

Global competition in the datacenter industry – why Denmark has a strong competitive position



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Agenda

About Invest in Denmark – and Data Centres

Data centres in Denmark – Top conditions

Data centres in Denmark – Our approach

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About Invest in Denmark

- Denmark's national investment promotion agency
- Integrated part of The Trade Council under the Ministry of Foreign Affairs
- Matrix structure of Investment Managers abroad, and Project Managers in Denmark
- More than 70 successful investment projects a year
- Result for 2016: more than 1600 jobs created in Denmark



Our Services

- Free of charge and in full confidentiality



Why Invest in Denmark has Data Centre focus

- Datacenter IT Traffic will increase **300%** from 2012 – 2017
- Data centre power will ***triple*** 2015 - 2018
- DC white space expected to ***grow 150%*** in three years
- From 2014 to 2020, capital spending on world wide data center construction will rise by **10.5%** per year (exclusive of IT infrastructure).
- Apple in Denmark, Amazon in Sweden, Facebook in Denmark and Sweden, Google in Finland,

MINISTRY OF FOREIGN AFFAIRS OF DENMARK

INVEST IN DENMARK

We are not alone...



Ministry of Foreign Affairs, International Trade and Worship



Quote from a Competitor

- Boston Group analyze Swedish DC opportunities:
- *“... this opportunity will not be realized if Sweden remains passive, as the country has been during the past years. Competition for data center business is intensifying. In Europe, Sweden will need to **outperform orther up-and-coming Nordic countries**, as well as more establish powerhouses in Central and Northern Europe...Sweden will need to look at what others are doing to attract data centres – **and beat them.**”*(The Boston Consulting Group, June 2016)

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Data centre – Stability and Security

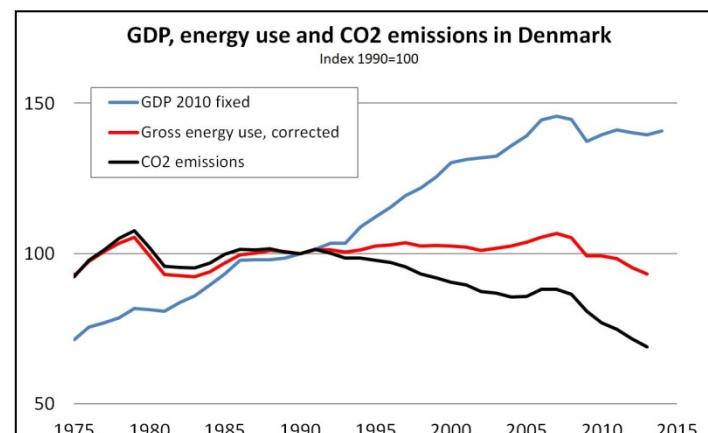
Geographically and meteorology

- No natural disaster zones
- Stable temperate climate with a yearly avg. temperature of 7.7 degrees Celsius



Politically and economically

- The Danish economy is AAA-rated
- Fixed exchange rate policy since 1982 and DKK pegged to the Euro since 1999
- The 2012-2020 Green Energy Agreement adopted by 90% of the Danish parliament
- Comprehensive public investments in power grids and renewable energy



Thirty years of continuous sustainable growth
Data sources: Statistics Denmark Table NAHL2 and Danish Energy Agency

Denmark on the Business Charts

– Denmark is a high flyer in Europe!

- **No. 1 Least Corrupt Country (World)**

Transparency International Corruption Perceptions Index 2016

- **No. 1 for Fast Construction Permits (Europe)**

World Bank 2016

- **No. 3 for Ease of Doing Business (World)**

World Bank 2016

- **No. 5 in the Global Entrepreneurship and Development Index**

Global Entrepreneurship and Development Institute 2016

- **No. 6 in the EU on the Global Competitiveness Index**

World Economic Forum Global Competitive Report 2016-2017 – No. 12 globally

- **No. 6 for Doing Business (World)**

Forbes Magazine 2016

Reliable and Competitive Green Power

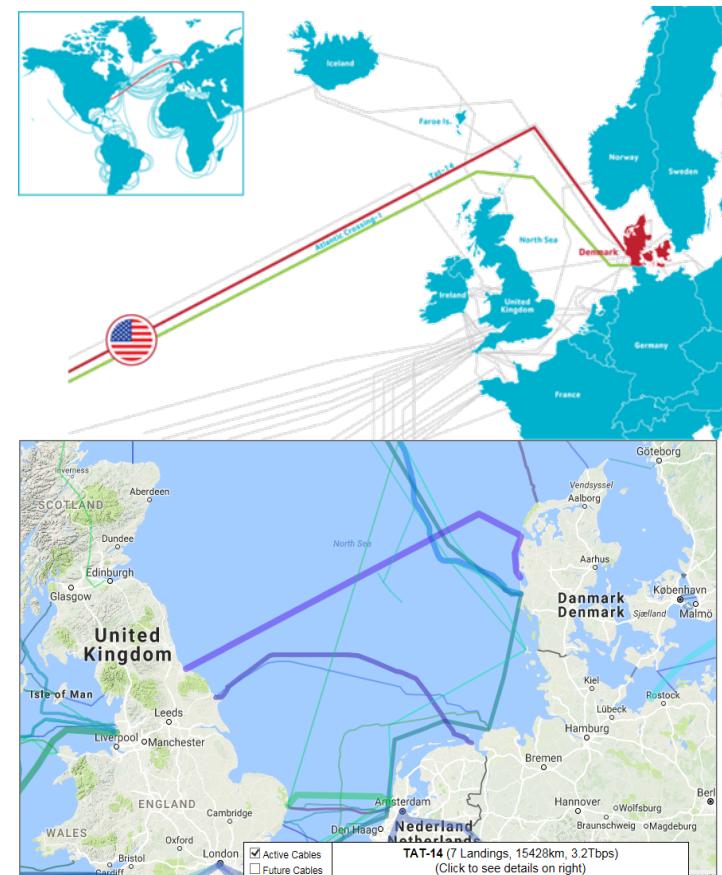
- Most reliable power grid in Europe (after Luxembourg)
- Fully redundant N-1-1 connections and sufficient power on site (132/150 kV grids)
- Power links directly to Norway, Sweden, Germany and soon also to the Netherlands
- 65% renewable energy in the power mix
- The Nordpool power market is the most competitive in Europe
- With the removal of the PSO tax, the Danish electricity prices will reach the level of Norway and Sweden by 2021



The Danish high voltage power grid

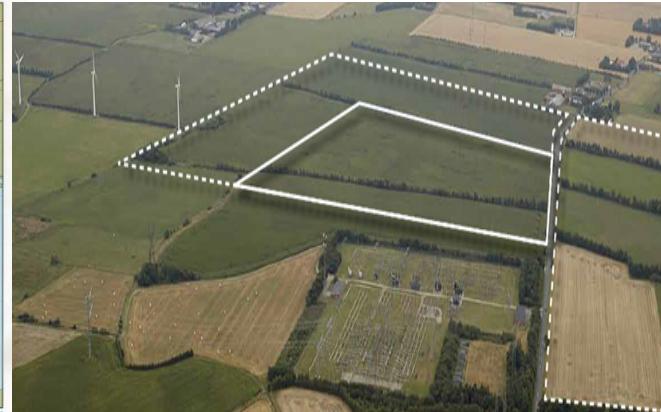
High-capacity Data Transmission Infrastructure

- Subsea Fiber Optic Cable Connectivity: Tat-14; Atlantic Crossing 1; Danice; Pangea; Cobra(2018); Viking(2022)
- The fibre optic grid in Denmark is extremely well developed
- Multiple Dark Fibre Vendors
- Low latency to Central Europe. Competitive latency to US and Russia



Available large scale sites at competitive price

- Plug & play sites available in all sizes 2 MW< to < 500 MW +
- Sites up to 100+ hectares available close to redundant 132/150 kV lines
- European power grid backbone and excellent fibre connectivity
- Large water reservoirs for cooling if required
- Terrain: generally flat with a few gently rolling plains



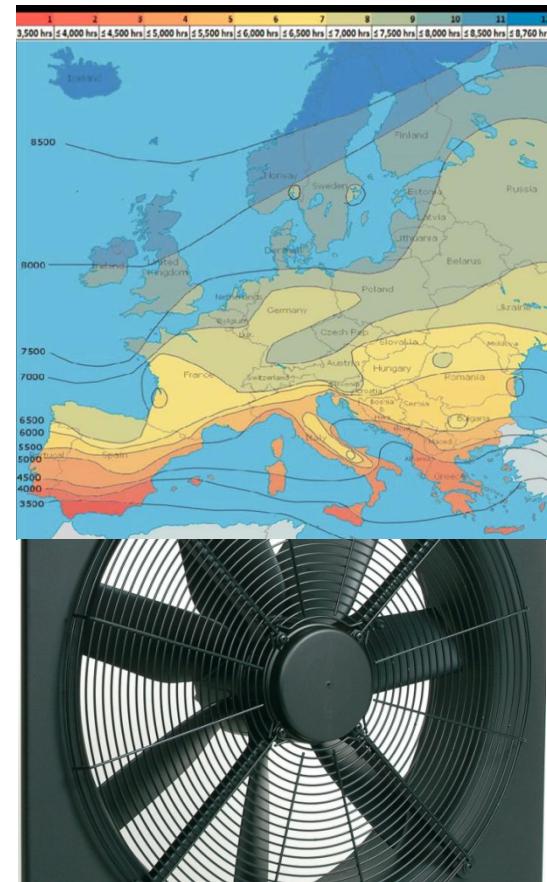
Sustainable Energy

- Currently 65 % green electricity, 80 % by 2020, 100 % by 2035. Green electricity generated from **wind, solar and biomass**
- Denmark as a 100 % fossil free society by 2050
- Green certificates for 100% renewable power available



Energy Efficiency – Free Air Cooling

- Cool climate for datacenter operations (summer 16 C, winter 0.50 C).
- Increased temperature in data centers result in low energy consumption for cooling
- Possibility for <85% annual free air cooling
- **Note** no mosquitoes or giant snowdrifts!!!

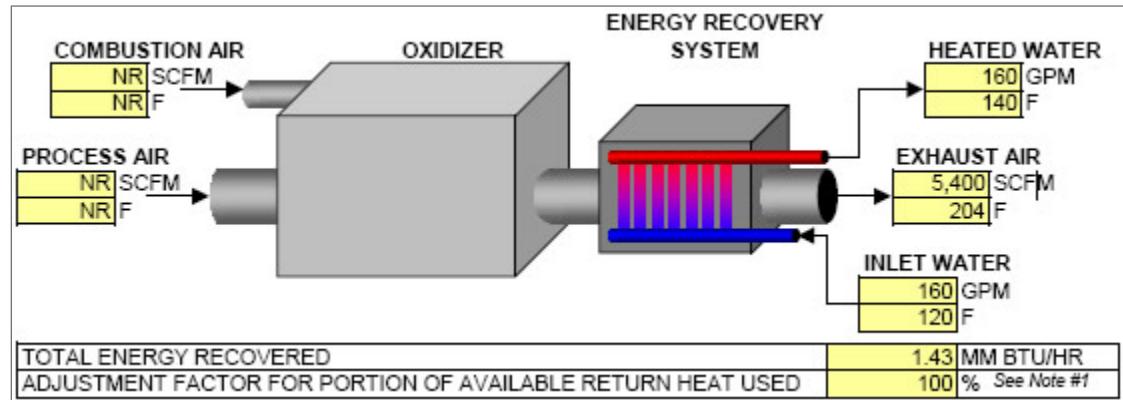


Energy Efficiency – Use of Waste Heat

- 62 % of Danish households are heated by district heating, mainly from CHP plants and industrial processing. This amounts to the greatest coverage in Europe (highest pct. of households)
- Waste heat from data centres can be used for heating

Three major advantages

- Use waste heat and conserve natural resources
- Reduce carbon emissions
- Increase overall energy efficiency



Summary: Top Conditions for Data Centres

- Political, economic and environmental security & stability
- Large scale sites available
- 99,997% power grid uptime
- 100% electricity available from renewable sources
- Competitive electricity prices
- Low latency and excellent fibre connectivity
- Cool climate = free air cooling
- Use the heat from data centres for district heating
- No. 1 in Europe for fast building permits



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Successful go-to-market strategy

- Customers demand Invest in Denmark and our partners work confidentially and “under the radar”
- Successful cooperation between Investor, Municipality and Invest in Denmark



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BUT

- to improve the possibility that new customers choose Denmark for their next data centre we need a strong industrial DDI





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Apple to Invest €1.7 Billion in New European Data Centres



“ This significant new investment represents Apple’s biggest project in Europe to date. We’re thrilled to be expanding our operations, creating hundreds of local jobs and introducing some of our most advanced green building designs yet.”

Tim Cook, CEO, Apple

”



- State-of-the-art facilities in Ireland and Denmark will run on 100 percent renewable energy
 - Each data centre will measure 166,000 square metres
 - Facilities will have the lowest environmental impact yet for an Apple data centre. Apple will also work with local partners to develop additional renewable energy sources
- “Our commitment to environmental responsibility is good for the planet, good for our business, and good for the European economy.”

Lisa Jackson, Apple’s vice president of Environmental Initiatives



Facebook Chooses Denmark to Build Data Centre for the Future

“ This one [data centre] will be powered by 100% renewable energy and support thousands of jobs in the community over the next few years. (...) this data center will help make sure Facebook keeps running smoothly for all of you. Thanks for having us, Odense!

Mark Zuckerberg, CEO, Facebook



- The data centre will measure 55,000 square metre
- One estimate is that Facebook will provide 150 jobs when operational
- Facebook will tap on to the benefits of one of the world's greatest energy systems with large quantities of green energy, high security of supply, good fibre connections and competitive power prices
- “The Odense data centre will be one of the most advance, energy-efficient data centre in the world”
McEntegart, Director of data centre operations, Facebook