



# PHOTOVOLTAICS

## LIFE CYCLE SERVICES

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## PROJECT LIFE CYCLE SERVICES

The range of services offered by SGS throughout the project life cycle minimise the total risk of your photovoltaic (PV) project. Subscribing to the logic that the earlier risks are detected, the earlier effective countermeasures can be implemented, SGS engages in PV projects starting at the **Conceptual Phase**. During this stage, services such as Design Verification, Technical Due Diligence, Tender Support and Feasibility Studies help minimise both cost- and time-related risks during project development and ensure optimum power performance.

Specifically, the Design Verification and Site Assessment activities comprise an estimate of the expected annual energy production by computer simulation. In parallel, SGS verifies the combined environmental cases relevant for the PV systems, which include the impact of variables such as temperature, rain, hail, snow, corrosion, dust, lightning, horizon and near-shadow effects.

Verification of the design and site conditions also includes the following activities

- Assessment of layout and design for construction and electrical installation
- Assessment of quality of system components and installation
- Assessment of quality of documentation, operation and maintenance instruction

The **Manufacturing Phase** is an equally critical stage of project realisation. At this time, regular inspection visits of the different manufacturers are performed to assure quality during production of components.

An inspection can include assembly checks, material testing supervision and Non Destructive Testing (NDT). This begins with a pre-production meeting to establish the inspection and test plan as well as supervision of test runs of electrical and mechanical components.

For PV modules, SGS offers complete certification and testing according to IEC 61215, IEC 61646 & IEC 61730-1/-2, executed by the accredited SGS Solar Test House. SGS offers also testing of PV components like inverters, cables, connectors, J-Boxes, etc.

If requested, quality management and/or ability audits can also be performed in the earliest stages to select the most qualified suppliers.

To ensure the appropriateness and security of **Transportation and Installation**, the following inspections are essential

- Pre-Shipment Inspection
- Dimensional Control
- Visual Control
- Damage Control

In addition to the inspections, as-built documentation should be reviewed for the following

- Material Certificates
- IEC/UL/CE Certificates
- Flash Test Protocols

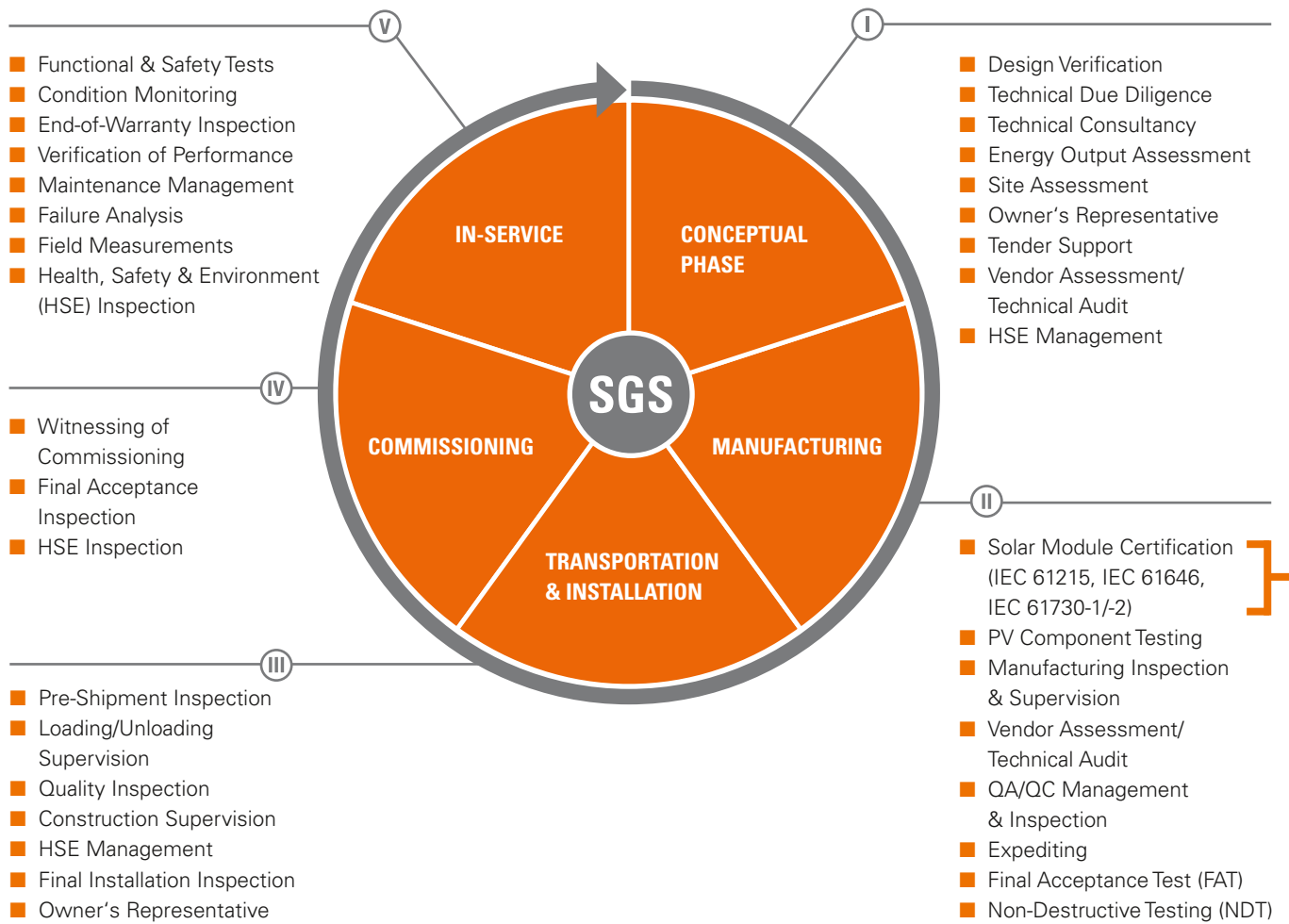
The subsequent **Commissioning Phase** of the PV system is critical and will be witnessed by SGS experts to confirm that work has been performed according to approved procedures and to ensure a safe start-up.

In addition to the above-mentioned phases, SGS performs periodic **In-Service** Inspections to guarantee optimum operation of the PV system during its entire lifetime.

The above range of services is tailored on a project-by-project basis to suit the actual verification needs of the undertaking.

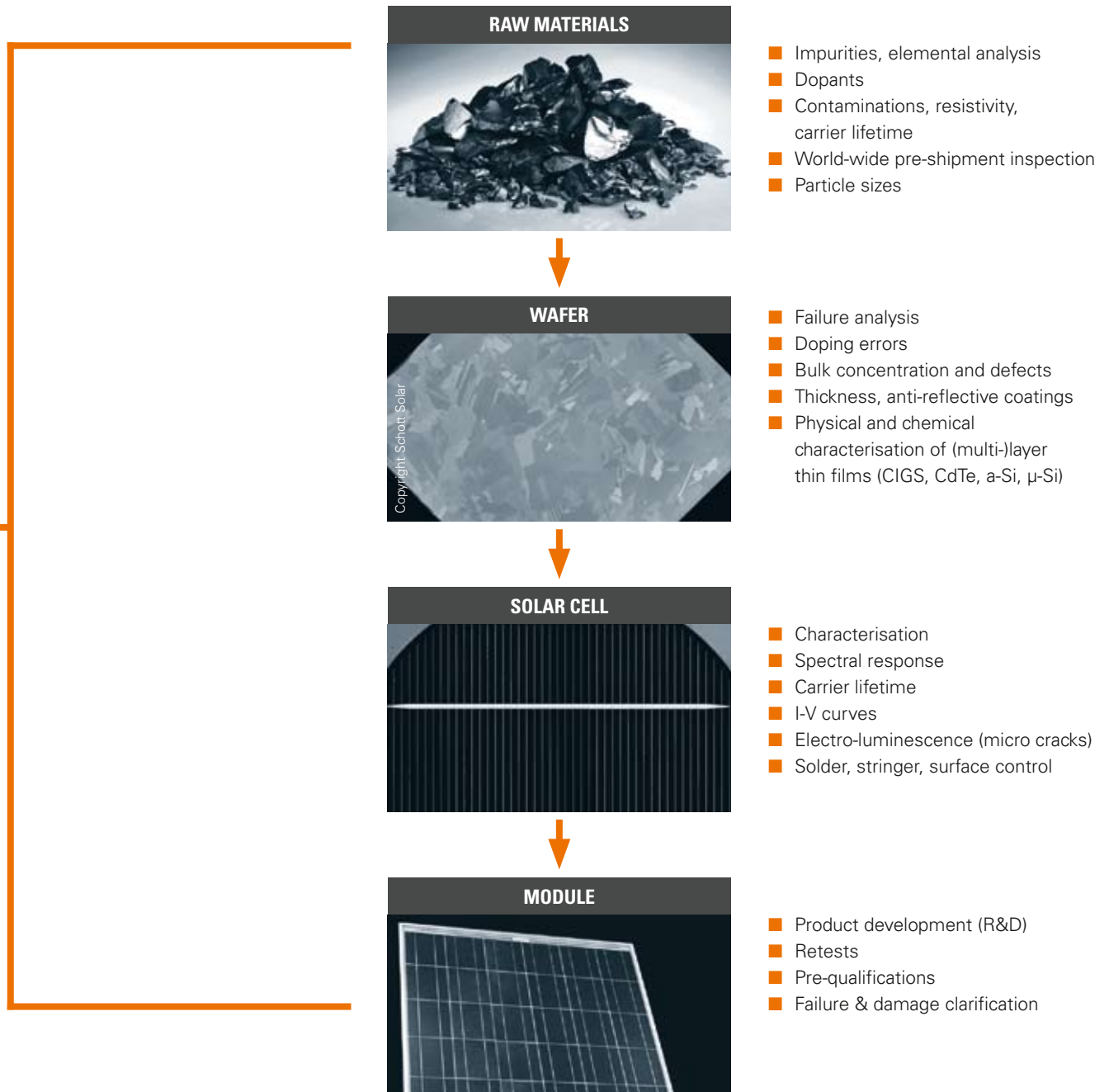
# PROTECTING YOUR INVESTMENT FROM

## SGS SERVICES IN PROJECT PHASES



# SILICIUM TO SOLAR ENERGY

## SGS SERVICES ALONG THE MODULE SUPPLY CHAIN







Photovoltaic (PV) systems represent an environmentally sound, robust, reliable, and thoroughly tested technology with a long lifetime. Though up-front capital costs are considerable, subsequent operation and maintenance costs are relatively low.

Further, investments in PV are offset through reductions in electricity consumption of the installation to which

the system is connected or through direct sales of the entire energy production to the utility.

The economic viability of a PV system over its lifetime is conditional in part on the initial attention paid to and appropriate consideration of the specific physical requirements of solar cells and solar modules with respect to such parameters as tilt angles, operative

temperatures, shadow-makers, mechanical load and other conditions. Lastly, it is important to ensure adequate access for the functional control and maintenance of solar installations as well as suitable systems and routines for the daily monitoring of operations. This requires expert knowledge to assess the economics of a new project or the remaining lifetime of a PV system.



