

An aerial photograph of a city, likely Copenhagen, showing a mix of traditional architecture and modern infrastructure. In the foreground, there are dense residential buildings with red-tiled roofs. In the middle ground, a large industrial facility with several tall smokestacks emitting white plumes of smoke is visible. To the left of the industrial site, a prominent green spire of a church or cathedral stands out. In the background, several wind turbines are visible against a clear blue sky.

Danske Energirådgivere – spydspidser i Energiemarkedet

af Anders Dyrelund
markedschef for energi, Rambøll Energi

RAMBØLL

DISPOSITION

- 32 år som energirådgiver
- Enerkipolitiske målsætninger og god lovgivning er drivkraften
- FRI – foreningen af rådgivende ingeniører
- Rambøll Energi – eksempler på referencer og eksport
- Danmark i front på energiområdet

32 ÅR SOM ENERGIRÅDGIVER

- Civ.ing.Byg 75, HD org.78
- 1979-81 Rambøll, Varmeplan, Aarhus mv
- 1981-86 Energistyrelsen, Varmeplan. Hovedstadsområdet mv.
- 1986-91 Rambøll, Varmeplan. og optimering af fjernvarme
- 1991- Eksportere viden til over 20 lande
- 2000- Revitalisere varmeplanlægningen, klima, projektforslag for fjernvarme og VE bæredygtig byudvikling mv.
- 2010- Implementere EU's energilovgivning

ENERGIPOLITIK OG LOVGIVNING

UDVALGTE MILEPÆLE

- EU's direktiver fremmer omkostningseffektive helhedsløsninger
 - Strategisk miljøvurdering
 - Vedvarende energi
 - Bygningers energimæssige ydeevne
 - Energieffektivitet (nyt)
- Vigtig dansk lovgivning indenfor energiområdet
 - Varmeforsyningsloven og elforsyningsloven – modeller for EU dir.
 - Lov om kommunal fjernkøling - ny, men utilstrækkelig
 - BR10 og forslag til BR2020 - lever ikke op til EU's direktiver og modarbejder varmforsyningsloven ?!

FRI – FORENINGEN AF RÅDGIVENDE INGENIØRER

- En brancheforening af uafhængige rådgivere
- EMK-udvalget, Energi, Miljø og Klima
- Gode kollegaer – men skarp konkurrence
- Et godt hjemmemarked er basis for eksport
- Samarbejde på eksportmarkedet
- Eksempelvis i regi af DBDH
- Danske rådgivere er meget overrepræsenteret i internationale energiopgaver på kommercielle vilkår

DANSKE RÅDGIVERE STÅR RELATIVT STÆRKT PÅ DET INTERNATIONALE MARKED

Based on international design rev.

1	Fugro	The Netherlands
2	WorleyParsons	Australia
3	AECOM	U.S.A.
4		
5		
6	Arcadis	The Netherlands
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18	Arup	U.K.
19		
20		
21	Poyry	Finland
22	WSP	U.K.
23		
24		
25	Ramboll	Denmark
26		
27	Grontmij	The Netherlands
28		
29	Atkins	U.K.
30		
31		
32	COWI	Denmark
47	ÅF	Sverige
56	Scott Wilson	U.K.

Based on total design revenue

1	AECOM	U.S.A.
2	URS	U.S.A.
3	Jacobs	U.S.A.
4		
5		
6		
7		
8		
9		
10	Arcadis	U.K.
11	Atkins	U.K.
12		
13		
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16		
17		
18		
19	Arup	U.K.
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28	WSP	U.K.
29		
30	Grontmij	The Netherlands
31		
32	Ramboll	Denmark
37	Poyry	Finland
51	COWI	Denmark
55	ÅF	Sweden

Source : ENR 2010. Ranks the design firms based on their design-related revenue. Top 200 measures all design revenues outside of the home country, while top 150 list measures all design-related revenue

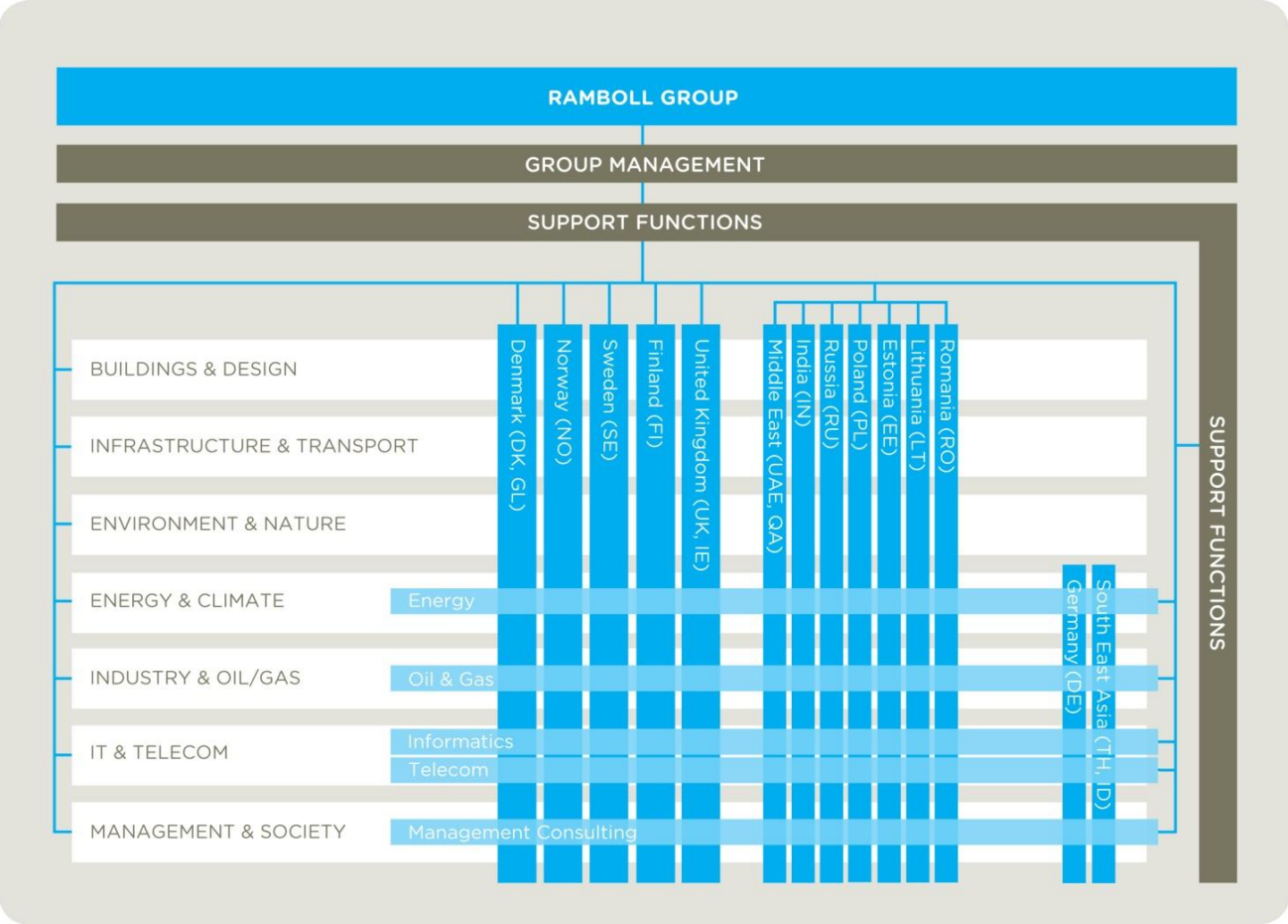
2-3 DANSKE RÅDGIVERE PÅ EUROPAS TOP-20

Ranking – based on average number of employees		
1	Altran Technologies	France
2	WS Atkins plc	England
3	Arcadis Group	The Netherlands
4	Fugro N.V.	The Netherlands
5	Mott MacDonald Group	UK
6	Alten Group	France
7	ARUP Group	UK
8	Mouchel Group	UK
9	WSP Group plc	UK
10	Ramboll Group	Denmark
11	Assystem Group S.A.	France
12	Groupe Egis	France
13		
14	Scott Wilson	U.K.
15	Pöyry Group	Finland
16	Grontmij	The Netherlands
17	COWI	Denmark

Source : Sector review December 2010.

The European top 300 consulting engineer and architectural groups

RAMBØLL – ET EKSEMPEL



FROM 2 TO 10,000 IN A LIFETIME

- **Founded in 1945** by two Danish engineers, B.J. Rambøll and J. G. Hannemann, merged with Højlund Rasmussen
- Now: international corporation employing close to **10,000 dedicated specialists**
- **Multi-disciplinary activities** ranging from sustainable energy to structural engineering
- **Owned by foundation** - not controlled by commercial interests and shareholders
- **Vision** for 2015: The leading consultancy with the best employees and managers



ENGINEERING, DESIGN AND CONSULTANCY

Service areas:

- Buildings & Design
- Infrastructure & Transport
- **Energy & Climate**
- Environment & Nature
- Industry & Oil/Gas
- IT & Telecom
- Management & Society

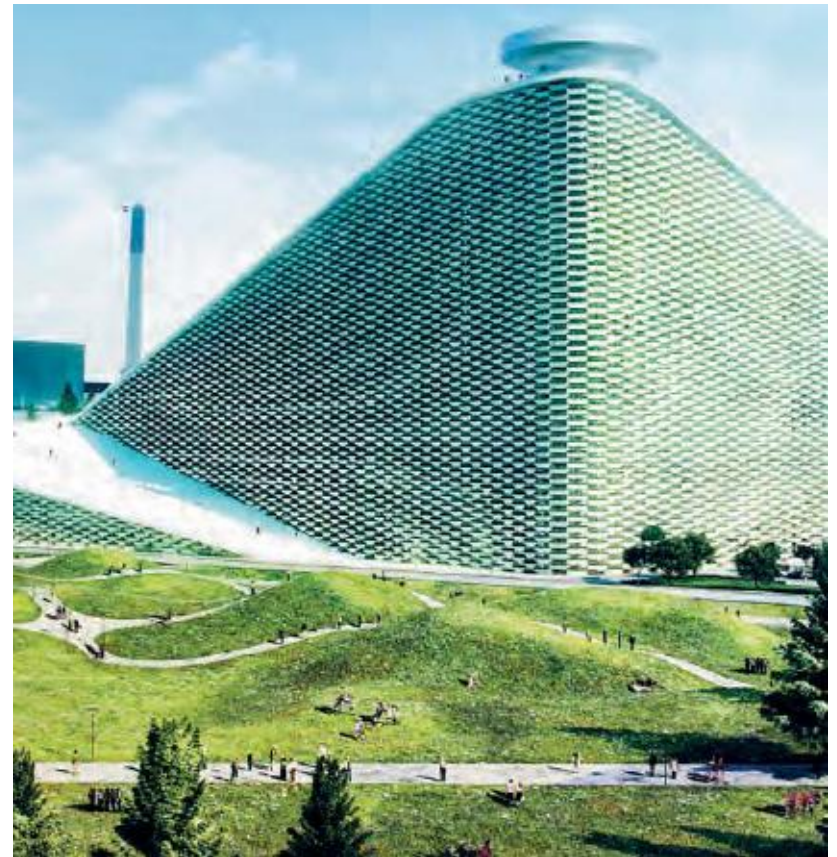


RAMBOLL ENERGY



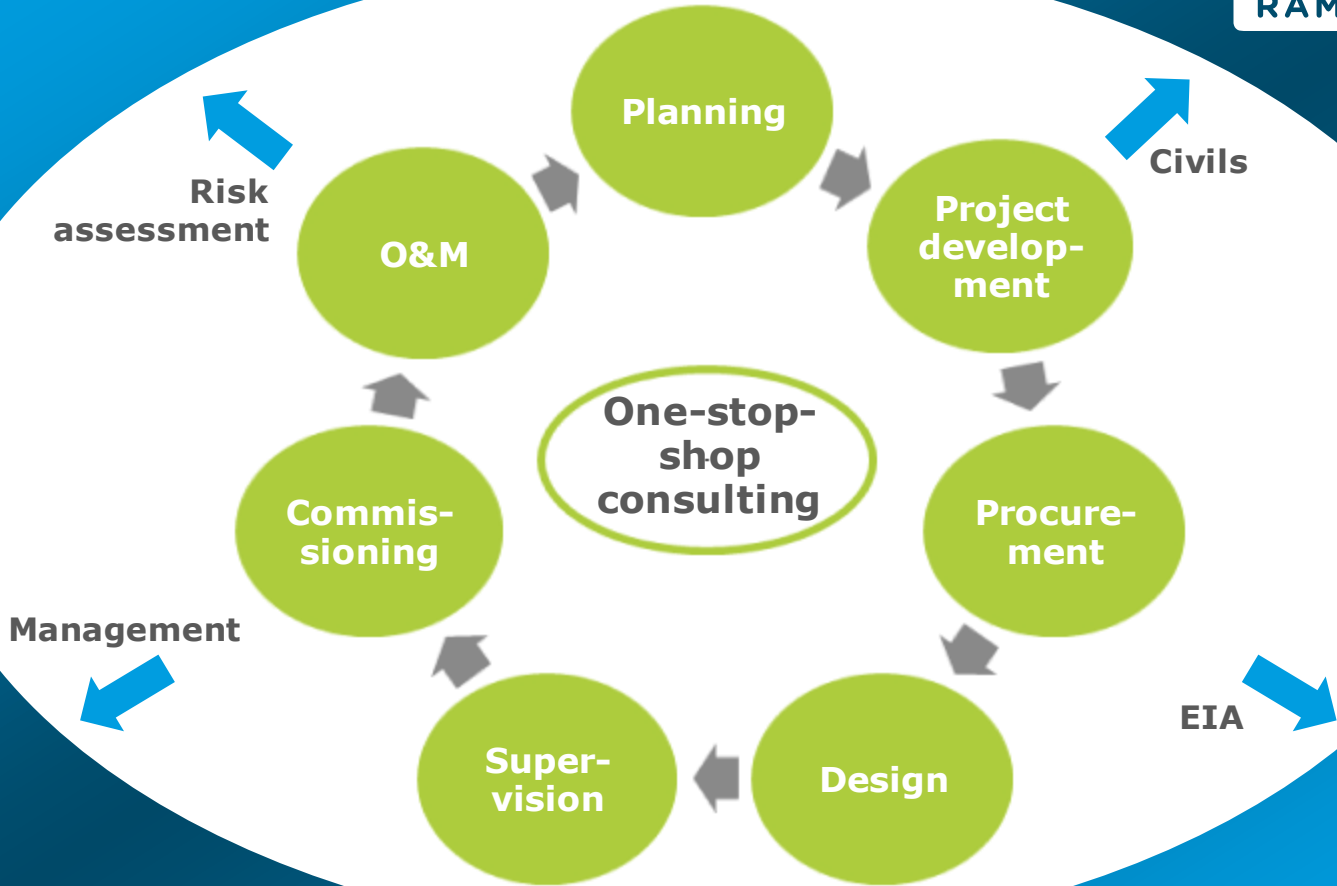
RAMBOLL ENERGY HAS AMBITIOUS GROWTH TARGETS – 700 STAFF IN 2012

- Market leader in selected service areas and markets
- Since 1.1.10, organic growth: +66 / +28%
- From 1 April 2011, 400 staff



ONE-STOP-SHOP CONSULTING

RAMBOLL



RAMBOLL

OUR SERVICE AREAS

- Energy strategy and planning
- Energy production
 - Waste-to-energy
 - Onshore and offshore wind
 - Biomass
 - Biogas generation
 - Solar energy
 - Hydro, tidal and wave power
 - Geothermal energy
 - CHP
- Energy transmission, distribution and storage
 - District heating and cooling
 - Biogas distribution
 - Power transmission
- Energy efficiency



A wide-angle photograph of a coastal industrial facility. In the foreground, a body of water is visible. In the middle ground, several white wind turbines are positioned along a shoreline. Behind them, a large industrial complex with various buildings and structures is situated. Several tall, dark smokestacks are visible, with white plumes of smoke rising from them into the sky. The sky is filled with large, white, fluffy clouds. The overall scene suggests a transition from traditional fossil fuel-based industry to renewable energy sources.

ENERGY STRATEGY AND PLANNING

ENERGY STRATEGY AND PLANNING REFERENCES

- HEAT PLAN DENMARK
 - Strategic study for heating independent of fossil fuels, 70% DH 30% heat pumps
- CLIMATE PLAN, COPENHAGEN, DENMARK
 - Vision: A CO₂ neutral Copenhagen by 2025, Feasibility study
- SUSTAINABLE URBAN DEVELOPMENT, Energy, Carlsberg
 - Study





ENERGY PRODUCTION



WASTE-TO-ENERGY

- Waste-to-energy is one of the cornerstones of any efficient waste management system and a way to secure energy supplies for the future
- A waste-to-energy facility may generate a range of outputs: electricity, district heating/cooling, steam for industrial processes or desalinated seawater

WASTE-TO-ENERGY PLANT REFERENCES





WIND ONSHORE/ OFFSHORE

- Wind is typically included in strategies for growth in renewable energy, and its usage as an energy source keeps growing steadily

WIND REFERENCES

- BESSAKERFJELLET WIND FARM, NORWAY
 - 25 pcs Enercon E70 turbines, 57.5 MW installed effect
 - From procurement to commissioning process for turbines and civil work
- GREATER GABBARD, UK
 - 140 Siemens 3.6 MW turbines mounted on individually designed steel monopiles and transition pieces
 - Detailed foundation design





BIOMASS

- Biomass is a renewable energy source and an energy solution that is innovative, cost efficient and carbon neutral
- Biomass is used for the production of a significant and increasing part of the energy consumed in modern society

BIOMASS REFERENCES

- FUSINE BIOMASS POWER PLANT,
LOMBARDIA, ITALY
 - Brown-field project in existing void building.
 - 24 MW and 55,000 tpa wood chips

- AKERSHUS, NORWAY
 - New 2 x 10 MW biomass-fired boiler. 20,000 tpa of wood-chips. Expected total district heating capacity 60MW
 - Conceptual design and layout, procurement, project and contract management, supervision of construction and commissioning





BIOGAS

- Produced from biodegradable wastes, biogas can be used for the production of low-carbon heat and electricity and can be upgraded for use as a vehicle fuel.

BIOGAS REFERENCES

- MAABJERG BIO-ENERGY, DENMARK
 - Green-field biomass power plant. 600,000 tonnes of manure annually. Production of heat and electricity
- BIOGAS, BORÅS STAD, SWEDEN
 - Gas filling station for a bus park for 43 busses, and gas storage and compressor building
 - Tender documents, procurement, installation





SOLAR ENERGY

- Energy from the sun is the single largest source of energy on Earth
- The daily insolation of light from the sun on our globe is approximately 6,000 times the total amount of energy consumed daily on Earth

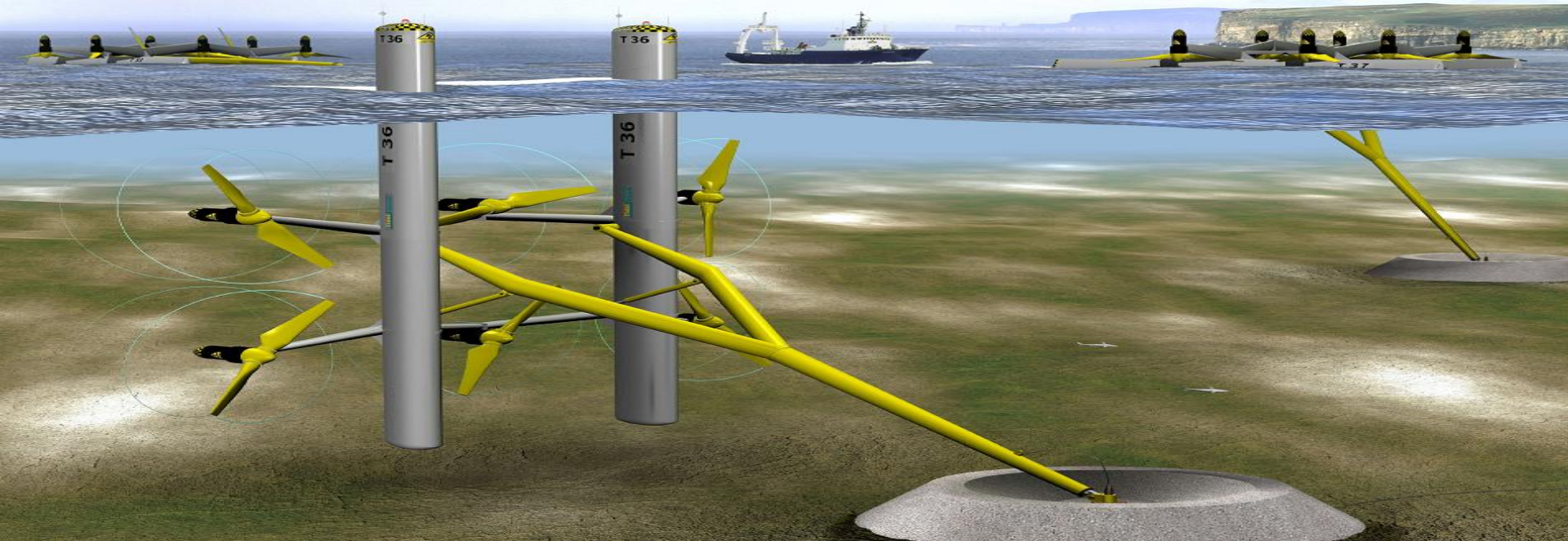
SOLAR ENERGY REFERENCES

- SOLAR HEATING PLANT,
MARSTAL, DENMARK
 - Largest solar heating plant in the world. 18,000 m².
- SOLAR HEATING PLANT,
VOJENS, DENMARK
 - Second largest 17.500 m² solar heating plant to assist the present gasfired boilers and gasfired CHP plant to deliver heat to the district heating network. Project start: Spring 2011



An aerial photograph of the ocean with several large, powerful waves crashing over a rocky reef. The water is a deep blue, and the white foam of the breaking waves is prominent. The perspective is from directly above, showing the circular and semi-circular patterns of the waves as they break.

HYDRO, TIDAL AND WAVE POWER



TIDAL POWER GENERATION, PENTLAND FIRTH, UK

- Client: TidalStream
- Semi-submersible dual-mode 10 MW turbine
- Technology based on that of horizontal axis wind turbines
- Services: Structural engineering, installation and maintenance feasibility study
- Completion date: 2011



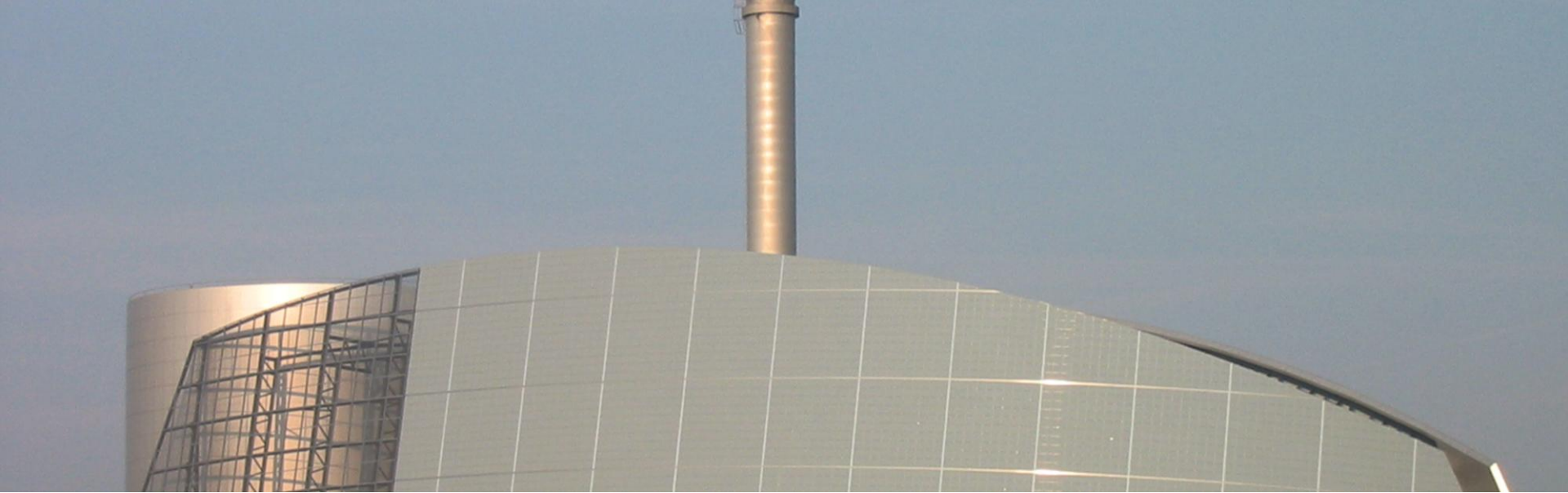
GEOHERMAL ENERGY

- Only 60 degrees Celcius is required to provide a building with heating and hot tap water.
- The underground contains tremendous CO₂ neutral energy resources at 70 degrees Celcius or more, making it a renewable energy source worth considering

GEOHERMAL ENERGY REFERENCES

- GEOHERMAL HEAT, VIBORG, DENMARK
 - Establishment of heat supply based on renewable energy and local resources
 - Services: Feasibility study, conceptual design and project implementation





CHP (COMBINED HEAT AND POWER)

- Combined heat and power (CHP) is an energy efficient use of fuel
- Rather than rejecting energy as waste heat when electricity only is produced, this energy is exploited in combined heat and power plants

CHP PLANTS IN DENMARK

- Avedøre Power Station

- Multifuel CHP
- Straw
- Wood pellets
- Gas
- Coal

- Heat Accumulator

Height 50 m, Diameter 26 m, 2 x 22.000 m³, 2x 8.000 GJ, Pressurized heat accumulator, 120 deg C



The background image shows an industrial or energy facility. On the right, three tall, silver, cylindrical smokestacks rise against a clear blue sky. In the foreground, a building with a green roof is visible. The building has a glass facade on the left side, and a white car is parked in front of it. The overall scene is brightly lit, suggesting a sunny day.

ENERGY TRANSMISSION, DISTRIBUTION AND STORAGE



DISTRICT HEATING AND COOLING

- In cold, urban climates, city-wide district heating systems are key to the cost-effective use of environmentally friendly, low-carbon heat sources
- Likewise, district cooling systems can deliver chilled water to commercial buildings from low-carbon sources

DISTRICT HEATING REFERENCES

- CTR, COPENHAGEN DISTRICT HEATING SYSTEM, DENMARK
 - Largest heat transmission company in Denmark. Supplies 9% of all district heating produced in Denmark. Ramboll Energy has been main consultant to CTR since 1984
- I/S VESTFORBRÆNDING, COPENHAGEN, DENMARK
 - Installed load: 220 MW.
Distribution system: 75 km.
Connections: 500





POWER TRANSMISSION

- Electric power transmission was accomplished in 1882 with the first high voltage transmission in Germany
- Within masts and towers Ramboll is the global leader. Services range from design of transmission line towers and foundations to field audits

POWER TRANSMISSION REFERENCES

- DETAILED DESIGN OF TRANSMISSION LINE
 - Client: M/s Deepak Cable (I) Pvt. Limited for KPTCL
 - 400kV Quad D/C line at Shantigrama, Hassan (tower types: DA, DB, DC & DD)
 - 220/66kV M/C line at Kothipura, Bidadi (tower types: MA, MB, MC & MD)
 - 66kV D/C line at Kushal nagar, Madikeri (tower types: DA, DB, DC & DD)
 - 3 projects executed for 1 customer



A close-up photograph of industrial machinery, likely a steam boiler or engine. The image features several cylindrical metal components with various gauges and pipes. A prominent gauge in the upper center shows a temperature scale from 0 to 120 degrees Celsius, with the needle pointing to approximately 90. Below it, another gauge shows a pressure scale from 0 to 5. The background is slightly blurred, showing more of the machinery and a yellow safety marker.

ENERGY EFFICIENCY

DANMARK I FRONT, STORT EKSPORTPOTENTIALE, MEN MANGEL PÅ ARBEJDSKRAFT

- Energiplanlægning og energistrategier
- Vind
- Fjernvarme
- Kraftvarme
- Affaldsvarme
- Biomasse
- Store solvarmeanlæg
- Energiudstyr: Pumper, Termostater mv
- Byggekomponenter: Ovenlysvinduer, Isoleringsmaterialer
- Enzymer mv.

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