



## Overview of Innovative Technologies & Portfolio Performance Improvements

Data driven asset management

For better energy projects

Our track record  
of assignments

+200

Offshore  
projects



+1300

Onshore  
projects

+140

Solar PV  
projects

# Overview of various innovative technologies in O&M



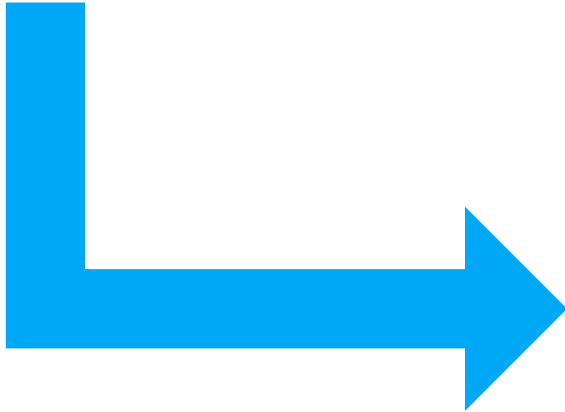
Technology	Comments
Blade Drone Inspections	Reduction of the H&S risk/Current technology can identify hair thin cracks.
Ice Detection Sensors	Depending on location and weather conditions
Condition Monitoring System (CMS)	Assist with preventive maintenance
ISpin	Depending on yaw misalignment

# Key Findings of Performance Improvements

- The key to performance improvement is finding the opportunities first.
- A drill-down approach delivers portfolio improvements at low cost.
- We provide the full analysis chain via:
  1. Portfolio wide high level analysis;
  2. Forensic SCADA
  3. Independent measurement and IEC-61400-12-1 power curve testing.

# Q: Why do wind farms under-perform?

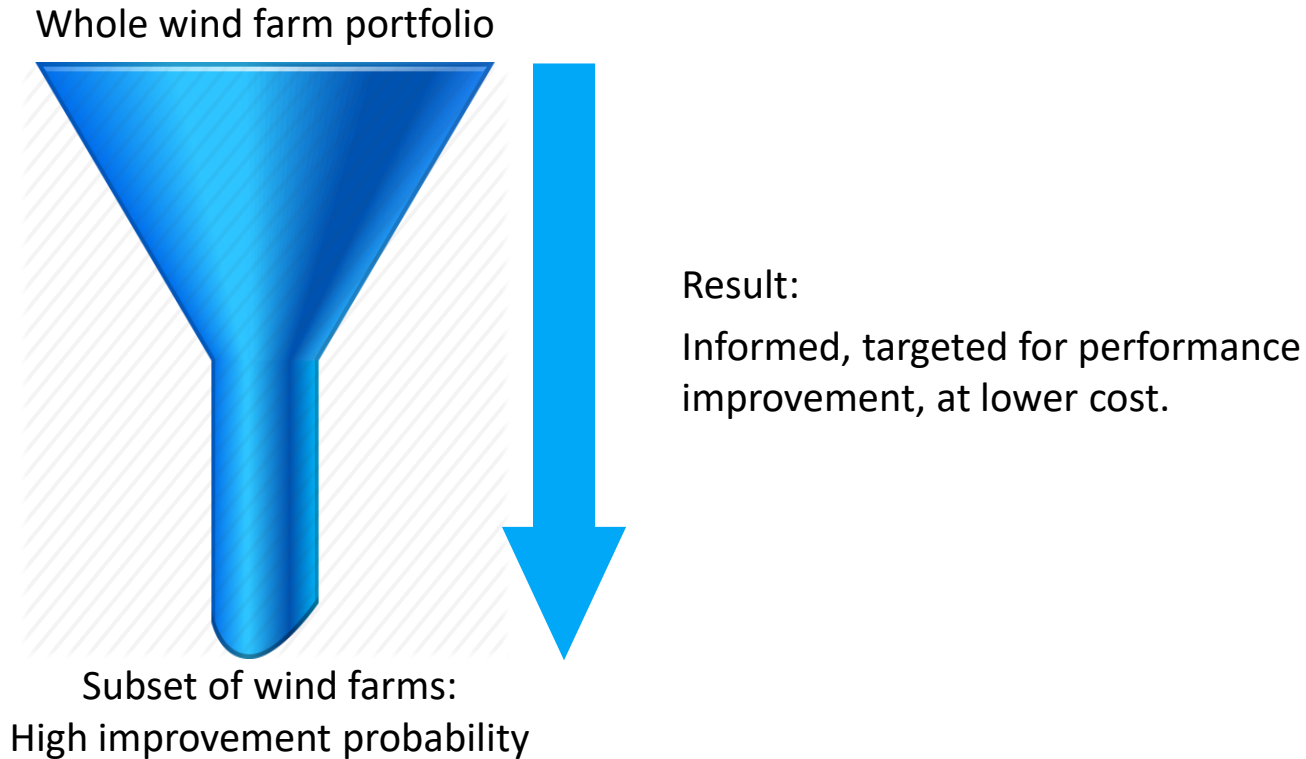
- Performance improvement costs are high, and certain.
- Outcome is usually unknown, and uncertain.



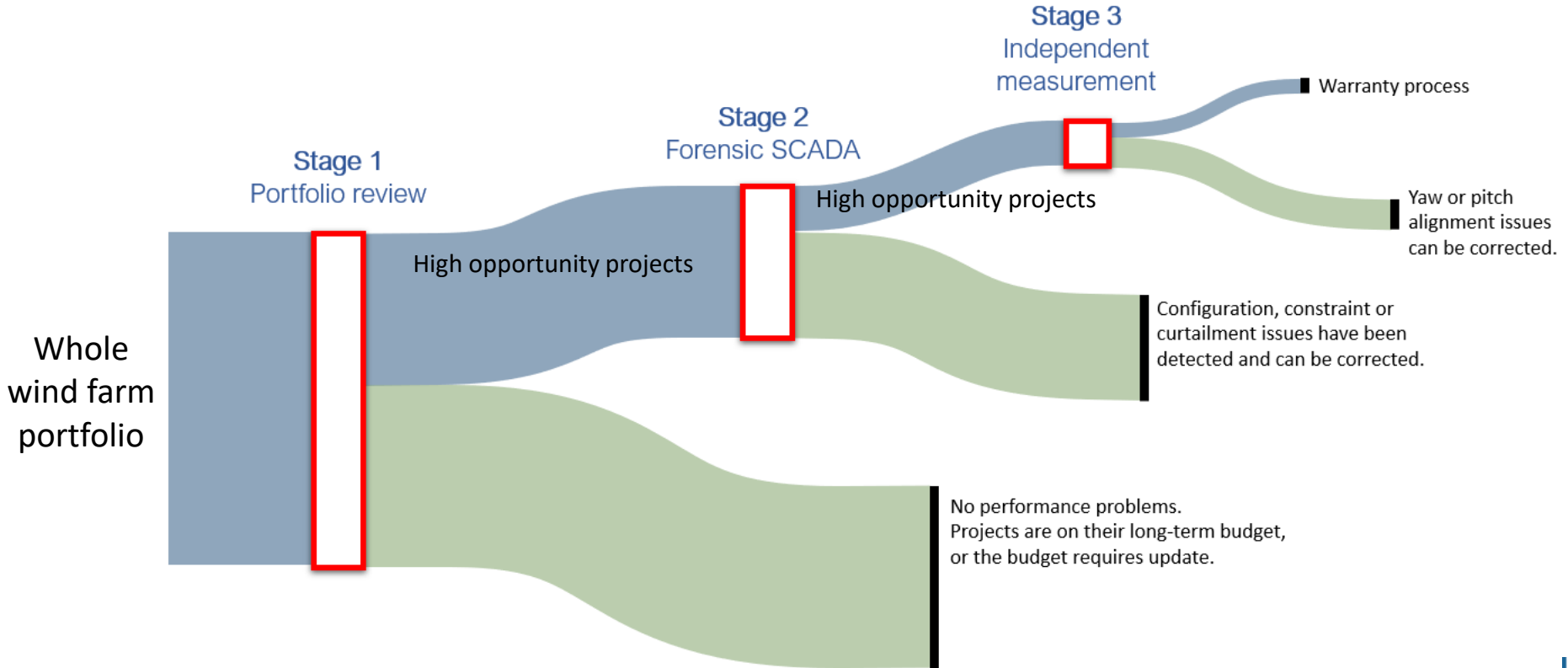
- When we analyse SCADA data:
  - Many wind farms could perform better.
  - Owners often didn't realise.

A: Largely because owners don't look – it is too expensive.

# A solution: portfolio drill-down

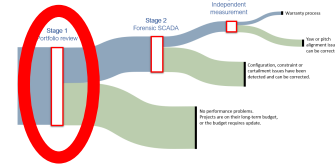


# Overview - 3 Stage drill down





# Stage 1: Portfolio review - Budget



- The first step for existing or new assets is to review the budgeted performance.
- What is it based on?
- Is it up to date?
- Has it been produced using best practice?
- Are we comparing like with like – e.g. monthly vs long-term annual?

## Outcome

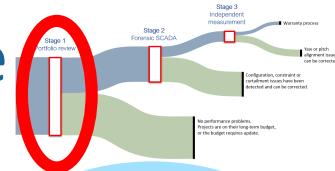
- Realistic budget yield across all projects.





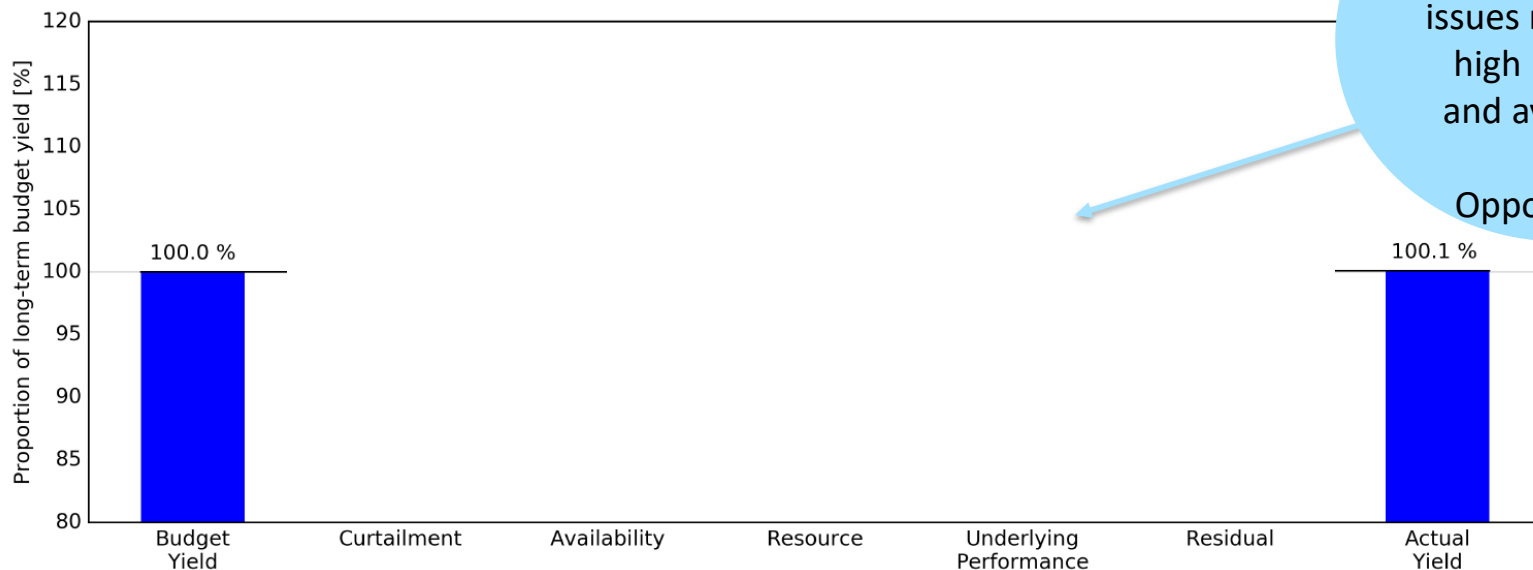
# Stage 1: Portfolio review – high level performance

- Low cost: all projects analysed.
- Budget energy simulation per month, based on global climate data.
- Comparison to monthly operator figures.

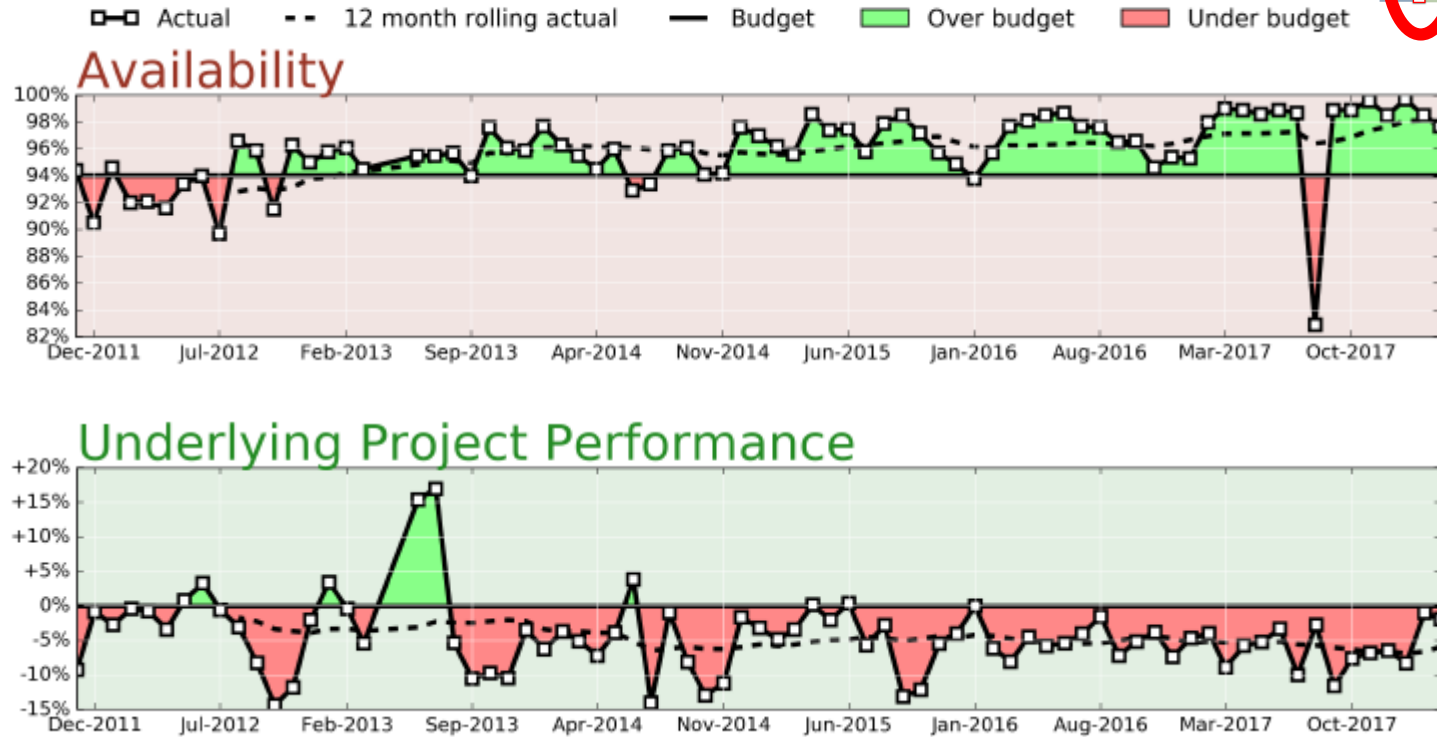
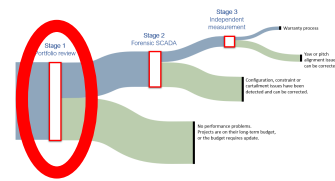


On budget, but underlying performance issues masked by high resource and availability

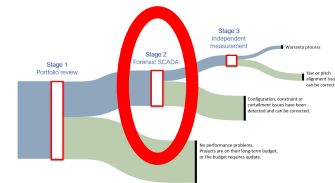
Opportunity?



# Stage 1: Portfolio review – trends analysis



# Stage 2: Forensic SCADA

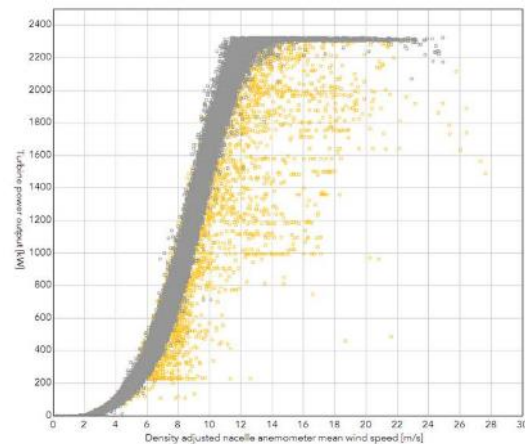
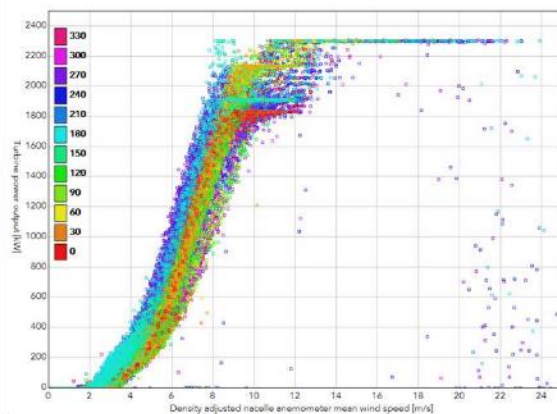
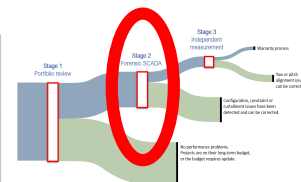
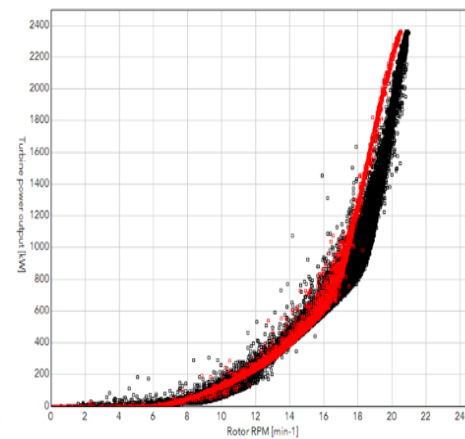
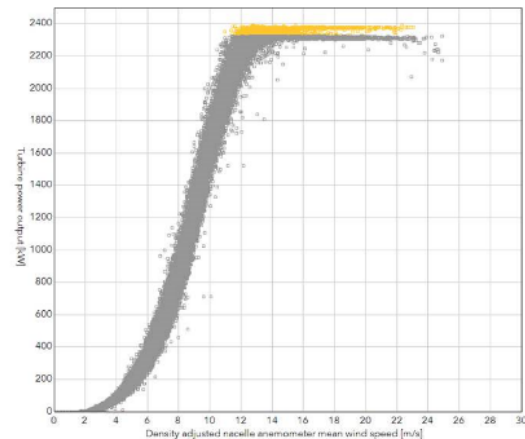
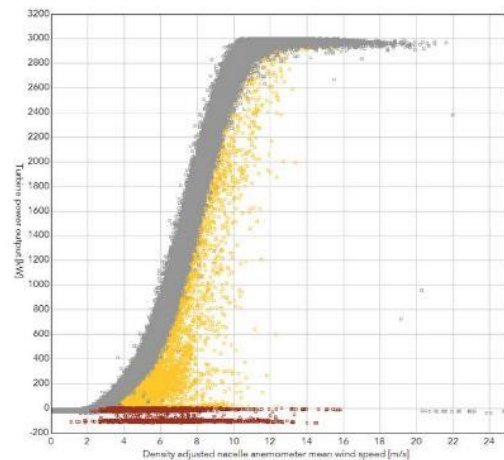


## Portfolio scope:

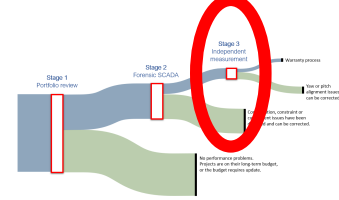
- Efficient use of Big Data to identify under-performance causes.
- Only projects with underlying performance issues from Stage 1.
- Use SCADA data to assess whether the wind farm is configured, and behaving correctly.

## Outcome:

- Often once identified, these can be rectified by the OEM/O&M provider.



# Stage 3: Independent Measurement



- Measurement equipment may be needed: LiDAR, hub devices, met masts.
- Deployment is targeted and specific though, reducing cost and time.
- Often yaw or pitch misalignment issues.

K2 Management are fully  
IEC 61400-12-1  
accredited for power  
performance  
measurement



# Thank you for your attention

## Questions?

