



PHD CHAMBER OF COMMERCE AND INDUSTRY / INVEST INDIA / GREENSTAT / ARENA H2CLUSTER & NORWEGIAN HYDROGEN FORUM PRESENTS:

# OPPORTUNITIES FOR GREEN HYDROGEN IN INDIA



HYBRID EVENT

## BERGEN NORWAY

30th - 31st AUGUST 2022

30th August 2022  
**SUMMIT**

31st August 2022  
**INDUSTRY VISITS**

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PHD CHAMBER  
OF COMMERCE AND INDUSTRY



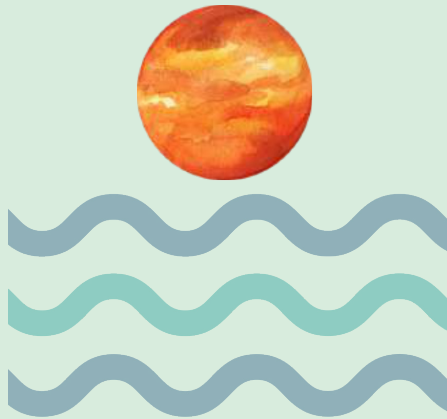
**INVEST INDIA**  
NATIONAL INVESTMENT PROMOTION  
& FACILITATION AGENCY

**GREENSTAT**



Arena H2Cluster  
The Norwegian Hydrogen Cluster





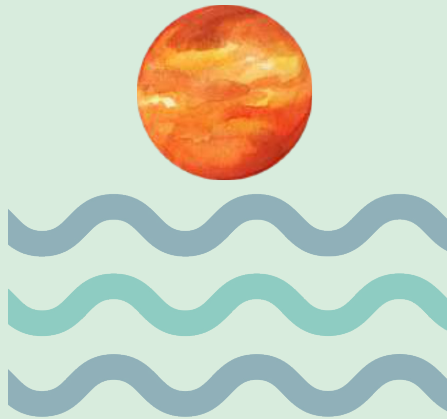
## ***ABOUT THE SUMMIT***

The International Climate Summit was held for the first time on 3rd of September 2021 in New Delhi. The summit was organized by PHD Chamber of Commerce and Industry in association with Invest India and Innovation Norway as the Country Partner. The participation was overwhelming, including a high level delegation from Norway along with 35,000 participants from around the globe. Several Nobel laureates, Academicians, Policy Makers worldwide attended the summit.

The Summit was a resounding success and many of the key takeaways which were submitted to the Government of India were accepted for Introduction of Green Hydrogen in India.

National Hydrogen Energy Mission (NHEM), launched in 2021, aims to aid the Government of India in meeting its climate targets and making India a global hub for green hydrogen. India has set the target to a production of 5 million tonnes of green hydrogen, annually, by 2030, along with the parallel development of renewable energy capacity.

This year's International Climate Summit, "Opportunities for Green Hydrogen in India", will be held in Bergen, Norway, on 30.-31. August. Greenstat, Arena H2Cluster and the Norwegian Hydrogen Forum will represent the Norwegian partnership along with the Indian side represented by PHD Chamber of Commerce and Industry and Invest India.



## **KEY FOCUS AREAS FOR THE SUMMIT:**

- To identify the incentives required for setting up mega scale hydrogen plants in India for industrial and domestic consumption and export.
- Opportunities for setting up and developing needed infrastructure to ensure safe transport, storage and use of green hydrogen.
- Cost effective technologies for setting up plants for the production of hydrogen on a medium and large scale
- R&D collaborative tie ups for hydrogen production, using PEM, Alkaline, AEM and Technologies with Norwegian and European Research Labs.
- Opportunities for international technological collaboration – ensuring the use of best practices throughout the entire value chain of Green Hydrogen.
- Setting up of Centre of Excellence covering process safety, mapping of available standards and policies with respect to International standards, using state of the art within software, training of manpower through VR and AVR in Hydrogen Production, Transportation and Applications.
- Provide pathway for sustainable energy security coupled with direction on developing road map for achieving net zero target of India.



### **Vegard Frihammer**

Green Executive Officer / Founder

Founder and GEO of GREENSTAT, an energy company founded to create value through green business models within local energy, hydrogen, energy analysis and other areas within renewable energy.



### **Karen Landmark**

Chief Strategy Officer

Dr. Karen Landmark has more than 20-year experience working with sustainability issues for private sector. She holds a PHD in sustainability transitions focusing on energy transitions and effects on societies. She is part of the management at the Greenstat Group and hold the position as chair of the board for Greenstat Asia.

# **Greenstat welcomes ICS2022 to Bergen, Norway**

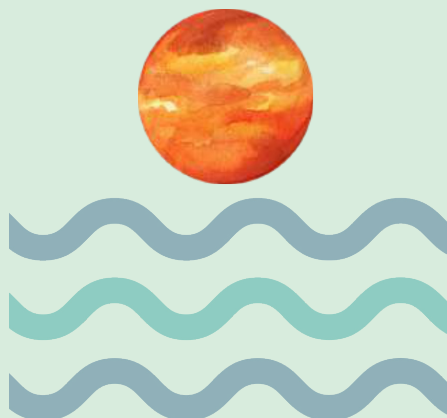
It is a great honor and pleasure for Greenstat to co-host this year's International Climate Summit, "Opportunities for Green Hydrogen in India", in Bergen, Norway, where Greenstat is headquartered. As a co-host with the PHD Chamber of Commerce and Industry and Invest India, we hope to follow up last year's success in New Delhi, India, with enhanced worldwide attention.

Norway started producing hydropower 130 years ago and with its almost 100 years of experience in the production of green hydrogen, by electrolysis. Approximately 99% of all power production in Norway today is based on renewable energy. However, just over a third of the total energy consumption in Norway is still based on fossil energy, which is mainly used in mobility and industry.

Norway has a major responsibility to be a proactive player in the transition from fossil energy to renewable energy, with its long history and access to enormous amounts of fossil energy, which today represent as much as about 40% and 60% of respectively gas and oil resources in Europe. To meet the future needs will have to take part in scaling up the global production of Green Hydrogen.

We all have a responsibility to reduce climate emissions, and thus reduce the fatal consequences from global warming. We also know that a prerequisite for our success is largely dependent on global cooperation. In addition to being a huge country, in terms of population, India also stands out with its clear commitment to renewable energy and green hydrogen. This makes India a very attractive market for countries, such as Norway, with significant access to technology, expertise and financial instruments. By joining forces with India, we strengthen our chances to succeed with common goals within the global energy transformation.

The threat of climate change has finally set in motion a global green transition, moving from fossil energy to renewables at a scale and pace not previously seen. However, the scale and speed required is often under-appreciated. A renewable-energy economy must expand at the same pace as the fossil-fuel economy contracts to keep jobs and energy prices stable. Critically, the transition pace is slowed by economic and social barriers, not technology. Most of the technology required to achieve ambitions climate goals already exists, but to drive a fair, effective and fast transition governments, business, and R&D need to act with unity. Let us succeed, together!



**Ingebjørg Ternes Wilhelmsen**

Secretary General at the Norwegian Hydrogen Forum (NHF)

NHF was founded in 1996 as a non-profit member organization, which promotes the advantages of hydrogen and ammonia as energy carriers. NHF members span Norwegian producers, distributors, industry, universities, research institutes, companies in the transportation sector, consulting firms and other organizations interested in hydrogen. The basis on which NHF is founded concerns the important role hydrogen will have in the transformation to a greener future. Norway have been a frontrunner when it comes to renewable energy such as hydropower. Now, we must show the world that we still are a renewable energy nation to reckon with and take a leading role in the hydrogen and ammonia industry.

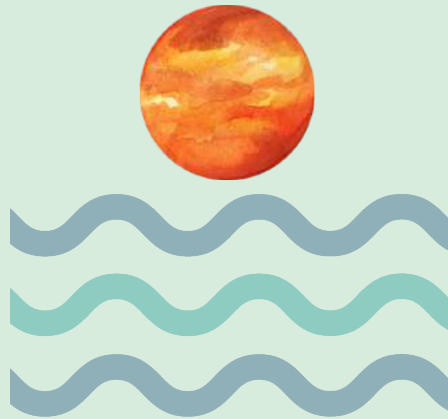
India is one of the world's fastest growing economies, and with impressive plans for rapid growth in renewable energy. This includes investments in 450 GW production capacity of hydrogen by 2030. India's success will undoubtedly mean a lot to every man and woman living in India, and it will also have enormous global environmental impact. It is with great admiration I registered the determination and enthusiasm of India's authorities to facilitate this rapid development and major investments in hydrogen.

Norway is in comparison a "slightly" smaller nation. However, we have unique position within natural gas and infrastructure for CO2 capture and storage. This represent great opportunities for production and export of blue hydrogen. We also have large renewable resources in hydropower and are seeking further development in offshore wind. Norway also have a strong technological competence, a versatile supplier industry and world class research institutes. Thus, Norway is very well positioned to take a significant role in developing the hydrogen economy. However, the Norwegian export revenues have decreased dramatically in recent years. The Norwegian government has therefore set an ambitious goal of increasing Norway's exports excluding oil and gas by 50 per cent by 2030. This is a huge challenge, but in every challenge there is also possibilities.

I believe there are great opportunities for Indian and Norwegian companies to join their forces and expertise. And I am confident that we together will be able to contribute to a faster reduction of the climate gas emissions.

On behalf of all our members in the Norwegian Hydrogen Forum, it is a great honor to welcome you to this years International Climate Summit 2022. I look forward to seeing you all!





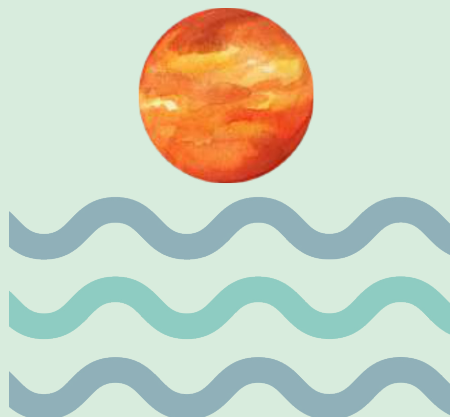
***His Holiness Sri Sri Ravi Shankar***

His Holiness Sri Sri Ravi Shankar, Founder of Art of Living, is a globally revered spiritual master and peace maker. The contribution of Art of Living through its recent many initiatives to remove the sufferings of the people of Ukraine in ongoing war with Russia, has been noteworthy.

His foundation 'Art of Living' is having presence across under 56 countries and has reached an estimated 500 million people. Accredited as a United Nations non-governmental organization in 1996, Art of Living works in special consultative status with the UN's Economic and Social Council. His Holiness has also taken many initiatives to combat climate change through 'Ancient Wisdom'.

***Spiritual transformation is the only Panacea for climate change.***

***"Since ancient times, people the world over have honored our planet and its five elements. This is how we were able to thrive on our beautiful earth all these years. It is our duty to care for our environment as our very existence depends on it."***



**Sturle Pedersen**  
Greenstat Norway

Experienced Chief Executive Officer with more than 30 years of global experience in leading successful businesses initiatives and ventures through conceptualizing ideas and seizing opportunities.

Extensive experience of initiating and leading international alliances, negotiations, mergers and acquisitions, as well as securing funding and facilitate and build strategic partnership with global industry leaders. Strong emphasis and devotion for accelerating the transition from fossil fuel to renewable energy with emphasis upon green hydrogen in the energy mix.

## ***“It’s now or never”...***

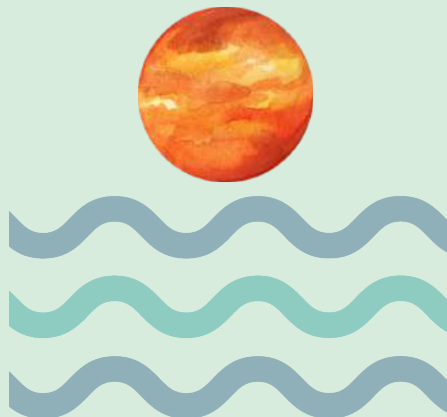
Indicating that harmful carbon emissions from 2010-2019 have never been higher in human history, is proof that the world is on a “fast track” to disaster, António Guterres (General Secretary UN) has warned, with scientists arguing that it’s ‘now or never’ to limit global warming to 1.5 degrees.

It is with humility towards our common planet and great gratitude to all contributors to this year’s summit, “Opportunities for Green Hydrogen in India”, we welcome everyone! India, with a population of 1.4 billion, consumes huge amounts of fossil fuels. At the same time, India is a country with enormous potential to produce its own energy through renewable sources. Through strategic cooperation with countries possessing key competences and technologies, India will be able to achieve its goal of energy independence (Atmanirbhar Bharat).

This year’s conference will help accelerate foreign investment and technology cooperation between Norway and other countries, with India. We welcome Gurudev Sri Sri Ravi Shankar to give us a backdrop towards ancient wisdom in regards of living in harmony with nature. We also look forward to listen to perspectives from high ranking members of Hydrogen Europe, the Indian and Norwegian government as well as from global leading industry and R&D. This years summit will present some groundbreaking projects for scaling the hydrogen value chain, followed by sessions focusing into opportunities related to: investments, technology, safety and decarbonizing. Finally, we challenge some key speakers to point out constructive ways forward and to point out the connections between barriers and opportunities.

Hydrogen plays a key role in the energy transformation. India already consumes about 7MMT of gray hydrogen, which opens up for rapid scaling to green hydrogen within an already “well-functioning market”. This is something Honorable Prime Minister Narendra Modi has pointed out as an important starting point for being able to kick start the country’s hydrogen investment. With this targeted investment, India will be able to quickly scale up large-scale production of technology and thus achieve greatly reduced costs associated with hydrogen production.

We welcome audience, from all over the world, to participate in this year’s International Climate Summit, focusing on Opporutnities for Green Hydrogen In India. Together we are able to make a considerable impact on Climate Change.



### **Dr. Jeewan Prakash Gupta**

Summit Chair and Chair Environmental Committee,  
PHDCC

Dr. Jeewan Prakash Gupta is currently the Managing Director, Greenstat Hydrogen India Ltd.

He is also Chairman of Governing Council, Centre of Excellence in Process Safety and Risk Management at IIT Delhi.

He is also Member of Board of Governors of SRIRAM Institute of Industrial Research.

He is an adjunct Professor at ICT Mumbai.

He holds several other positions on technical bodies for production of Renewable Energy and Green Hydrogen.

# **India is the Epicenter of opportunities for Green Hydrogen**

This year's International Climate Summit serves as a reminder of several important collective issues. First, that the complexities of the global challenges calls for a holistic approach to transition and a deep reconnection with nature.

In the planning of the conference, we kept reflecting on the famous quote from the environmental lawyer, Dr. Gus Speth who stated;

*"I used to think that top environmental problems were biodiversity loss, ecosystem collapse and climate change. I thought that thirty years of good science could address these problems. I was wrong. The top environmental problems are selfishness, greed and apathy, and to deal with these we need a cultural and spiritual transformation. And we scientists don't know how to do that."*

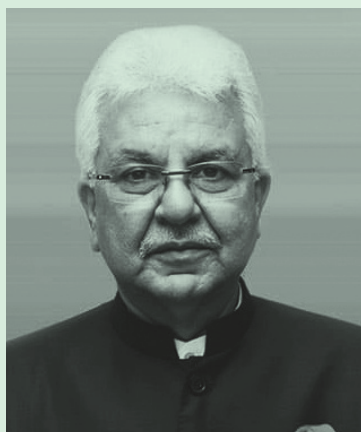
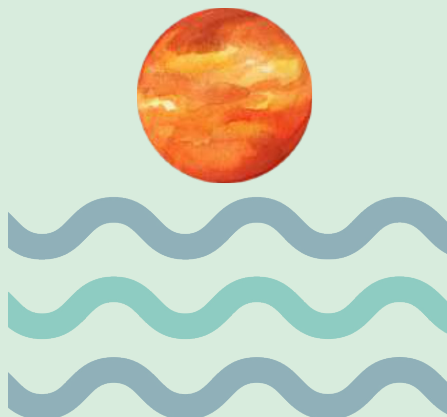
With this spirit, we are humbled and grateful for the participation of His Holiness Sri Sri Ravi Shankar a great spiritual master of this modern era, who will unravel the unique path of spiritual wisdom to deal with the existential crisis arising out of Climate Change.

Second, the need to speed up the shift from fossil energy to renewable energy. This shift calls for fast technological development and deployment

During the last 7.5 years, India has witnessed the fastest rate of growth in renewable energy capacity, an addition among all large economies, with renewable energy capacity (including large hydro) growing 1.97 times and solar energy expanding over 18 times.

For Solar energy alone, about 5,000 trillion kWh per year energy is incident over India's land area with most parts receiving 4-7 kWh per sq. m per day. In India, with an average of 300 sunny days a year, the Solar photovoltaics power can effectively be harnessed providing huge





### **Pradeep Multani**

President, PHD Chambers of Commerce and Industry

An eminent industrialist and a renowned name in the field of Traditional Medicine, Mr. Pradeep Multani, Chairman, Multani Pharmaceuticals Limited having an enriched experience of more than 40 years in the manufacturing of Ayurvedic and Unani medicine and products.

He is holding the position of Chairman for last 32 years of a 83 year old prestigious multi crore limited company.

He is also the President of PHD Chamber of Commerce and Industry, Co-Chairman, FICCI - AYUSH Committee and President of Association of Manufacturers of Ayurvedic Medicines (AMAM).

scalability in India. This clearly indicates that there is a very high potential of harnessing the Green Hydrogen energy. In line with the Indian Prime Minister's announcement of Hydrogen Mission at the CoP26, the Government is committed to achieving 500 GW of installed electricity capacity from non-fossil fuel sources by the year 2030, India will meet 50% of its energy requirements from renewable energy by 2030 and reduce the projected Carbon emissions by one billion ton from now till 2030.

The issue of the cost for which the global green-hydrogen fraternity is concerned has been very well addressed by Mr. Mukesh Ambani, the Chairman and Managing Director of Reliance Industries, Limited (RIL), as he asserted that in a decade's time, novel technologies and innovations are likely to bring down the cost of greenhydrogen significantly to a dollar per kilogram in comparison to European Union's \$3 per kilogram or more and assure that the transportation as well as disbursing of green-hydrogen takes place at less than a dollar per kilogram.

India's renewable energy program has to be driven by private sector investment. During recent past, Indian renewable energy programs and projects attracted an investment of US\$ 64.4 billion and India is progressively becoming a favored destination for investment in renewables. Liberal foreign investment policy allows the foreign investors to enter into joint ventures with an Indian partner for financial and/or technical collaboration and for setting up renewable energy-based power generation projects. Up to 100 per cent foreign investment as equity qualifies for automatic approval, under the extant FDI policy of the Government.

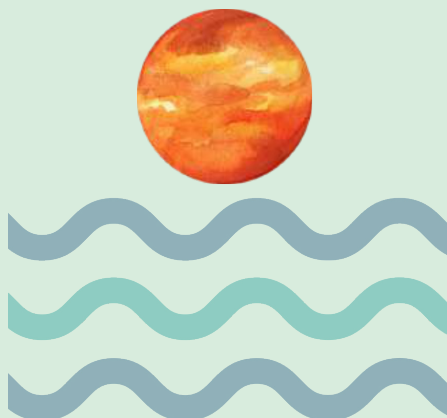
Existence of several IIT's network of CSIR Research Laboratories, Central and State Universities and Center of Excellences are actively functional in India to lead frontier of world class science and technological research. This offers a very fertile location for innovation. Further, India offers infrastructure for the manufacture of the electrolyzers, storage stands and other complex plant and machinery, needed for Green Hydrogen Production.

With fastest growing GDP in the world today, energy consumption, climate emissions and a need for green solutions are growing in parallel. In view of this, we welcome the green hydrogen economy in India, both for export and to feed the local demand.

We are sure that Norway and India together through International Climate Summit 2022 in Bergen, Norway can jointly change the Landscape of Green Hydrogen on the global map for India's economy, energy security and simultaneously, successfully address the Climate Commitments in times to come.

Dr. J.P. Gupta  
Summit Chair & Chair, Environment Committee  
PHD Chamber of Commerce & Industry  
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President  
PHD Chamber of Commerce & Industry  
Contact: +91-11-26863801-04  
Email ID: president@phdcci.in;  
chairman@multani.org



# OPPORTUNITIES FOR GREEN HYDROGEN IN INDIA / 30th August

## EU CET

## INDIA - IST

9:00 - 09:30 AM 12:30 - 1:00 PM

9:30 - 09:50 AM 1:00 - 1:20 PM

9:50 - 12:00 AM 1:20 - 3:30 PM

12:00 - 1:00 PM 3:30 - 4:30 PM

1:00 - 2:00 PM 4:30 - 5:30 PM

2:00 - 4:10 PM 5:30 - 7:40 PM

4:10 - 5:00 PM 7:30 - 8:30 PM

4:55 - 5:00 PM 8:25 - 8:30 PM

## PROGRAM

### REGISTRATION

**WELCOME:** Dr J.P. Gupta / Mr Sturle Pedersen / Mr Vegard Frihammer

**PART 1: INAUGURAL SESSION:** Ministers from Norway & India President, PHDCC / Hydrogen Europe/ European Clean Hydrogen Alliance / Norwegian Hydrogen Forum / Arena H2Cluster / Blessings by Gurudev Sri Sri Ravi Shankar / Release of Knowledge Book - Opportunities for Green Hydrogen in India.

**PART 2: GROUNDBREAKING PROJECTS FOR SCALING THE H2 VALUECHAIN**  
Steel industry / Ammonia / Hub/ ports

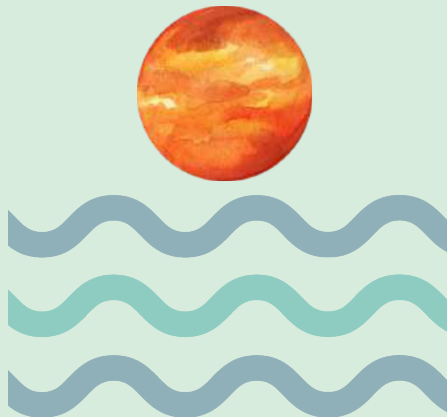
### LUNCH

### PART 3: PARALLEL SESSIONS

- A. INVESTMENTS - private and governmental opportunities
- B. TECHNOLOGY - challenges to succeed scaling up
- C. SAFETY - guidelines and capacity-building
- D. DECARBONIZATION - governmental approach

**PART 4: PANEL DEBATE:** Opportunities for Green Hydrogen in India

### CLOSING REMARKS



# OPPORTUNITIES FOR GREEN HYDROGEN IN INDIA / 31st August

<b>EU CET</b>	<b>INDIA - IST</b>
9:00 - 10:00 AM	12:30 - 1:30 PM
10:30 - 12:00 AM	2:00 - 3:30 PM
12:00 - 1:00 PM	3:30 - 4:30 PM
1:00 - 3:00 PM	4:30 - 6:30 PM
3:00 - 5:00 PM	6:30 - 8:30 PM
5:00 PM	8:30 PM

## PROGRAM

**Bergen City Center -> Kollsnes, by electric buses or -cars**

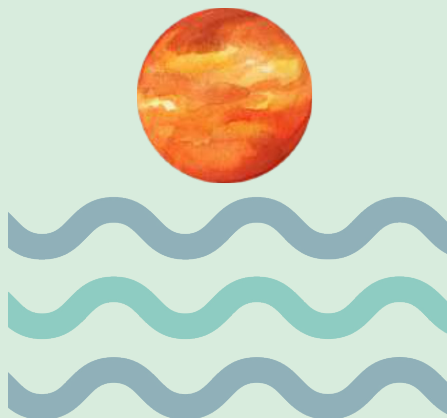
**Kollsnes, Øygarden Municipality:** Northern Lights - CCS / ZEG Power  
- H2 production / CCB Kollsnes

**Lunch, organised by the Mayor of Øygarden Municipality, Tom Georg Indrevik**

**Kollsnes -> Fantoft, with possible stop on the way (or passing by):**  
Greenstation (energystation at Straume) / Uno-X hydrogen station at Åsane / Green  
Yacht / Others

**Fantoft – business presentations and venture lab:** Alma Clean Power / Clara  
Venture LabsGreenstat / Gexcon / Norled? / LMG Marine / Corvus Energy / Others

**Return to Bergen, City Center**



## Knowledge & Support Partners:



Ministry of Environment, Forest and Climate Change



Arena H2Cluster  
The Norwegian Hydrogen Cluster



IIT DELHI



DET MODERNE INDIA



IndianOil



University of South-Eastern Norway



SHRIRAM



Uio  
University of Oslo



Norwegian University of Science and Technology



Institute for Energy Technology



Norwegian Centres of Expertise  
NCE Maritime CleanTech



TECHNOLOGY DEVELOPMENT BOARD  
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