## IECRÉ Renewable Energy System Certification Introduction

Wolfram Zeitz Executive Secretary IECRE & IECEE April 2022



IEC System for Certification to Standards Relating to Equipment for use in Renewable Energy Applications

## Agenda

- IEC and IECRE in brief
- Renewable energy (RE) installations
- Reasons for the need of international standards and conformity assessment (CA)
- Definition of unique aspects of RE installations
- RE supply chain, where CA is used and why
- Why RE standards are needed at each level
- Why is RE certification unique
- IEC does NOT certify, what it DOES do
- Describe stakeholders & value proposition



## **IEC family**

#### Global reach: 174 countries (88 members – 86 affiliates)





## IEC

IEC is the abbreviation for International Electrotechnical Commission

- IEC is represented by 174 member countries representing
  - 99% of world population
  - 99% of electric power generation
- Scope
  - Standardization of devices and systems that produce electricity and contain electronics
  - Renewable energy
  - Interoperability
  - Safety
  - Performance
  - EMC (Electromagnetic Compatibility)
  - Environment
- Knowledge platform
  - 20 000 experts
  - >200 technical committees
  - >10 000 international standards
  - Testing and certification
- Many national standards originate from IEC standards



## IEC management structure





IECRE

## **IECRE**

IECRE is the abbreviation for IEC System for Certification to Standards Relating to Equipment for Use in Renewable Energy Applications (IECRE System)

- IECRE operates a single, global certification system addressing 3 sectors
  - Solar photovoltaic (PV) power
  - Wind power
  - Marine energy
- Being part of IEC, IECRE benefits from global brand recognition
  - international organizations (e. g. WTO, UN)
  - local/national authorities
  - industry
  - banks and insurance companies
  - etc.
- Processes and rules are open, transparent, and clear
- All participants share a consistent approach and recognition (certification bodies, inspection bodies, test bodies)
- Uniform implementation, clear understanding, and delivery of information
- Uniform implementation and clear understanding of the certification processes (reports, statements, certificates)



## **IECRE structure**

#### **Conformity Assessment Board (CAB)**

Management of conformity assessment policies, activities and systems (IECEE, IECEx, IECQ, IECRE)



## **IECRE common elements**





## **IECRE** participation by country

As per IEC CA 01, Basic Rules, countries listed as Voting Members are identified with the "star" icon. Countries listed as Non-voting Members are identified with the "eye" icon.

Member Bodies (MBs)			Table search:				Exc	el	PDF	Print
Country	Member Body Name	\$	Voting Member	\$	Marine Energy	\$	Solar Energy	\$	Wind Energy	¢
Australia	Joint Accreditation System of Australia and New Zealand (JAS-ANZ)		<b>X</b>				$\checkmark$			
Belgium	CEB-BEC		*		$\checkmark$					
China	Certification and Accreditation Administration of the People's Republic of China (CNCA)		*				$\checkmark$		$\checkmark$	
Denmark	IEC National Committee of Denmark		<b>X</b>						$\checkmark$	
France	LCIE by Delegation from the IEC NATIONAL COMMITTEE of FRANCE		*		$\checkmark$				$\checkmark$	
Germany	IEC National Committee of Germany		×				$\checkmark$		$\checkmark$	
💿 India	Bureau of Indian Standards		*				$\checkmark$		$\checkmark$	
🔴 Japan	IEC National Committee of Japan		*		$\checkmark$		$\checkmark$		$\checkmark$	
Korea, Republic of	IEC National Committee of Korea, Republic of		*				$\checkmark$		$\checkmark$	
Netherlands	IEC National Committee of Netherlands		*		$\checkmark$				$\checkmark$	
Saudi Arabia	SASO (Saudi Standards, Metrology and Quality Org.)		*				$\checkmark$		$\checkmark$	
Spain	IEC National Committee of Spain		*				$\checkmark$		$\checkmark$	
United Arab Emirates	Ministry of Industry and Advanced Technology (MoIAT)		*				$\checkmark$			
United Kingdom	UK Committee for IECRE		*		$\checkmark$				$\checkmark$	
United States of America	USNC/IECRE		*		4		4		$\checkmark$	

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9 Please go to <u>https://www.iecre.org/dyn/www/f?p=110:7::::P7\_ORG\_TYPE:REMB</u> for current membership participation information

# Why IEC Standards and conformity assessment?

- ~200 bn US\$ international renewable energy market just for new installations (wind and solar each ~100 bn US\$, marine still nascent)
- Harmonized international consensus standards throughout RE industry
- Harmonized conformity assessment
- Harmonized interpretation
- Reduced risk
- Peer assessment
- Transparency
- Mutual acceptance
- Broad stakeholder engagement
- Unique RE international CA system



### Importance of IECRE Conformity Assessment





IECRE conformity assessment system replaces IEC 61400 – 22 standard Reason: It's not a standard but rather a conformity assessment system





# A RE power plant is just like any power plant, a complex system...

- RE systems are assembled from many large and small components, which all have to work harmoniously to produce reliable energy
- Depending on technology: blades, gears, towers, panels, cables, controllers, etc.
- Components assessed by
  - design analysis assessment
  - model validation
- System assessed by
  - design analysis assessment
  - component validation
- Requires field assembly, commissioning and O&M
- Interconnection compliance
- Every turnkey system is a unique field installation







### ...however, unlike conventional power plants, RE power plants face unique exposures

- Components and systems cannot be tested to design specifications (specific to wind applications)
- Power driving components are immediately exposed to the environment
- The "energy sources" are not continuously available 24/7
- The variables of the power sources vary constantly, and with this, loads and degradation:
  - wind turbine: Wind loads (incl. gusts), icing, wildlife etc.
  - PV power plant: Wind loads, snow loads, hail, temperature, sand abrasion, irradiation, wildlife etc.
  - marine power plants: Water current, wildlife etc.
- Min. 20 years design life may result in challenges given the direct environmental exposure to power generation devices
- Each installation is unique as it must fit the particular geology and geography of its location, and in addition, the design criteria need to meet demand (one size does not fit all!)
- Assessment must depend on design analysis and model validation through testing
- Turn key system reliability and performance depend on upstream component certifications
   AND installation / maintenance quality



### RE supply chain, where CA is used and why

Raw materials Compone	nts Transport Ir	nstallation Operation & maintenance
<ul> <li>Wind:</li> <li>Blades</li> <li>Bearings</li> <li>Gearboxes</li> <li>Towers</li> <li>Towers</li> <li>Panels</li> <li>Actuators</li> <li>Controllers</li> <li>Converters</li> <li>Foundations</li> <li>Cables</li> <li>Grid connection</li> <li>Etc.</li> </ul>	<ul> <li>Photovoltaic:</li> <li>Panels</li> <li>Inverters</li> <li>Connecting cables</li> <li>Trackers (optional)</li> <li>Cables</li> <li>Cable conduits</li> <li>Controllers</li> <li>Inverters</li> <li>Foundations</li> <li>Grid connection</li> <li>Cleaning machines</li> <li>Etc.</li> </ul>	<ul> <li>Marine:</li> <li>Blades</li> <li>Bearings</li> <li>Gearboxes</li> <li>Towers</li> <li>Panels</li> <li>Actuators</li> <li>Actuators</li> <li>Controllers</li> <li>Converters</li> <li>Foundations</li> <li>Cables</li> <li>Grid connection</li> <li>Etc.</li> </ul>

CA not applicable

# Why are RE standards and conformity assessments needed at each level?

- Reliability depends on integrated system design of many components
- Each individual component contributes to the successful interaction of the system:
  - Wind: blades, bearings, gearboxes, generators, towers, foundations, controllers, etc.)
  - PV: panels, actuators, support structures, inverters, cables
  - Marine: wave/current/tidal energy converters



## How does the IECRE system work ?

- IECRE itself does NOT certify, however, IECRE assures through a systematic approach that system participants who issue certificates are qualified
- Qualified registered participants are competent to assess RE equipment and projects
  - RECBs (RE Certification Bodies)
  - REIBs (RE Inspection Bodies)
  - RETLs (RE Test Laboratories)
- Competence validation through regular, revolving peer assessment
- Proper IEC and other international standards are referenced insuring appropriate interpretation of standards
- Transparency
- Influence for all stakeholders
  - All stakeholders have a voice (RECBs, REIBs, RETLs, OEMs, End Users)
  - All national member bodies have a vote
  - All participating member bodies recognize & accept IECRE certificates



### Peer assessment is crucial for the IECRE system





\* Peer assessment committee

## Who are the IECRE stakeholders?

- OEMs, EPCs
- RECBs, RETLs, REIBs Place • Independent Project owner **Grid Operator** Region Engineers (IEs) End Users Regulators **Operation & Financing Bank** Maintenance Developers **OEM Manufacturer** Operators Permitting authorities **Owners** Re-insurer FPC Banks Insurers **RECBs/REIBs/RETLs** Independent Grid operators Insurer engineers Regulators Specialized product tester / • Etc. laboratory Etc... Time Risk management Courtesy of EXXERGY

**IECRE** 

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## What is the motivation for different stakeholders to make use of the IECRE system?

- OEMs, EPCs
- RECBs, REIBs, RETLs
- Independent Engineers
- End Users
  - Developers
  - Operators
  - Owners
  - Banks
  - Insurers
  - Grid operators
  - Regulators

Level playing field, mutual acceptance Expanded market, increased value, proven proficiency Market, value, proficiency

Consistency, quality, resale value Quality, reliability

Risk management, performance, resale value

Grid compliance, reliability Safety, code compliance



### Thank you! secretariat@iecre.org www.iecre.org

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IECRE



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