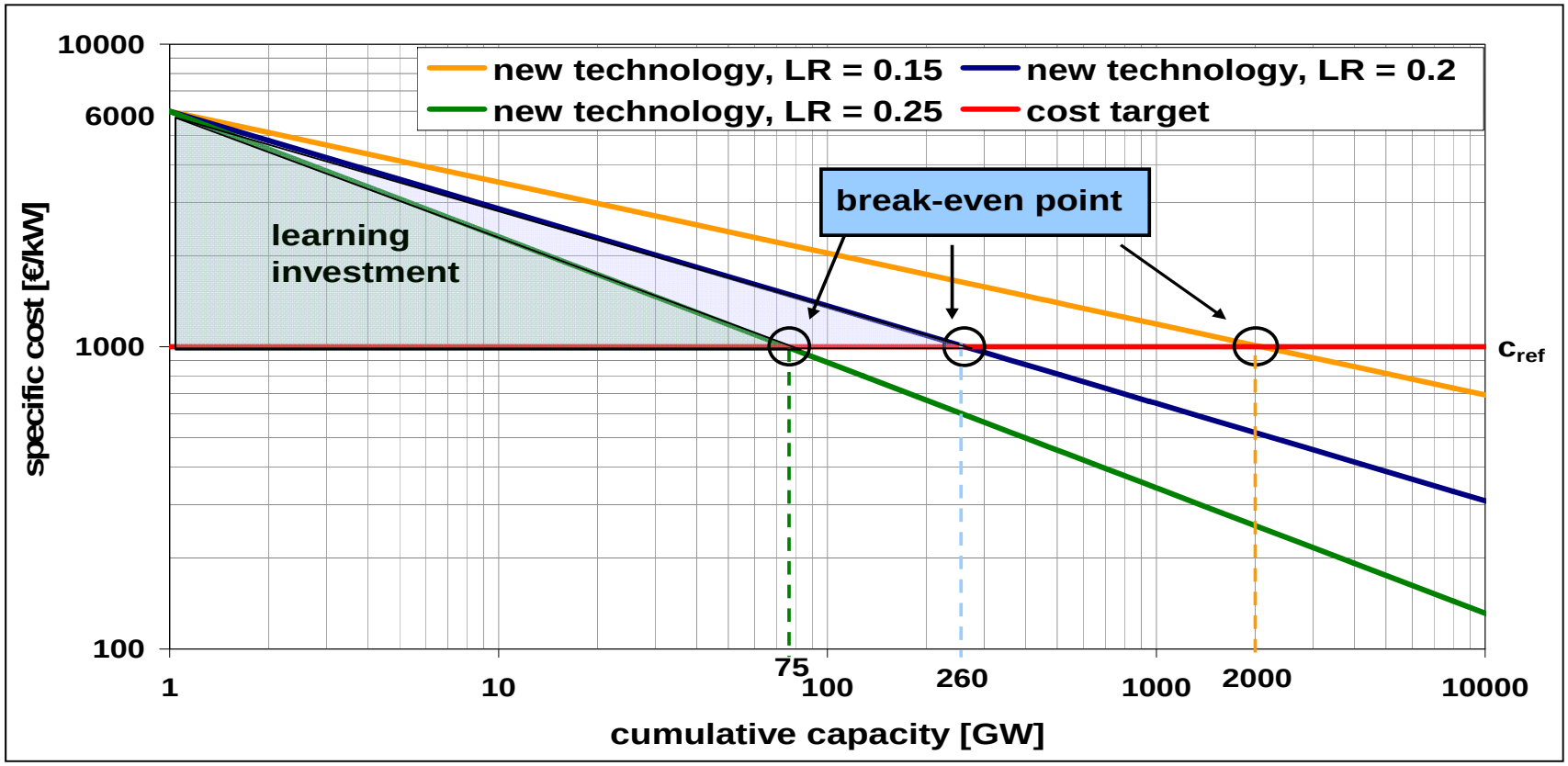
Innovation in renewable energy – basics

- Innovation should be measured using a large variety of indicators; i.e. patents, reduced costs and prices due to improved processes, the number of products newly launched onto the market, innovative start-ups and investments in research and development.
- The higher the market growth induced by deployment policies, the more private companies will invest in exploration and exploitation of new technologies.
- Market growth together with public R&D has lead to substantial innovation effects in RES technologies.
- There has been a marked, disproportionate increase in patent applications for renewable energy technologies over the last few years.
- RES deployment policies for RES need to keep up pressure for cost reduction but at the same time minimize revenue risks.

© Fraunhofer ISI

Fraunhofer ISI

Learning Investment und break-even point



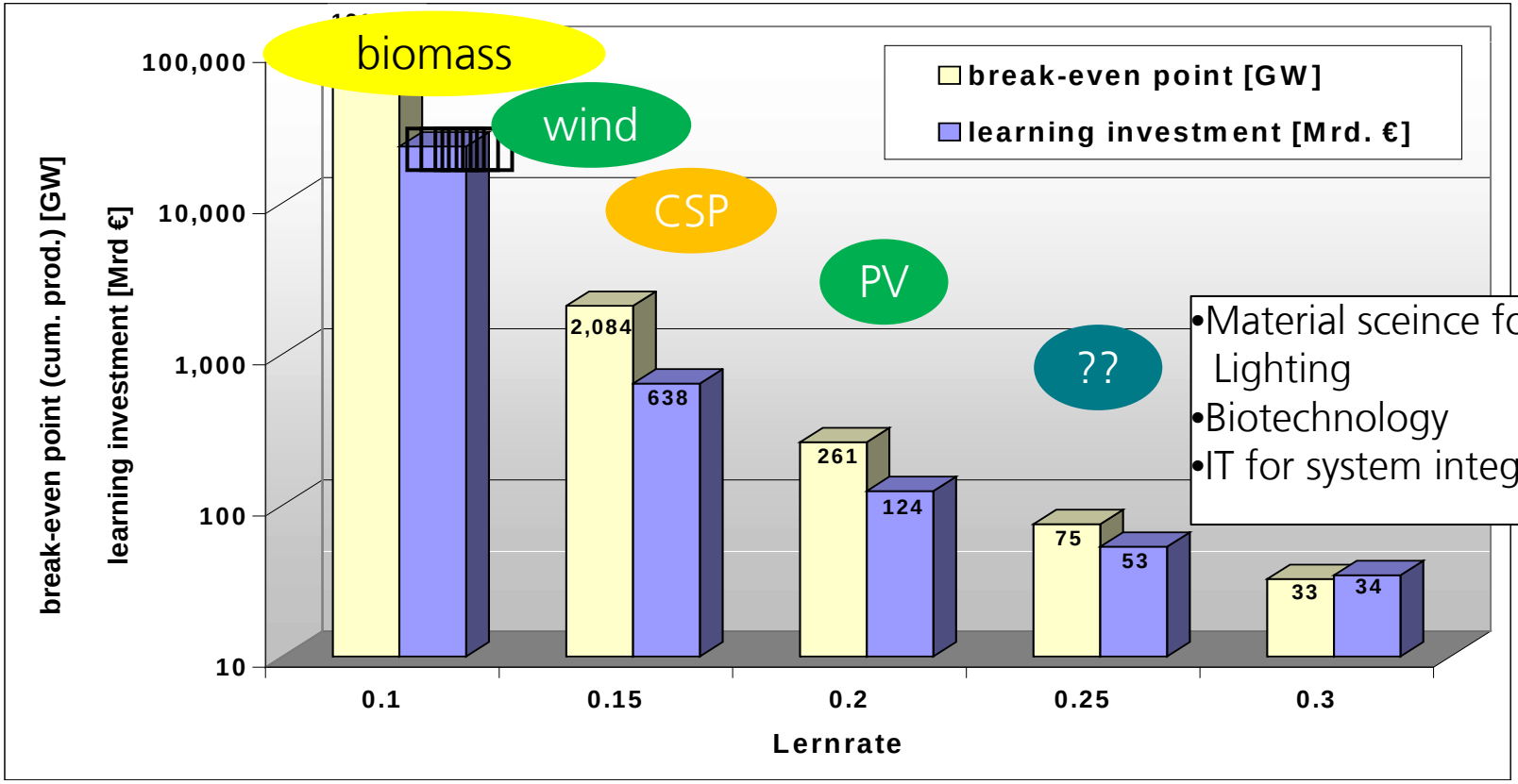
Sensitivity of Learning Investments and break-even point w.r.t. learning rate (log-log scale, c_0 = 6000 €/kW, cost target c_{ref} = 1000 €/kW).

Quelle: Folz; Fh-ISI

© Fraunhofer ISI

Fraunhofer ISI

Learning Investment and break-even Punkt



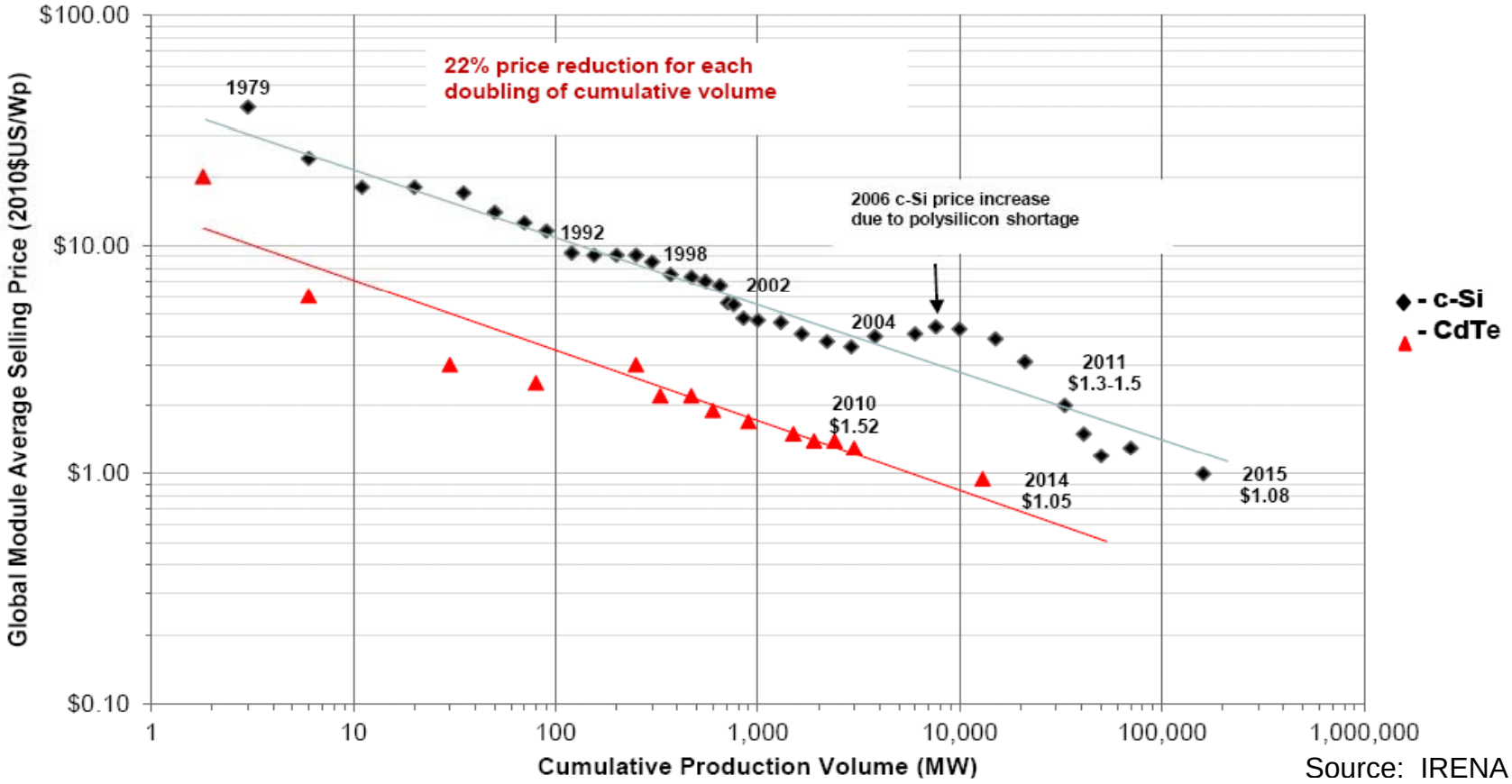
Sensitivity of Learning Investments and break-even point w.r.t. learning rate (log-log scale, c_0 = 6000 €/kW, cost target c_{ref} = 1000 €/kW).

Source: Folz; Fh-ISI

© Fraunhofer ISI

Fraunhofer ISI

Learning curve expectations realised for photovoltaics

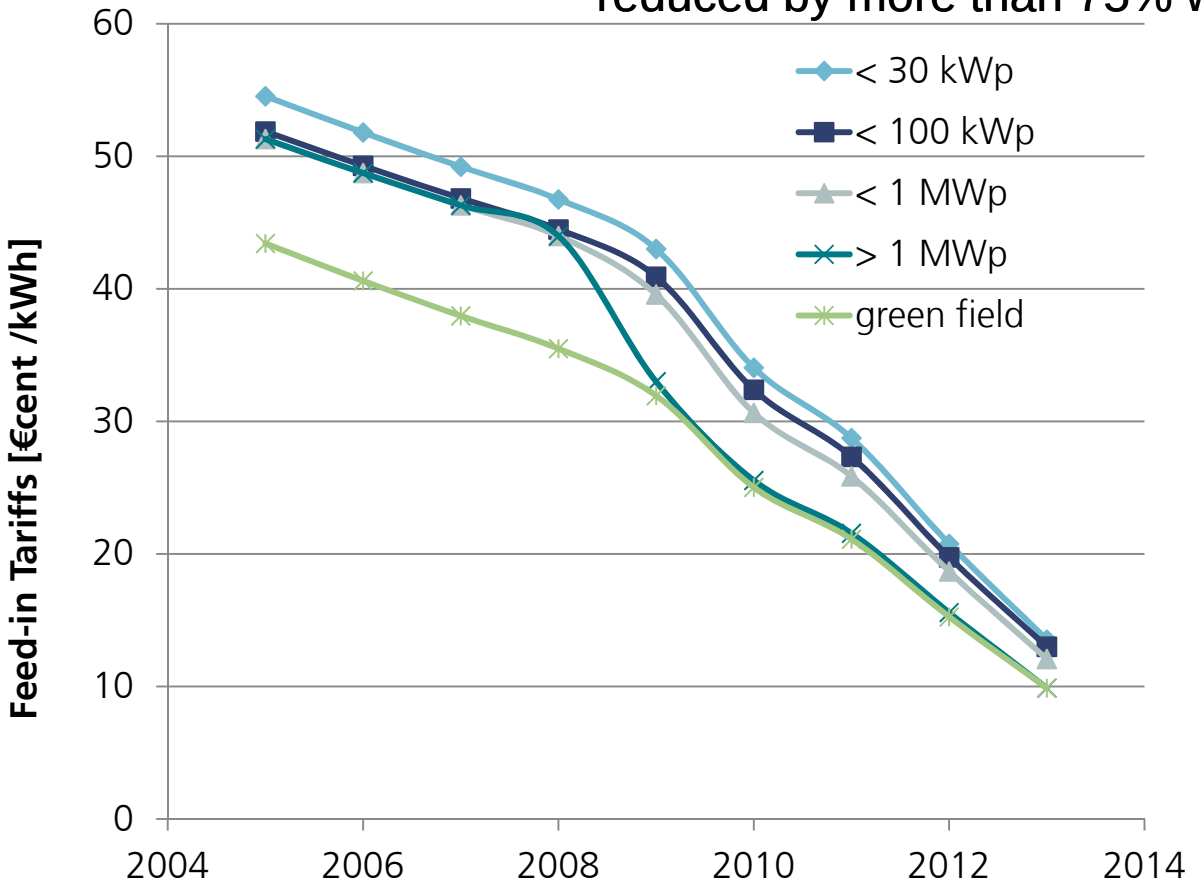


Source: IRENA

Fraunhofer ISI

Continuous price reductions in alignment with cost reductions are key!

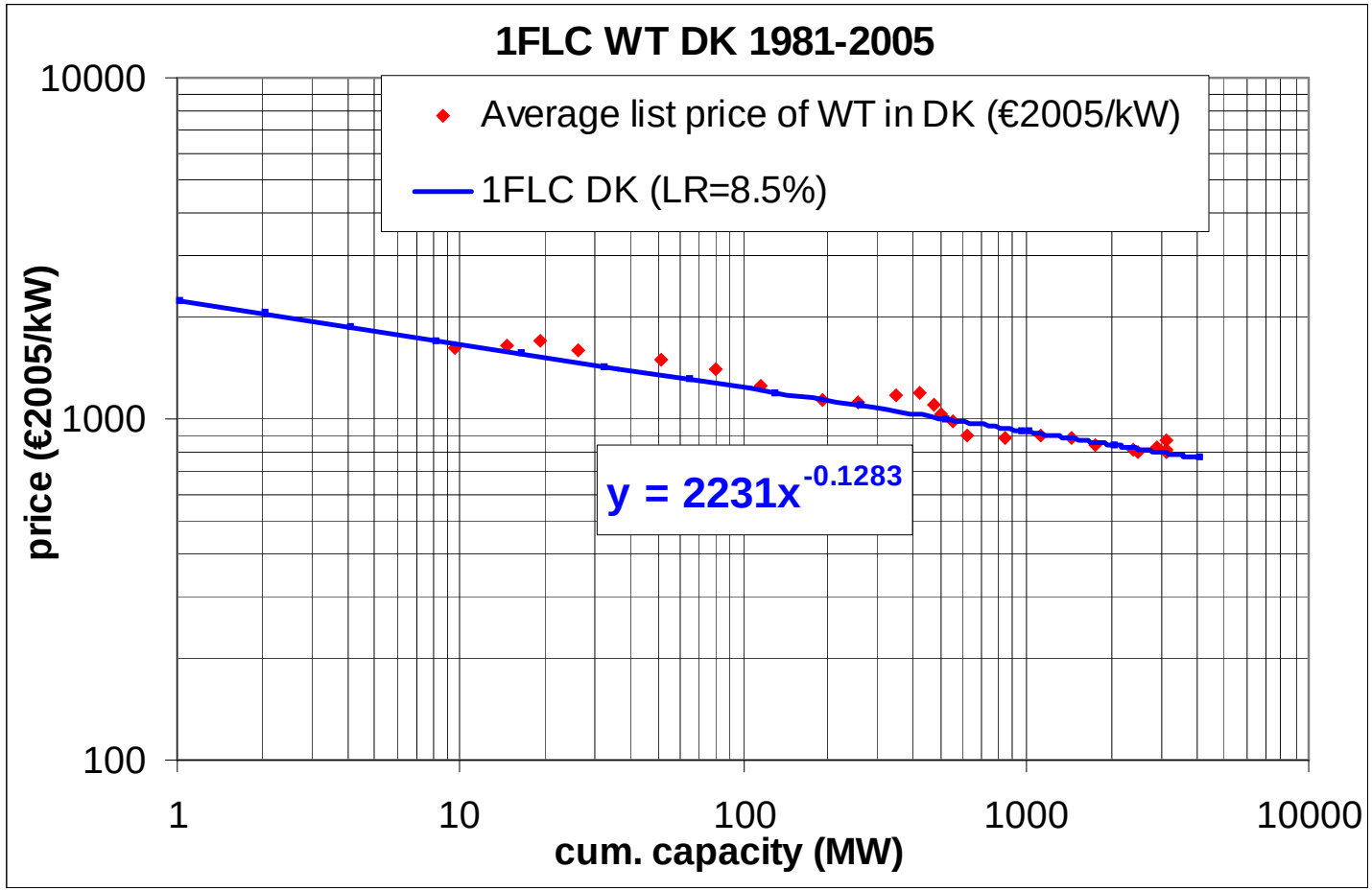
In Germany FIT levels for PV could be reduced by more than 75% within 8 years



© Fraunhofer ISI

Fraunhofer ISI

Learning curve expectations realised for wind energy



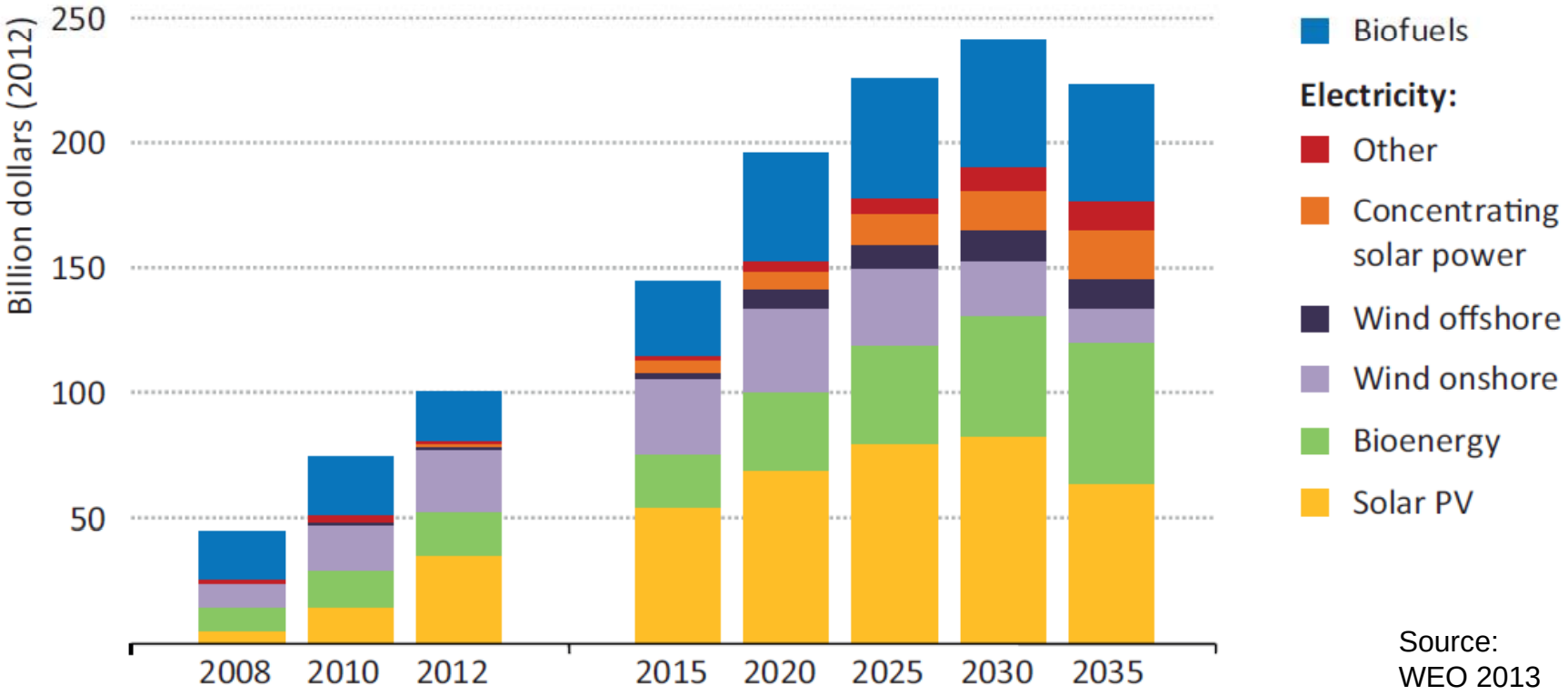
Source: Folz

© Fraunhofer ISI

Fraunhofer ISI

Deployment incentives for RES globally

Total Subsidies for Renewable energies continuously increase despite strong technological learning



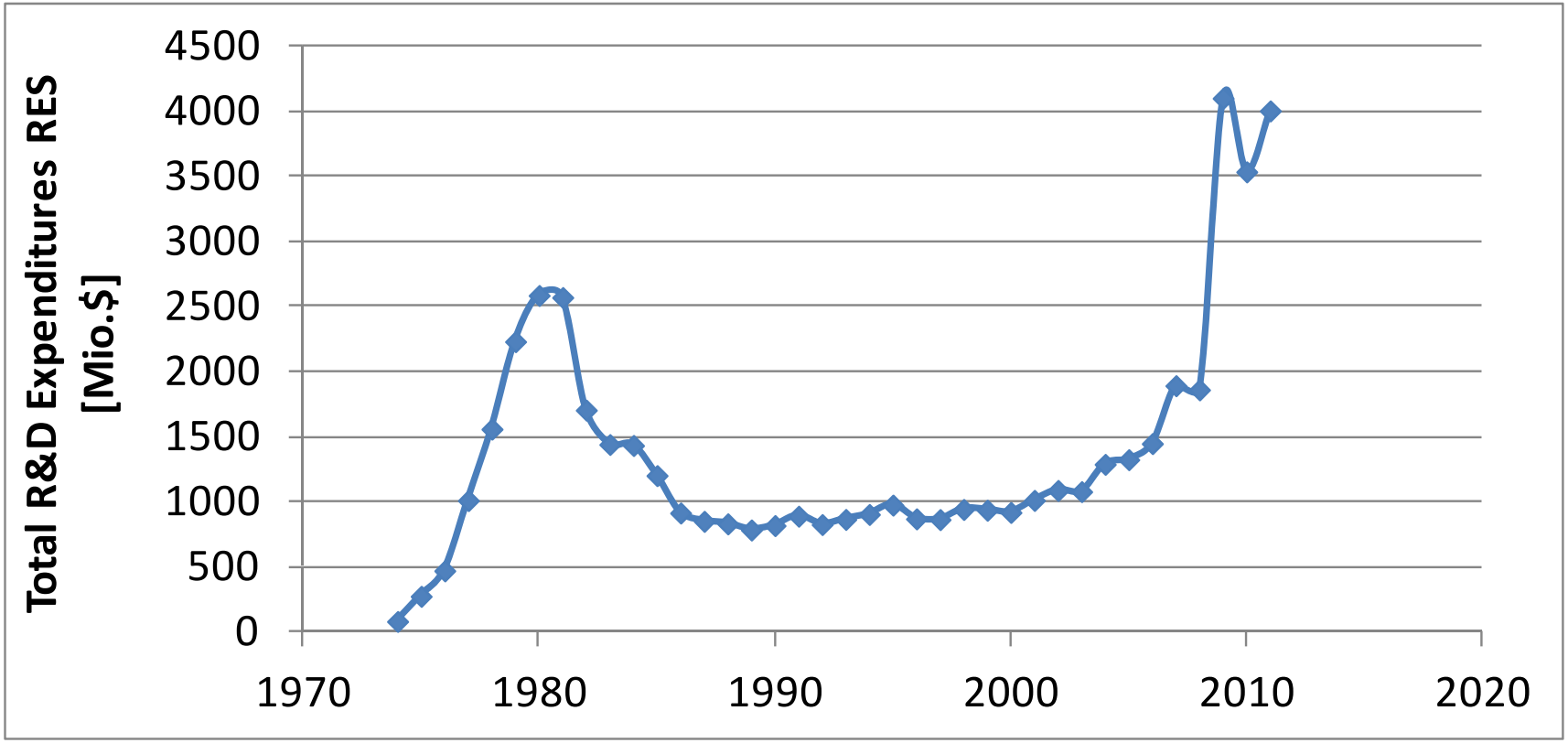
Source: WEO 2013

© Fraunhofer ISI

Fraunhofer ISI

R&D expenditures for RES in OECD

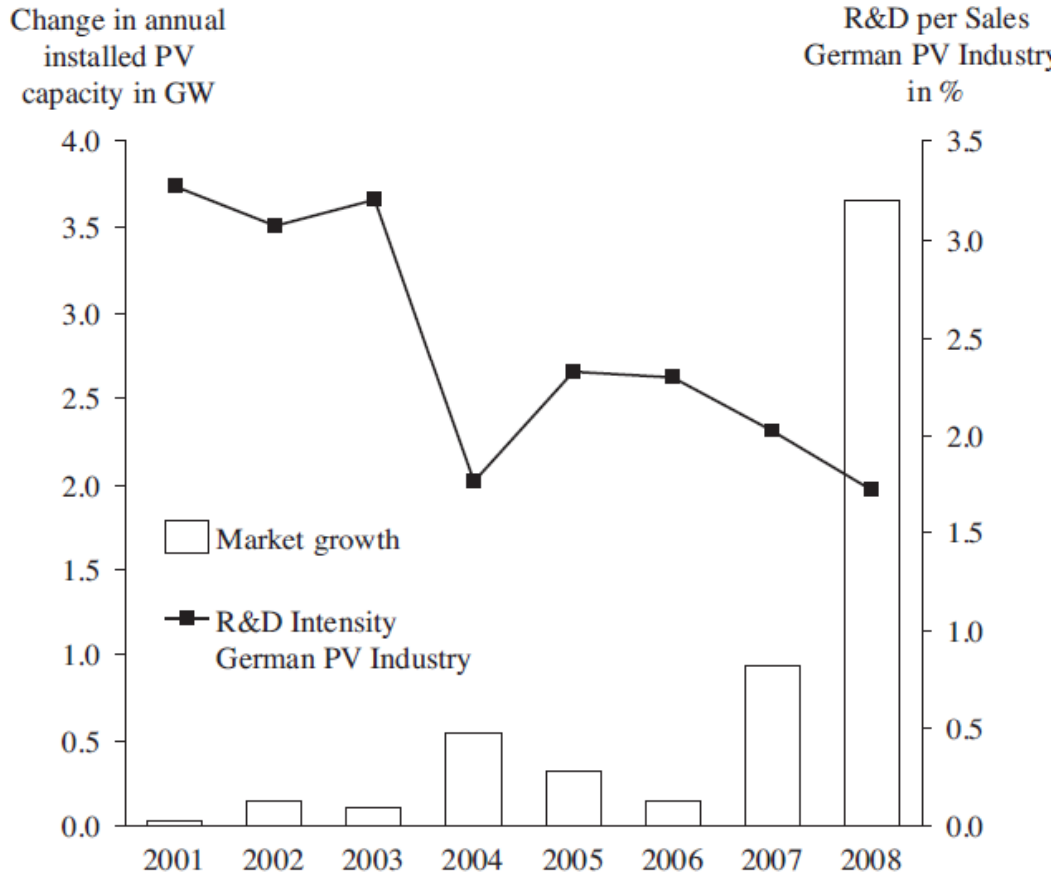
Total R&D expenditures for RES also show rapid increase during last decade



© Fraunhofer ISI

Fraunhofer ISI

R&D spending and market development of PV in Germany

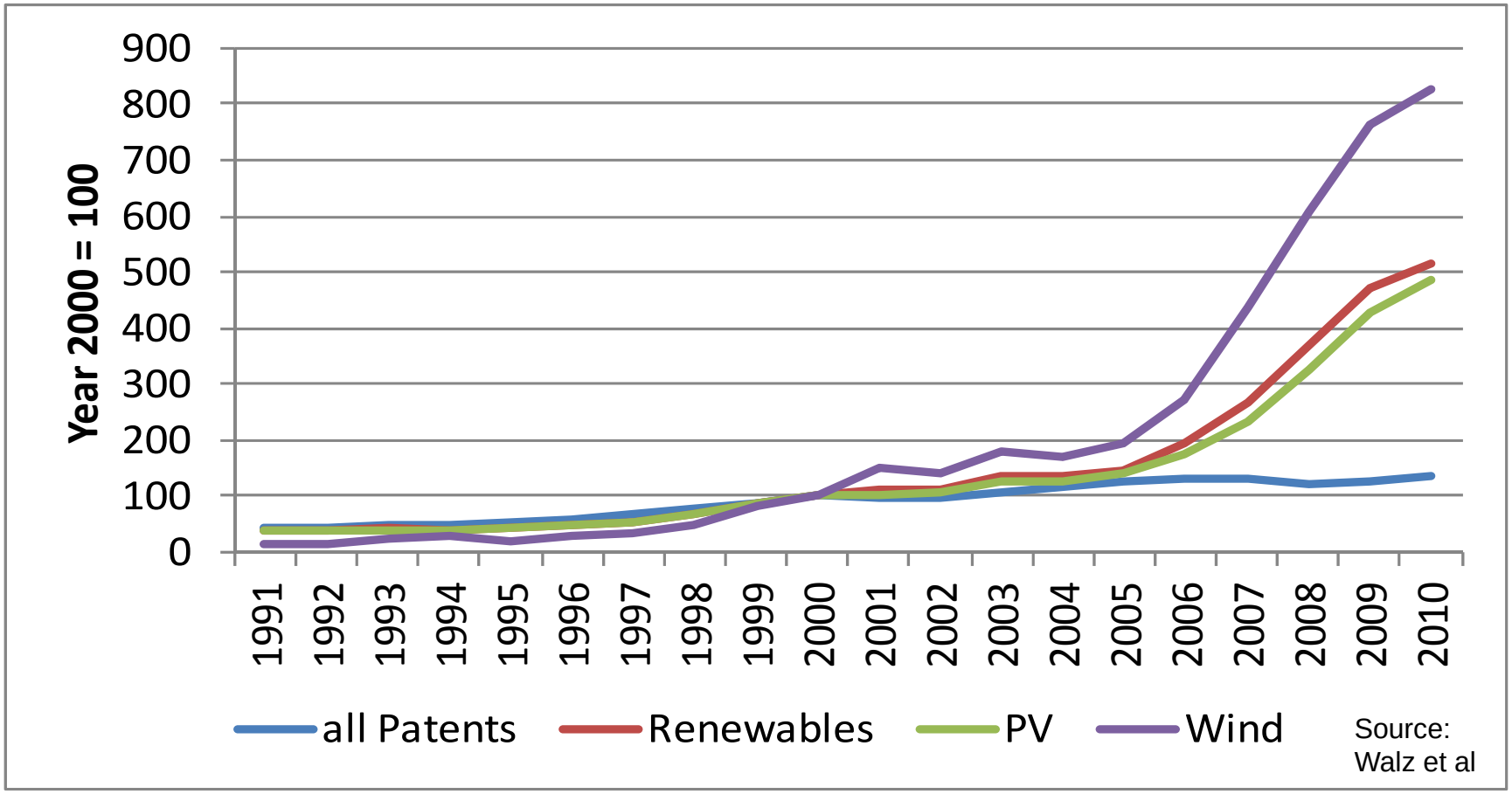


Relative R&D spending per sales of German PV industry decreased with growing market but **absolute** expenditures strongly increased.

Source:
Hoppmann et al (2013)

Fraunhofer ISI

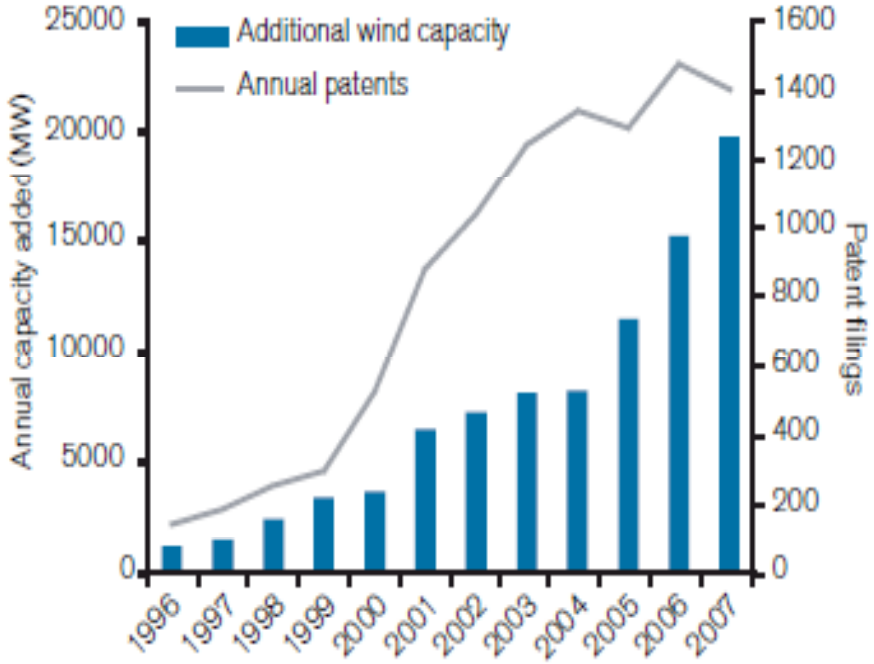
Number of patents for renewables grows substantially stronger than all patents

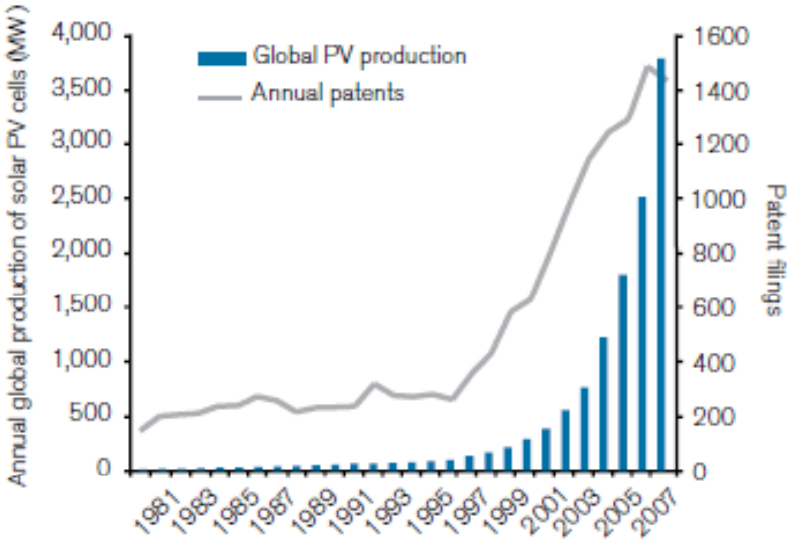


© Fraunhofer ISI

Fraunhofer ISI

Number of patents for renewables strongly correlates with RES market deployment





Source:
Chatham House

Fraunhofer ISI

Innovation in renewable energy – key findings

- "**Carbon pricing** alone will not be sufficient to reduce emissions on the scale and pace required … **deployment incentives** for low emission technologies should increase two to five times … **public energy R&D funding** should double" – Stern Review
- **Stable and predictable remuneration schemes** for renewables provide the basis for continuing innovation and cost reduction
- **Public R&D should focus on fundamental and applied research** in new technologies with a focus on cross-cutting issues like material science or biotechnology and **compete** for the best R&D result
- **Generation system with more flexibility** need in **institutional innovations,** e.g. to create markets to incentivize flexibility of the demand side or participation of renewables in balancing markets – governments need to support the **suitable market design**

© Fraunhofer ISI

Fraunhofer ISI

We systematically assess key **factors framing renewable energy technology diffusion in the European Union** in an online questionnaire open until 15th of April and **kindly ask you to participate** in this:

http://www.re-frame.eu/

Thank you!

Fraunhofer ISI