# Global Efficient Lighting Centre

Shuming Hua

23 April 2014

UNEP

GELC

Global Efficient Lighting Centre

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# Global Efficient Lighting Centre

**Who is GELC**

**What is our vision?**

**Projects and activities**

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# Creation of GELC

MEMORANDUM OF UNDERSTANDING was signed in Kenya, 2011

NLTC become the Partner of UNEP/GEF en.lighten initiative and the member of Steering Committee.

Opening Ceremony of GELC was hold on 31 Oct. 2012 in Beijing

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# Our Vision


- Quality Control
- Lab Capacity Building
- Applied Research
- Technical Advisory and Information Sharing
- Training

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# Projects and activities


- Quality Control
- Lab Capacity Building
- Applied Research
- Technical Advisory and Information Sharing
- Training

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# Global CFL lamp quality checking Test

| Region | Country |
|---|---|
| Central America | Costa Rica<br>Dominican Republic<br>Panama |
| South America | Chile<br>Uruguay |
| West Africa | Guinea-Bissau |
| North Africa | Tunisia |
| Middle East | Lebanon |
| West Asia | Azerbaijan |
| South Asia | Tonga |

86% of Samples identified as manufacturing Chinese

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# Global CFL lamp quality checking Test

| Safety test -IEC 60968 | Performance test - IEC 60969 | Mercury content test - IEC 62554 |
|---|---|---|
| • Interchangeability (Item 6)<br>• Protection against electric shock (Item7)<br>• Insulating resistance (Item 8.1)<br>• Electric strength (Item 8.2)<br>• Mechanical strength (Item 9)<br>• Resistance to flame and ignition (Item 12) | • Lamp Power<br>• Power factor<br>• Initial Lumen Flux<br>• Initial efficacy<br>• Color tolerance<br>• Color Rendering Index<br>• 2000hrs Lumen maintenance | • Format of Mercury<br>• Mercury content |

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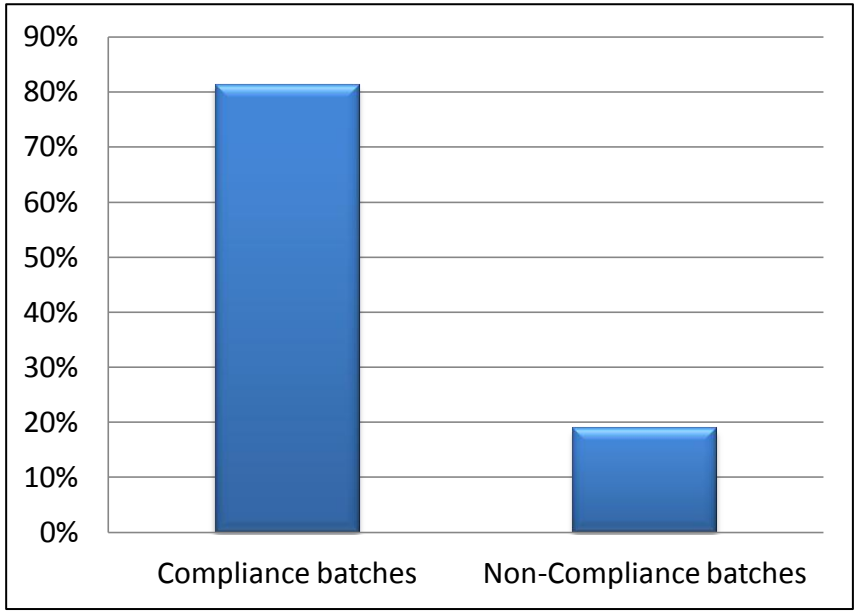
# Global CFL lamp quality checking Test





Compliance rate of Safety Test

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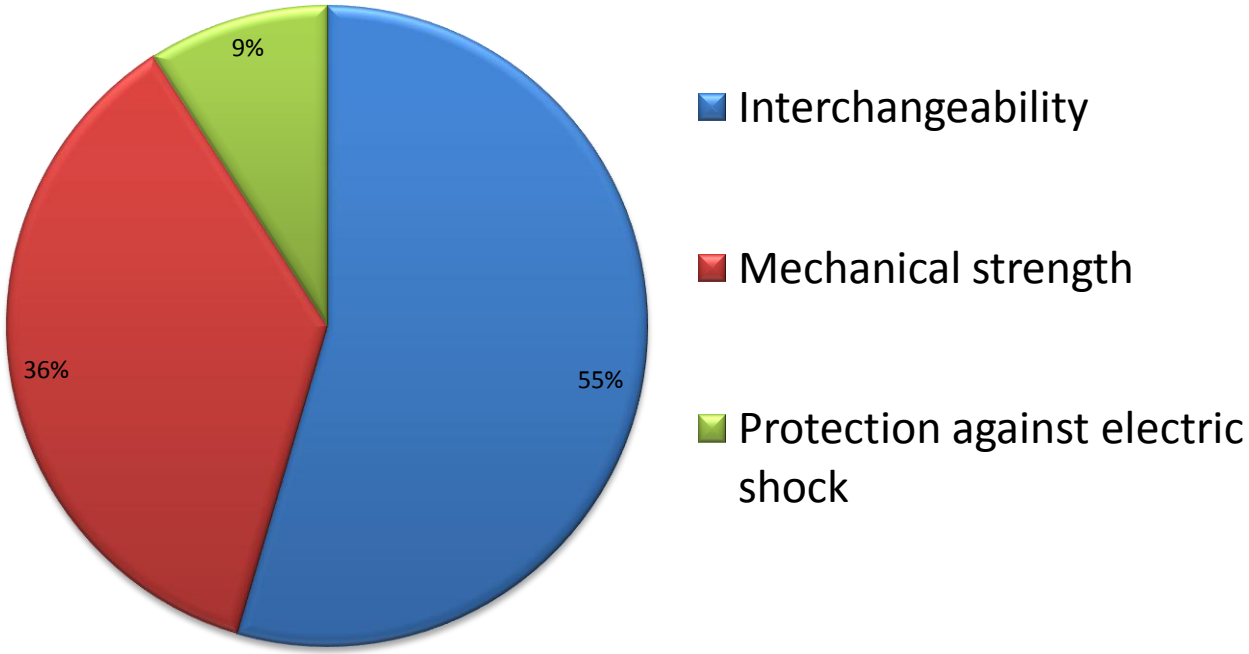
# Global CFL lamp quality checking Test

**Non-compliance of safety test items**

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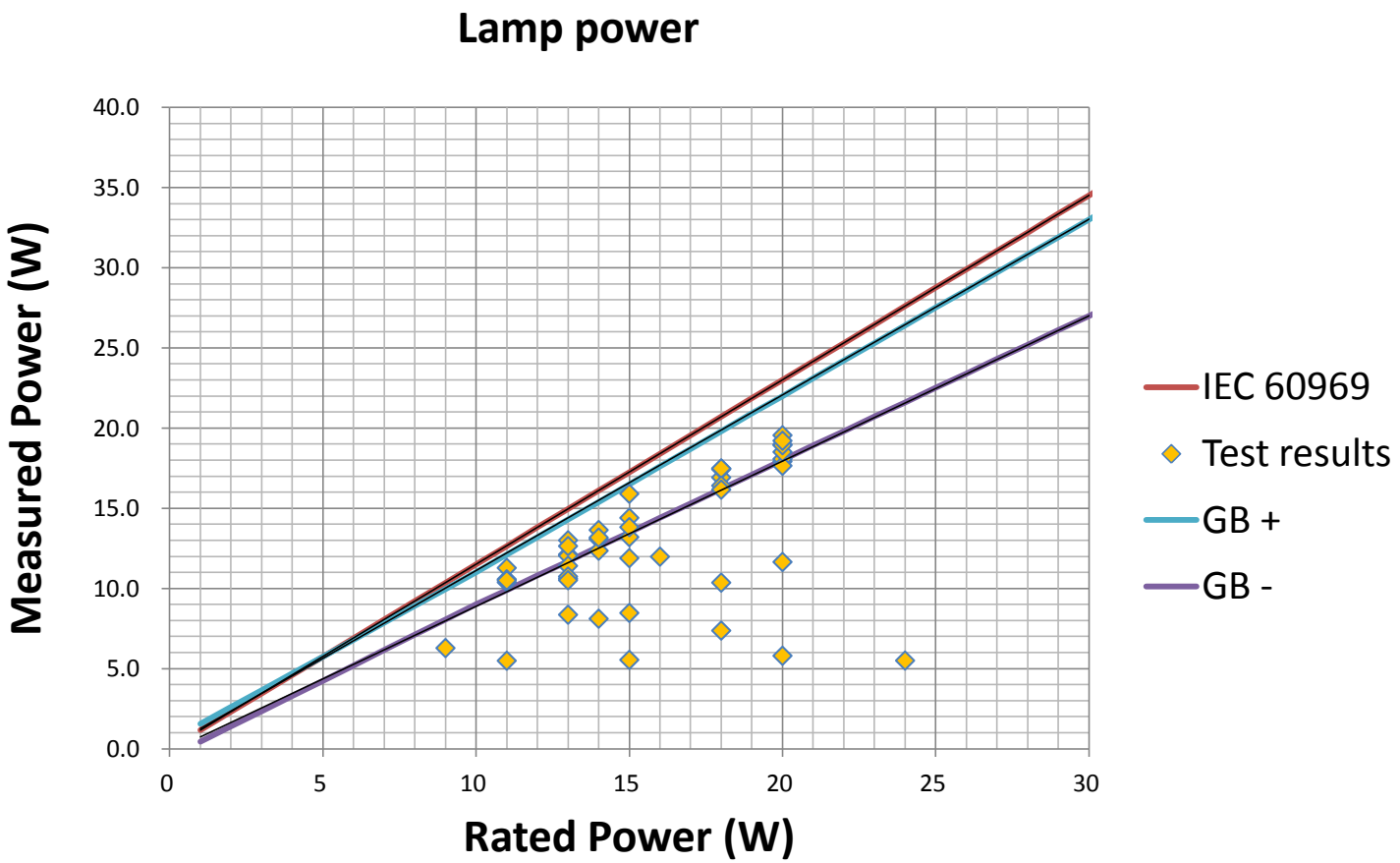
# Global CFL lamp quality checking Test

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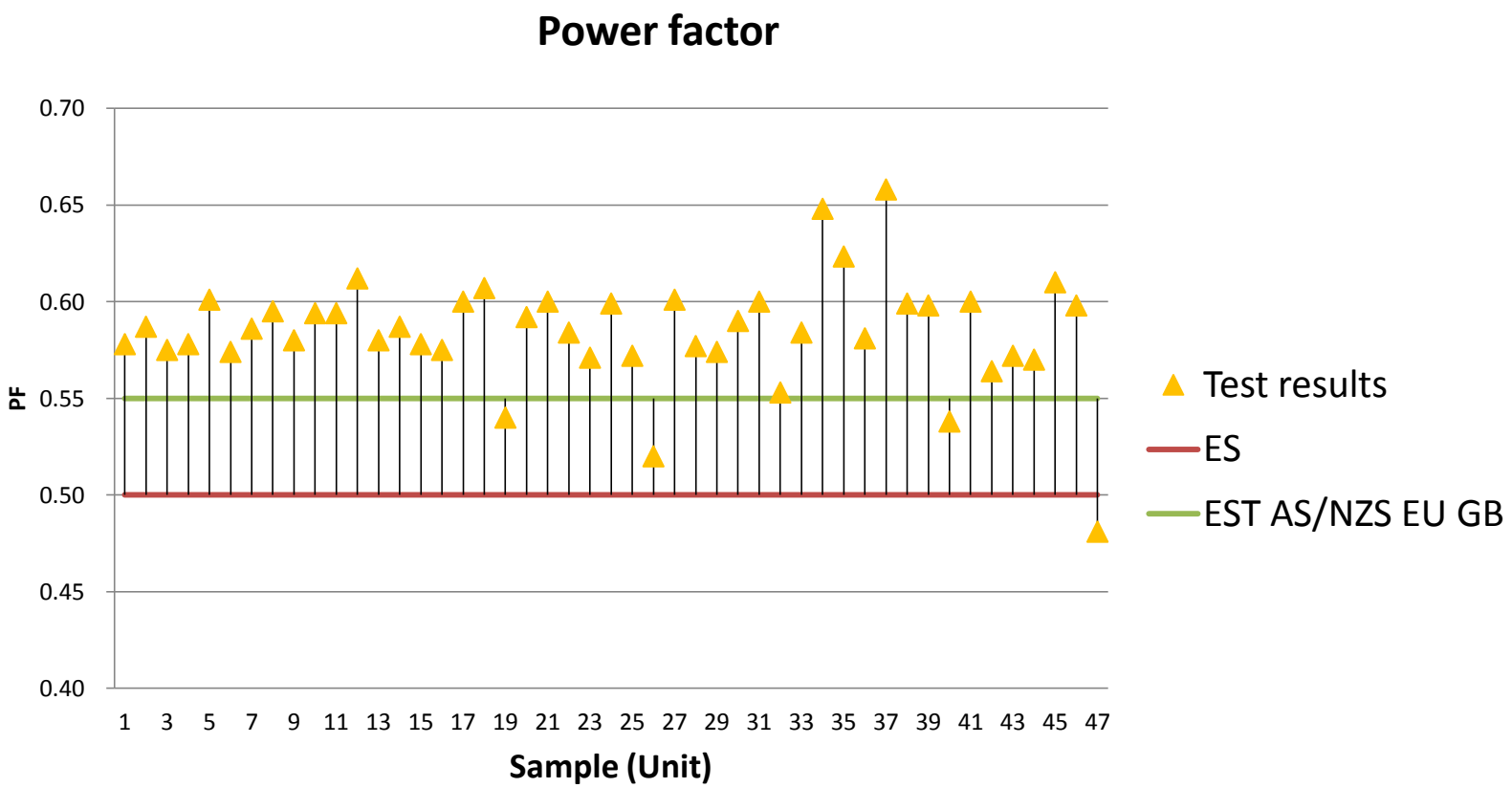
# Global CFL lamp quality checking Test

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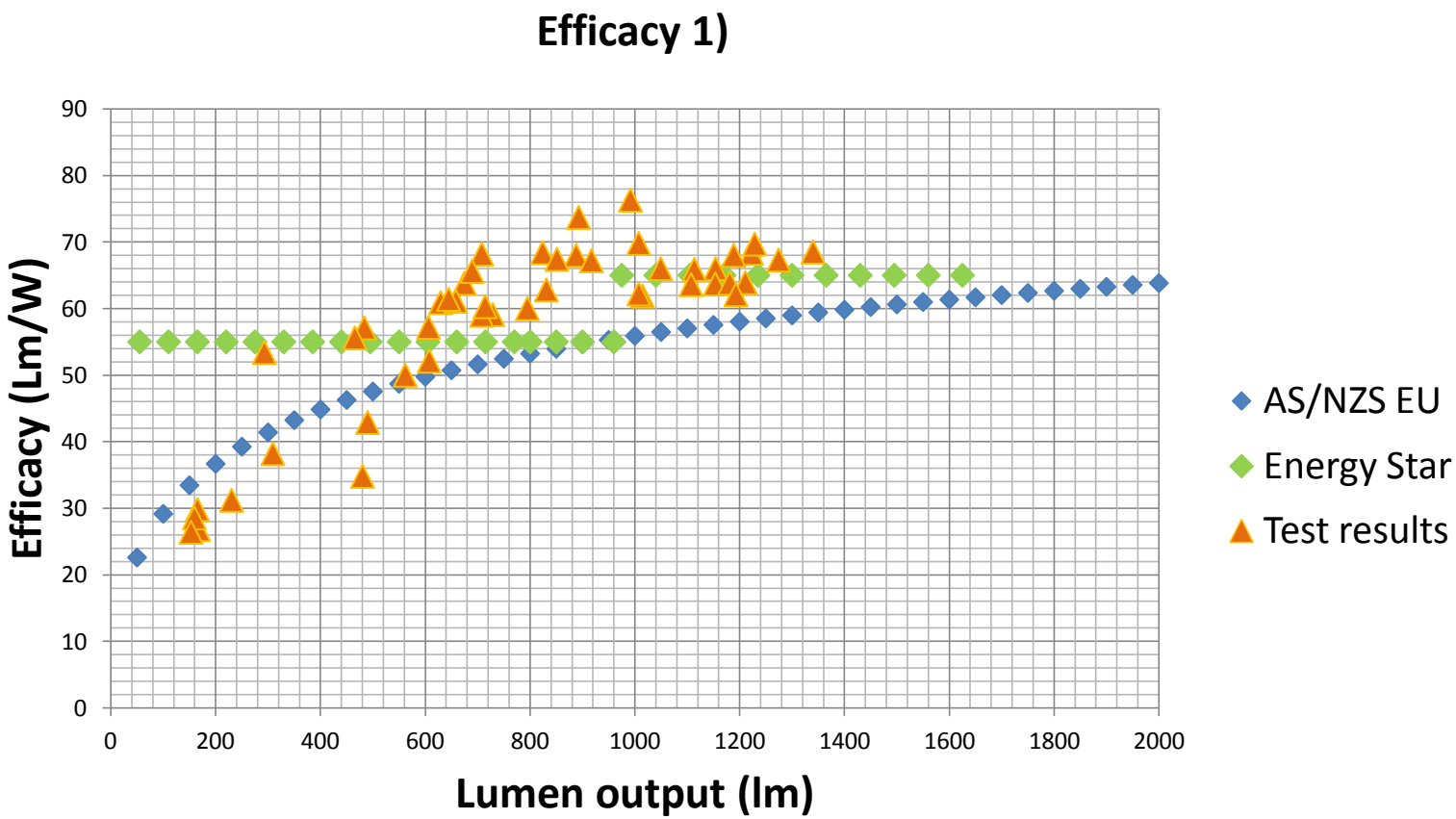
# Global CFL lamp quality checking Test

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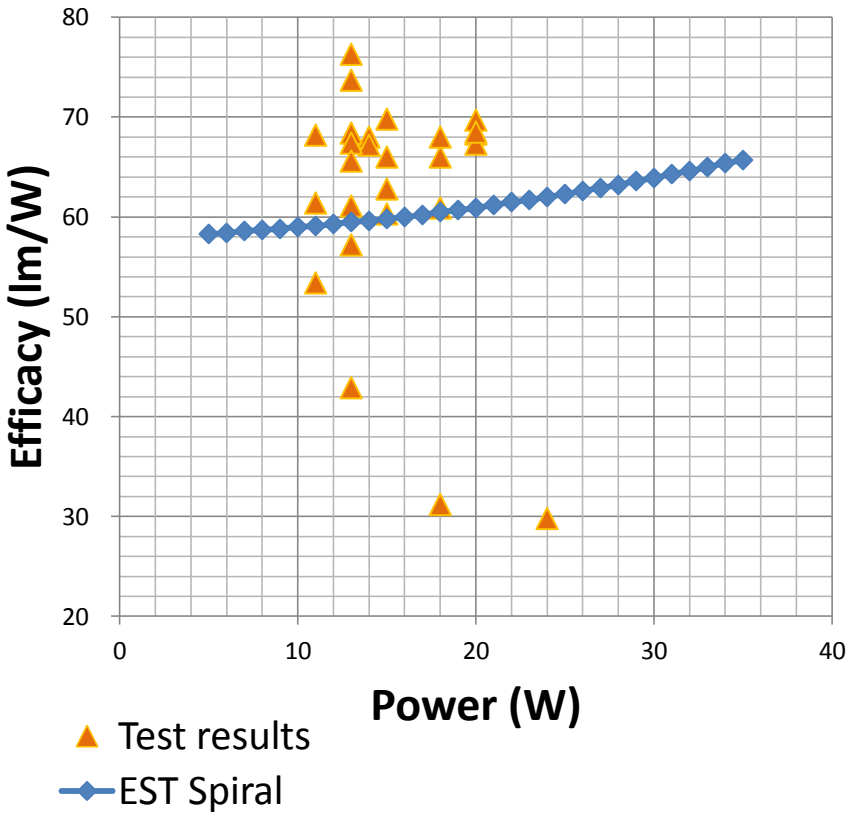
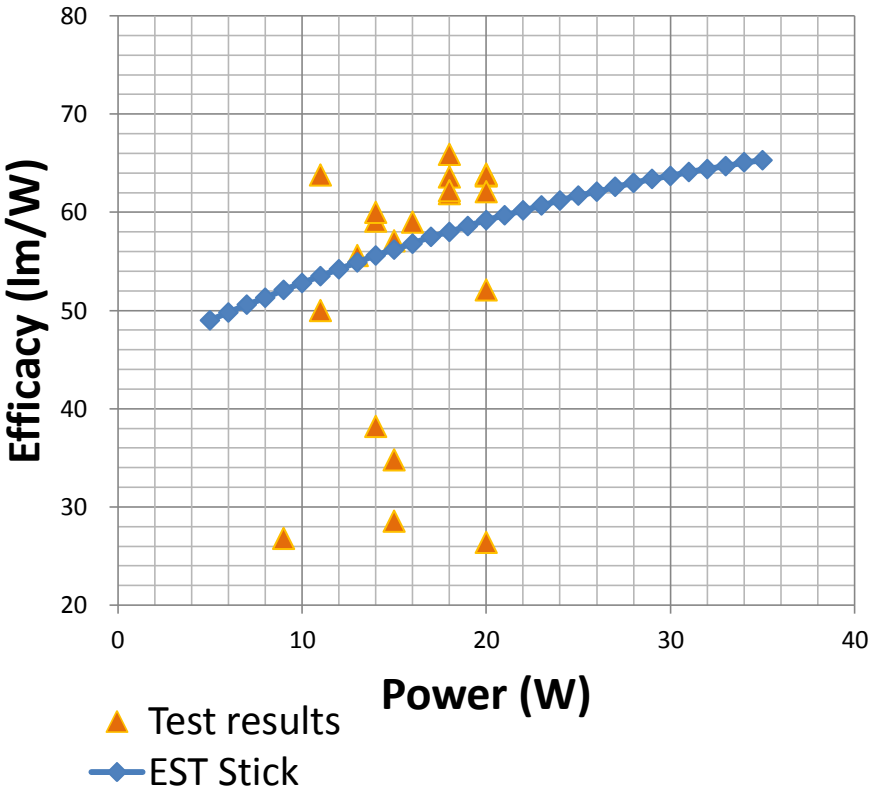
# Global CFL lamp quality checking Test

## Efficacy 2)

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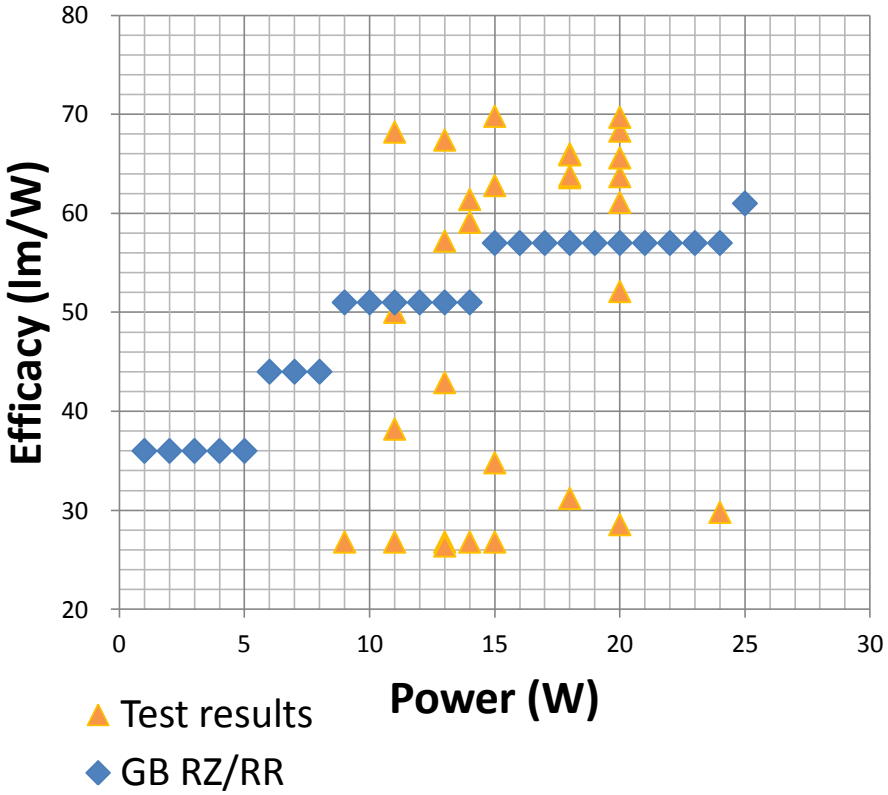
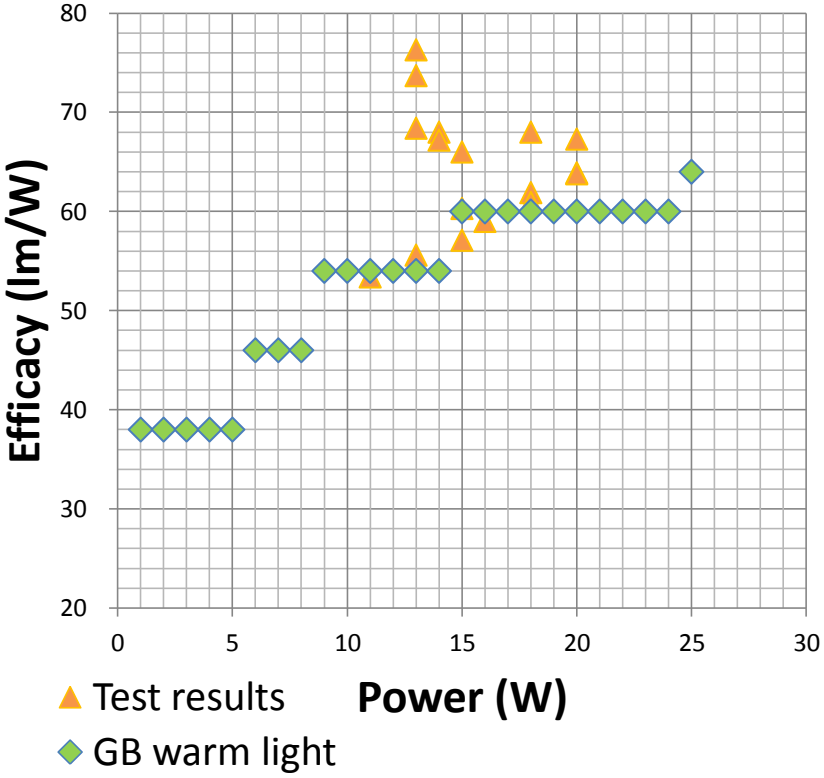
# Global CFL lamp quality checking Test

## Efficacy 3)

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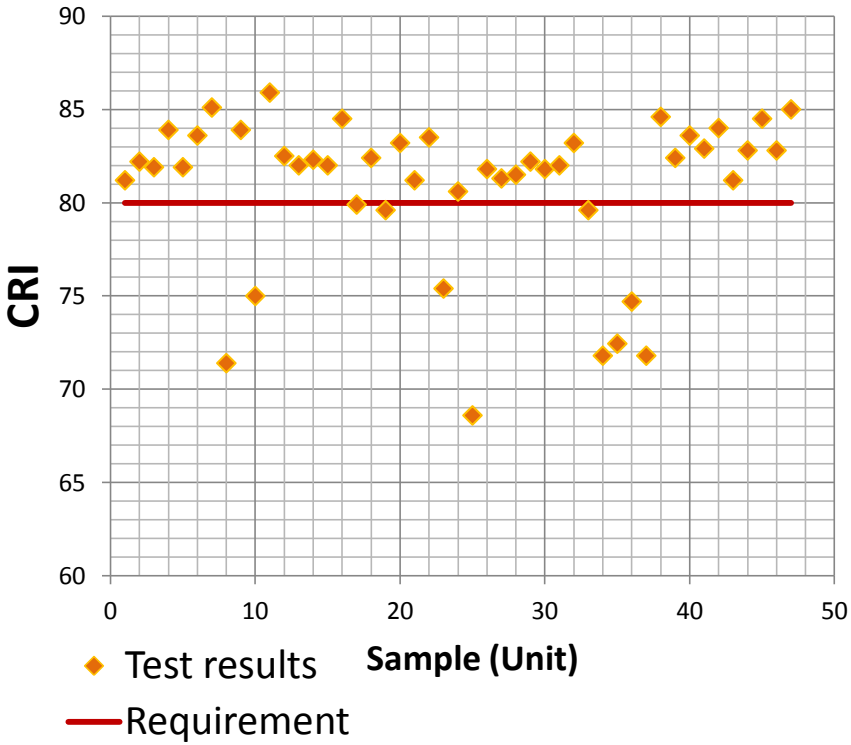
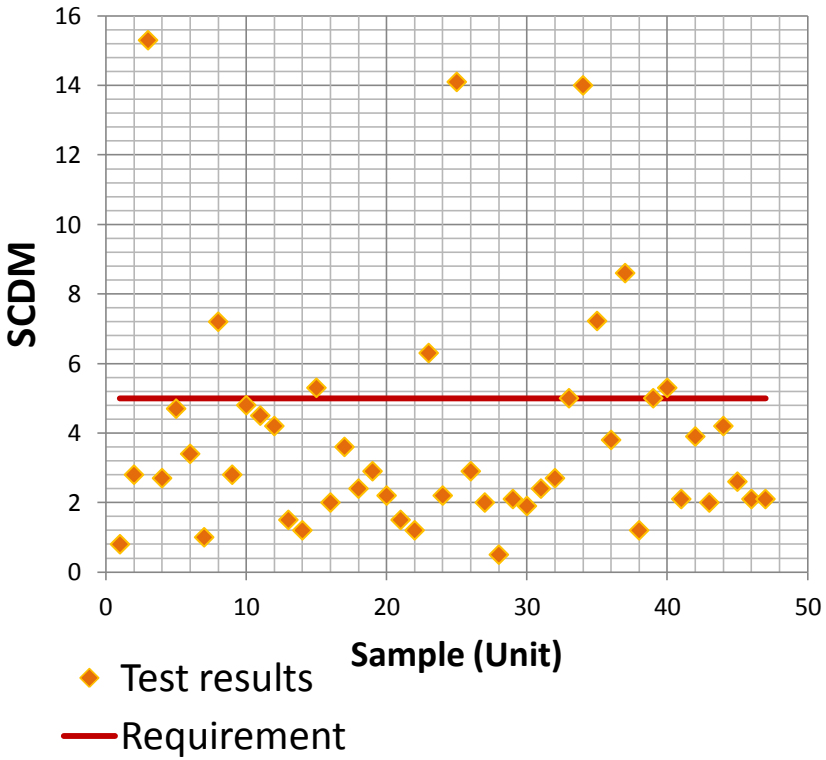
# Global CFL lamp quality checking Test

## Color Characteristic

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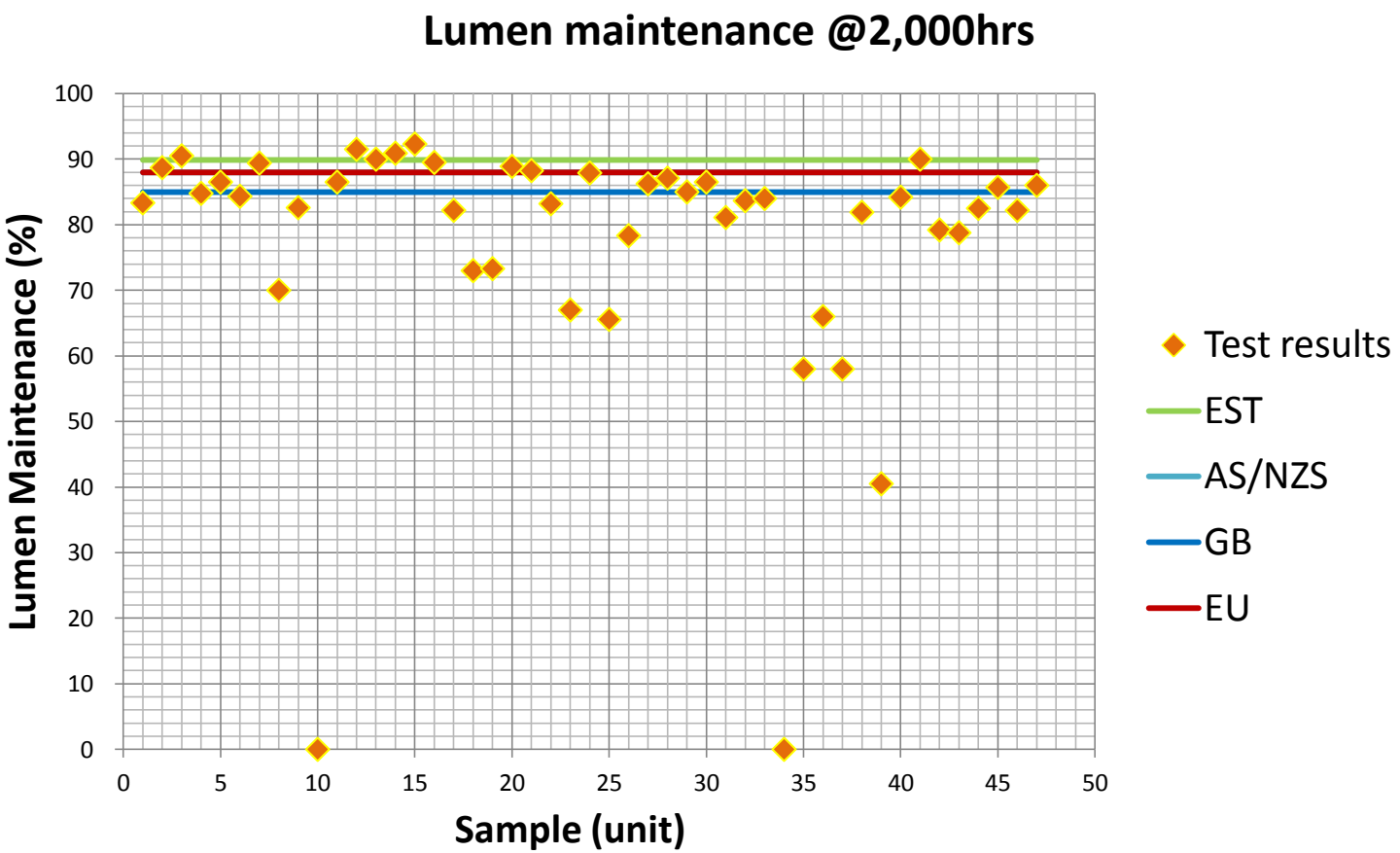


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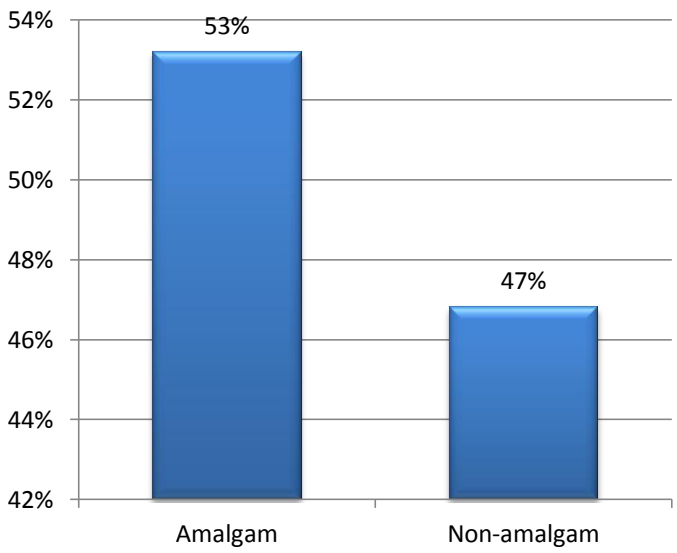
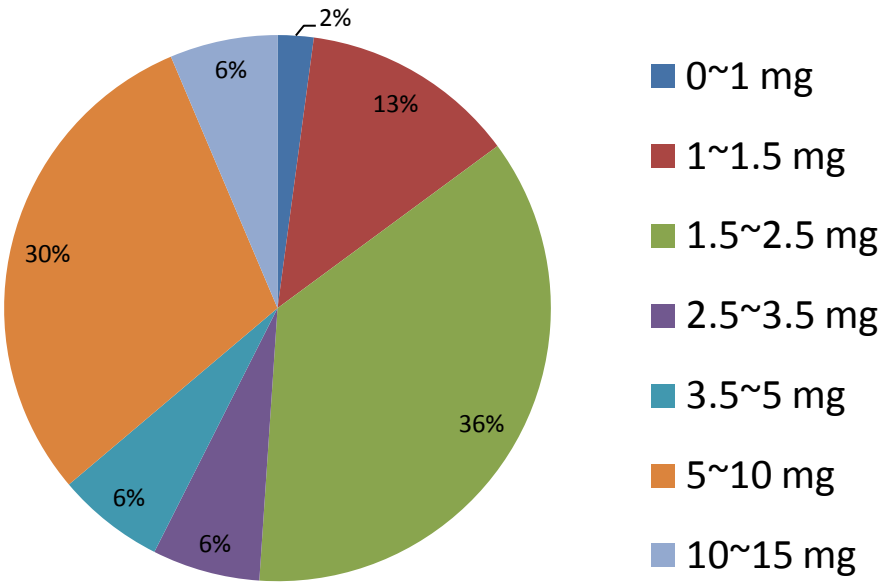
# Global CFL lamp quality checking Test

## Mercury content

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# Projects and activities


- Quality Control
- Lab Capacity Building
- Applied Research
- Technical Advisory and Information Sharing
- Training

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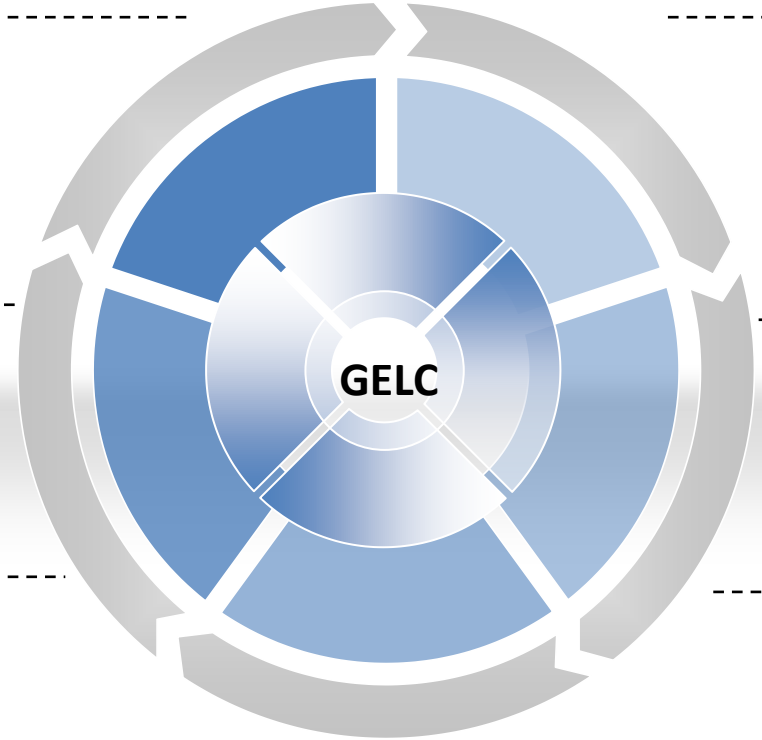
# Laboratory Capacity Building

**APLAC Proficiency Testing program**

**IEA Inter-laboratory Comparison**

**Round Robin Test With 4 Russian laboratories**




**Establishment of Swedish national lighting laboratory**

**Vietnam National Laboratory Training**

**Tunisia National Laboratory cooperation**

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# APLAC Proficiency Testing Program

APLAC T088
APLAC Proficiency Testing Program Photometric measurement of Solid State Lighting Products

A total of 29 laboratories from 19 Accreditation Bodies enrolled in the program and 28 laboratories from 18 Accreditation Bodies returned results.

Testing according to the "ZT007-APLAC Proficiency Testing Program -Measurement Method for the Proficiency Testing Program

(a) Total luminous flux (lm);
(b) RMS Voltage (V) and Current (A);
(c) Electrical active power (W) ;
(d) Luminous efficacy (lm/W);
(e) Chromaticity coordinates x, y;
(f) Correlated Colour Temperature (K);
(g) Colour Rendering Index (CRI) Ra;
(h) Power factor (PF).

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# APLAC Proficiency Testing Program

| En number | | Number of Participants (Percentage) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| NLTC-IDC | Total luminous flux | Voltage | Current | Power | Luminous efficacy | x | y | CCT | Ra | Power Factor |
| ≤ 1.0 | 24 (89%) | 20 (71%) | 28 (100%) | 19 (68%) | 21 (78%) | 22 (85%) | 23 (88%) | 23 (88%) | 23 (96%) | 28 (100%) |
| > 1.0 | 3 | 8 | 0 | 9 | 6 | 4 | 3 | 3 | 1 | 0 |
| Total | 27 | 28 | 28 | 28 | 27 | 26 | 26 | 26 | 24 | 28 |

| En number | | Number of Participants (Percentage) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| NLTC-OD | Total luminous flux | Voltage | Current | Power | Luminous efficacy | x | y | CCT | Ra | Power Factor |
| ≤ 1.0 | 24 (92%) | 26 (96%) | 21 (78%) | 27 (100%) | 25 (96%) | 24 (96%) | 25 (100%) | 25 (100%) | 25 (100%) | 21 (78%) |
| > 1.0 | 2 | 1 | 6 | 0 | 1 | 1 | 0 | 0 | 0 | 6 |
| Total | 26 | 27 | 27 | 27 | 26 | 25 | 25 | 25 | 25 | 27 |

| En number | | Number of Participants (Percentage) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| NLTC-D | Total luminous flux | Voltage | Current | Power | Luminous efficacy | x | y | CCT | Ra | Power Factor |
| ≤ 1.0 | 21 (81%) | 26 (96%) | 22 (81%) | 26 (96%) | 21 (81%) | 25 (100%) | 24 (96%) | 25 (100%) | 23 (96%) | 25 (93%) |
| > 1.0 | 5 | 1 | 5 | 1 | 5 | 0 | 1 | 0 | 1 | 2 |
| Total | 26 | 27 | 27 | 27 | 26 | 25 | 25 | 25 | 24 | 27 |

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# APLAC Proficiency Testing Program

| En number | | Number of Participants (Percentage) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| NLTC-HCCT | Total luminous flux | Voltage | Current | Power | Luminous efficacy | x | y | CCT | Ra | Power Factor |
| ≤ 1.0 | 22 (85%) | 26 (96%) | 20 (74%) | 27 (100%) | 24 (92%) | 23 (92%) | 23 (92%) | 23 (92%) | 22 (92%) | 23 (85%) |
| > 1.0 | 4 | 1 | 7 | 0 | 2 | 2 | 2 | 2 | 2 | 4 |
| Total | 26 | 27 | 27 | 27 | 26 | 25 | 25 | 25 | 24 | 27 |

| En number | | Number of Participants (Percentage) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| NLTC-LPF | Total luminous flux | Voltage | Current | Power | Luminous efficacy | x | y | CCT | Ra | Power Factor |
| ≤ 1.0 | 23 (88%) | 26 (96%) | 19 (70%) | 21 (78%) | 24 (92%) | 23 (92%) | 25 (100%) | 25 (100%) | 24 (100%) | 23 (85%) |
| > 1.0 | 3 | 1 | 8 | 6 | 2 | 2 | 0 | 0 | 0 | 4 |
| Total | 26 | 27 | 27 | 27 | 26 | 25 | 25 | 25 | 24 | 27 |

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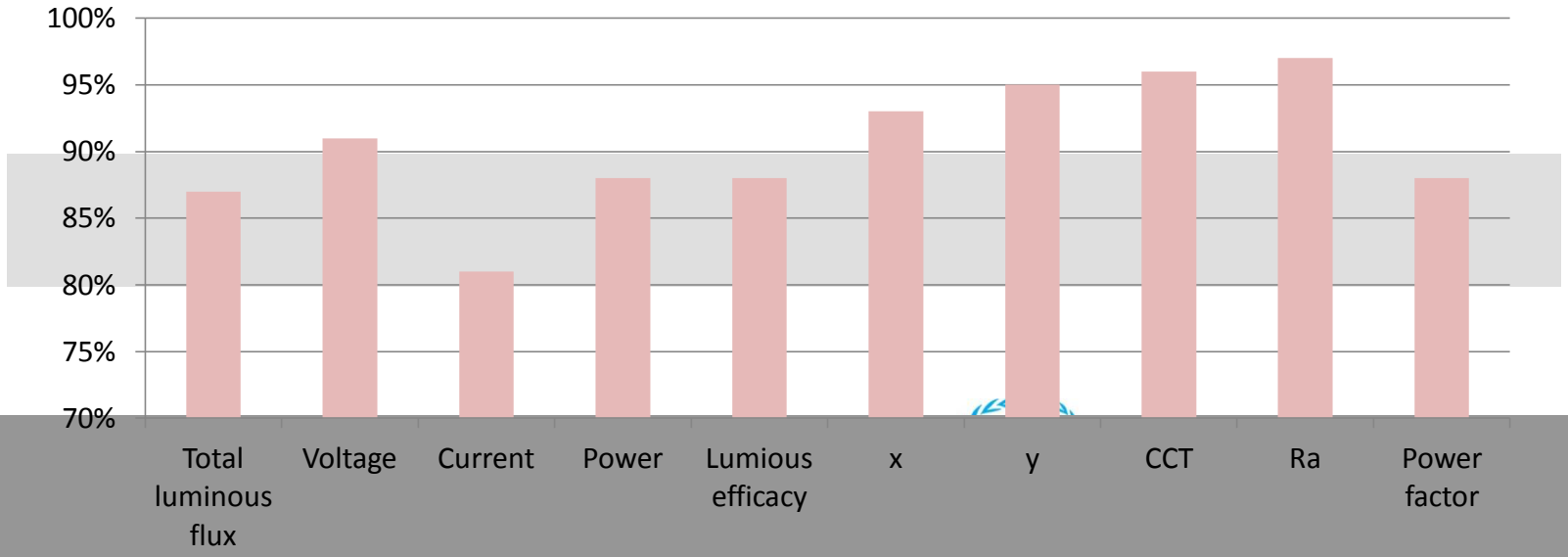
# APLAC Proficiency Testing Program

| En number | | Number of Participants (Percentage) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| All type lamps | Total luminous flux | Voltage | Current | Power | Luminous efficacy | x | y | CCT | Ra | Power Factor |
| ≤ 1.0 | 114 (87%) | 124 (91%) | 110 (81%) | 120 (88%) | 115 (88%) | 117 (93%) | 120 (95%) | 121 (96%) | 117 (97%) | 120 (88%) |
| > 1.0 | 17 | 12 | 26 | 16 | 16 | 9 | 6 | 5 | 4 | 16 |
| Total | 131 | 136 | 136 | 136 | 131 | 126 | 126 | 126 | 121 | 136 |



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# IEA Inter-laboratory Comparison

The IC was designed in compliance with ISO/IEC 17043:2010, Conformity Assessment – General Requirements for Proficiency Testing

14 laboratories participated in the IEA Inter-laboratory Comparison

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# IEA Inter-laboratory Comparison

Summary of the findings

- Most laboratories have acceptable agreement with the assigned values
- some laboratories have larger deviations from assigned values, especially for LED artifacts.
- The (relative) expanded uncertainties reported by a few of laboratories appear to have a larger difference than the suggested one, either too small or too big.

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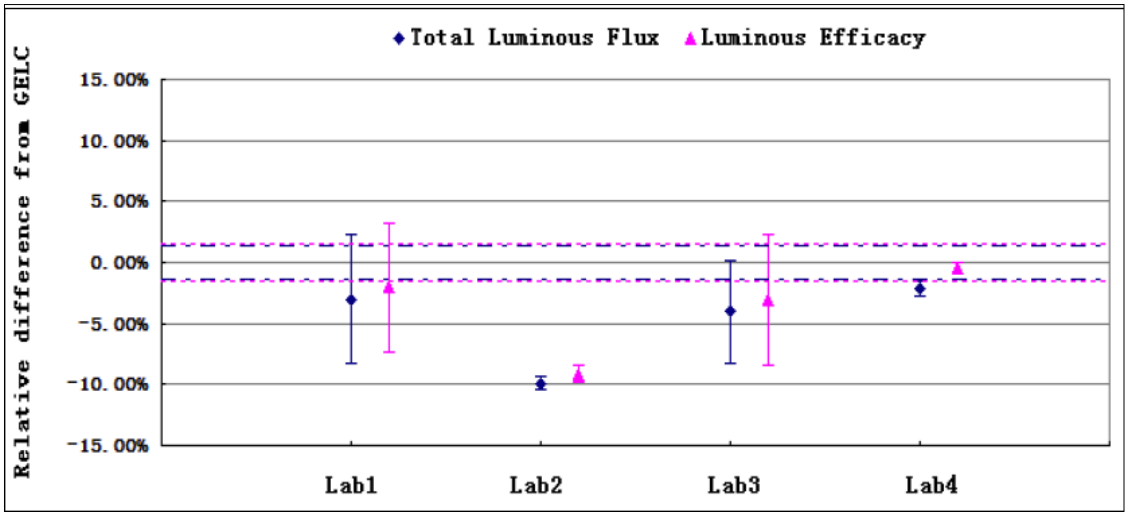
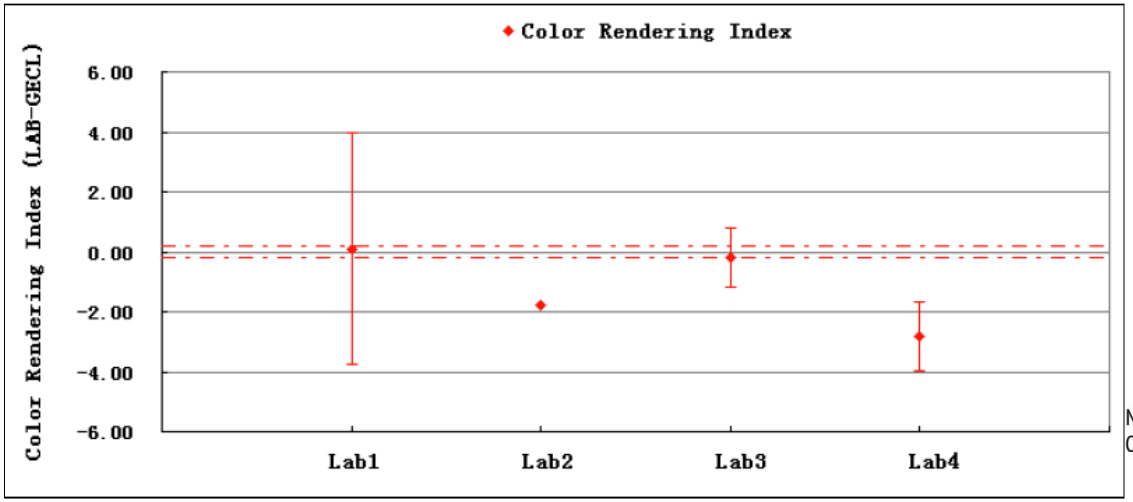
# Round robin test with 4 Russian Laboratories

Lamp I

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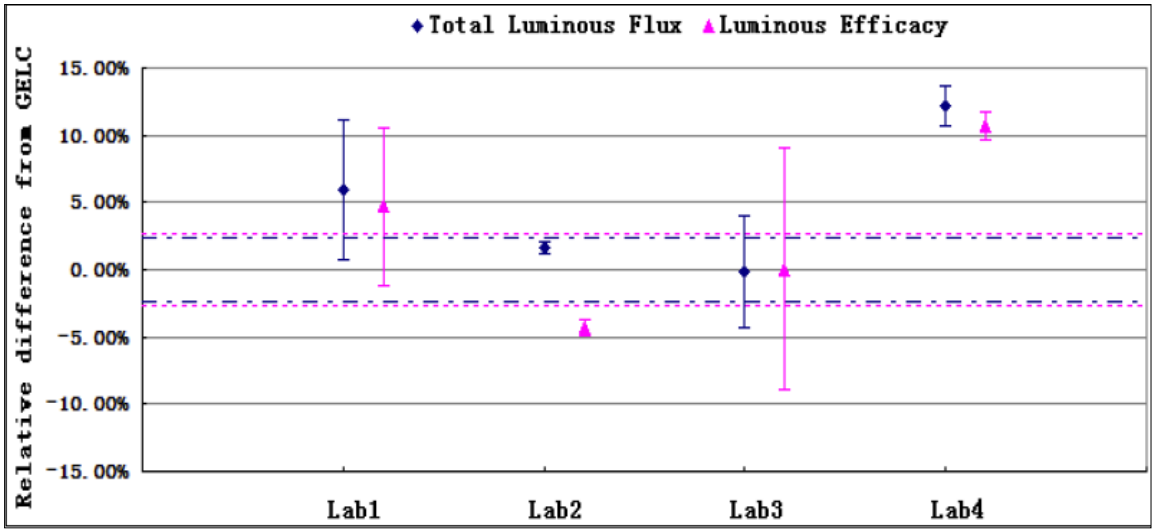
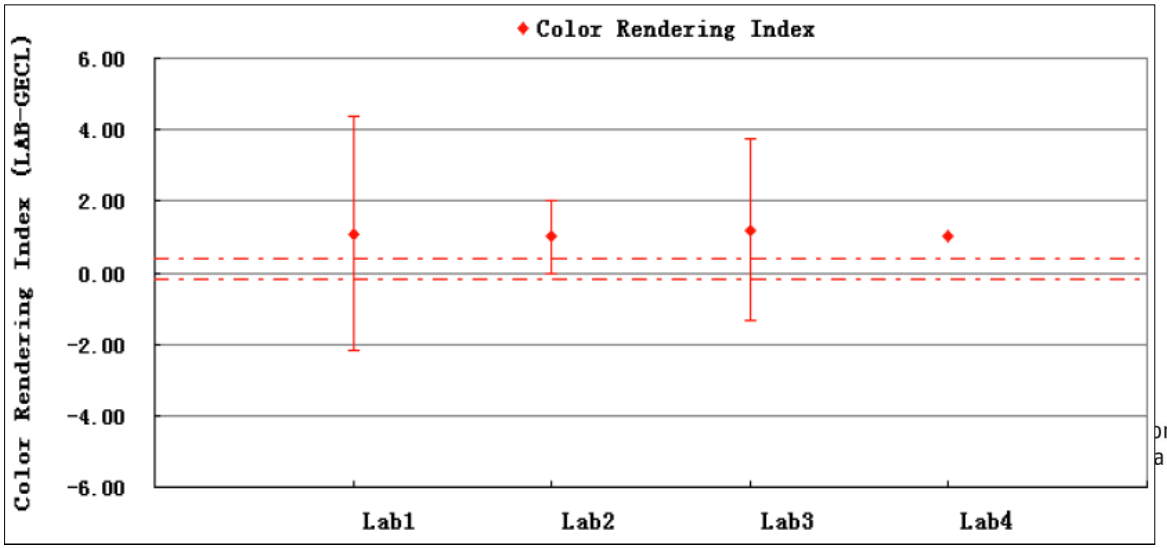
# Round robin test with 4 Russian Laboratories

Lamp II

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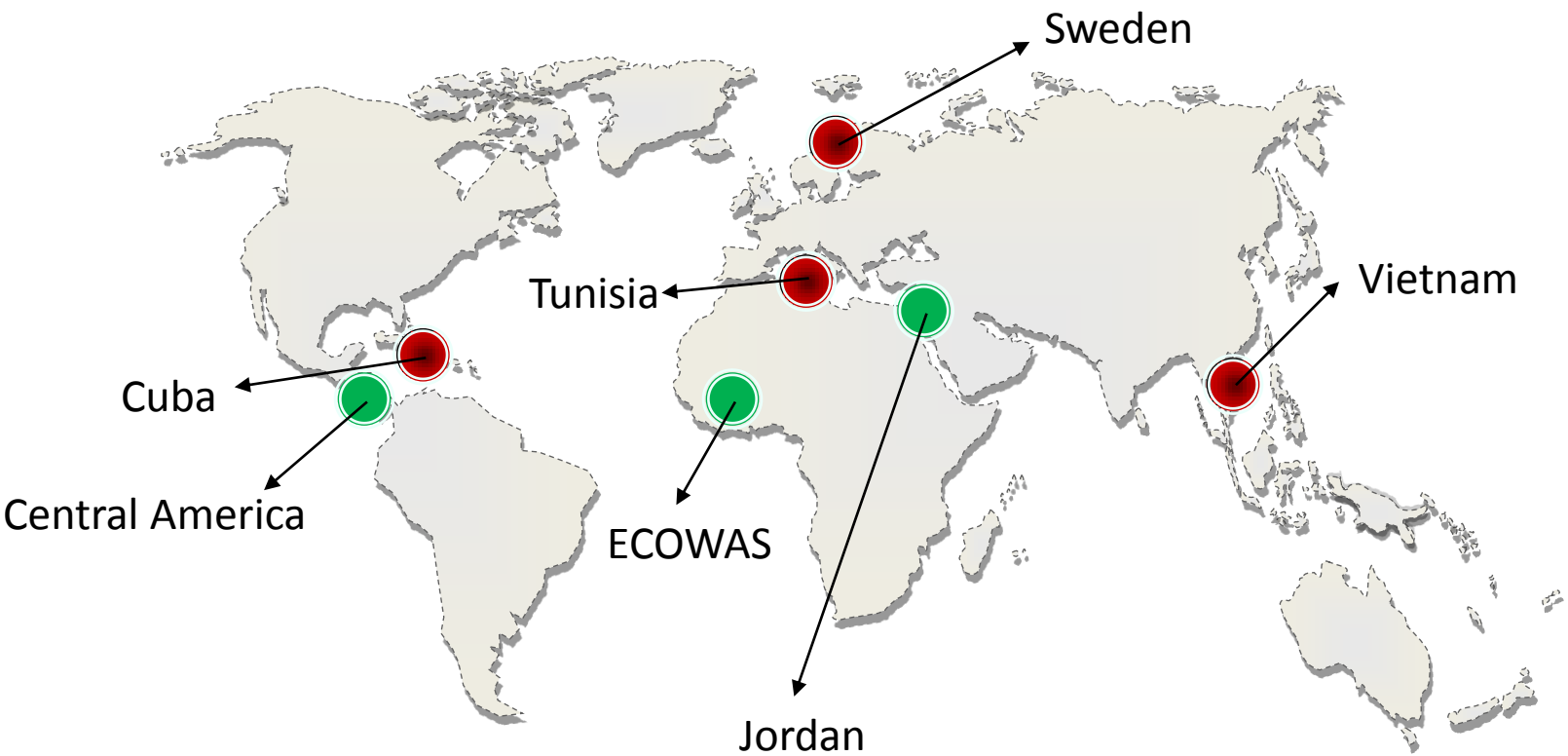
# Laboratory Capacity Building

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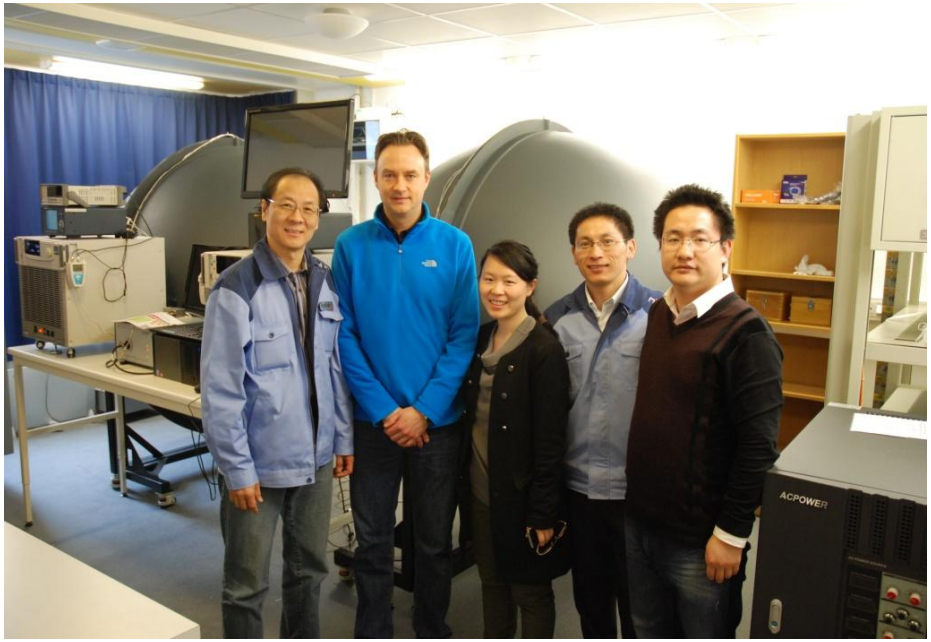
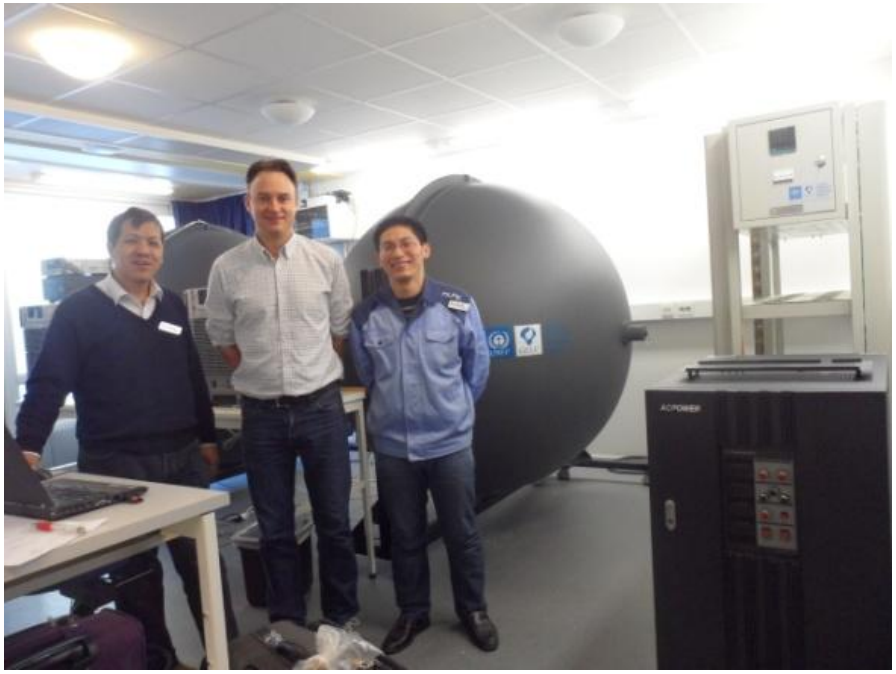
# Establishment of Swedish national lighting Laboratory

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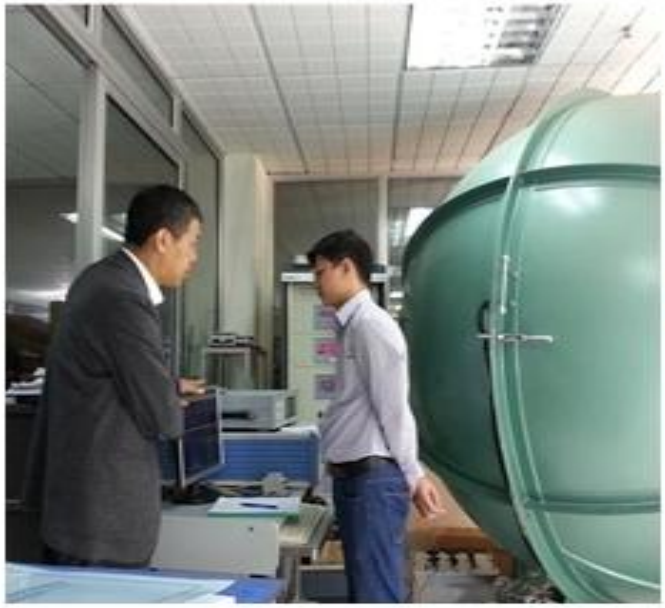
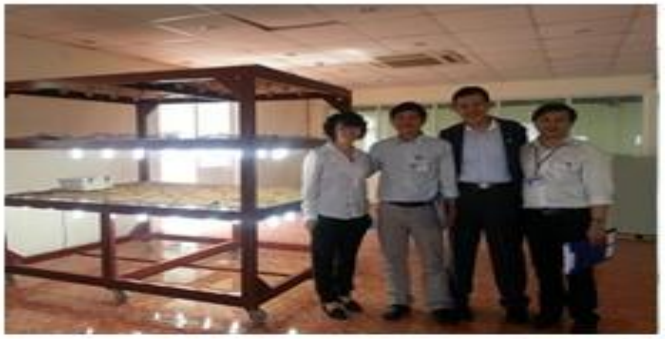
# Training for Vietnam National Lighting Laboratories





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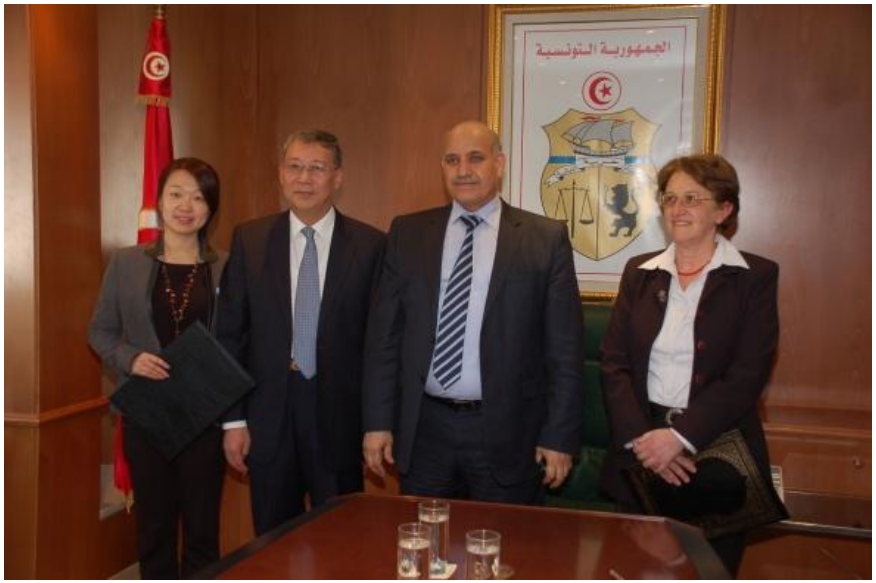
# Cooperation with Tunisia National Lighting Laboratory

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# Projects and activities


- Quality Control
- Lab Capacity Building
- Applied Research
- Technical Advisory and Information Sharing
- Training

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# Technical Trainings in Vietnam lighting manufacturers

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# Lighting Training tour in China



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# Technical Trainings at GELC



Training: South-South Cooperation Project

Training on promotion of testing level & quality management

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# Projects and activities


- Quality Control
- Lab Capacity Building
- Applied Research
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- Training

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# Applied Research

**Subjective Evaluation Research**

**OLED Research lab**

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# Applied Research

**SSL Reliability Research lab**

**Photometric Research lab**

**LED Module Lifetime Research lab**

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# Projects and activities


- Quality Control
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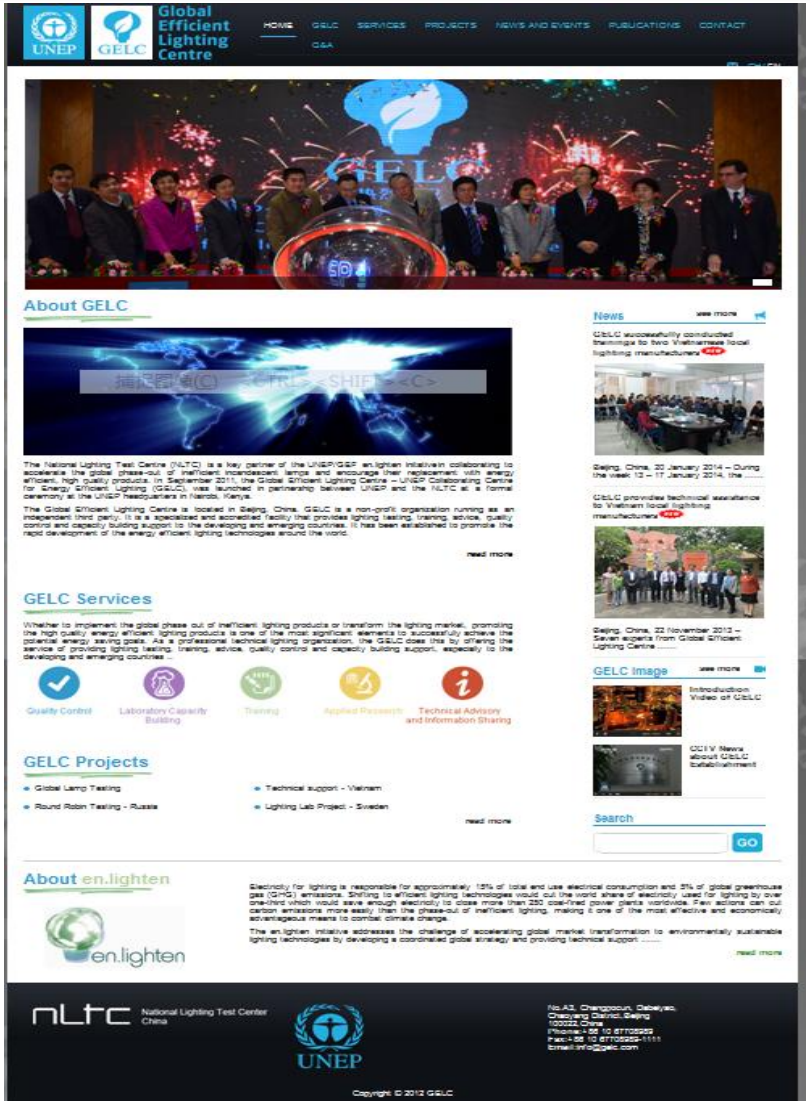
# Quality Information Release Platform

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# Workshops

## ECOWAS Regional Workshop


## Central America Regional Workshop

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# Discussion

## Southeast Asia and Pacific MVE Project

- Testing
- Laboratory capacity building
- Training
- MVE
- Information sharing framework

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# Thank you

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