

# Welcome!

## Open Consultation on Metrology for Smart Electricity Grids

Stakeholder sessions for  
the EMN for Smart Electricity Grids

**16 & 25 NOVEMBER | 1 DECEMBER 2021**

EUROPEAN  
METROLOGY  
NETWORKS



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# Some housekeeping

- The meeting will be recorded to facilitate summarizing the discussion outcomes
  - *Only the presentations will be made public, so feel free to comment!*
- Please turn your cameras on...
- ... but mute your microphone when you are not speaking
- Use the 'raise hand' function if you want to ask a question
- Use the chat to give comments, ask questions and raise issues

# Smart Grid measurement challenges

## 3 discussion sessions each with a slight specific focus

- 16 November, 10 am CET      DC grids and HV testing
- 25 November, 10 am CET      Digital transformation and cybersecurity
- 1<sup>st</sup> December, 10 am CET      Measurement of grid signals

**Feel free to register to all sessions!**

# Agenda

Time (CET)	Item
10:00	Welcome
10:05	Measurement needs identified via a recent stakeholder survey
10.15	Keynote on <b>DC grid challenges</b> by Dr Mathieu Caujolle, Électricité de France (EDF)
10.35	Forum discussion on metrology needs for DC grids, HV testing and other smart grid measurement challenges
11.45	Wrap up
12:00	End of the meeting



**SMART ELECTRICITY  
GRIDS**

**EUROPEAN  
METROLOGY  
NETWORKS**

# Strategic Research Agenda Stakeholder Survey

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# Strategic Research Agenda

## EMN SEG Strategic Research Agenda

Draft version 1.0 (11/2020)  
For approval BoD

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## **DRAFT** European Metrology Network Smart Electricity Grids

## Strategic Research Agenda

### Guiding future R&D along stakeholder needs

- 1<sup>st</sup> draft prepared based on existing knowledge of stakeholder needs
- Feedback loop including stakeholders

[Link to Strategic Research Agenda >>](#)

# 9 Themes of the SRA



Revenue  
Metering



Power Quality



Grid Monitoring  
& Data Analytics



Digital  
Substations



Instrument  
Transformers  
and Sensors



High-Voltage  
Testing



Efficiency



DC Grids and  
Applications

and “Grid Integration”



# Measurement challenges for each SRA theme



## Digital Substations

### 4.4 Digital substations

Future electrical power grids will require real-time control and monitoring systems to meet increasingly complex and challenging conditions. Digital instrumentation will slowly substitute conventional analogue instrumentation. New standards in the IEC 61869 series address the digital communication of electronic instrument transformers, as well as stand-alone merging units (SAMUs) and digitisers for analogue instrument transformers. Following the introduction of these new standards, the transition from traditional analogue instrumentation towards the new digital instrumentation technology is expected to gain speed, both on a transmission and distribution level. To support this change, new metrological tools and methodologies are needed as test systems for new technology.

countries. These smart meters represent a network of IoT-devices, thus requiring a high level of IT security to prevent malevolent coordinated intrusions from destabilising the grid control.

#### 4.4.1 Some measurement challenges in digital instrumentation

- New metrological tools and methodologies for intelligent electronic devices (electronic instrument transformers, SAMU, all-digital meters and PMUs)
- Investigation of PTP or White Rabbit methods for accurate time-stamps
- Addressing IT security of smart meters at the proper level



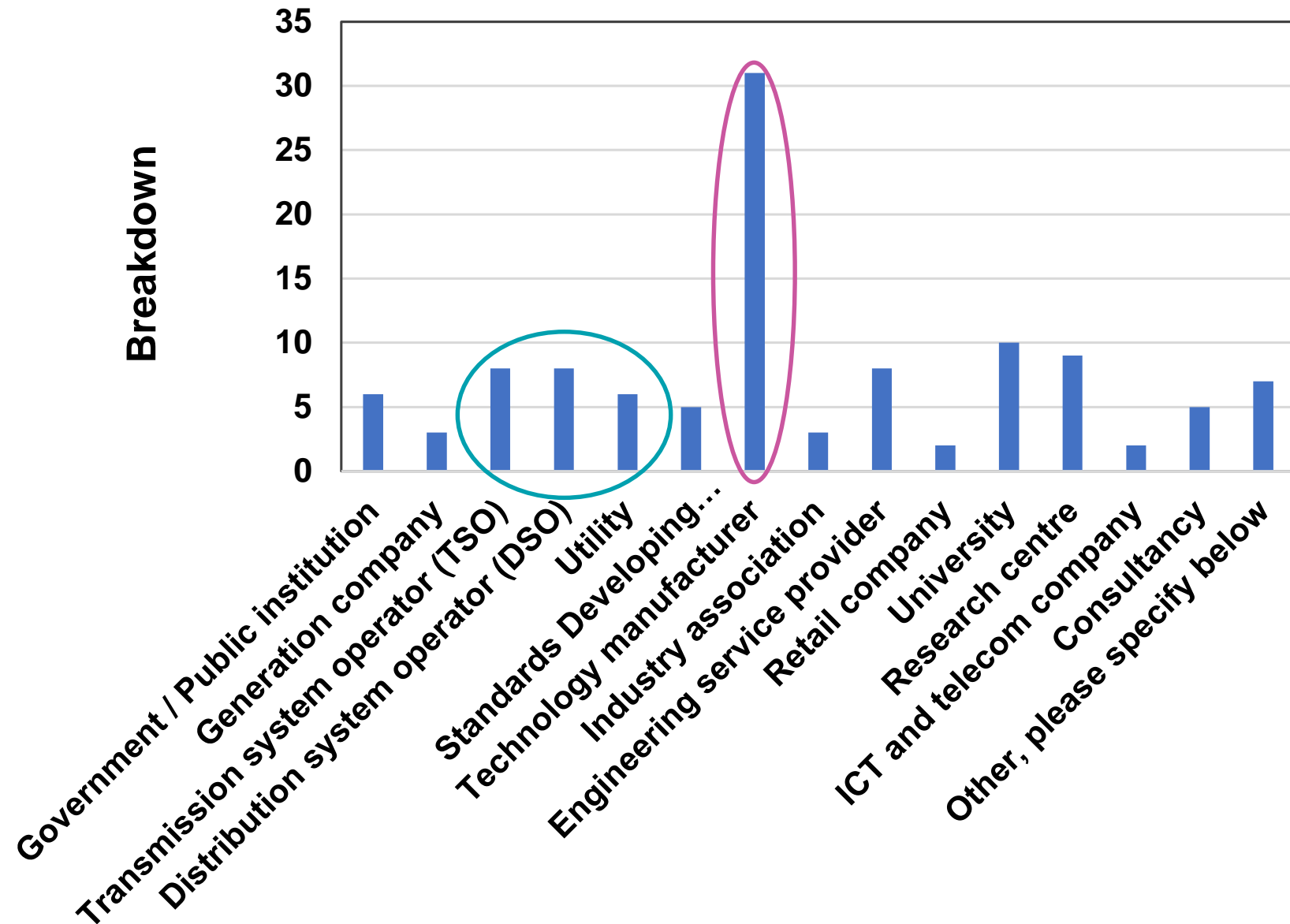


# Stakeholder survey

- Stakeholders asked about the relevance of specific measurement challenges for the 9 themes
- Took place during March – April 2021
- 80 participants from 18 countries across European continent



# Stakeholder survey

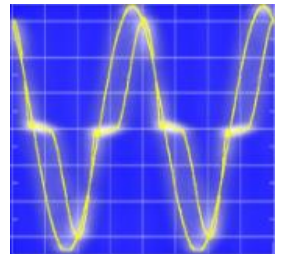


- 40 % from Technology manufacturer
- 30 % from Utilities & Network Operators
- 60 % from organisations with > 500 employees

# Top 5 metrological challenges from the survey

## Findings of the survey

1. Fault location identification
2. Full characterisation of the frequency transfer function of instrument transformers
3. Monitoring the propagation of transient and disturbance phenomena
4. New characterisation methods for instrument transformer with PQ phenomena
5. New metrological tools and methodologies for intelligent electronic devices



# DC Grids – Top 3 metrological challenges

1. On-site measurement data for proper sets of DC PQ parameter definitions
2. Characterisation methods regarding efficiency and state of typical DC applications
3. Specifications and methodologies for PQ “compatibility level” and “planning level” in LVDC



Findings of the survey



# High-voltage testing – Top 3 metrological challenges

Findings of the survey

1. Non-destructive testing techniques for commissioning or preventive maintenance
2. Traceability for voltage dividers and measuring systems for composite and combined wave shapes
3. Loss measurements of power transformers, and high voltage capacitors and reactors



# Keynote address

## DC grid challenges

**Dr. Mathieu CAUJOLLE**

**Team manager – Grid Planning, Protection and Power Quality**

**Electricité de France**

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