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**ENERGY**

# High Resolution Turbine Specific Matrix
## Practical Example

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# Background -DNV GL Proposed Data Requirements – High Res

- Individual Turbine Performance Matrixes, (similar to above), based on the raw data collected during multiple power performance tests.

  - Include standard deviation of production from warranted power curve in each WS-TI bin

  - No. points in each bin

  - Start & end date of tests, detail of measurement setup, filtering etc

  - Site location (could be approximate to maintain conf)

  - Minimum of 5 tests provided ; individual matrix for each test, and a combined matrix

  - Geographically diverse and seasonally representative spread of tests

  - Higher confidence if all individual matrices are similar ; substantial deviations will need explanation

- Aim to be used to replace consultant's own standard method, as lowest uncertainty option, with wide geographic applicability

# Can individual manufacturers differentiate themselves with turbine specific data? - Practical Considerations

- Turbine models are evolving more quickly than we can test them.
- Can we use previous generations to inform current generations?

# Example case - Data available

| Rotor size | Power Curve Revision | | |
|---|---|---|---|
| | A | B | C |
| Smallest | 1 | | |
| Medium | 2 | | |
| Large | 1 | 1 | 1 |
| Extra large | 1 | | |

7 Turbine test on the same platform, but only two tests on the same configuration!
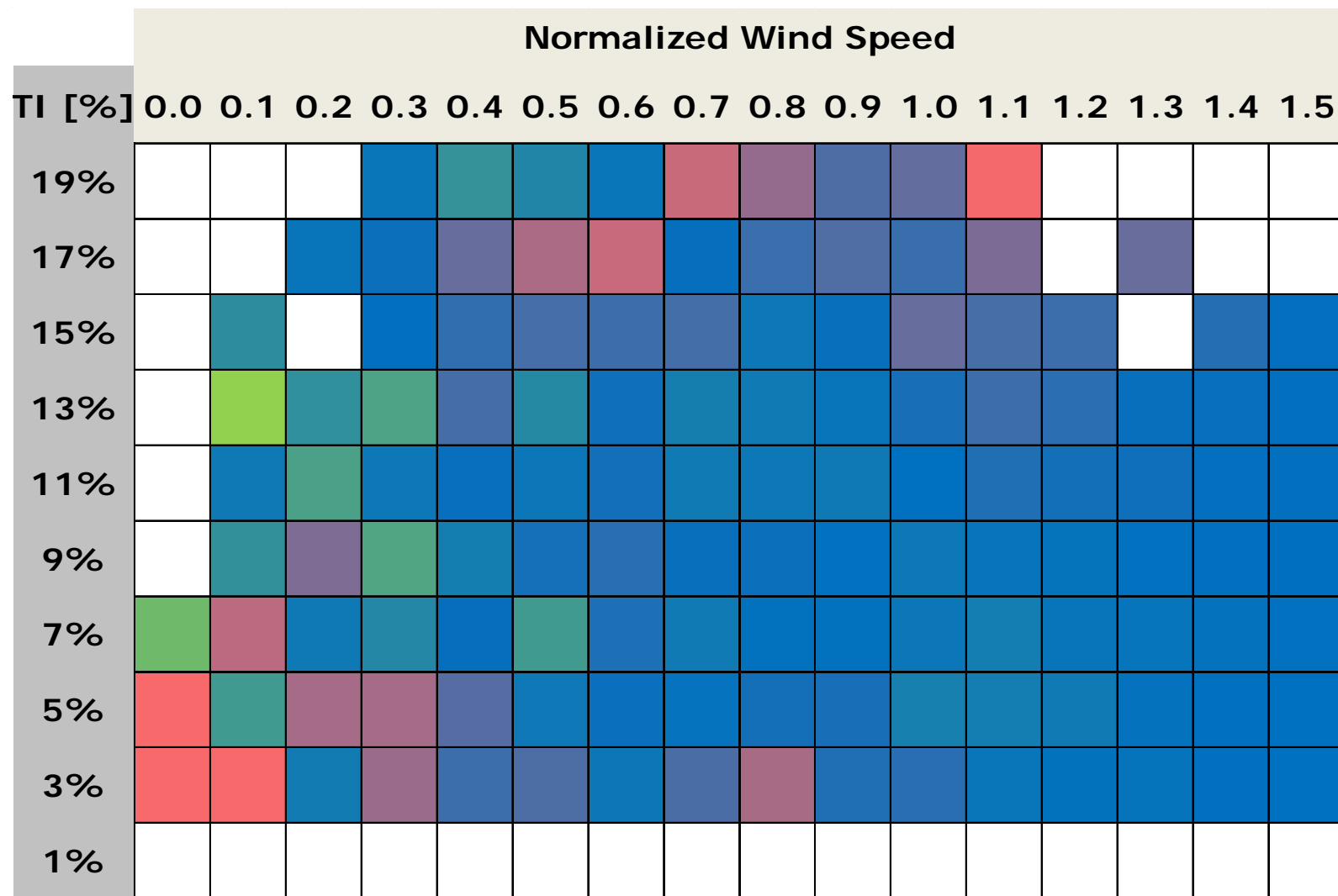
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# Additional challenges

- Minimum data requirements for IEC tests are not sufficient for developing a matrix.

- Can you compare different control algorithms and rotor diameters?
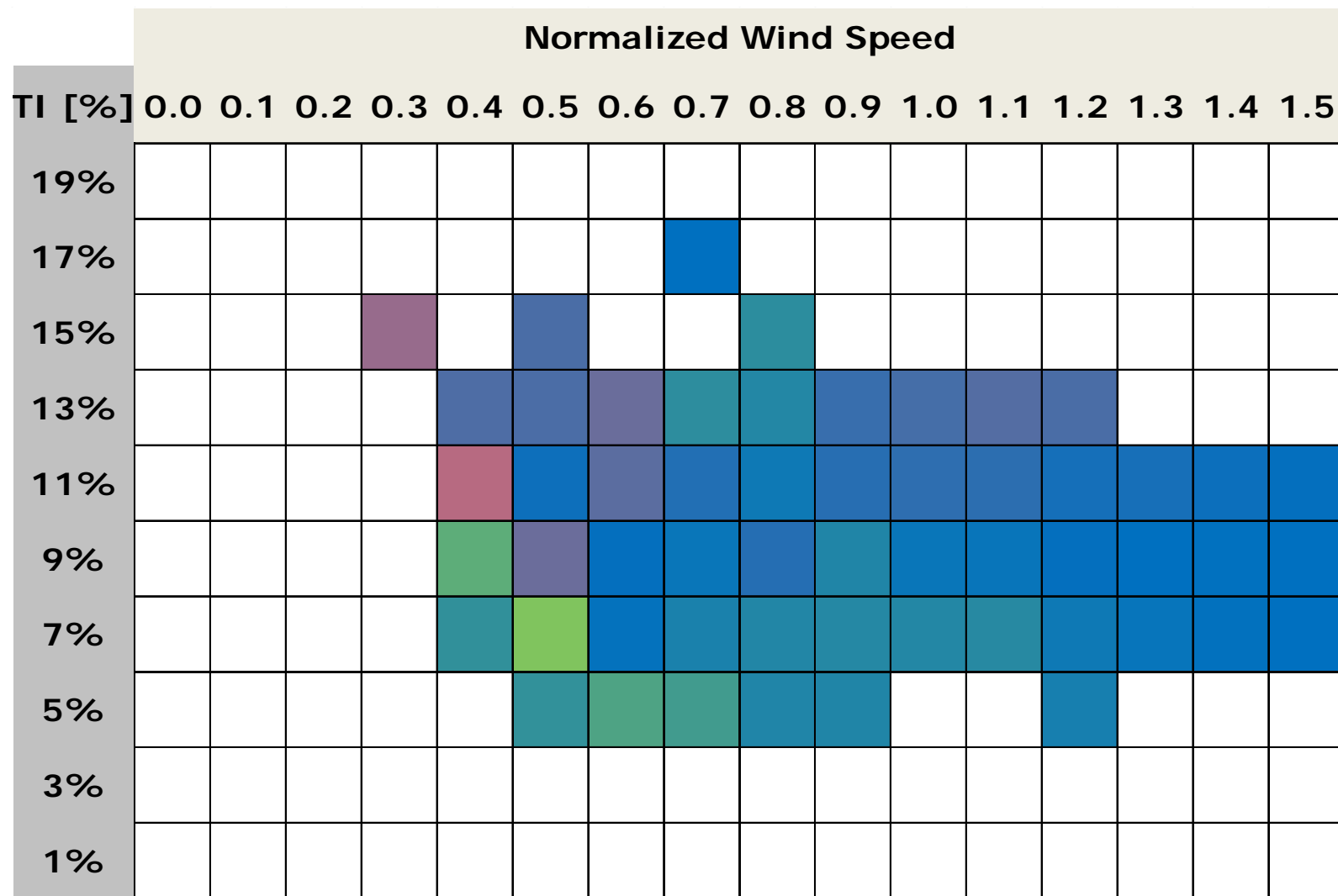
  - Normalize to Zero TI PC?
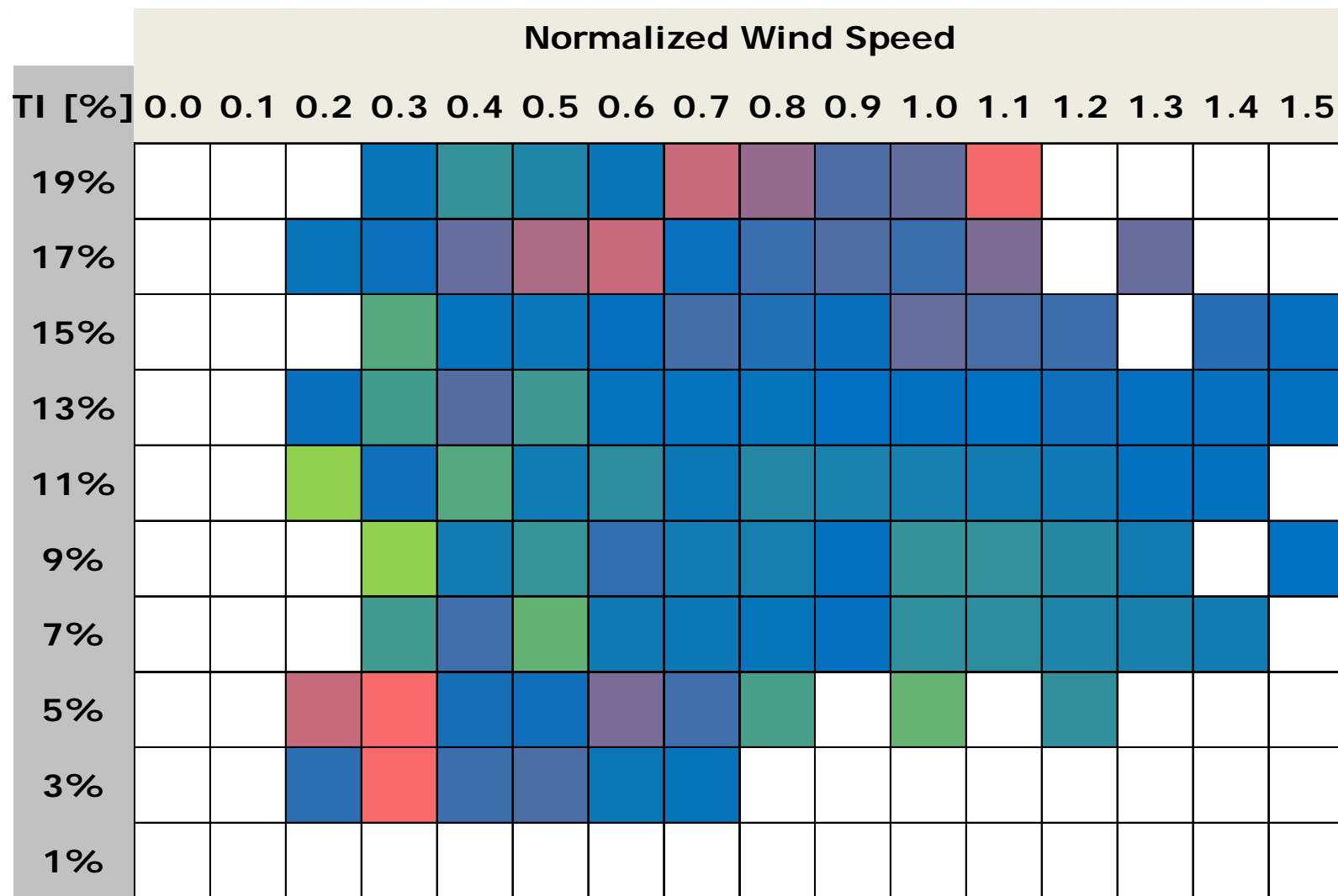
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# All data – linear fitting
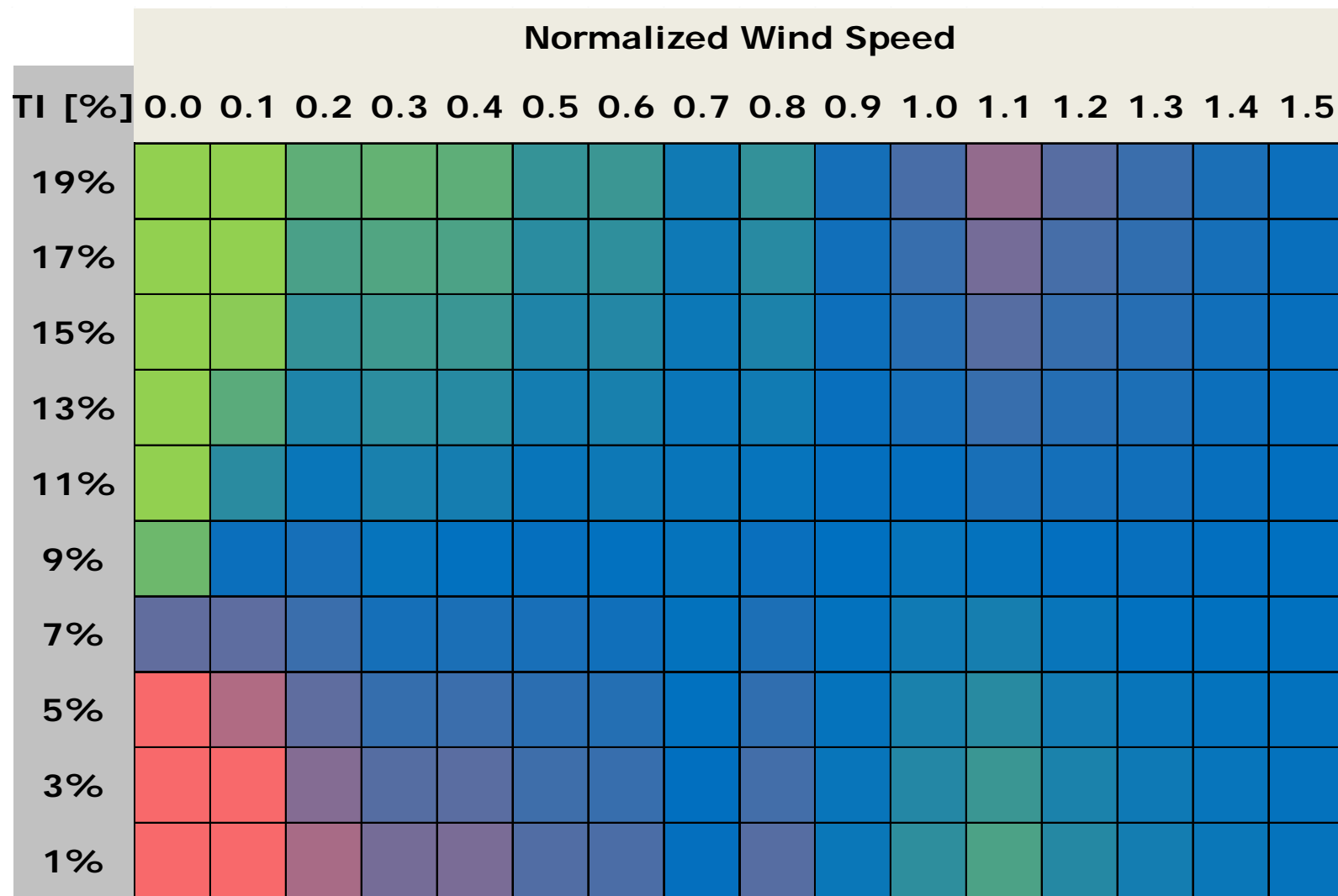
# All data – no fitting

# Test 2



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# Test 3

# Thoughts? Comments?

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