

# Solar Energy Valley in Catania - Italy

Enel Innovation LAB  
3sun factory



June 9<sup>th</sup> 2021 Eurec workshop : “Strength through cooperation – Europe’s PV value chain working together”

# 3Sun 2.0



From Thin Film ...

through bifacial ...

up to HJT ...

giga fab (3GW)...

...and 3SUN roadmap



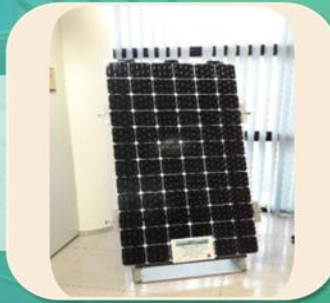
2011

Thin Film Factory inauguration



2018

Technology reconversion



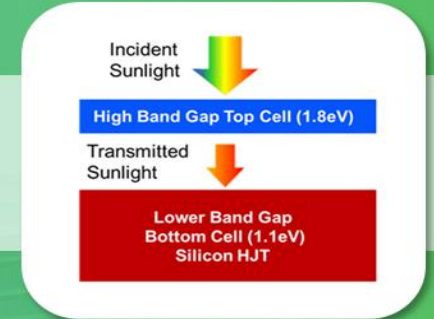
2019

Bifacial HJT – 200MW manufacturing lines



2022

Gigafactory manufacturing starting



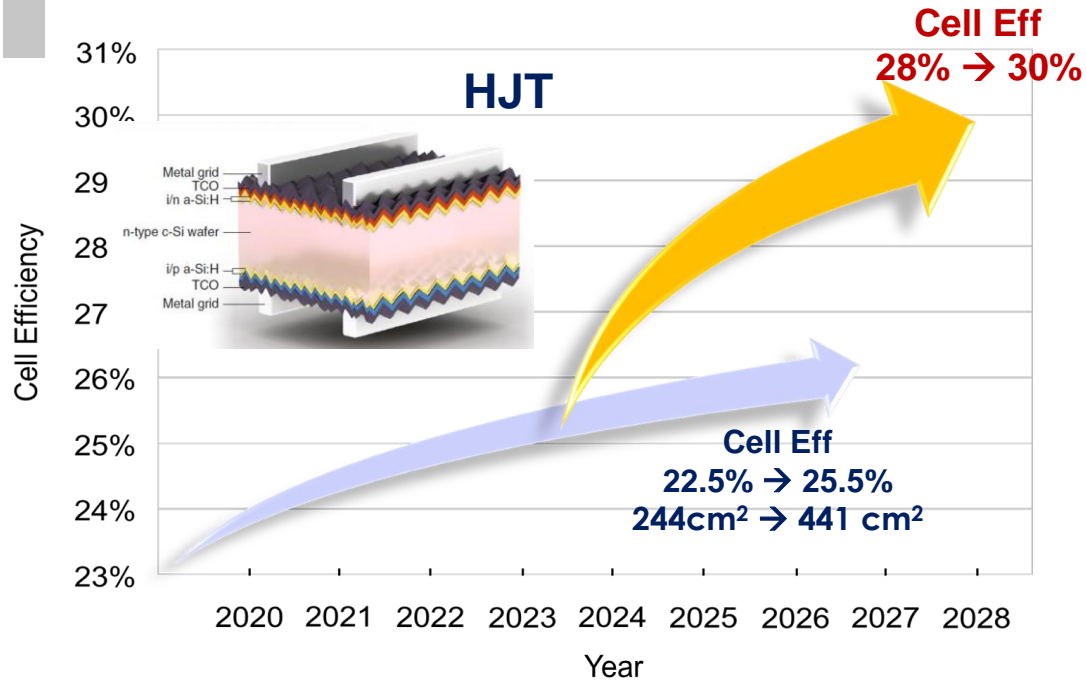
2025

Tango technology ( $\eta > 28\%$ )

## 3SUN – ENEL Factory Achievement

- Enel, Sharp and STMicroelectronics Join Venture among the biggest Eu PV Initiatives
- About 7 Million PV Thin Film Manufactured for ENEL from 2012 to 2017 (amorphous/microcrystalline silicon)
- Q1 2018 → Switched to bifacial modules with crystalline silicon solar cells
- Q4 2019 → HJT Technology implementation: start production of high efficiency high energy gain bifacial modules (370W – 390W), 72 Cells/ Modules, >90% Bifacial Factor, optimized architecture for LCOE lowering
- Feb 2020 → World Record Bifacial Cell Efficiency on M2 wafer size cell (156.75mm x 156.75mm) → 24.63%
- Apr 2020 → World Record laboratory bifacial cell on > 200 cm<sup>2</sup>, area in collaboration with CEA INES

# Tecnology roadmap



## Power conversion

- PERC limited by passivation structure low Voc (charges recombination limit) → Cell Efficiency: 23.5%
- HJT better passivation limited only by grid shadowing → Cell Efficiency: 26.8 - 27%
- HJT back contact (no grid) → CE: 27.5-28.5%

## Energy production and LCOE

- Higher bifacial ratio due to symmetric structure: 95% HJT vs. 75% PERC
- Higher resilience to environment during operation
  - No PID (Potential Induced Degradation)
  - Reduced degradation per year : less than ½ PERC degradation
- No light induced degradation (LID) vs. 2% losses in best PERC
- Higher thermal stability (less than ½ losses with respect to PERC)
- No light and high temperature degradation (LeTID) vs. 4% losses in PERC

## Tandem Perovskite-Silicon

