

TÜV Rheinland (Shanghai) Co., Ltd.
Solar&Commercial Products

Report

Supply Chain Verification
In
Tongwei Solar

On behalf of Tongwei Co.,Ltd.

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List of Contents

1	Executive Summary	5
1.1	Full traceability chain capacity assessment	5
1.2	Full traceability chain audit summary	5
1.2.1	Tongwei Solar (Yancheng) Co., Ltd.	5
1.2.2	Tongwei Solar (MEISHAN) CO., LTD	6
1.2.3	Tonghe New Energy (Jintang) Co., Ltd.	6
1.2.4	Sichuan Yongxiang Photovoltaic Technology Co., Ltd.	6
1.2.5	Sichuan Yongxiang Polysilicon Co., Ltd.	6
2	Scope of Work	7
3	Supply Chain Verification	8
3.1	Supply Chain Mapping	8
3.2	Overview	9
3.3	Supplier Level N-1 (PV Module Manufacturer)	14
3.3.1	Management Overview	14
3.3.2	Chain of Key Evidences	16
3.4	Supplier Level N-2 (PV Cell Manufacturer)	28
3.4.1	Management Overview	28
3.4.2	Chain of Key Evidences	30
3.5	Supplier Level N-3 (PV Wafer Manufacturer)	39
3.5.1	Management Overview	39
3.5.2	Chain of Key Evidences	41
3.6	Supplier Level N-4 (PV Ingot Manufacturer)	49
3.6.1	Management Overview	49
3.6.2	Chain of Key Evidences	51
3.7	Supplier Level N-5 (Polysilicon Manufacturer)	58
3.7.1	Management Overview	58
3.7.2	Chain of Key Evidences	59

1 Executive Summary

From 15 to 29 of the April 2024, TÜV Rheinland inspectors have verified the supply chain traceability of PV supply chain so as to ensure the raw material conformity as basic requirements.

The verification comprises of onsite observation of traceability control at Jiangsu Yancheng City, Sichuan Meishan City, Sichuan Chengdu City, Sichuan Leshan City related manufacturing facilities of Tongwei Solar in China. Additionally, documents and evidences provided by upper stream suppliers were checked on site.

Based on the verification results, the traceability chain of PV raw material is available, and fulfils supplier's procedure and related requirements. Referring to the TÜV Rheinland validation process and the chain of evidence, it is feasible to effectively trace the material information of the relevant PV project.

1.1 Full traceability chain capacity assessment

For each traceability level in the full traceability chain, TÜV Rheinland performs a specific capability assessment to be able to more clearly demonstrate the comprehensive capability of the full traceability chain.

Supply Chain	Factory Name / Address	Region of Origin	Traceability capability
PV Module	Tongwei Solar (Yancheng) Co., Ltd. No. 88, Jiuhuashan Road, Economic Development Zone, Yancheng City, Jiangsu Province, China	Jiangsu, China	AA
PV Cell	Tongwei Solar (MEISHAN) CO., LTD No. 999, Kangding Avenue, Xiuwen Town, Dongpo District, Meishan City, Sichuan Province, China	Sichuan, China	A
PV Wafer	Tonghe New Energy (Jintang) Co., Ltd. No. 888, East section of Jinle Road, Jintang Avenue, Jintang County, Chengdu City, Sichuan Province, P. R. China	Sichuan, China	AA
PV Ingot	Sichuan Yongxiang Photovoltaic Technology Co., Ltd. No.8, Cross Street, Jinsu Town, Wutongqiao District, Leshan City, Sichuan Province,China	Sichuan, China	AA
Polysilicon	Sichuan Yongxiang Polysilicon Co., Ltd. No. 100、 102 Yongxiang Road, Zhugen Town, Wutongqiao District, Leshan City, Sichuan Province, P.R.China	Sichuan, China	AA
Remark: AA – Outstanding level, ≥80 score; A – Common level, ≥65 score B – Need Improvement, ≥55 score C – Only meet basic requirements, <55 score F – Material information untraceable, 0 score, critical item fails.			

1.2 Full traceability chain audit summary

1.2.1 Tongwei Solar (Yancheng) Co., Ltd.

- Tracing the supplier of the PV cell and the relevant small pack number is feasible.
- Each module gets a unique serial number for traceability in production, linking to its production records, PV Cell small pack number, other material information and IV data in the MES (Manufacturing Execution System) system.
- Utilizes WMS (Warehouse Management System) for storage and MES for production, with ERP (Enterprise Resource Planning) for purchase orders and contracts. Cell purchases are settled monthly.

- Serial numbers match cell small pack numbers, advanced assembly lines, combined with strict management systems to be at a very advanced level of traceability management in the industry.

1.2.2 Tongwei Solar (MEISHAN) CO., LTD

- Tracing the supplier of the PV wafer and the relevant batch number is feasible, and with only one minor improvement, even more precise traceability units can be achieved.
- MES, WMS, ERP systems are used for the factory management, and wafer-related production data are automatically recorded into the systems by scanning codes.
- The facility's systems have the ability to quickly search and export data in batches and are able to search for traceability information for delivery lots. This is made possible by the factory's assembly line and management software design, which enables the advanced traceability management concept of WaferID to be realized and effectively implemented.

1.2.3 Tonghe New Energy (Jintang) Co., Ltd.

- Tracing the supplier of the PV ingot and the relevant ingot number is feasible.
- During the production process, ingot numbers are linked to adhesive tooling's RFID and uploaded to the MES system, Post-cutting, wafers are transported to cleaning machines by AGVs, followed by automatic placement in RFID-equipped cassettes for sorting verification. Compared to traditional process card management, digital management significantly enhances the precision and efficiency of traceability management.

1.2.4 Sichuan Yongxiang Photovoltaic Technology Co., Ltd.

- Tracing the supplier of the Polysilicon and the relevant batch number is feasible.
- Each ingot receives a unique identifier linked to batch and furnace information, facilitating detailed tracking through the MES system.
- AGVs ensure precise delivery of materials to furnaces, where operators use ingot numbers for accurate processing.
- QR codes on processed ingots allow for tracking from production to storage, with quality and compliance details managed in the ERP system.
- Detailed transport, sales, and supply chain information are reliably traced and verified through the ERP system, ensuring accurate documentation and supply chain transparency.

1.2.5 Sichuan Yongxiang Polysilicon Co., Ltd.

- Tracing the supplier of the Silicon Powder and the relevant batch number is feasible.
- Systematized and digital management covers almost all aspects of polysilicon manufacturing process, except for some parts of warehouse management.
- The Traceability Management System integrates mature management logic, encompassing information on materials, manufacturing, and products. The application of dynamic algorithms enhances the accuracy and credibility of traceability.

2 Scope of Work

Tongwei Co.,Ltd. (the “Client”) has assigned TÜV Rheinland to verify the supply chain traceability of PV supply chain so as to ensure the raw material conformity as related requirements, to a certain extent. The task will comprise of onsite verification of traceability control of production process from incoming material to finished products, and documents verification including the evidence documents provided by upper stream suppliers.

3 Supply Chain Verification

3.1 Supply Chain Mapping

TÜV Rheinland performed traceability audits in PV supply chain manufacturing facilities of Tongwei Solar, to verify that the relevant management processes and requirements provide complete and effective traceability of material information.

PV Module	PV Cell	PV Wafer	PV Ingot	Polysilicon
<ul style="list-style-type: none"> • Module flash report • Production Record (MES/WMS/ERP) • Material in/out of warehouse records • Cell delivery note • Procurement Contract • Invoice 	<ul style="list-style-type: none"> • Cell delivery note • Production Record (MES/ERP) • Material in/out of warehouse records • Wafer delivery note • Procurement Contract • Invoice 	<ul style="list-style-type: none"> • Wafer delivery note • Production Record (MES/ERP) • Material in/out of warehouse records • Procurement Contract • Invoice 	<ul style="list-style-type: none"> • Product delivery note / packing list • Production Record (MES/ERP) • Material in/out of warehouse records • Purchase Inbound Form • Dispatch Note • Procurement Contract • Invoice 	<ul style="list-style-type: none"> • Product delivery note / packing list • Production Record (Traceability Management System, EAS, FSSC) • Material in/out of warehouse records • Purchase Inbound Form • Dispatch Note • Procurement Contract • Invoice