

Renewable energy

GL Garrad Hassan



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Assessing logistical constraints during offshore wind project construction - spatial management of contractors and CDM considerations

26 January 2010

GL Garrad Hassan





Contents

- CDM issues facing offshore wind construction
- GL Garrad Hassan's approach to offshore construction modelling
- Case study
- Summary



Potential CDM Issues Facing Offshore Wind Construction

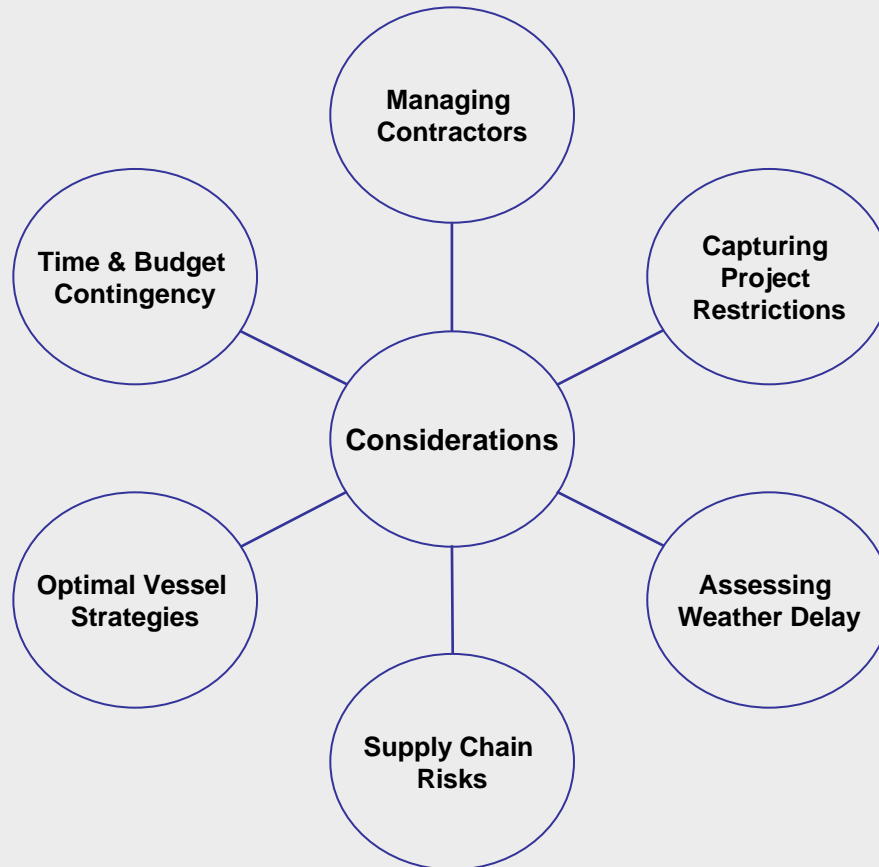
- Offshore construction is a complex undertaking!
- How do you effectively implement CDM regulations?
- How do you manage the interfaces between potentially numerous principal contractors?
- What is the most cost effective approach for a project build, whilst maintaining a safe working environment for contractors?



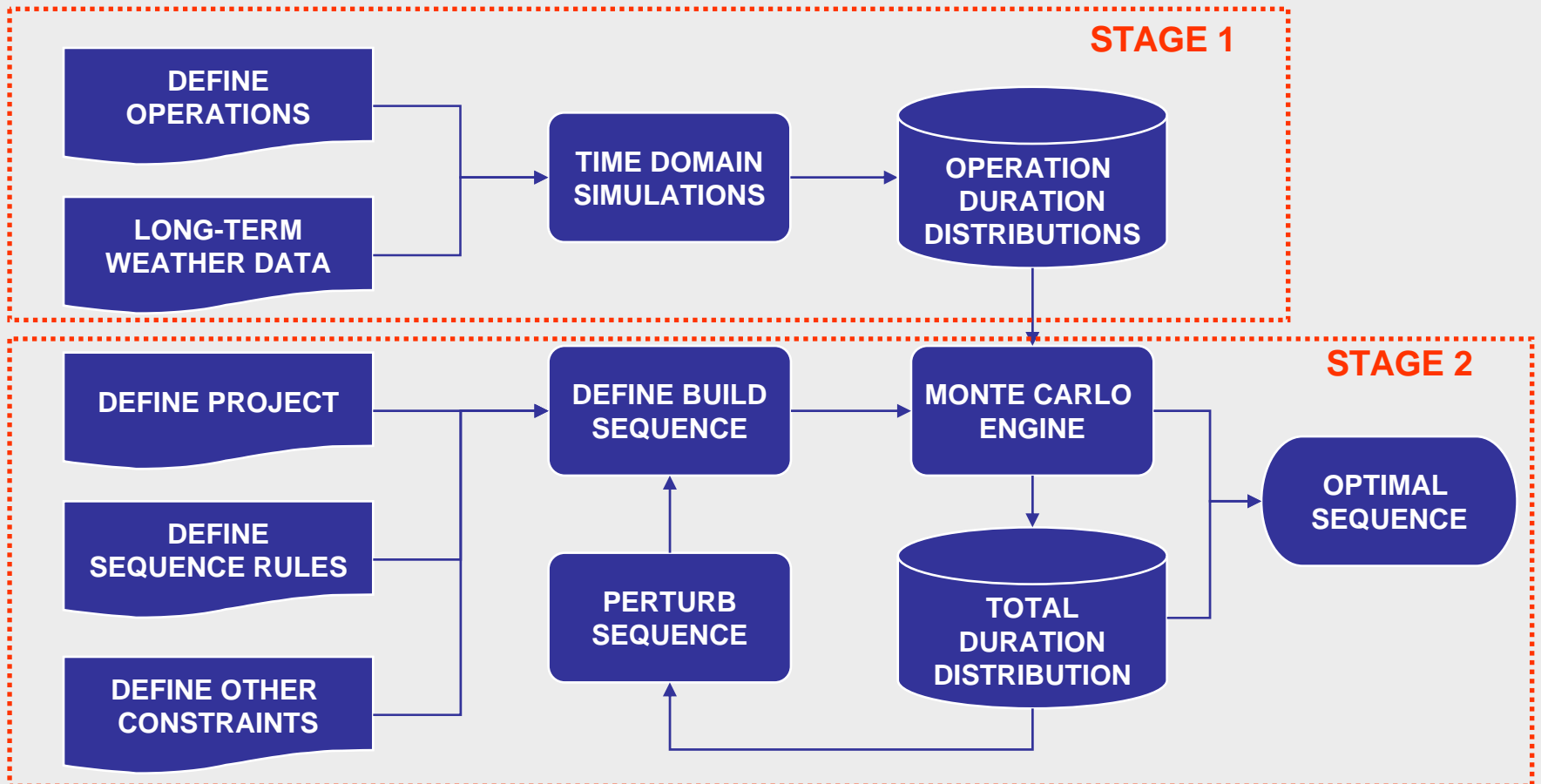
Is this the only way to plan my build?



Further Considerations for Offshore Construction

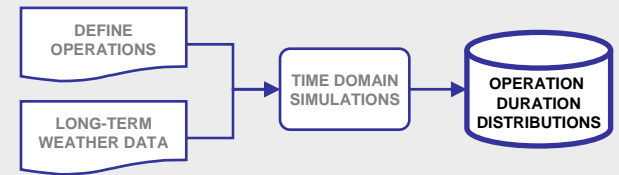


GL Garrad Hassan Approach: O2C (Optimise Offshore Construction) Model - Structure

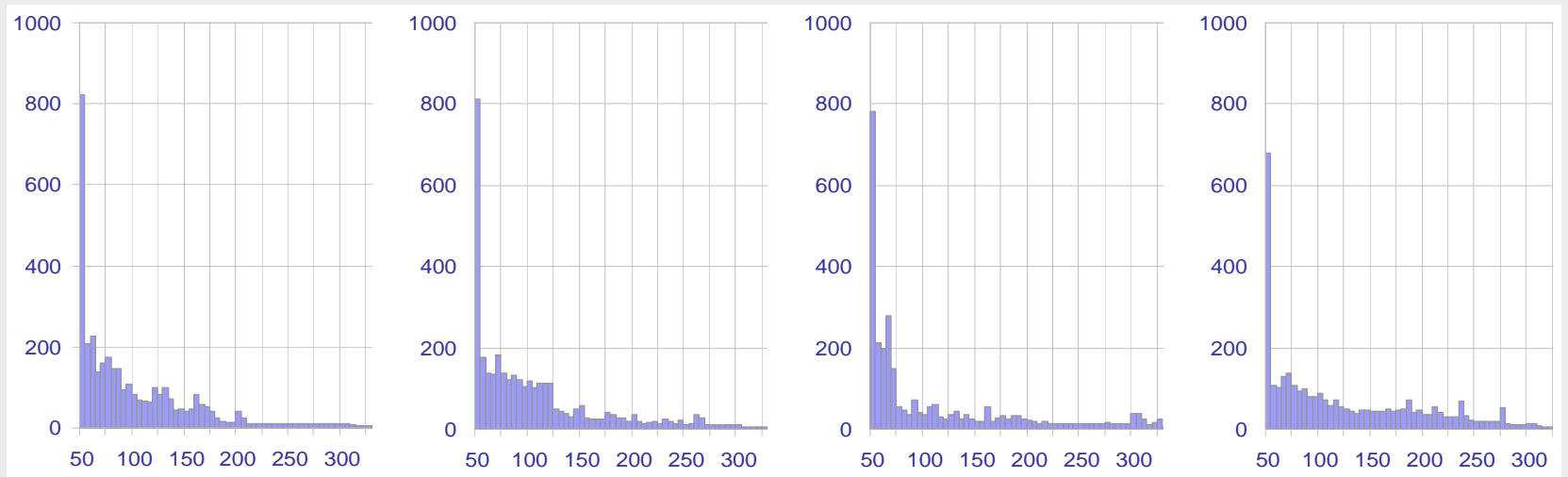




Stage 1 Outputs



Example: - Monopile Foundation Installation Duration Distributions



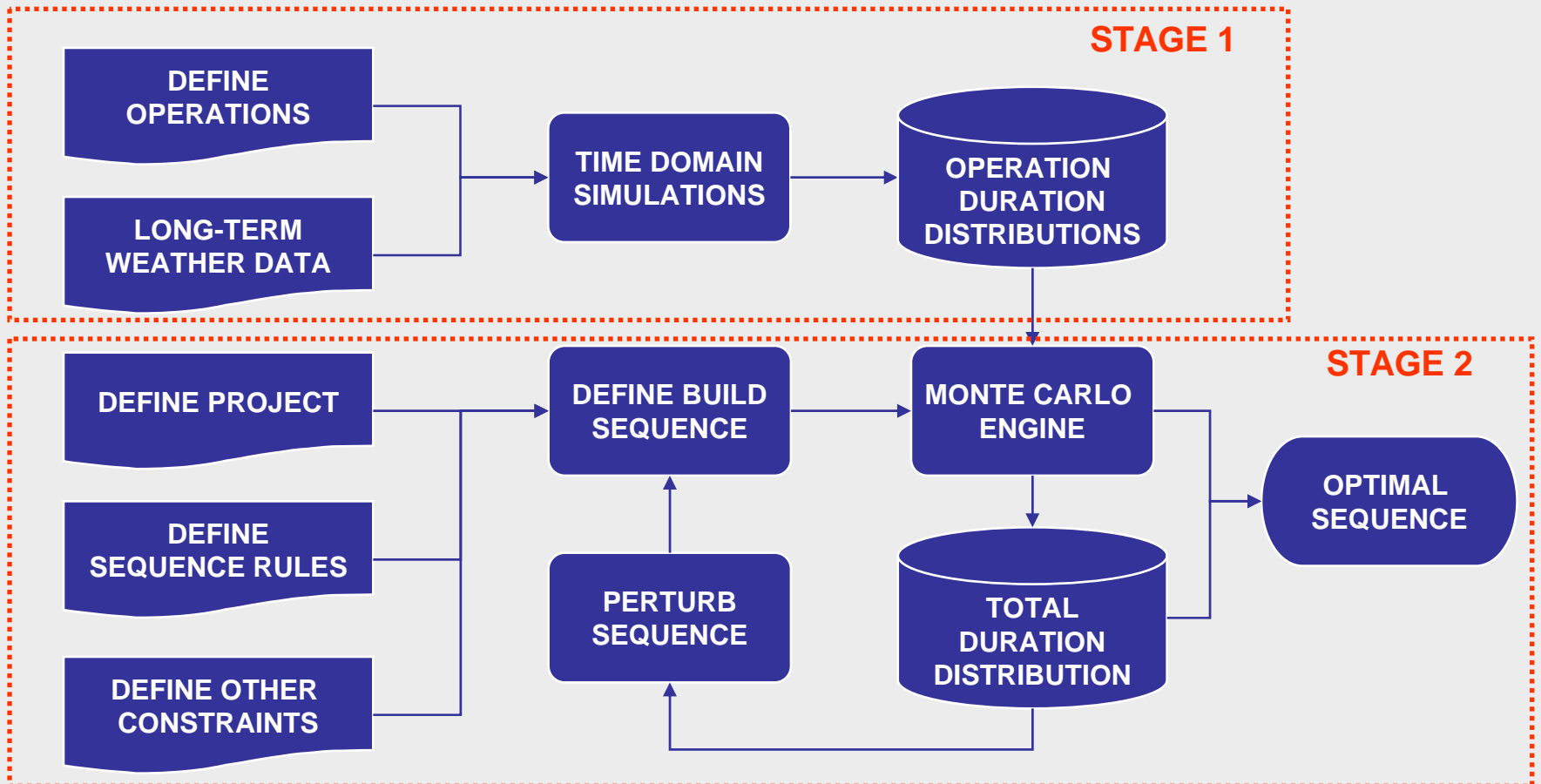
**Duration [hrs]
(March)**

**Duration [hrs]
(June)**

**Duration [hrs]
(September)**

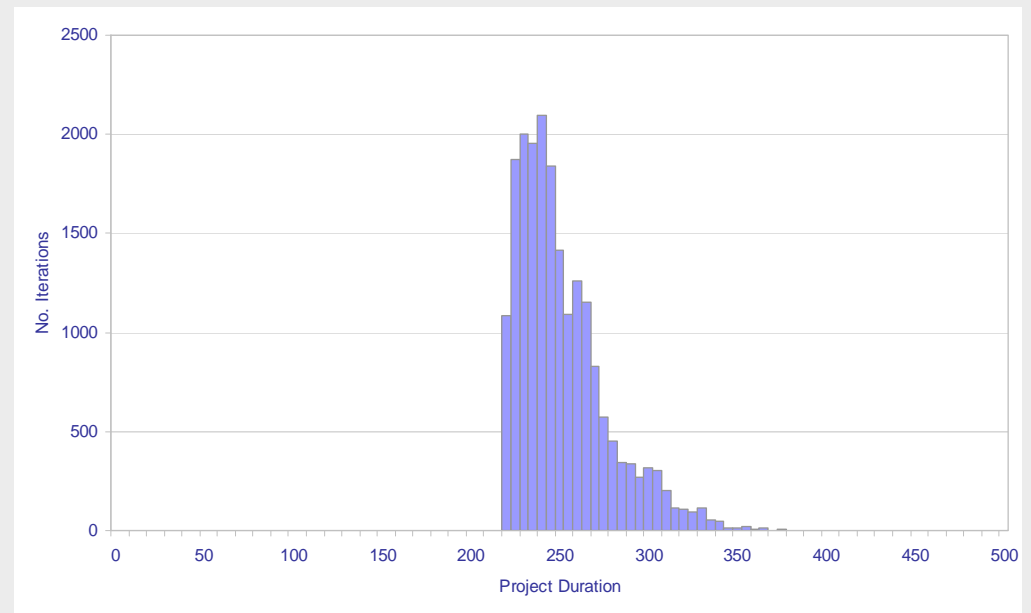
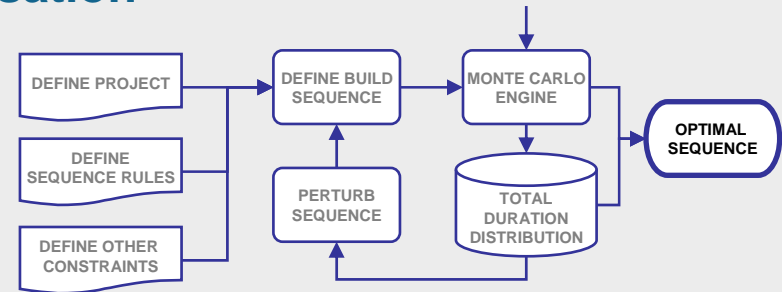
**Duration [hrs]
(January)**

GL Garrad Hassan Approach: O2C (Optimise Offshore Construction) Model - Structure



Stage 2 – Programme Modelling & Optimisation

- Project Build Duration Distribution
- For each defined activity sequence
 - Weather Downtime
 - Logistical Downtime



Total Project Build Duration Distribution



Case Study: Effectively Managing Offshore Construction (CDM)

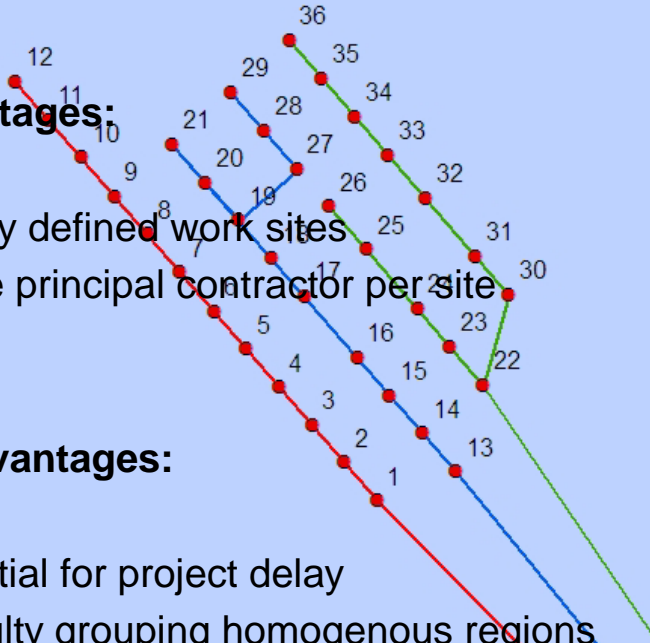
Zoned approach:

Advantages:

- Clearly defined work sites
- Single principal contractor per site

Disadvantages:

- Potential for project delay
- Difficulty grouping homogenous regions (foundation sizes etc.)



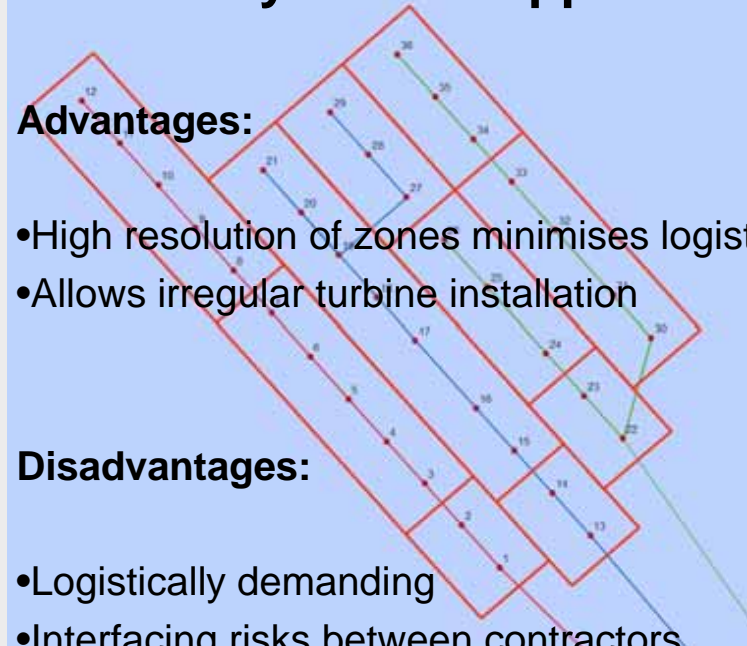
Turbine by turbine approach:

Advantages:

- High resolution of zones minimises logistic delay
- Allows irregular turbine installation

Disadvantages:

- Logistically demanding
- Interfacing risks between contractors
- Large project management role





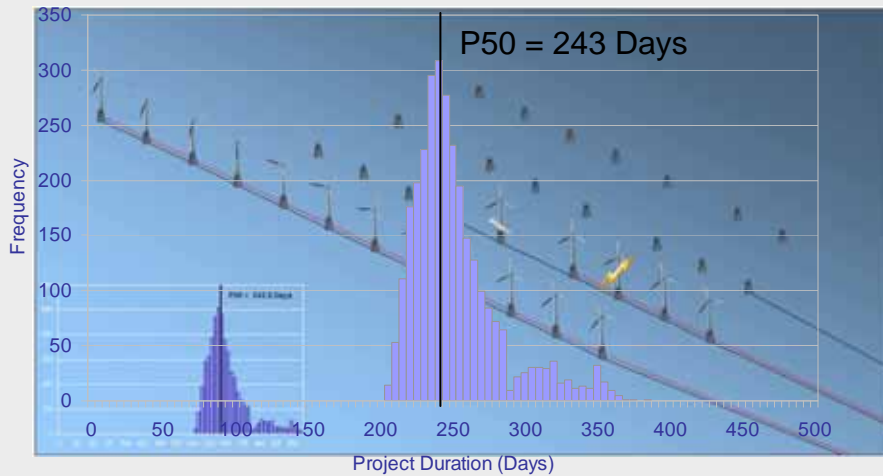
Case Study: Effectively Managing CDM Zones

Construction sequence:

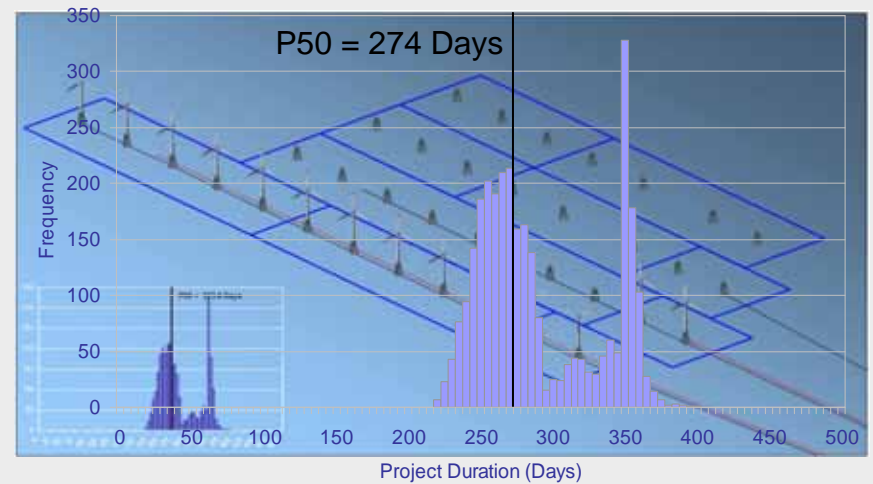
1. Foundation Installation
2. Sub-Sea Cable Installation
3. Cable Terminations
4. Wind Turbine Erection
5. Cable Testing
6. Wind Turbine Testing
7. Wind Turbine Commissioning

Case Study: Effectively Managing CDM Zones

Turbine by Turbine



Zoned



Cost benefit analysis: 'Zoned' ~ 3 % to 5 % more costly than the 'Turbine by Turbine'



Summary

Within the CDM Framework:

- Allows developer to assess & reduce contract interface risks
- Allows for the effective planning of contractor movements on site
- Allows resourcing sensitivity studies to be conducted
- Allows cost benefit analysis
- Importantly allows for a novel visualisation of multiple project builds

Thank You for Your Attention

Nick Baldock – GL Garrad Hassan

Contact details:

nick.baldock@garradhassan.com Bristol (UK)

joseph.phillips@garradhassan.com Bristol (UK)

robin.stowell@garradhassan.com Bristol (UK)