

Solar + Energy Storage

Advanced Professional and Technical Advisory Services



Empowering Trust[®]



ADVISORY AND DUE DILIGENCE LEADERSHIP

New developments and rapidly declining costs for storage technologies are making the great potential for energy storage a reality and accelerating solar + storage deployments worldwide. To meet the increased demand, UL now offers a suite of services to support your solar + storage projects. From hybrid power system modeling and optimization to financial due diligence, we help you maximize success. On each project, we leverage our unique experience across the value chain in renewables including solar energy, solar technology, grid forecasting and integration, and our long history in battery and energy storage safety certification.

Who needs solar + storage advisory services?

Advisory services benefit anyone with a vested interest in understanding the key contributors to a plant's energy and economic loss profile and the specific actions to mitigate and manage those risks, improve energy yield and increase revenues. Performance and advisory services are for developers, investors, insurance providers, engineering, procurement, construction (EPC) companies, equipment suppliers, asset managers, operations and maintenance (O&M) managers, and plant owners.

Site optimization, energy estimates and use-case analysis

We design and optimize your solar or solar + storage project to meet its intended use case, including front-of-the-meter deployments for power and energy and behind-the-meter applications for servicing loads and helping to ensure reliability. We provide preliminary design support, optimization analysis and full bankability reports for project financing.

Professional and advanced advisory services

Leveraging UL's leadership in testing and certification, we provide best-in-class, comprehensive advisory and due diligence services including technology risks, warranties, performance guarantees, contract reviews, resource planning and financial reviews such as capital expenditures (CAPEX) and operations expenditures (OPEX) assessments.

Independent engineering

UL engineers have a deep background in renewable energy performance and readily create accurate bankable energy assessments, energy loss profiles, site analysis, energy storage use-case verification, technology assessments, site surveys including civil, electrical and design, fire and safety functional design review analysis, permitting, and project execution.

ADVANCED ADVISORY SERVICES

Our services are highly customizable to better accommodate your analytical needs and specific requirements. Customers trust us to provide them with the following services:

Comprehensive services – origination to operations

- Owner's engineering and advisory support
- Project or portfolio due diligence
- Independent engineering
- Financial modeling
- Key component risk and warranty analysis
- Testing, training and education
- Proposal and bidding support
- Policy and regulatory compliance

Solar + storage energy models and economic analysis

- Preliminary site design, architecture and optimization
- Energy and capacity market simulation
- Solar and energy storage sizing and economic analysis
- Independent energy yield and energy model assessments
- DC versus AC inputs, shading, clipping, conversion efficiency and tracking
- Loss analysis including auxiliary load
- Grid and plant curtailment
- Battery augmentation planning and replacement strategies
- Equipment health, degradation, and risk analysis for modules, DC, trackers, inverters
- O&M oversight and improvement assessment

Distributed energy generation resources, residential, commercial and industrial, and microgrids

- Techno-economic optimization using HOMER Grid and HOMER Pro, UL's distributed generation and microgrid modeling tools
- System sizing and optimization
- Advanced sensitivity and reliability analysis
- Accurate tariff, incentive, resilience and demand response modeling
- Detailed, dynamic, multiyear and custom schedules

Technology support

- Energy storage technology/bankability reviews and independent engineering
- Solar Photovoltaic (PV) technology/bankability reviews and independent engineering
- Battery capacity degradation
- Key component supply chain and quality evaluation — product performance, manufacturing and reliability evaluation
- Installation, system design and performance
- Ongoing operations and maintenance evaluation
- Product risk assessment including certifications fire and safety testing

Utility scale - front of the meter

- Project techno-economic analysis - performance, degradation, costs and revenues
- Energy shifting arbitrage
- Day-ahead and real-time market energy arbitrage
- Capacity market participation
- Ancillary services
- Load shedding and operational constraints
- Detailed battery charging management – grid, wind, solar, DG, CHP
- Dispatch based on hourly and sub-hourly price forecasts
- Grid & plant system analysis – point of interconnection limits, curtailment, auxiliary load, conversion efficiency

Custom engagements and project-specific needs

- Request for proposal (RFP) or tender support
- Mergers and acquisitions (M&A) support including new asset acquisition or divestiture due diligence
- Product testing
- Site acceptance testing and commissioning support
- Performance guarantee assessment
- Analysis custom engagements and other support

Connect with Us!



UL is a trusted independent advisory, testing, inspection and certification body for a broad range of industries. With deep expertise in renewable energy, UL helps manufacturers, developers, owners, investors, lenders, utilities and policy makers navigate the risk and complexity associated with renewable resources.

To speak with our experts about your project needs, contact us at renewableenergyservices@ul.com.

KEY OFFICE LOCATIONS



AFRICA

Johannesburg, SOUTH AFRICA

ASIA PACIFIC

Melbourne, AUSTRALIA
Beijing, CHINA
Suzhou, CHINA
Bangalore, INDIA
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