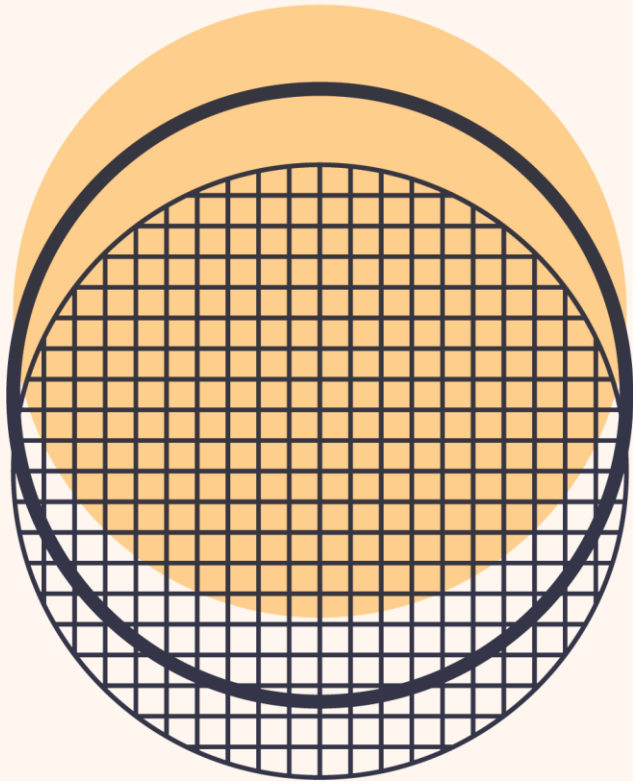




Making
quality
visible.



'Quality' PV modules :
What does that mean?

October, 2019

PV Lab Australia

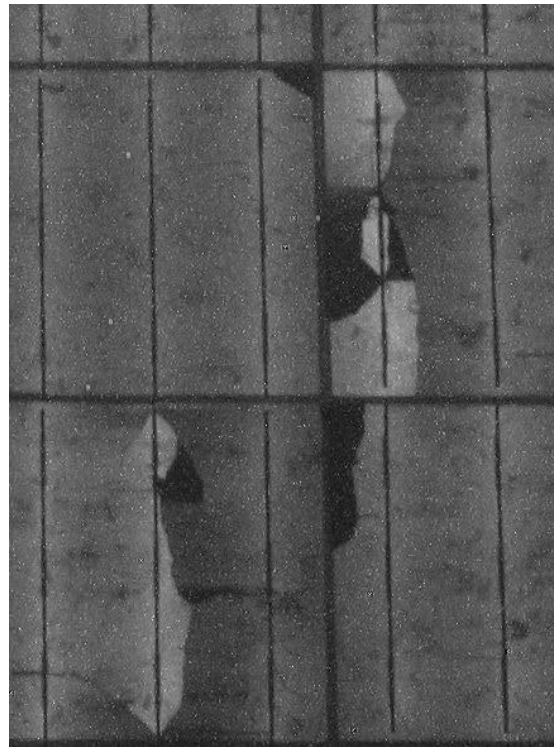
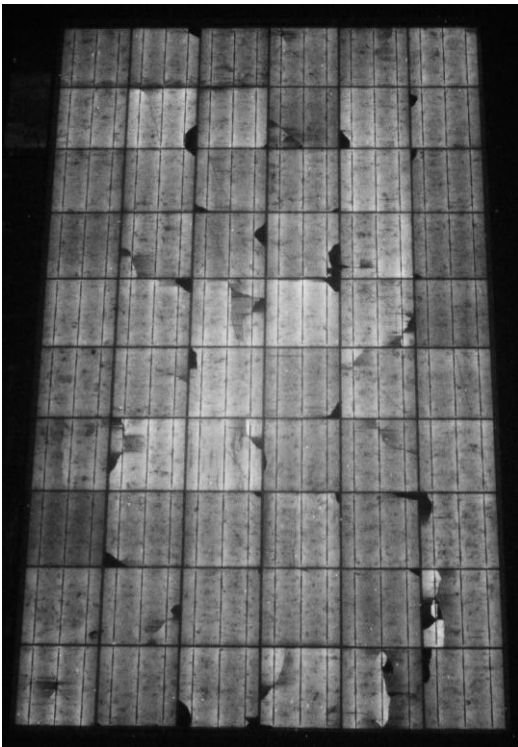
An independent and specialised laboratory for PV modules

- Focus: Quality assurance and risk assessment for PV modules
- Founded: late 2013, acquired equipment, setup space 2014, small-scale tests 2015, large volume tests 2016
- Managed by: Dr. Michelle McCann and Lawrence McIntosh
- Location: The Australian National University, Canberra



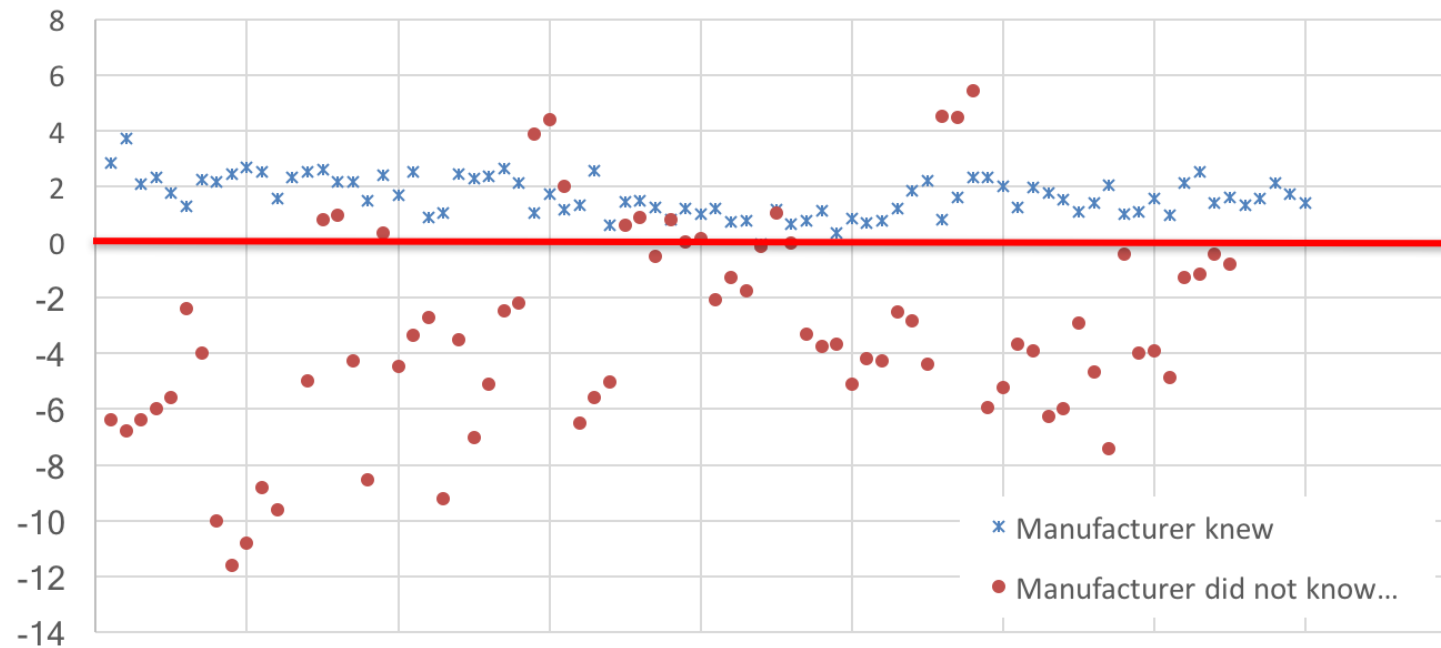
Electroluminescence test

- Shows micro-cracks and other features not visible to the naked eye



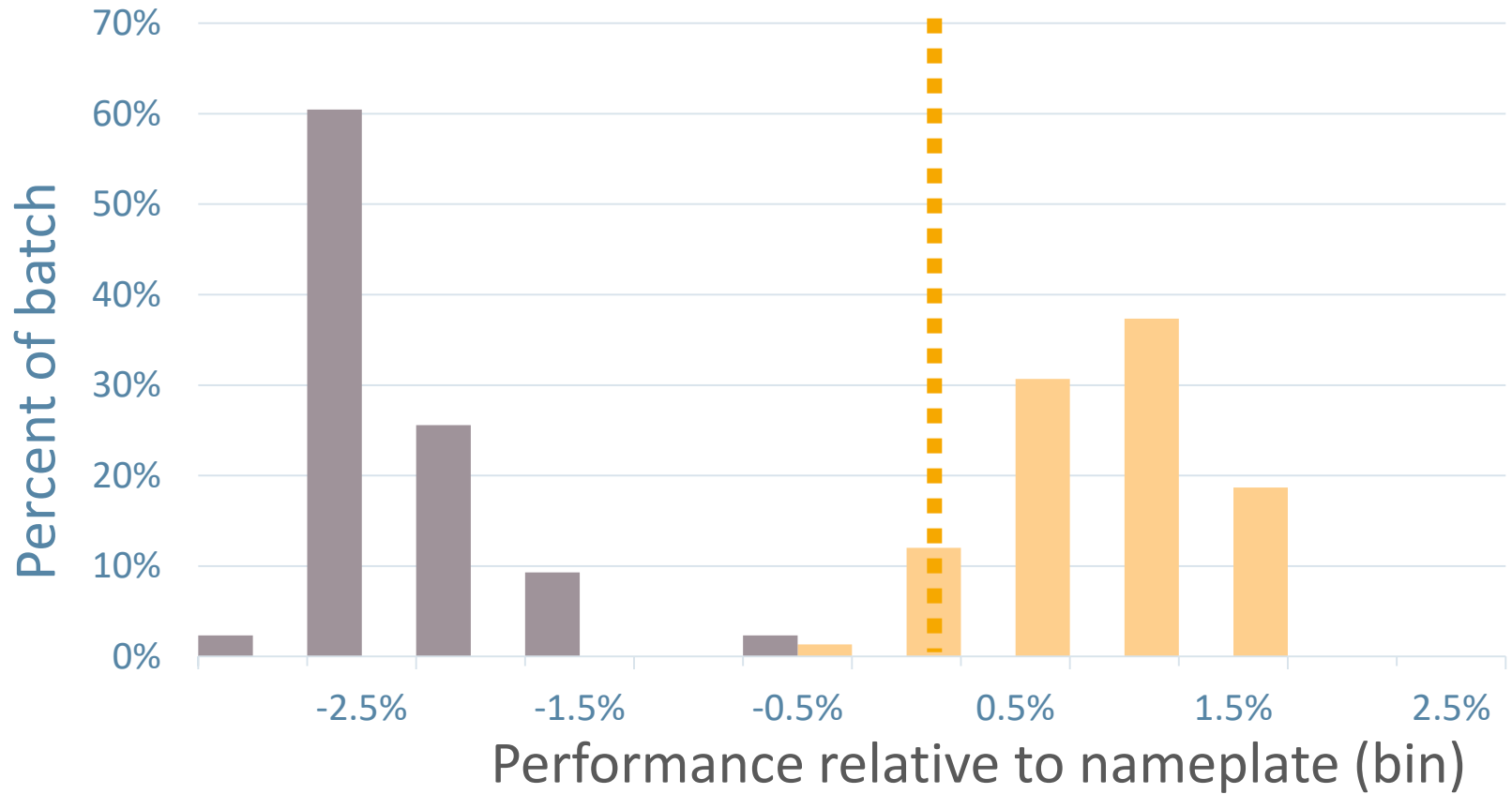
STC - Sample Results

- Measures power output under standard test conditions
- % Deviation from nameplate power

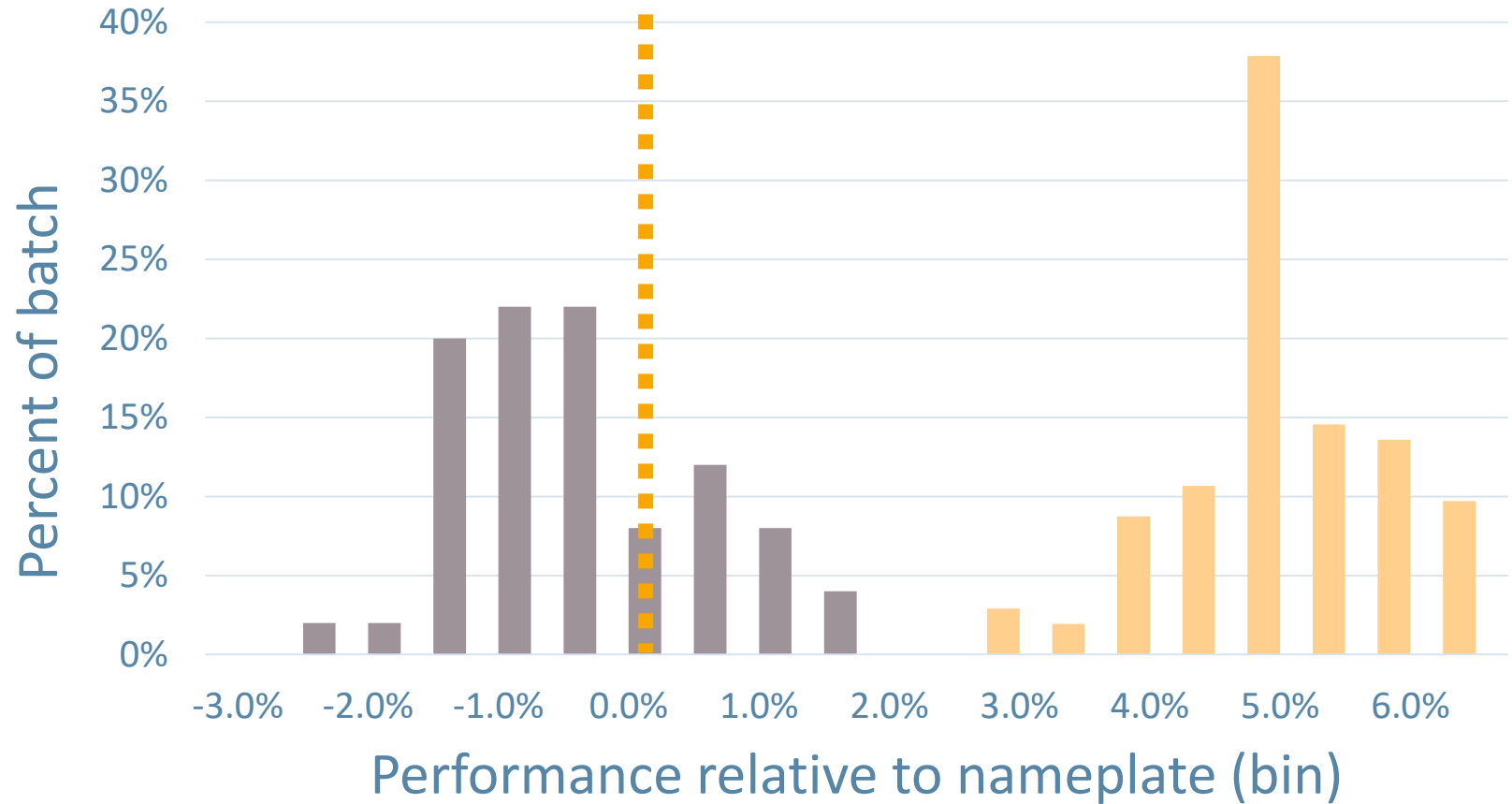


- Manufacturers can choose where to ship certain product
- Quality in Australia reflects lack of culture of testing
- How you buy seems to be important

Case Study #1



Case Study #2



Should you do something?

- If manufacturers know that you are testing: results up by 3%
- Farm gate rejections for large farms in Europe: 3% common for EL
- Wet leakage can pick up faults that save lives and
- PID can pick up panels with potential for profoundly reduced output power (including complete failure)

→ Quality assurance does not cost, it saves

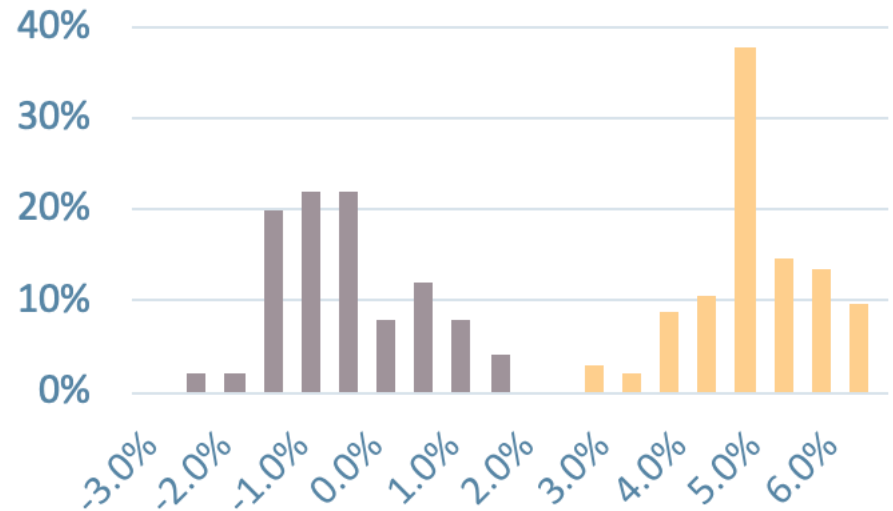


What can you do?

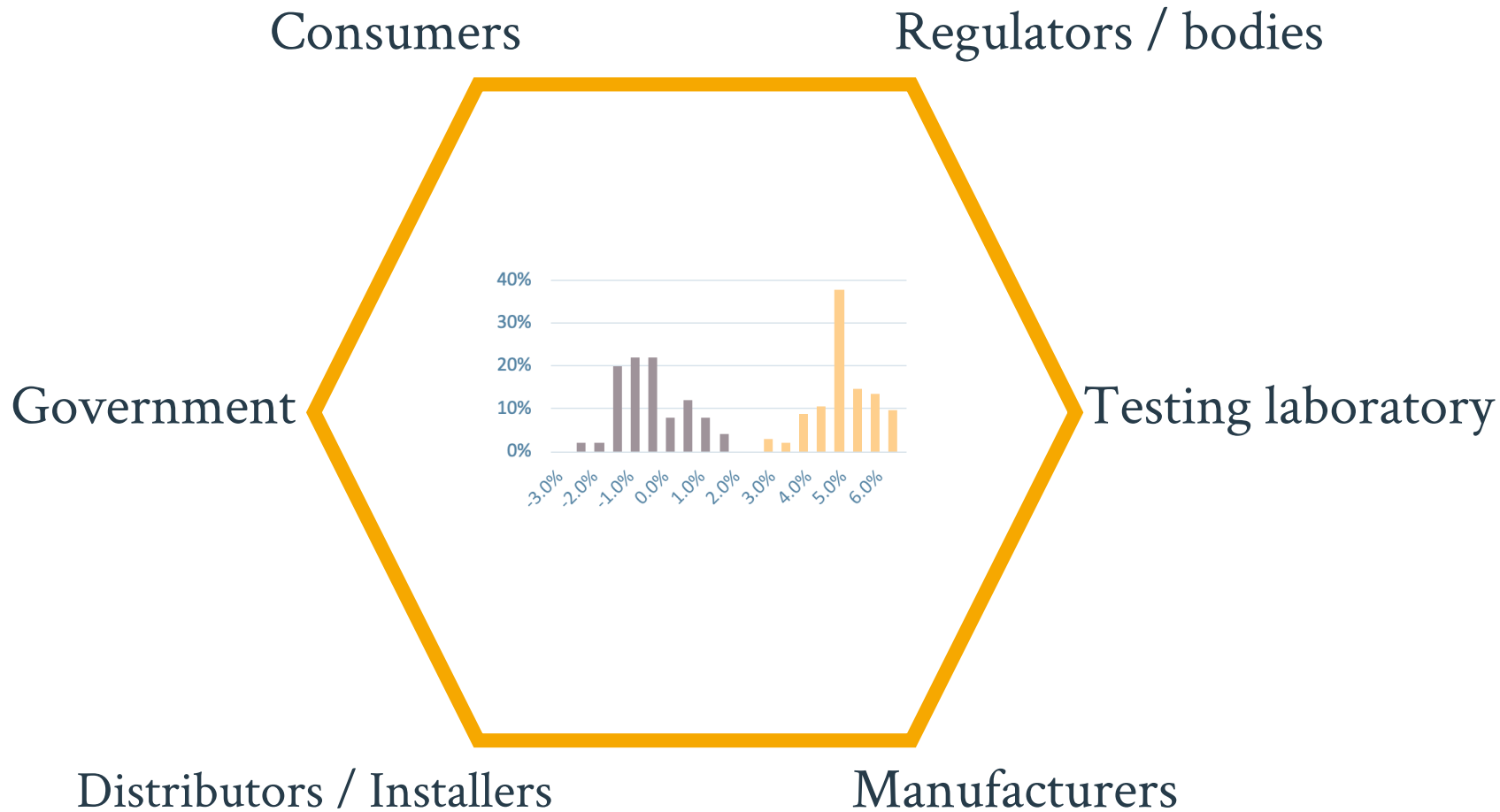
- Run a quality assurance program
- Budget-fit, improve offering
- ... There's also a bigger fish

What can ^{we} you do?

- Target is this:
- Two problems
 - 5%
 - The unseen
- Big problem :
bigger solution



Who does what?



The Vision

	October 19	January 20	April 20	July 20
Brand X	✓	✗	✗	✓
Brand Y	✓	✓	✗	✓
Brand Z	✓	✓	✓	✓
...	✓	✗	✓	✗
...	✗	✓	✓	✓

Blue Reports

TALESUN

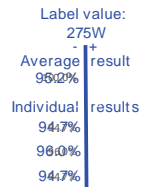
October 2018

Model: Talesun TP660P-275
 Power: 275W Power class: 0~+3%
 Polycrystalline 60 Cells

BLUE REPORTS
 Solar PV Quality Database

Power Measurement

MEASURED POWER VS LABEL



The power output of three solar panels from Talesun, shown as % relative to the manufacturer's labeled value.

AVERAGE MEASURED POWER

262W

AVERAGE RESULT
 % Relative to label value

95.2%

A result of 100% means the average power output of the panels matches manufacturer's stated power.

Manufacturing and Shipping Defects



AVERAGE GRADE

B

INDIVIDUAL GRADES

Panel 1: **A**
 Panel 2: **D**
 Panel 3: **A**

This grading, from A to E, assesses the panel for defects which are likely to have originated in the manufacturing process and/ or during shipping and handling.

Visual inspection

PASSED



PASS: There were no visual defects that may cause a risk of reliability loss or power output.

Wet leakage test

SAFETY TEST: PASSED



QCELLS

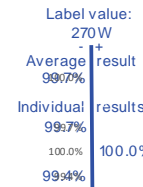
October 2018

Model: Q-Cells
 Power: 270W Power class: +0 to +5W
 Polycrystalline 60 Cells

BLUE REPORTS
 Solar PV Quality Database

Power Measurement

MEASURED POWER VS LABEL



The power output of three solar panels from Qcells, shown as % relative to the manufacturer's labeled value.

AVERAGE MEASURED POWER

269W

AVERAGE RESULT
 % Relative to label value

99.7%

A result of 100% means the average power output of the panels matches manufacturer's stated power.

Manufacturing and Shipping Defects



AVERAGE GRADE

A

INDIVIDUAL GRADES

Panel 1: **A**
 Panel 2: **A**
 Panel 3: **A**

This grading, from A to E, assesses the panel for defects which are likely to have originated in the manufacturing process and/ or during shipping and handling.

Visual inspection

PASSED



PASS: There were no visual defects that may cause a risk of reliability loss or power output.

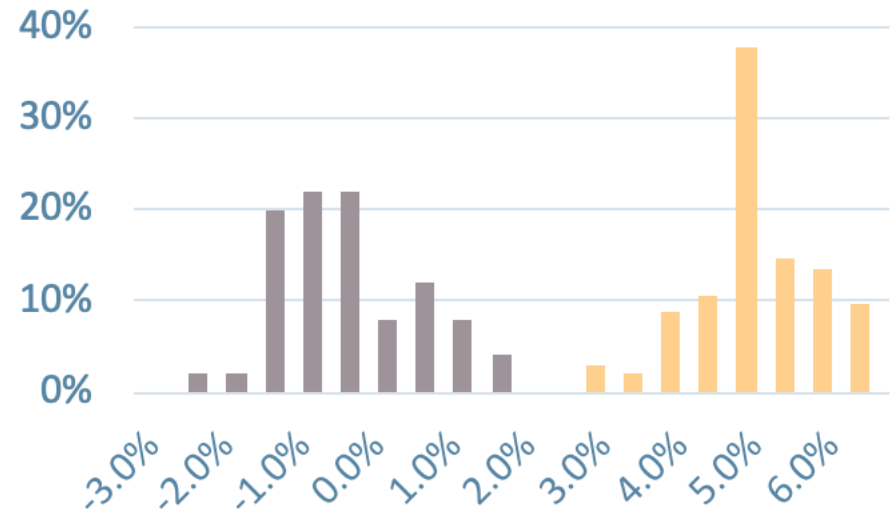
Wet leakage test

SAFETY TEST: PASSED



Blue Reports

- Brands tested phase 1
 - CANADIAN SOLAR, GCL, JA SOLAR, JINKO, LG, LONGI, QCELLS, TALESUN, TRINA
- Might work... early days (beta testing), needs input / feedback (from you!)



Thank you for listening!



Making quality visible.