



**mtec**

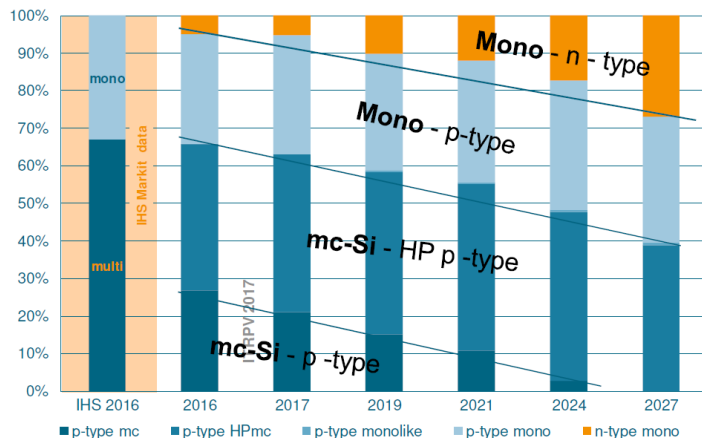
**HIGH EFFICIENCY LOW COST PV TECHNOLOGY**

**PHILIP PIETERS**

**BUSINESS DEVELOPMENT DIRECTOR ENERGY**

# ITRPV 2017 TRENDS

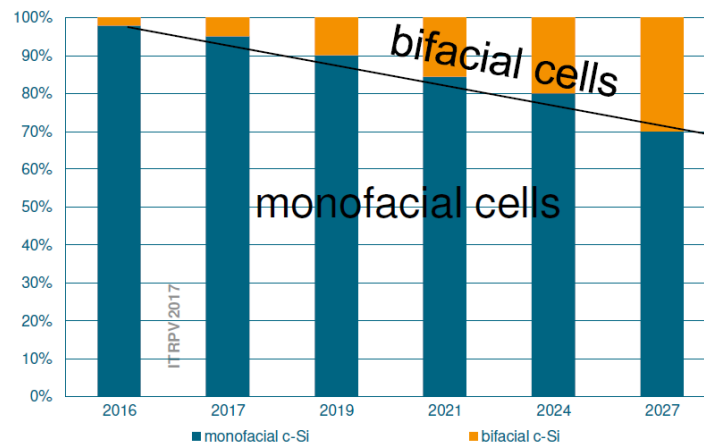
## MORE N-TYPE



### Advantage n-type

- No B-O complex, no LID  
note: advanced hydrogenation for p-type
- Less sensitive to metal impurities
- Better surface passivation
- Bifacial cells

## MORE BIFACIAL

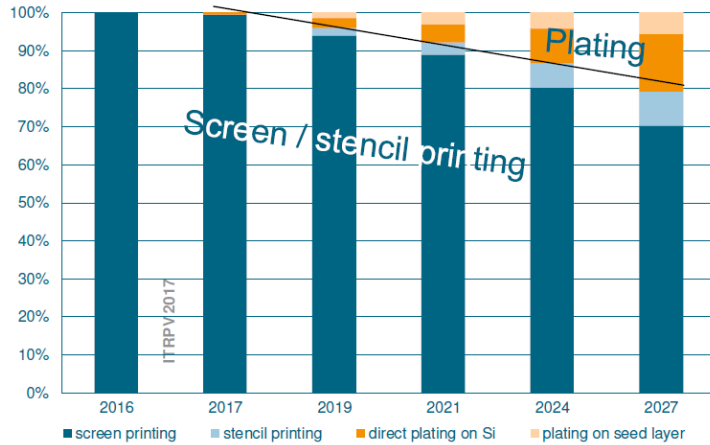


### Advantage bifacial

- More kWh
- Lower cell cost (less metal)
- Glass-glass modules typical longer life-time

# ITRPV 2017 TRENDS

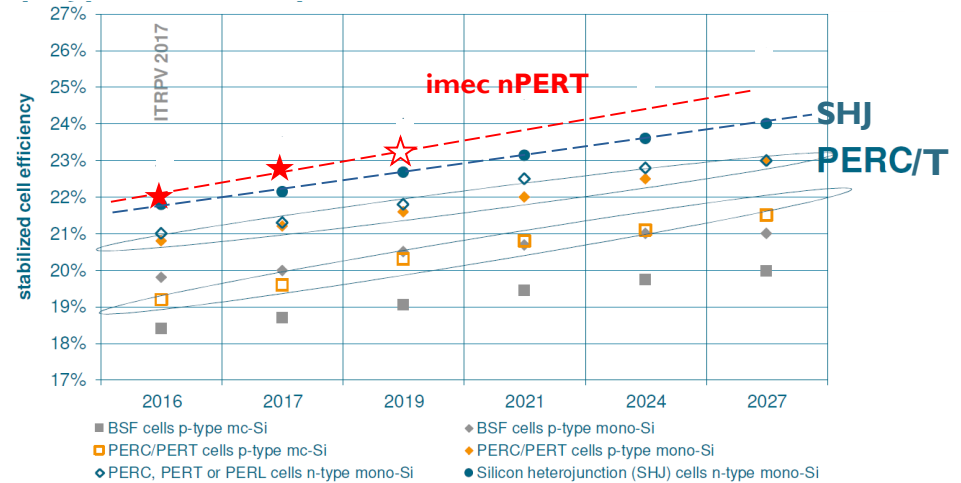
## MORE PLATING



## Advantage plating

- Higher efficiency  
Cf. record cells Kaneka, Sunpower
- Lower material cost

## INCREASING EFFICIENCIES

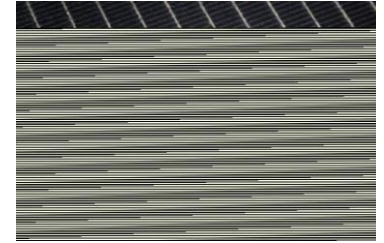
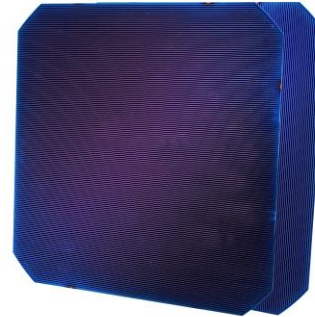
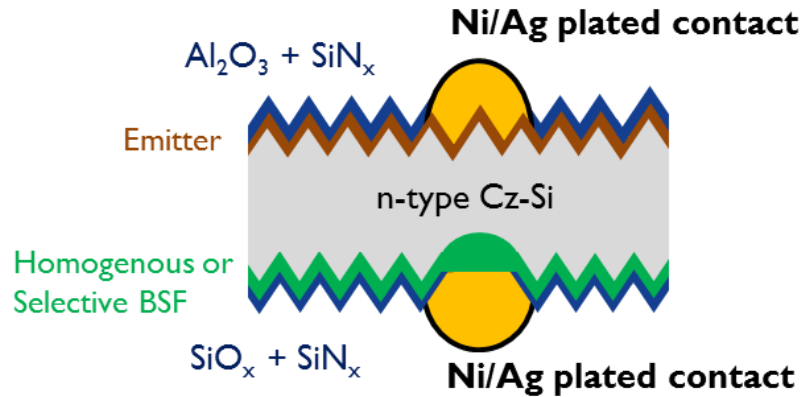


- n-type  $\Rightarrow$  higher efficiency

## imec nPERT

- Highest efficiencies (except HJ-IBC)
- Cost effective industrial processes

# IMEC HIGH EFFICIENCY LOW COST NPRT

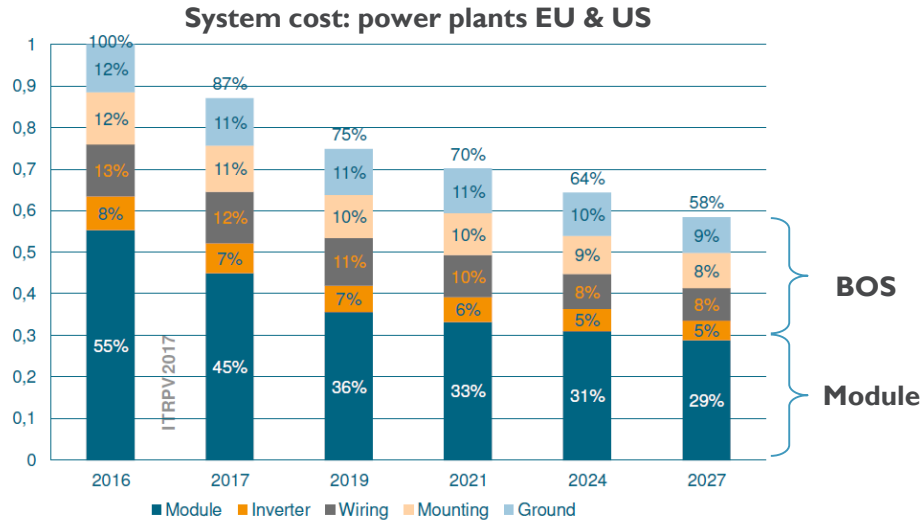


- 22.8% \* efficiency, towards +23%
- 97% bifaciality
- Co-plated Ni/Ag fingers
- Wire-based interconnections
- Cost in volume below 0.30\$/Wp (+370W modules, 72 cells)
  - 70% lower cell metallization cost compared to screen printing

L. Tous, et al., Silicon PV 2017

\* 239cm<sup>2</sup> cells and Gridtouch™ measured

# TOWARDS LOWER LCOE



- Module cost largest part of system cost
- Efficiency increase essential
  - to bring down module \$/Wp cost
  - to bring down LCOE
- PERC is first step, nPERT can be next
- Bifacial modules important to increase kWh



imec

embracing a better life