



Når det virker her,
kan det virke der?
FFAs Årskonferanse

Dr.-Ing. Hendrik Sturm

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Introduction

A successful transition of knowledge from Oil & Gas to Offshore Renewables



(Draupner, 1995)



(Borkum Riffgrund 1, 2014)

"Based on pioneering efforts [on suction anchors] by NGL, Shell and Statoil"

(Offshore Energy Center's Hall of Fame, 2015)

About NGI

International research center in geotechnical engineering

- ▶ Independent private foundation
- ▶ Main office and laboratories in Oslo
- ▶ 240 employees representing more than 35 nationalities
- ▶ 20-40 guest researchers annually
- ▶ 55 mill US\$ turnover 2015



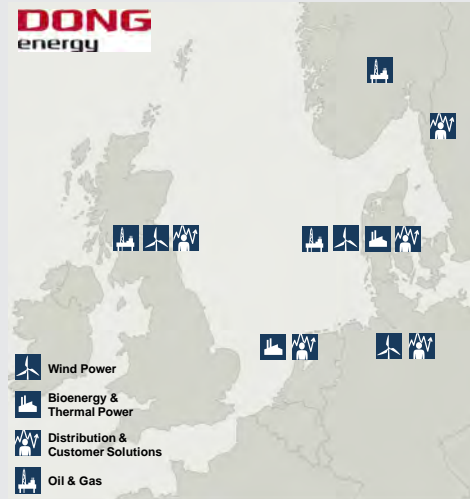
About DONG Energy

One of the leading energy groups in Northern Europe

- ▶ Leading European integrated energy company
- ▶ Production, retail, and distribution
- ▶ Bioenergy, Thermal power, Oil & Gas and, Wind Energy
- ▶ 6.700 employees
- ▶ Headquartered in Denmark

Global market leader Offshore Wind

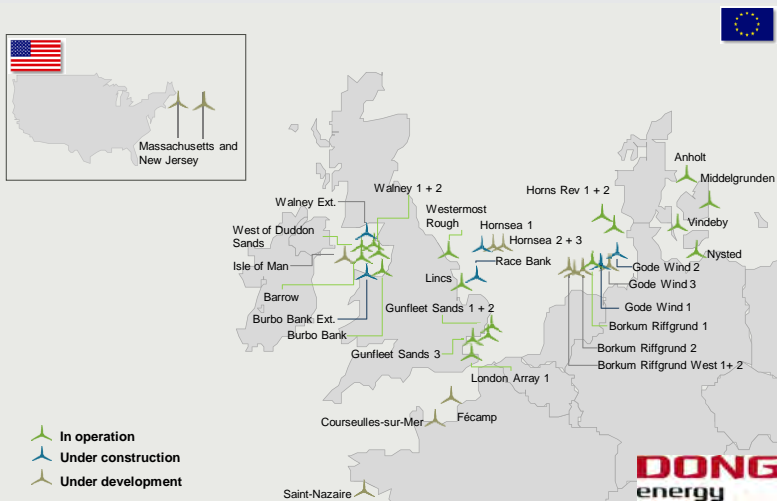
(Source DONG Energy)



(By courtesy of DONG Energy)

About DONG Energy

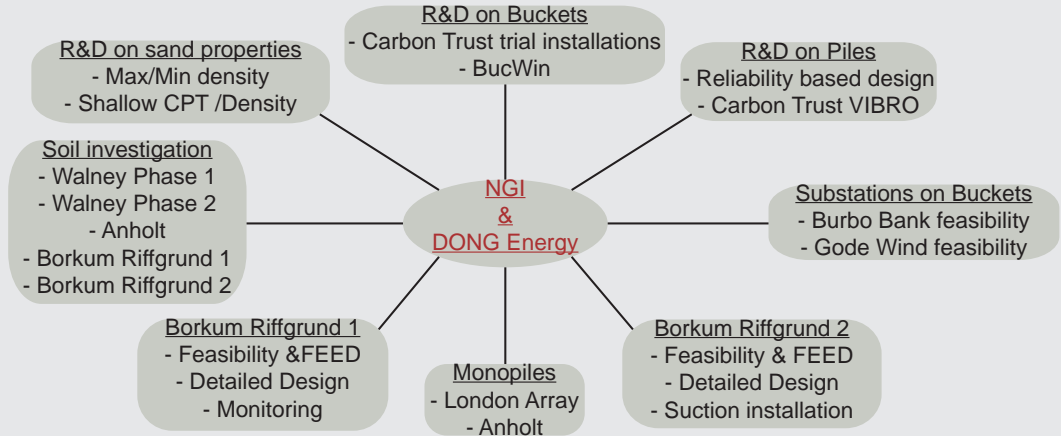
Global market leader in Offshore Wind



(By courtesy of DONG Energy)

NGI and DONG Energy

Long relationship in Research and Consultancy



The Suction Bucket Jacket

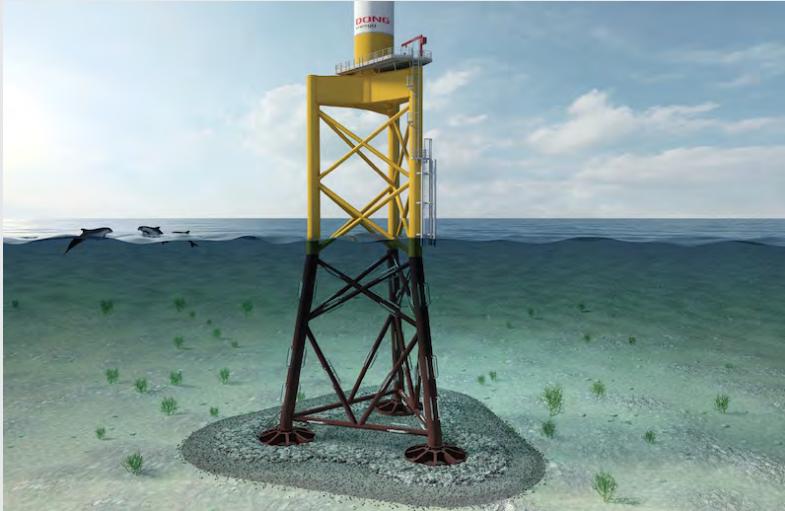
In the search of a new foundation concept

Due to increasing turbine size, larger water depths and technical challenges with existing foundation concepts, DONG Energy was seeking a new foundation concept,

which resulted in the

Suction Bucket Jacket

The Suction Bucket Jacket



(By courtesy of DONG Energy)

The Suction Bucket Jacket

Suction (caisson) concepts in Oil & Gas

1985 Gullfaks C



Penetration tests

1995 Nkossa



1997 North Sea



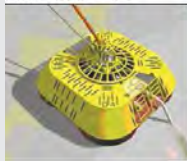
1997-99 Brazil



1999 GOM Diana



2001-2003 APL



2005 Trent



1994 & 1996 Draupner & Sleipner T

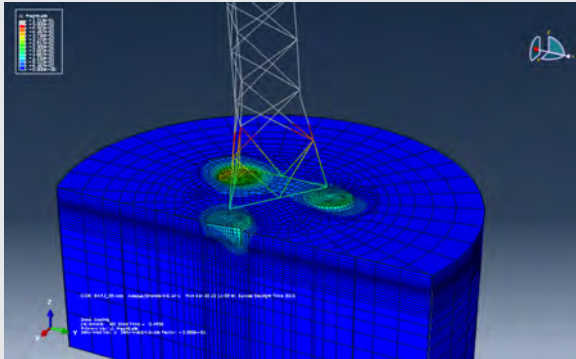


2013 & 2014 Dudgeon & OWA Penetration Trials



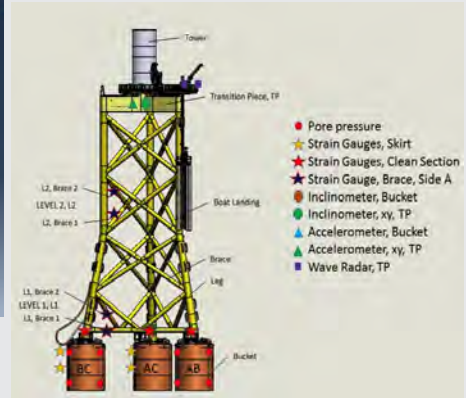
The Suction Bucket Jacket

Design and Monitoring by NGI



(Advanced Finite Element analysis)

(Monitoring, planned and installed by NGI)



The Suction Bucket Jacket

Borkum Riffgrund 01



(Suction Bucket Jacket right before installation)

The Suction Bucket Jacket: Today and future

A successful transition of knowledge from Oil & Gas to Offshore Renewables

- ▶ Installation in 2014 and in operation since 2015
- ▶ Future projects in DONG Energy:
 - ▶ Borkum Riffgrund 2 (20 foundations)
 - ▶ HornSea (20+ foundations)
- ▶ Also other developers investigating that concept: Statoil, Vattenfall, ...

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hanks for your attention

(Source: Vestas AS)

