



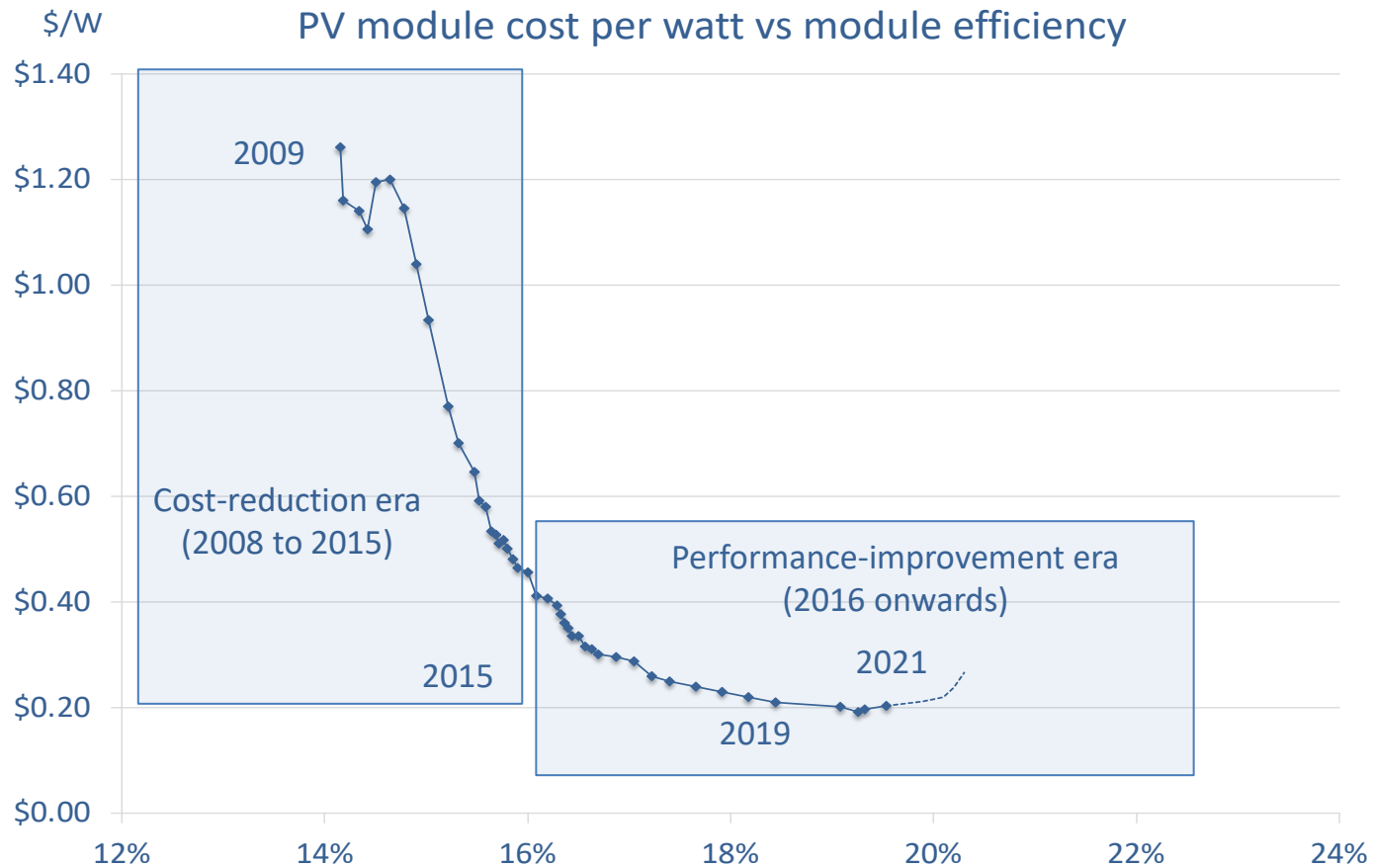
The history and future of PV technologies

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The story so far

The past decade has seen the PV industry transition from a cost-reduction era to a performance-improvement era

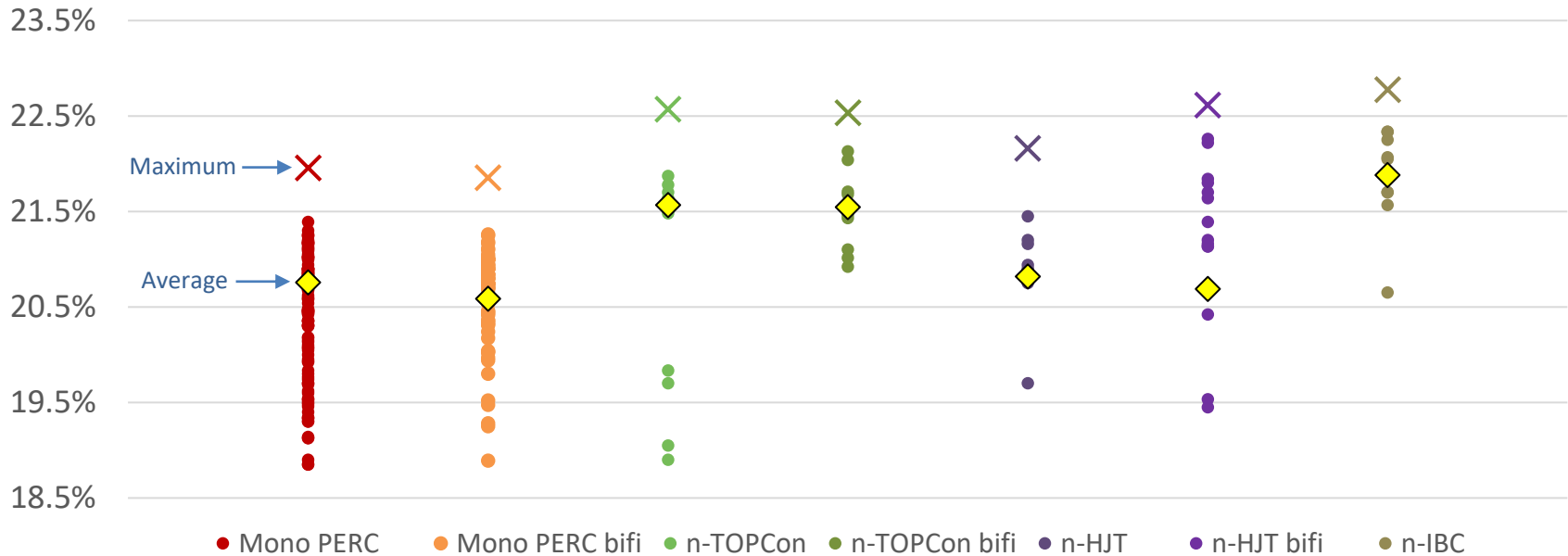


Source: Exawatt, based on analysis of Chinese manufacturers from 2009 to 2022

Mono PERC efficiency limits

Mono PERC is reaching its efficiency limits, TOPCon and HJT can offer higher module efficiencies

Module series efficiency by technology, 2022 Q2



Source: Exawatt Module Tracker

Other advantages of TOPCon and HJT over mono PERC:

Higher bifaciality

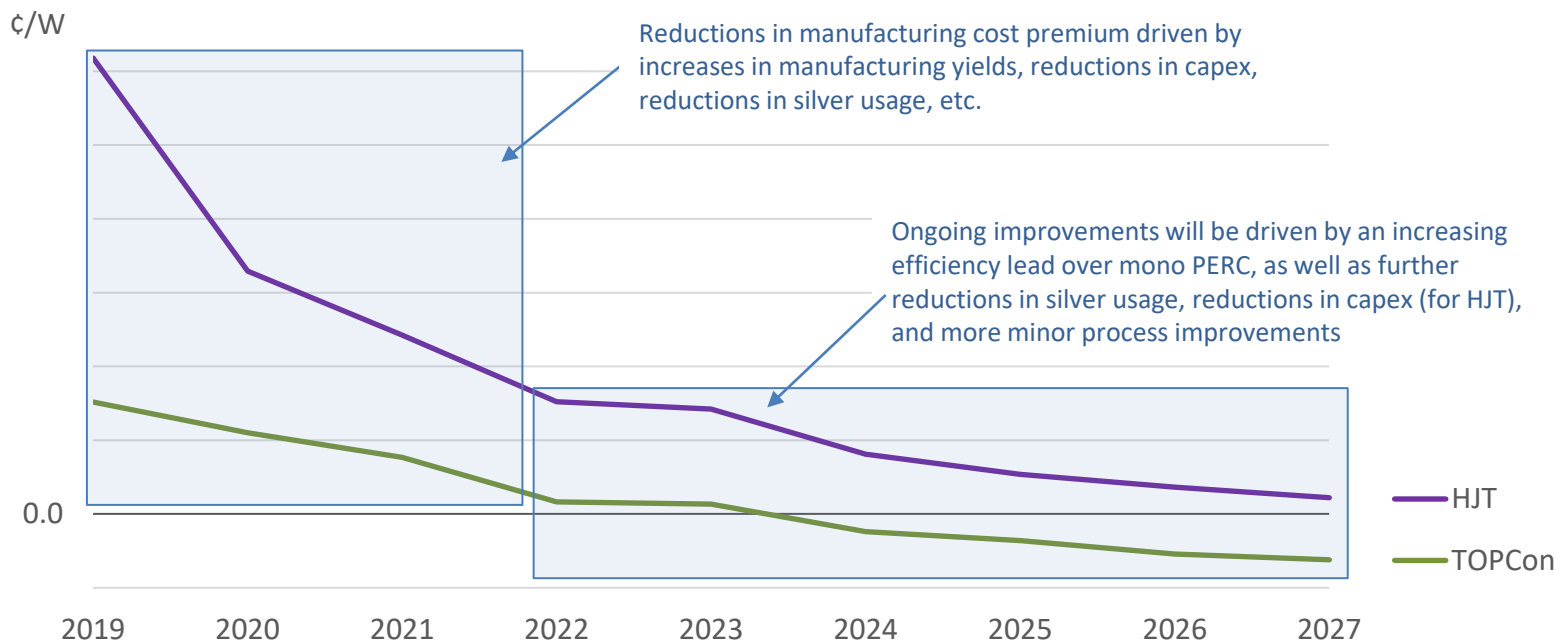
Reduced (but not eliminated) LID

Improved temperature coefficient and improved low-light performance

When will we see a transition to n-type?

As with the industry's transition from multi BSF to mono PERC, we will see a major transition to n-type technologies when cost-per-watt parity with mono PERC is achieved

Modelled manufacturing cost premium for an integrated manufacturer



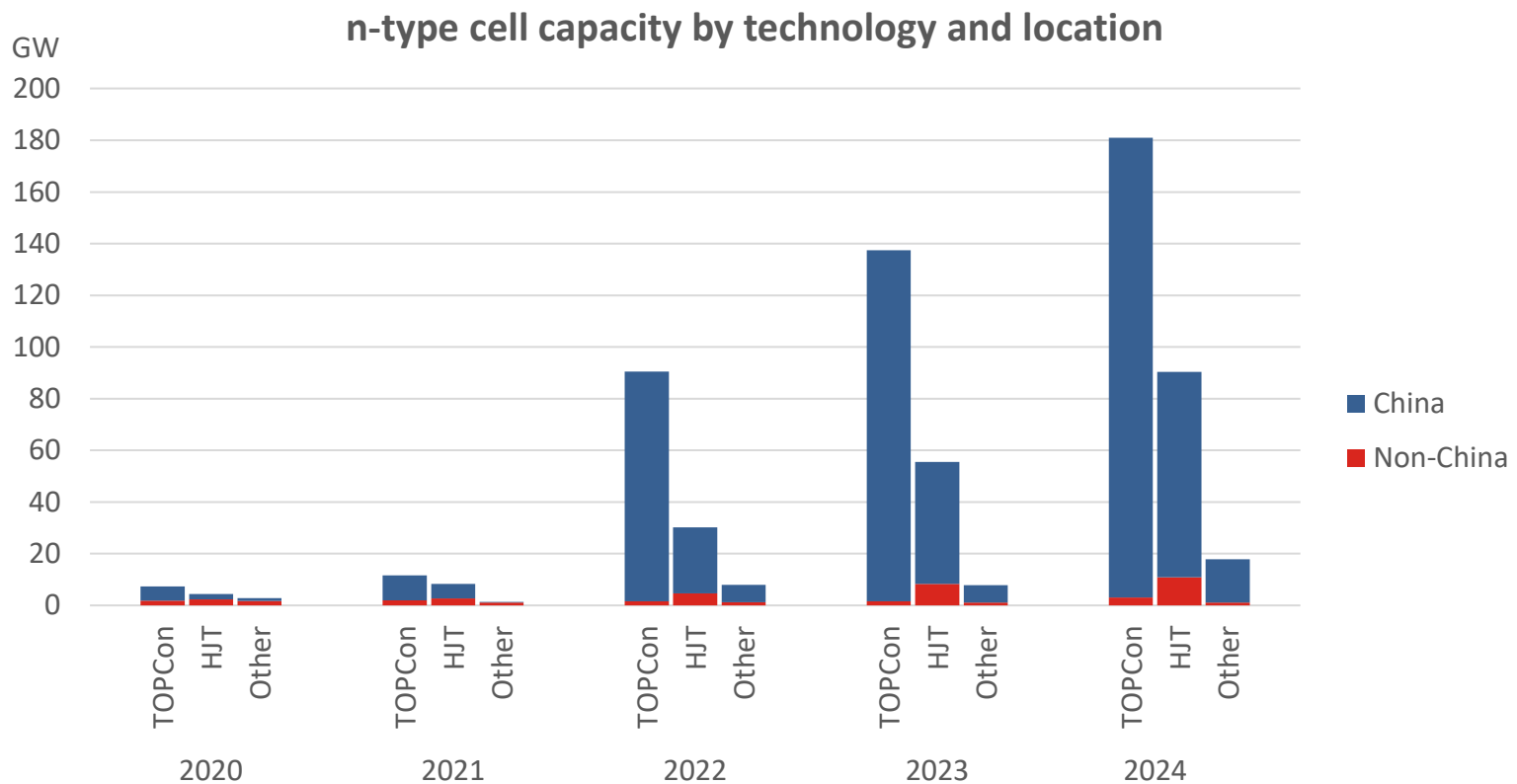
Source: Exawatt Cost Update

At leading integrated manufacturers, we believe TOPCon is on track to reach cost-per-watt parity with mono PERC in the next two years

n-type capacity expansion plans

China currently dominates announced n-type cell capacity plans

Several existing major manufacturers are moving heavily into TOPCon. Meanwhile, there are ambitious HJT capacity plans from a number of new entrants



The future beyond the n-type transition

Tandem cells are a likely possibility for the next industry transition after n-type, but are unlikely to be a key driver of the industry until at least the late 2020s



Get in touch:

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