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Repowering aging solar projects with industrial-grade eBOS

21 May 2025
10:00 am – 11:00 am | EDT, New York
4:00 pm – 5:00 pm | CEST, Berlin, Paris

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Welcome!

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Do you have any questions? ❓ 🙋

Send them in via the Q&A tab. 👉 We aim to answer as many as we can today!

You can also let us know of any tech problems there.

We are recording this webinar today. 📹

We‘ll let you know by email where to find it and the slide deck, so you can re-watch it at your convenience. 👀 💡

S&P Global
Commodity Insights

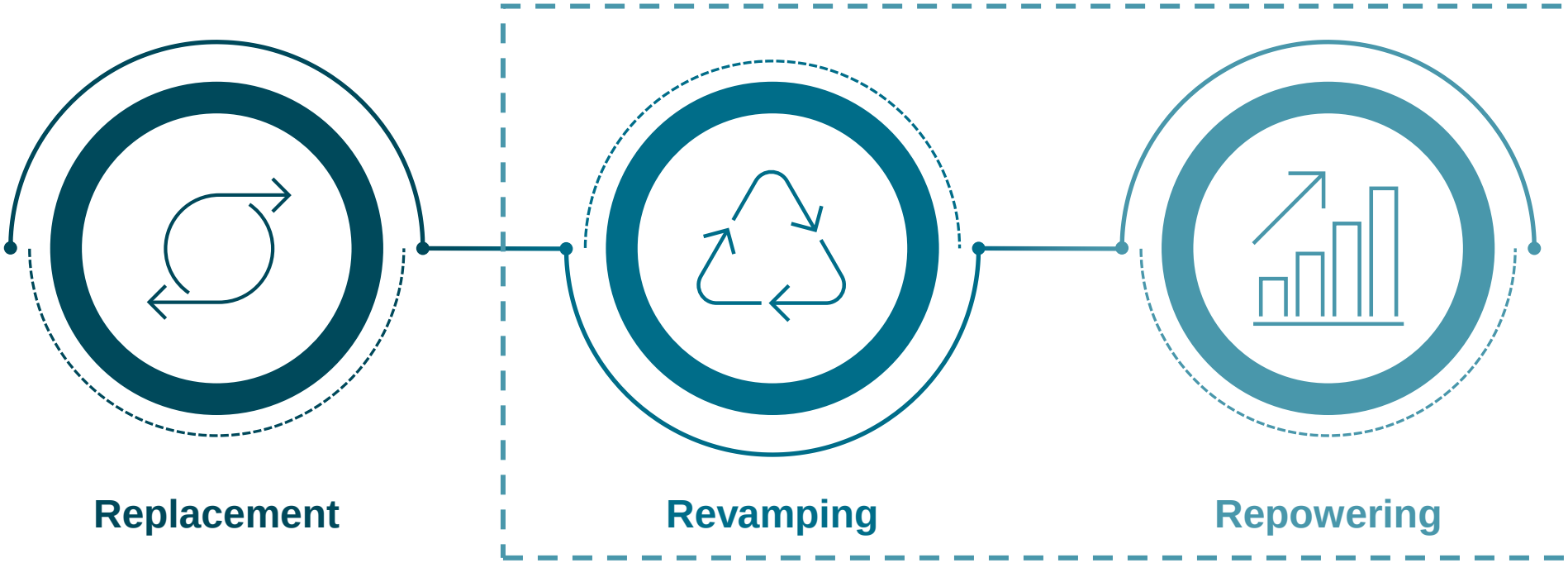
Power up: Market drivers of solar repowering

PV Magazine webinar

Liam Coman / Analyst / Clean Energy Technology

May 21st, 2025

Three possibilities exist when swapping components: replacement, revamping and repowering

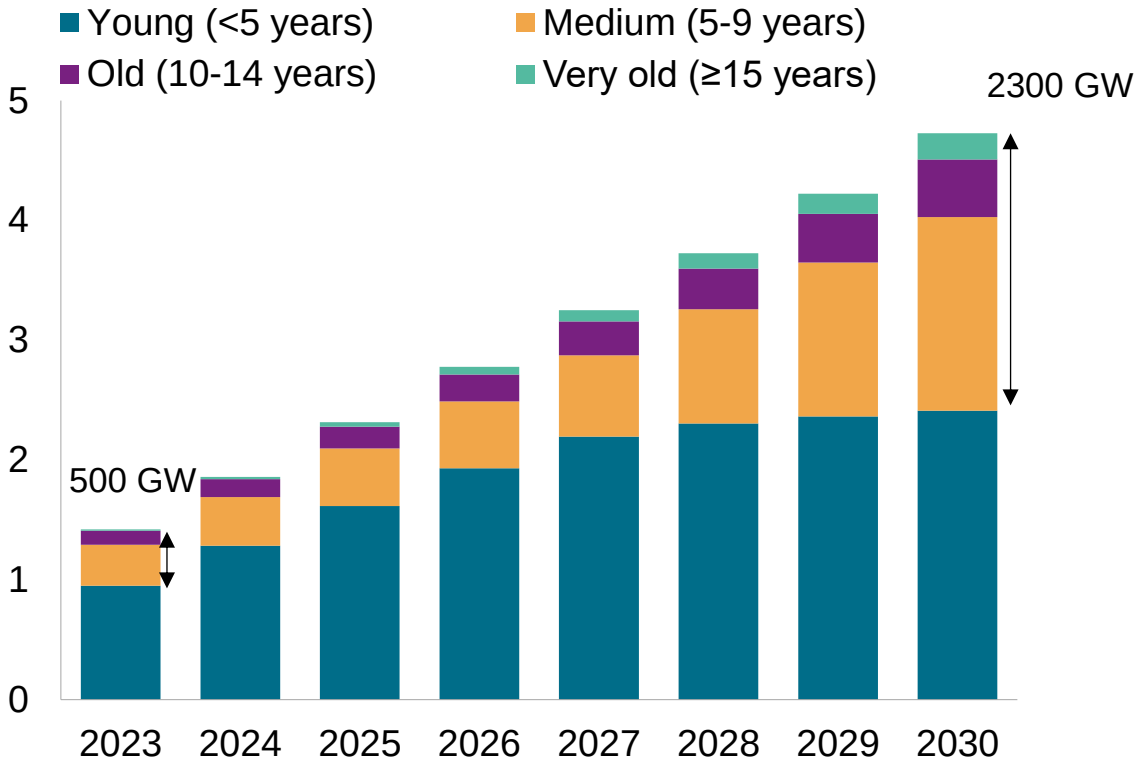


Source: S&P Global Commodity Insights.

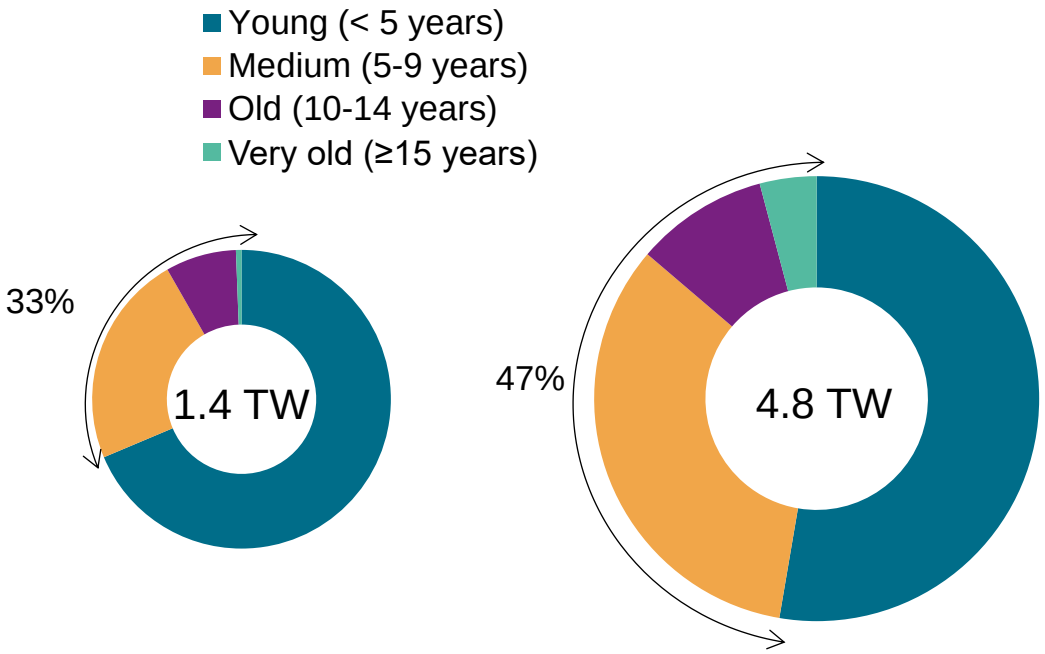
Market sizing of repowering

Older assets (≥ 5 years old) will account for 47% of the global asset base in 2030, up from 33% in 2023

Age of installed base (TW)



Age of installed base 2023 & 2030



Data compiled 2024.
Source: S&P Global Commodity Insights.

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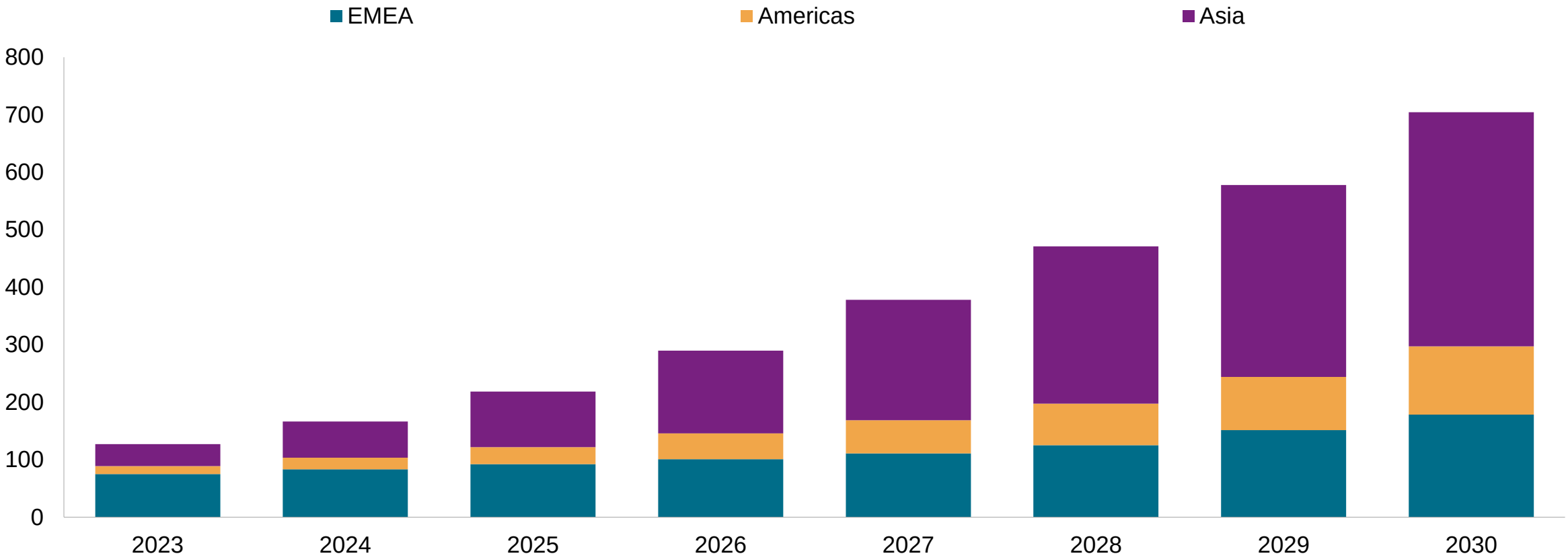
10-year-old systems will quintuple in size to hit 700 GW in 2030

EMEA accounts for ~ 40% of 10-year-old systems globally in 2025

Cumulative installed base ≥10 years old (GW)



Data compiled 2024.
Source: S&P Global Commodity Insights.

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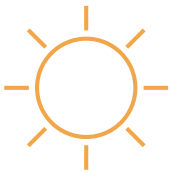
Technical considerations of repowering

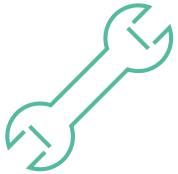
A multitude of factors affect the lifespan of components on site

Product type



Weather conditions

Replacement ≠ failure



Servicing and maintenance

Development of product

Manufacturer health

Data compiled 2024.
Source: S&P Global Commodity Insights.

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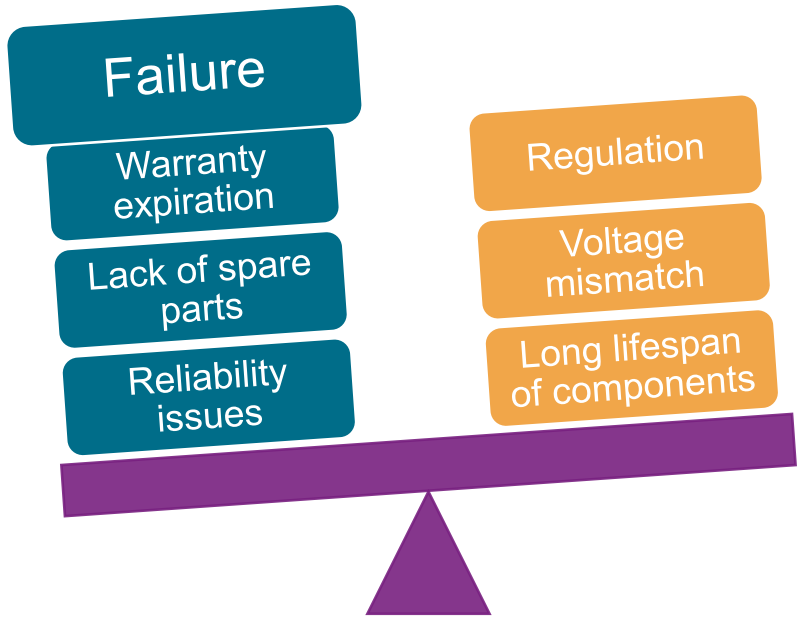
Failure is the key driver for repowering, but other financial and technical considerations can influence the decision

Technical considerations

Drivers

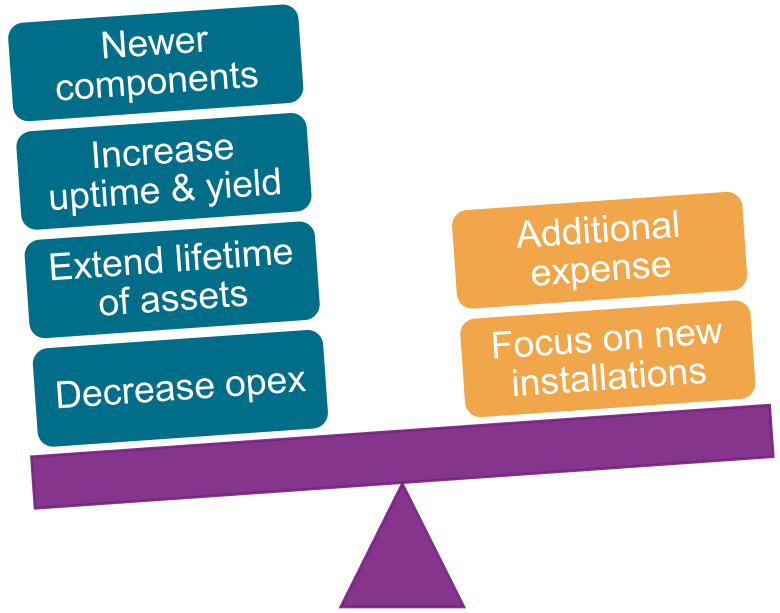
Inhibitors



Financial considerations

Drivers

Inhibitors



Data compiled 2024.
Opex = operating expenditure.
Source: S&P Global Commodity Insights.

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Repowering Aging Solar Projects

With Industrial-Grade EBOS

Introducing Shoals Technologies Group™

2 decades of experience and commitment to quality, transforming the solar power industry

Shoals is a leading provider of electrical balance of systems (EBOS) solutions for utility-scale, commercial, and industrial solar PV and energy storage projects.

HIGHLIGHTS

- Founded in 1996 as a Tier 1 automotive supplier
- Launched Solar EBOS in 2002
- Debuted on the Nasdaq stock exchange in 2021 (SHLS)
- PV magazine BoS award 2024 for 2kV solutions

Sustainable Growth

Where we are and where we are going

Largest EBOS supplier worldwide with over **80 GW** under contract, in construction, and operating

Over **60 patents** issued and pending globally

Headquartered outside Nashville, Tennessee, USA

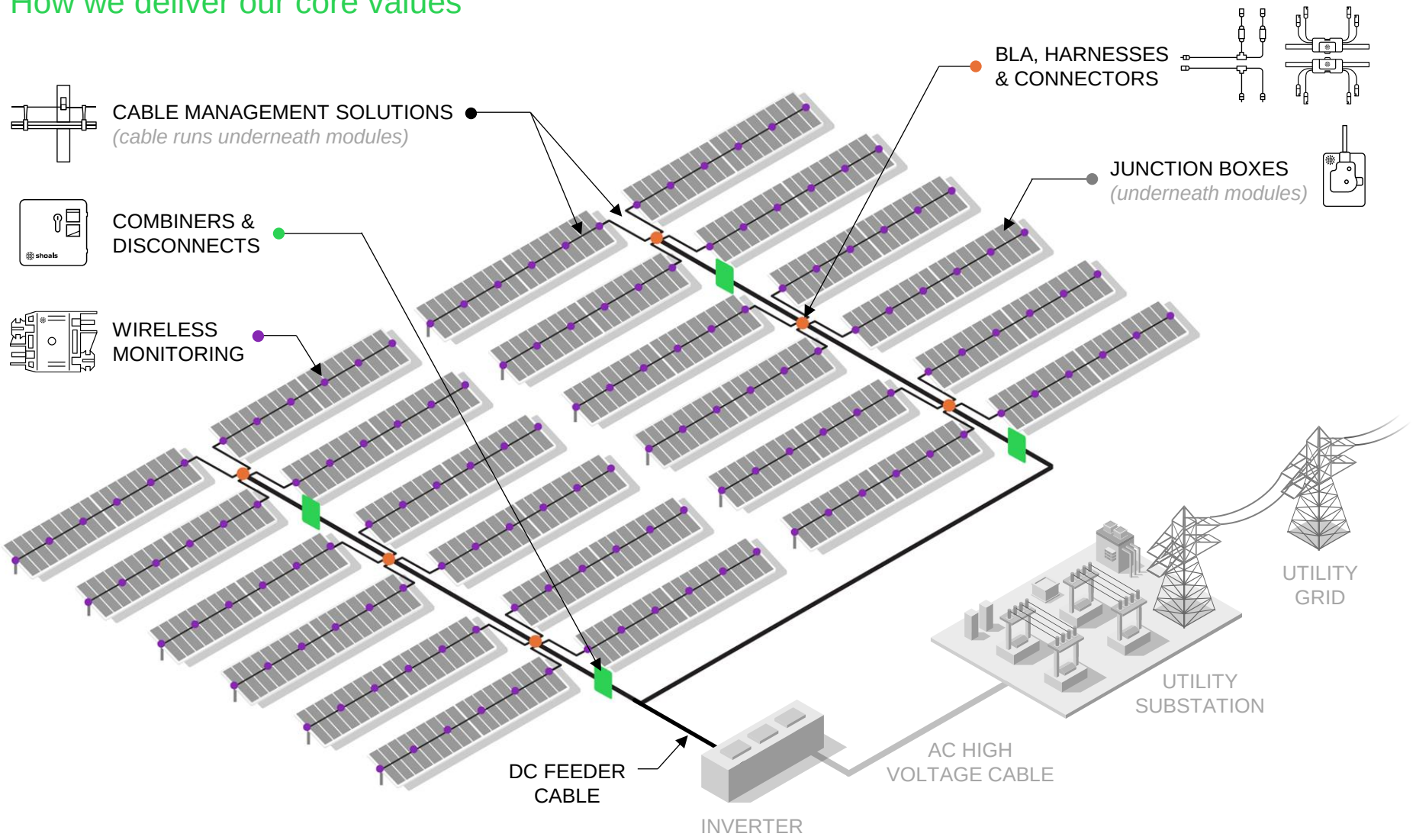
Localised manufacturing across the globe, to suit local market needs by offering UL, IEC and AS/NZS standards products

GEOGRAPHIES SERVED

Sample projects from around the world at shoals.com/projects

What We Do in Utility-Scale Solar

How we deliver our core values



● BLA TRUNK BUS

● DISCONNECT BOX

● CABLE MANAGEMENT SOLUTION

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Beyond Inverters & Modules: The Role of EBOS

Hidden costs and risks of outdated or poor quality EBOS infrastructure

Outdated or poorly quality EBOS is one of the most overlooked threats to long-term system performance.

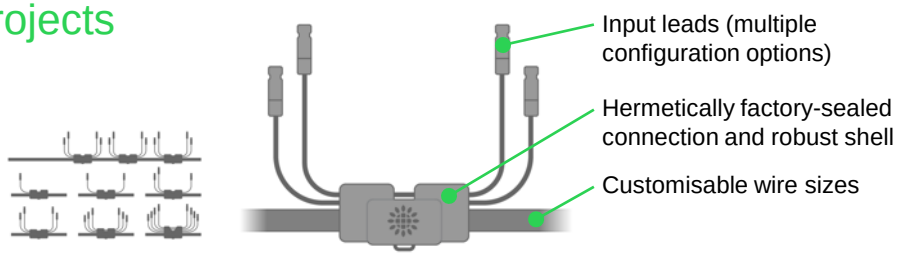
Poor-quality wiring, connectors, and harnesses can lead to:

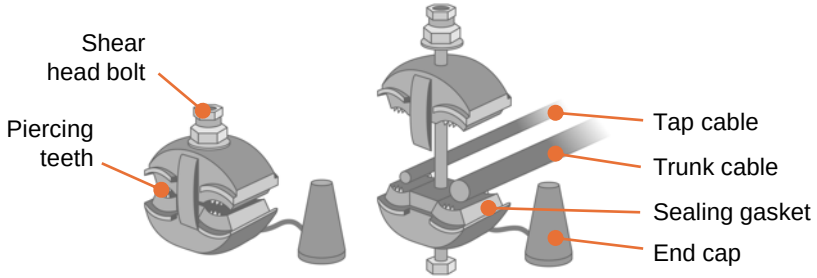
- Increased downtime and troubleshooting costs
- Higher risk of hot spots, corrosion, and safety hazards
- Energy losses due to voltage drop and degraded conductivity
- Greater O&M burden from installation errors or inconsistent field work
- Shorter overall system lifespan and reduced ROI

Upgrading to industrial-grade, factory-tested EBOS reduces these risks, ensuring reliability, safety, and energy yield across the full system lifecycle.

The Safer Choice

BLA vs. IPCs in solar projects





	Shoals BLA	IPCs
Manufacturing & Design	✓ **Factory fabricated** with innovative, patented undermold/overmold design	⚠ **Field fabricated** with piercing and insulated with gel or dry clamshell
Testing	✓ **Overperforms** in wet hipot testing by 10X	⚠ **Underperforms** in wet hipot testing by 10X
Installation	✓ **Easy** installation – no need for skilled labour, clean environment, special tools, or gel	⚠ **Complex** installation – dependent on skilled labour, clean environment, and other factors
PV Standards Compliance	✓ **Fully compliant** – includes UL 9703 PV assembly or harness and UL 6703 connector	⚠ Solar PV UL standards are **not guaranteed**
Risk Of Failure	✓ Long-term **risk is reduced** with factory fabrication and testing	⚠ **Increased risk** from lack of field testing and greater exposure to heat, moisture, and oxidation
Design Life	✓ **Proven 35+ years** design life of Shoals' solutions	⚠ **Unclear** design life

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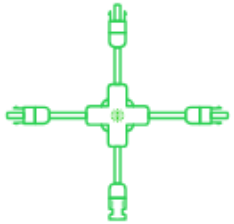
Solar Repowering Product Portfolio

Shoals' product roadmap is shaped by the latest industry trends and evolving customer needs

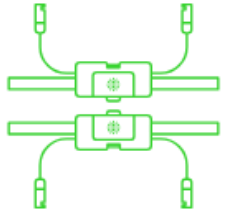
Electrical Balance of Systems

Optimising EBOS products is what Shoals does best. When designing your harnessing system, we strive for efficiency and ease of use, thereby reducing the need for specialised labour in construction.



Homeruns, Interconnection & Extensions

Our patented prefabricated interconnection & extension solutions and homerun harnesses reduce specialised labour required in PV installations, making solar panel integration a breeze.



Big Lead Assembly (BLA), mini BLA, LT BLA

The BLA® trunk bus system takes all the complexity out of wiring your solar field. Using our latest in-line fuse and wire manufacturing technology, we offer you a site free of traditional DC string combiners.

Transition Boxes

The Transition Box adds additional versatility to the BLA solution for above-ground to below-ground transitions.

Combiners, Recombiners, and Disconnects

The next evolution of combiner, recombiner, and disconnect boxes optimises both cost and layout without sacrificing quality or performance.

Engineering & Design

We always welcome the opportunity to collaborate with you, addressing your project needs in a way that respects budget and delivers results. Bring us your drawings and, together, we'll build a solution.

Lessons Learned from our Repowering Case Study

What was the issue and how Shoals is fixing it

What Happened?

- ✓ Cable damage from zip ties and tracker movement; wire sheathing wore down over time.
- ✓ Wiring insulation deteriorated due to contact with tracker steel parts.
- ✓ IPC challenges:
  - Difficult to install correctly; torque-sensitive and error-prone.
  - Connections can’t be tested easily; issues appeared within just 3 years.
  - Morning dew led to hot spots, raising fire risk.
  - Tracker operation limited to fixed (tabletop) position to prevent fires, resulting in production losses.
  - Replacement difficulties with piercing connectors – cable must be removed and reinstalled.

Shoals Solutions:

- ✓ Switching away from IPCs – replace IPCs with aluminum mini BLA trunk bus
- ✓ Pilot project size 1.9 MW to showcase the improved performance thanks to our solution

Superior Quality

It’s the Shoals way of working

> I’ve been to [Shoals’] facility and they’re incredible from a manufacturing standpoint… I think they actually exceed six sigma.”
>
> **— Engineer, EPC**

LOT TRACKING

With robust systems in place, we can track critical components in every product

SYSTEMS

Our Quality Systems go above and beyond the base requirements

TESTING

Products coming off our lines are tested to last a lifetime

REPORTING

Our Quality Team is happy to provide you with the required documents

GUARANTEES

We guarantee the product leaving our doors is quality made

Quality is in our DNA – we follow industry standards and then take it up a notch.

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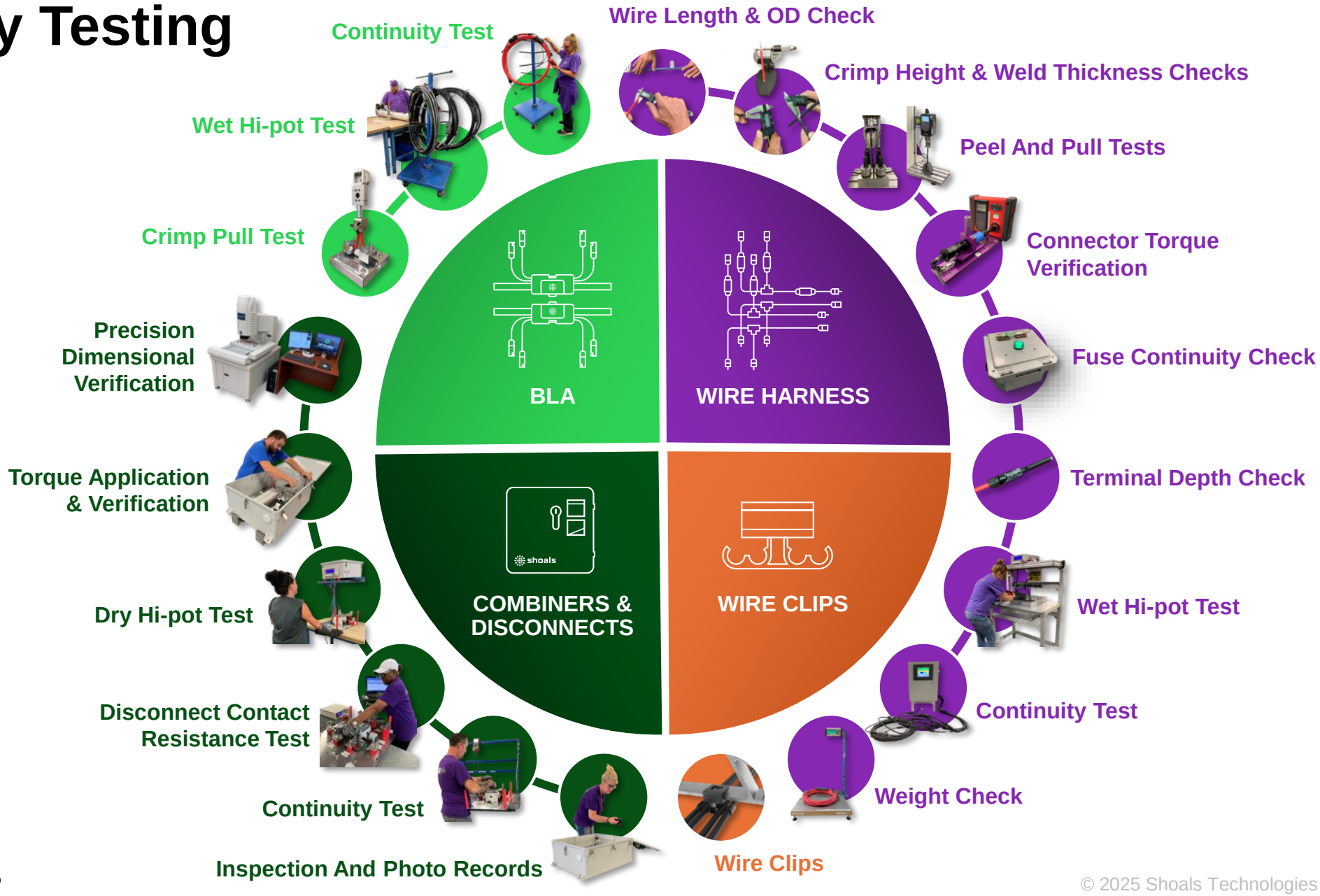
Quality Testing



Shoals Design Life

Built for long-term performance, our solutions last the lifetime of your project

UV Exposure

Shoals utilises high irradiance, direct UV exposure test conditions for wire, wire harnesses, and BLA

Key mechanical and electrical criteria are measured to confirm degradation does not exceed regulatory limits

High Temperature

Shoals utilises industry (IEC, IEEE) best practices to calculate lifetime of materials based on extreme temperature testing

Key mechanical criteria are measured empirically, and hours of life are calculated based on Arrhenius equations

Water Ingress

Shoals demonstrates the IP68 seal of its products through weeks of submersion (vs. hours for most companies), far exceeding IEC standards

Key electrical criteria are validated through submerged hi-pot testing, exceeding regulatory limits

Shoals environmental testing exceeds safety oriented regulatory standards to confidently deliver solutions with design life exceeding 35 years

Big Lead Assembly (BLA) + Load Break Disconnect (LBD)

The BLA is an aboveground aluminum trunk system that combines the functionality of cable assemblies, combiner boxes, and fusing all into one. This free air de-rated system eliminates the need for standard combiner boxes, messy multiple conductor string wires, cable trays, trenching, and field crimping. Factory manufactured and quality guaranteed.

Lab-proven under full load during static heating sequence testing, the LBD is designed for maximum durability and years of uninterrupted, real-world service. Field installation time has been slashed, space for cable terminations generously increased, and O&M torque points reduced by up to 63%.

Key Features (BLA)

- Up to (4) 10 mm2 or (8) 6 mm2 input leads per BLA mold drop
- Configurable for Thin Film, Crystalline, or Bi-Facial
- Plug and Play - eliminates field crimping and splicing
- Patented undermold / overmold process chemically bonds and hermetically seals joints (IP68)
- Eliminates standard combiner boxes
- Compliant with IEC 62930 and 62852 up to 1500 VDC

Key Features (LBD)

- 400 A, 1500V disconnect, 100% load-break rated
- Plated bus bars rated for 90°C, Cu/Al
- Breather vent reduces internal condensation
- Safety shield covers all live components
- Designed for ease of cable installation
- Surge protection device

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Mini BLA + Fused Recombiner (FR)

Similar to BLA, mini BLA is a smaller iteration of the aboveground aluminum trunk system that combines the functionality of cable assemblies, combiner boxes, and fusing all in one. This free air de-rated system eliminates the need for standard combiner boxes, messy multiple conductor string wires, cable trays, and field crimping. Factory manufactured and quality guaranteed.

Shoals mini BLA pairs with the Fused Recombiner for protection and a disconnect point for N-S unobstructed row access. This solution lowers yearly maintenance, installs like traditional home run wiring, and delivers reliable power for stacked tracker configurations over long distances

Key Features (mini BLA)

- Up to (2) 6 mm2 or 10 mm2 input leads per BLA mold drop
- Configurable for Thin Film, Crystalline, or Bi-Facial
- Plug and Play - eliminates field crimping and splicing
- Patented undermold / overmold process chemically bonds and hermetically seals joints (IP68)
- Eliminates standard combiner boxes
- Compliant with IEC 62930 and 62852 up to 1500 VDC

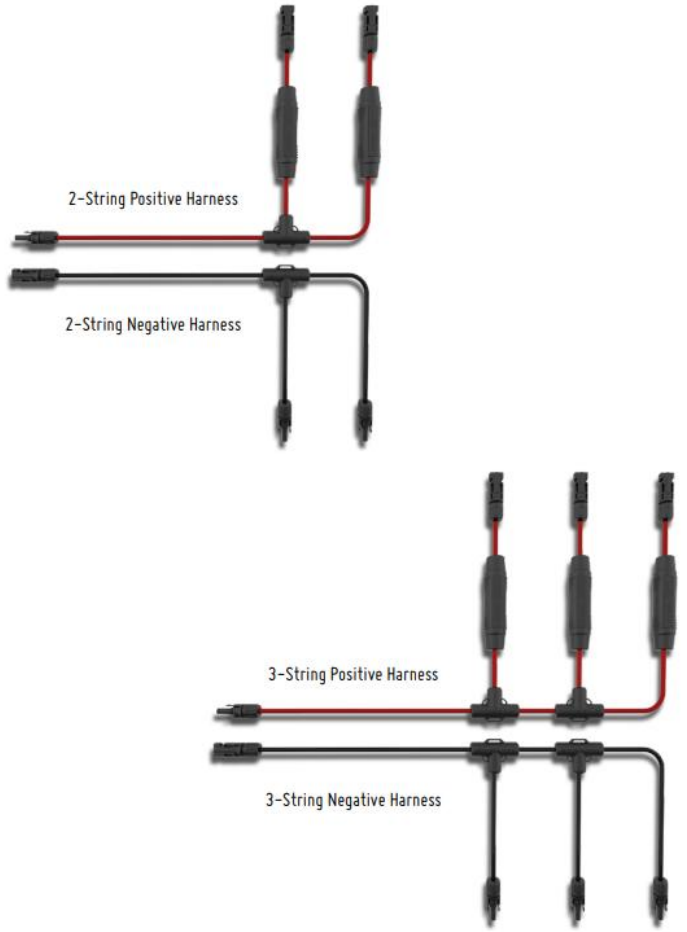
Key Features (FR)

- 400 A, 1500V disconnect, 100% load-break rated
- Plated bus bars rated for 90°C, Cu/Al
- Breather vent reduces internal condensation
- Safety shield covers all live components
- Designed for ease of cable installation
- Surge protection device

Shoals Interconnect Harnesses

Whether the site calls for a BLA or traditional combiner design, Shoals offers pre-fabricated wire interconnect harnesses with inline fuses to eliminate the need for measuring, cutting, and crimping in the field and reducing the need for individual wire runs. These harnesses are custom manufactured according to each project's site layout with plug-n-play connectors for rapid installation.

Shoals Interconnect Harness offering supports a variety of PV module technologies including bifacial, crystalline, and thin film (First Solar Series 4/6/7) to ensure seamless integration across the board.



Key Features

- UV/sunlight resistant
- Resistance welded joints
- Configurable for Thin Film, Crystalline, or Bi-Facial
- Custom manufactured to the installation
- Plug and Play - eliminates field crimping and splicing
- Patented undermold / overmold process chemically bonds and hermetically seals joints (IP68)
- Compliant to IEC 62930 and 62852

Options

- Available in 4mm2, 6mm2, 10mm2, and 16mm2 wire sizes
- Certified PV connectors available
- Cable available in standard colors
- Standard output fuses up to 50A

Conclusion

Repowering isn’t just about replacing inverters or modules

Repowering is an opportunity to upgrade the full system or just as much as you need for long-term, efficient performance

Industrial-grade solutions like Shoals mini BLA offer faster installation, fewer errors, and longer system life than field-fabricated DIY IPCs

EBOS is a critical part of repowering success, directly impacting safety, longevity, and energy yield

Early EBOS planning helps avoid costly rework, improve project ROI, and ensure your repowered system meets today’s reliability standards

Don’t wait for a failure.

Design for reliability from the start and make your EBOS decisions early in the process.

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Q&A

For additional questions, please reach out to:

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by Matthew Lynas

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