

Country efforts towards high quality in PV systems The case of Chile

IRENA 8th Assembly
Thematic Meeting – Scaling-up Solar PV
Abu Dhabi, 12th January 2018

ABOUT THE CHILEAN SOLAR COMMITTEE



- Chilean Government Agency (Created by Corfo)
- Promote the development of a national solar energy industry
- Increase the competitiveness, productivity, technological capabilities, and markets of the country
- Promote the characteristics of Atacama Desert and its exceptional solar resource





SOLAR ENERGY
PROGRAM

COMITÉCORFO

Shared Vision
2025

“Chile is a world model in the incorporation of solar energy within its energy matrix, thanks to the development of a competitive national solar industry, with high technological level and international standards, which contributes to the country’s energy transition and the creation of conditions for a new inclusive economy, diversified and low in emissions”

SOLAR ENERGY PROGRAM 2016-2025

ROAD MAP GUIDELINES

TECHNOLOGICAL DEVELOPMENT

- Solar Technology Centre
 - Photovoltaic systems for desert application technological program
 - Solar mining and metallurgy program
 - Thermal energy storage system program
 - Solar desalination program
 - Solar fuels program
 - Advanced human capital program

INDUSTRIAL DEVELOPMENT

- Open innovation platform
- Innovation challenges financing
- High-tech investment attraction program

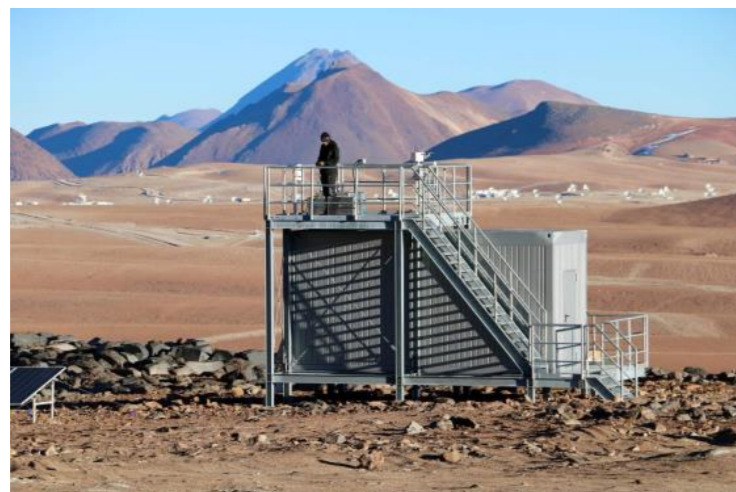
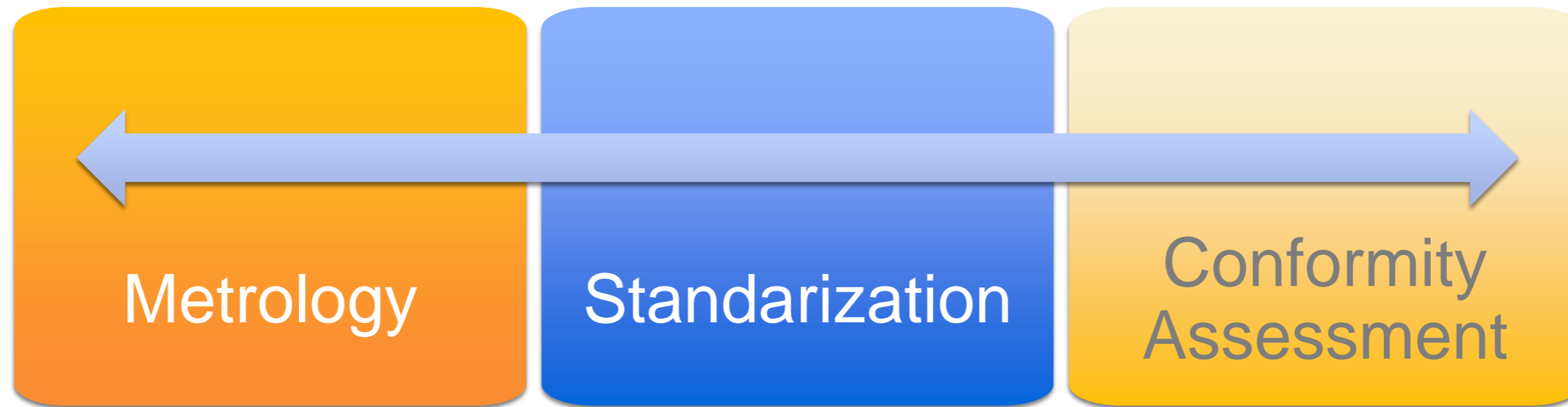
STRENGTHENING QUALITY INFRASTRUCTURE

- **Resource characterization**
- **Metrology**
- **Standards**
- **Conformity assessment schemes**
- **Certification of labor competencies program**

Solar Corridor “Cuenca del Salado”

Solar Technological District

PILARS OF QUALITY INFRAESTRUCTURE



QUALITY INFRAESTRUCTURE ROAD MAP



2015

2017

2020

2025

10 IEC standars

Implement National IEC TC82 committee (PV)

Implement National IEC TC117 committee (CSP)

New standars with desert context conditions

Conformity assesment schemes IECRE

Metrology: Laboratory of radiometry and photometry

Resource characterization

CHILE: THE BEST SOLAR RESOURCE IN THE WORLD

Chile receives the highest solar radiation in the Atacama desert, being up to 50% higher (kWh / m² year) than the next best places in the world for the development of solar technologies.

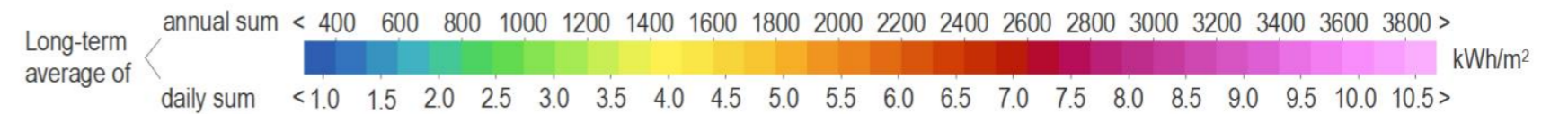
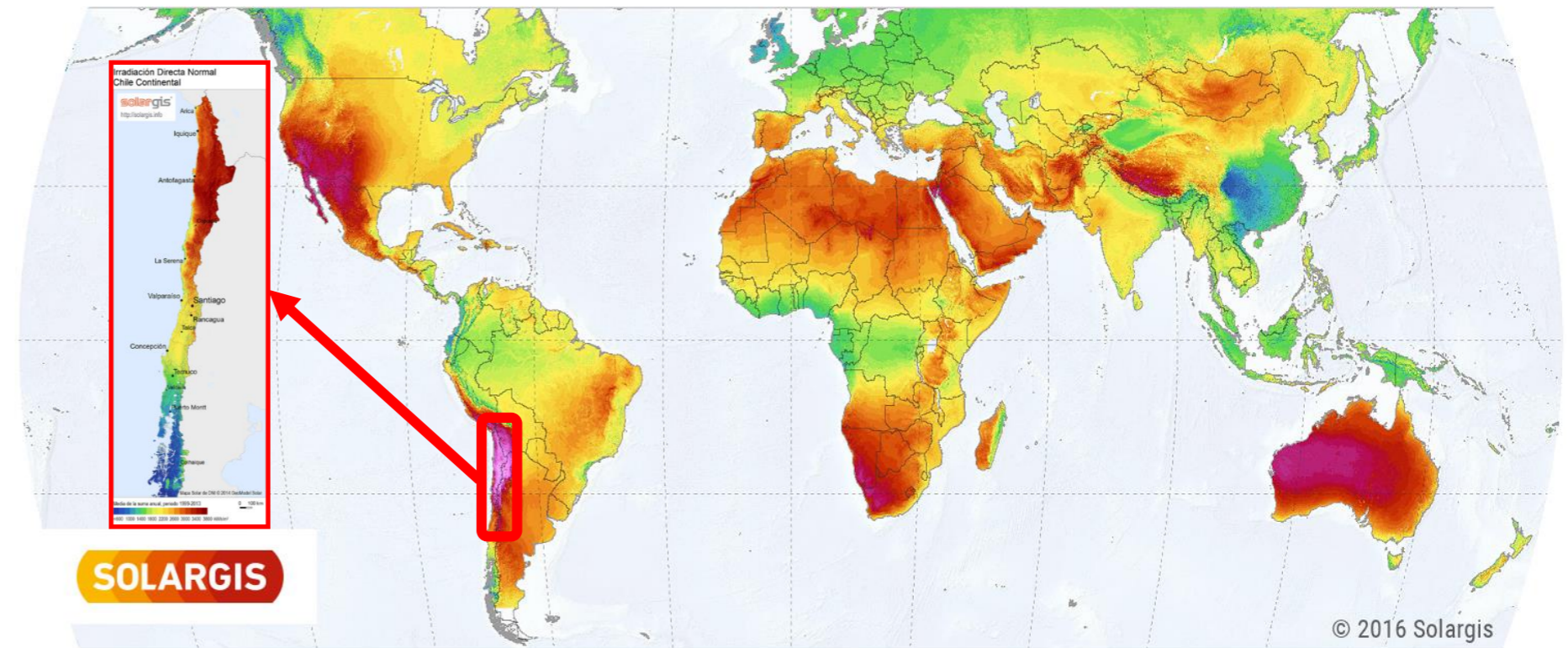
DNI: 3500 kWh/m²

Direct Normal Radiation or DNI, is the component of solar radiation that solar concentration technologies use

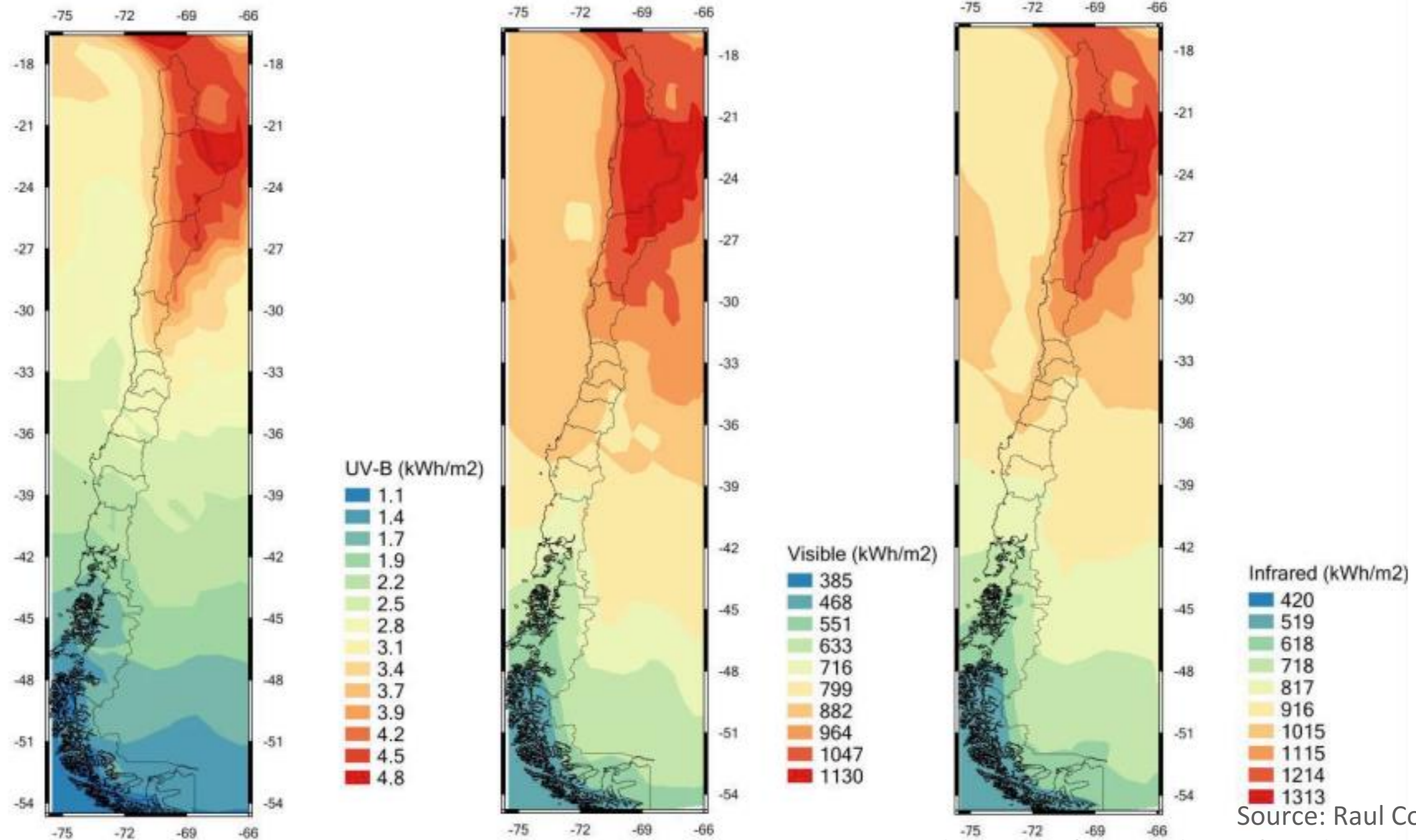
GHI: 2500 kWh/m²

Global Radiation is the component of solar radiation used by photovoltaic technologies and flat solar thermal collectors.

DIRECT NORMAL IRRADIATION



SOLAR SPECTRUM IN THE ATACAMA DESERT



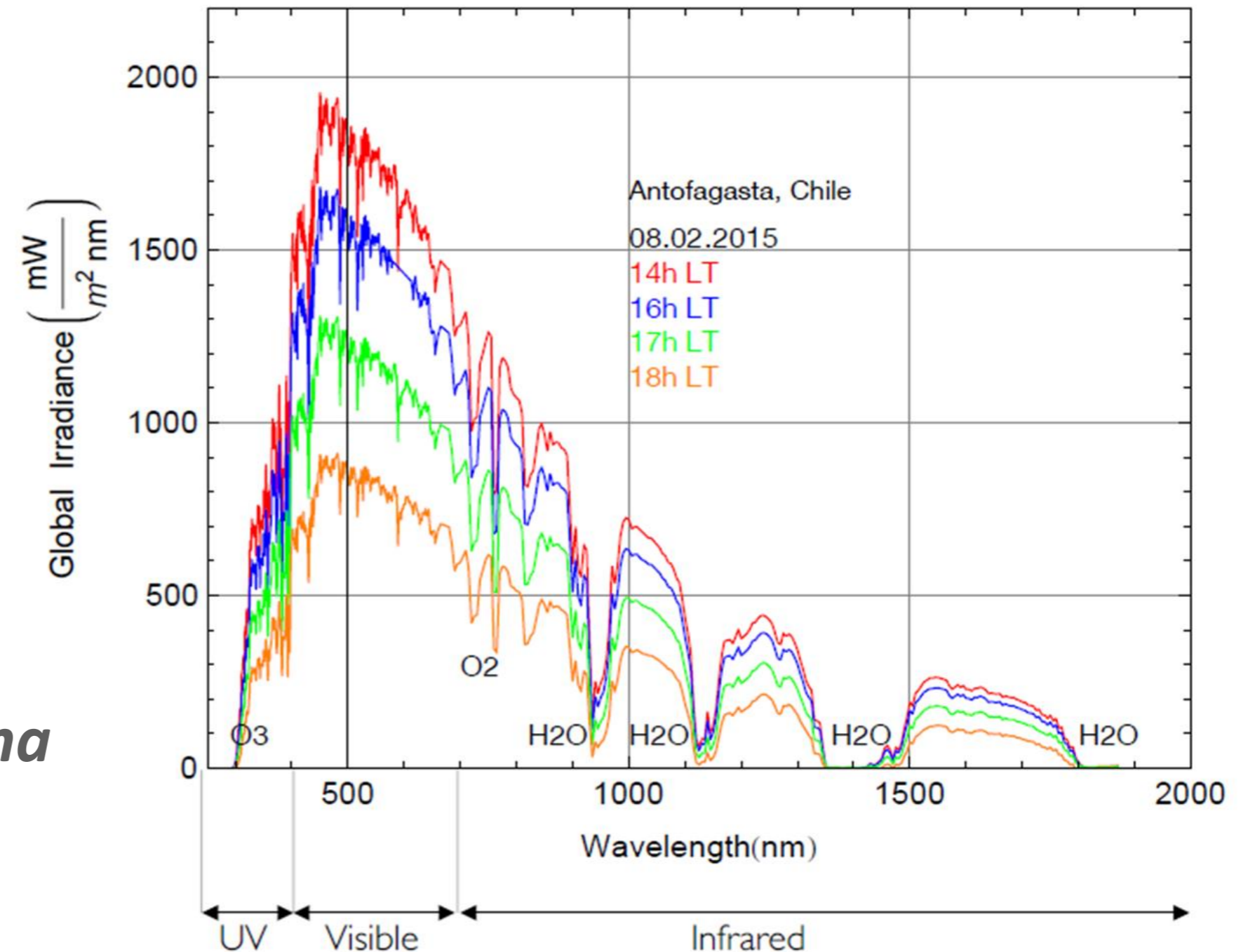
Source: Raul Cordero, 2015, USACH

From the project financed by Corfo: Solar Spectrum (15BPE-47233)

Spectrum

*UV-B radiation is **60% more intense** in Chile than in Europe. This can cause early damage to workers and equipment installed in a solar park.*

*According to IEC and EN standards the UV-B radiation is equivalent to **1 year in the Atacama Desert***

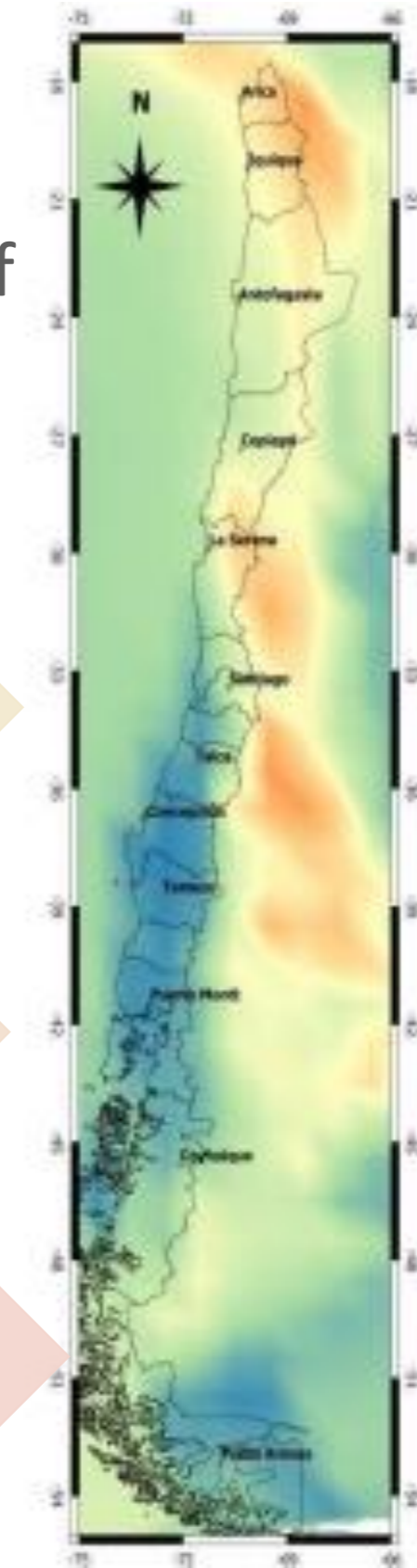
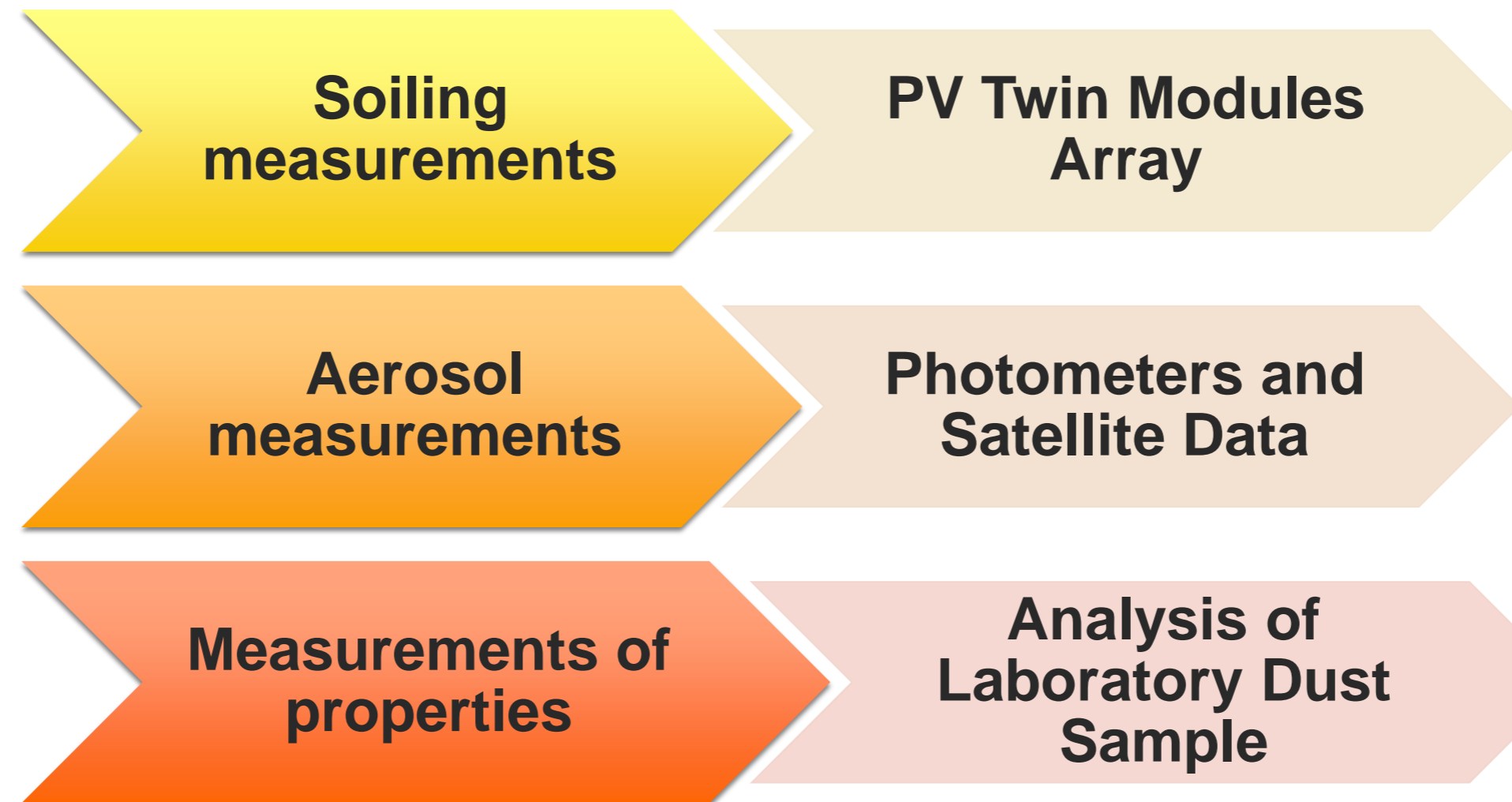


Source: Solar Committee 2015: Solar Spectrum in the Atacama Desert, Raúl Cordero

MAP OF AEROSOL OPTICAL DEPTH (AOD)



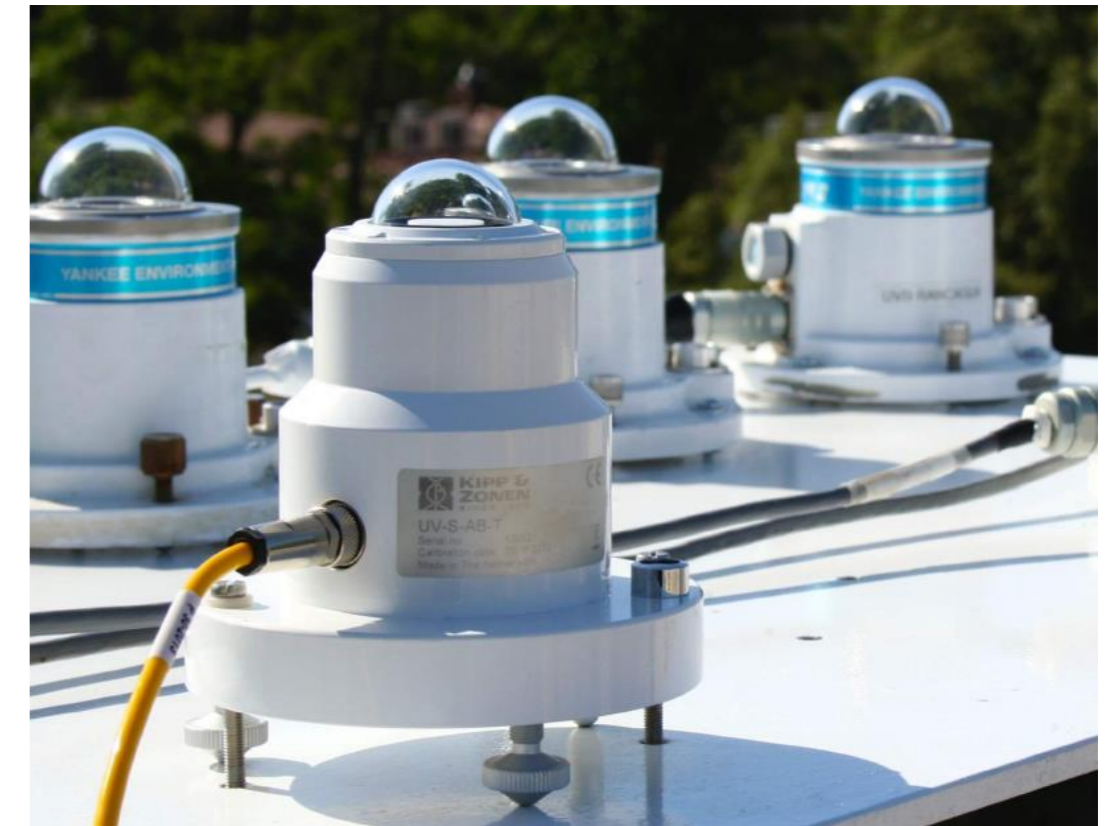
Dust Measurements in Suspension (Aerosols) serve to validate satellite data. Satellite Data Maps should allow to identify Areas with potential problems of Soiling.



LABORATORY OF RADIOMETRY AND PHOTOMETRY



To develop radiometry and photometry metrology in Chile



QUALITY INFRAESTRUCTURE ROAD MAP



2015

2017

2020

2025

10 IEC standars

Implement National IEC TC82 committee (PV)

Implement National IEC TC117 committee (CSP)

New standars with desert context conditions

Conformity assesment schemes IECRE

Metrology: Laboratory of radiometry and photometry

Resource characterization

QUALITY INFRAESTRUCTURE ROAD MAP



2015

2017

2020

2025

10 IEC standars

Implement National IEC TC82 committee (PV)

Implement National IEC TC117 committee (CSP)

New standars with desert context conditions

Conformity assesment schemes IECRE

Metrology: Laboratory of radiometry and photometry

Resource characterization

Increase the Awareness

Regional Forum: Developing quality infraestructure for PV (IRENA and PTB)

Benchmark Study on PV power plants failures

SOLAR PV POWER PLANTS BENCHMARKING STUDY



COMITÉCORFO

General Objectives:

To collect benchmarking information related to the technical and operational aspects (types and failure rates) of solar photovoltaic plants.

Specific objectives:

To identify the types and failure rates by components of each PV plant.

Analyze the information collected, classify the types of failure and obtain the corresponding failure rates for each type.

Propose preventive and mitigation measures for each of the types of failures raised, based on international experience and on-the-ground survey



MAIN RESULTS

- *The greatest number of faults present in the **PV Panels, Medium Voltage Installations, Low Voltage Installations, SCADA, Communications and Panels Supporting Structures**, are mainly due to the **inheritance of the construction and commissioning stage**.*
- *For the **transformation centers** the failures of:*
 - ✓ *Problems on the Control side; Problems on the Force side; Elements of Force; Control elements: mainly due to manufacturer faults and **problems of the external network to the plants**.*

MAIN RESULTS



- For the **transformation centers** the failures of:
 - ✓ **Excess of Temperature**, this type of failure occurs mainly in the inverters that are inside booths, due to the **saturation of the ventilation filters** or faults in the fans that are used to circulate the air inside the booths.
- It is necessary to **strengthen Performance Engineering (predictive maintenance)** in solar plants.

- *International experts from 16 countries*
- *Regional Interest on Quality Infrastructure*
- *Commitment to collaborate and to share experiences*
- *At National level → Increase the interest, awareness and call to action*



DEVELOPING QUALITY INFRASTRUCTURE FOR PHOTOVOLTAIC ENERGY GENERATION

JOINTLY ORGANIZED BY

QUALITY INFRASTRUCTURE FOR ENERGY EFFICIENCY & RENEWABLE ENERGY IN LATIN AMERICA AND THE CARIBBEAN

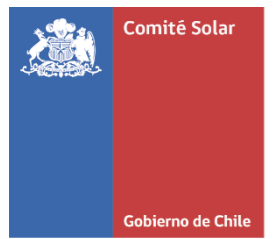


AND



WITH THE CONTRIBUTION FROM





CHALLENGES FOR QUALITY INFRAESTRUCTURE



SOLAR ENERGY
PROGRAM

COMITÉCORFO

The radiation conditions in Chile also impose challenges for solar development that must be resolved in order to take advantage the extraordinary solar resource.

We face challenges in technology, innovation and research.

Solar Spectrum

Adapt technology to these conditions

Soiling

The fouling of photovoltaic modules, flat collectors and concentration mirrors affects the production of energy.

Degradation by corrosion

Corrosivity can strongly affect the use of solar resources by degrading energy production equipment.



CHALLENGES FOR QUALITY INFRAESTRUCTURE



SOLAR ENERGY
PROGRAM

COMITÉCORFO

Standards

The experience in the **field inspection** of the photovoltaic modules has determined that under certain conditions the standards are not sufficiently clear to perform the tests.

Systems of Conformity Assessment

The photovoltaic solar energy development projects not only need high standards for their component parts and parts, but also solar systems require their corroboration and conformity assessment in accordance with international standards.



COMITÉCORFO



SOLAR ENERGY
PROGRAM

Tomás E. Baeza Jeria
@tomascosky
tomas.baeza@corfo.cl

<http://www.programaenergiasolar.cl/english>

Thank You

IRENA 8th Assembly
Thematic Meeting – Scaling-up Solar PV
Abu Dhabi, 12th January 2018