



MEYER BURGER



Pushing the boundaries: HJT technology to decrease LCOE

Dr Gunter Erfurt, Chief Operating Officer

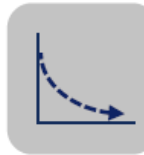
Munich, 6/1/2017



HJT – compelling benefits

Heterojunction technology

- Highest efficiency >22,5% production average, further upside potential
- 35% more kWh/m² compared to standard c-Si technology and therefore lowest levelized cost of electricity
- Highest energy yield due to excellent Tc (-0.25%/K), bifacial cell design and cell stability (no PID, no LID)



Lowest OPEX
through less production steps



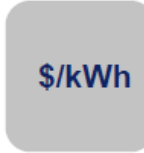
Highest efficiency



Wafer thickness below 150
μm possible



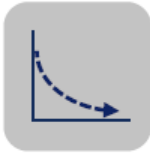
New technology with highly
competitive Capex/Watt



Lowest levelized cost of
electricity



Limited risk with fast
Return on Investment



Reduced production steps and labour costs



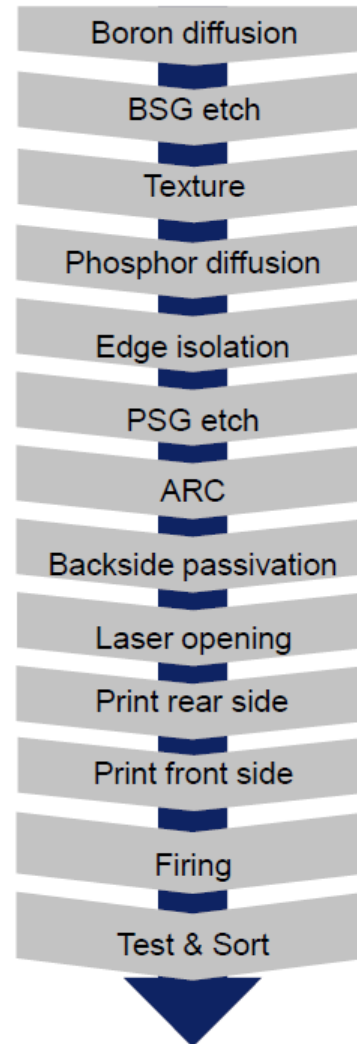
PERT/PERL hurdles for mass production

- High number of process steps
- Double diffusion affecting yield and efficiency distribution

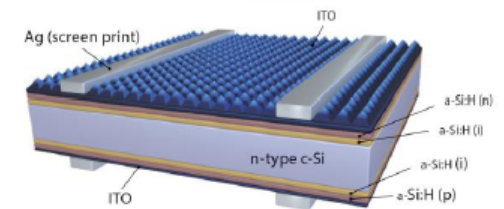
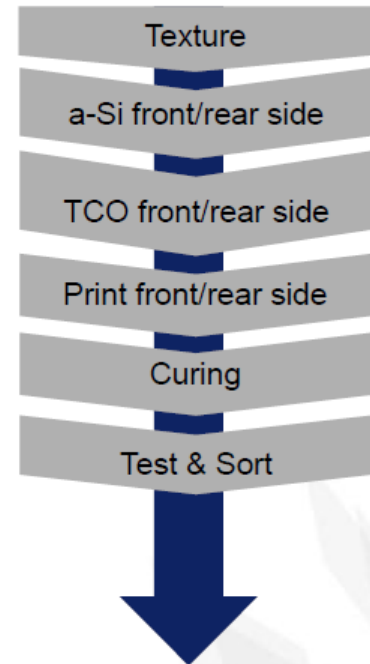
HJT Benefits

- Less footprint and manpower due to few process steps
- Efficiency potential up to 26%
- Suited for “thin wafers” due to
 - Voc increase for thin wafer
 - Symmetric front and backside
- “Free” Bifacial cell with highest backside efficiency
- Low temperature coefficient
- Lowest levelized cost of electricity

PERT/ PERL process



HJT process



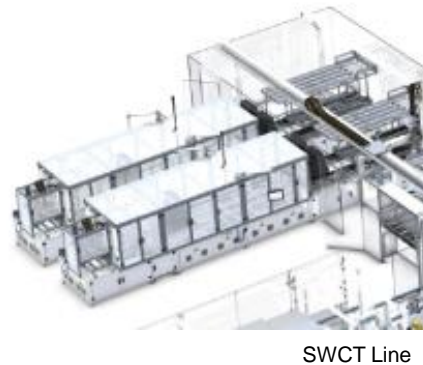
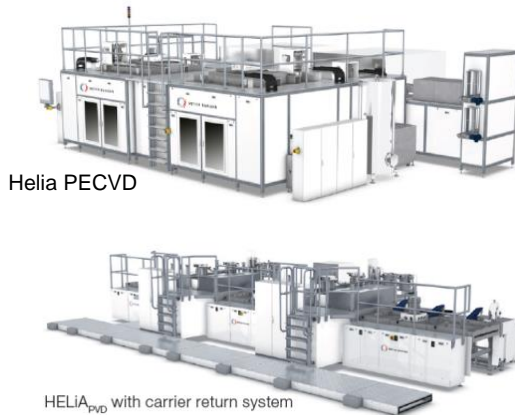
Meyer Burger drives PV technology roadmap: geared up to set next standards



Heterojunction Cell Technology

SmartWire Technology

Glass/Glass Module



HJT

SWCT

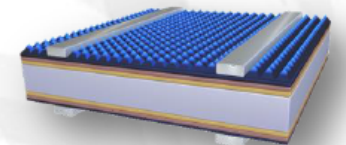
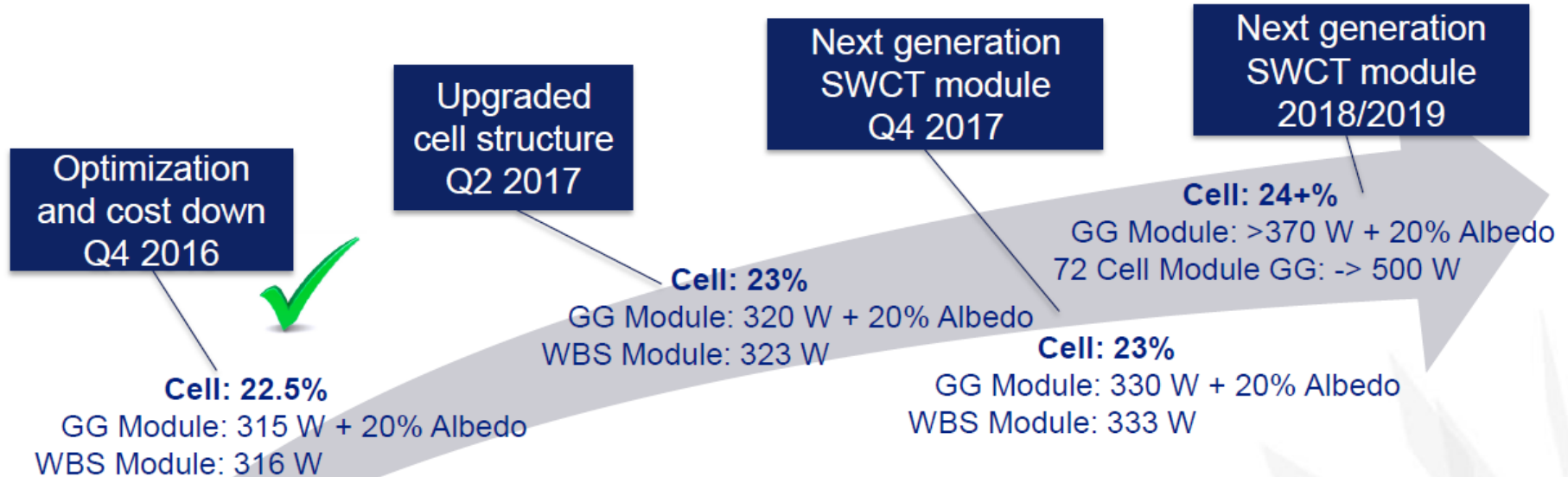
384 Watt bifacial
60 cells with 20% Albedo
vs ~300 Watt PERC Mono

Laying the ground for next industry standards



22,5% cell efficiency guaranteed

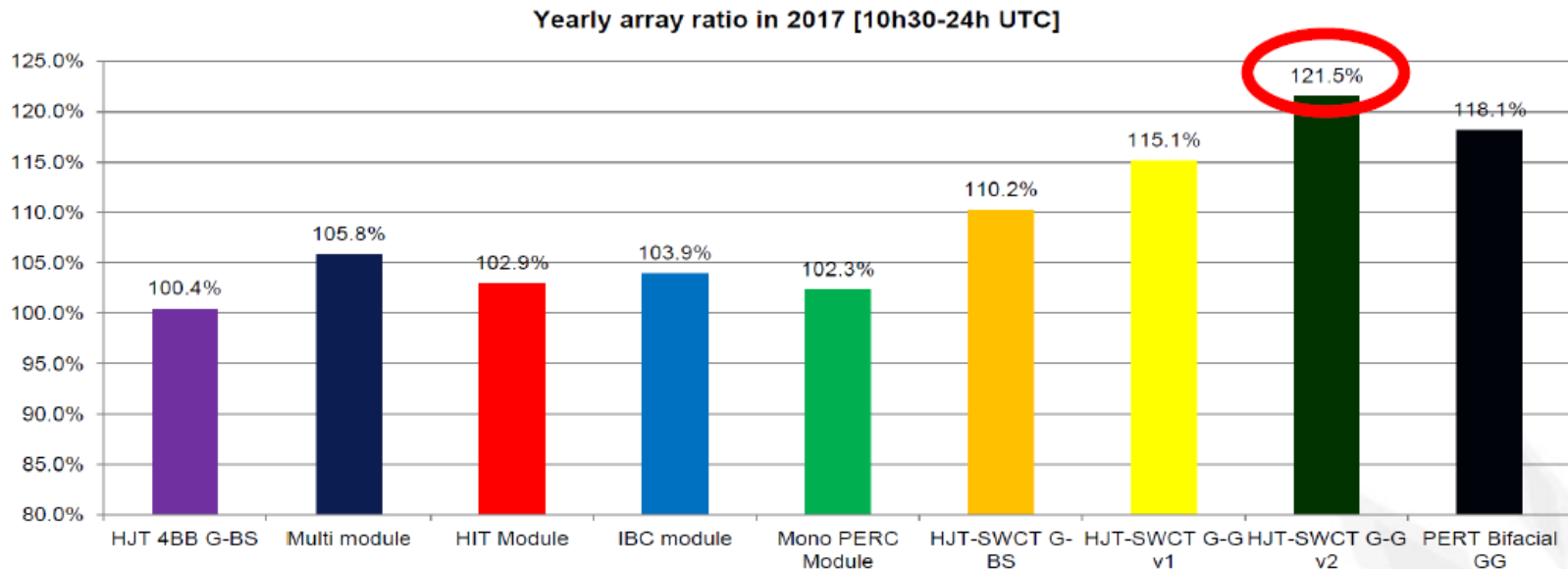
Strong roadmap beyond 23,5%



As part of the cooperation with Meyer Burger, we contractually guarantee an average cell efficiency of 22,5%

Independent institute measuring +21% higher energy yield

HJT/SWCT Energy Yield measured at CEA/INES – Jan 16th to 31st 2017



- HJT-SWCT mono-facial G-BS has **+4.4%** higher average energy yield than Multi module
- HJT-SWCT mono-facial G-BS has **+7.9%** higher average energy yield than Mono PERC module
- HJT-SWCT mono-facial G-G has **+3.4%** higher average energy yield than PERT Bifacial module (Transparent backsheet)

➤ This translates directly into a lower LCOE for HJT-SWCT, which confirms HJT-SWCT business case

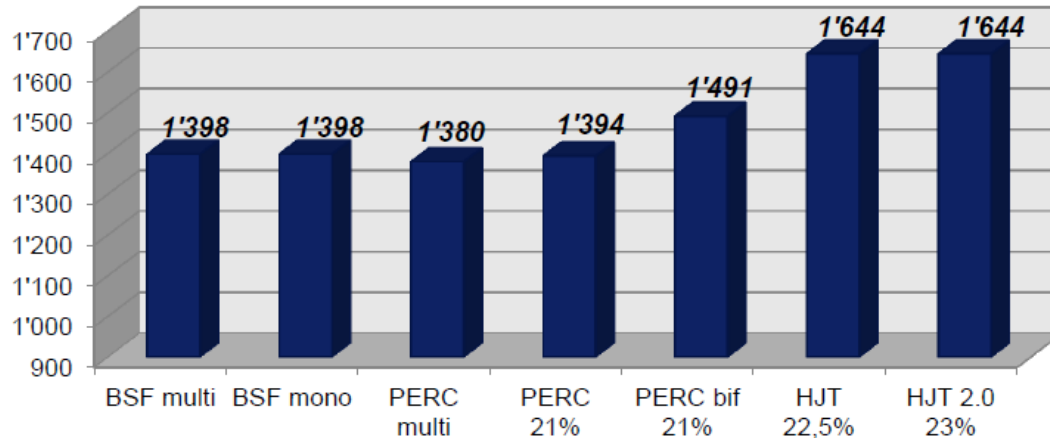
\$/kWh

Levelized cost of electricity

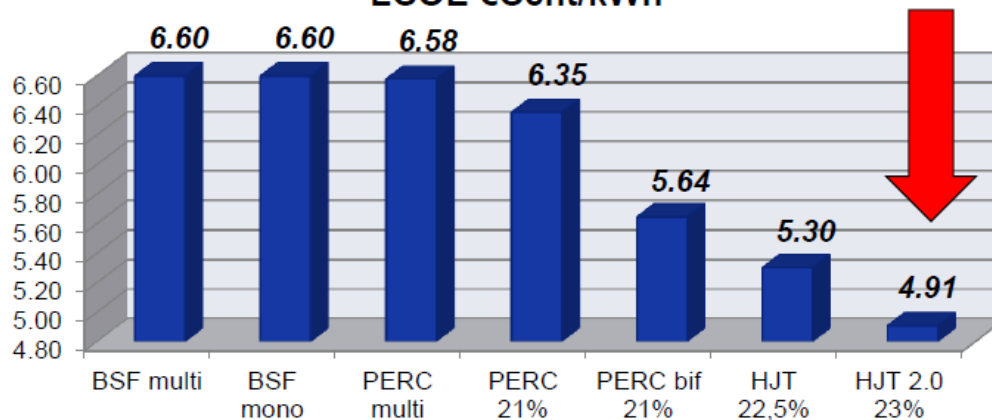
The only real driver



Energy Yield [kWh/kWp]



LCOE €Cent/kWh



Target

- Bring kWh generation cost to the cheapest level of all options
- Find best technology for mass production capability

Assumptions

- 1600 kWh/m² yearly irradiation
- 55°C average module working temperature
- 25 years system lifetime
- 1-2% LID for PERC
- 10% albedo effect for HJT bifacial
- 7% albedo for PERC/PERT/L bifacial



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Thank you for your attention

