

Oslo a driving force in innovative sustainable energy

OREECs role as a facilitator for
energy-technology innovation.
Examples, companies and ongoing
projects

Per-Olav Lauvstad
Project manager ORREC
11. September 2014





Area: 385,000 km²

5 million inhabitants

58-71°N

This is Norway

50 m² flat in Oslo: \$300k

Oil and gas sector:

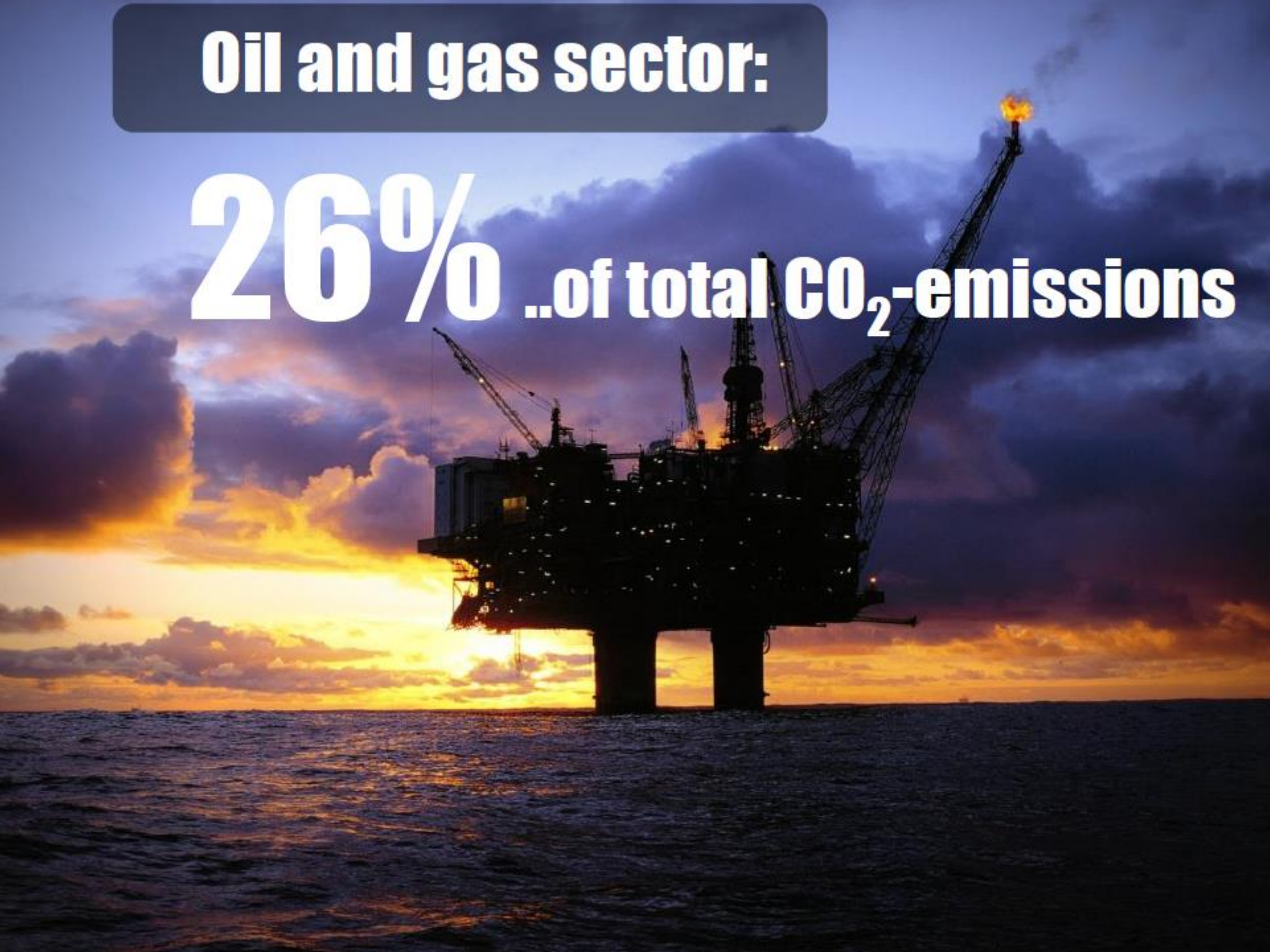
Yearly revenues:

\$68 billion



Oil and gas sector:

26% ..of total CO₂-emissions



Stationary power generation:

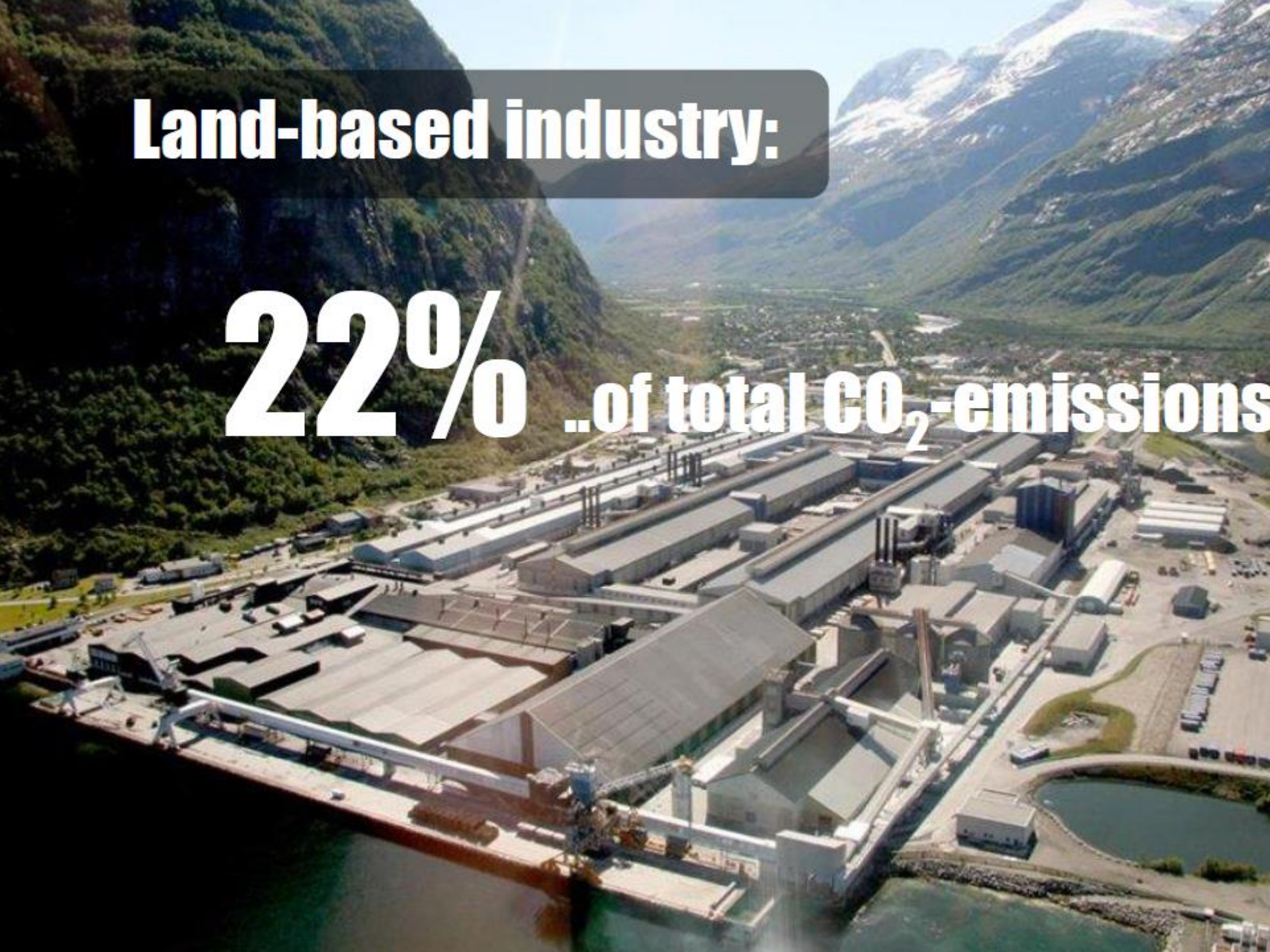
3%

..of total CO₂-emissions



Land-based industry:

22% ..of total CO₂-emissions



A photograph of a multi-lane highway during a heavy snowfall. Several cars with their headlights on are driving away from the camera. In the foreground on the right, a white bus is visible with an orange LED sign on its roof that reads "Gardermoen" with a left-pointing arrow. A triangular warning sign is visible on the right side of the road. The overall scene is hazy and white due to the snow.

Transport sector:

19% ..of total CO₂-emissions

Due to revenues from oil and land based industry, transport sector is the most attractive sector to cut emissions.

OREEC

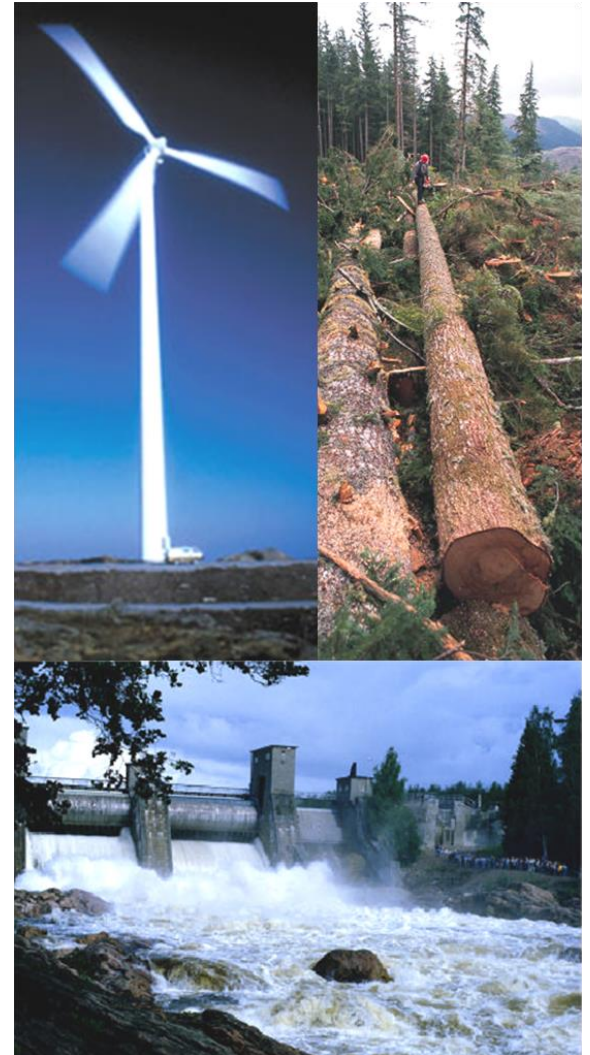
Mission:

To increase innovation and opportunities for business development in renewable energy technology

«Green investments can help to get the economy moving again, and do so in a way that makes it more sustainable.»

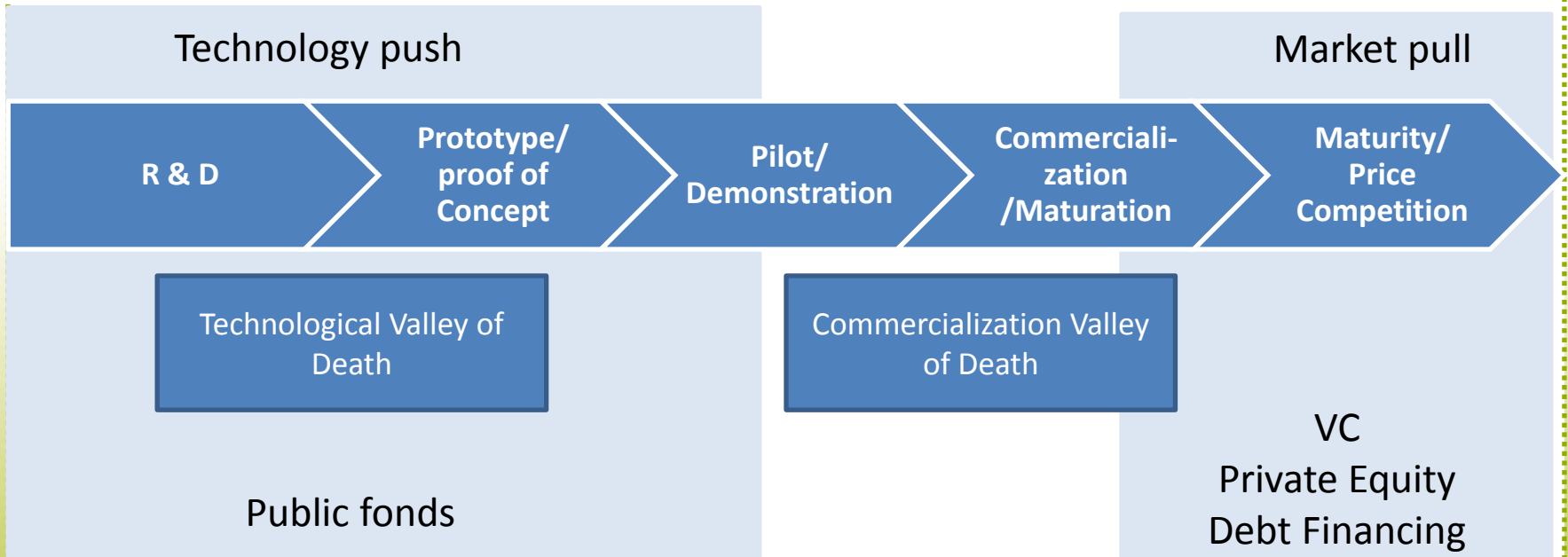
“Brining technology push and pull strategies together into a dynamic strategy and plan requires a vision.”

Mariana Mazzucato University of Sussex



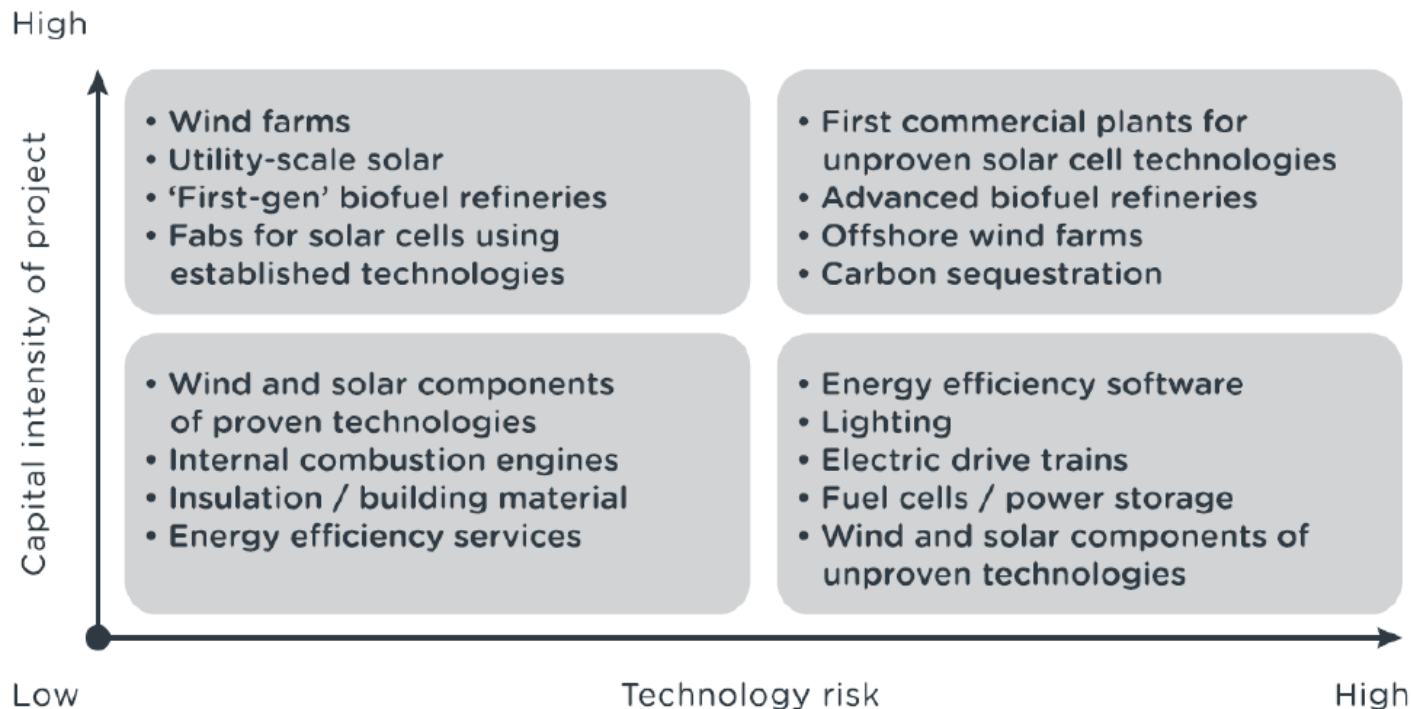
Cleantech innovation

- Cleantech ideas take on average 24 – 30 years to reach a mass market*



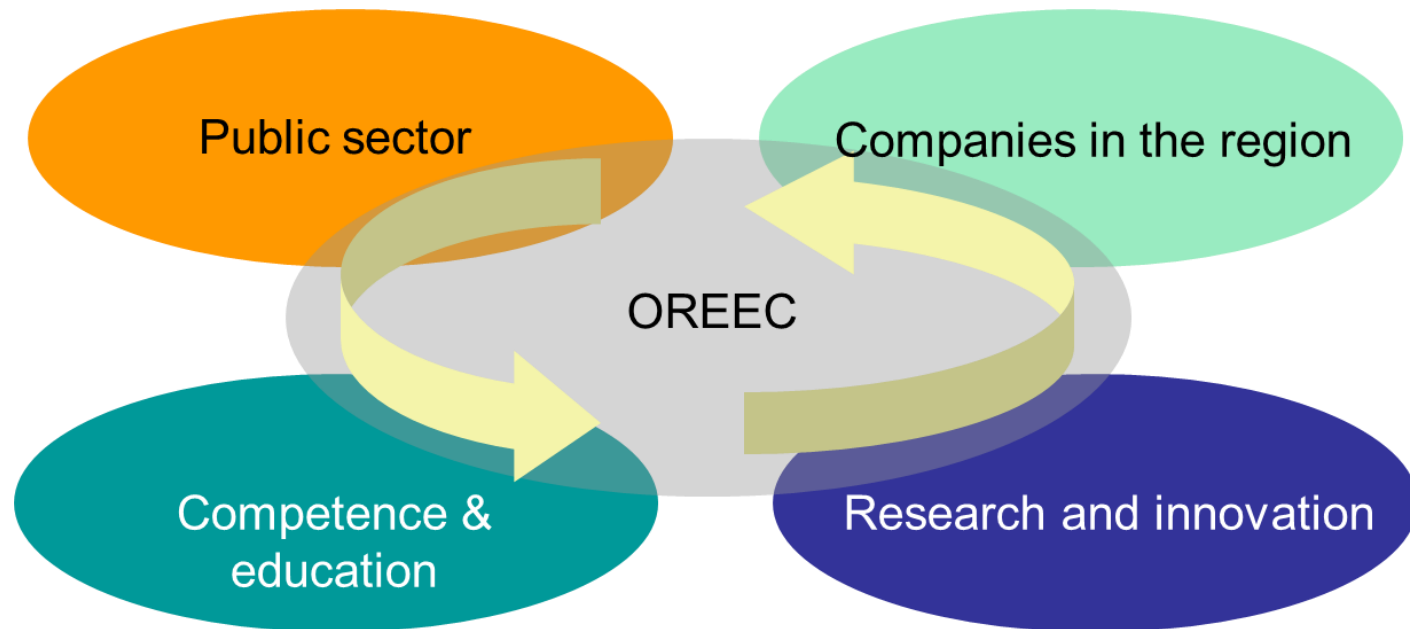
Technology risk in clean tech

(VC will ride the wave, who will kick/push?)



OREEC

- A network of companies, research institutions, universities, public sector and investors/finance sector
- OREEC – facilitator for increased cooperation
- 54 members, 200 companies participating in our projects



Activities to increase innovation

- Brokering
 - Meetings with companies to identify needs for R & D and funding
- Company projects
 - Financing early/verification projects
6000 – 25000 Euro
- Building consortia
- Seminars, workshops
 - To increase the interaction between research, entrepreneurs, customers and industry
- Supplier Development
 - Meetings between customers and suppliers
- Influencing key stakeholders
 - Lobby operations towards politicians



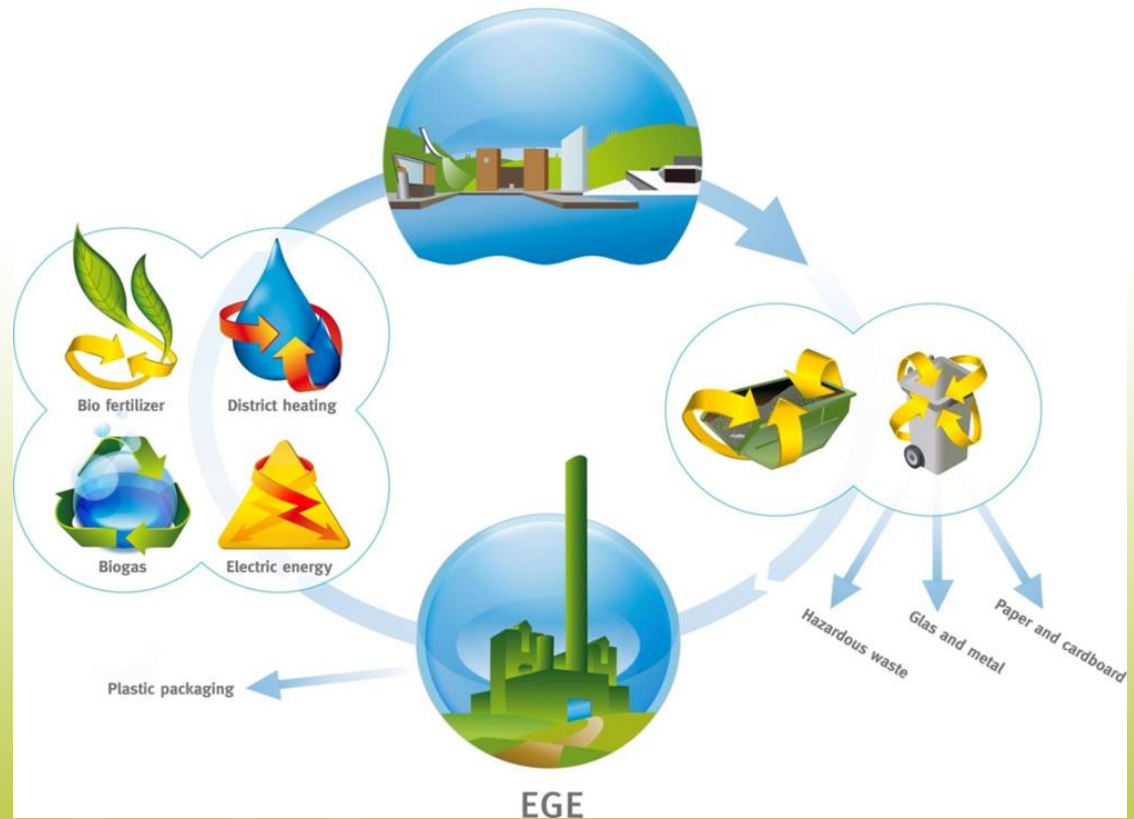
The Oslo Region

- Growing from 1.1 million to 1.5 million by 2030
- 50 % reduction in greenhouse gas emissions by 2030
- Plan for residual waste treatment
- Increased demand for energy will be met by energy efficiency and increased use of renewable energy
- Increased need for transport should be covered by public transport and ZEV
- Public transport on renewable fuel within 2020



Circular economy and waste treatment

- Cycle-based waste management system
- 50 % recovery of household materials
- 70% recovery of household materials by 2020
- Source sorting of food waste and plastic packaging



District heating

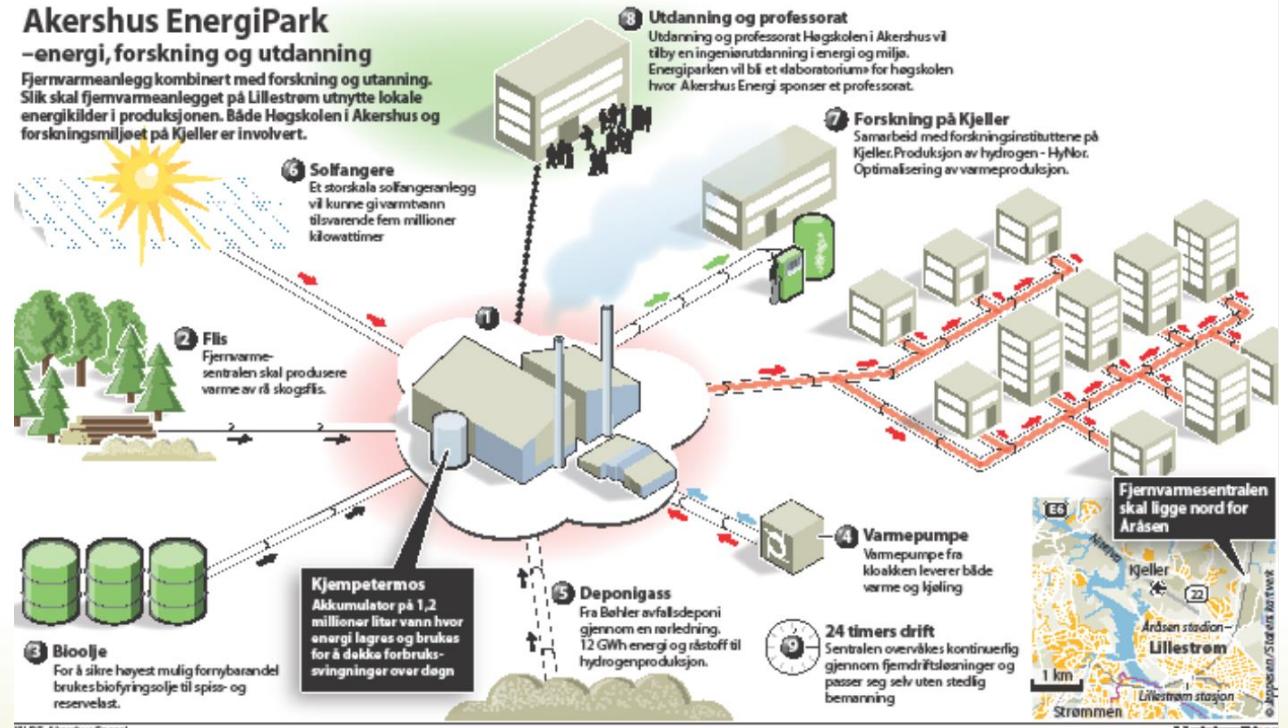
- Covers 20% of the population in Oslo
- 2013 6% oil
- Basis for increased use of district heating based on renewables:
 - Garbage incineration
 - Biomass – pellets and woodchips
 - Bio-oil
 - Solar heating
 - Bio gas
- Local energy production
- Change from fossil fuels to renewable fuels, oil boilers are banned from 2020



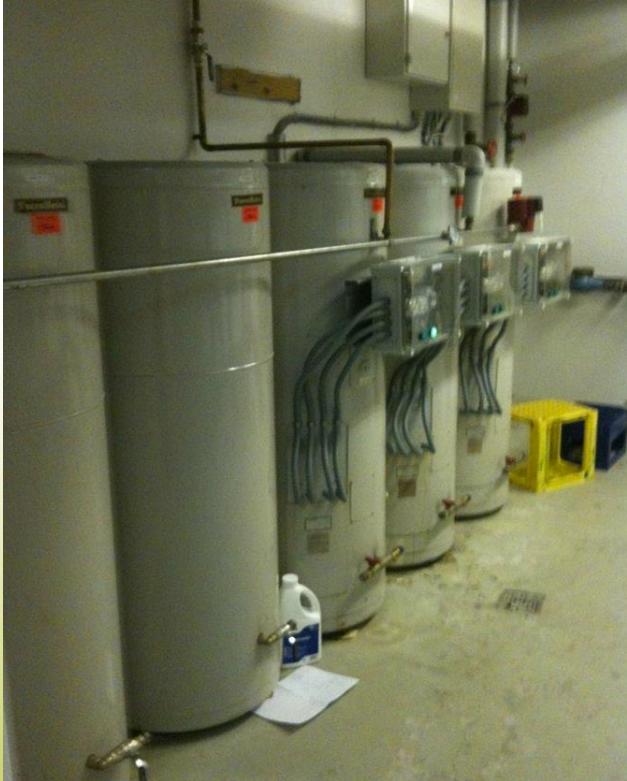
Incineration of burnable waste - 410 000 tons/year.
Production of hot water for district heating (840 GWh)
and electrical energy (160 GWh)

Akershus EnergiPark –energi, forskning og utdanning

Fjernvarmeanlegg kombinert med forskning og utdanning. Slik skal fjernvarmeanlegget på Lillestrøm utnytte lokale energikilder i produksjonen. Både Høgskolen i Akershus og forskningsmiljøet på Kjeller er involvert.



Geothermal energy



Heat pumps for heating and cooling
Drilling around 200 meters
Combined with central hot water systems
Local heating/ hot water connected to district heating
Combing low an high temperature in the district heating system



Powerhouse, an energy-plus house

- Over the life time it produces more Energy than it uses
 - Good isolation
 - Natural ventilation
 - Solar PV
 - Geothermal heating/cooling
 - Low energy use and automation of lights
 - Delivered by Asplan Viak AS



Increased need for transport should be covered by public transport and ZEV

- Incentives for Zero Emission Vehicles
- Public transport on renewable fuel within 2020
 - 1200 buses
 - 3000 taxi's
- Renewable fuel
 - Biogas
 - Electricity
 - Hydrogen
 - Ethanol

Why ZEVs in Norway?

96% renewable electricity (127 TWh/yr total, st.)

Tax-exemption (Tax: ~100%)

VAT-exemption (25%)

Access to public transport lanes

Free driving on toll-roads

Free public parking (and charging)

10% of annual road fee

Free passage on ferries

Biogas in Oslo



- CBG from sewage: 2,2 mill Nm³/a
- LBG from food waste: 4,5 mill Nm³/a
- Potential: biogas from sewage: >6 mill Nm³/a
- Sold to distributor; AGA (Linde Group)
 - 6 filling stations in Oslo
- Existing users of biogas:
 - 87 busses
 - 68 waste collecting trucks
 - 6 waste collecting trucks in the Municipality of Asker
 - 4 dairy trucks run by Tine
 - Some company and private cars

Production of biogas

- Biological treatment of sewage
- Biological treatment of food waste - 50 000 tons/year
 - Production of biogas as fuel for transport
 - Production of bio fertilizer



- Biological treatment are delivered by Cambi AS
- Technology for producing liquid biogas are delivered by Linde Group

Working on making the shipping industry fossil free



- LNG/LBG replacing oil
- Siemen/Scania blue drive chain for fishing boats
- Land based electricity for ships at harbor
- Electric ferries

Electric ferry starts in November 2014
80,8 meter long and 20,8 meter wide.
Capacity: 120 cars and 360 passengers.
20 min. fare, charges in 10 min.
34 charging's a day

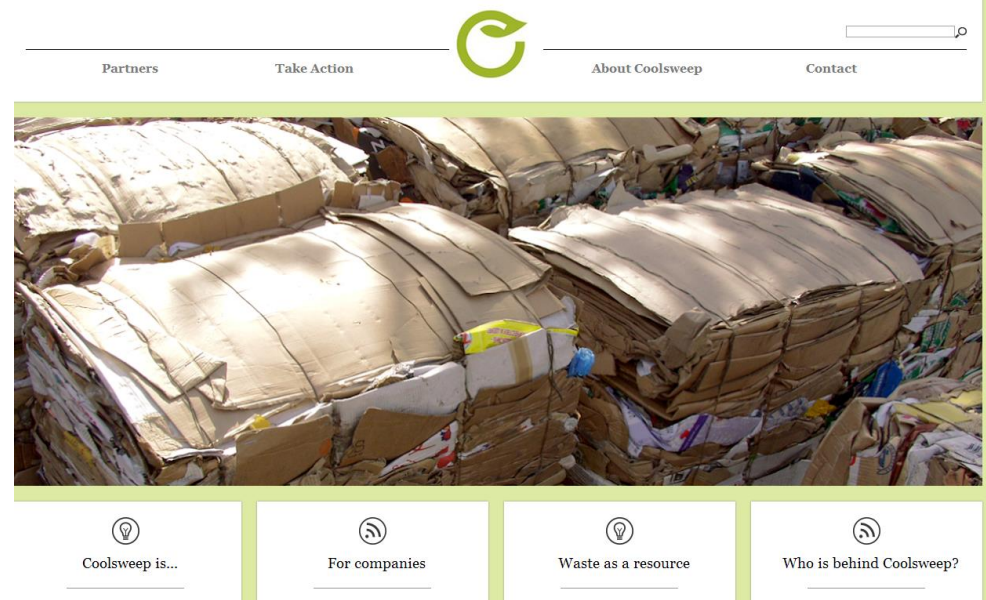
Regions of Knowledge - COOLSWEEP

Coordinating and Leveraging regional knowledge for initiating a Sustainable and optimised EU Waste to EnErgy Programme

OREEC are coordinator

Partners (from International
Cleantech Network):

- Copenhagen Cleantech Cluster
- ECO World Styria, Graz, Østerrike
- Euroimpresa, Milano
- Aclima, Bilbao
- FORA, Danmark
- Montanuniversität, Østerrike
- Riga Tekniske Universitet
- Cambi AS (Third Party)



Cleantech technologies

- Energy Generation: wind, solar, hydro/marine, geothermal, biofuels
- Energy Storage: fuels cells, advanced batteries, hydrogen, hybrid systems
- Energy Infrastructure: management, transmission
- Energy Efficiency: lightning, buildings, glass
- Transportation and Logistics: vehicles, logistics, structures, fuels
- Water and Wastewater: conservation, purification, treatment
- Air and Environment: emissions, monitoring and offset, trading
- Advanced Materials: nano, bio, green chemicals
- Manufacturing & Industrial: advanced packaging, smart production
- Agriculture: natural pesticides, land management, aquaculture
- Recycling and Waste: recycling, waste treatment and recovery



Norwegian Cleantech industry

- 1 786 companies in 2011
- Employed around 38 000 people
- It is the fifth largest industry in Norway measured in added value
- A total revenue of 24 billion Euro
- A total of 8,6 billion Euro added value
- The industry grew by more than 12 percent in 2011



Overview

Segments	No. of companies
Renewable Energy	
Hydro-production	594
Hydro-technology	33
Bioenergy	155
Wind-production	15
Wind- manufacturing and technology	33
Solar	30
Other clean energy	22
Subtotal	882
Environmental Technology and Services	
Consulting R&D, ICT	102
Energy efficiency	96
Industrial/transport emission management CCS	27
Environmental monitoring	11
Subtotal	236
Traditional environmental Services	
Waste management, treatment and recycling	475
Power distribution and trading	
Power distribution and trading	193



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- Collection Solutions, Material Recovery
- Collection Solutions, Compaction
- Sorting Solutions, Recycling
- Sorting Solutions, Mining
- Sorting Solutions, Food

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Our reverse vending solutions facilitate the return of more than 30 billion empty cans and bottles annually.
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SORTING SOLUTIONS, RECYCLING

Our sensor-based sorting solutions for paper, plastics and metals help efficiently recover hundreds of thousands of tons of these materials every year.
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COLLECTION SOLUTIONS, MATERIAL RECOVERY

Our material recovery business processes over 750 million pounds of containers annually - all of which are recycled.
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SORTING SOLUTIONS, MINING

Our sorting solutions are helping mining operations to reduce environmental impact and better utilize existing deposits.
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COLLECTION SOLUTIONS, COMPACTION

Our installed base of vertical balers enables daily savings of 20,000 transport movements - saving in turn 160,000 liters of fuel.
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SORTING SOLUTIONS, FOOD

Our sorting solutions inspect millions of produce items per hour, enabling higher yields and better utilization while reducing energy usage throughout the food supply chain.
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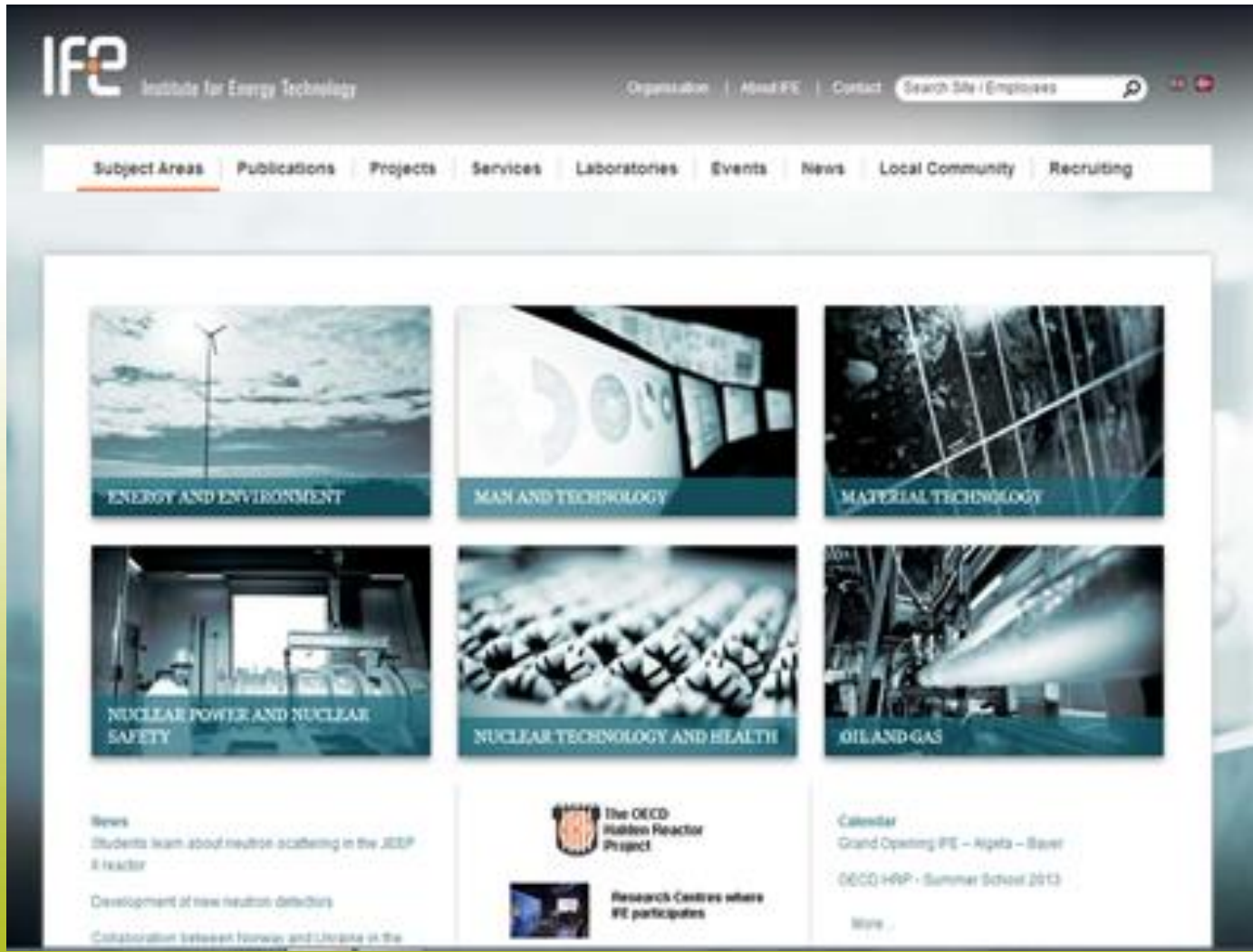


SORTING SOLUTIONS, SPECIALTY PRODUCTS

Our sorting solutions effectively remove NTRM from tobacco processing operations and deliver a high degree of quality control for processing raw materials such as virgin plastics, synthetic rubber, specialty chemicals, and pharmaceuticals.
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Thank you for your attention!

