



Aerial Methane Measurement

Peter Evans, on behalf of the OEUK AMM Task Finish Group

(bp, Bumi Armada, CNOOC, EnQuest, Equinor, Harbour, Ithaca, OEUK, Petrofac, NEO NEXT, Serica, Shell, TAQA, TotalEnergies)

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Aerial Methane Measurements: Drivers and Challenges

Voluntary programmes are transitioning to regulatory requirements

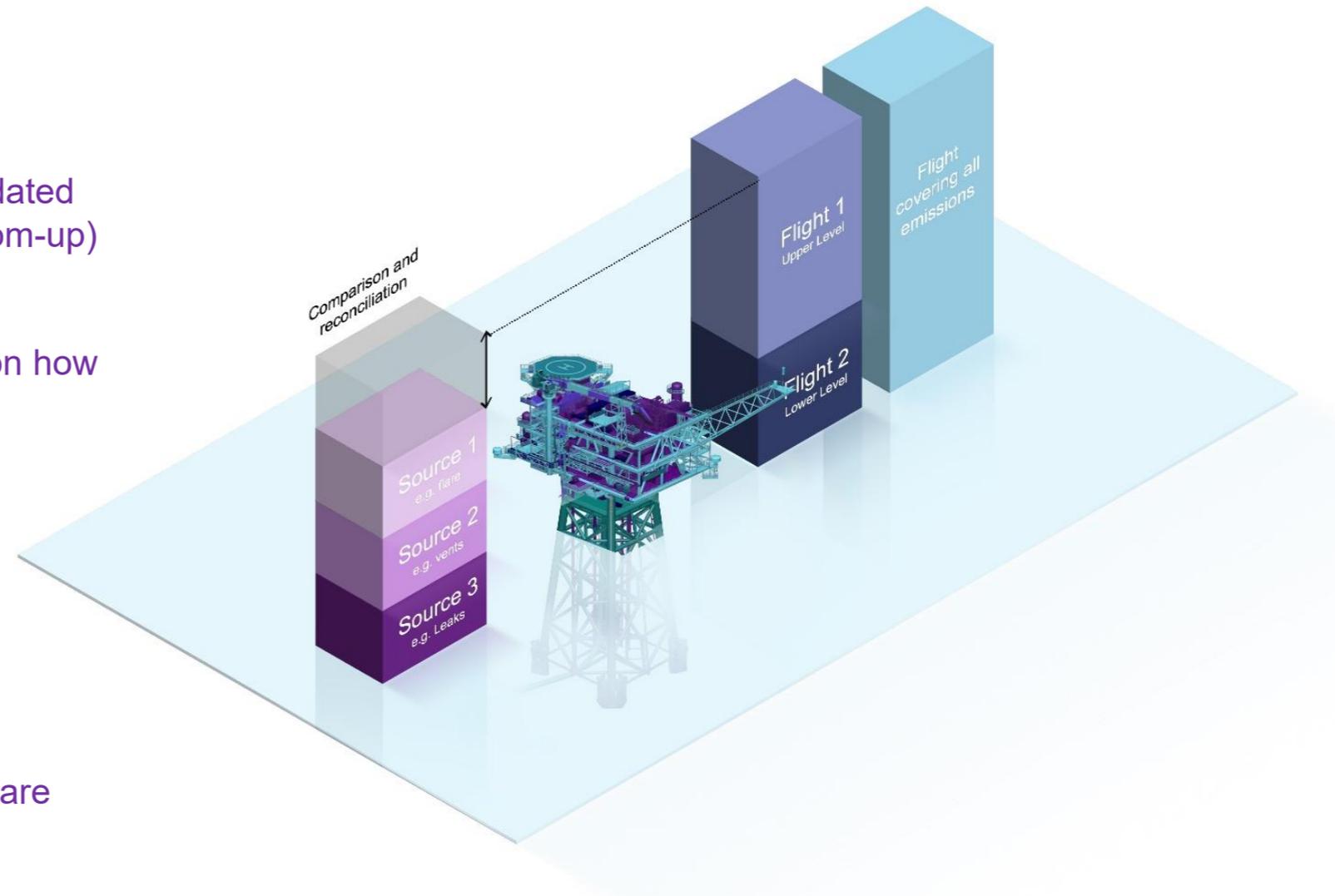
Site level (Top-Down) measurements are being mandated as a test of aggregated source-level emissions (Bottom-up) completeness and accuracy

But this is a nascent technology, with little guidance on how to deliver consistent, trusted results

Phase 1:

- Improve estimation of bottom-up uncertainty
- Improve understanding of the repeatability
- Improve estimation of top-down uncertainty
- **Develop guidance for top-down methods**

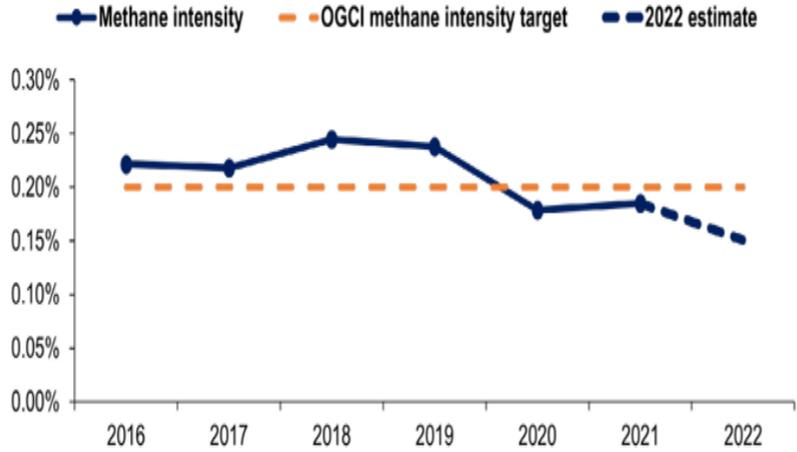
Offshore focus is drone technology, but many issues are common to alternatives e.g. satellites



Developing guidance



Figure 12: Upstream oil and gas methane intensity per year, 2016 to 2022 (source: DESNZ and NAEI)



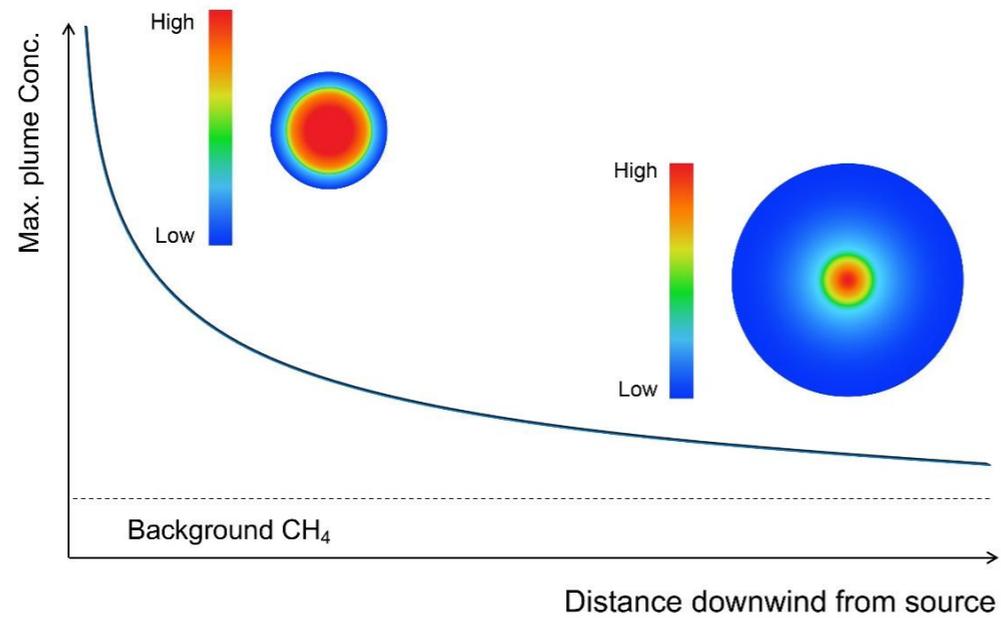
Key processes for trusted results

- ✓ Be as transparent as possible
- ✓ Operate with consistent methods
- ✓ Set clear boundary conditions
- ✓ Prove performance with independent evidence
- ✓ Work to available quality systems
- ✓ Fast turnaround of results



Instrumentation

- ✓ Performance of the instrument as part of a method
- ✓ Wind speed measurement is equally important

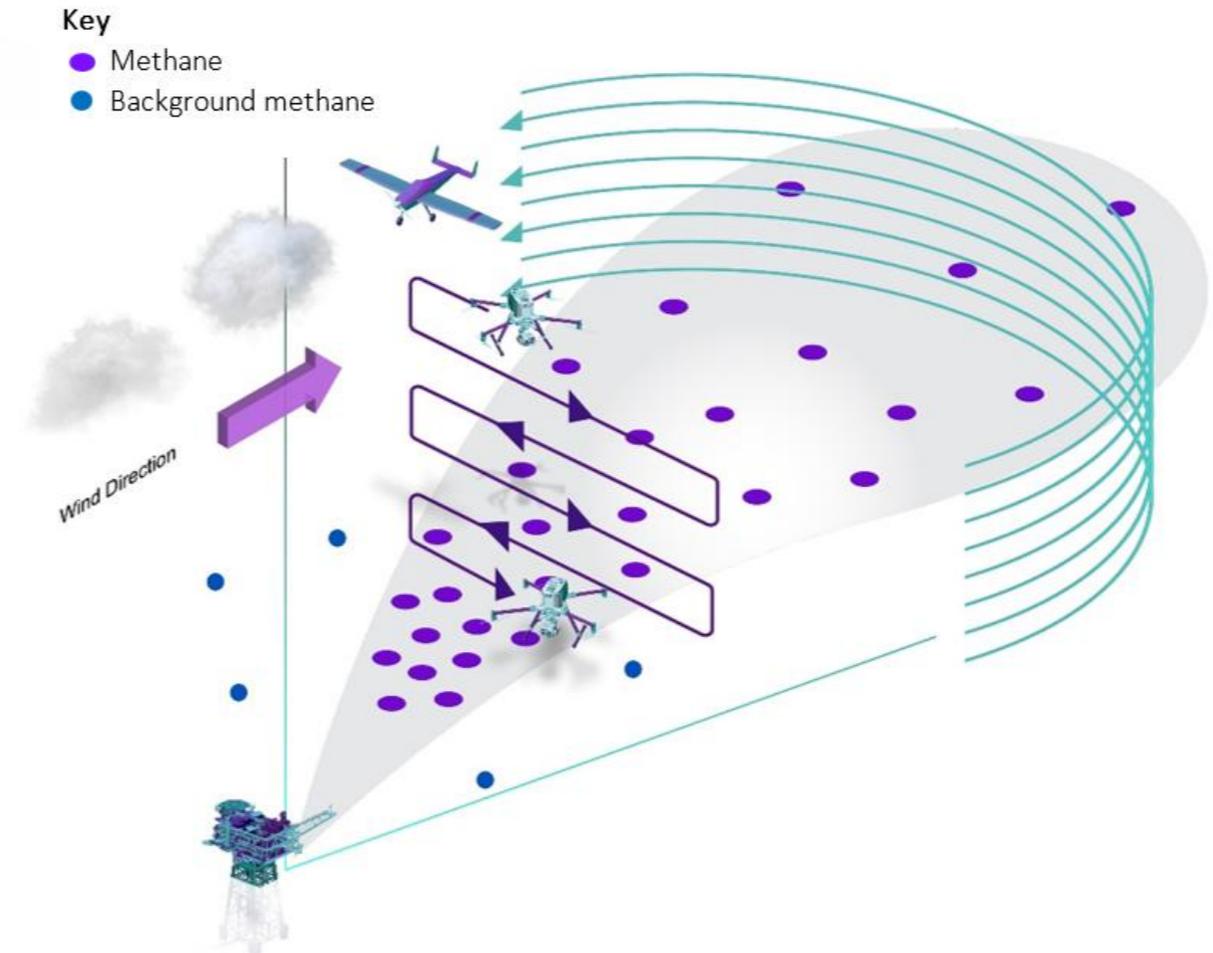


- ✓ Maintain equipment
- ✓ Additional data



Drone provision and standard flight procedures

- ✓ Training for drone providers
 - Stage 1 – Onshore
 - Stage 2 – Accompanied offshore
- ✓ Clear requirements from end user
- ✓ Align aerial methane methodology with wider company policies and procedures for the safe and effective use of drones
- ✓ vendor sets clear boundaries for workable weather
- ✓ Set clear procedures for the positioning of flights
- ✓ make sure that major plumes are not split between flights
- ✓ Establish a clear plan for the number of flights and steps

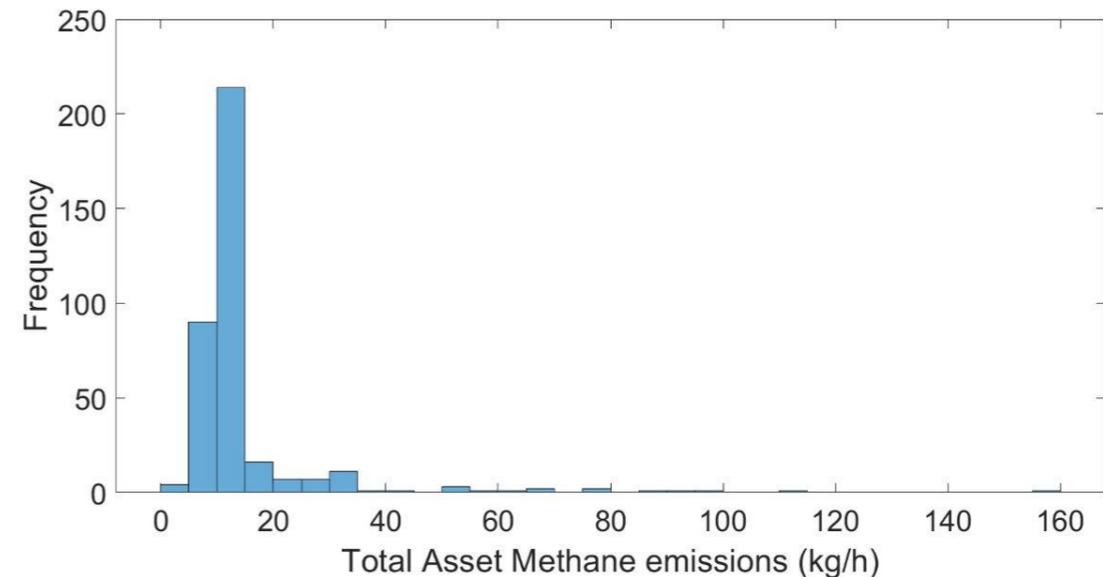


Taking measurements, processing data

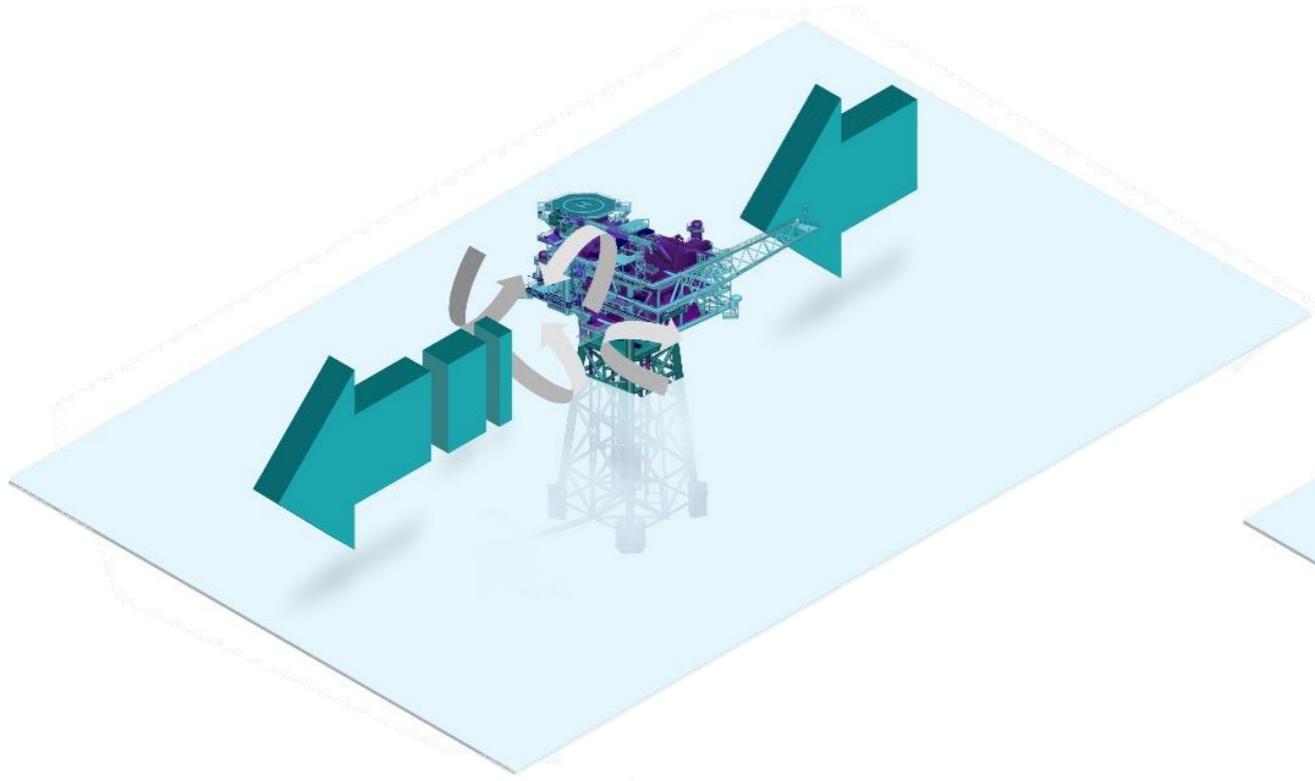
- ✓ Communicate with facility at all stages of planning and execution
- ✓ keep the facility as stable as possible during the measurement window
- ✓ conduct test flights
- ✓ Take steps to assess data quality before the flight crew leave the field
- ✓ Provide a clear limit of detection (LOD)
- ✓ Provide a clear estimate of limit of quantitation (LOQ)

Typical challenges:

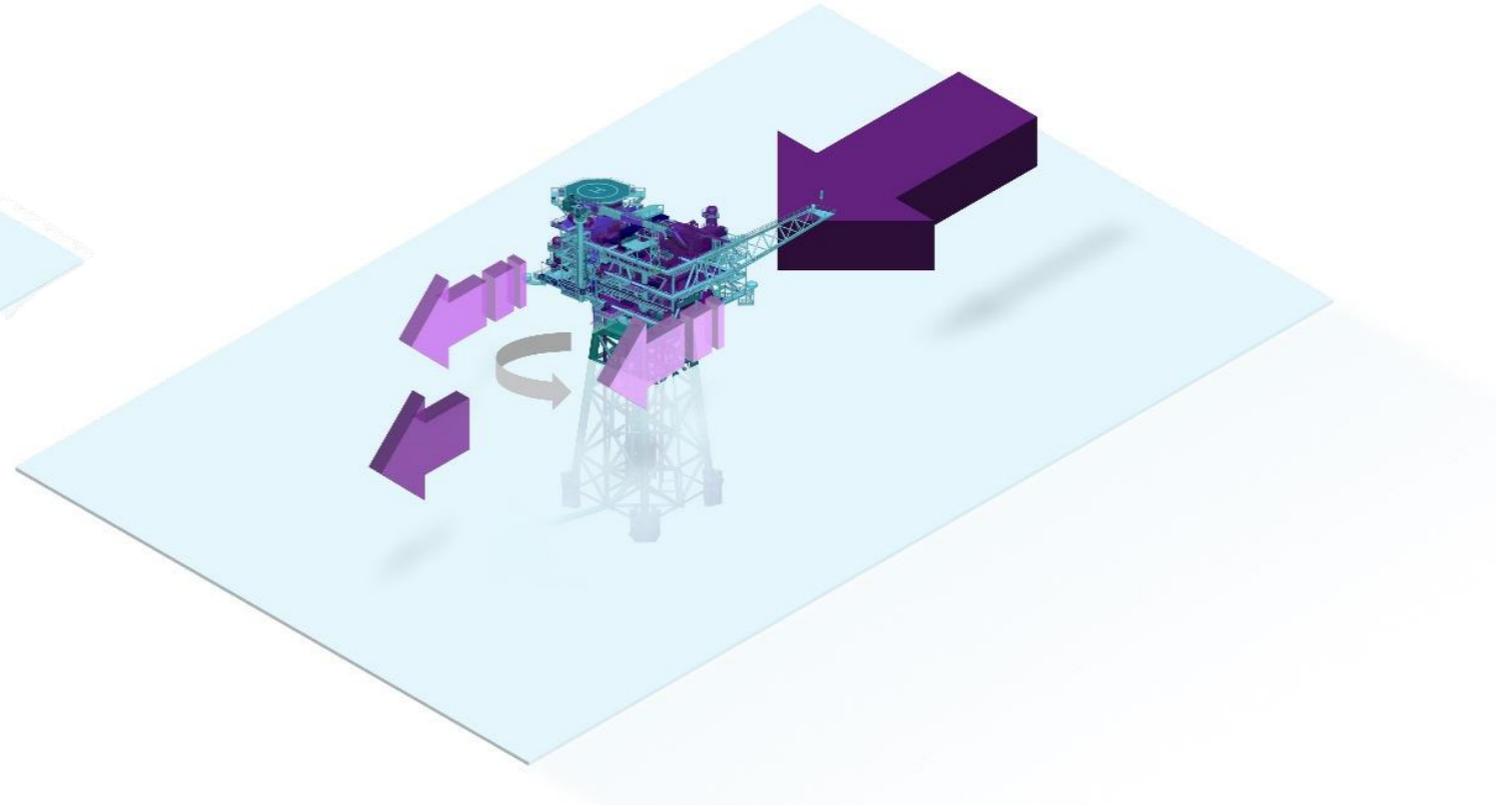
- Adverse weather
- Unpredictable wind direction and speed
- High altitude emissions
- Variable and intermittent sources
- Large emission ranges
- Short time windows for measurement
- Partial plumes



Turbulence and wake effects



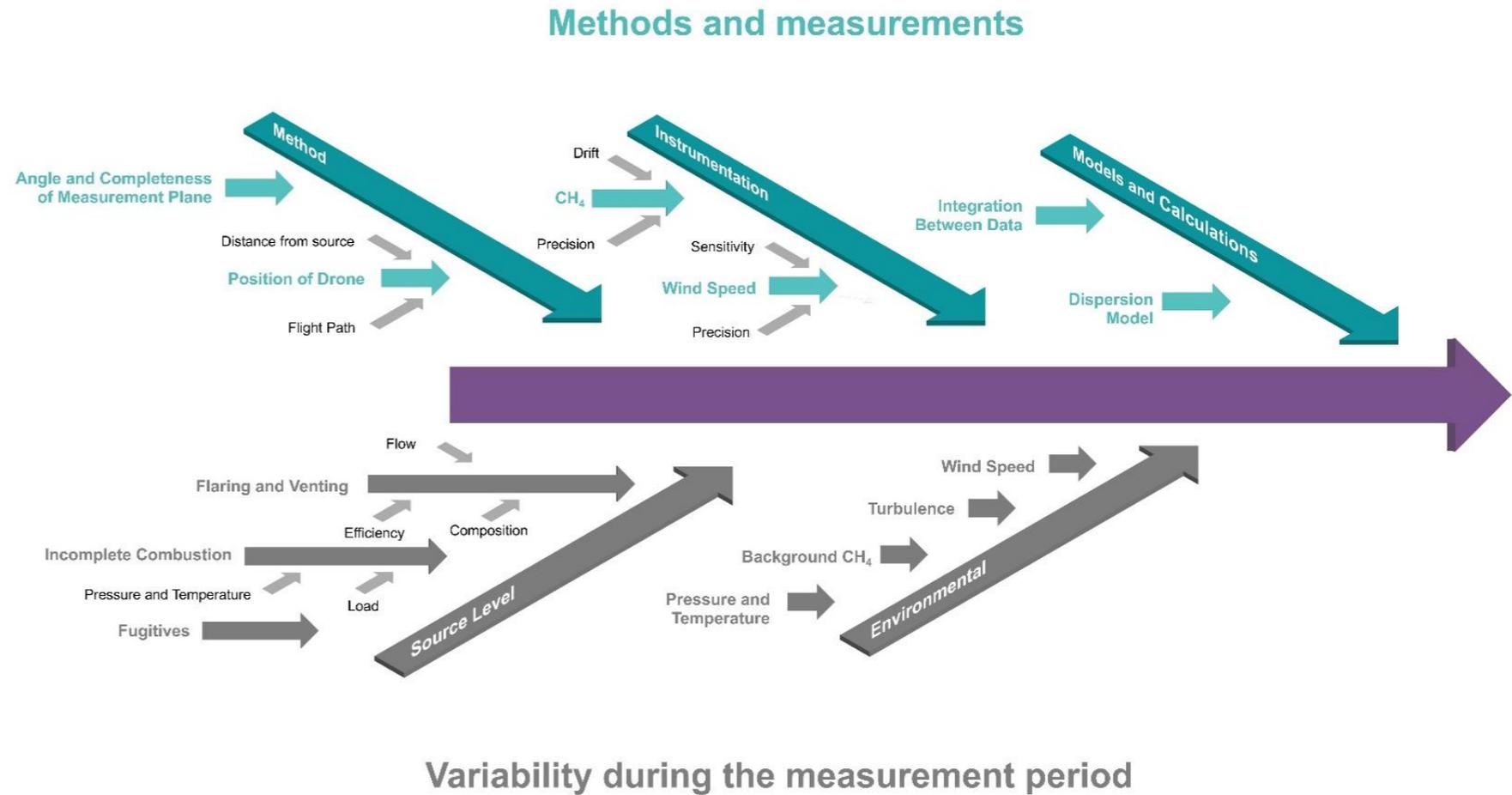
Disruption to flow created by complex structures



Low windspeeds in the Lee of the facility

Uncertainty

- ✓ Provide a specific uncertainty estimate
- ✓ Document how uncertainty is derived
- ✓ Uncertainty can be informed by controlled release experiments, but these rarely reflect the full complexity of real field measurements
- ✓ Time match source and site level data
- ✓ Establish a process of continuous improvement, learning from previous measurement campaigns



Download the guideline here:



Thank you to
all those
involved in
developing the
guideline