Task 52 General Meeting 2023
WG6 presentation

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WG6 : Scanning Lidar

Recommended Practices

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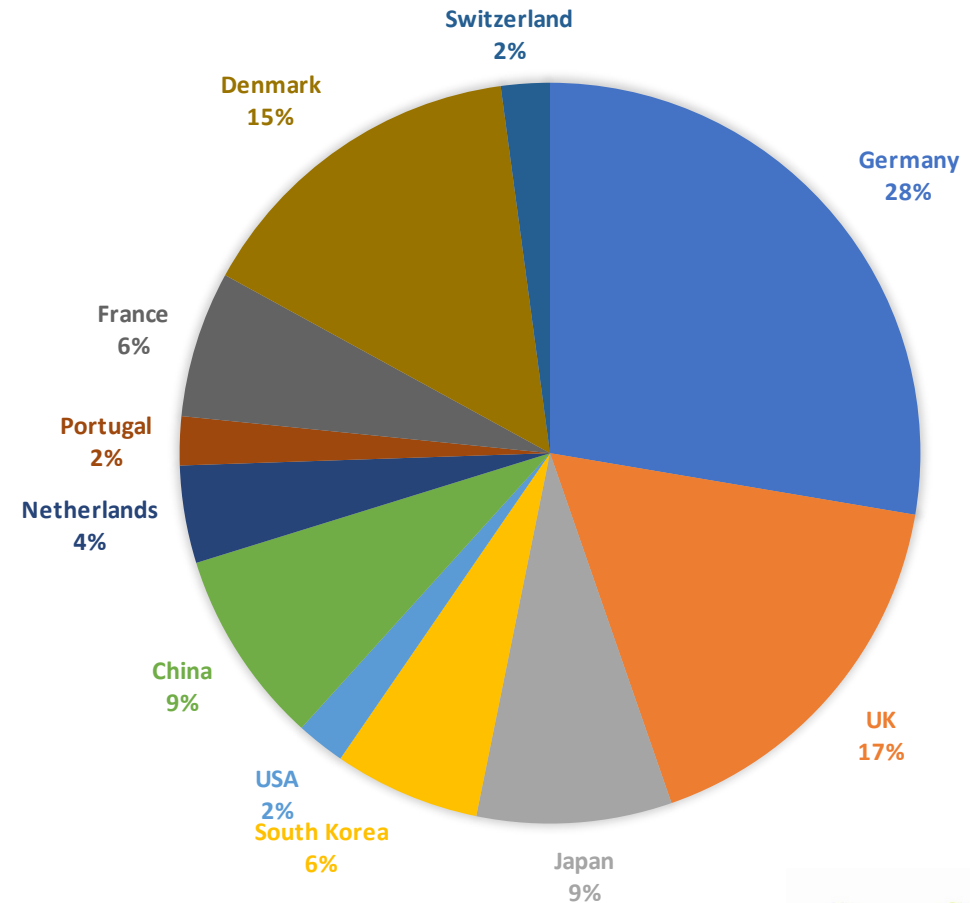# Session 1: Scanning Lidar Recommended Practice

What is it?

- A descriptive guide to enable the use of scanning lidars for different wind energy use cases

Who is taking part?

Who are we?

- WG6 has 48 participants from 11 countries

- Confirms level of interest in the technology

- Confirms need for clear guidance

- Mix of consultants, manufacturers, Research Institutes and Developers.

Pie chart of participants by country: Switzerland 2%, Germany 28%, UK 17%, Japan 9%, South Korea 6%, USA 2%, China 9%, Netherlands 4%, Portugal 2%, France 6%, Denmark 15%

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Oem involvement…..

<u>Technology</u>

- The purpose of the RP is to open Scanning lidar – OEM engagement
  - Vaisala (France), Lumibird (France), Leice (China), Leonardo Systems (Germany)
- Is the evidence base for each system equally as strong?
- Use cases to examine both single and dual scanning examples.

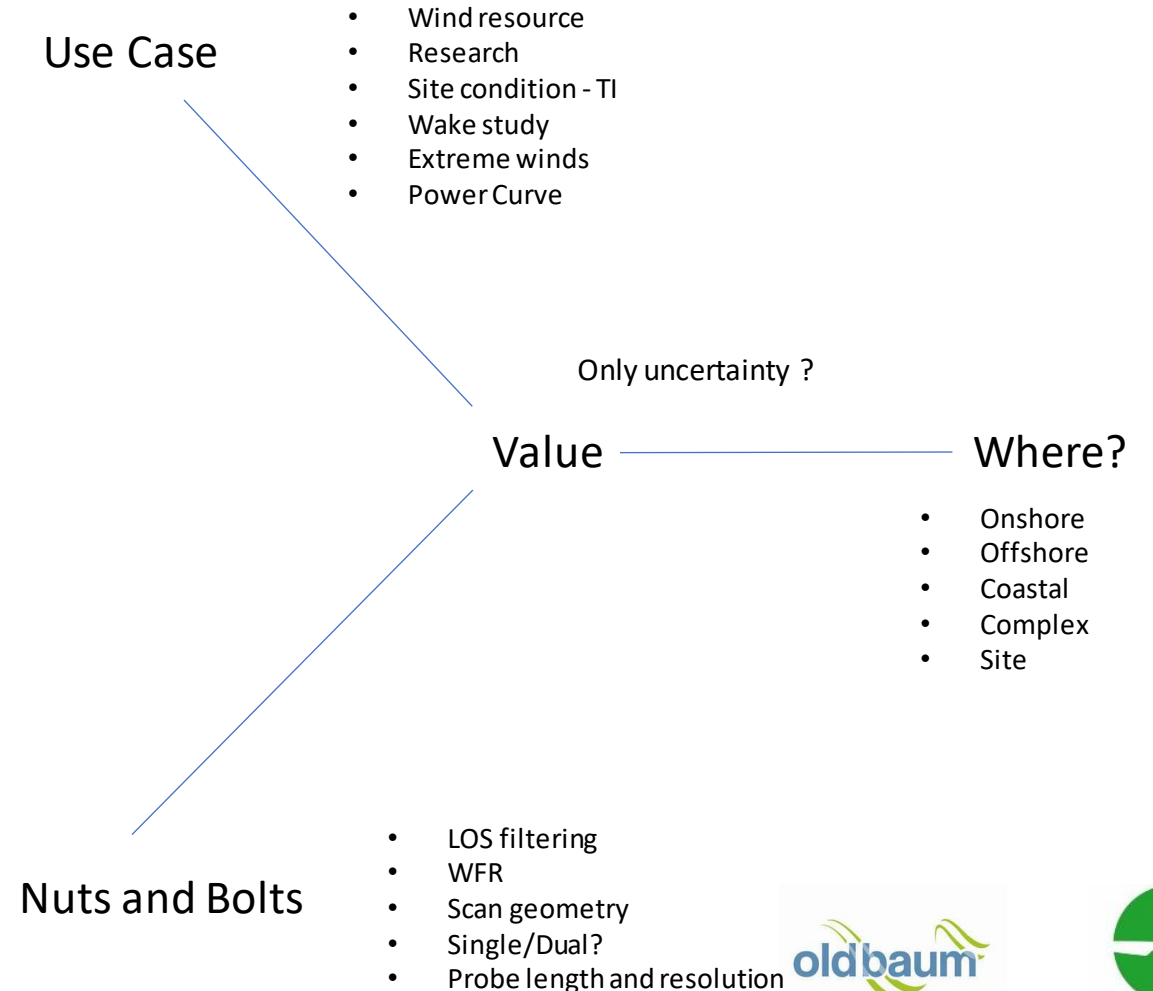Leonardo

Vaisala

Lumibird
Halophotonics
Galion

Leice

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Consider the end-user

Drivers

- In Recommended practices we always need to remember the end user
- End users justify use of SL through understanding the value
- End users need to understand how to setup a scanning lidar
- Are these settings correct for each location?
- Are these settings valid for each use case?

Use Case
- Wind resource
- Research
- Site condition - TI
- Wake study
- Extreme winds
- Power Curve

Only uncertainty ?

Value —— Where?
- Onshore
- Offshore
- Coastal
- Complex
- Site

Nuts and Bolts
- LOS filtering
- WFR
- Scan geometry
- Single/Dual?
- Probe length and resolution

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Soooo what have we been up to?

The last 12 months

Ensure a framework exists to align pre-normative and normative guidelines for Scanning Lidar

The big one

Workshop Objectives

- Greater understanding of the role of scanning lidar for site condition use case.

- Understand challenges from practical experiences with respect to scan head alignment and using the guidelines

- How do the IEC, IEA and NEDO documents work together?

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- How do the IEC, IEA and NEDO documents work together?

Do different markets have different experiences?

- Clearly they do……..
- What drives this?
- Do we have conflicting guidance already?
- Or are these use case specific?

Some examples

Differences already in drafts – Single scanning lidar

- TCT PC measurement 40-90 degrees sector scan
- NEDO guidelines 30 – 60 degrees sector scan
- TCT PC scan head rate – 1deg/sec and 2 deg/sec – 1Hz acquisition time
- NEDO discusses 3deg/sec – 1/3rd Hz acquisition time
- Circa 1km HTT NEDO; not specified in TCT – if not near coast?

What is key to a robust recommended practice?

Evidence
Accessibility

Gaps in guidance – need more evidence

- Single Scanning
  - Single Scanning Lidar – WRA only? Can we challenge this?
  - Far shore – 10km – single scanning and flow homogeneity
  - Single scanning : TCT document uses rejection on LOS variation from cosine reconstruction – but does this lose good information? What if different recon method?
  - Can we use single SL for TI?
- Data recovery and rejection at range - more than CNR?
- Wind shear – number of elevations vs scan angle vs no of 10min pts
- Method of cleaning LOS?
- 10km……..
- And there is more

Gaps in guidance – need more evidence

- Method of comparison TI
- Triple SL (TSL) – value case?
- Limits on number of data reconstruction points
- Maturity of guidance
- Can we talk about data availability? MEASNET availability refers to wind speed – is it valid for std dev?
- Gap filling and assessment of uncertainty
  - Methods for both 10-minute and standard deviation
- Probe length (50m/25m) impact on TI versus availability and sensitivity

Gaps – Questions raised

- Do all KPIs transfer
- Do all tests transfer from test site to campaign site.
- Gap filling
  - Data availability – 95% for std dev?
  - Gap filling for std dev is MCP still valid at this scale?
  - Bias correction
- Hard target methods
- Single versus Dual
- No of points – geometry issue

Addressing the Gaps – SL Challenges

- Series of Challenge exercises to capture user experience &
- For each identified "Gap" or proposed change to published setup
  - The gap is defined and a scope is drawn up
  - A gap can be identified by a user wanting clarification, or who has obtained different results
  - All participants are invited to examine their datasets for data that matches the scope
  - For each exercise the results are collated and discussed at the next workshop
  - The aim is to have 4-6 such exercises with the results form each assessed and put forward for publication.

Outlook – The next 12 months

- Expected kick-off IEC 61400-50-5

- Two Challenges

- Appointment of Chapter leads

- Actually write something……..

Still on schedule….(roughly)