



Foundations for building the Offshore Wind Industry and its Supply Chain

Presented by

Dr Lewis Lack, C.Eng., M.I.Mech.E
Xanthus Energy Ltd



About Xanthus Energy Ltd

Our Vision:

To **Enable** the development of large scale “Farshore”
Wind Energy Resources

Our Focus:

To develop Cost Effective and Environmentally-
acceptable “Farshore” wind turbine foundation
systems using:

Innovative, Proven Technology
Fit-for-Purpose Design and Optimisation
Efficient Manufacturing
Self-installing Technology



Overview

1. Reflections on current offshore wind farm assembly
2. A look at some new ideas
3. Lessons from other Industries
4. NWIP FastWind Project update



Offshore Wind ...Progress so far!



Turbine installation has been slow and risky.

Pedigree...

Beatrice: 1 per year

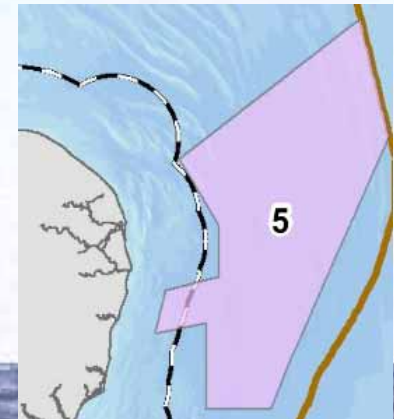
Rhyl Flats:
24 foundations
installed over 4
months = £360,000 /
foundation

Thornton Bank:
8 months to
manufacture 6
foundations



Round 3 Targets

Zone	Name	Size (Area)	Distance from Land	Projected Installed Power	No of WTGs	No of WTGs	Start year - invest decision
		[km ²]	[km]	[GW]	[5MW]	[8MW]	
3	Dogger Bank	8600	125 - 195	9	1800	1125	2014
4	Hornsea	4735	34 - 190	4	800	500	2014
5	Norfolk	6036	55	5	1000	625	2015



Why offshore assembly is ...

- ...to be avoided

- Cost
- Too slow
- Subject to delays
- Weather window sensitivity
- Risk!



Overview

1. Reflections on current offshore wind farm assembly
- 2. A look at some new ideas**
3. Lessons from other Industries
4. NWIP FastWind Project update



Towards 2020 and 32 GW

**Necessity is the
mother of invention...**

...

**But engineers should be
the masters of invention**



Some of the new ideas



Overview

1. Reflections on current offshore wind farm assembly
2. A look at some new ideas
3. **Lessons from other Industries**
4. NWIP FastWind Project update



Lessons from other Industries

Design

- Fit for purpose ...
- Long life

Manufacture

- Low cost - CAPEX
- Rapid assembly

Installation

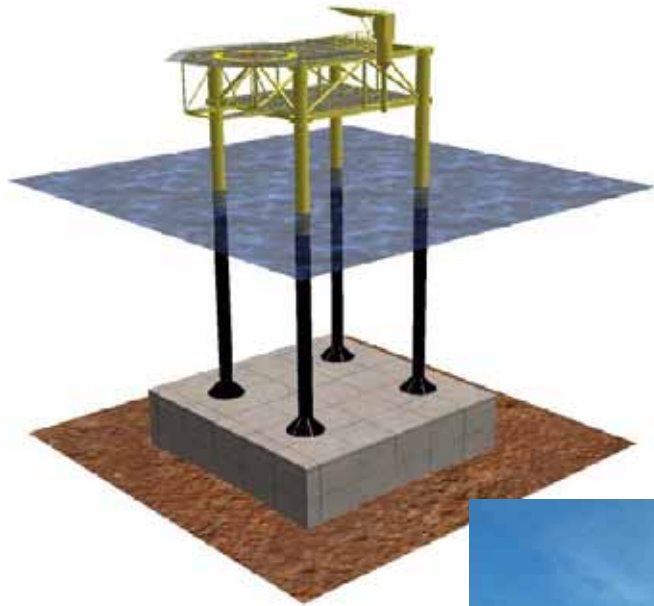
- Low cost - CAPEX
- Simple
- Use what is available

Operation

- Low cost - OPEX
- Easy to remove



Lessons from other Industries



Ocean Resource

- Simple design
- Avoid wave impact
- No offshore lift
- Minimum maintenance!



Lessons from other Industries



Liberty ships

- Kaiser Shipyards in California
- 2751 ships in 4 years
- 250,000 components
- Production rate
150 days down to
4 days 15hrs 29 mins

Lessons from other Industries



McDonalds

- Ray Kroc observed:
 - ✓ So many people served so quickly
 - ✓ Each person was their own waiter!



Lessons from other Industries



Condeep

- Use the foundation to transport the topside
- Towed using ocean going tugs
- Use seawater to ballast

Overview

1. Reflections on current offshore wind farm assembly
2. A look at some new ideas
3. Lessons from other Industries
4. **NWIP FastWind Project update**



NWIP FastWind Project



Xanthus Energy SeaBreeze[©]

- Prefabricated
- Pre-assembled
- Self Installing – buoyant GBS
- Seabed Founded and levelled



SeaBreeze[©] - Design Drivers

- **Low Installed Cost**
- **Fit for purpose Design**
- **Durability**
- **Low Cost Maintenance and Operation**
- **Minimal Visual Intrusion**
- **Economic Removal**
- **Location Flexibility (i.e. seabed conditions and water depth)**



Assembly Factory Areas

- 1 Newhaven
- 2 Ramsgate
- 3 Medway (Sheerness and Isle of Grain)
- 4 Great Yarmouth
- 5 Humber
- 6 Hartlepool and Tees
- 7 Tyneside
- 8 Methil (Fife Energy Park)
- 9 Dundee
- 10 Montrose
- 11 Peterhead Bay
- 12 Cromarty Firth (Nigg Bay and Highland Deephaven)
- 13 Hunterston
- 14 Belfast (Harland and Wolff)
- 15 Barrow-in-Furness
- 16 Mostyn
- 17 Milford Haven
- 18 Swansea/Port Talbot
- 19 Portland
- 20 Southampton



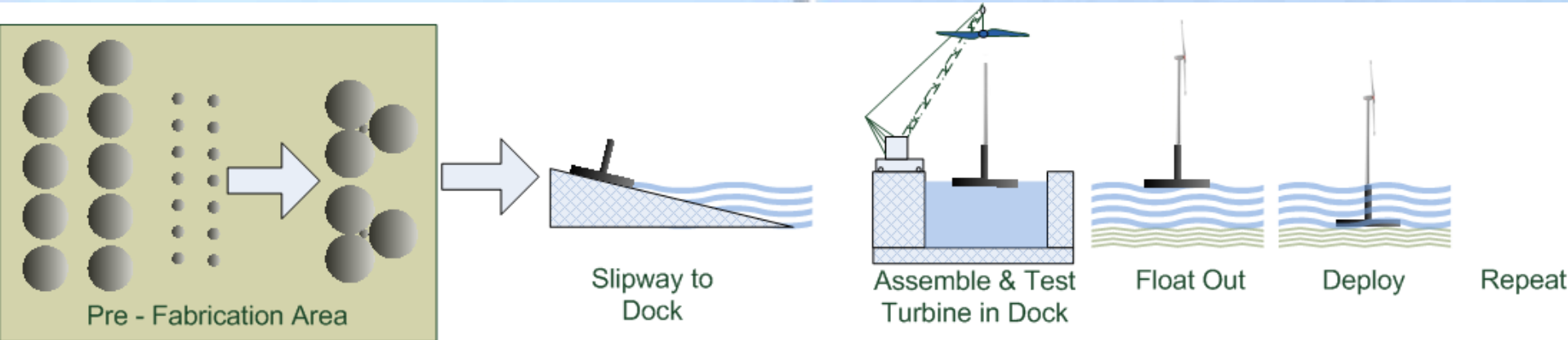
Enough space?

How big a space is needed?

What will it cost to setup



Production Process (Typical)

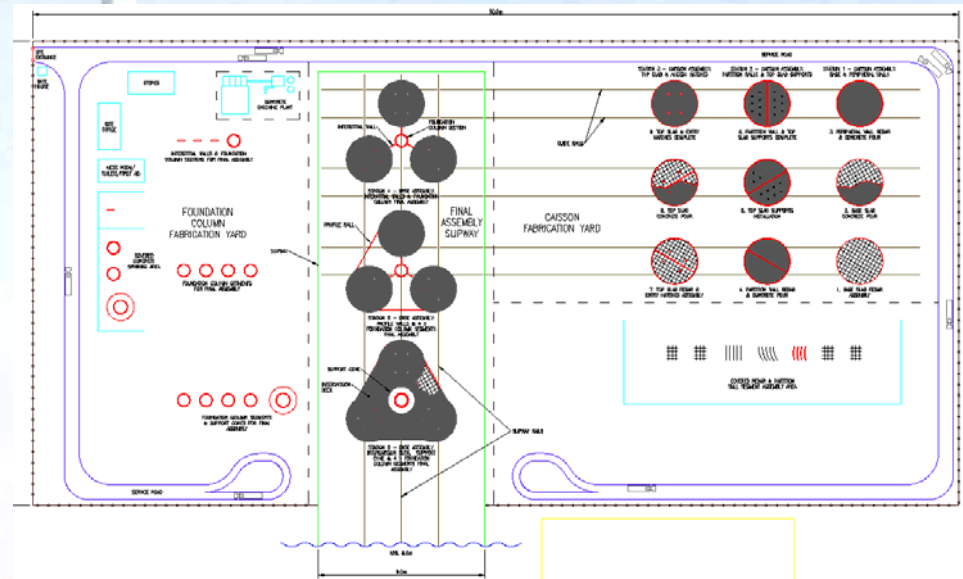


- **How much more simple it can be...**
- **Install and commission on land – reducing cost**
- **12 hrs deploy using standard tugs no weather risk**
- **Dramatically reducing cost, timescales and risk**

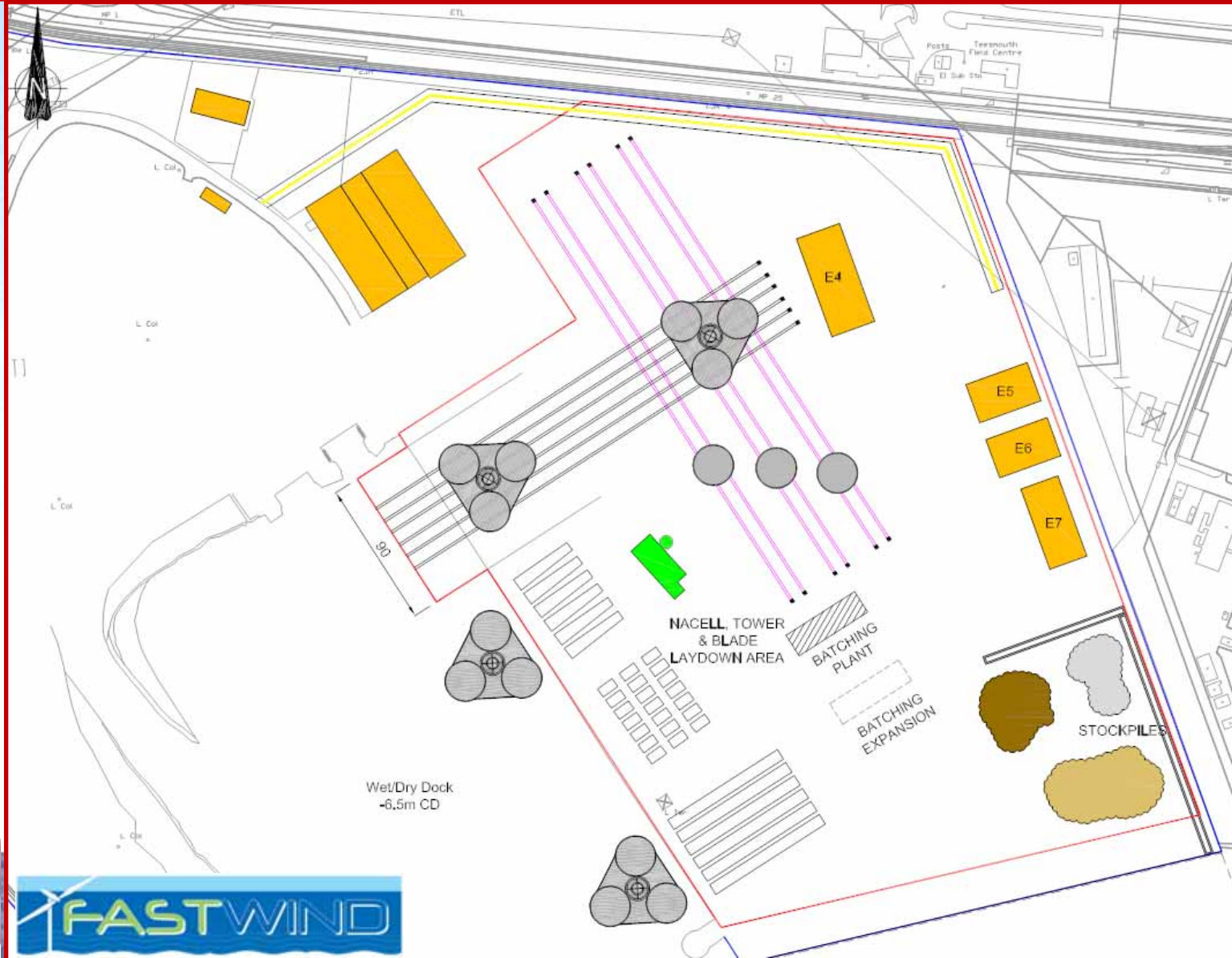
Foundation Factory

Some Statistics

- Delivery rate: 3 / week
- Factory area - 500 m x 200 m
- WIP – 9 caissons plus 3 final assemblies
- Precast facility
- Over 11,000 tonnes concrete per week



Assembly Factory Draft Layout



Conclusions

1. **There is another faster way to build offshore wind farms**
2. **We need some who will step up to the challenge ... out of the comfort zone**
3. **There are lessons to learn from other industries**
4. **The reward will be lower cost electricity
and successful UK offshore wind businesses!**





Supporting Wind Power Offshore

Thank you for your attention

**Ocean House
27a Welsh Street
Chepstow
NP16 5LN
Wales**

Tel : 0844 351 0265

**Email:
lewis.lack@xanthusenergy.com**

