

NOAH's position on CCS as a climate change tool

{Long version}

In NOAH's view, there is a wide range of problems connected with Carbon Capture and Storage, which together means that we must reject it as a viable method to reduce CO₂ emissions from fossil fuels.

NOAH finds that CCS is contrary to the EU's and Denmark's policies for the environment. The following describes some of the concrete problems that make NOAH conclude that CCS must be rejected as a solution to climate problems:

Timing – can CCS deliver reductions in time?

In NOAH's judgement CCS is a technology that will not be able to deliver the reductions that are needed - and certainly not in the short term. CCS is in the earliest developed for commercial use by 2020. And only from 2030 one can expect that CCS will be used in any significant degree. It will be too late in terms of securing the rapid reductions needed if we want to keep temperature rise below 2 degrees.

CCS risks to both to pre-empt many billions of kroner both in the short term and for the decades to come, which otherwise could be applied to renewable energy and energy savings, providing CO₂ reductions here and now.

The demand that new coal fired power plants have to be "CCS-ready" will just open a huge door for even more coal fired plants. These plants may operate for many years without CCS while the technology is developed, storage sites are identified and financing is secured.

Environmental impacts of CCS

With an increase in the power plants' fuel consumption of up to 40 percent and the corresponding greater need for mining of coal, transportation of coal, capture, compression, transportation, injection and storage of CO₂, contrary to the spirit of the Danish Law for Environmental Protection.

For example the principles:

- Prevent and mitigate pollution of air, water, soil and subsoil, as well as vibration and noise problems (Chapter 1, § 1. 2, para 1)
- Limit the use and waste of raw materials and other resources (Chapter 1, § 1. 2, para. 3)
- Promote use of cleaner technology (Chapter 1, § 1. 2, para. 4)
- Promote recycling and reduce the problems associated with waste disposal (Chapter 1, § 1. 2, para. 5)
- In the administration of the law emphasis shall be put on what is achievable using the best available techniques, including less-polluting raw materials, processes and systems and the best anti-pollution measures. This evaluation hereof must focus on preventive efforts through the use of cleaner technology. (Chapter 1, § 3. 1)
- That in assessing the extent and nature of measures to prevent and counter pollution, emphasis must be put on the whole cycle that substances and materials run through in order to reduce waste of resources as much as possible (Chapter 1, § 3. 2, para. 2).

In NOAH's assessment, the EU CCS Directive is in breach of EU environmental policy, for example the principle of preventive action, the principle that action against environmental damage must be done at source and finally the principle of "polluter pays".

NOAH believes that CCS entails an unnecessary additional environmental impact due to the extra consumption of energy, water and raw materials and associated emissions. Only CO₂-emissions will diminish, while emissions of acidifying substances, nutrients (eutrophication), heavy metals, and substances that cause of low-level ozone will be worsening.

CCS also breaks with the current waste strategy aimed at minimizing landfill by promoting reuse, recycling, preventive measures and cleaner technology. A waste stream of liquid CO₂ to the underground opens a wide door for similar disposal of many of society's waste problems in the future.

NOAH opposes the establishment of a new CO₂ infrastructure with pipelines, pressure stations, injection facilities, CO₂ storage, etc., because it will cause interference with the terrain and landscape, and randomly harass people.

Usually, the national and municipal plans reveal where future infrastructure is likely to be developed, giving the individual or company a basis for their planning. With CCS an entirely new infrastructure is introduced that cut across existing structures, and it would harass many people and companies.

NOAH does not believe that CCS is for the good of the common wealth and should not justify the expropriation of land and property in connection with seismic studies, construction of wells, pipelines or injection facilities.

NOAH believes that CCS would result in increased pollution, e.g. toxic amine compounds, which are the substances to be used in large quantities in the CO₂ capture process. NOAH is concerned that the deposited CO₂ by accident or miscalculation of the density of the storage can be released to the seabed and the overlying water masses with serious acid damage in the marine environment, or if the spills happen on land, they may enter basements and houses, and at worst poison residents and make the houses uninhabitable.

“CCS on biomass” is sometimes mentioned as representing an especially promising perspective, whereby you can pull CO₂ out from the atmosphere. It is used by the power companies and other proponents for CCS to secure a continued use of coal as “CO₂-neutral” by firing with a mixture of coal and biomass.

CCS with e.g. 30% co-firing of biomass will in Denmark lead to a complete exploitation of the accessible biomass. The alternative would be to grab large areas in other countries though the import of biomass, that depending on origin risk leading to big social as well as environmental problems, where it is grown. Increased demand for land to grow biomass and food products lead to renewed pressure on natural habitats as well as increasing food prices.

The need for burning extra 40% of fuel due to the energy demanding CCS-process will also apply to biomass-CCS. This makes biomass-CCS an unacceptable way to use a very limited resource – domestically grown or imported. If all coal in Denmark was substituted with biomass we would by far exceed the accessible Danish resources and prevent any other use of the biomass.

NOAH thinks that the only sustainable way to capture and sequester carbon is by changes in agricultural and forestry systems and practices. This however must not lead to any lenience in the phasing out of the fossil fuels.

Climate Effects of CCS

NOAH believes that proponents of CCS mislead policymakers and the public by claiming that CCS can contribute significantly to solving the climate problem.

This misleading is done by alleging that CCS can remove 85-90 per cent of a power plant's CO₂-emissions. It is only in theory. So high removal rates has not yet been demonstrated, neither in pilot plants nor full scale plants. It must be noted also that the theoretical rates only apply to the capturing process (capture-stage).

One should of course see the whole chain of CCS activities in context, and greenhouse gas emissions take place in all stages - emissions that must be offset against the captured CO₂.

Finally, the extra energy consumption in the order of 40 percent and the extraction and transport of coal etc. must be factored in at all stages. Such a calculation shows that CCS as a whole can only be expected to reduce CO₂ emissions by 70 to 75 per cent and even with the very technology optimistic assumption that the capture component can achieve an 85 percent capture in full scale installations.

It must be viewed in light of the fact that CCS is marketed as a tool that allows us to continue to use coal in the energy supply. Climate wise, the problem is obvious because the third to fourth of the emissions, which is not captured, will be able to "fill" the atmosphere to the point where we are very likely to get a temperature rise above 2 degrees Celsius.

Burning the current resources of coal, oil and gas can lead to a discharge in the order of 18,000 Gt CO₂. Even if you - totally unrealistically - assume that CCS here and now could be retrofitted on all power plants using coal, oil and gas, and assuming that these plants had a net capture of the mentioned 70 per cent of CO₂ emissions, then CCS-fitted plants over 100-150 years would lead to a release of at least 5400 Gt CO₂. To this must then be added emissions from flaring of gas and the impact from all other greenhouse gases.

The quantity of greenhouse gases according to IPCC fourth assessment report that can be emitted in the 21 century, before the temperature interval 2,0-2,4 degrees Celsius with high probability will be exceeded, is in the range of 800-1500 Gt CO₂. Currently we are emitting a global amount of greenhouse gases equivalent to about 50 Gt CO₂ per year.

So – even if we spent all of society's resources to establish CCS tomorrow, we would anyway soon meet the threshold in the climate system that will trigger the 2-degree temperature rise.

CCS will also destroy or delay the opportunities for a development with energy conservation and VE.

The economics of CCS

NOAH believes that CCS is too expensive a way to reduce emissions of CO₂. Faced with a CO₂ reduction cost of CCS in the order of 1,700 DKK per tonne [340 USD or 230 Euros] - or 17 times higher than what is generally the cost of reducing a tonne of CO₂ in the EU (CO₂ quota price May 2009) - then a political decision to spend billions of taxpayers' money on supporting the realization of CCS really mean that opportunities for VE and energy efficiency will be destroyed. CCS will sequester many billions of dollars for research, development and demonstration.

CCS can only come to play a negative role in the climate issue - because the technology will tap the resources that after all are limited. Important years will be lost in the development of the necessary energy efficiency and renewable energy sources which alone can provide an assurance that society can survive in the longer term.

NOAH is therefore opposed to any use of public funds for CCS.

We believe it would be an economic mistake to go ahead with CCS, whether it is with public or private funds.

Public funding of CCS

Funding is providing the necessary financial basis in the form of subsidies and private capital to construct the necessary facilities, which will enable CCS to work.

CCS is currently neither operating nor economically viable. And there is no prospect that it will change in the coming decades. If CCS is to be realized, it can in other words only be done through massive public investment in these technologies.

NOAH is against any use of public funding of CCS. Proponents of CCS have been very adept in raising awareness in Europe of the need for massive public support for research and development and for pilot and demonstration plants. And the 'narrative' about CCS has largely managed to portray CCS as a necessary transitional technology.

State support can help to provide the CCS with a competitive advantage relative to energy efficiency and renewable energy technologies.

Many private companies, energy companies and organizations in line with some public research institutions have a clear self interest in the very large projects as a development of CCS will entail. NOAH believes there is a great need for increased public scrutiny and discussion of the role of these stakeholders in the decision-making about CCS.

NOAH believes that public support in the energy and agriculture fields must be directed towards

- 1) energy savings (stop wasting energy, behaviour, turn off the light, refrain from the superfluous ride in the car etc.);
- 2) energy efficiency in all sectors (insulation, optimizing of pumps, ventilation systems, new technology across the board etc.);
- 3) renewable energy;
- 4) research and development in agriculture and forestry, so as to stop these sectors' contributions to the greenhouse gas emissions;
- 5) land-use changes so that agriculture and forestry together can contribute to significant net removal of carbon in soil and plants.

The funding should be directed towards research, development, demonstration, market introduction and land conversion.

Security and storage responsibility (liability)

NOAH considers it unacceptable that the future generations due to current operations should inherit a security, economic and environmental problem, the extent of which it is impossible to say anything definitive about today.

But we know that there would be very large stocks, which require monitoring over a very long period.

In this sense the issue of liability is similar to the issue of liability for the storage of radioactive material from nuclear power plants.

Both assume a continuous stability in societies, for which there is no historical precedent.

NOAH considers it quite unreasonable that the operating companies can be released of the liability immediately after the store's final seal. This is suggested in the CCS Directive, which was part of the EU energy and climate package from 2008.

CCS in the CDM

NOAH has been against the flexible mechanisms of the Kyoto Protocol - both before and after their adoption.

In Kyoto, it was decided to establish a global CO₂ trading (Cap and Trade) system with CDM (Clean Development Mechanism) as the most significant mechanism. The Earth's carbon cycle was turned into a commodity and CO₂ reductions in developing countries paid for by the developed countries or their companies would benefit the industrialized countries in terms of project credits that can offset the industrialized countries' CO₂ reduction commitments.

NOAH rejects that countries or companies through the CDM can trade off their reduction commitments by implementing projects in developing countries. NOAH's position is that the rich world must reduce its emissions as much as possible as quickly as possible domestically. Simultaneously, the rich countries must finance comprehensive climate action in developing countries as a repayment of ecological debt but not in the form of CDM projects. NOAH is therefore against the fossil industry's proposal that CCS should be approved as one of the project types approved to generate credits under the CDM.

The arguments against are e.g.:

- The extent and importance of the CDM will increase with the acceptance of CCS in the CDM. It will further weaken industrialized countries' motivation to act innovatively in relation to energy conservation and development of renewable energy technologies, when the industrialized countries cheaply can meet their national commitments by having CCS-facilities in developing countries.
- The fact that CCS has the potential to flood the world's CO₂ trading system with credits with large decreases and fluctuations in the CO₂ allowance price as a result. It will harm innovation and the development of true CO₂ reduction technologies.
- CCS in developing countries risk being launched without an adequate regulatory framework to ensure proper disposal, monitoring and enforcement of the responsibility for the storage.
- CCS will strengthen developing countries' dependence on coal and on a technology that in the outset is controlled by foreign companies.

- The fact that developing countries will tie their energy future to a centralized system with significant input from coal, and thereby miss the opportunity to instead go directly to a sustainable, decentralized energy supply system based on local renewable energy sources.
- The fact that especially developing countries will get increased problems with securing adequate fresh water supplies for people and for irrigation and other purposes. This will happen where CCS is applied to power plants that get their cooling and process water from rivers and lakes that are used for drinking water and irrigation. CCS will increase the water withdrawal for cooling the power plants with 20-130 % and the water consumption will increase by 50-90 % depending on the technologies in the respective plants.
- The fact that there is already lack of fresh water in many countries, not least in developing countries. The competition over water intensifies concurrently with the development of wealth, the global and local warming, melting of mountain glaciers, deforestation, desertification, population growth and migrations, industrialisation, replacement of small scale farming with agribusiness etc. Electricity produced on coal fired power plants and on nuclear plants is depending on the use of vast quantities of cooling water and water consumption. In the US, in France and Germany there has been incidents where power plants were forced to shut down production – or the authorities have dispensed from the environmental demands for the temperature in the discharge of the cooling water.
- Developing countries risk to have the long-term storage responsibilities forced upon them and to live with any incidental impact of CCS.
- That the rich countries will benefit from the inclusion of CCS in the CDM through a significantly increased quantity of cheap project credits providing an opportunity to slack their domestic reduction efforts.
- The size of the projects would mean that a few technologically advanced developing countries will have a disproportionate share of the projects - whereby the already existing imbalance in the CDM will be increased.

CCS in the CDM - like the entire CCS technology (or the complex of technologies) - has not been subject to a visible public debate.

The Danish government did not submit its own recommendation in the consultation that has been in the UNFCCC, but simply express itself through officials on the internal lines in the EU for further action harmonised with the other EU countries' preferences.

Neither the Danish Parliament's Committee on Europe nor the Committee on Energy nor the Environment Planning Committee has been presented with a recommendation from the government.

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NOAH's overall conclusion regarding CCS is that it is a technology that the world is best served by putting behind it - the sooner the better. CCS is not a solution for the climate problems.

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