

210+HJT

New PV Manufacturing 2020: Trends and Challenges

July 2020

New PV Manufacturing 2020: Trends and Challenges



The pandemic is affecting the global economy. Industry competition and changes are becoming more intense

Pandemic

**Industrial
concentration**

Expansion

Innovation
breakthrough
period

IP War

Market
decentralisation

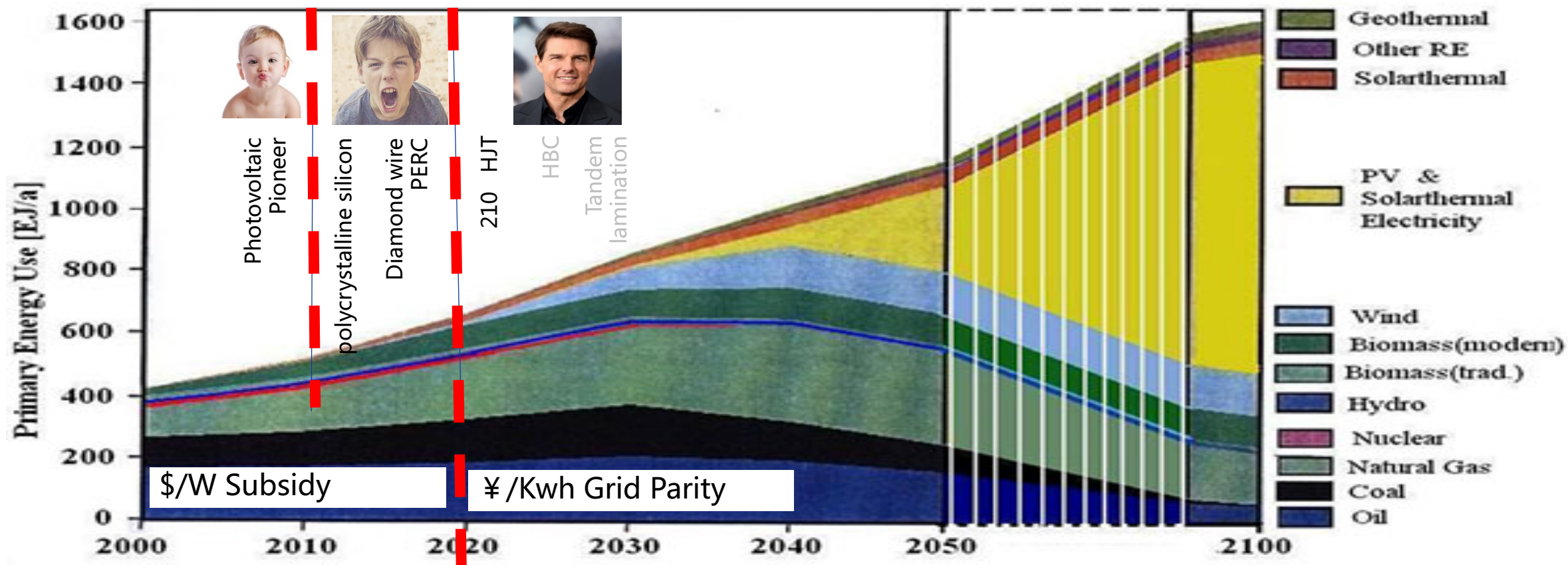
Entry of
state-owned
enterprises

Semiconductors

(Automation, Smart Tech)

New PV Manufacturing 2020: Trends and Challenges

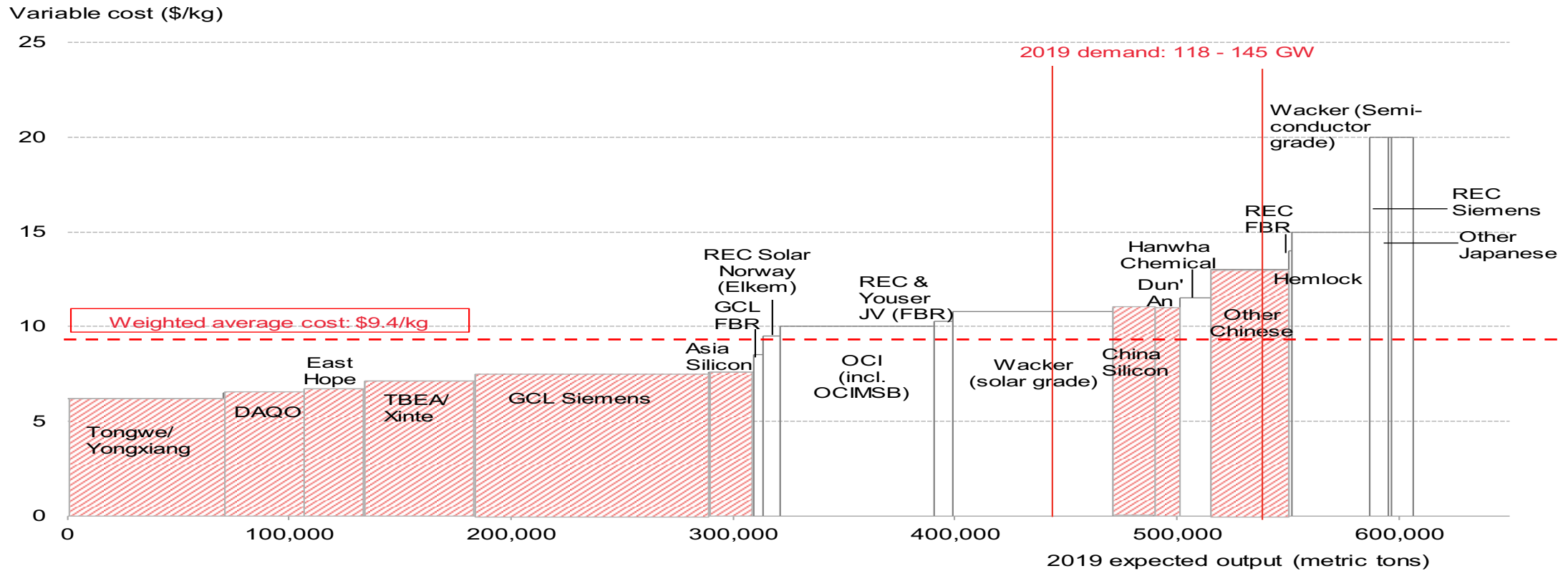
210 + HJT technology platform is the fourth major opportunity for development of the photovoltaic industry



New PV Manufacturing 2020: Trends and Challenges

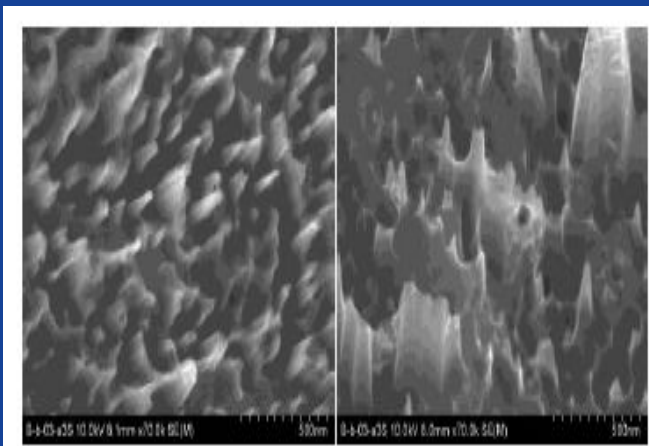
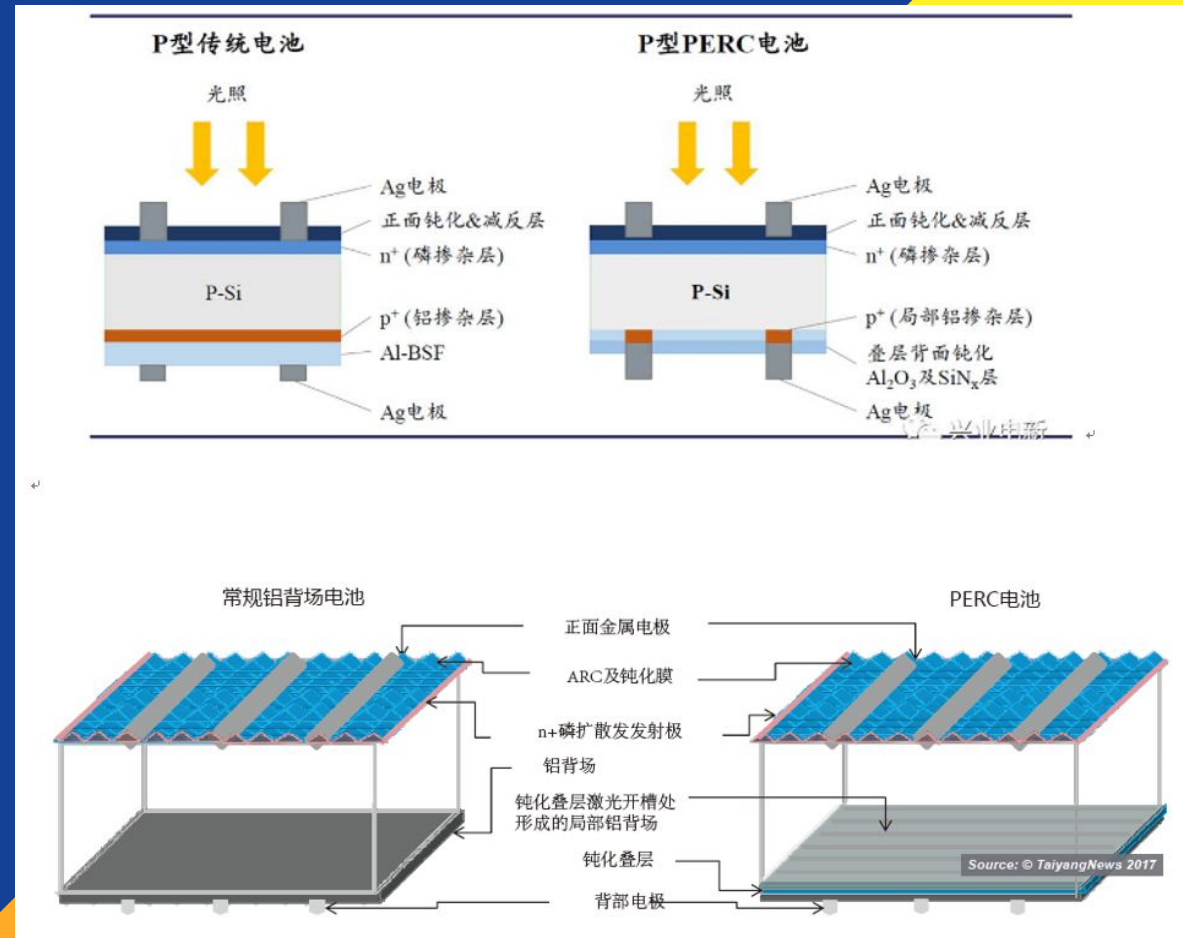
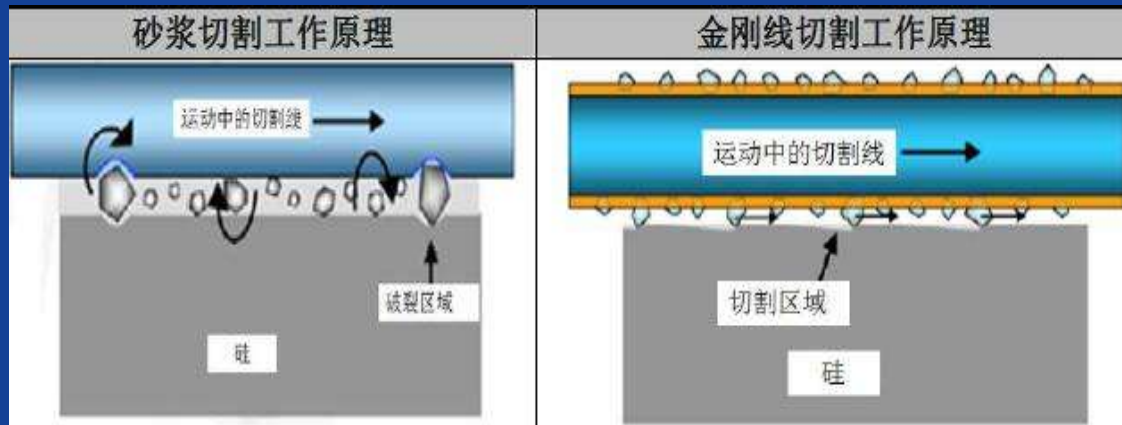


The second opportunity comes from the local commercialisation of polysilicon

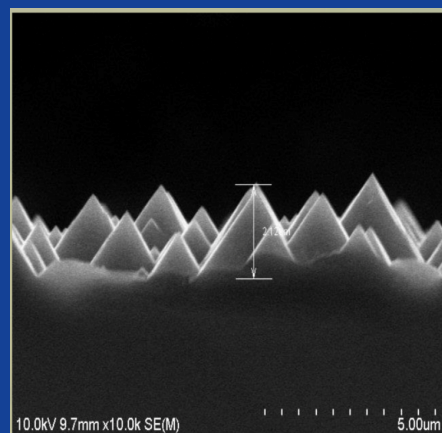


光伏新制造2020：趋势与挑战

The third opportunity comes from single crystal diamond wire cutting, PERC technology replacements



Polycrystalline silicone
Black mc-Si



Monocrystalline silicone
Alkaline Texturing

New PV Manufacturing 2020: Trends and Challenges

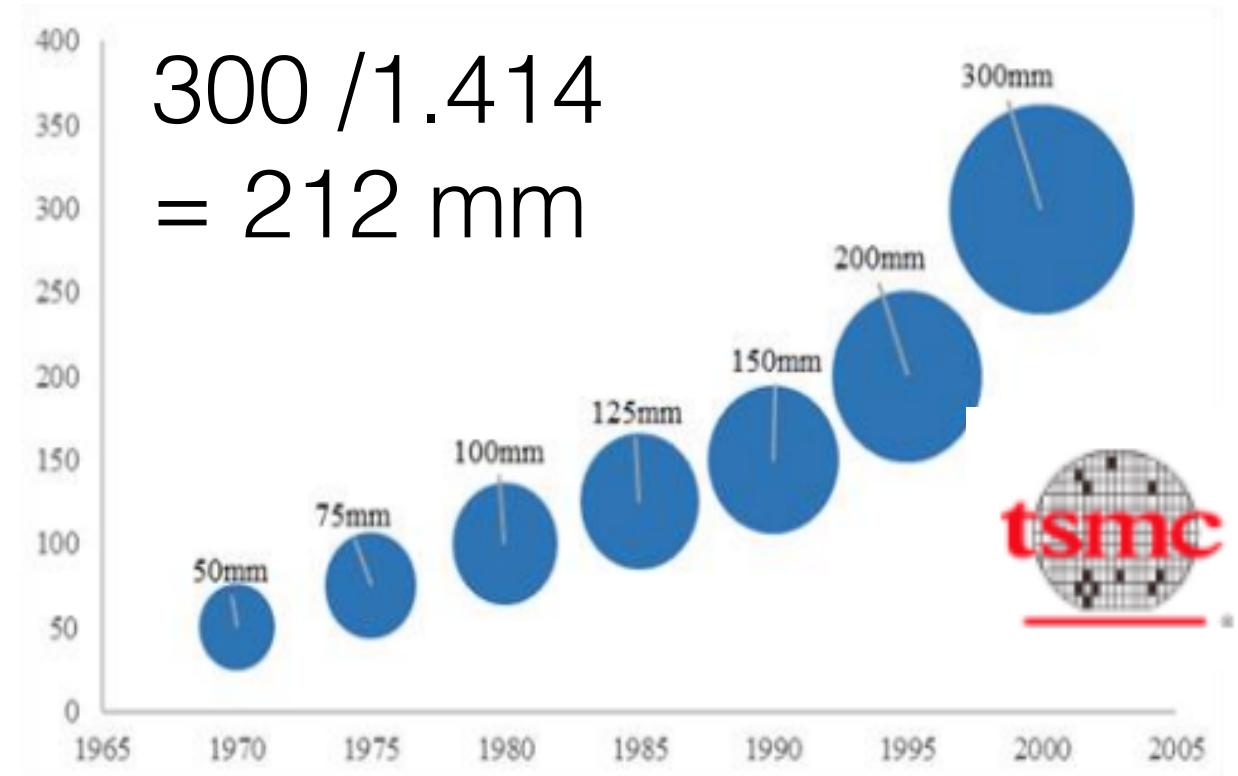


156/158-161/162-166-210: The photovoltaic industry urgently needs a stable-sized platform



23/09/2009 10pm Hamburg Germany

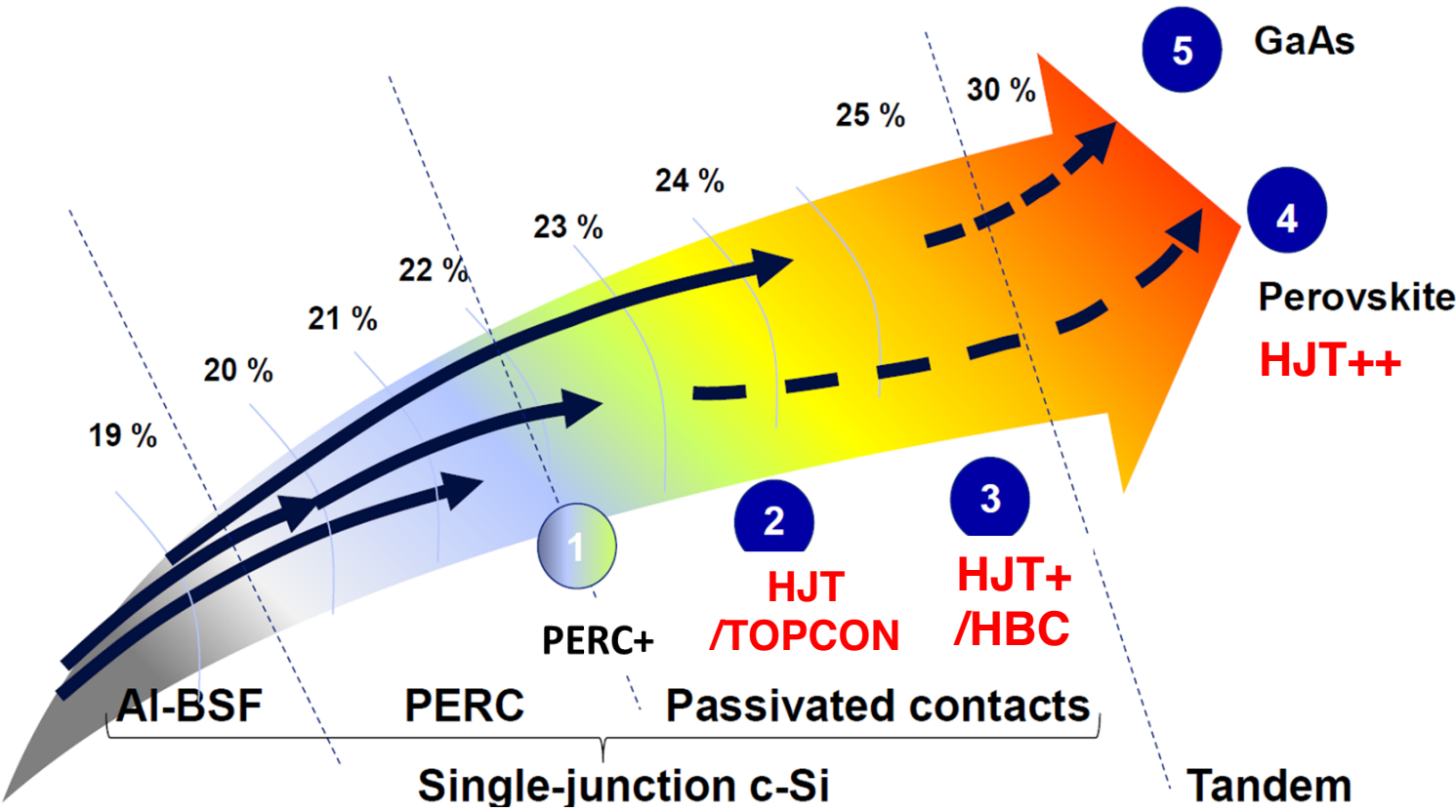
Discussion with Charlie Gay from the American Academy of Engineering to determine the final version of components



Central and GCL respond to China's national semiconductor strategy to promote the rapid development of 210mm photovoltaic products

New PV Manufacturing 2020: Trends and Challenges

The fourth opportunity is 210 + HJT



行业内唯一一款半片异质结组件产品,效率高达21.9%
The unique half HJT cell module, efficiency over 21.9%



New PV Manufacturing 2020: Trends and Challenges



The core advantage of the Risen heterojunction solar module

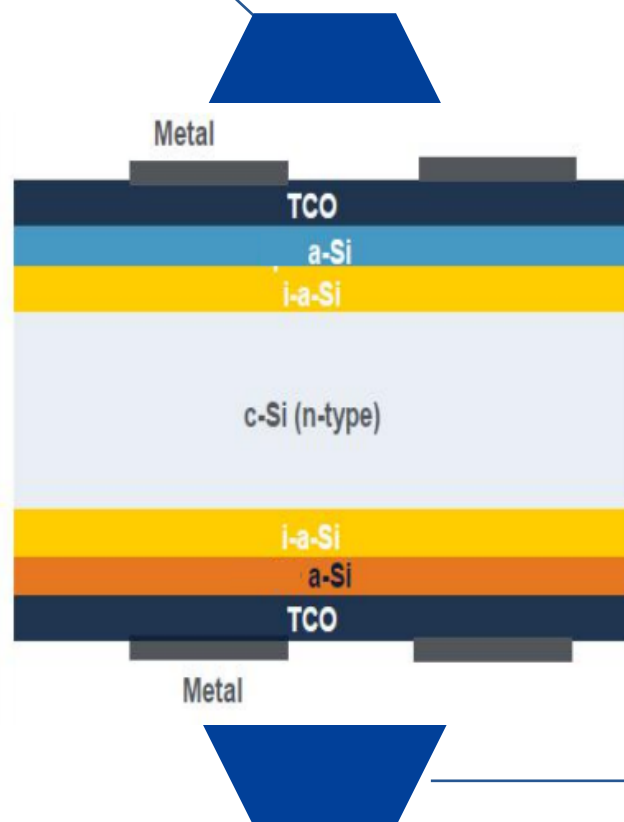
Loss > 1/3

+20%

Best bifacial rate

Excellent low-light
power generation

Low temperature
coefficient



High
reliability

High power
generation

Low electricity cost

**no LID, no PID,
relatively
tensionless**

+8-15%

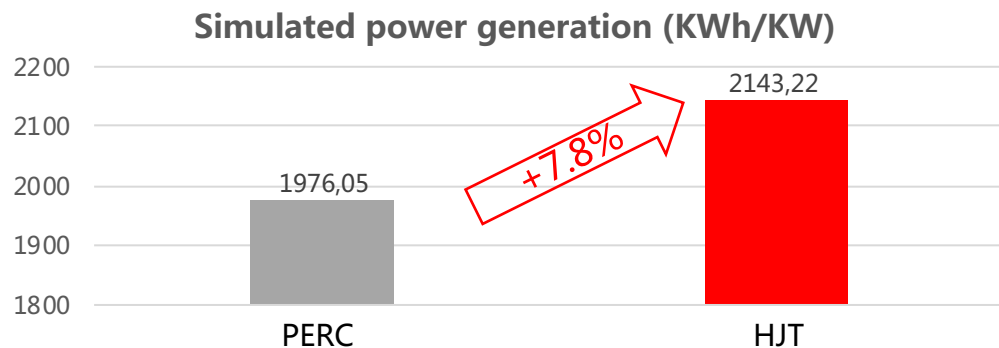
New PV Manufacturing 2020: Trends and Challenges



LCOE advantage of the Risen heterojunction solar module (-5.5%)

Module	PERC Bifacial 390W	Bifacial HJT 415W
DC capacity	3MW	3MW
DC/AC	1.04	1.04
Installation	Fixed	Fixed
System voltage	1500V	1500V
Pcs	30	28
Lifetime	30 years	30 years
First year degradation	2.50%	1.0%
Annual degradation	0.50%	0.50%
Power generation (KWh/KW)	1976	2143
Power gain	7.8%	

KWh cost LCOE calculation (Cent/W)			
Cost	Perc 390W	HJT 415W	HJT-PERC
Module	0.257	0.3	0.043
BOS	0.250	0.238	-0.012
Total cost	0.507	0.538	0.029
LCOE (cent/KWH)	0.0438	0.0414	-5.5%



HJT modules are very cost-effective in terms of KWh costs and surface area costs. In the future they will soon be highly cost-effective per watt through rapid improvement of Ag paste, silicon wafers, targets, chemicals.

Heterojunction platform trends and challenges (more essential and critical)



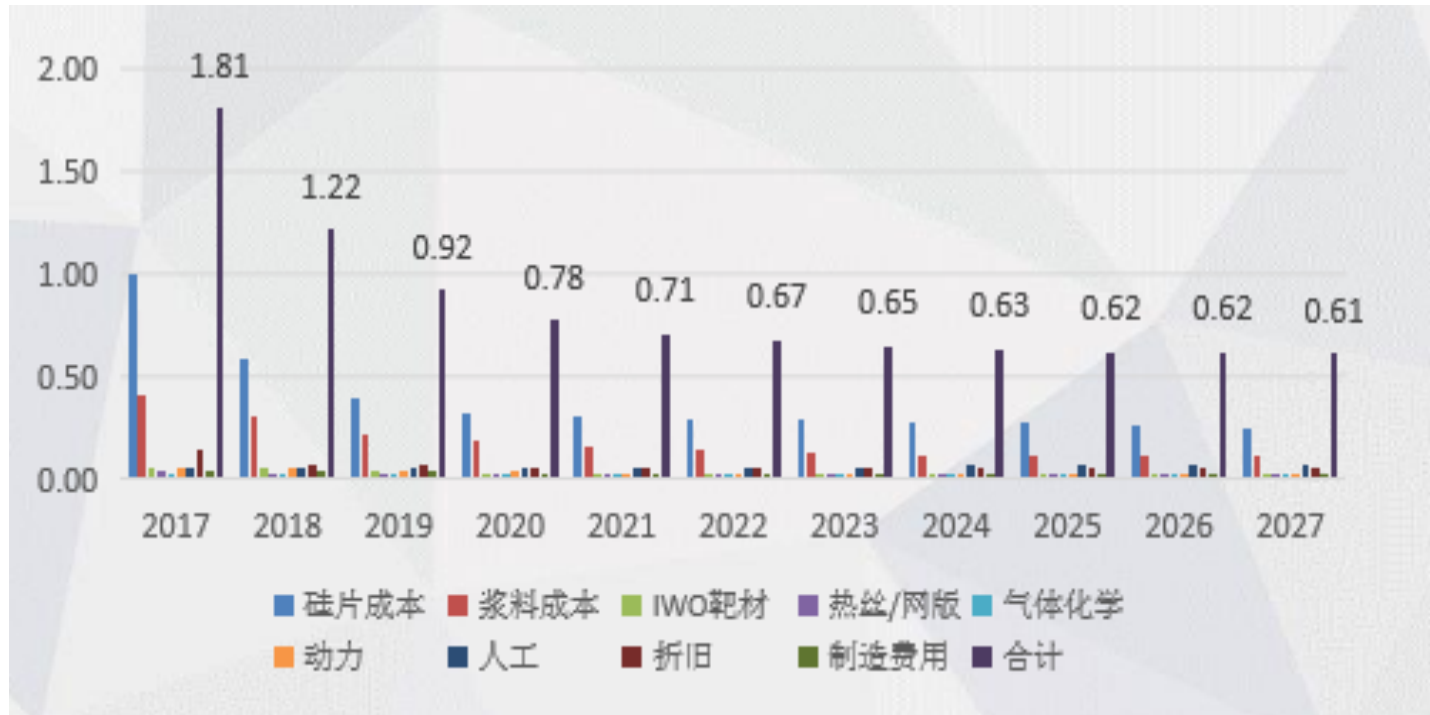
	210 series manufacturing optimization	Breakthrough (Intellectual property arrangements)	Quality
Crystal pulling	Capacity, attenuation, defectiveness	CCZ、Doping	Mechanical stress, attenuation
Cutting sections	Tensionless manufacturing	Tensionless cutting	Mechanical stress
Cell	Cost, cost, cost 0.8 - 0.7 - 0.6 Capacity, capacity, capacity	PECVD、PVD Electric field, flow field, thermal field design (process + equipment IP)	Obvious advantages
Module	Product design	Low temperature welding, MBB, half-cut passivation, test sorting	
System	Major system design optimisation	Large plate, tracks, bifacial	Installation test

Heterojunction platform trends and challenges (more essential)



Operating Costs

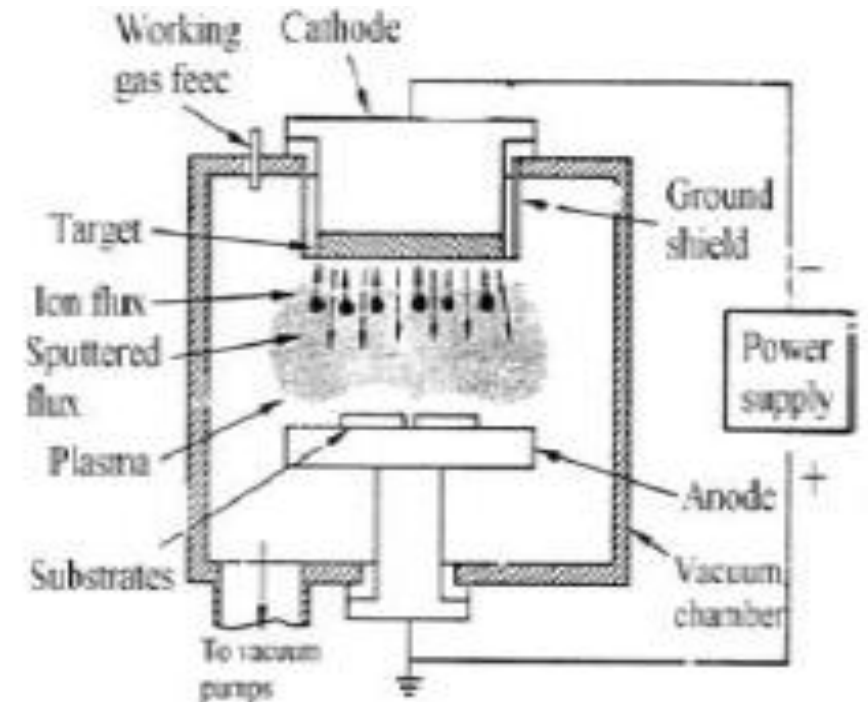
silicon wafer, paste, target materials, chemicals



Three Gorges Capital: Research Report by Mr. Zheng Haijun

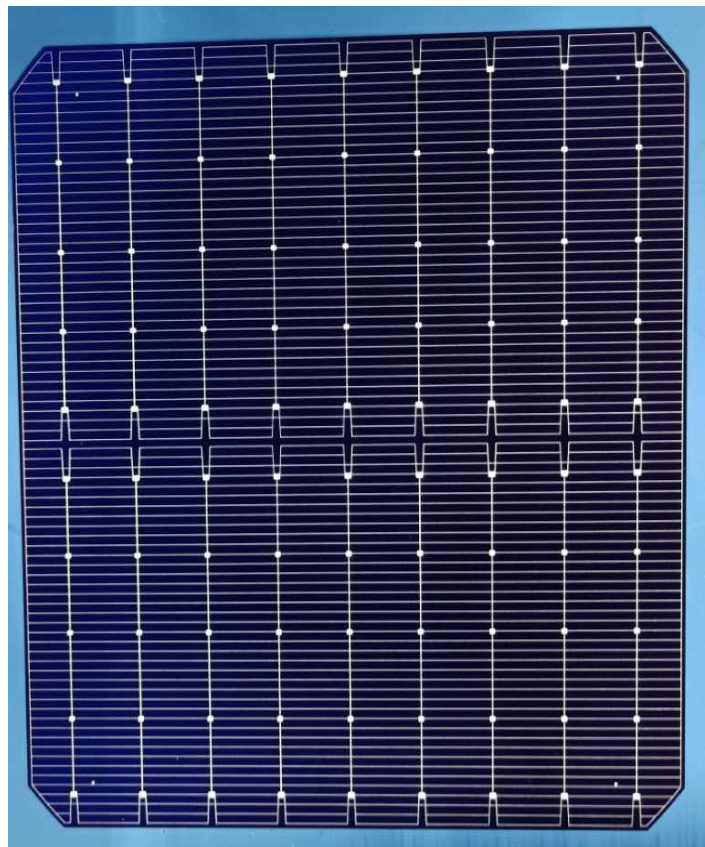
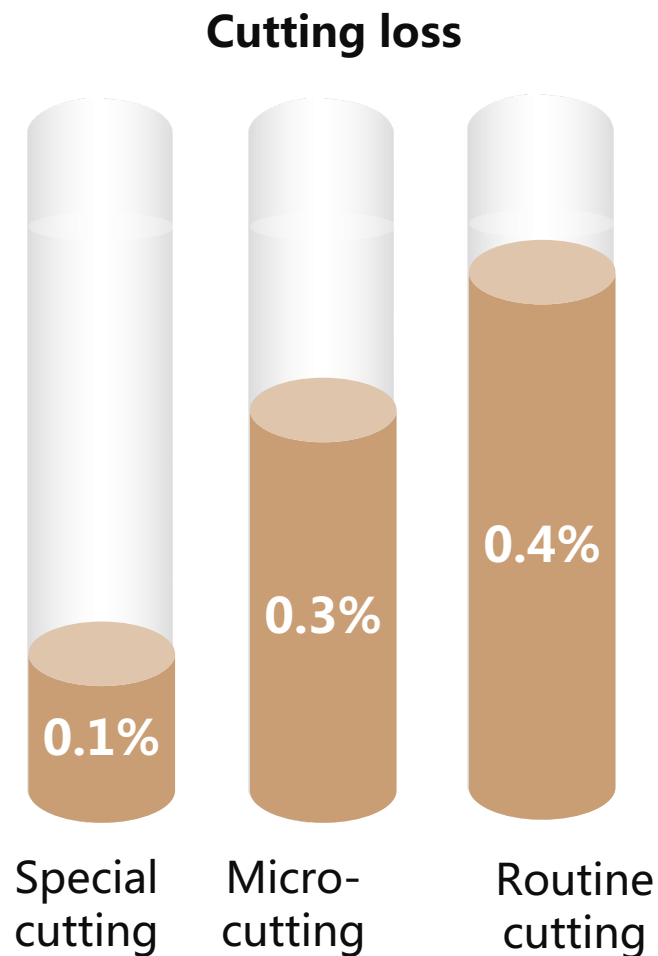
Equipment investment

Core equipment is PECVD / PVD
electric field optimisation



80 (equipment manufacturer) + 10 (manufacturer)
Patent for process and equipment coupling

Risen Heterojunction Components: Technical Breakthrough



9BB

Half cut + 9BB

50% reduction in Ag
paste consumption

A small step for modules,
a giant leap for Cells!

paste, silicon wafer, target
materials, chemicals

TSMC + AMAT

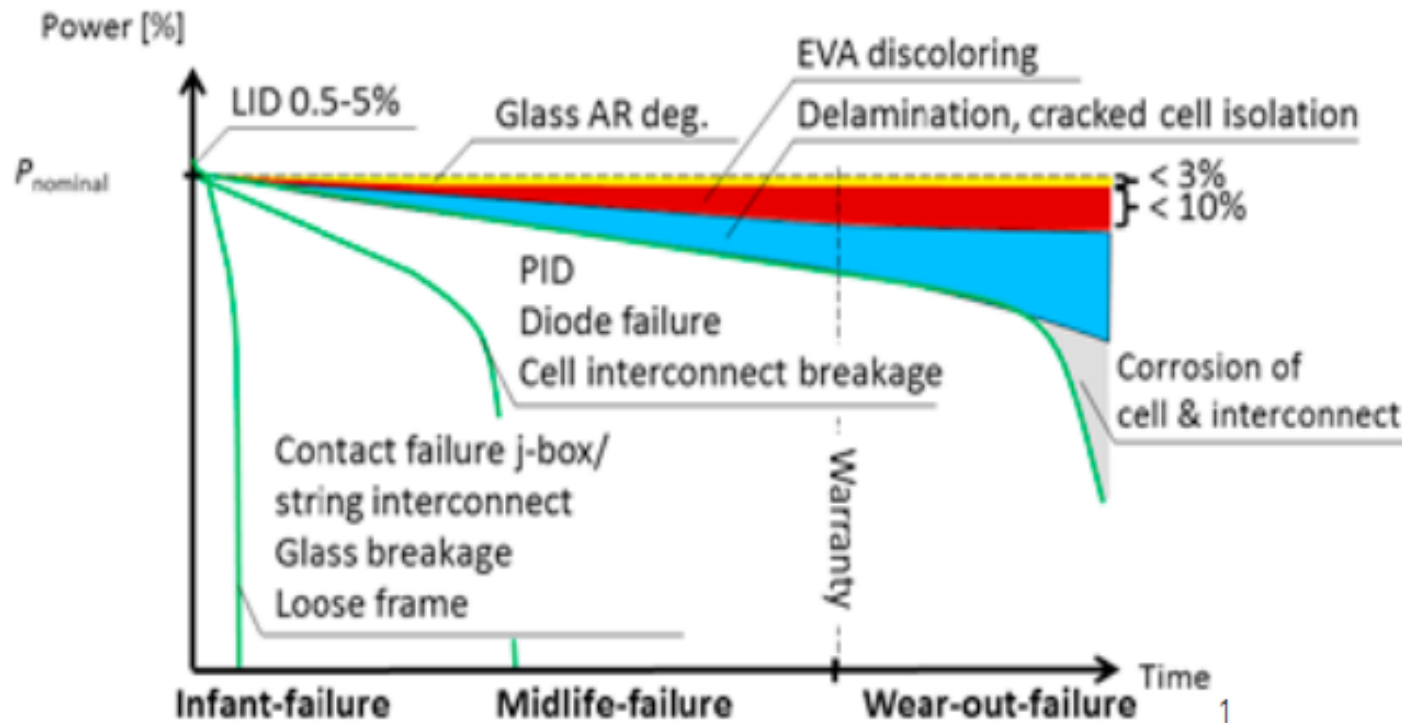
80+10 Ecology

Equipment + process IP

New PV Manufacturing 2020: Trends and Challenges



New product DFMEA creates a "quality upgrade"



The “technology and quality management system” is facing stricter requirements and undergoing comprehensive upgrades

FMEA (Failure Mode and Effect Analysis)

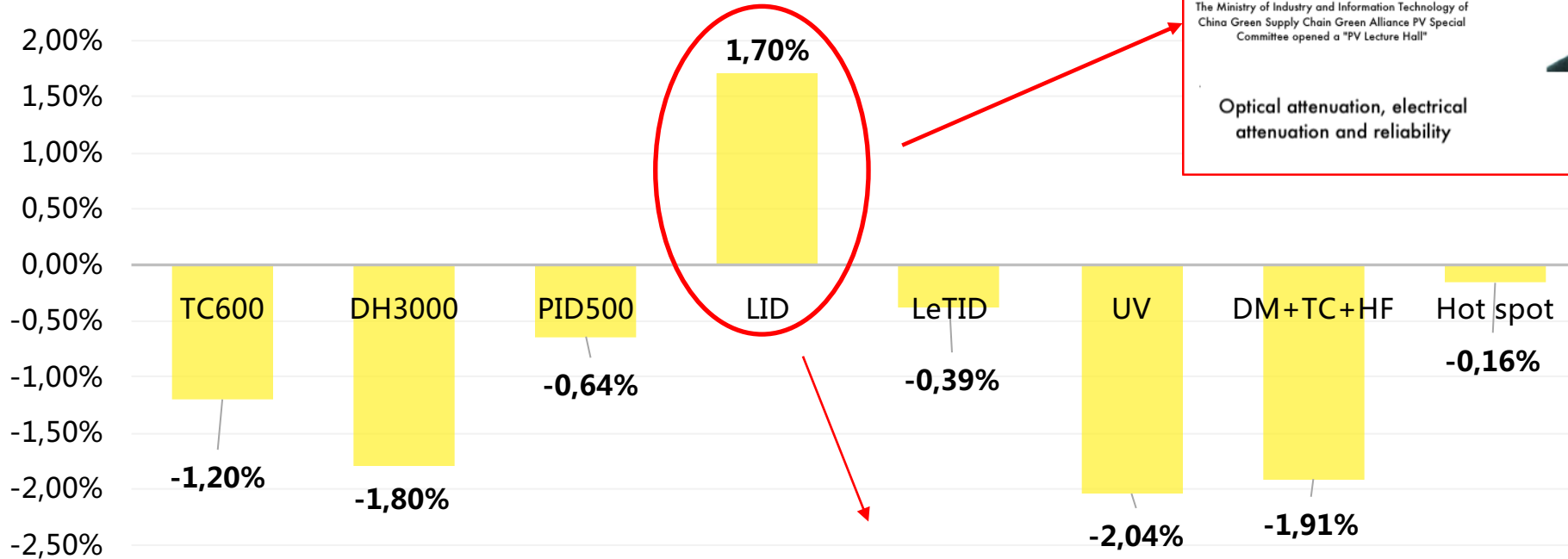
Control Plan


The advantage of Risen heterojunction components – high reliability



Strict DFMEA design aging test carried out for heterojunction product features


HJT component reliability






ECOPV
中国绿色供应链联盟光伏专委会

Study on the photo-induced gain of HJT battery



Professor Wang Wenjing
Wenjing Chair



Principal speaker
Dr Cui Yanfeng

The Ministry of Industry and Information Technology of China Green Supply Chain Green Alliance PV Special Committee opened a "PV Lecture Hall"

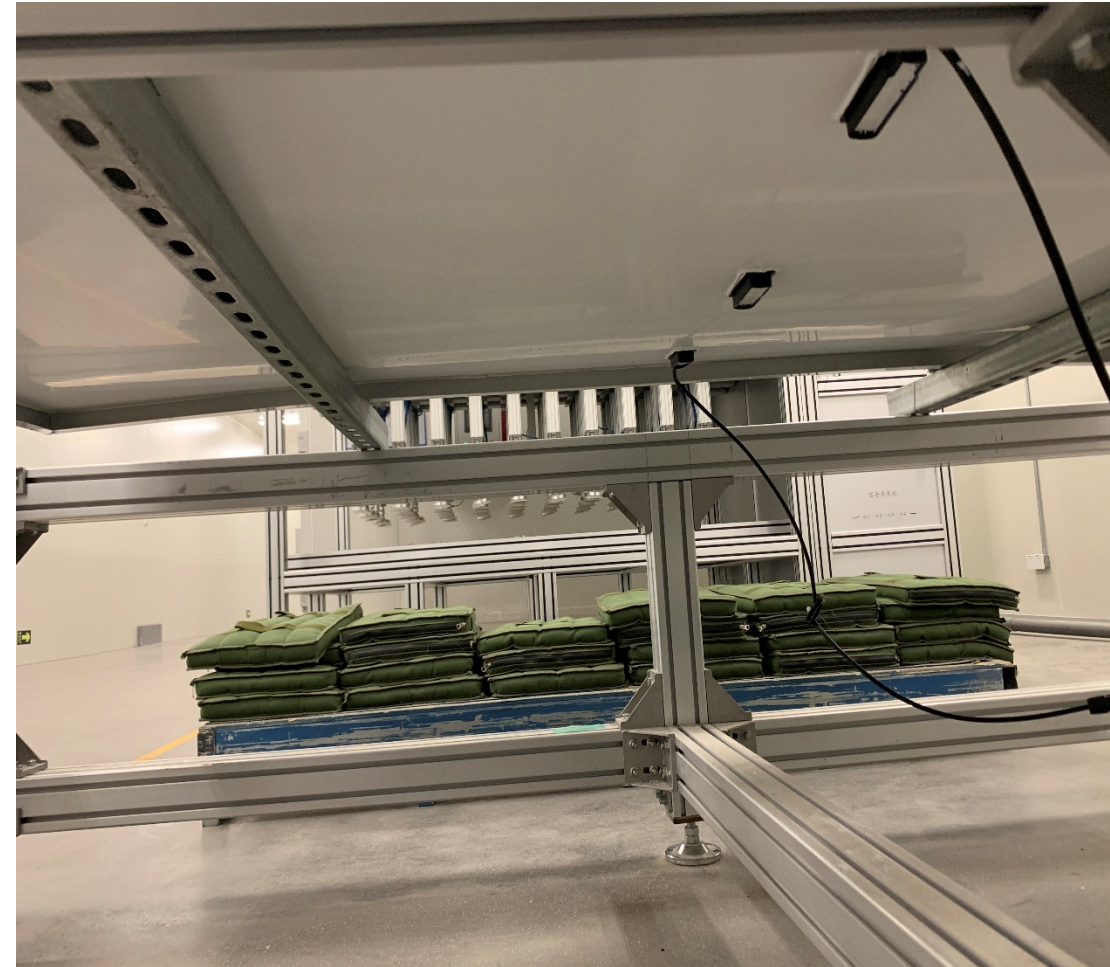
Optical attenuation, electrical attenuation and reliability



210 platform trends and challenges (new ways of thinking)



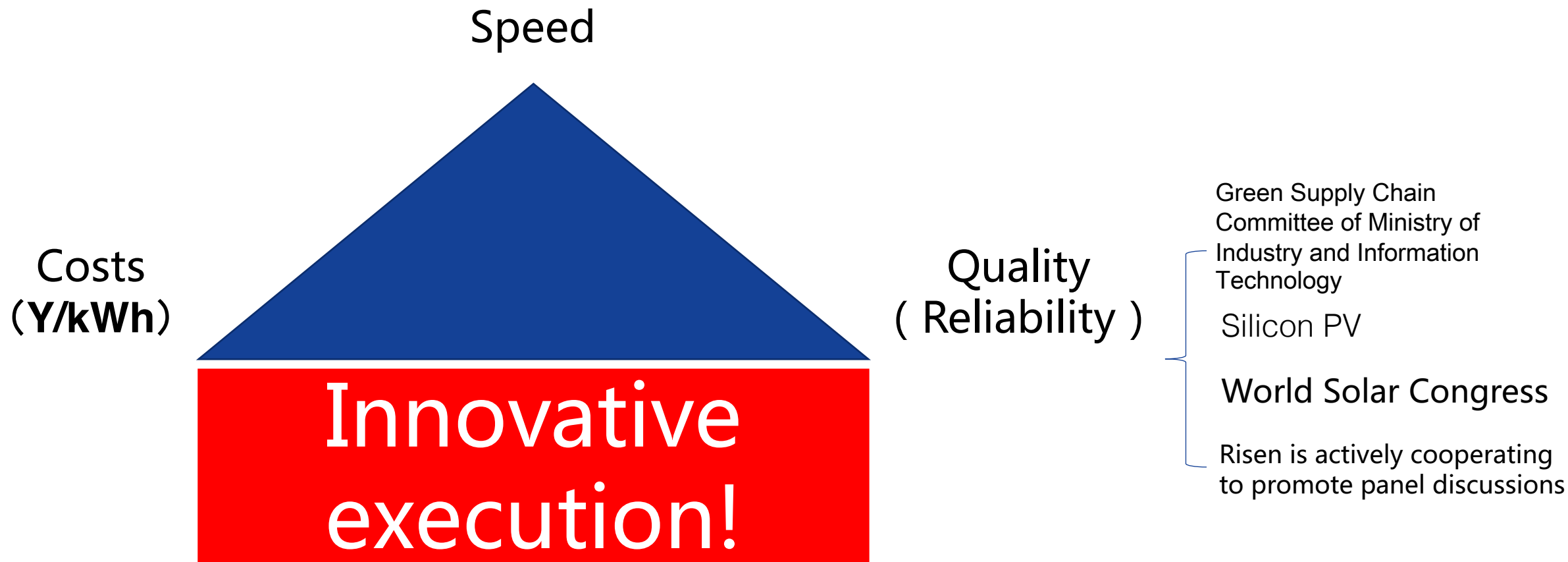
158.75 Product mechanical load test: **optimised design for the future, 210 IS FREE**



New PV Manufacturing 2020: Trends and Challenges



Ecological competition in the new world





Thank you!

The Power of Rising Value