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The EMPIR initiative is co-funded by the European Union's Horizon 2020 research and innovation programme and the EMPIR Participating States

IT4PQ Final Workshop

Instrument Transformers for Power Quality

Methods and Procedures for Assessing Accuracy of *I*nstrument *T*ransformers *for P*ower *Q*uality

IT4PQ: from triggers to project outputs

Gabriella Crotti – Project coordinator

19NRM05 IT4PQ Final Workshop
INRIM, Torino, June 22nd, 2023

Outline

- Background & Motivation
- IT4PQ in a nutshell
- Expected output
- Workshop Programme

Towards carbon neutrality

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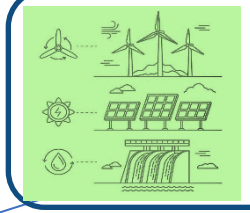
Instrument Transformers for Power Quality

Energy Efficiency



Distributed Energy Resources (DERs)

Energy transition

Greenhouse gas reduction

electrification of all sectors (transport, industry, buildings)

Energy usage by type of fuels

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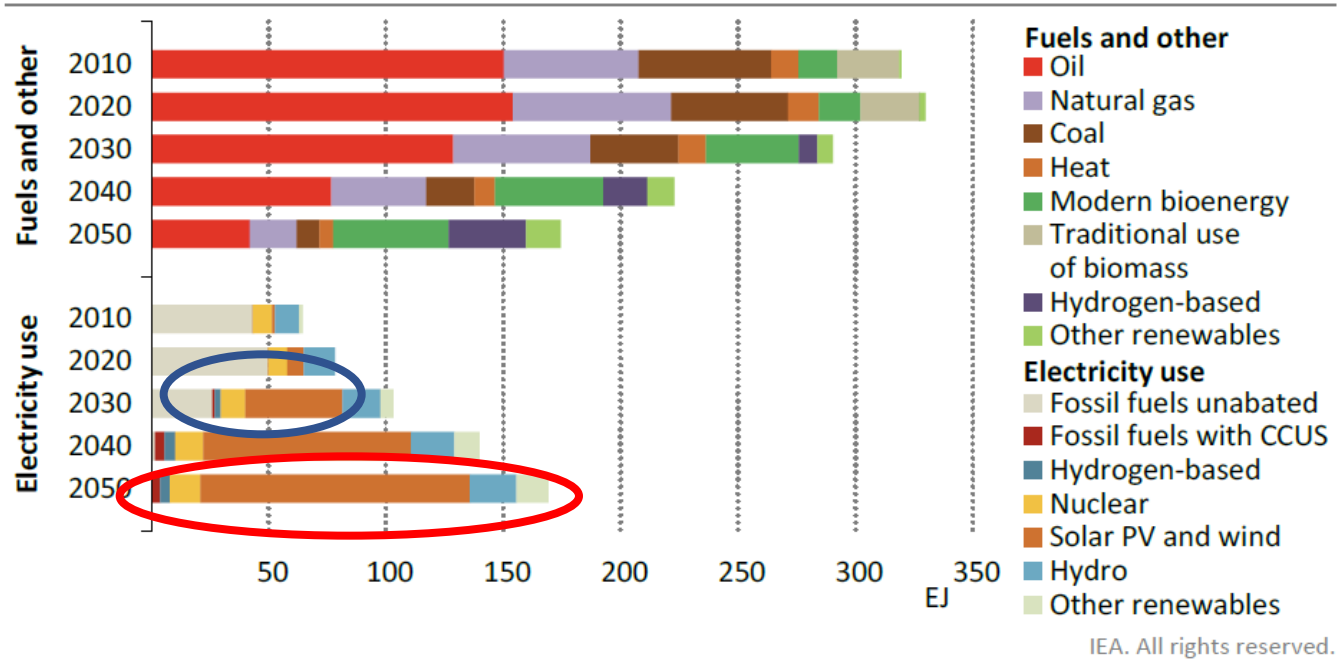
Net-Zero Energy Scenario (2020-2050).



100% increase of the electricity use in the next 25-30 years

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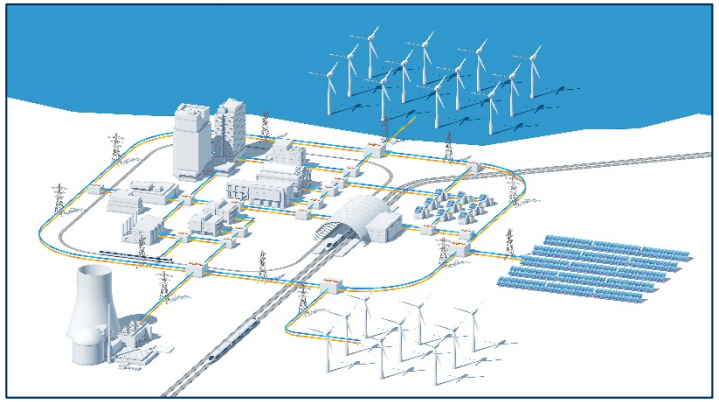
Impact on the electricity grids

- Impact on the amount, continuity and quality of the electrical energy transmitted and distributed by the grid
- Need for:
  - extended monitoring and control of the grid state
  - **identification of disturbances and critical conditions**
  - increased grid resilience



Accurate and comparable measurements of HV/MV grid voltage/current measurement essential

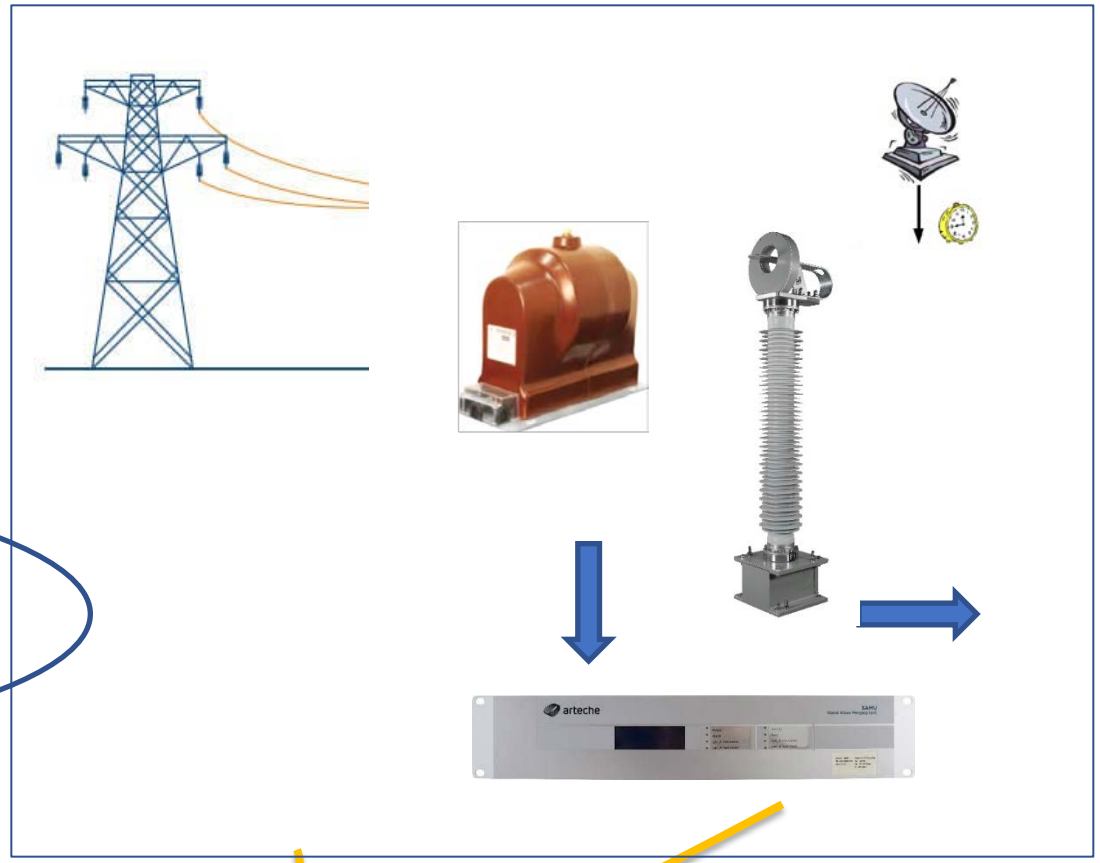
PQ measurement chain

Tests and procedures to qualify PQ measuring systems well defined and available.

A new generation of low power instrument transformers available

Gaps remain in HV and MV IT traceability, wideband quantification of ITs accuracy in PQ, comprehensive classification of ITs for PQ .

Activity on this subject: IEC, CIGRE, Academia



IT4PQ
Instrument Transformers for Power Quality

Set up of the *metrological framework* for the traceable calibration and test of Instrument Transformers (ITs) for Power Quality (PQ) measurements in electricity distribution grids

- **Focus on MV grids (30 kV/2kA, disturbances up to 9 kHz)**
- **All types of ITs considered**

Metrics, generation and reference measurement systems, methods and procedures, uncertainties

The project framework: EMPIR

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Instrument Transformers for Power Quality

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The European Metrology Programme for Innovation and Research is a joint European Research Programme in the field of Metrology, undertaken by 22 countries - Member States and Associated Countries to Horizon 2020

- **Call Normative: research to develop metrological methods and techniques required for standardization, regulation and conformity assessment**

The project is supported by the European Metrology Network for Smart Electricity Grids (EMN SEG)

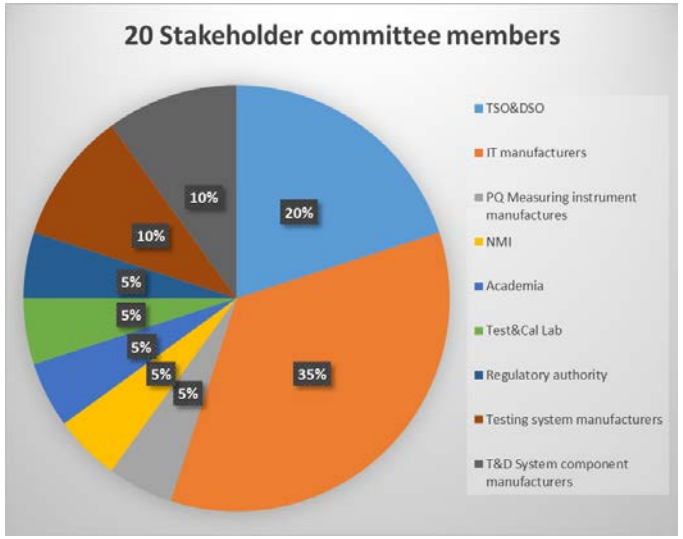
The Consortium

Short Name	Organisation	Country
INRIM	Istituto Nazionale di Ricerca Metrologica (INRIM)	Italy
CMI	Cesky Metrologicky Institut (CMI)	Czech Republic
LNE	Laboratoire national de métrologie et d'essais (LNE)	France
PTB	Physikalisch-Technische Bundesanstalt (PTB)	Germany
TUBITAK	Turkiye Bilimsel ve Teknolojik Arastirma Kurumu (TUBITAK)	Turkey
VSL	VSL B.V.	Netherlands
RSE	Ricerca sul Sistema Energetico – RSE S.p.A.	Italy
SUN	Università degli Studi della Campania Luigi Vanvitelli	Italy
TUD	Technische Universität Dresden	Germany
UNIBO	Alma mater studiorum Università di Bologna	Italy

6 National Metrology Institutes

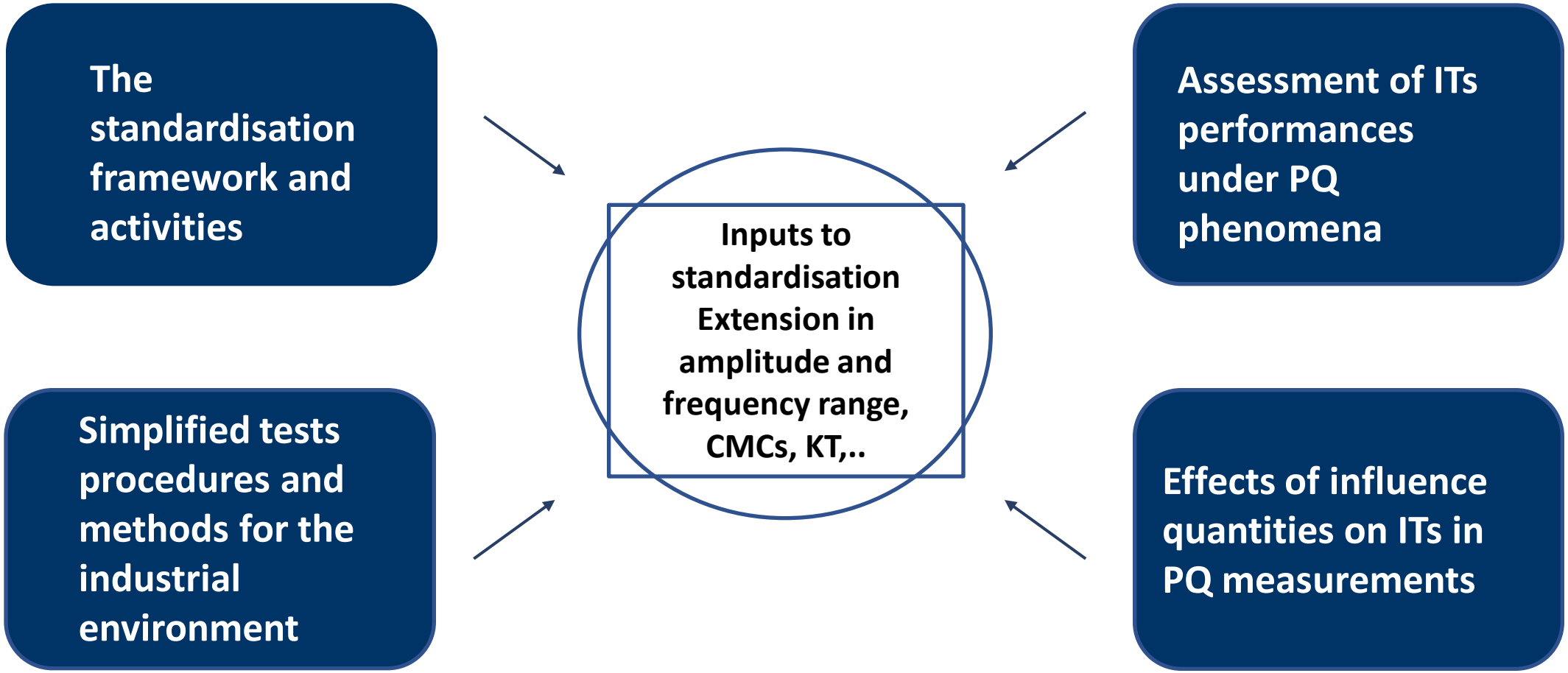
1 Research Centre

3 Technical Universities



Chief Stakeholder organisation: IEC TC 38 Instrument transformers

The Workshop



All times are CEST (UTC +02:00)

Thursday June 22 2023		
08:45	Participants joining	
09:00	*Opening and Welcome*	
09:10	*IEC TC 38 status report IT4PQ -- June 2023*	*Volker Leitloff (Rte - France)* Chair of IEC TC 38 and CENELEC TC 38
09:45	*IEC TC 38 WG 47 – Evolution of instrument transformer requirements for the future market: link and exchanges with the IT4PQ Research Project*	*Paolo Mazza (RSE S.p.A. – Italy)* *Convenor of IEC TC 38 WG 47*
09:50	*The IT4PQ project: from triggers to project outputs*	*Gabriella Crotti* (INRIM – Italy)
	SESSION I - *Assessment of IT performances in PQ measurements*	
10:00	Definition of framework test conditions and metrics	*Mario Luiso* (Unicampania – Italy))
10:15	Reference system for the assessment of current transformer's PQ performances	*Enrico Mohns* (PTB –Germany))
10:30	Inductive VTs: a comparative analysis of performances under PQ disturbance	*P.S. Letizia* (INRIM - Italy)

10:45	**Coffee break**	
	SESSION II – *IT test procedures for the industrial environment*	
11:15	Simplified and low-cost characterization of medium-voltage low-power voltage transformers in the power quality frequency range	*Alessandro Mingotti* (UNIBO – Italy)
11:30	A simplified procedure based on a wideband comparator for the calibration of CTs for PQ.	*Fabio Munoz* (VSL- The Netherland)
11:45	Simplified test procedures for frequency characterization of inductive VTs	*Mario Luiso* (UNICAMPANIA - Italy)
12:00	IT4PQ: wideband testing of LPITs	*Andrea Nalli* (G&W Altea)
12:15	Time for questions and discussions	
13:00	Lunch	
	SESSION III - *ITs under realistic conditions: assessment of combined influence factor impact*	
14:15	Inductive VTs: effect of temperature and vibrations	*Daniela Istrate* (LNE, FRANCE)
14:30	Impact of temperature and burden on the frequency dependent transfer ratio of resin cast MV voltage instrument transformers	*Robert Stiegler* (TU Dresden - Germany)
14:45	Impact of adjacent phases and proximity on wideband LPVT and VT performance	*P.S. Letizia* (INRIM –Italy)
15:00	LPCTs: effect of influence quantities on the accuracy of Rogowski Coils and simplified testing.	*Alessandro Mingotti* (UNIBO – Italy)
15:15	*Time for Questions and Final Discussion on* *Key outputs of the project* *PQ Accuracy class and wideband behaviour* *Open issues* *Link with ADMIT*	All
16:00	**End of Workshop**	

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Thank you!

This project 19NRM05 IT4PQ has received funding from the EMPIR programme co-financed by the Participating States and from the European Union's Horizon 2020 research and innovation programme

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