

CCS DEVELOPMENT IN NORWAY



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Gassnova SF, the Norwegian state enterprise for CCS

SLEIPNER: 16 YRS OF SUB SEA BED CO₂ STORAGE



NORWAY PUNCHING ABOVE IT'S WEIGHT IN CCS



- Oil and energy cluster
- R&D based industrial development
- Financial resources
- Making fossil fuels sustainable
- A driving force vs. the climate challenge

GASSNOVA SF

THE NORWEGIAN STATE ENTERPRISE FOR CCS



CLIMIT : R&D programme

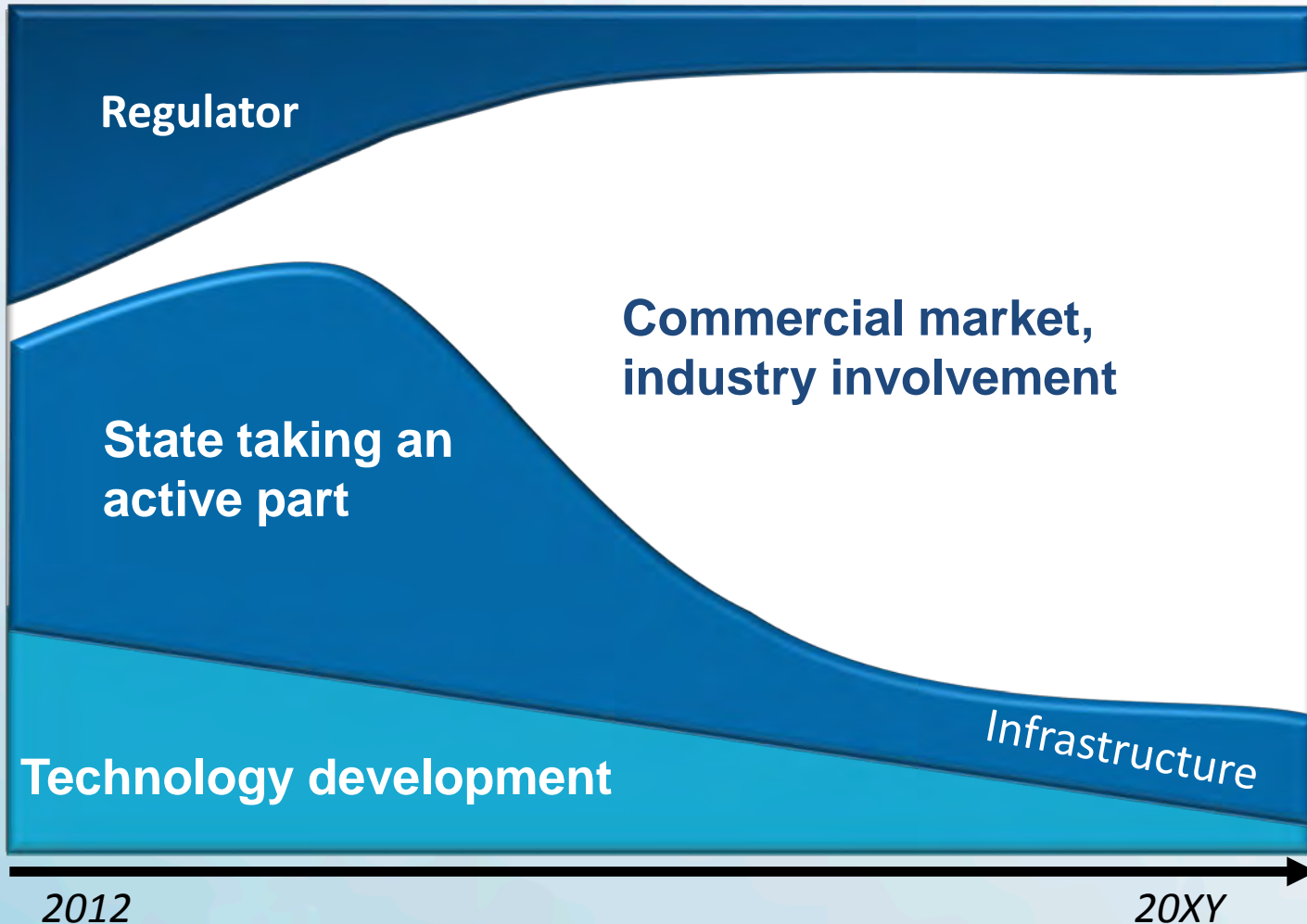
- R&D Grants

Projects

- Demo projects
- Govt/Industry Partnering

Advisor to the authorities

CCS IN NORWAY - STATE INVOLVEMENT



CCS FOR A BETTER CLIMATE

Functioning market



International deployment



Reduced cost and risk



Framework conditions



Acceptance in society



Early CCS Demo



R&D and tech. verification

PROJECTS

- **CO₂ Technology Centre Mongstad (TCM)**
 - Opened May 7th 2012
- **Full-scale CO₂ Capture Mongstad (CCM)**
 - Concept decision and technology qualification
 - FID 2016
- **Transport and storage Mongstad**
- **Norwegian CCS Study**

MONGSTAD





CO₂ TECHNOLOGY CENTRE MONGSTAD (TCM): AMBITIONS

- Verify CO₂ capture technology owned by vendors
- Reduce cost and risk
- Development of market
- International deployment





Admin complex

Electrical substation

Amine plant

Chilled Ammonia plant

Utilities

Area for future development

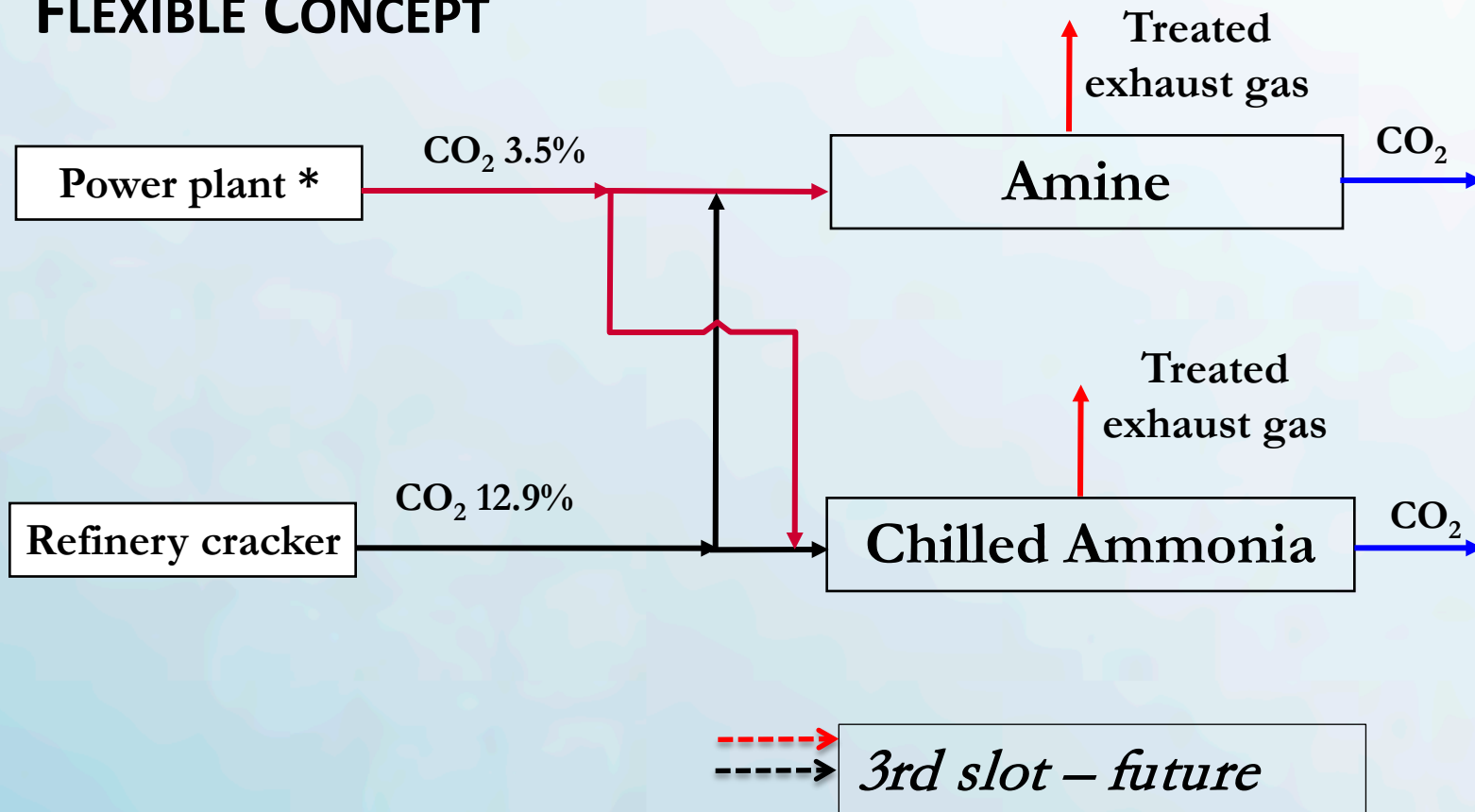
Seawater

Piperacks

Photo 20 April 2012

CO₂ TECHNOLOGY CENTRE MONGSTAD

CAPACITY 100 KT/YR
FLEXIBLE CONCEPT



* CHP design capacity of 280MW electricity and 360MW heat

CO₂ TECHNOLOGY CENTRE MONGSTAD (TCM)

OFFICIAL OPENING: 7 MAY, 2012



GASSNOVA

75.12%



Statoil

20%



2.44%

SASOL
reaching new frontiers



2.44%





PRESS CLIP

Oil and Gas Journal, 08.05.2012

<http://www.ogi.com/articles/2012/05/mongstad-carbon-dioxide-test-center-opens.html>



The screenshot shows the Oil & Gas Journal website. The main headline is "Mongstad carbon dioxide test center opens". The page includes a navigation menu with categories like "GENERAL INTEREST", "EXPLORATION & DEVELOPMENT", and "DRILLING & PRODUCTION". There are also sections for "TOPIC INDEX", "VIDEO LIBRARY", and "MOST POPULAR".

BusinessGreen, 07.05.2012

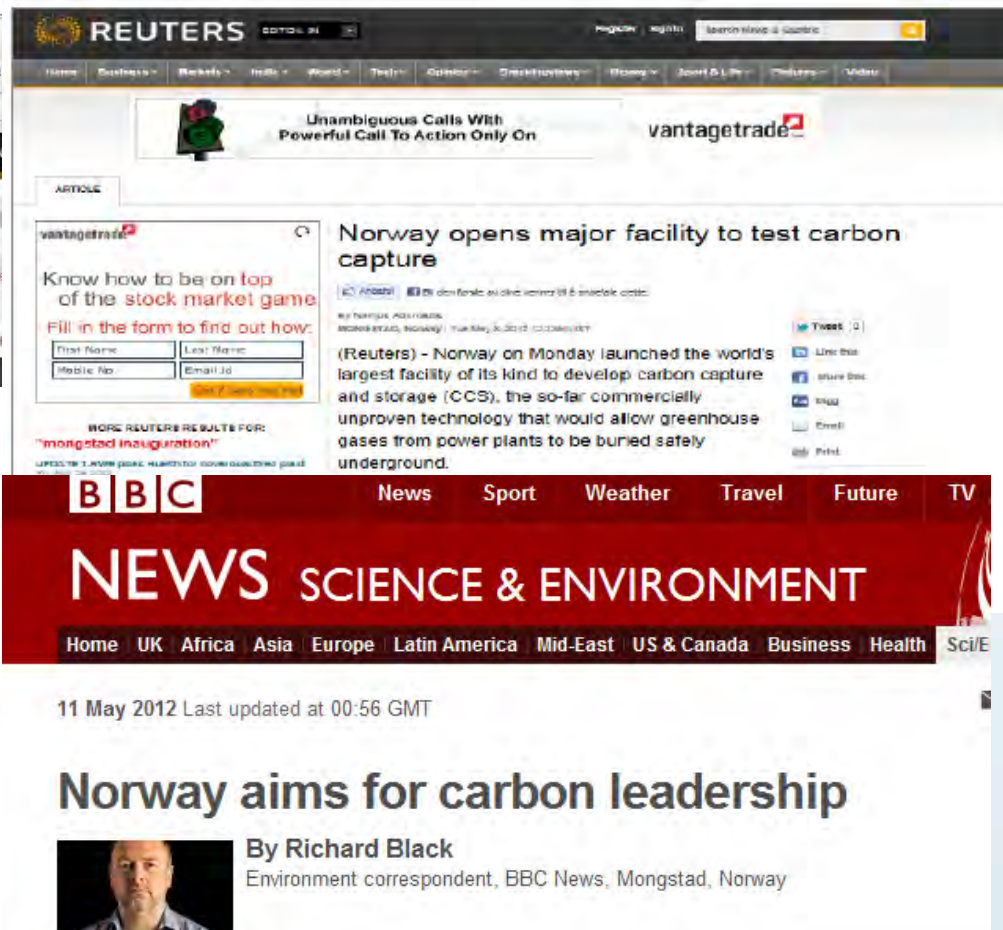
<http://www.businessgreen.com/bg/news/2173094/-worlds-largest-ccs-test-bed-issues-uk-pioneers>



The screenshot shows the BusinessGreen website. The main headline is "World's largest CCS test-bed issues call for UK pioneers". The page includes a navigation menu with categories like "HOME", "NEWS", "IN DEPTH", "REVIEWS", "BLOGS", "VIDEO", and "EVENTS". There is also a section for "Get similar articles delivered to your inbox".

Reuters, 07.05.2012

<http://in.reuters.com/article/2012/05/07/us-norway-carbon-capture-idINBRE8460SE20120507>



The screenshot shows the Reuters website. The main headline is "Norway opens major facility to test carbon capture". The page includes a navigation menu with categories like "Home", "Business", "Markets", "Tech", "Opinion", "Energy", "Environment", "Health", "Life", "Culture", and "Video". There is also a section for "WORD REUTERS RESULTS FOR: 'mongstad inauguration'" and a "vantage trade" advertisement.

INTERNATIONAL COOPERATION

- **International deployment of technology:**
 - R&D&D projects potential funding by CLIMIT
 - Participation in international demo (TCM) and full scale projects (CCM)
 - Vendors and technology users
 - A world market for technology
- **A functioning market:**
 - Harmonized framework conditions and regulation
 - Carbon price

FULL SCALE CO₂ CAPTURE MONGSTAD (CCM) INVESTMENT DECISION 2016



TECHNOLOGY QUALIFICATION PROGRAMME

- **Amine technologies:**
 - Aker Clean Carbon AS (Norway)
 - Mitsubishi Heavy Industries LTD (Japan)
 - Powerspan management Company LLC (USA), with Huaneng Clean Research Institute (China)
- **Chilled ammonia technology:**
 - Alstom Carbon Capture GmbH (Germany)
- **Amino acid salt technology:**
 - Siemens AG, Energy sector (Germany)



Welcome to Mongstad !

Thank you for your attention