

### CLEAN ENERGY AND PTX – SOLUTIONS DRIVING THE GREEN TRANSITION

### SHOWCASING DANISH TECHNOLOGIES TO ICELAND





Co-financed by



MINISTRY OF FOREIGN AFFAIRS OF DENMARK The Trade Council

### YOUR PARTNERS IN DENMARK

### The Confederation of Danish Industry (DI)

with a broad sector representation covering manufacturing as well as service industries across sectors such as water, transport, energy, IT, health, trade and professional services. DI has over 500 employees at our main office in Copenhagen, Denmark. Furthermore, we have offices in Brussels. Moscow. Mumbai. Munich, New York, Sao Paolo, Shanghai and Washington. From these offices, DI International offers competences, activities and services that help Danish companies navigate in international markets and to turn global State of Green opportunities into successful business results.

### The Royal Danish Embassy in Iceland

DI is a nationwide employers' organisation The Embassy of Denmark in Iceland is one of 102 Danish missions in the world. The Embassy is located in the capital city of Iceland, Reykjavík and focusses on strengthen the ties between Denmark and Iceland and to build bridges to Icelandic stakeholders, authorities, and businesses. The Embassy represents Danish interests in Iceland in various wavs incl. assisting Danish businesses when exploring their export potential in Iceland.

State of Green is a not-for-profit, publicprivate partnership from Denmark founded in 2008. We facilitate relations with international stakeholders and leading Danish players working to drive the global transition to a sustainable, low-carbon, resource-efficient society.

Βv sharing the accumulated Danish knowledge, experience, and solutions with the rest of the world. State of Green seeks to stimulate debate, spur partnerships, and inspire others. We believe that through collaboration and dialogue, we can accelerate the global green transition together.

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### INTRODUCING DANISH SOLUTIONS WITHIN GREEN ENERGY AND PTX

### Green energy & Power-to-X

the international marked and exported to the transformation of our energy system from entire world. Energy export is a strong national priority and Danish companies can provide expertise in several green sectors.

Denmark is e.g. a world leader in wind energy, covering 50 % of the country's electricity consumption. Technologies are developing rapidly and prices are coming down so that wind energy is today the preferred new energy source - both from a We continue setting ambitious climate climate and economic Moreover, Danish companies can offer reduce greenhouse gas emissions by 70 % by system solutions for green energy covering 2030 compared to 1990. To meet this target, the entire energy infrastructure generation.

As green energy solutions continue its growth, power-to-x is a fast-growing market, where Danish companies can provide stateof-the-art technologies to convert green energy to e.g. liquid and gas fuels along the entire ptx-value chain.



### Danish solutions

Green energy solutions are frontrunners on Denmark is undergoing a remarkable black to green. We started almost 50 years ago – due to the oil crisis. From depending entirely on imported fossil fuels, today, we have a world record security of electricity supply with a 50 percent share of wind energy plus sizeable contributions from bioenergy and solar energy making our electricity supply rather green.

> perspective. targets and we are currently working to and Denmark needs to apply further solutions in renewable energy, energy efficiency – and to harvest synergies between sectors and energy forms through sector coupling.

> > Danish companies develop innovative and efficient green energy solutions in a range of fields - wind power, bioenergy, waste-toenergy, district heating as well as energy efficient solutions in buildings and industry. We seek to develop further ties and collaboration models with Icelandic partners.



### **Company overview**

Headquartered near Copenhagen, BWSC provides specialized technical, engineering, Operations & Maintenance (O&M) and consultancy services for power plants and other energy-related facilities worldwide.

Forty years of experience with energy infrastructure, a diverse staff of seasoned experts, full technology independence and our big-picture "Power Plant Health" approach make us uniquely able to help you define your ambitions and reach them through continuous improvement of your facility.

One key BWSC strength is our ability to help conventional power plants reduce their carbon footprint via fuel conversion, renewables integration and efficiency boosting technologies and practices. This work, combined with extensive services in the fields of biomass processing, wasteto-energy conversion, power-to-x, energy storage and carbon capture, is part of our broad commitment to the green energy transition.

## What problems does the company solve?

We are great supporters of the green energy Meet freshwater transition, yet most of the world's power plants treatment, emission are still brown. Starting with this reality and end-of-life demolitior knowing that all power plants can lower needs with help from emissions, we apply our knowhow and they have seen it all a technologies to help our customers improve a successful outcome. efficiency and move towards cleaner energy sources.

### Lifetime extension

Reduce your plant's carbon footprint and meet strict emission targets by switching from diesel/ HFO to cleaner fuels or converting your conventional thermal plant to run on biomass. Improve efficiency and ensure regulatory compliance with expert and fully certified upgrades of your equipment, components and systems.

### **Renewables integration**

Join the green energy transition by adding solar or other renewable energy sources to your engines or conventional thermal plant – our team can supply everything you require, including battery storage and modern control technologies for optimal grid control.

#### Automation

Improve reliability, data transparency, regulatory compliance and plant economics with our comprehensive and platform-independent approach to designing, implementing and maintaining state-of-the-art DCS and other automation solutions

### Special projects

Meet freshwater generation, oily water treatment, emission control, rehab & recovery, end-of-life demolition and other less common needs with help from our special projects team – they have seen it all and will guide your project to a successful outcome.

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### **Company case**

Our O&M staff work with investors and plant operators to keep power plants working reliably, efficiently and safely for decades. We have more than 40 years of experience, specialising in large and medium-scale power plants, combined heat and power (CHP) plants, and renewable energy power plants.

As an engineering partner, BWSC is participating in Stiesdal's development of energy storage technology. This is one great example of how our dedicated engineering teams help innovate new energy transition. Regarding Power-to-X, BWSC

has collaborated with Liquid Wind, a Power-to-X consortium for green hydrogen production in Sweden. Furthermore, BWSC's electrical engineering team is addressing grid stabilization issues for renewable energy on remote islands. We have also worked with Faroe Islands largest utility on upgrading their digital control system to integrate wind as an energy source into their overall plant automation system. We have an ongoing project on Guam, where we lead a fuel conversion project to provider cleaner energy to the community.



# Copenhagen Infrastructure Partners

### **Company overview**

Copenhagen Infrastructure Partners (CIP) is a Danish Fund management company focused on renewable energy infrastructure including offshore wind, onshore wind, solar PV, biomass and energy-from-waste, storage, transmission and distribution, Power-to-X and other energy assets. CIP has 270 employees across offices in Copenhagen, New York, London, Hamburg, Utrecht and Tokyo.

CIP manages seven Funds with almost EUR 16 billion in commitments under management. The Funds have made more than 20 investments in large-scale energy infrastructure assets totalling almost 8 GW in capacity across the US, Canada, the UK, Germany, Spain, and Taiwan. Additionally, there are over 20 green-field energy infrastructure projects in process to reach final investment decision and start construction with in the next 3 years.

Investors in the Funds include several blue-chip institutional investors from the Nordics, Continental Europe, the UK, Israel, Taiwan, Korea, Australia and multilateral organizations, e.g., EIB. The investors in CIP's Funds comprise mainly pension funds, life insurance companies and large family offices.

# What problems does the company solve?

Most recently, CIP has established the Energy Transition Fund, focusing primarily on Power-to-X investments. The fund has by June 2021 raised EUR 0.8bn, aiming at reaching a target fund size of EUR 2.25bn by Q1 2022 or sooner.

The fund will invest in next generation renewable energy infrastructure including industrial scale Power-to-X projects and enables institutional investors to participate in the decarbonization of the so-called hard to abate industries such as shipping, steel production, and agriculture through the use of green fuels and feedstock and CO2-free fertilizers. The fund will primarily focus on greenfield projects in Western Europe, North America, Australia and developed Asian countries. Besides PtX the fund may invest in advanced biofuels, carbon capture and utilization/storage (CCU/S), and other infrastructure technologies, applications, and solutions to decarbonize industries and transportation.

### **Company case**

The Energy Transition Fund has secured an attractive portfolio of industrial scale development stage PtX projects with diverse exposure to production technologies and offtake markets. The projects, which are located in Western Europe (Denmark, Sweden, Norway, Spain) and Australia, are expected to produce green hydrogen, green ammonia, and green methanol.

The Australian PtX project, Murchison, was announced in November 2020 and will, once operational, export green ammonia to countries such as Japan, South Korea, and Taiwan. The Danish project, Høst, was announced in February this year. It will be a 1GW electrolysis plant located on the west coast of Jutland and source power from North Sea offshore wind turbines to produce green ammonia, which is expected to be used as feedstock for CO2-free fertilizer for the agriculture business and as green fuel for the shipping industry.

# Copenhagen Infrastructure Partners





### HALDOR TOPSOE

### Perfecting chemistry for a better world

### **Company overview**

Topsoe wants to accelerate a sustainable energy transition and aims to be the global leader in carbon emission reduction technologies by 2024. Today, the biggest global challenge is climate change, and we will use our knowledge and capabilities to accelerate a responsible energy transition towards renewable energy. We're a global leader in supply of electrolyzers, catalysts, and technology, and we are heavily engaged in innovating new solutions together with our customers, fx green hydrogen, green ammonia and eMethanol and other renewable solutions to fast-track the road to cleaner fuels for aviation. shipping, and remaining heavy-transportation. We are headquartered in Denmark and serves customers around the globe. In 2020, our revenue was approximately DKK 6.2 billion, and we employ around 2.100 employees.

# What problems does the company solve?

For over 80 years, Topsoe has worked with the world's energy and chemical producers to production maximize value while minimizing environmental impact, using a variety of market-leading technologies and catalysts. Regardless of project complexity, we ensure delivery of high-value offerings by leveraging unmatched in-house R&D capabilities, and industry-leading engineering expertise, in close collaboration with our business partners. The result is greater operational performance, reliability, and output - all at a lower cost to the planet.

Our renewables division has been innovating on proven technologies for almost two decades,

### providing the world with groundbreaking solutions for sustainable production of fuels that will power the future, including:

**SOEC:** Our revolutionary new solution for green Power-to-X initiatives, our proprietary solid-oxide electrolysis cell technology represents the market's most efficient high-temperature electrolysis offering for production of green hydrogen, green ammonia, eMethanol, and other renewable fuels.

**HydroFlex**<sup>™</sup>: A tried and tested technology for hydrotreatment of renewable feedstocks, HydroFlex units and catalysts are tailored to the specific refinery requirements, enabling production of high-grade drop-in fuels that are ready for use or blending.

**H2bridge<sup>TM</sup>:** A circular solution that replaces external fossil hydrotreating feedstocks with renewable LPG or naphtha – while also optimizing heat and water efficiency - H2bridge aids in significant reduction of greenhouse-gas emissions, carbon footprint, and OPEX.

**PureStep<sup>™</sup>:** PureStep enables production of new plastic from low-grade mixed waste, mitigating traditional fossil-feed requirements while also reducing the amount of plastic waste sent to landfills or incineration.

### CONTACT

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## HALDOR TOPSØE 🖪

### **Company case**

Aquamarine Investment Partners (US) and Topsoe have drafted a Memorandum of Understanding. The objective is completion of a green hydrogen/ammonia facility using Topsoe technology.

Neom, Saudi Arabia's planned mega-city, will utilize Topsoe technology to support the world's largest green-hydrogen facility.

Green-methanol facilities in Scandinavia, commissioned by Liquid Wind (SE), will use Topsoe solutions for commercial-scale production of methanol from green hydrogen and captured CO2.

The "Copenhagen X Project," a joint venture between Copenhagen Airport, A.P. Møller -Mærsk, DSV Panalpina, DFDS, SAS, Ørsted, and Topsoe, will result in the creation of a production plant for hydrogen and e-fuels.





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### Powering good for sustainble future

### **Company overview**

Hitachi ABB Power Grids is a pioneering technology leader. Our core competencies are power and digital technologies, advanced automation systems, open digital platforms. With a proven track record, global footprint and unparalleled installed base, Hitachi ABB Power Grids balances social, environmental and economic values.

We offer industry-leading expertise spanning the full range of renewable energy project challenges, including engineering, procurement, and construction (EPC), financial analysis, consulting services, front-end engineering, and design (FEED), systems development, construction, operations and maintenance.

To limit the impacts of global climate change, we need to shift away from fossil fuels and look to renewable sources such as solar, wind, and hydropower that capture naturally occurring energy and convert it into electricity.

Areas which we focus on within the space of RE are among many:

- Wind Power
- Solar Power
- Power 2 X
- E-Mobility
- Energy Storage
- Asset Management by means of Digital solutions

# What problems does the company solve?

The world's power grids are coming under increasing strain from the destabilizing effects of variable and often unpredictable renewable energy (i.e. solar and wind) in the power mix. Our SVC Light Enhanced solution addresses these challenges by combining two power quality and grid stabilization technologies in a single compact device.

### Power to X:

Converting RE energy to various types of fuel which can be used for energy storage, transportation and other applications

### Solar:

Solar energy developers face a highly competitive, cost-constrained environment. Our consulting services, proprietary market data and analysis, and software solutions are designed to improve and de-risk the business case for new projects, lower finance costs and help maximize revenue.

### E-Mobility:

Transforming the transportation towards RE fleets, be it electrical or other fuels. We focus on optimizing the charging infrastructure and the control of the charging

### Onshore:

We have extensive expertise designing equipment that meets the unique environmental and electrical conditions of offshore and onshore wind farms, addresses grid code requirements and enables the transmission of large volumes of onshore wind power to distribution centers.

### CONTACT

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### **Company Cases**

- <u>Doggerbank</u>
- <u>Kriegers Flak Combined Grid solutions</u>
- Samso Island Denmark
- Hitachi ABB Power Grids to supply one of Europe's largest battery energy storage
  systems





# kamstrup

### **Company overview**

Kamstrup is a leading supplier of intelligent metering solutions and services. We help utilities all over the world reduce waste and optimise their production and distribution of clean water and energy, and we enable sustainable management of buildings. We believe better data enables better decisions. This is why, for 75 years, Kamstrup has been dedicated to delivering the actionable insights water and energy professionals need when managing their network and supply. We are headquartered in Denmark with production facilities here and in Georgia, USA.

We help the utilities and industry in more than 90 countries with solutions that provide the customers

with insight and gives them the knowledge and data to create a sustainable business. Our solutions digitize the utilities and assists them in identifying leaks, identify water and heat loss and thereby increasing energy efficiency.

We deliver both meters, reading systems, project management, systems for data management, hosting

and service solutions as well as data analytics tools. We offer different service solutions based on our

customers' resources and requests. Regardless, if our customers choose individual solutions from us or if they need to outsource entire projects to us.

# What problems does the company solve?

The new energy reality requires an integrated and intelligent energy system with district heating as its natural cornerstone. But improving energy efficiency and facilitating the transition to renewable energy sources and waste heat

requires a level of transparency in the district energy system that can only be derived from frequent and accurate meter data.

Transparency is also the prerequisite for incorporating renewables in systems with the complexity of fluctuating sources like solar energy, wind and surplus heat. It is no longer simply about turning an engine on or off. Today there is a need for forecasts for the wind, the sun, the consumption etc.

Our solutions help utilities live up to future demands such as optimised operations and increased cost efficiency. With actionable insights it provides an even better service to end-users. The smart metering with our MULTICAL energy meter range is a central part of the solution, because you cannot optimise what you do not measure. Our remote reading system READy enables automatic reading of intelligent heat meters through drive-by mobile reading as well as automatic reading on a daily or hourly basis. You get fast and easy access to consumption data and the system gives you access to tools for analysing and optimising your distribution network.

Data from our smart meters and our analytics platform, Heat Intelligence, gives insight and transparency via continuous operational surveillance. Using these tools, the utilities can map their distribution network, locate losses and prioritise their resources. Heat Intelligence analyses data to transform it into

knowledge and if the utilities know what happens below ground, they will know where to invest to future-proof their business. This step towards digitalising utilities provides more and reliable data – and the more data the utilities have, the more value they can create.

### CONTACT

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# kamstrup

Our intelligent solutions and services help utilities obtain:

- Fast leak detection
- Data for accurate billing
- Monitoring of temperature levels in the distribution network
- Detection of defect or faulty set heat installations
- Improved customer service
- Reduction of peak loads

### **Company Cases**

Here are great case stories from customers in Denmark. But our customers abroad, especially in the rest of Scandinavia but also several other areas around the world, are facing many of the same challenges which we have solved in a great partnership.

Heat Intelligence helps reduce heat loss: <u>https://</u> www.kamstrup.com/en-en/customer-references/ heat/aars-heat-intelligence

Digitalisation delivers measurable results: <u>https://</u> www.kamstrup.com/en-en/customer-references/ heat/case-assens-district-heating

New opportunities with network meter reading: https://www.kamstrup.com/en-en/customerreferences/heat/loekken-fjernvarme

Remote meter reading via intelligent energy meters resulted in a lot of saving plus a targeted allocation of resources: <u>https://</u> www.kamstrup.com/en-en/customer-references/ heat/neastved







### **Company overview**

Since 1891 NKT has pioneered the cable industry. We started out with developing – at the time – highly innovative low voltage cables (LV) during the second industrial revolution. Our cables supported the transition from steam and waterpower to electricity and helped build the basis for modern convenient life as we know it.

Today we partner with our customers in the energy sector to create a safe and sustainable future in a world increasingly depending on power.

Over the years, our understanding of the role we play in society has changed us from being merely a cable manufacturer relentlessly improving the quality and durability of our cables to becoming a full-service trusted partner. By adding first medium voltage cables (MV) and later high voltage cables (HV) to our portfolio of products, we have now become a leading cable supplier within Europe supporting the New Green Deal by the EU Commission. Among others we deliver alternating current (AC) and direct current (DC) cables for wind farms and large interconnectors over long distances – i.e. between countries.

We pride ourselves in solving our customers reallife challenges everyday, while providing lasting value to the world's power grids. Feel free to contact us, we are always happy to share our expertise and discuss future mutual opportunities.

# What problems does the company solve?

NKT is a leading cable supplier specialized in manufacture and installation of all types of cables. The application is for grid reinforcement and the offshore wind industry as well as transmission over long distances with interconnectors.

We are responding to the renewable energy transition by offering tailormade products to suit our customers needs. We are in the forefront of developing products needed for the electrical grid of the future.

We have delivered cables for DC interconnectors both onshore and offshore as well as AC and DC export cables for connecting offshore wind farms to mainland grid.

### **Company Cases**

Kriegers Flak – world's first hybrid interconnector (AC, 220 kV) between Germany and Denmark. The project also entails a an offshore wind farm with the capacity of 600 MW and linking up with two existing offshore wind farms.

Caithness-Moray and Shetland HVDC Link turnkey supply and installation of a interconnector of 160 & 260 km 320 kV DC, both onshore and offshore. Project executed to ensure transmission of electricity from (future) generation in Shetland to consumption in Scotland and England.

SuedLink – 750 km transmission project to move electricity from generation of hydropower in Norway and wind power from Denmark to consumption in the south of Germany. DC, 525 kV

### CONTACT

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We connect a greener world







### For Greenland - Energy delivered without using fossil fuel

### **Company overview**

Nukissiorfiit is the all-compassing utility company of Greenland, supplying the citizens of Greenland with clean water and clean energy for electricity and heating. We both produce and distribute, with an end-to-end value chain in our line of business.

We are +400 dedicated people working in the Arctic to secure reliable water and energy supply every day of the year. Our company is owned by the Greenlandic Government, and was founded in 1949.

# What problems does the company solve?

In Nukissiorfiit about clean we care а environment. This is essential when delivering clean water and clean energy for the people of Greenland. 70% of our energy production is from renewable energy, primarily from our 5 hydropower plants. We dream of a fossil free future, an endeavor to double our production from hydropower by 2030. We want to achieve 95% renewable energy production within the next 9 years. To achieve this aim we plan to build a new hydro power station in the Disko region in 2027, and expand the country's largest hydropower station by 122% in 2025. This won't cut it though. and we have more hydropower development projects in the pipeline, alongside projects on solar and wind.

Our small settlements in Greenland mainly rely on diesel power. We want to change this, and have started an epic journey of transforming every diesel plant into hybrid solution power plants containing solar, battery and wind. This is hard, with rough weather conditions, isolated sites, tough economics and unpredictable habitation development. We do it anyway, because we care

about the people of Greenland and our shared environment.

The solution for 100% renewable energy is not set in stone. Many elements are still unknown. Will we achieve 100 % through Ptx? Will hydropower, solar and wind do the trick? Will tidal energy be part of our production mix in the future? We explore all the options, and invite you to share in our knowledge and experience. It is our hope that your knowledge can contribute to our success in achieving 100 % fossil free energy production as soon as possible. Please knock down our door and join in our journey, both if you are a supplier, a contractor, a counsellor, a field expert or a future employee.

See you in Greenland - we are everywhere .

### **Company Cases**

Our biggest hydropower station is Buksefjorden hydropower station. It produces 260 GWh every year through its 3 x 15 MW turbines. The plant was commissioned in 1993 and has paid for itself trice over in saved fuel costs. It is a significant factor to the relatively low prices of energy in Greenland, where infrastructure is a serious challenge. The future years will be exciting; with a planned expansion, that leaves room for excess power for unknown power intensive projects.

In Sisimiut we have a test center with test sites for wind turbines. We are testing small scale turbines from 10 - 200 kW. At the site we have both gentle, steady wind and extreme wind speeds combined with the freezing temperatures of the Arctic. We test for the extreme and we sometimes throw a blade or two some hundred meters. This test site is not for the timid. Do you have equipment we should try out?

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### Wind. It means the world to us. ™

### **Company overview**

Vestas is the energy industry's global partner on sustainable energy solutions with more than 40 years' experience, insights, and knowledge of wind. We design, manufacture, install, and service onshore and offshore wind turbines across the globe, and with more than 140 GW of wind turbines in 85 countries, we have installed more wind power than anyone else. Through our industry-leading smart data capabilities and more than 120 GW of wind turbines under service. we use data to interpret. forecast, and exploit wind resources and deliver best-in-class wind power solutions. Together with our customers. Vestas' more than 29,000 employees are bringing the world sustainable energy solutions to power a bright future.

# What problems does the company solve?

Vestas' wind turbines are checked and tested at our own test centers, after which the results are verified and certified by independent organizations. We also continuously monitor a large number of the turbines in operation, both to determine how the turbine design can be optimized and to use the data and knowledge to make turbine operation even more reliable and cost-effective. Vestas has an extensive portfolio of turbines which are each suited to specific conditions and requirements.

You need to consider various factors when operating a wind farm. It must be serviced, it has to be managed effectively to get the most out of the turbines, you have to train people to operate it, and it has to be insured. We can help with all these issues, and more.

We provide a range of different offerings, such as service and training, and work in close collaboration with our customers to help them find the optimum solution for operating their wind power plant.

To gain the most out of your wind site, Vestas offers you a wide range of options and solutions to support you in every step of your value chain. With our vast knowledge of the wind resource, we are able to assist you in optimizing the layout of even the most complex sites, and we offer a great variety of options and solutions to enhance the performance of the wind power project – and the business case certainty of your investment

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