SOLAR FOR ALL

# »Solar for All« Contest

## for Innovative Community Solar Electrification Solutions

## 2016

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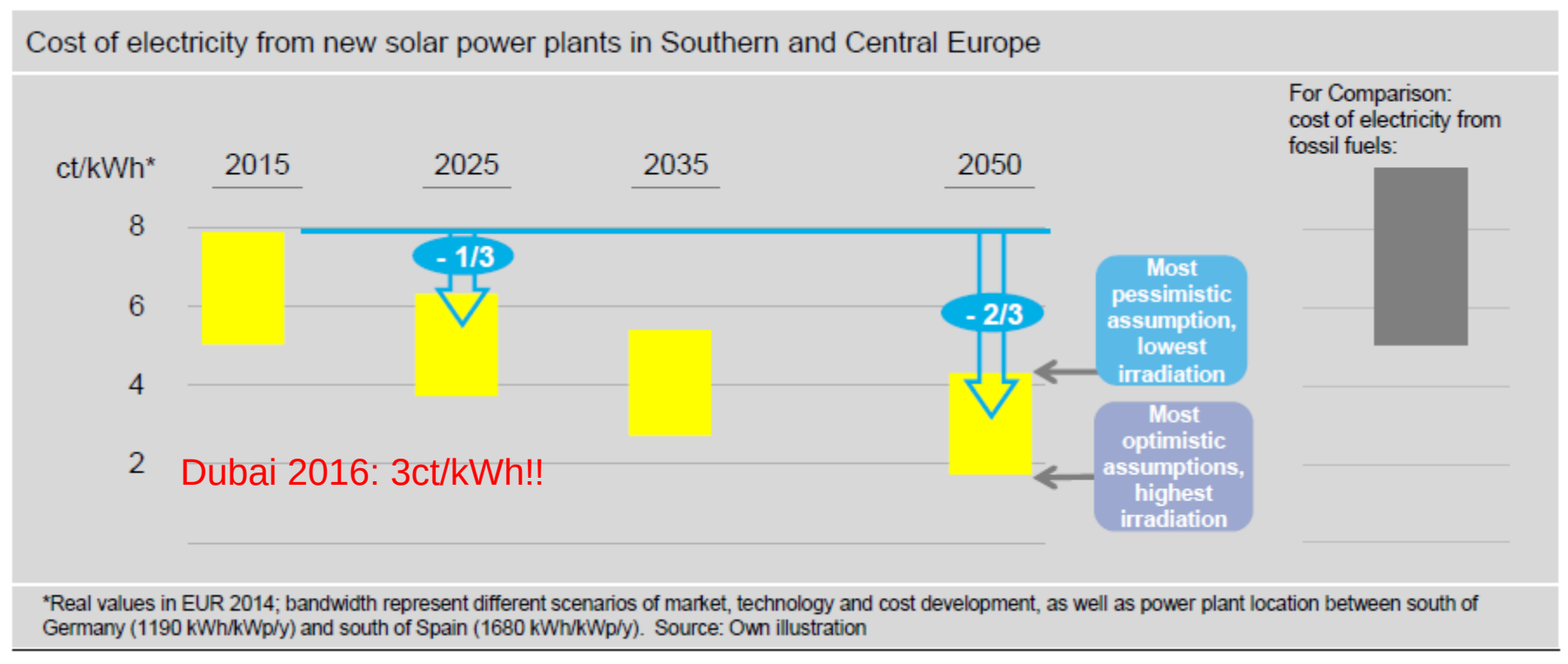
Director, Fraunhofer ISE

Levelized Cost of Photovoltaic (PV) Electricity

# Solar power soon offers the lowest-cost electricity in many regions of the world!

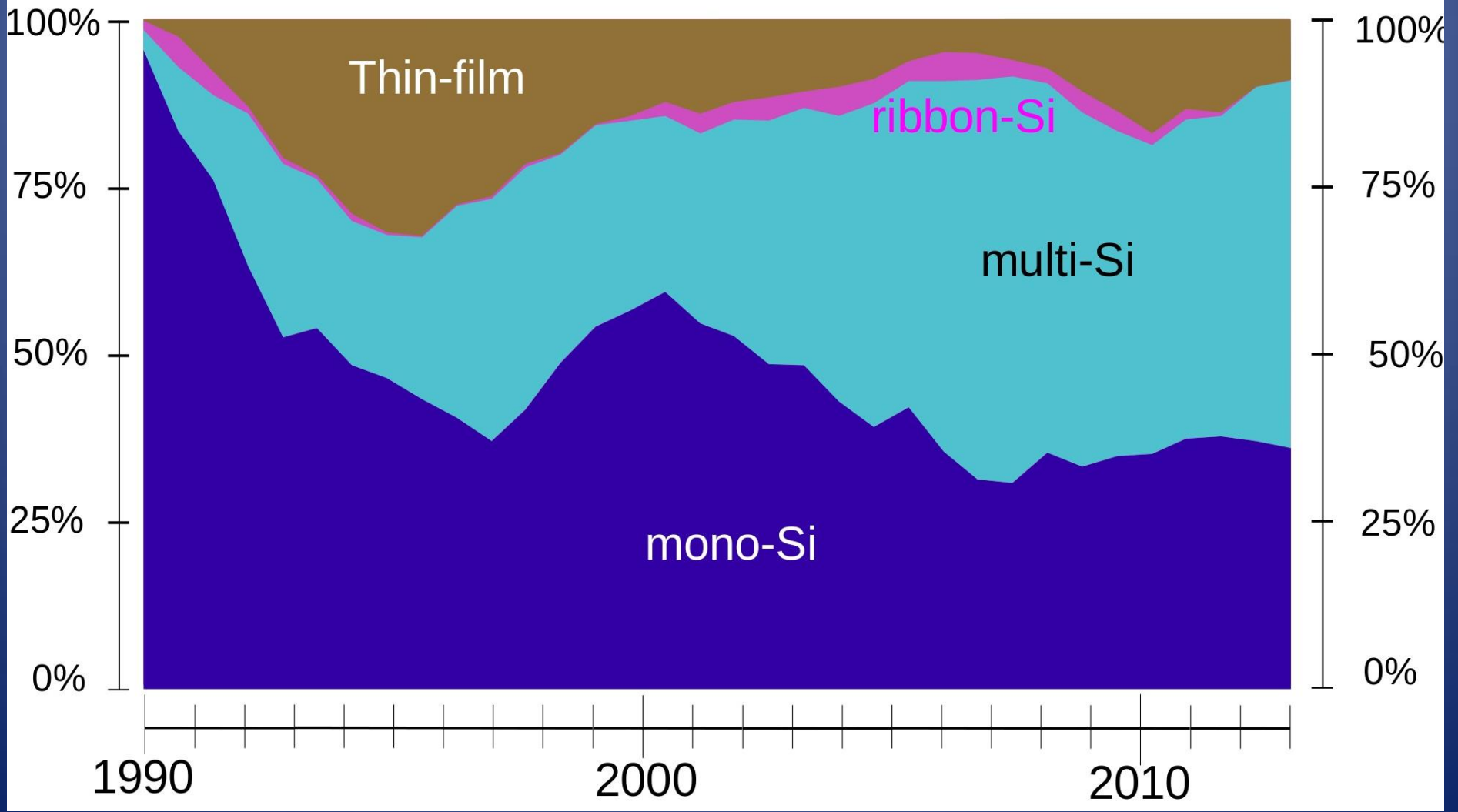



**InterSolar India 2016 – Workshop: "Bridging the Financing Gap-Innovative Financing and Ecosystem Building for off-grid Energy Access Entrepreneurs "**

Source: Fraunhofer ISE (2015): Current and Future Cost of Photovoltaics.
Study on behalf of Agora Energiewende

# Global Market Share by PV Technology

from 1990 to 2013




Source: Solarbuzz 2014

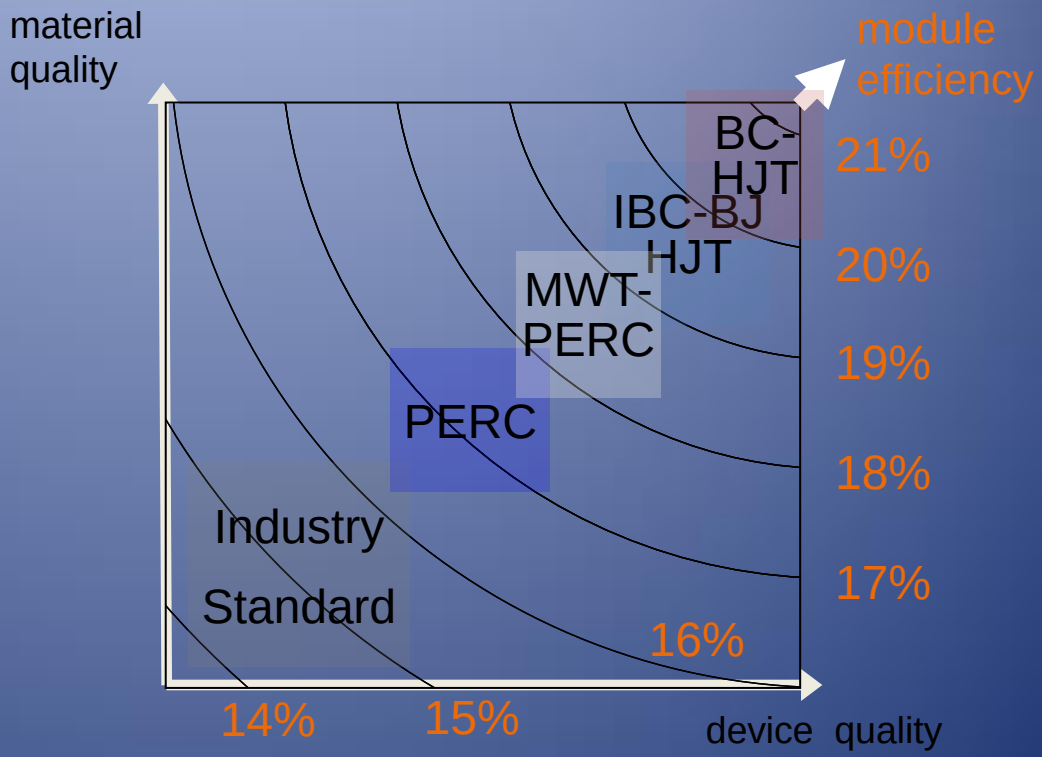
Crystalline Silicon Technology Portfolio

# c-Si PV is not a Commodity, but a High-Tech Product!

material quality
- diffusion length
- base conductivity

device quality
- passivation of surfaces
- low series resistance
- light confinement

cell structures
- PERC: Passivated Emitter and Rear Cell
- MWT: Metal Wrap Through
- IBC-BJ: Interdigitated Back Contact – Back Junction
- HJT: Hetero Junction Technology




Adapted from Preu et al., EU-PVSEC 2009

# Global PV Production Capacity and Installations

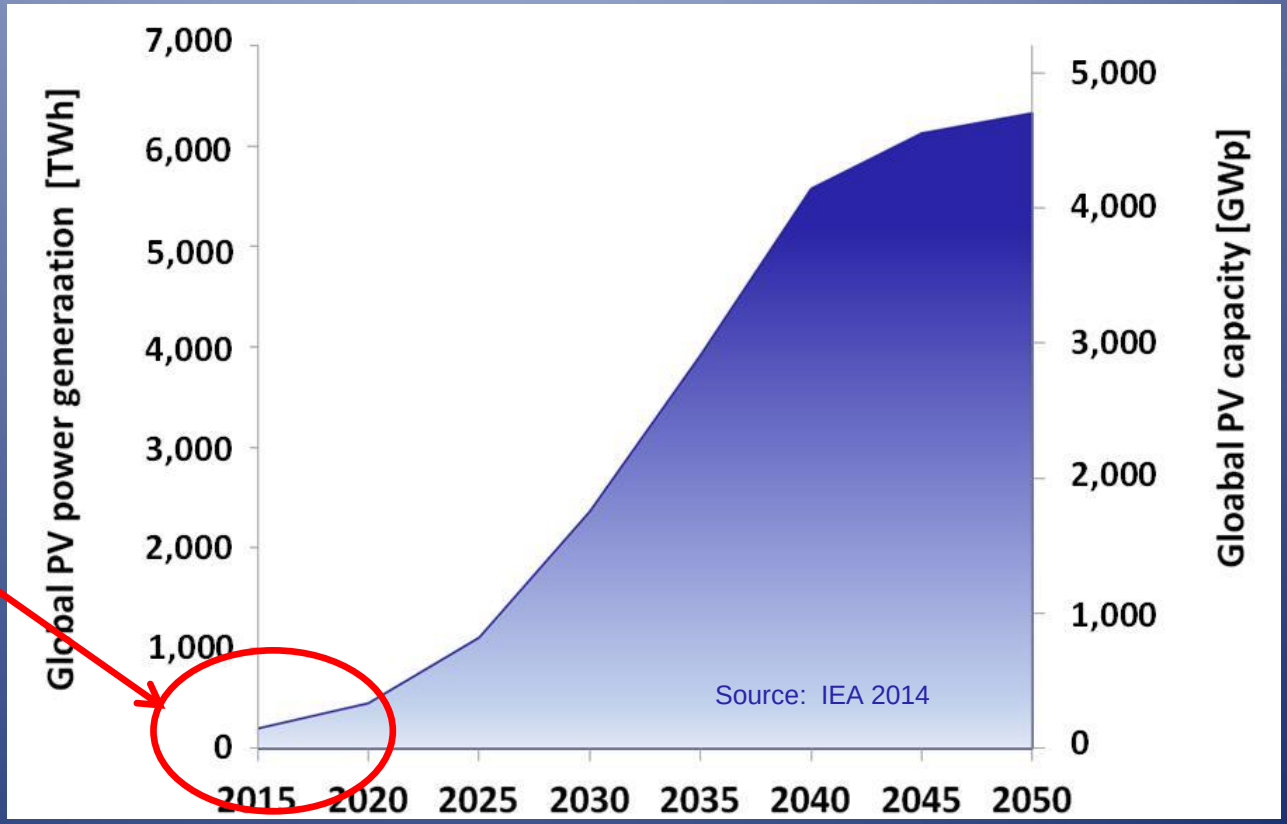

| | 2010 | 2011 | 2012 | 2013e | 2014e | 2015e | 2016e | 2017e |
|---|---|---|---|---|---|---|---|---|
| Production Capacity | 31,8 | 50,1 | 62,7 | 65,1 | 65,6 | 57,9 | 60,0 | 65,1 |
| Installations | 15,1 | 26,8 | 30,8 | 35,1 | 43,7 | 51,9 | 57,1 | 58,8 |
| Excess Capacity | 110,6% | 86,9% | 103,8% | 85,3% | 50,1% | 11,6% | 5,1% | 10,7% |

Source: Lux Research Inc., Grafik: PSE AG

# PV Market Growth: PV heading into the Terawatt Range!

- Rapid introduction of PV globally is fueled by availability of cost-competitive, distributed energy
- In 2050 between 4.000 and 30.000 $GW_p$ PV will be installed!
- By 2016, less than 300 $GW_p$ have been installed!

We are just at the beginning of the global growth curve!



- With all these positive outlooks for the global penetration of cost-effective PV, progress of PV into the huge market of 1.4 bn people without own electricity worldwide is still very slow.

- All contestants of SOLAR FOR ALL confirmed that access to financing is their biggest obstacle for further expansion.

- Contests such as SOLAR FOR ALL can serve to identify innovative solutions in the field of commmunity solar electrification.

- The combination of technical due diligence by Fraunhofer ISE, combined with a thorough financial analysis serves well to de-risk investment into SOLAR FOR ALL finalists.

- Fraunhofer ISE is pleased to offer technical due diligence for PV projects of all sizes on a global basis, with more than 30 years of world-leading research experience in this field!

- The Jury was very pleased about the technical quality and the multiplication potential of all finalists, especially the winning teams.

- We consider crowdfunding for those companies to be a very promising strategy to access investor money.

- We strongly recommend participation in the crowdfunding of bettervest, for SOLAR FOR ALL winners, and for their other projects.

- The combination of thorough technical and financial analysis, followed by crowdfunding, might develop into a very promising approach to assist in bridging the financing gap for off-grid entrepreneurs in India and globally!

SOLAR FOR ALL