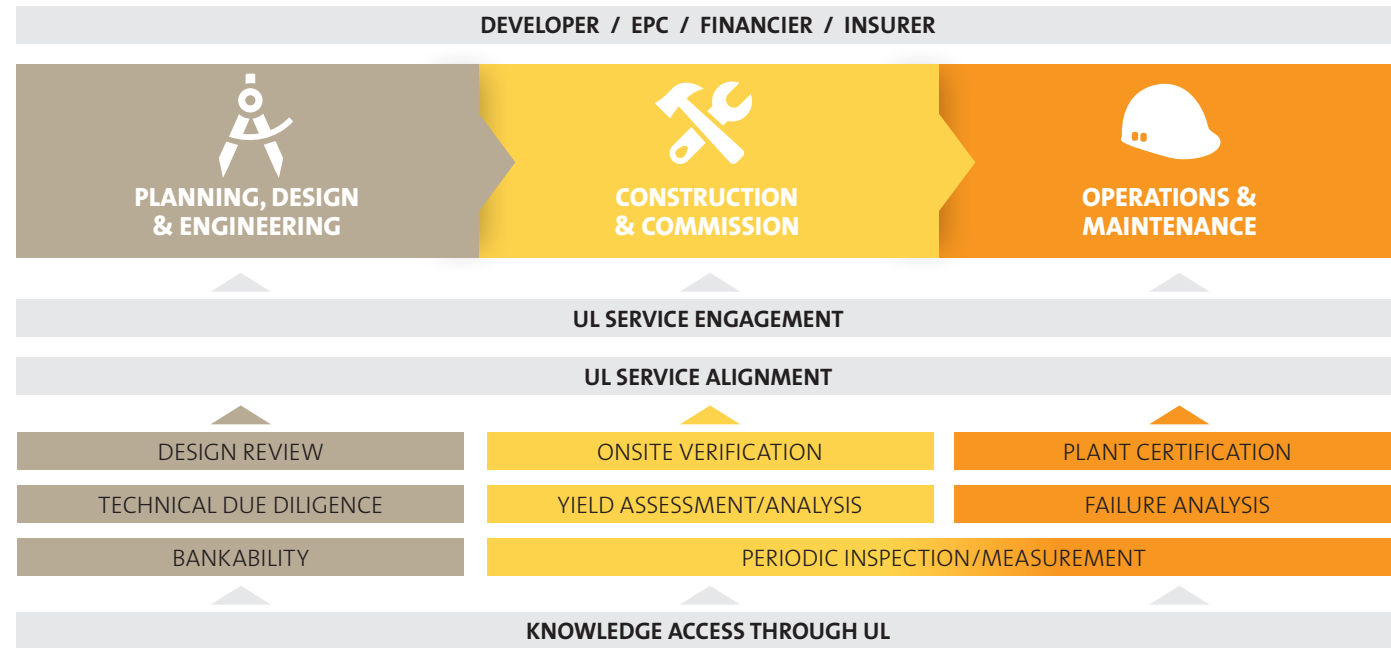




Your single-source solution provider for PV plants

**BUILDING TRUST
INTO THE GLOBAL
PV VALUE CHAIN**

REVIEW, VERIFICATION, TESTING, CERTIFICATION AND INSPECTION ACROSS THE PV VALUE CHAIN.



UL is a trusted independent testing and certification body with 120 years of experience. Our offer to the PV industry covers the entire value chain – right up to and including PV plants. We perform testing and certification of materials, components, products and systems, as well as on-site field evaluations. A one-stop solution for all stakeholders of a PV power plant, anywhere in the world.

OUR VALUE PROPOSITION

FOR MANUFACTURERS AND EPCS

- Global footprint with local presence
- Local testing and inspection in Asia, Europe and North America
- Technical expertise
- Build stakeholder confidence with trusted test and inspection results

FOR BANKING & FINANCE

- Independent testing and evaluation services for performance, reliability, durability and quality
- Technical due diligence including energy yield assessment
- Factory inspection, quality audits and monitoring

FOR OWNERS/OPERATORS

- Periodic performance assessments
- Preserve system performance with periodic inspections
- Failure analysis and advisory services reduce system downtime



PROTECT YOUR INVESTMENT. FROM DESIGN TO OPERATIONS – UL'S SERVICES FOR PV PLANTS

UL's suite of services help owner-operators, developers, financiers, EPCs, insurers and manufacturers manage risks associated with building and operating PV plants. The services expand on UL's long-standing technical knowledge, as well as our solid track record and relationships with regulators around the globe. Safety, performance, availability and achieving expected energy yields

are critical factors right from the planning and design stage to the commercial operation date (COD) and throughout the in-service lifetime of a PV plant. UL provides assistance that financiers, developers and operators can use to make well-informed decisions as they assess risks and uncertainties. UL's services align with the project development process and build on one another.



Through an independent third-party evaluation, you can increase stakeholders' confidence in hardware selection, system design and code compliance during the planning, design and engineering phases.

Improper implementation and installation practices may propagate across the entire system, giving rise to potential defects during commissioning. Careful inspection and measurement reduces the likelihood of costly rework and delays. Our broad knowledge of PV hardware, systems and regulatory code requirements can reduce construction risks.

System availability is a key factor towards achieving expected energy production. Periodic inspections and maintenance can mitigate outages or unexpected drops in yield. In addition, through periodic examination of the system, UL provides you with insights into equipment status and overall system health. Finally, independent third-party inspections help protect asset value if and when plant ownership changes.



PLANNING, DESIGN & ENGINEERING

- **DUE DILIGENCE** – This set of services involves assessing technical aspects of the project. It comprises a Project Documentation Review, a Design Review and an Energy Yield Assessment (EYA).
- **DESIGN REVIEW** – Based on the completed system design and technical documentation package, the equipment interaction is reviewed for conformance to local code requirements.
- **YIELD ASSESSMENT** – An energy yield assessment is performed prior to construction, with consideration for location, meteorological data, and hardware specifications, for the purpose of verifying financial models to expected production.
- **BANKABILITY/PERFORMANCE** – Targeted services provide full or partial testing to international performance standards such as IEC/UL 61215 or IEC/UL 61646. UL also recommends additional key tests to expose defects that are known to impact long-term reliability. The production processes are examined specifically for consistency in PV quality, including stringent quality control across the supply chain. The company size, history, reputation, financial foundation, and product portfolio are also reviewed.



CONSTRUCTION & COMMISSION

- **HARDWARE CERTIFICATION** – PV products and components are evaluated and tested to recognized safety and performance standards.
- **RELIABILITY AND DURABILITY** – We perform reliability and durability testing based on the guidelines of the International PV Module QA Task Force or, on request, following a customer specified test plan.
- **PRE-INSPECTION** – This service includes inspecting a sampling of the plant to identify issues like electrical code compliance, accuracy in measurements, structural requirements and system document control.
- **PLANT COMMISSIONING** – Preliminary examinations, tests and measurements verify safe system operation. UL then verifies that installation matches the plans, is code compliant, and performs as expected.
- **PLANT PERFORMANCE VERIFICATION** – UL determines energy production based on actual weather conditions and system characteristics, and uses results to assess financial models and impact on revenue.



IN-SERVICE, OPERATIONS & MAINTENANCE

- **POST-INSPECTION** – Once a plant is in operation, we follow up to identify any construction issues that may have been introduced during operation or caused by environmental stressors.
- **FAILURE ANALYSIS** – UL collects and analyses data/samples from a PV plant to determine if the cause of failure was due to over-stress or wear-out.
- **FIELD EVALUATIONS** – Via documentation review and inspection of equipment, UL assists in determining probable acceptance of an installed product, which may lead to approval by the appropriate authority.

WHY UL?

- Rigorous evaluations processes help clients better understand risk
- Experience in renewable energy yield assessment and projection
- Major banks, financial institutions and insurance companies engage with the UL family of companies
- World leader in safety science, performance testing and certification of PV products and components
- Technical expertise that can be there fast – in some cases within 24 hours
- Resource to regulators due to UL's broad knowledge of NEC, local and national standards and codes
- Broad knowledge of local and national standards and codes
- Globally accredited laboratories for PV components and systems testing
- The UL Certification Mark is trusted by more consumers in North America than any other safety mark and signals a commitment to safety for both manufacturers and regulators

EUROPE

Denmark

T: +45.44.85.65.65
E: info.dk@ul.com

France

T: +33.1.60.19.88.00
E: info.fr@ul.com

Germany

T: +49.69.489810.0
E: info.de@ul.com

UL TTC

T: +49.2151.883324
E: ttc@ul.com

Italy

T: +39.039.6410.101
E: info.it@ul.com

Poland

T: +48.22.336.33.39
E: info.pl@ul.com

Spain

T: +34.93.368.13.00
E: info.es@ul.com

Sweden

T: +46.8.795.4370
E: info.se@ul.com

The Netherlands

T: +31.26.376.4800
E: info.nl@ul.com

United Kingdom

T: +44.1483.302.130
E: info.uk@ul.com

AMERICAS

Argentina

T: +54.11.4316.8200
E: info.ar@ul.com

Brazil

T: +55.11.3049.8300
E: info.br@ul.com

Canada

T: +1.866.937.3ULC, 1.866.937.3852
E: customerservice.ca@ul.com

Mexico

T: +52.55.3000.5400
E: info.mx@ul.com

United States

T: 877.UL.HELPS, 1.877.854.3577
E: cec@ul.com

ASIA PACIFIC

Australia

T: +61.1.8824.7775
E: customerservice.au@ul.com

China

E: customerservice.cn@ul.com

Guangzhou

T: +86.20.3213.1000

Shanghai

T: +86.21.6137.6300

Suzhou

T: +86.512.6808.6400

Hong Kong

T: +852.2276.9898
E: customerservice.hk@ul.com

India

T: +91.80.4138.4400
E: customerservice.in@ul.com

Japan

E: customerservice.jp@ul.com

Ise

T: +81.596.24.6717

Tokyo

T: +81.3.5293.6000

Korea

T: +82.2.2009.9100
E: customerservice.kr@ul.com

Malaysia

T: +603.5632.5922
E: customerservice.my@ul.com

New Zealand

T: +64.3.940.4400
E: customerservice.nz@ul.com

Singapore

T: +65.6274.0702
E: customerservice.sg@ul.com

Taiwan

T: +886.2.5559.8168
E: customerservice.tw@ul.com

Thailand

T: +66.2.207.2408
E: customerservice.th@ul.com

For more information
on UL services for PV plants,
please contact **ULHELPS@ul.com**
or call **1.877.ULHELPS (1.877.854.3577)**

ul.com/solar

