

# **Central European Energy Conference – CEEC**

## **EU Energy Policy and Energy Security of Central Europe VIII**

### **23 - 25 November 2014**



Anders Stølan, CEO



[www.id-norway.com](http://www.id-norway.com)

# The European Commission's policy framework for climate and energy

- The European Commission's policy framework for climate and energy in the period from 2020 to 2030 (COM (2014) 15 final) includes proposal for reduction of greenhouse gas emission target by 40 % in 2030 relative to emissions in 1990, as well as an increased share of renewable energy in the electricity sector from 21 % in 2014 to at least 45 % in 2030. The EC analysis shows that a new GHG target would require an increased level of energy savings of approximately 25 % in 2030. It also concludes that the EU will have to step up its efforts on research and innovation policy to support the post-2020 climate and energy framework. What are the lessons learned by the V4 Member States from implementing the targets of the 2020 Framework in the field of energy efficiency and R&D? What should be done in order to meet the ambitious targets of the 2030 Framework?

# Norway committed to Carbon capture and storage (CCS)

- The Norwegian Government has a strong commitment to carbon capture and storage (CCS). The main objective of the Governments strategy for CCS is to identify measures that will further develop the technology and reduce costs.
- Human-induced climate change is one of the greatest challenges we face. Power generation and other use of fossil energy is the largest source of greenhouse gas emissions. In World Energy Outlook 2013, the International Energy Agency (IEA) estimates that global energy demand will increase by one-third up to 2035, and that fossil fuels will cover 76 per cent of the global energy need in 2035.
- Both the IEA and the UN Intergovernmental Panel on Climate Change (IPCC) note that capture and storage of CO<sub>2</sub> will be necessary in order to achieve the international ambition of limiting the global temperature increase to two degrees Celsius. At the same time, CCS is challenging both as regards further development of the technology, reducing risk and costs and finding good project models. The technology is expensive and there are few large-scale CCS facilities under construction or planning in the world today.
- State enterprise Gassnova was established to advise the authorities in CCS matters. Gassnova represents the State's ownership interests in Technology Centre Mongstad (TCM) and manages the CLIMIT research and development programme along with the Research Council of Norway.

# The Norwegian Government's CCS strategy

- The primary objective of the Government's CCS strategy is to identify measures that can contribute to technology development and cost reductions. This includes the Government's ambition to establish at least one full-scale CO<sub>2</sub> capture and storage facility by 2020. The Government is focused on clarifying the goals and needs for this work, and ensuring that the various initiatives are thoroughly and systematically assessed. The Government will continue to work on its strategy in the lead-up to the 2015 budget, including continued mapping of opportunities for realising a full-scale facility.
- **Technology Centre Mongstad (TCM)**
  - Technology Centre Mongstad represents a significant Norwegian contribution to international development of CO<sub>2</sub> capture, and is a key part of Norway's CCS efforts. CCS technology is in the early stages of development and, while some technologies are more mature than others, there is a need for development work spanning multiple years, as well as more experience in upscaling and operating large-scale facilities. TCM was built to address these issues. TCM is an arena for long-term and targeted development, testing and qualification of CCS technology, and shall contribute to international dissemination of this experience with the aim of reducing the costs and risk associated with CO<sub>2</sub> capture.
  - The Norwegian State, represented by Gassnova, owns 75.12 per cent of the facility, while the other owners are Statoil (20 per cent), Shell (2.44 per cent) and Sasol (2.44 per cent). The centre currently contains two test facilities. In 2009, the Storting (Norwegian parliament) authorised the Ministry of Petroleum and Energy to invest in the technology centre. Statoil, Shell and the State (Gassnova) then formed the TCM DA technology enterprise, and started construction of the centre. The South African company Sasol has subsequently joined the group of owners. The technology centre was officially opened in May 2012 and has been operating ever since.
  - The technology centre is the world's largest of its kind. It was built with the infrastructure and capacity to support multiple technologies simultaneously. The facility is designed to test CO<sub>2</sub> capture from two different flue gas sources at the same time to ensure that the experience gained from the technology centre has the broadest possible relevance. One of the flue gas sources is the cracker unit at the oil refinery and the other is the combined heat and power station (Energiverk Mongstad). To date, agreements have been signed with three suppliers for construction, testing and demonstration of their technologies at the facility: Cansolv, Aker Clean Carbon and Alstom. These suppliers are testing technologies based on amine blends (Cansolv and Aker) and chilled ammonia (Alstom). The technologies were selected in part based on assessments of their improvement potential, their suitability for implementation in existing facilities, potential full-scale application, technical maturity, environmental impact and possibility of cleaning exhaust gas from various sources such as coal, gas and refining.
  - For more information about TCM, see [www.tcmda.no](http://www.tcmda.no).

# CLIMIT and Centres for Environment-friendly Energy Research (FME)

- CLIMIT is a national programme for research, development and demonstration of technologies for capture, transport and storage of CO<sub>2</sub> from fossil-based power production and industry. Since 2005, the programme has provided support for more than 260 projects spanning the entire chain, from basic scientific research to innovation projects and projects that demonstrate CCS technology. Projects must have a clear commercial potential, and contribute to development of technology and expertise in Norway. The programme is administered by the Research Council of Norway and Gassnova. More information is available at [www.climit.no](http://www.climit.no)
- Two Centres for Environment-friendly Energy Research (FME) within CO<sub>2</sub> capture and storage were established in 2009. The FME scheme shall contribute to a broad and binding collaboration between leading research institutions and innovative enterprises in Norway, as well as close cooperation with international players. The centres are appointed for up to eight years. Both centres (BIGCCS and SUCCESS) scored well on the assessment performed by the Research Council of Norway in 2014.

# Norway's support to European research programme on CCS

- On behalf of the Norwegian Government, Minister of Petroleum and Energy Tord Lien has replied positively to an invitation from the European Commissioner of Energy Günther Oettinger to participate in a research programme under the Horizon 2020 Programme. The Norwegian contribution will help establish a programme aiming to support research activities in the operative phase of a full scale CCS project in the EU.
- Any project fulfilling the requirements of a joint call would be eligible to apply. The ROAD project in the Netherlands is currently the most mature project in Europe, and could be a possible candidate.
- **- Technology development and cost reductions are necessary for a broad deployment of CCS, and more full scale projects have to be realized to achieve this. I will be highly pleased if we can contribute to realizing a new full scale project in Europe through this reserach cooperation, says Minister of Petroleum and Energy Tord Lien. Meanwhile, he underlines that there are a number of steps remaining before we can conclude on the success of the programme.**
- The applicable research programme requires the participation of at least three countries. Based on an application process, in which potential projects may participate, research funds from the EU can be activated from 2017. The design of the programme is ongoing. Pursuing this possibility is in line with the ambition to invest on a broad basis in developing cost-effective CCS-technology stated in the Government's Political Platform.
- **- A research programme such as this will be a useful contribution to the CCS strategy the Government is working on. I would like to emphasize that this effort does not replace the work considering the feasibility of full scale CCS in Norway.**

# Norway's international climate and forest initiative

- The initiative was launched by Prime Minister Jens Stoltenberg during the climate change negotiations in Bali in December 2007.
- Commitments to prevent deforestation and forest degradation in developing countries are not included in the Kyoto Protocol. The Government is working towards the inclusion of such commitments in a new global climate regime for the post-2012 period.
- The Government is prepared to increase its support for efforts to prevent deforestation in developing countries to about NOK three billion a year.
- The project covers all types of forest in developing countries, not just rain forest.
- Forests in developing countries support the livelihoods of forest-dependent communities, including indigenous peoples. The forest areas also protect biodiversity and water resources, and contribute to adaptation to climate changes in tropical forest countries.
- Its main aims are as follows:
  - To bring about rapid, cost-effective and verifiable reductions in greenhouse gas emissions;
  - To work towards the inclusion of emissions from deforestation in a new international climate regime;
  - To promote the conservation of biodiversity.
- **Norwegian support to the Amazon Fund**
  - Norway was the first contributor to the Amazon Fund.
  - The Norwegian contribution to the Amazon Fund based on Brazil's results in reducing deforestation was 1 billion NOK in 2011 (approximately USD 170 million dependent on exchange rates).
  - Norway has pledged up to USD 1 billion to the Amazon Fund for the period up until 2015.

# Why Norway?

- **Research & Development**

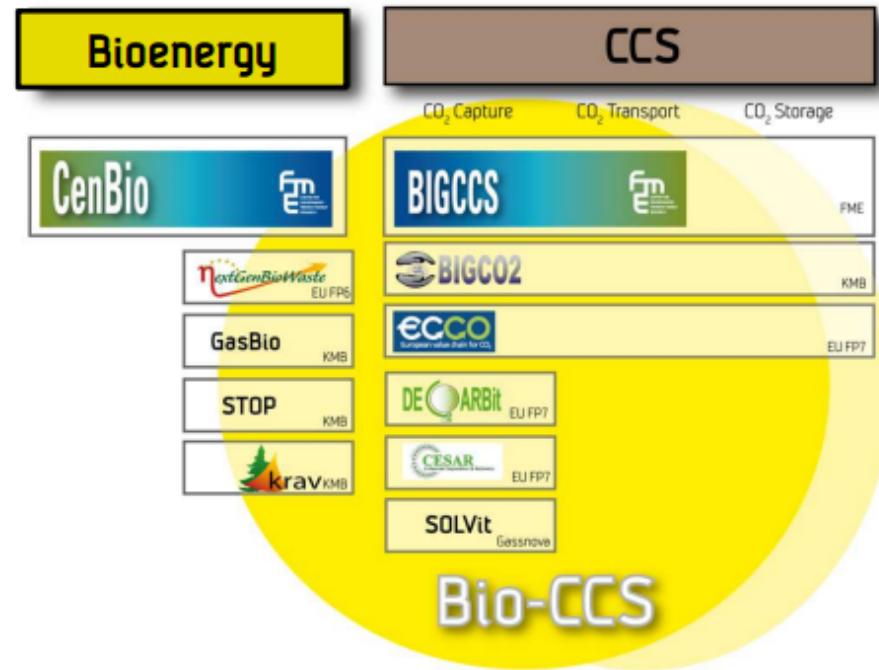
- In Norway there are Centers Environment-friendly Energy Research (CEER) both for bioenergy (Cenbio) and CCS (BIGCCS)
- SINTEF and NTNU has good knowledge and international activities both within bioenergy and CCS

- **Storage capacity**

- Large CO<sub>2</sub> storage capacity in the North Sea
- Future industry?

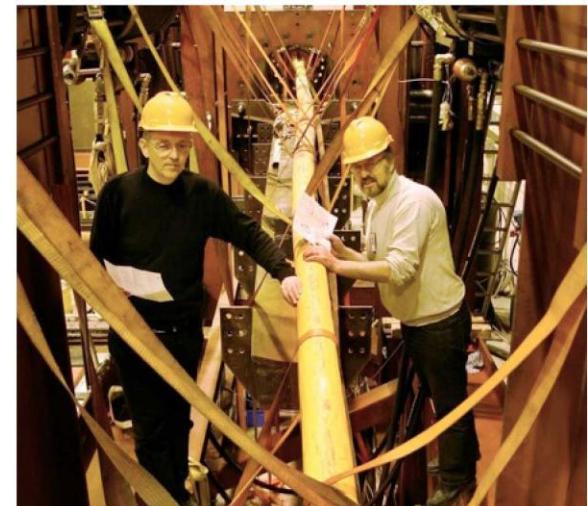
- **Biomass resources**

- Large resources
- Planned increased harvest

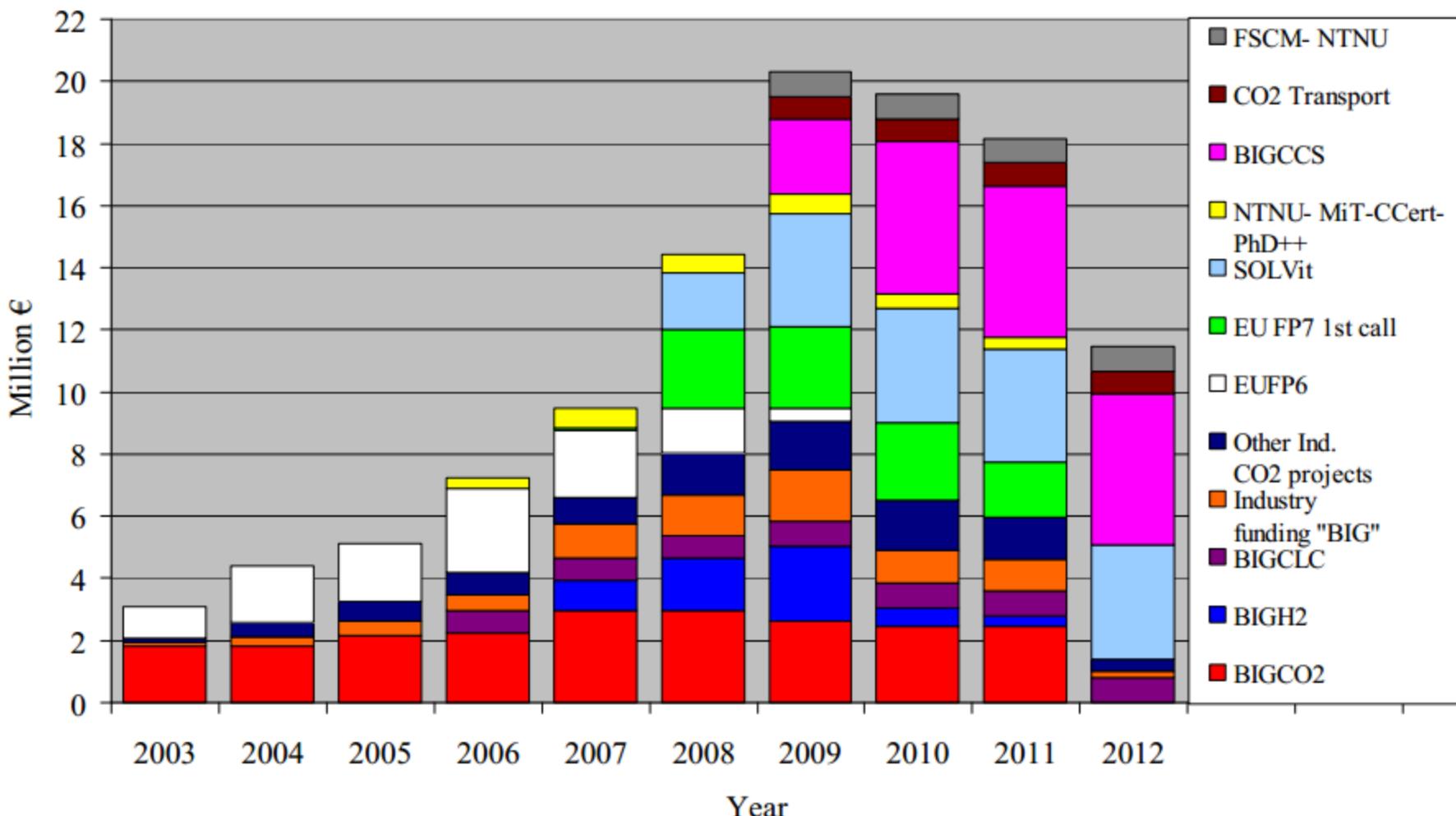


# SINTEF is the largest independent research organisation in Scandinavia

- Leading expertise in the natural sciences and technology, environment, health and social science
- 2100 employees from 70 countries
- Annual sales of NOK 3 billion (EUR 400 mill) - customers in more than 60 countries
- A non-commercial research foundation with subsidiaries

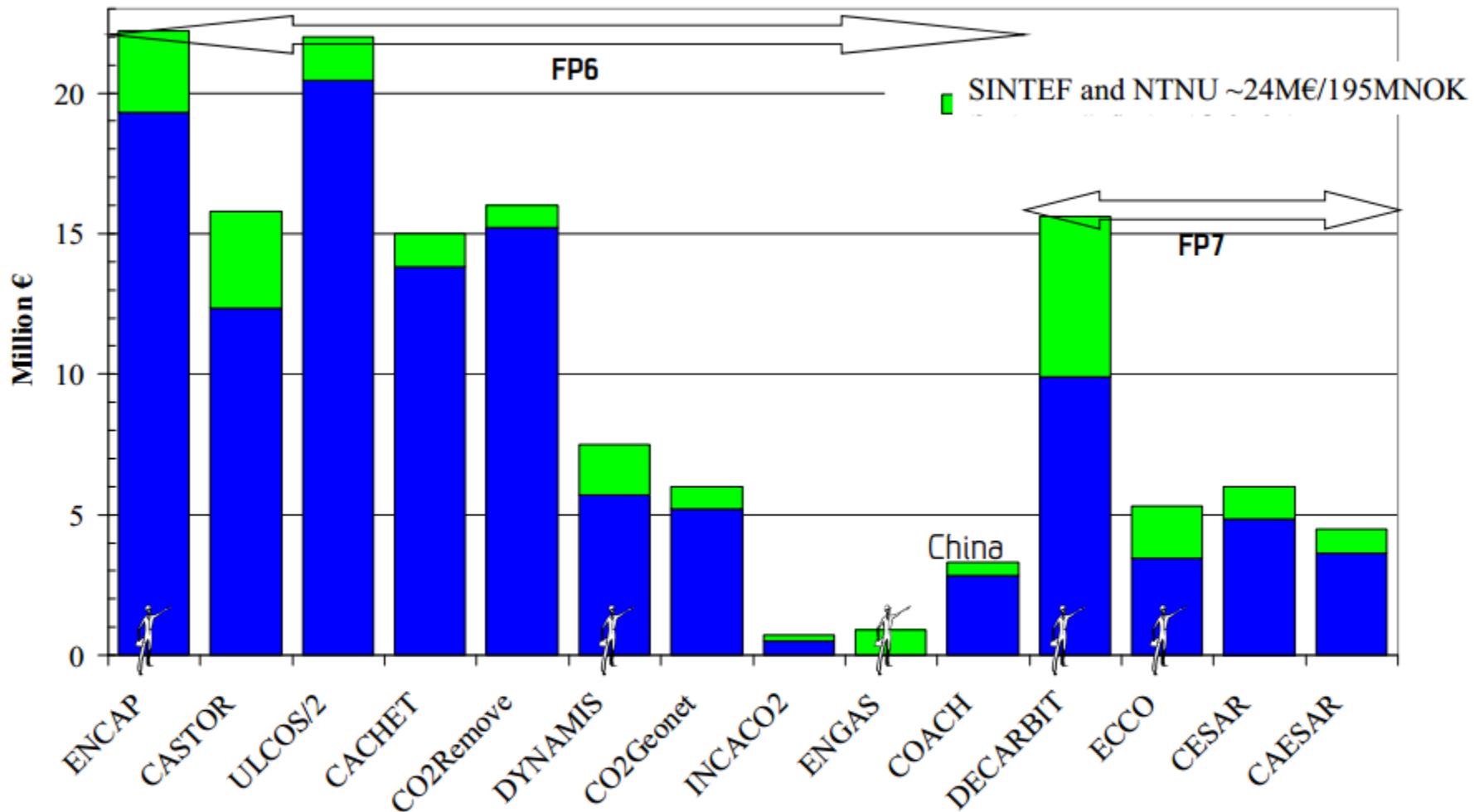


# SINTEF and NTNU: CCS project portfolio



2003-2012: >150 Million€

# EU FP6 and FP7 R&D – Our Involvement in CO<sub>2</sub> Capture and Storage



**Our partners:** Vattenfall, RWE, Statoil, Hydro BP, Rohoel, Siemens, Alstom, Lurgi, L'Air liquide, Linde, Progressive Energy, Mitsui-Babcock, DLR, DONG Energy, Elsam, PPC, E.ON, SNSK, ENEL, ENDESA, E.ON, Schlumberger, IFP, TNO, RF, NIVA, OGS, ISFTA, Fraunhofer, IEA-GHG, GEUS, ARCELOR, Corus, BGS, BGR, BRGM, ECOFYS, JRC, Societe Generale, Universities of Twente-Ulster-Chalmers-Stuttgart-Delft, KTH, TU-Sofia, KTH, Corning, EDP, ECN, TIPS...

# Strategic role of SINTEF and NTNU within CCS

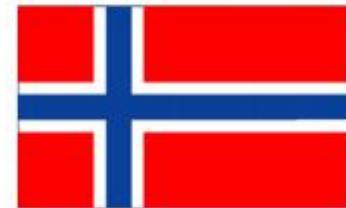
- [ZEP](#) – member of AC, 4 members in WG's
- Hosts of GHGT-8, targets to host GHGT-13
- Hosted [1st European CCS conference](#) Feb 09
- Host of IEAGHG CCS Summer School
- Co-authors in IPCC Special report on CCS
- "Owner" of the International Trondheim CCS conference series (TCCS)
- Member of core group, European Energy Research Alliance, [EERA](#), CCS key
- ECCSEL – Joint European CCS infrastructure
- International co-operation
  - Trilateral MoU between SINTEF, IFP and TNO within CCS
  - Strong European network in projects (DLR, TUM, GEUS, BGS, ENEL, ALSTOM,...)
  - World-wide network in CCS (US and AUS, Brazil, China,...)



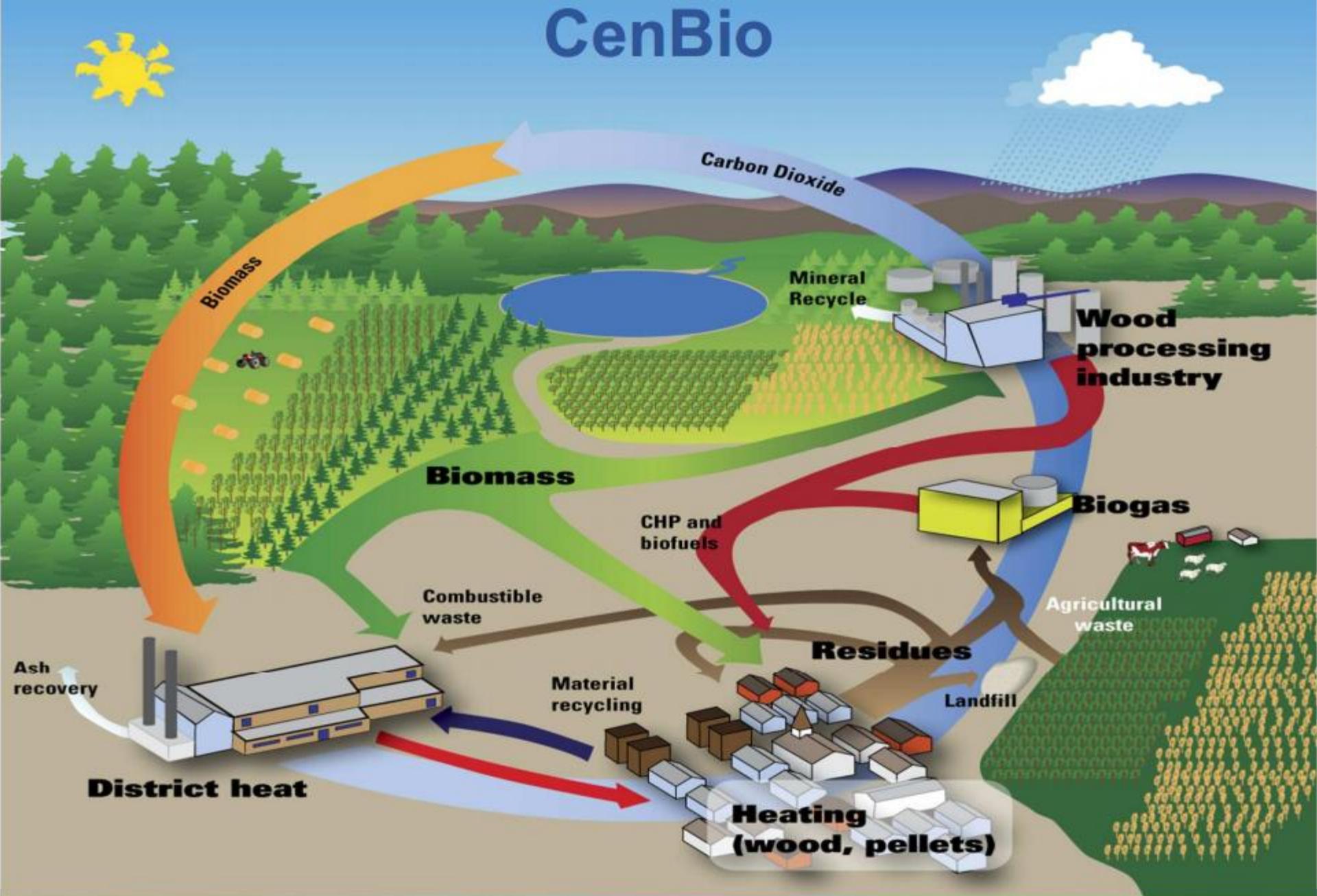
European Technology Platform for  
Zero Emission Fossil Fuel Power Plants (ZEP)

# Bioenergy – The biggest contributor of renewable energy in the world today!

- The world:
  - More than 3/4 of all renewable energy is bioenergy
  - The second largest renewable power producer (after hydropower)
  - 25-33% of the primary energy supply can come from sustainable bioenergy in 2050
- The European Union:
  - Contributes with 2/3 of today's renewable energy production
  - Bioenergy in the **20-20-20** target: 70%
- Norway:
  - 14 TWh bioenergy in 2009 (mainly heat)
  - Potential: 45 TWh
  - Target 2020: Doubling to 28 TWh!



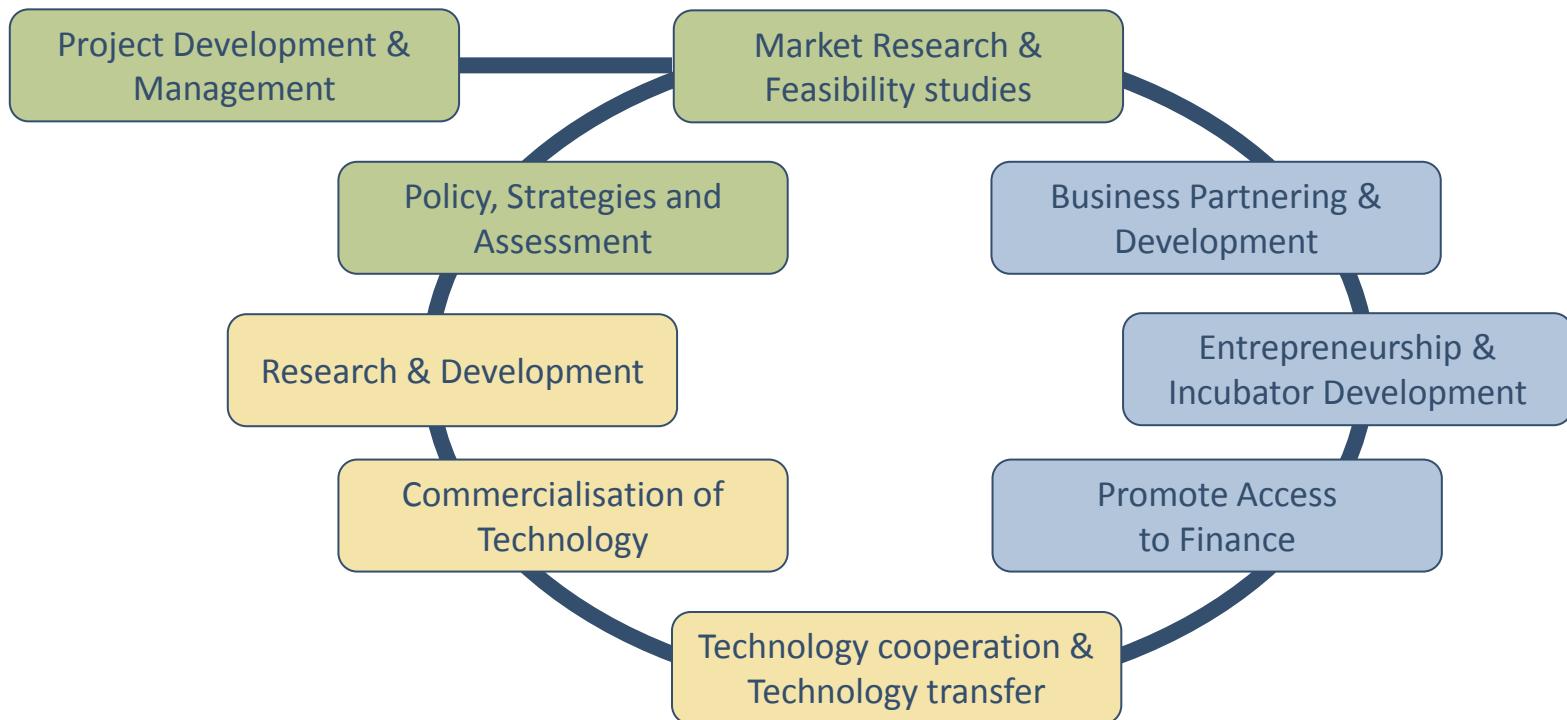
# CenBio



# IDN Group – Who are we?

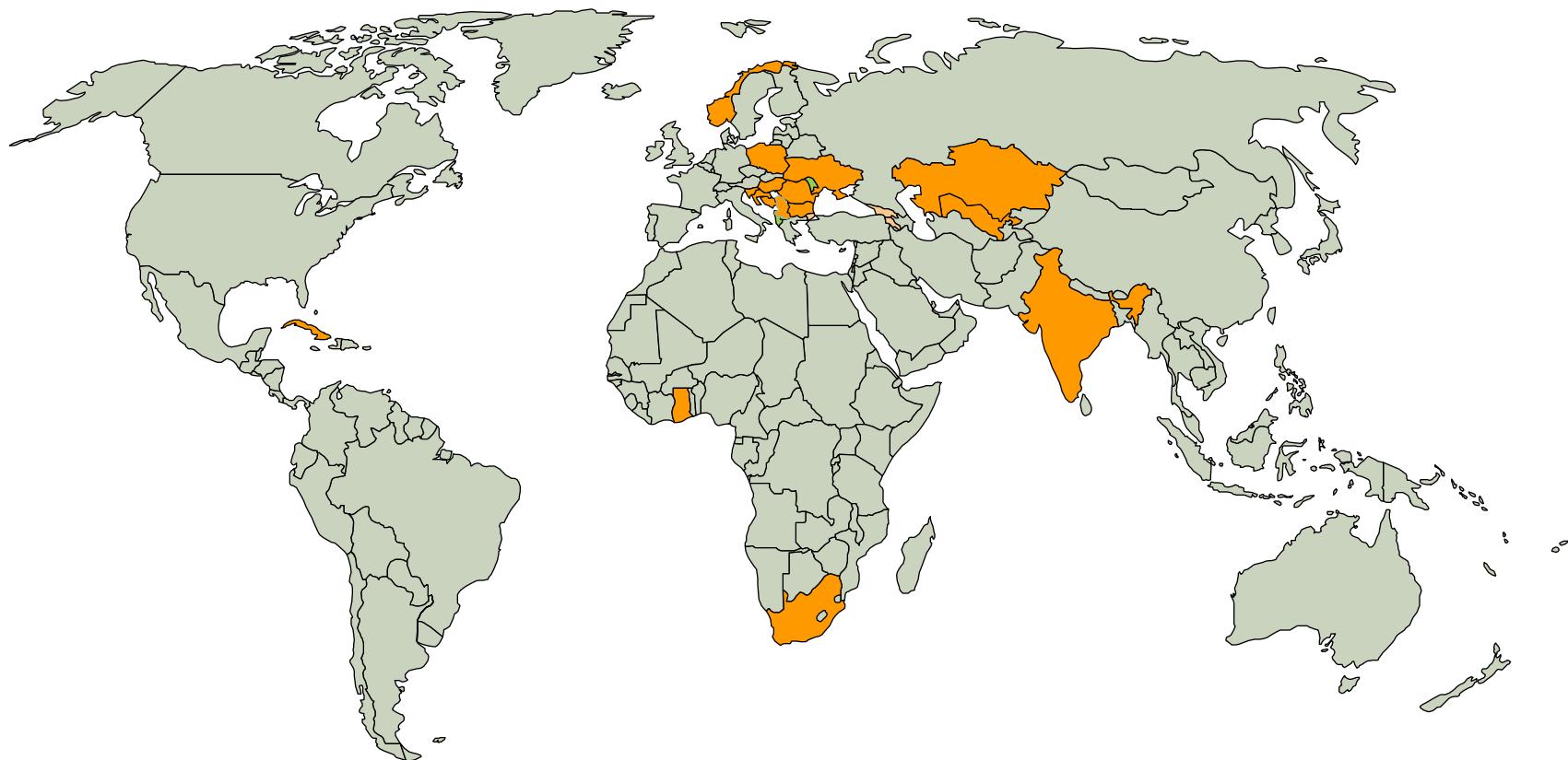
- The **IDN Group** is a spinoff from SINTEF, the SINTEF Group being the largest independent research institution in Scandinavia. The IDN Group comprise of four institutions, **International Development Norway (IDN)**, **IDN Research**, **Foundation for Management and Industrial Research (MIR)** and **Youth Enterprise Services (YES) Foundation**. IDN Research, MIR and YES are all independent non-for-profit foundations.
  - The IDN Group has offices in Norway, Poland, Romania, Serbia, Macedonia and Kazakhstan.
- Having offices in Central Europe and a broad network of partners and associated experts from most EU countries, the IDN Group capitalise on shared resources and its international network to provide state-of-the art, high quality, efficient and customised services and solutions.
- IDN Group operates globally, with projects in Serbia, Poland, Romania, Macedonia, Kazakhstan, Uzbekistan, Cuba, Ghana, South Africa, Bulgaria and Slovakia.
- IDN Group's philosophy is to provide products and services from a turnkey perspective, that is to say from idea all the way to market. This is why the IDN Group is organised in a holistic way, from research, commercialisation of technology, through incubations, entrepreneurship and development of SMEs for internationalisation. The Group is also involved in restructuring of companies and in promotion of access to finance.

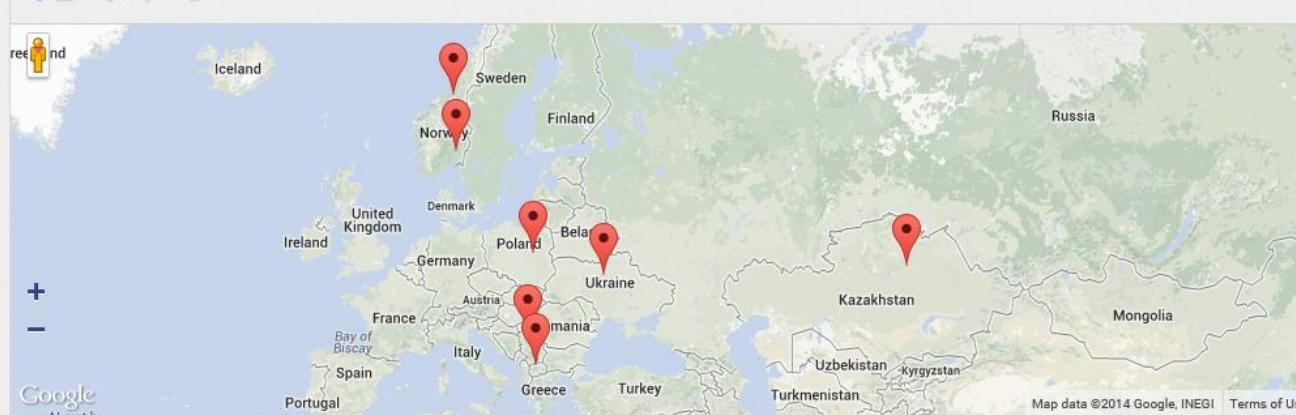
# IDN Groups' Services



A brief description of each services on the next three slides ....

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