PV System: Quality Control, Test, Risk Evaluation and Management

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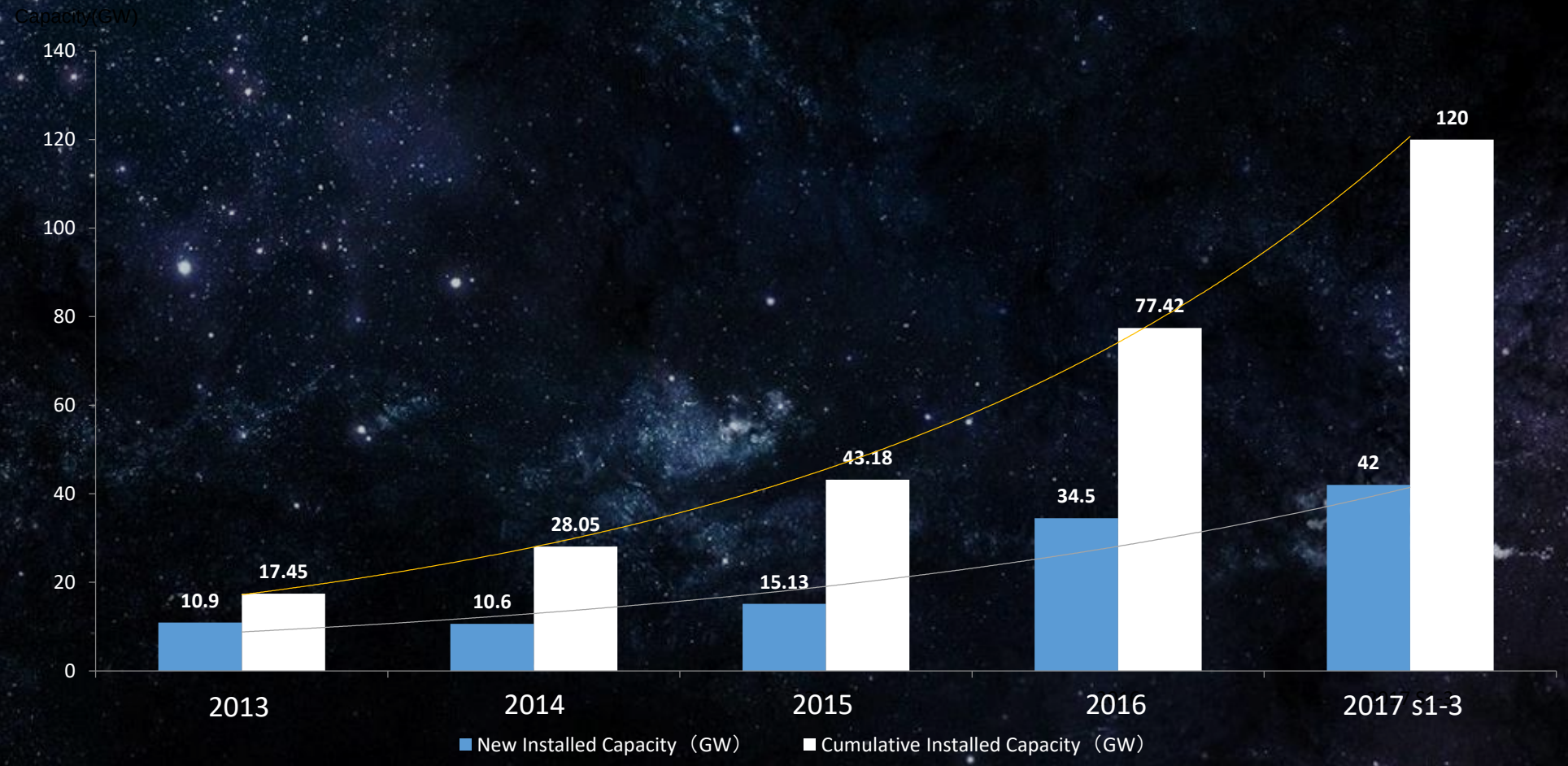
Evolution of the Installed PV Capacity in China



02 Analysis

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Solar Irradiance data

- Inaccurate
- Normally using data from NASA (Satellite data)
- No direct normal and diffused irradiance
- Annual solar irradiance variation
- Environmental variation

Design

- Do not fully consider local environment
- Flood prevention and consideration
- Rooftop load
- Surrounding environment and shading
- Wind load
- Tilt angle
- Open rack load
- Open rack space

Core Devices

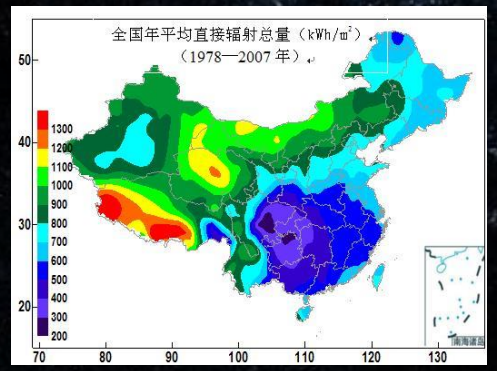
- Hot spot
- Invisible crack
- Power degradation

Construction&Installation

- Polarity reversed
- Connection terminal is not stable
- Improper installed method
- Unqualified insulation and corrosion prevention
- Insufficient wiring embedded depth
- Improper grounding

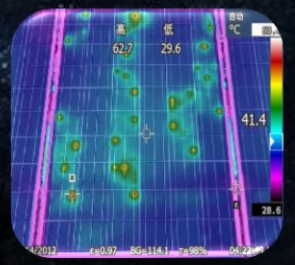
O&M

- Insufficient test method
- Do not detect fault in time
- Improper operation
- No periodic check, inspection

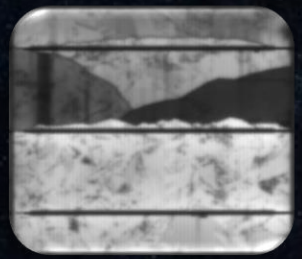


Rooftop load

Shading



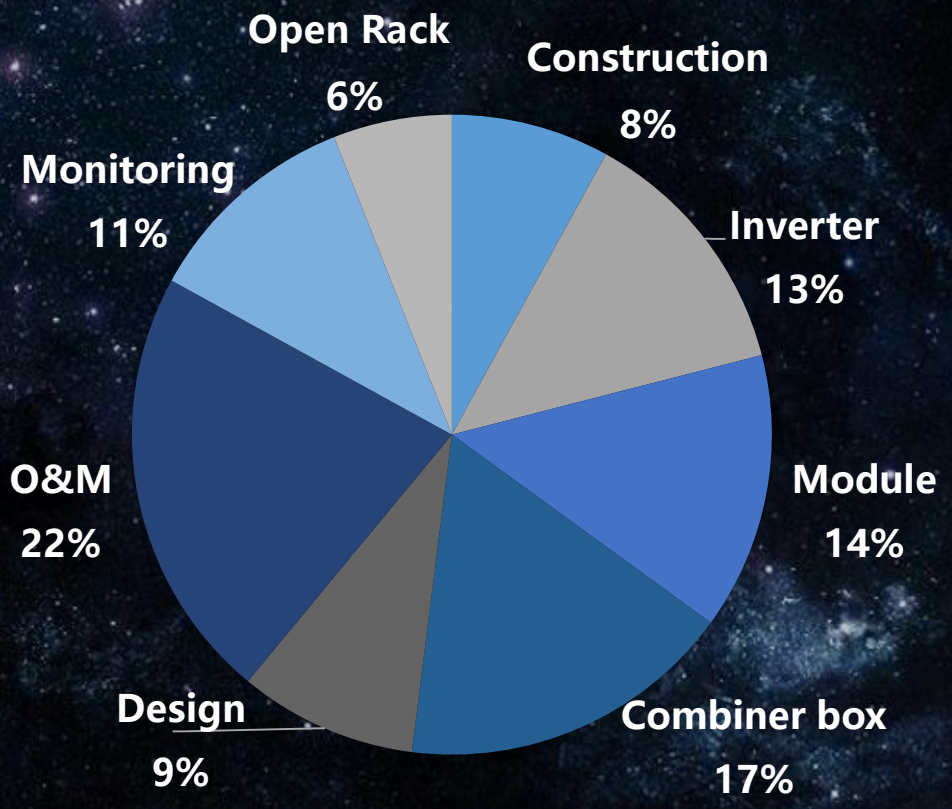
Hot spot



Crack

Instable Connection

Polluted module



Data is based on CGC case study

Root cause of such failures

- Improper design
- Unprofessional construction
- Careless management of installation
- Unprofessional supervision
- Unprofessional completion acceptance
- No specific standard requirements

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Quality Control

Whole Process Quality Management

Product Certification → Production Oversight → Resource Evaluation → Design Evaluation → Commissioning Test → Monitoring → O&M Evaluation

Products	Standards
PV Module	IEC61215, IEC61730
PV Combiner Box	CGC/GF 037
PV Inverter	IEC62109/NB/T32004, CGC-R46016, CGC-R46072
PV Fuse	GB/T13539.6/IEC60269-6
PV Circuit Breaker	GB14048.1, GB14048.2 , CGC-R46015
PV SPD	EN50539-11/GB/T18802.31
PV Junction Box	IEC62790
PV Connector	IEC62852
PV Cable	IEC62930
Solar Tracker	IEC62817

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PV Module Evaluation item	PV Inverter Evaluation item
R&D	Efficiency
Manufacturing process, test	Reliability
Product quality	Corresponding and control ability
Quality assurance	Quality assurance
	Additional functions
CGC/GF 086:2017	CGC/GF 063:2017

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Quality Control

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Whole Process Quality Management

Production Oversight

- Preparation of equipment
- 24h monitoring
- Random sampling
- Production oversight

Resource Evaluation

- Field test
- Data Filtering
- Shading Simulation

Design Evaluation

- Array configuration evaluation
- System safety evaluation
- Components evaluation
- Performance evaluation
- Drawing evaluation

Commissioning Test

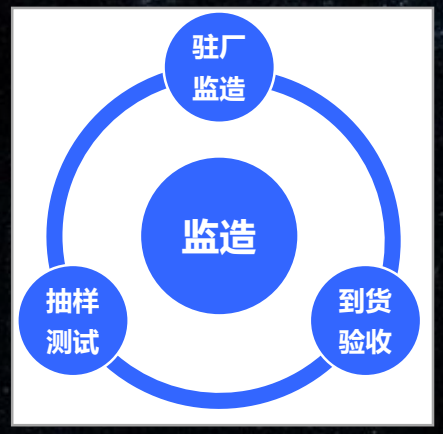
- Products quality measurement
- System safety measurement
- Power quality measurement
- PV System performance simulation and test (PPI)

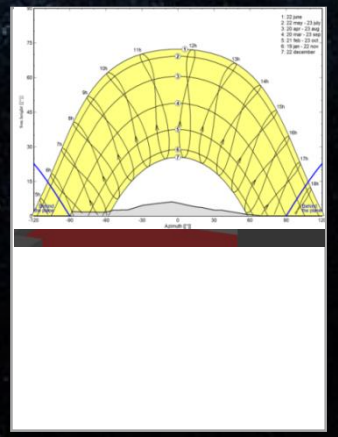
Monitoring

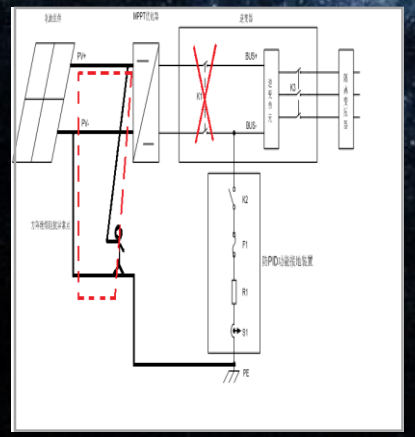
- Real-time monitoring
- Project comparison on adjoining areas.

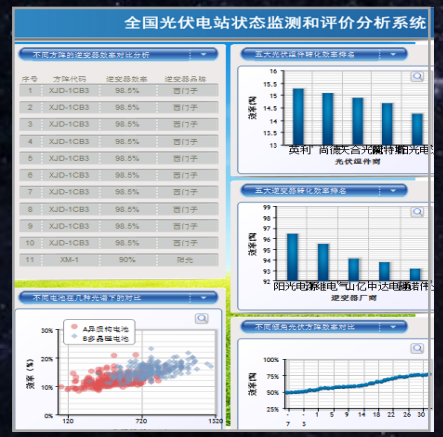
O&M Evaluation

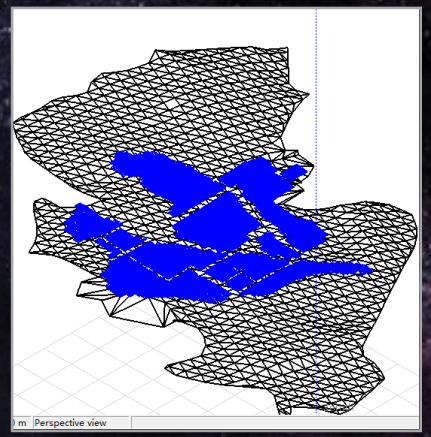
- Quality assurance
- Comparison of planned and actual maintenance costs
- PV System performance simulation and test (EPI)











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Mutual Recognition

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IECRE

Certificate of Acceptance

To participate
in the IECRE – IEC System for Certification to Standards relating to Equipment for use In Renewable Energy Applications

China General Certification Center (CGC)
Room 1108 Yiheng Building, No.28
North 3rd Ring Road East, Chaoyang
District, Beijing, 100013, P.R.China

has been assessed and determined to fully comply with the requirements of ISO/IEC 17065: 2012, The Rules and Procedures of the IECRE System.

China General Certification Center (CGC)

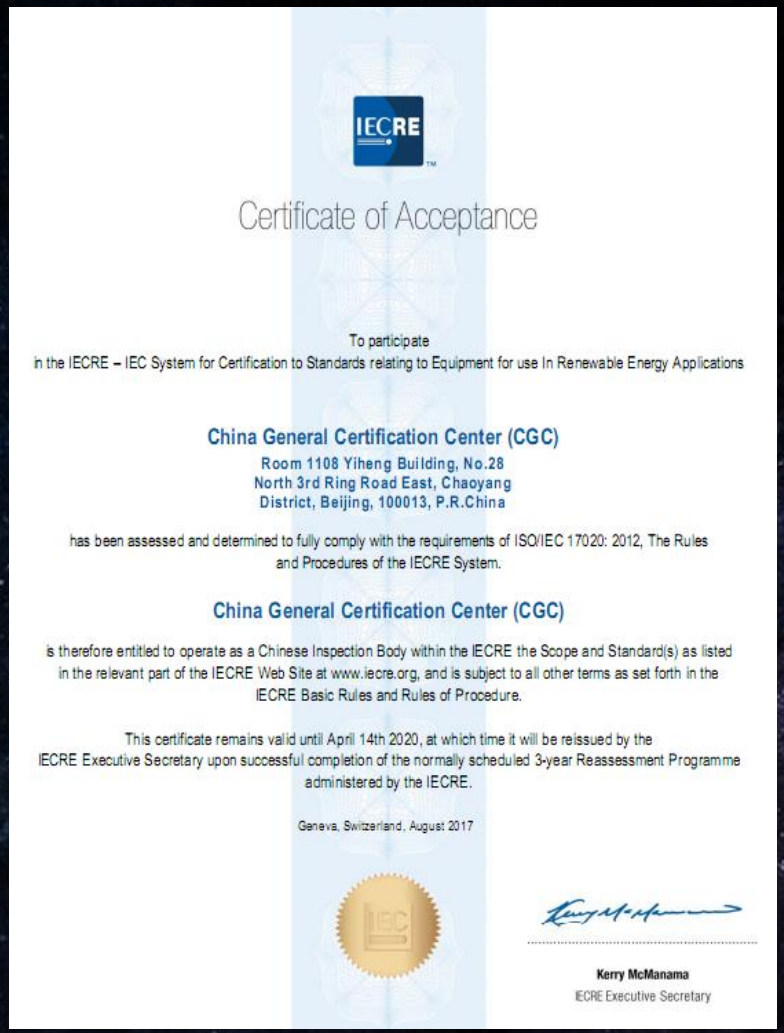
is therefore entitled to operate as a Chinese Certification Body within the IECRE the Scope and Standard(s) as listed in the relevant part of the IECRE Web Site at www.iecre.org, and is subject to all other terms as set forth in the IECRE Basic Rules and Rules of Procedure.

This certificate remains valid until March 10th 2020, at which time it will be reissued by the IECRE Executive Secretary upon successful completion of the normally scheduled 3-year Reassessment Programme administered by the IECRE.

Geneva, Switzerland, April 2017

Kerry McManama
IECRE Executive Secretary

Certification Body



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Geneva, Switzerland, August 2017

Kerry McManama
IECRE Executive Secretary

Inspection Body

07

Test Experience

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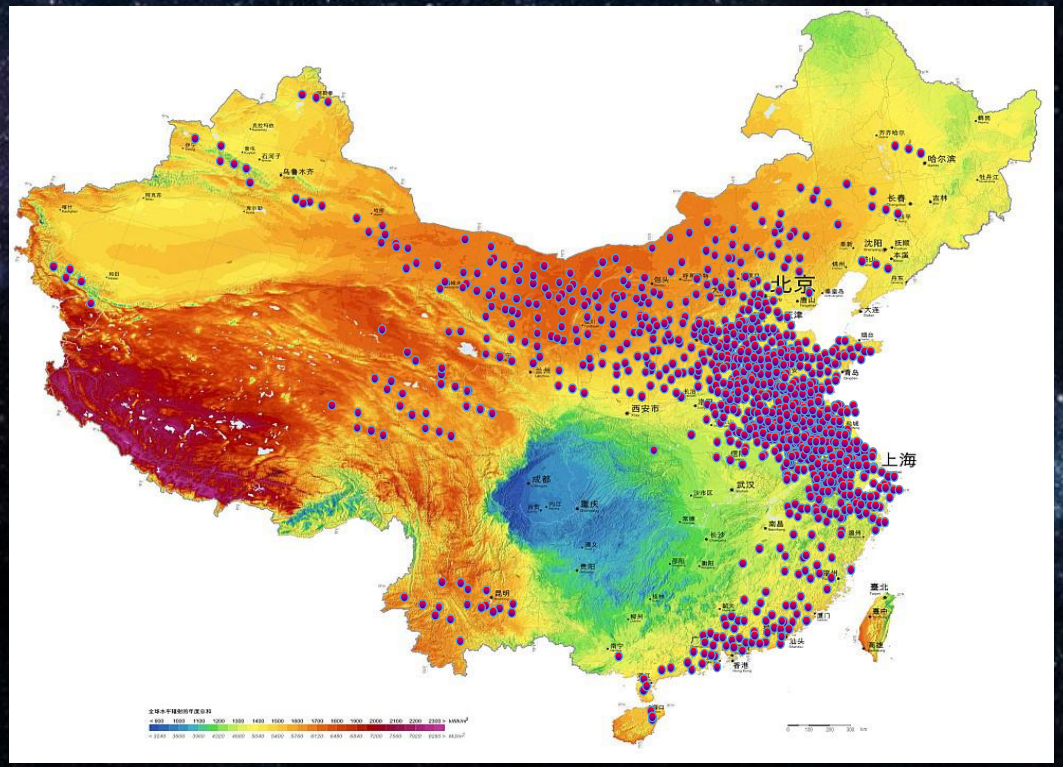
Commissioned nearly 1000 PV projects



Authorized by National Energy Bureau, CGC undertook the commissioning of PV projects in electricity-free area

THANK YOU

FOR YOUR ATTENTION

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