




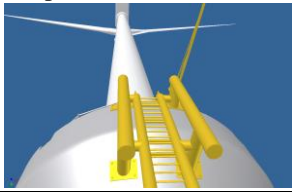
Offshore Wind Energy References


JANUARY 2012




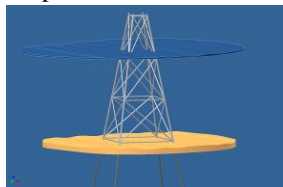
OFFSHORE REFERENCES


Country / site	Belgium
Project:	NORTHWIND Offshore Wind Farm, 216 MW
Company:	NIRAS
Client:	NORTHWIND
Scope of work	Detailed foundation design of 72 WTG mono pile foundations and one OHVS mono pile foundation.
	
Year:	2011 – ongoing


Country / site	France
Project:	St. Nazaire and St. Briec
Company:	NIRAS-SOGREAH
Client:	DEME
Scope of work	Technical feasibility studies.
	
Year:	2011


Country / site	Germany / North Sea
Project:	Borkum Riff 01 Offshore Wind Farm, 320 MW
Company:	NIRAS
Client:	DONG Energy -
Scope of work	Lead site management during the planning phase. Assessment of harbours, planning of resources, preparation of site factbook for CAPEX budget, as a basis for final investment decision.
	
Year:	2010 – ongoing


Country / site	UK / Irish Sea
Project:	West of Duddon Sands Offshore Wind Farm, 389 MW
Company:	NIRAS
Client:	DONG Energy -
Scope of work	Lead site management during the planning phase. Assessment of harbours, contract negotiations for harbours, planning of resources, preparation of site factbook for CAPEX budget and input to other leads. Assistance with preparation of tender documents for foundation installation
	
Year:	2010 – ongoing

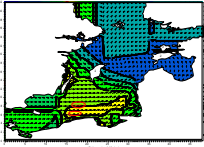
Country / site	Holland
Project:	Beaufort Offshore Wind Farm
Company:	NIRAS
Client:	DEME-Hochtief
Scope of work	Preparation of tender design for mono piles and partly Jackets for different wtg sizes. Preparation of Conceptual Design Basis, geotechnical evaluation, scours protection and management. Contract meetings.
	
Year:	2009 -

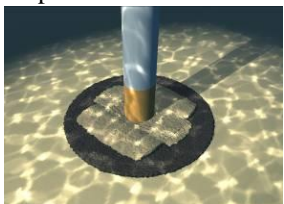
Country / site	German North Sea
Project:	Hochsee Windpark Nordsee and He Dreiht
Company:	NIRAS
Client:	EnBW
Scope of work	Tender proposal for consultancy, Front End Engineering Disk Study for EnbW. Contract meetings.
	
Year:	2009 – 2010


Country / site	Denmark / Anholt Offshore Wind Farm (Kattegat)
Project:	Anholt
Company:	NIRAS
Client:	DONG Energy
Scope of work	Lead Site management in the planning phase, for the 400 MW offshore wind farm. Installation management, assessment of metocean conditions and suitability of installation vessels for operation at the site. Assistance with preparation of tender documents for foundation installation and with preparation of contract for hiring main installation vessel for foundation installation.
	
Year:	2009 – 2010


Country / site	Denmark
Project:	Anholt
Company:	NIRAS
Client:	Energinet.dk
Scope of work	Environmental Management support of the environmental impact assessment process for Anholt/Djursland offshore wind farm. Foundation concept study for the transformer station (jackets, gravity based structure). Preparation of tender documents for foundation structures for foundation and topside. Water depth of 20 m.
	
Year:	2009 -


Country / site	Netherlands
Project:	Tromp-Binnen Offshore Wind Farm
Company:	NIRAS
Clients:	KEMA RWE Energy
Scope of work	 <p>Conceptual design for met mast and including design basis for app. 300 MW. Design depth app. 32 m. Preliminary design for gravity based foundation structure including design basis for app. 300 MW.. Design depth app. 32 m. Conceptual design for mono pile and gravity based foundation structure including design basis for app. 300 MW. Conceptual design for transformer station – overall layout. Preparation of construction and installation plans. Certification. Design depth app.32m</p>
Year:	2008 -

Country / site	Germany
Project:	Kriegers Flak I Offshore Wind Farm
Company:	NIRAS
Client:	EnBW GmbH
Scope of work	 <p>Proposal for preparation of Design Basis. 80 turbines. Water depth between 20 and 42 m.</p>
Year:	2009 -

Country / site	Germany
Project:	Baltic 1 Offshore Wind Farm
Company:	NIRAS
Client:	EnBW GmbH
Scope of work	 <p>Detailed scour protection design for mono piles installed at approximately 18 m water.</p>
Year:	2009 -

Country / site	Germany
Project:	Offshore Windpark Riffgat
Company:	NIRAS
Client:	ENOVA
Scope of work 	30 units of 5 MW turbines at 22 m water depth. Planning and tender documents for the detailed and final ("90 % BSH") bathymetric survey and geotechnical investigations. Audits of contractors and laboratories. Elaboration of geotechnical design basis. Proposal for detailed foundation design.
Year:	2009 -

Country / site	UK
Project:	Gunfleet Offshore Wind Farm
Company:	NIRAS
Client:	DONG Energy
Scope of work 	Monitoring of WTG installation, assignment as Client's Rep onboard installation vessel.
Year:	2009

Country / site	Denmark
Project:	Sprogo Offshore Wind Farm
Company:	NIRAS
Client:	A/S Storebælt
Scope of work 	Detailed design of gravity based foundations including sea bed and stone works. Preparation of design basis, metocean report, geotechnical investigations, technical specifications and design reports. Management of tender phase for foundations and wind turbines. Contract management and project certification. Water depth up to 18 m.
Year:	2008 -

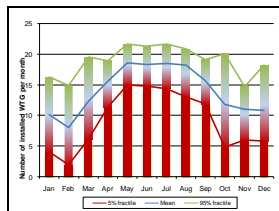
Country / site	Denmark
Project:	Copenhagen – Avedoere
Company:	NIRAS
Client:	DONG Energy
Scope of work	Detailed design of near shore gravity based foundations. Elaboration of design basis, design reports, technical specifications and certification.
Year:	2008 -




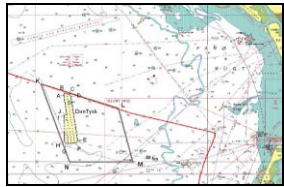
Country / site	Denmark
Project:	Rødsand 2 Offshore Wind Farm
Company:	NIRAS
Client:	E.ON Vind Sverige
Scope of work	Environmental Management of Rødsand 2 Offshore Wind Farm. Project management of permit and environmental issues throughout the development and construction phase.
Year:	2008 -



Country / site	UK
Project:	Robin Rigg Offshore Wind Farm
Company:	NIRAS
Client:	Vestas Offshore
Scope of work	Assessment of installation risk for installation of 60 3.0 MW WTGs on Robin Rigg Wind Farm. The scope comprises assessment of weather windows for the different operations involved in the complete installation as well as hind casting of metocean statistics.
Year:	2008 -



Country / site	UK
Project:	Walney Offshore Wind Farm
Company:	NIRAS
Client:	DONG Energy
Scope of work 	<p>Management during preparation of Application for Agreement for License. Micro siting, park layout and project development from the very beginning of the project. During the development phase installation management and logistic planning was adopted including interface management and risk evaluation.</p> <p>Consultancy related to design (mono piles and transformer station), geotechnical issues and metocean conditions were conducted. The survey included wave and sediment conditions and in this relation data management for turbines, substation and offshore cable route.</p> <p>Negotiations with potential installation companies, suppliers and ports. Contract management and contract strategy.</p> <p>During the construction phase site management at the Port of Barrow, design evaluations of quay walls, general supervision, offshore site management and monitoring during installation of scour protection and cables (inter array and transmission).</p> <p>In house environmental management support ongoing from 2004. EIA. Environmental assessment of issues related to birds, marine mammals, fish and shellfish, benthos, terrestrial ecology and marine archaeology. Responsibilities include assessment, authority dialogue, management of consultants and input to the Environmental Statement.</p> <p>104 turbines, app 370 MW and water depth up to 25 m.</p>
Year:	2004 – 2006 / 2008 - ongoing

Country / site	Germany
Project:	DanTysk Offshore Wind Farm
Company:	NIRAS
Client:	Vattenfall Europe
Scope of work 	<p>Conceptual design for mono pile and gravity based foundation for 5 MW Turbine. Evaluation of construction and installation methods. Environmental impact. Water depth up to 30 m.</p> <p>QA of tender material for geotechnical investigations and laboratory program, optimisation of site investigations and supervision offshore during drilling campaign. 25 – 30 m water depth. North Sea.</p>
Year:	2007 -

Country / site	UK
Project:	Gunfleet Sands Ltd.
Company:	NIRAS
Client:	DONG Energy
Scope of work	Contract Management for a 164 MW offshore wind farm (Round 1: 100 MW and Round 2: 64 MW). The wind farm is situated approx. 7 km of the coast at Clacton-on-Sea, Essex. The scope comprises general contract management for multiple contracts for consultants and services providers, contract for 49 mono pile foundations, cable supply, cable installation, Sub-station platform and 48 wind turbines. Finally an advisory function for the Project Manager.
Year:	2007 -

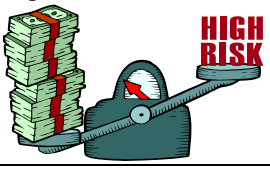



Country / site	Denmark
Project:	Horns Rev 2 Offshore Wind Farm
Company:	NIRAS
Client:	DONG Energy
Scope of work	Contract management for a 200MW offshore wind park at 8-18 m water depth 30 km from land. The scope comprises general contract management for multiple contracts for consultants and service providers, contract for 92 foundations, cable supply, cable installation, accommodation platform and 91 wind turbines.
Year:	2007 - 2010





Management for foundation works. The scope comprises assistance for snagging works, preparation of O&M manual, certification, and contract and claim management.


Country / site	UK
Project:	Horns Rev 1 Offshore Wind Farm
Company:	NIRAS
Client:	DONG Energy
Scope of work	Repair project - repairs of the 80 platforms. Weather risk analyses with respect to various vessels and installation methods based on site measured wind and wave data.
Year:	2007 -




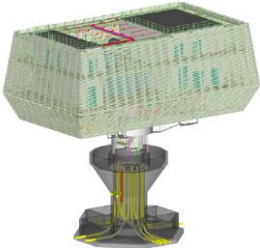
Country / site	UK
Project:	Westermost Rough Offshore Wind Farm
Company:	NIRAS
Client:	DONG Energy
Scope of work	Feasibility study and Environmental Impact Assessment. Responsible for the assessment of the biological and physical environment. In house consultancy ongoing from 2007.
	
Year:	2007 -


Country / site	Norway
Project:	Solund Aure, Snillfjord and Kvinesdal Wind Farms
Company:	NIRAS
Client:	Agder Energi Produksjon AS
Scope of work	Environmental screening of 4 wind farm projects in Norway (Solund, Aure, Snillfjord and Kvinesdal). Assessment of impacts from the 4 wind farm projects on the environment. Defining the environmental impact assessment programme.
	
Year:	2007 - 2008


Country / site	UK / Irish Sea
Project:	Barrow Offshore Wind Farm
Company:	NIRAS
Client:	DONG Energy
Scope of work 	<p>In-house consultancy assistance to BOW project management during execution of outstanding and remedial EPIC works in the transition to Operation and Maintenance Phase, which formally started on 1 January 2007.</p> <p>Environmental monitoring during and post construction of Barrow Offshore Wind Farm. Analysis of bird monitoring data. Responsible for the annual reporting to authorities during and post construction. Defining scope of work for environmental surveys. In house consultancy.</p> <p>Due-diligence. Data room studies. Evaluation of tenders and evaluation of proposed soil conditions and hydrographical conditions. Evaluation of foundation design and structural design etc. for 30 pcs of 3MW turbines and substation. Assistance in the contract and construction phase. Monitoring of manufacturing and installation phase, including assignments as Client's Rep onboard Resolution during foundation installation in 2005. Method statements and risk assessments. Assistance with review of draft as-built documentation after completion of installation.</p>
Year:	2003 –


Country / site	UK
Project:	Burbo Offshore Wind Farm
Company:	NIRAS
Client:	DONG Energy
Scope of work 	<p>Environmental management support. Support for the post construction environmental monitoring programme. Defining of agreeing the environmental monitoring programme with the authorities. Tendering and scoping environmental work. In house consultancy.</p>
Year:	2007 -


Country / site	Netherlands / North Sea
Project:	Q7 (Princess Amalia) Offshore Wind Park
Company:	NIRAS
Client:	Eneco Milieu B.V
Scope of work	Consultancy services. Installation of mono piles for 60 WTGs, 1 Met Mast, 1 Transformer Station and installation of 60 WTGs 23 km from the coast at water depths of 20-25 m. Offshore supervision of installation works, including assignments as Client's Rep onboard installation vessels during both foundation and WTG installation.
	
Year:	2006 - 2008


Country / site	Denmark
Project:	Roedsand 2
Company:	NIRAS
Client:	Energinet. dk
Scope of work	Request for tendering for the Design of the Transformer Station. Preparing of tender comprising Conceptual Design, Basic design and Detailed Design.
	
Year:	2006 - 2007

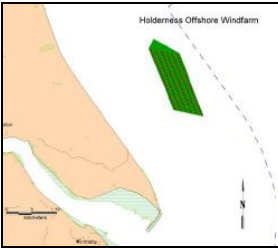
Country / site	Denmark
Project:	Horns Rev 2
Company:	NIRAS
Client:	Energinet.dk
Scope of work	Request for tendering for detailed design of the Transformer Station.
	
Year:	2006 - 2007

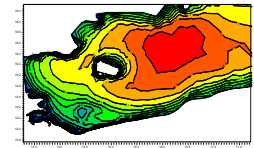
Country / site	Sweden / Oresund
Project:	Lillgrund
Company:	NIRAS
Client:	PHJV
Scope of work	Design basis and detailed design of foundation structures for WTG and transformer station including secondary structures. 48 pcs. 2.3 MW WTG. Fabrication specifications, method statements and risk assessments. Monitoring of seabed preparation for foundation installation in initial construction phase in 2006.
	
Year:	2005 - 2007

Country / site	Germany
Project:	Riffgat, North Sea
Company:	NIRAS
Client:	ENOVA Energieanl./Sellhorn Ingenieures
Scope of work	45 units of 5 MW turbines at 22 m water depth. Planning and tender documents for geotechnical investigations. Audits of contractors and laboratories. Elaboration of geotechnical design basis. 10 % lot. All certified by Germanischer Lloyd WindEnergie.
	
Year:	2005

Country / site	UK
Project:	Burbo Bank
Company:	NIRAS
Client:	Phil & Hochtief
Scope of work	Preliminary design of alternative foundation solutions. Evaluation of the tender design – mono piles. 30 pcs. 3,0 MW WTG.
	
Year:	2005

Country / site	Germany
Project:	Borkum Riffgrund, North Sea
Company:	NIRAS
Client:	Phil & Hochtief
Scope of work	Preliminary design of mono piles incl. boat landing. Water depth between 24 and 28 metres. 77 pcs. 3.0.MW WTG.
	
Year:	2005

Country / site	UK
Project:	Offshore Wind Farms
Company:	NIRAS
Client:	Danish Oil and Natural Gas
Scope of work	Feasibility studies for proposed offshore wind farms on selected locations in The East Irish Sea and near the east coast of UK. Preparation of baseline and work programmes for the application for license. Geotechnical, oceanographic, foundation and structural conditions and EIA aspects. A total of 600 MW, substation and offshore cable route on each investigated site.
	
Year:	2003

Country / site	Denmark
Project:	Baltic Sea
Company:	NIRAS
Client:	Danish Oil and Natural Gas
Scope of work	Pre-feasibility studies for a proposed offshore wind farm location at Kriegers Flak. Wind and hydrographical conditions. Bathymetry and soil conditions.
	
Year:	2003

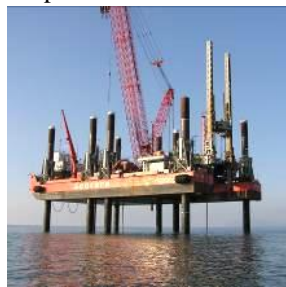
Country / site	Denmark
Project:	Samsøe Offshore Wind Farm
Company:	NIRAS
Client:	Samsø Havvind A/S / SEAS Danish Ministry of Energy and Environment / Samsø Ener- giselskab SEAS
Scope of work	10 pcs of approx. 2 MW. Evaluation of geotechnical and envi- ronmental design parameters for alter-native locations. Prelimi- nary foundation design and cost estimate. Geophysical Survey at Paludans Flak. Hydrodynamic modelling. Geotechnical investiga- tions and detailed foundation design (control) at deep water and soft soil next to the Paludans Flak.
Year:	1998 – 2001 / 2001 – 2003





Country / site	Denmark
Project:	Horns Rev 1
Company:	NIRAS
Client:	Elsam
Scope of work	Preparation of preliminary design for decommissioning of Horns Rev 1 offshore wind park. The preliminary design included pro- posed work procedures, recycling, removal of materials, choice of contractor, health, safety and environmental issues, tentative schedule and economy.
Year:	2001





Country / site	Denmark
Project:	Offshore Windfarms Roedsand and Omoe Staalgrunde
Company:	NIRAS
Client:	SEAS
Scope of work	150 MW: Planning and elaboration of Tender Documents for detailed geotechnical investigations for the two farms, each with 96 turbines. Supervision of the execution. Preliminary design for gravity and mono pile foundation. Supplementary geotechnical investigations for revised locations.
Year:	1998 – 2001



Country / site	Denmark
Project:	Design Regulations for Offshore Wind Farms
Company:	NIRAS
Client:	Danish Ministry of Energy and Environment/SEAS
Scope of work	Elaboration of the External Conditions (wind, wave, ice, soil etc.) for design, combinations of loads, size of partial factors of safety etc. In a working group headed by the power companies and with RISØE as a major contributor NIRAS is responsible for geotechnical analysis and materials and participate in structural safety analysis.
	
Year:	1999 - 2000

Country / site	Denmark
Project:	Middelgrunden Offshore Wind Farm
Company:	NIRAS
Client:	Københavns Miljø- og Energikontor/SEAS
Scope of work	20 pcs 1.6 MW turbines placed just outside Copenhagen. Foundation advisor for SEAS. Mono pile and alternative design of ballasted steel gravity structures. Detailed project and Tender Documents for the gravity solution.
	Supervision of geotechnical borings.
Year:	1998 - 1999

Country / site	Denmark
Project:	Tunø Knob Offshore Wind Farm
Company:	NIRAS
Client:	I/S MIDTKRAFT
Scope of work	10 pcs. of 500 kW VESTAS-turbines. Planning and evaluation of the geotechnical survey, design of alternative foundation concepts, tender documents and supervision at site.
	
Year:	1994 - 1995

Country / site	Denmark
Project:	Vindeby Offshore Wind Farm
Company:	NIRAS
Client:	ELKRAFT Amba
Scope of work	11 pcs. of 450 kW BONUS-turbines. Preliminary evaluation of wind- and wave energy, planning and evaluation of the geotechnical survey, detailed foundation design and design of alternative foundation concepts. Tender documents and supervision.
	
Year:	1989 - 1999

ADDITIONAL REFERENCES

Country / site	Germany
Project:	Offshore Wind Park SKY 2000, Baltic Sea
Company:	NIRAS
Client:	GEO GmbH
Scope of work	100 MW. Elaboration of Specifications and Conditions for preliminary soils investigations (CPTs and vibrocorings). Preparing of contractors contract.
Year:	2001

Country / site	Denmark
Project:	In-House consultant, SEAS Offshore Wind Farm
Company:	NIRAS
Client:	SEAS Wind Energy Centre
Scope of work	In-house consultant for SEAS in connection with the planning, EIA, baseline survey, authority approval, monitoring of the construction and GIS for three offshore wind farms located at Gedser Reef, Roedby Sand (Nysted Offshore wind farm) and Omoe Stålgrunde.
Year:	1998 - 2001

Country / site	Denmark
Project:	Suction as stability factor for the foundation of offshore wind turbines
Company:	NIRAS
Client:	Danish Ministry of Energy and Environment / SEAS
Scope of work	Phase 1: Study performed together with Danish Geotechnical Institute and another consultant has shown a considerably cost saving potential. Phase 2: Laboratory - and computer modelling.
Year:	1998 - 2001

Country / site	Denmark
Project:	Offshore Wind Farm Horns Rev 1
Company:	NIRAS
Client:	Hydro Soil Services Bladt Industries
Scope of work	82 turbines, 150 MW: Detailed design of mono piles for contractors bid.
Year:	2000 - 2001

Country / site	India
Project:	National Wind Turbine Test Station, Kayathar
Company:	NIRAS
Client:	Danida/RISØ
Scope of work	Design and specifications for foundations adaptable to various turbines up to 1 MW. Layout and specifications for the electrical connections for the test turbines to the electrical grid; incl. transformers and metering systems. Design of earthing and lightning protection system.
Year:	1998 - 2000

Country / site	Denmark
Project:	Use for pre-stressed concrete in offshore wind farms
Company:	NIRAS
Client:	ELSAMPROJEKT and SEAS Distribution Amba
Scope of work	Technical investigations and cost analysis concerning use of pre-stressed concrete in the foundation structure and use of pre-stressed concrete in a combined tower and foundation solution.
Year:	1999 - 2000

Country / site	Denmark
Project:	Environmental Impact Assessment of Offshore Wind Farms in Denmark
Company:	NIRAS
Client:	The electricity generation company, SEAS A/S
Scope of work	The EIA was prepared for Omø Staalgrunde and at Rødsand in Denmark. NIRAS was engaged as external consultants. The main task has been to define the overall programme of environmental investigations to be implemented in the period 1999-2000, prior to authorities' final approval of establishment of the offshore wind farm. The programme included hydraulic, morphological and biological investigations.
Year:	1999

Country / site	Sweden
Project:	Yttre Stengrund Wind Farm
Company:	NIRAS
Client:	NEG Micon UK Ltd.
Scope of work	Evaluation and cost estimate of gravity based steel foundations of ten 2 MW turbines at 10 m water depth in the Baltic Sea.
Year:	1999

Country / site	Denmark
Project:	Flow conditions around foundations for large offshore wind farms
Company:	NIRAS
Client:	Danish Ministry of Energy and Environment / SEAS
Scope of work	Technical input to the computer modelling by Danish Hydraulic Institute of the blocking effect in Femer Belt/Baltic Sea.
Year:	1998

Country / site	Denmark
Project:	Recommendation for foundation of Wind Turbines
Company:	NIRAS
Client:	RISØ, Secr. Type Approv.
Scope of work	Participant in a working group for an update of the Recommendations.
Year:	1997 - 1998

Country / site	Denmark
Project:	Cost-optimising of Large-scale Offshore Wind Farms
Company:	NIRAS
Client:	ELKRAFT / SEAS Amba
Scope of work	EU/JOULE-Supported R&D project conc. wind farms with more than 100 pcs of 1.5 MW turbines. NIRAS (NNR) in charge of the geotechnical investigations (incl. dynamic/cyclic lab. tests) and the foundation design. Foundation concepts adapted to wind loads from a revised turbine/tower concepts.
Year:	1996 – 1998

Country / site	Great Britain
Project:	Offshore Wind Farm, Norfolk
Company:	NIRAS
Client:	National Wind Power Ltd.
Scope of work	Modelling of wind and wave load history. Conceptual design of turbine foundation at 15 m tidal water depth.
Year:	1997

Country / site	Denmark
Project:	Foundation of Offshore Wind Farms (Danish)
Company:	NIRAS
Client:	Danish Ministry of Energy / ELSAMPROJEKT
Scope of work	R&D project. Three consulting engineering companies after a general decision on the design basis have optimised each their foundation concept (gravity, mono pile and tripod) on various water depths and foundation soils.
Year:	1996 – 1997

Country / site	Germany
Project:	Jade Offshore Wind Park, Wilhelmshaven
Company:	NIRAS
Client:	WINKRA PROJECT
Scope of work	Evaluation and cost comparison of alternative foundations of 16 turbines of 1.5 MW in a high tide location.
Year:	1996

Country / site	Germany
Project:	Foundation Catalogue, V12
Company:	NIRAS
Client:	VENTIS GmbH
Scope of work	Elaboration of standard concrete foundations for 500 kW turbines in different wind zones and foundation soils in Germany.
Year:	1994

Country / site	Germany
Project:	Wind Farm Plauerhagen, Mecklenburg-Vorpommern
Company:	NIRAS
Client:	NORDWIND BVmbh
Scope of work	3 pcs of 500 kW-turbines. Planning and Tender Documents for foundation design, access road etc.
Year:	1993

Country / site	Denmark
Project:	Onshore facilities for offshore Wind Farms
Company:	NIRAS
Client:	Frederikshavn Municipality
Scope of work	Evaluation of the benefits of the city and harbour of Frederikshavn in the erection of large-scale offshore wind farms.
Year:	1997

Country / site	Denmark
Project:	Municipality Planning
Company:	NIRAS
Client:	Thirteen Municipalities
Scope of work	Elaboration of plans for siting of wind turbines considering energy as well as environmental and aesthetical aspects.
Year:	1993 – 1997

Country / site	Denmark
Project:	Household Turbines in the Municipality Planning and Wind Turbines in the Municipality Planning
Company:	NIRAS
Client:	Danish Ministry of Energy and Environment
Scope of work	Elaboration of guidelines for the municipalities taking into consideration energy as well as environmental and aesthetical aspects.
Year:	1993 – 1995

Country / site	Greece
Project:	Wind Measurement Evaluation, Crete
Company:	NIRAS
Client:	EU programme RECITE
Scope of work	Evaluation of existing wind power measurements on Crete and determination of revised methods and measurement points.
Year:	1988 - 1994

Country / site	European Communities
Project:	Promotion of Renewable Energy
Company:	NIRAS
Client:	Energy Centre Denmark / EC DGXVII
Scope of work	OPET Action Programme on Renewable Energy. Danish contribution. Potential renewable energy applications, present status, main aspects of local authorities' involvement, proposals for efficient dissemination actions.
Year:	1992

Country / site	Denmark
Project:	Wind Energy Mapping in Denmark
Company:	NIRAS
Client:	Danish Ministry of Energy
Scope of work	Mapping of wind energy and the potential resources counties of Bornholm, Ribe, Vejle, South Jutland, Viborg, West Zealand, Storestrøm, Roskilde and Frederiksborg. Elaboration of an overall wind energy map. (1991).
Year:	1986 - 1992

Country / site	Denmark
Project:	Wind Turbine Siting
Company:	NIRAS
Client:	Var. countries
Scope of work	The counties of Århus, Ringkøbing, Northjutland, Copenhagen and Funen. Indication of fields of conflict, elaboration of configuration patterns, and calculation of efficiency/economy of potential sites.
Year:	1986

GEOCHNICAL REFERENCES

Country / site	Sweden
Project:	Lillgrund, Oresund
Company:	NIRAS
Client:	Vattenfall
Scope of work	48 WTG and 1 Transformer Station foundations. Preparation of Scope of Work for additional geotechnical borings. Geotechnical design Basis incl. update and preparation of alternative foundation. Certification by Det Norske Veritas.
Year:	2005 - 2006

Country / site	UK
Project:	Barrow, Offshore Wind Farm
Company:	NIRAS
Client:	Danish Oil and Natural Gas
Scope of work	48 WTG and 1 Transformer Station foundations. Preparation of Tender and Scope of Work for geotechnical investigations for the wind farm area and the 18 km cable alignment to shore. CPTs, Vibrocors and deep Borings. Preparation of the technical part of the contract. Offshore monitoring of the investigations. Evaluation of laboratory investigation programme. Design check of mono piles and driveability analyses.
Year:	2003 -

Country / site	Germany
Project:	Offshore Wind Park SKY 2000, Baltic Sea
Company:	NIRAS
Client:	GEO GmbH
Scope of work	100 MW. Elaboration of Specifications and Conditions for preliminary soils investigations (CPTs and vibrocorings). Preparing of contractors contract.
Year:	2001

Country / site	Denmark
Project:	Cost-optimising of Large-scale Offshore Wind Farms
Company:	NIRAS
Client:	ELKRAFT / SEAS Amba
Scope of work	EU/JOULE-Supported R&D project conc. Windfarms with more than 100 pcs of 1.5 MW turbines. NIRAS (NNR) in charge of the geotechnical investigations (incl. dynamic/cyclic lab.tests) and the foundation design. Foundation concepts adapted to wind loads from a revised turbine/tower conc.
Year:	1996 – 1998

Country / site	Denmark
Project:	Tunø Knob Offshore Wind Farm
Company:	NIRAS
Client:	I/S MIDTKRAFT
Scope of work	11 pcs. of 450 kW BONUS-turbines. Evaluation of the geotechnical survey, design of alternative foundation concepts, tender documents and supervision.
Year:	1994 - 1995

PAPERS

Papers

Samsø offshore wind farm – From idea to realization.

Claus Gormsen et al. Paper to EWEC Madrid, June 2003.

Design of prestressed gravity foundation for offshore wind turbines.

Mogens Bergholdt et al. Proc. European Wind Energy Conference, Copenhagen, July 2001.

Poster and company exhibition as well.

Design regulations for offshore wind farms. Specification for concrete and steel structures.

Ole Viggo Andersen. Proc. European seminar OWEMES, Sicily, April 2000.

Recent developments in offshore foundation design.

C. Birck & C. Gormsen. Proc. European Wind Energy Conference, Nice, March 1999.

Offshore foundation in practice.

C. Birck & C. Gormsen. Proc. European seminar OWEMES, La Maddelena, April 1997.

Cost-efficient foundation structures for large offshore wind farms.

C. Birck, C. Gormsen et al. European seminar OWEMES, La Maddelena, April 1997.

Offshore foundation on soft soil (In Danish)

C. Birck & C. Gormsen. Proc. XII Nordic Geotechnical Conference, Reykjavik, June 1996.