

Namindo Pty Ltd

2026 EDITION

Connecting to Energy

Polymer connections to solar PV and energy

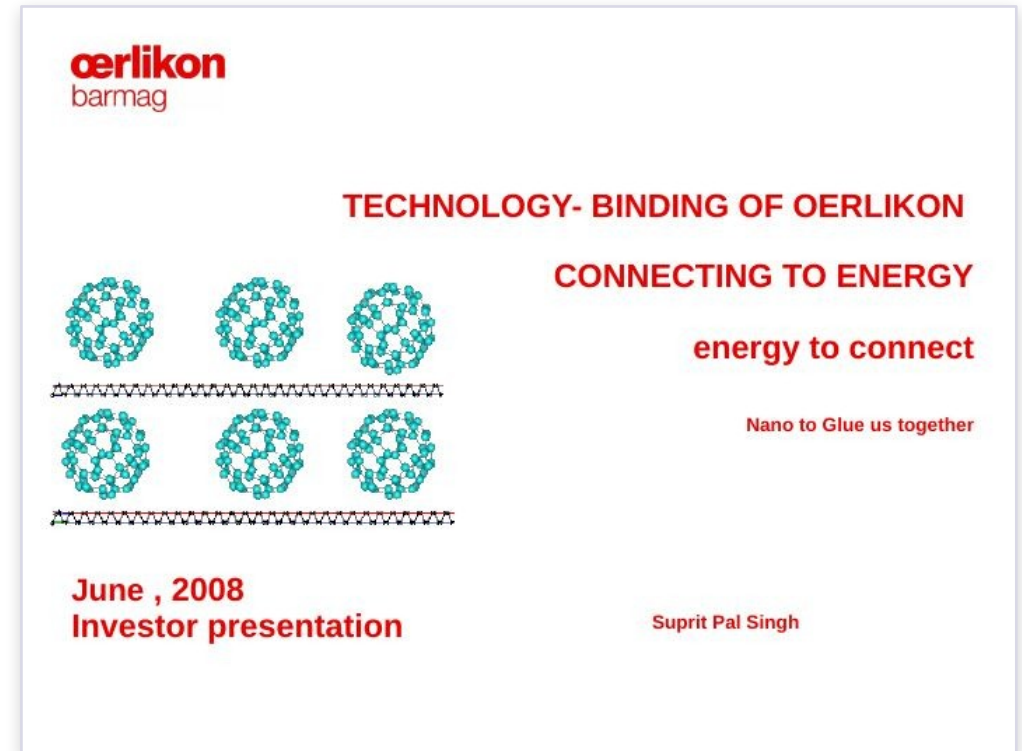
Suprit Pal Singh

First presented to investors in June 2008 as Technology Advisor to Oerlikon. Updated October 2026.

Eighteen years on, we checked the 2008 view against the facts

In June 2008 this talk asked investors a simple question. Could polymer and film know-how, built for textiles and plastics, help harvest the sun?

- We kept the original arc: the energy need, solar PV, films and roll-to-roll, reflectors, solar cooling, wind blades and fuels from sunlight.
- Each 2008 idea now sits beside the 2026 reality, with sources.
- Some bets came true faster than anyone expected. Some did not. We say which.
- The thread ends where Namindo works today: more energy from bifacial solar farms by managing the light under the panels.



The original cover, June 2008. The full 2008 deck is published unchanged as an archive edition.

Solar went from a niche to the largest source of new power

13 GW

Grid-connected solar PV in the world at the end of 2008.

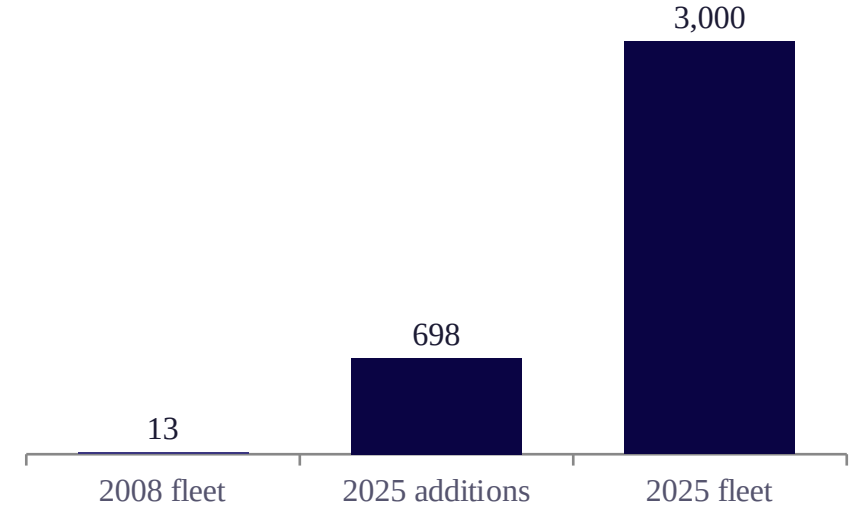
698 GW

New solar PV added in a single year, 2025.

≈ 3 TW

Solar PV installed worldwide at the end of 2025.

In 2008 the world added a few gigawatts of solar a year. In 2025 it added about fifty times the whole 2008 fleet. Solar is no longer the future option this talk argued for. It is the default.



Source: REN21 Global Status Report 2009 update (2008 fleet); IEA PVPS Snapshot 2026 via TaiyangNews (2025 additions and fleet).

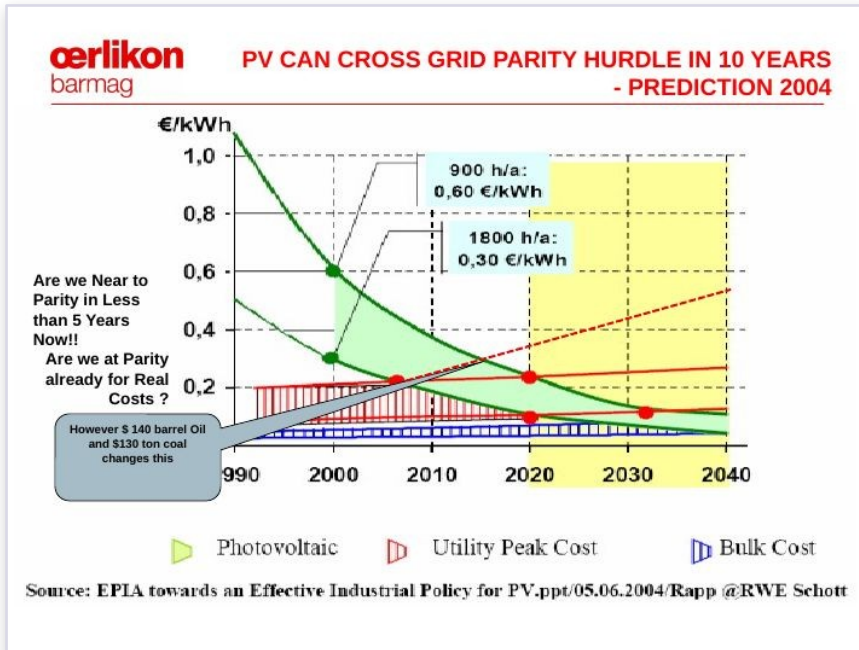


PART ONE

Solar PV: what came true

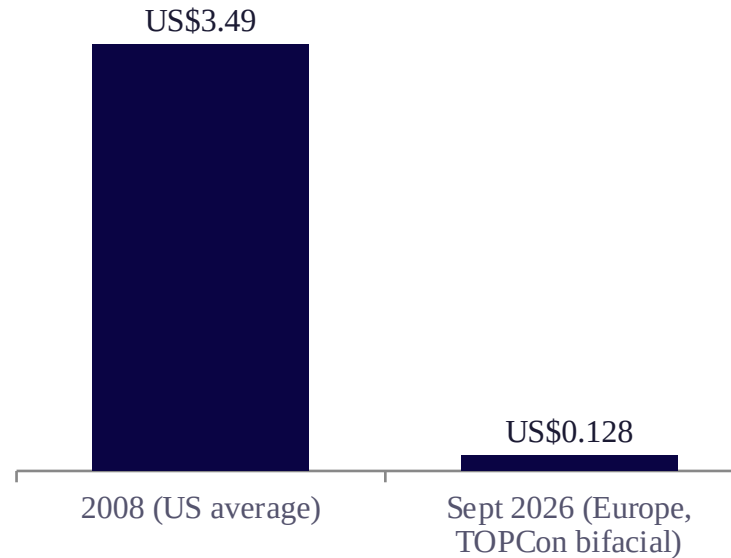
Grid parity, efficiency beyond the old limits, and a technology mix nobody predicted.

We asked if solar was near grid parity. It went far past it



2008: "Are we near parity in less than 5 years now?"

Module price, US\$ per watt



US\$0.043

Global average cost of power from new solar PV in 2024, per kWh.

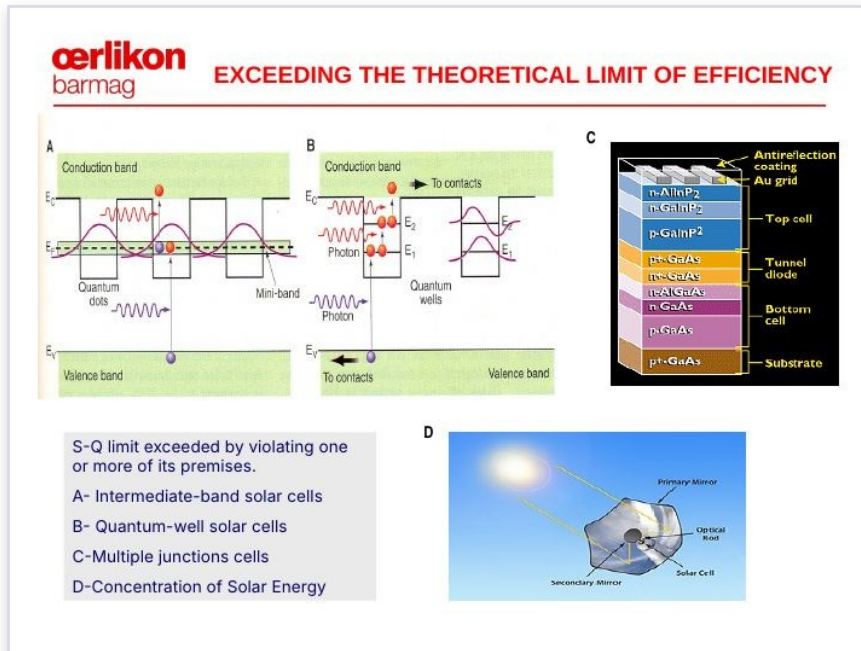
96%

Fall in module price per watt, 2008 to 2026.

The answer to our 2008 question was yes, and sooner than the curve we showed. Solar is now among the cheapest new power anywhere the sun shines.

Source: US EIA Solar PV module shipments, table 4 (2008 average module value); PV Tech, 7 Oct 2026, sun.store PV Index (Sept 2026); IRENA Renewable Power Generation Costs in 2024.

Beating the single-junction limit, as we said in 2008



Perovskite on silicon tandem

Heterojunction cell

TOPCon cell

35.5%

27.08%

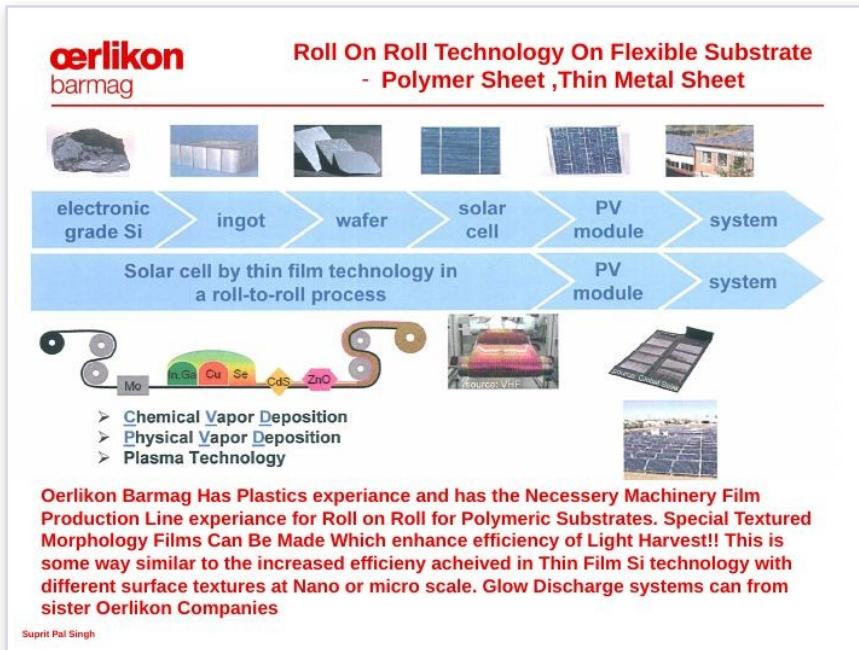
26.58%

2008: four ways to exceed the Shockley-Queisser limit

One of our four routes, the multi-junction cell, has arrived on silicon. A perovskite layer on a silicon cell reached 35.5% in July 2026, well past what a single silicon junction can reach.

Source: pv magazine, 15 Jul 2026 (LONGi 35.5%, certified by ESTI, EU Joint Research Centre); Trina Solar (TOPCon 26.58%, HJT 27.08% cell records).

Silicon won. Thin film and roll-to-roll stayed in niches



2008: roll-to-roll thin film on polymer substrate

≈ 98%

Share of world PV production that is crystalline silicon.

≈ 82%

Share of wafers that are n-type, the base of TOPCon cells.

706 GW

Modules shipped worldwide in 2025, the same record level as 2024. TOPCon kept its lead.

In 2008 we bet that films on flexible polymer would cut the cost of solar. Mass-produced silicon cut it faster. Polymers still matter in every module: the encapsulant, the backsheet or interlayer, the junction box and the cables.

Source: ITRPV 17th edition, via pv magazine, 25 Jun 2026.

Our 2008 bets, marked in 2026

What we said in 2008	What happened by 2026	Verdict
Solar will reach grid parity	Global average cost of new solar PV was US\$0.043 per kWh in 2024	Came true
New cell designs will beat the single-junction limit	Perovskite on silicon tandem cell at 35.5%, July 2026	Came true
Organic PV will reach market within 4 years, like OLED	Crystalline silicon is about 98% of production	Did not happen
Roll-to-roll films on polymer will lower cost	Silicon scale did it instead; films remain a niche	Partly
Everybody needs a reflector or concentrator	CSP reached 7.2 GW, against about 3 TW of PV. Reflected light now matters under bifacial panels	Changed shape
Wind needs bigger rotors	26 MW turbine with a rotor over 310 m, against 2 MW and 80 m in 2008	Came true
Fibre-reinforced polymer blades	All large blades are composite; recyclable blades in service since 2022	Came true
Hydrogen from sunlight	Electrolyser output under 5 GW in 2025; still early	Early

Source: As cited on the earlier and later slides of this deck.

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PART TWO

Reflectors, light and the ground

In 2008 we said everybody needs a reflector. In 2026 the reflector is the ground under a bifacial panel.

Concentrating solar power stayed small, and found a role in storage



2008: "Everybody needs a reflector or lens concentrator"

7.2 GW

Concentrating solar power in the world at the end of 2024.

350 MW

Added in 2024, most of it in China.

Mirrors lost the race to cheap silicon for daytime power. They kept a job where heat can be stored for the night. Australia has examples:

- VS1: 30 MW with 288 MWh of thermal storage.
- Yadnarie: 90 MW with 720 MWh, planned for 2027.

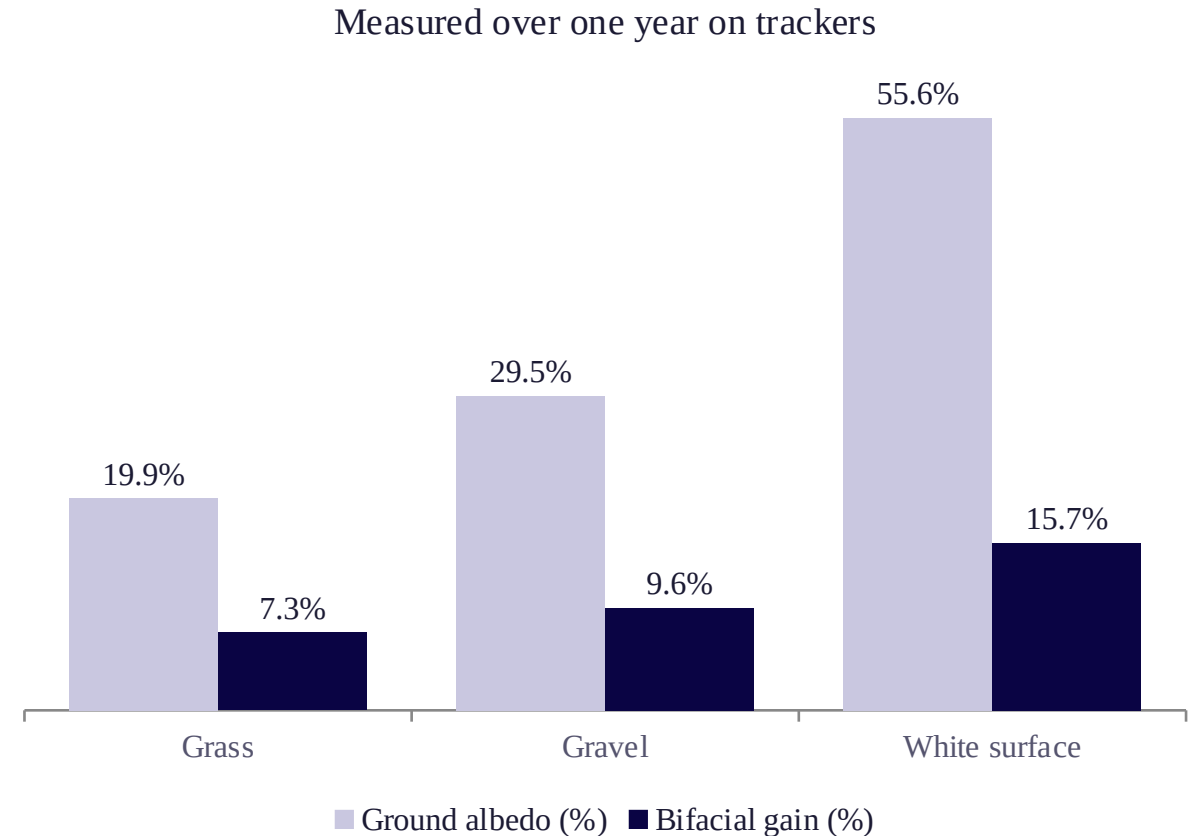
The light-management idea survived in a different form, as the next slides show.

Source: REN21 Global Status Report 2025, CSP chapter.

The ground under the panel is now part of the power plant

Bifacial panels collect light on both faces. The rear face lives on light the ground reflects. So the brighter the ground, the more energy the same panel makes.

- Bifacial TOPCon was the cheapest module category in Europe in September 2026, at €0.114 per watt. Bifacial is now the normal choice.
- Typical bifacial gain is 5% to 30%, set by the site, the mounting and the ground.



Source: Soltec BiTEC test site, one year of data, via pv magazine "All about albedo"; PV Tech, 7 Oct 2026 (module prices); UNSW pv-manufacturing.org (typical gain).

More energy from bifacial solar farms

Our main field programme raises the light the ground reflects to the back of bifacial panels, across a whole PV farm. The aim is more energy from the same panels, on the same land, with the same grid connection.

- An Australian patent application is filed.
- A field trial is planned, with every reading and site photo logged on webdoli.com.
- We describe the aims here, not the methods.

From the 2008 reflector slides to the ground under a bifacial farm: the same question about where the light goes.

1

Measure

Baseline rear-side light and yield on the site

2

Raise

Increase the ground reflectance under the rows

3

Log

Record readings and photos with a full audit trail

4

Prove

Report the extra energy in bankable terms

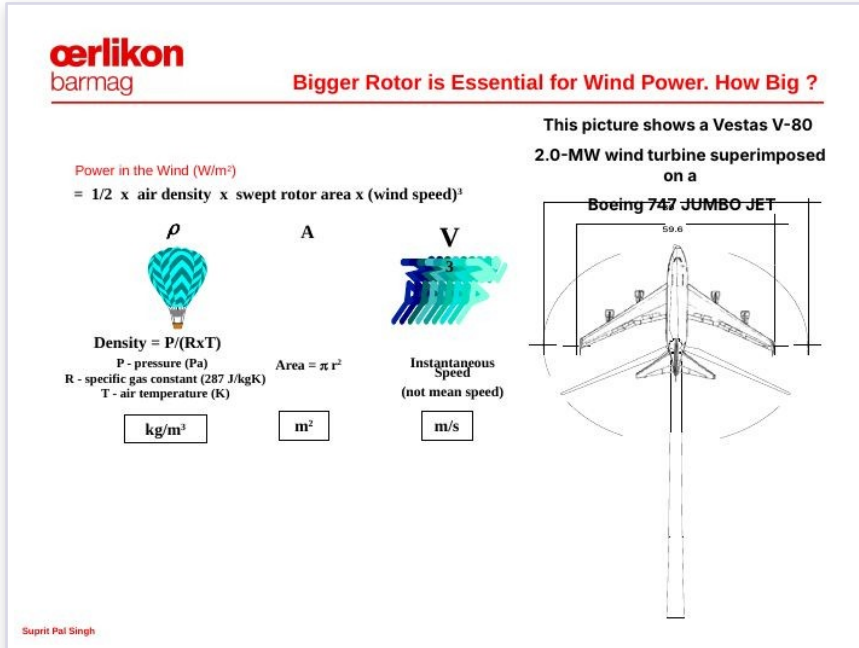
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PART THREE

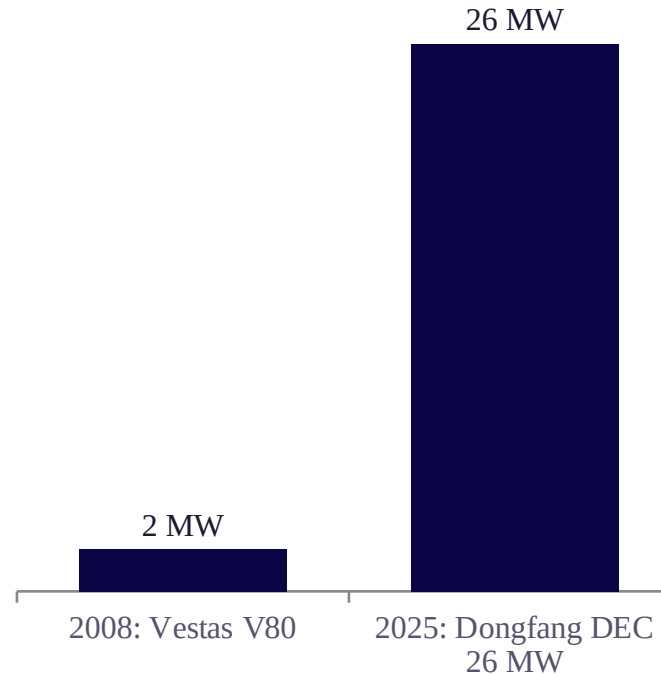
Wind and composites

Bigger rotors, and polymer blades that can now be recycled.

Rotors grew thirteen times in power since 2008



2008: a 2 MW Vestas V80 beside a Boeing 747



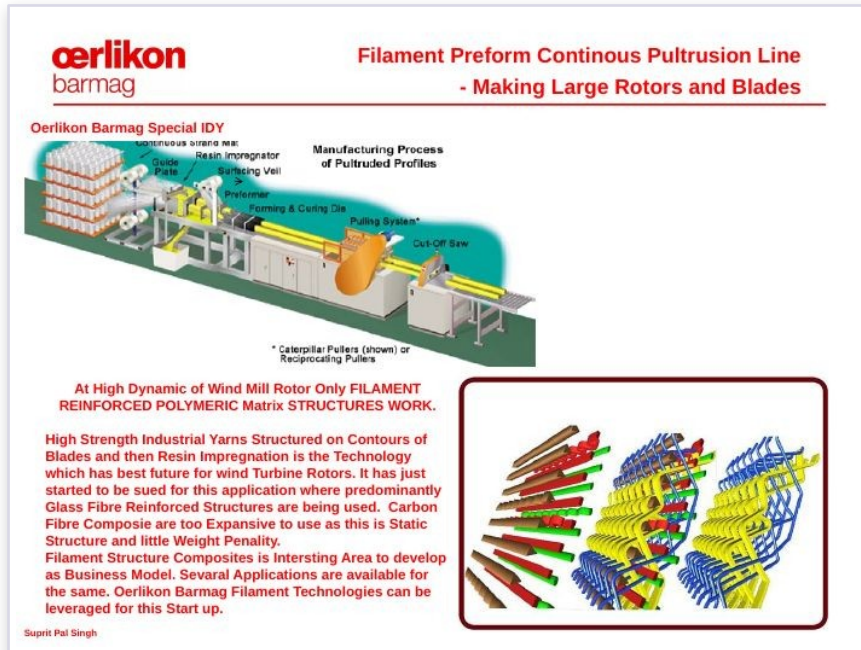
310 m+

Rotor diameter of the 26 MW offshore turbine, against 80 m for the V80.

The physics on our 2008 slide still holds. Power grows with the swept area, so rotors keep growing. Bigger blades need stronger, lighter composites.

Source: Offshore magazine, 4 Jun 2025 (Dongfang Electric 26 MW, rotor over 310 m); original 2008 slide (Vestas V80).

Filament-reinforced polymer blades, and now recyclable ones



2008: continuous pultrusion for large rotor blades

In 2008 we argued that only filament-reinforced polymer structures can carry the loads of a large rotor. That is now how every large blade is made.

THE NEXT PROBLEM

Thermoset blades were hard to recycle. Since 2022, blades whose resin is released by a mild acid have turned at RWE's Kaskasi offshore wind farm in the North Sea, so the glass fibre and other parts can be recovered.

Polymer science

is still the lever on blade length, weight and end of life.

Source: *The Maritime Executive*, 1 Aug 2022 (Siemens Gamesa Recyclable Blade at Kaskasi).

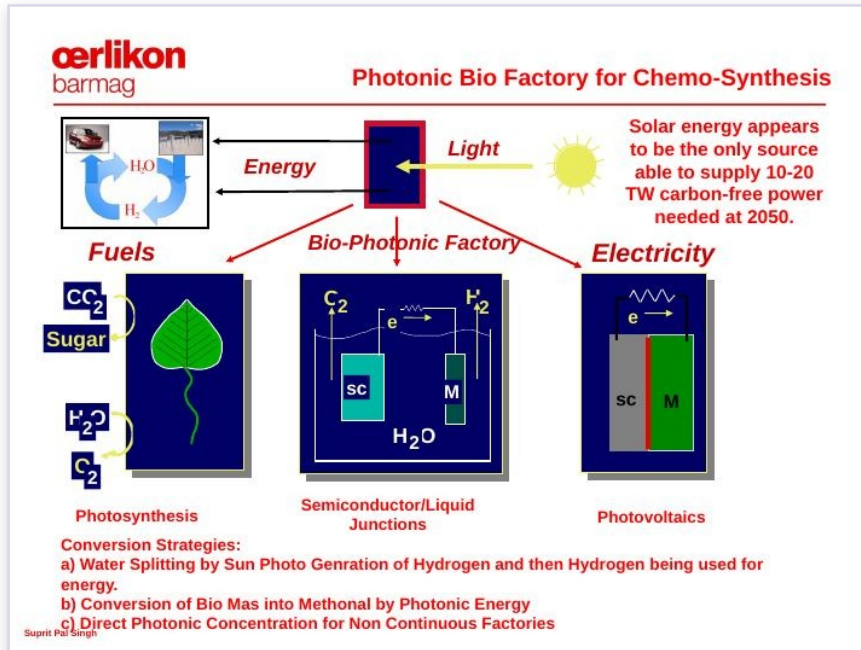
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PART FOUR

Fuels and storage from sunlight

Hydrogen made with solar and wind power, and the storage it needs.

Fuels from sunlight are still early, and storage decides the cost



2008: water splitting by sunlight, and fuels from biomass

58 GW/yr

Electrolyser factory capacity at the end of 2025.

< 5 GW

Electrolysers actually made in 2025, about 9% use of that capacity.

The machines exist. The projects are slower, about 9 GW a year to 2030 on current plans. Storage between when hydrogen is made and when it is used is a large part of the cost and the safety case.

Our moonshot

Namindo is working on a new approach to storing hydrogen at scale. An Australian patent application is filed.

Source: IEA Global Hydrogen Review 2026, via Argus Media, 19 Jun 2026.

Four lessons from eighteen years of solar

1 Scale beats novelty

The cheapest technology at scale won, even against cleverer ideas.

2 Light management pays

Once panels are cheap, the cheapest extra kWh comes from using more of the light on site.

3 Materials still decide

Encapsulants, blades, steels and seals set the life and the cost of the plant.

4 Prove it in the field

Investors and grant bodies fund measured results, logged and checked.

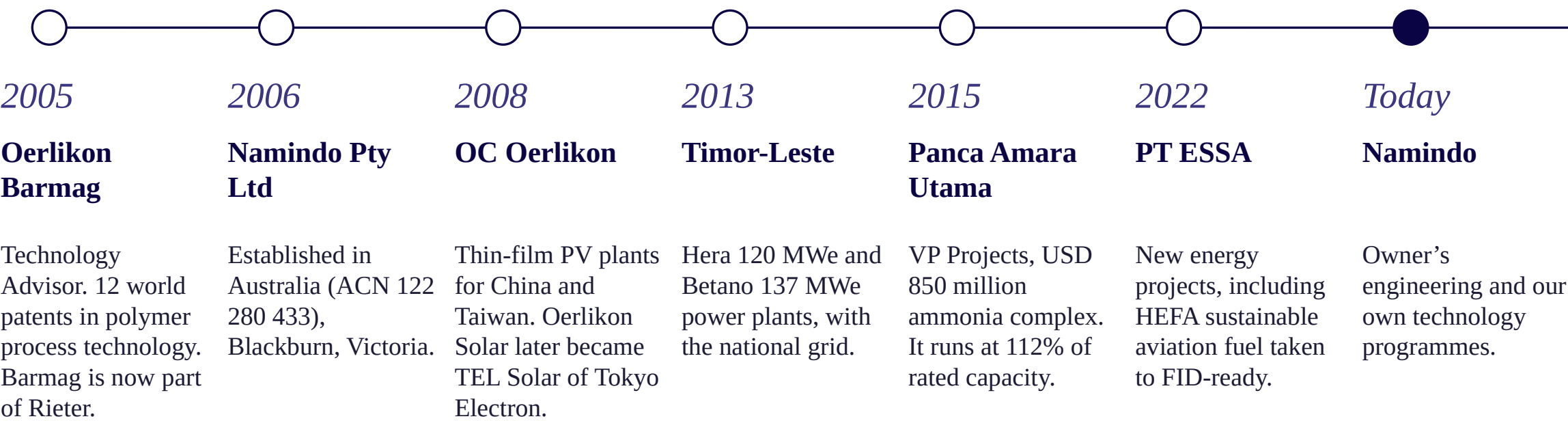


PART FIVE

Namindo since 2006

Bridging science and technology, from polymers to solar, power, ammonia and fuels.

Namindo and its founder, 2005 to 2026



One thread runs through all of it: materials, and where the light goes.

Source: Namindo Pty Ltd company records and founder's CV.

Owner's engineering, and technology of our own

Owner's engineering

We sit on the owner's side of energy and process projects: feasibility, licensor choice, FEED review, procurement and delivery.

Bifacial solar yield

Raising ground reflectance under bifacial PV farms. Australian patent application filed. Field trial planned with logged data on webdoli.com.

Hydrogen storage

Our moonshot: a new approach to storing hydrogen at scale. Australian patent application filed.

We also develop sonic reactors for process intensification. Across all of it, our practice areas run from polymers and materials to energy, biofuels and sustainable aviation fuel.

Where the 2026 figures come from

1. REN21, Renewables Global Status Report 2009 update, via Renewable Energy World: grid-connected PV 13 GW in 2008.
2. IEA PVPS Snapshot of Global PV Markets 2026, via TaiyangNews: 698 GW added in 2025, about 3 TW cumulative.
3. US EIA, Solar photovoltaic module shipments, table 4: average module value US\$3.49/W in 2008.
4. PV Tech, 7 Oct 2026, sun.store PV Index: TOPCon bifacial €0.114/Wp (US\$0.128/Wp), Sept 2026.
5. IRENA, Renewable Power Generation Costs in 2024, via pv magazine, 23 Jul 2025: solar PV LCOE US\$0.043/kWh.
6. pv magazine, 15 Jul 2026: LONGi perovskite-silicon tandem cell 35.5%, certified by ESTI.
7. Trina Solar: cell records of 26.58% (TOPCon) and 27.08% (HJT).
8. ITRPV 17th edition, via pv magazine, 25 Jun 2026: 706 GW shipped, about 98% c-Si, about 82% n-type wafers.
9. REN21 Global Status Report 2025, CSP chapter: 7.2 GW end 2024; VS1 and Yadnarie projects.
10. pv magazine, "The long read: All about albedo" (Soltec BiTEC data); UNSW pv-manufacturing.org, bifacial cells and modules.
11. Offshore magazine, 4 Jun 2025: Dongfang Electric 26 MW turbine, rotor over 310 m.
12. The Maritime Executive, 1 Aug 2022: recyclable blades installed at RWE Kaskasi.
13. IEA Global Hydrogen Review 2026, via Argus Media, 19 Jun 2026: electrolyser capacity and output.



Thank you

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The future cannot be realised unless we dream. (2008)