



CCS Directive transposition into national laws in the Baltic Sea Region: progress and problems by the end of 2011

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INTRODUCTION

- Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide was published on 5 June 2009, and entered into force on **25 June 2009**.
- The CCS Directive transposition process and related problems in European countries were monitored in a frame of the EU FP7 project CGS Europe in 2011.
- The aims of the research were to analyse results of the transposition of the CCS Directive into national law by the end of 2011, to compare the situation in the studied countries before and after the deadline, and to identify common and specific problems.
- During this study we had to take into account different geological, political and financial situations, climate and energy strategies, varying levels of research and technological development, and differences in public awareness and acceptance of CCS.
- The results of the study clarify the drivers and barriers to transposition, and prospects for implementation of CCS in Europe.





INTRODUCTION

- Part of these results including the Baltic Sea Region countries is shown in this presentation for:
- Estonia
- Denmark
- Finland
- Latvia
- Lithuania
- Germany
- Norway
- Poland
- Sweden





Data and methods

- Progress and problems in the CCS Directive transposition process were monitored in all EU FP7 CGS Europe project countries at the end of January, end of April and September-December 2011.
- Presented data were collected using questionnaires from countries participating in CGS Europe project . Data were collected by CGS Europe project partners during cooperation or consultations with national legal authorities responsible for the Directive transposition in the countries.
- Estimation of storage capacity as sufficient, insufficient or absent is based the approach used by FP6 EU Geocapacity project. CO₂ storage capacity was estimated in EU Geocapacity project using the common principles and formulas. Calculated capacity was compared with national large industrial emissions per year (more than 100 000 tonnes CO₂ per year) (**Vangkilde-Pedersen & Kirk, 2009**). All the identified storage sites should be capable of storing the lifetime emissions of the selected source point(s).
- According to the CCS Directive the storage site should be enough for a life time of the emitting source (for about 30 years) for CO₂ storage.
- In the present study we considered CO₂ storage capacity sufficient if reported conservative estimates of storage capacity could be enough for storage of large national emissions for 25 years and more.
- The storage capacity is considered absent, when either no reservoir rocks available and/or CO₂ cannot be stored underground in the supercritical state, and/or reservoir rocks don't correspond to the necessary for CO₂ storage site requirements, or have conflict of interest with potable water (Chadwick et al. 2006, Sliupa et al, 2008, Shogenova et al, 2009, 2011a,b).



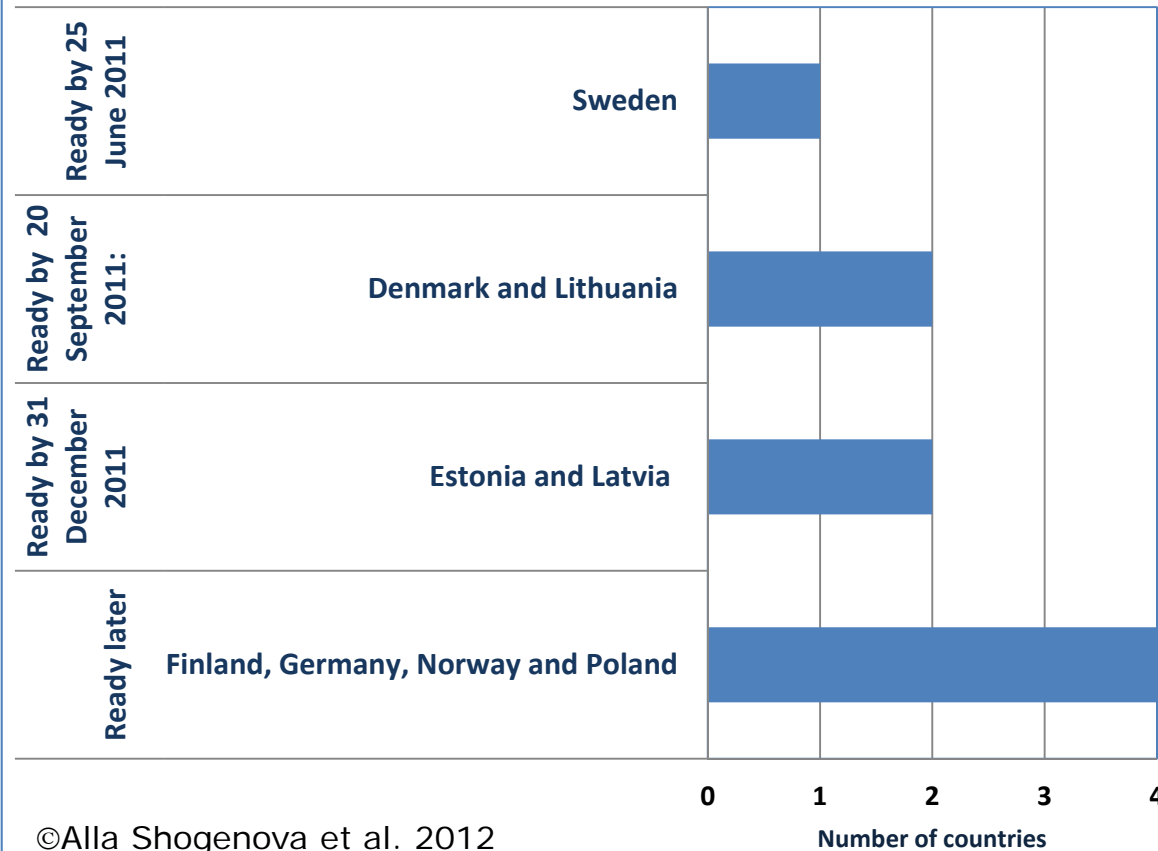
Monitoring of CCS directive transposition in 2011

- The directive could be transposed through writing of new laws and/or amendments of available regulations.
- **January:**
 - Denmark, Germany, Poland, Sweden, Lithuania and Norway have started their work on transposition of CCS directive in 2009-2010.
 - Lithuania estimated the process of CCS directive transposition as „well advanced and planned to be transposed in time”.
 - Denmark, Germany, Poland and Sweden estimated the process as „well advanced, but some problems expected”.
 - Norway reported that they “have started, but will be probably delayed”.
 - Estonia, Finland and Latvia had not report any significant progress in the process in January 2011. Their situation was described as “just started”.
- **June:**
 - Denmark (24/05/2011) and Sweden (22/06/2011) reported their readiness at national level before deadline (25th June 2011), but the law was officially published in Denmark on 17/9/2011.
 - Sweden decided to forbid temporarily CO₂ storage at national level in order to meet deadline and to have enough time for preparation of regulations permitting offshore storage.
 - Denmark, Lithuania, Latvia and Finland had communicated to EC partial transposition measures.
Estonia, Germany, Poland, and Sweden had not communicated any transposition before transposition deadline.

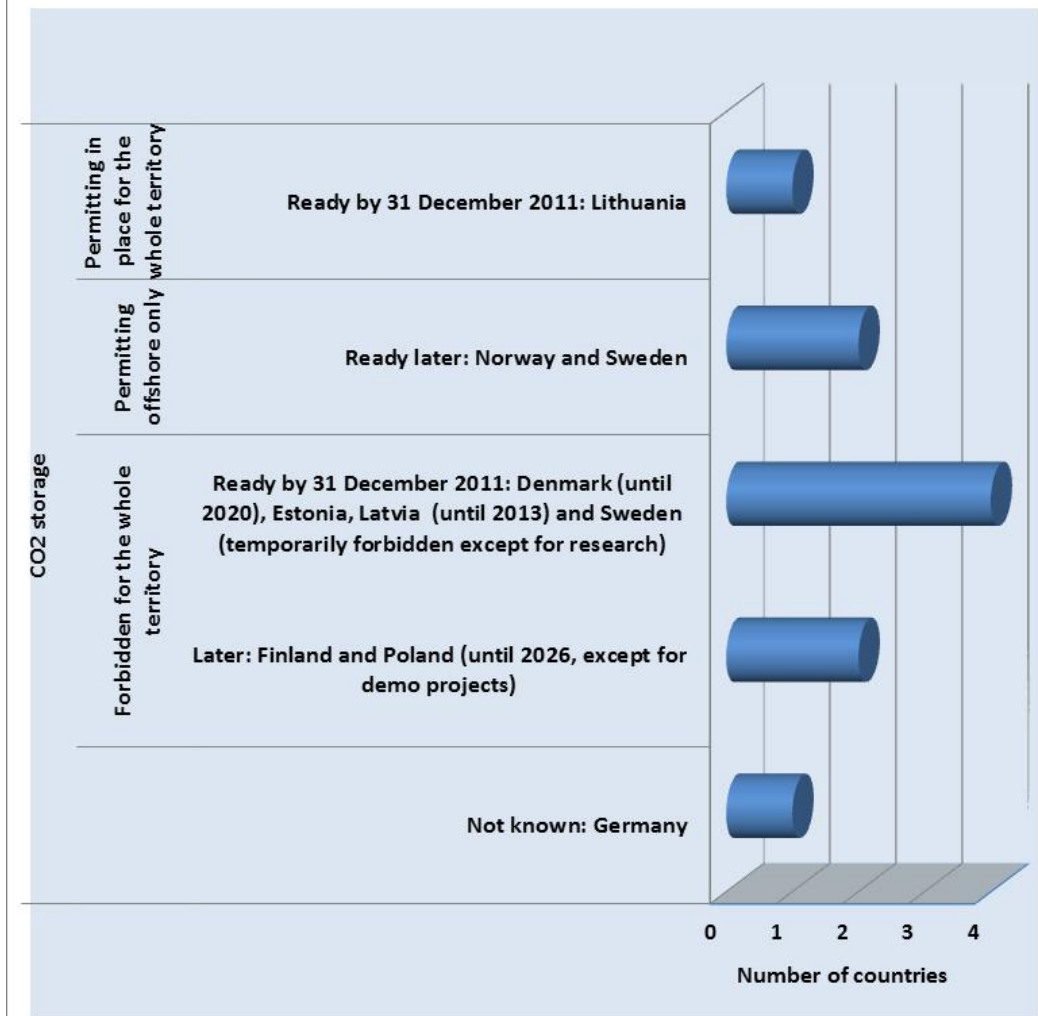




Readiness of CCS Directive transposition at national/jurisdictional level in the Baltic Sea Region countries



Permitted/not permitted CO₂ storage in national laws in the Baltic Sea Region countries



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Exceptions and requirements in national laws with forbidden CGS

- The exception from article 2 of the Directive is usually included for activities “with a total intended storage below 100000 tonnes, undertaken for research, development or testing of new products or processes”,
- Requirements to newly constructed large power stations (300 MW or more) to be “capture ready” with planned transportation and storage site (which in these case will be obviously cross-border).

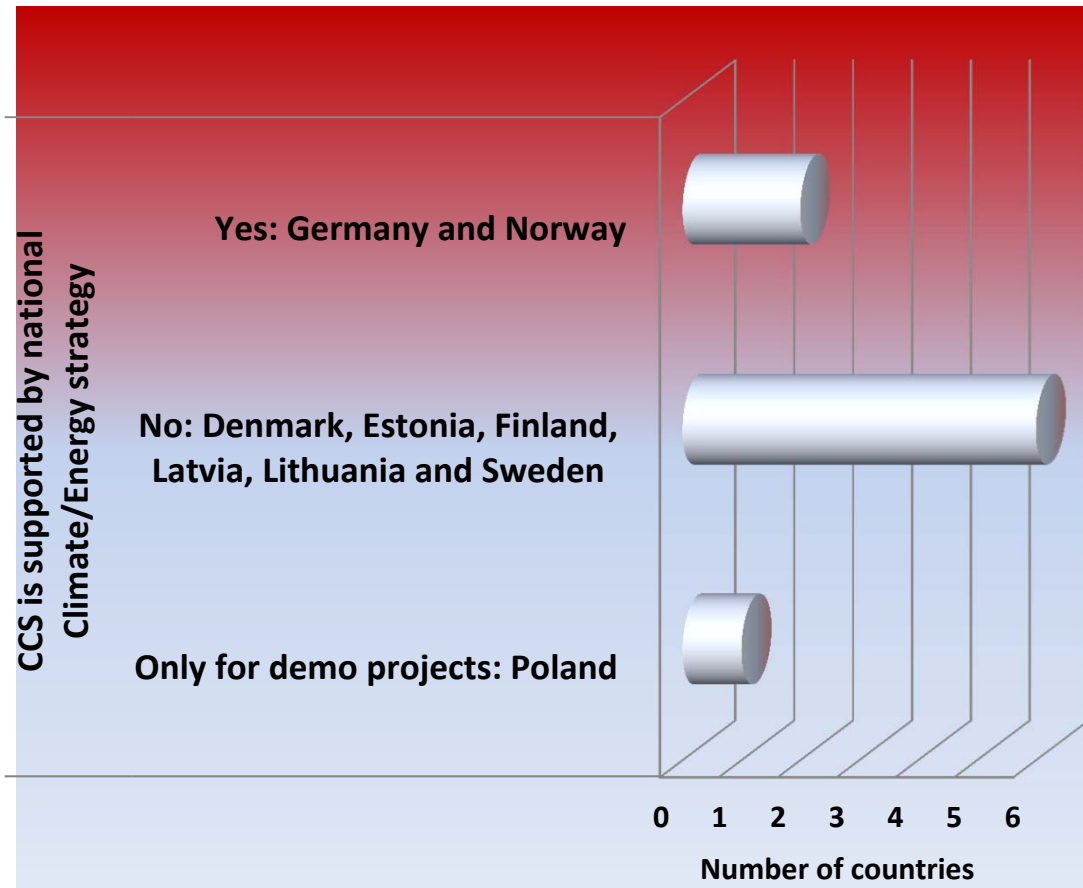


Problems

- The most frequent common national problems reported by participating countries in January and April 2011 were:
 - (1) Conflict of interests,
 - (2) CCS is not a part of the official national policy,
 - (3) public acceptance being absent,
 - (4) on-going public and political debates,
 - (5) probable insufficient storage capacity, or absent storage capacity
 - (6) financial matters,
 - (7) language translation problems
 - (8) cross-border storage and transport and mineral carbonation are not described (or not sufficiently described) in the CCS Directive, or guidance documents (Estonia and Finland).
- Specific national problem was reported in Sweden (Russian Territory in the Baltic Sea next to the Swedish territory in connection to potential storage).



CCS in national climate and energy strategy in the Baltic Sea Region countries



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Public acceptance and on-going public and political debates

- Among BSR countries in autumn 2011 only Norway reported that they had public acceptance of CCS.
 - This problem is usually investigated with involving of different NGOs and public consultations in Poland.
 - Latvia reported that they had not public acceptance .
 - Denmark, Finland and Lithuania reported that situation with public acceptance was not known.
 - Public opinion on CCS was estimated as neutral in Estonia.
 - However, the public resistance against CO₂ storage in Germany known in at least two federal states (Länder), among 16 available in Germany, is estimated as very considerable (Krämer, 2011).
 - Resistance to CCS by Greens are known in Germany and Denmark.
 - The influence of Greens to public opinion is the highest in Germany, resulted in on-going debates and several rejection of CCS Bill.
 - In Denmark activity of the local NGO were so high, that resulted in prohibiting of CO₂ storage onshore until 2020.
 - On-going public and political debates were reported in April by Germany, Poland, and Latvia, while in autumn 2011 political debates were still on-going in Germany, reported in Norway, and in local scale in Poland.
- The strongest influence of this matter on transposition process is definitely known in Germany (Krämer, 2011).



Storage capacity and conflict of interests

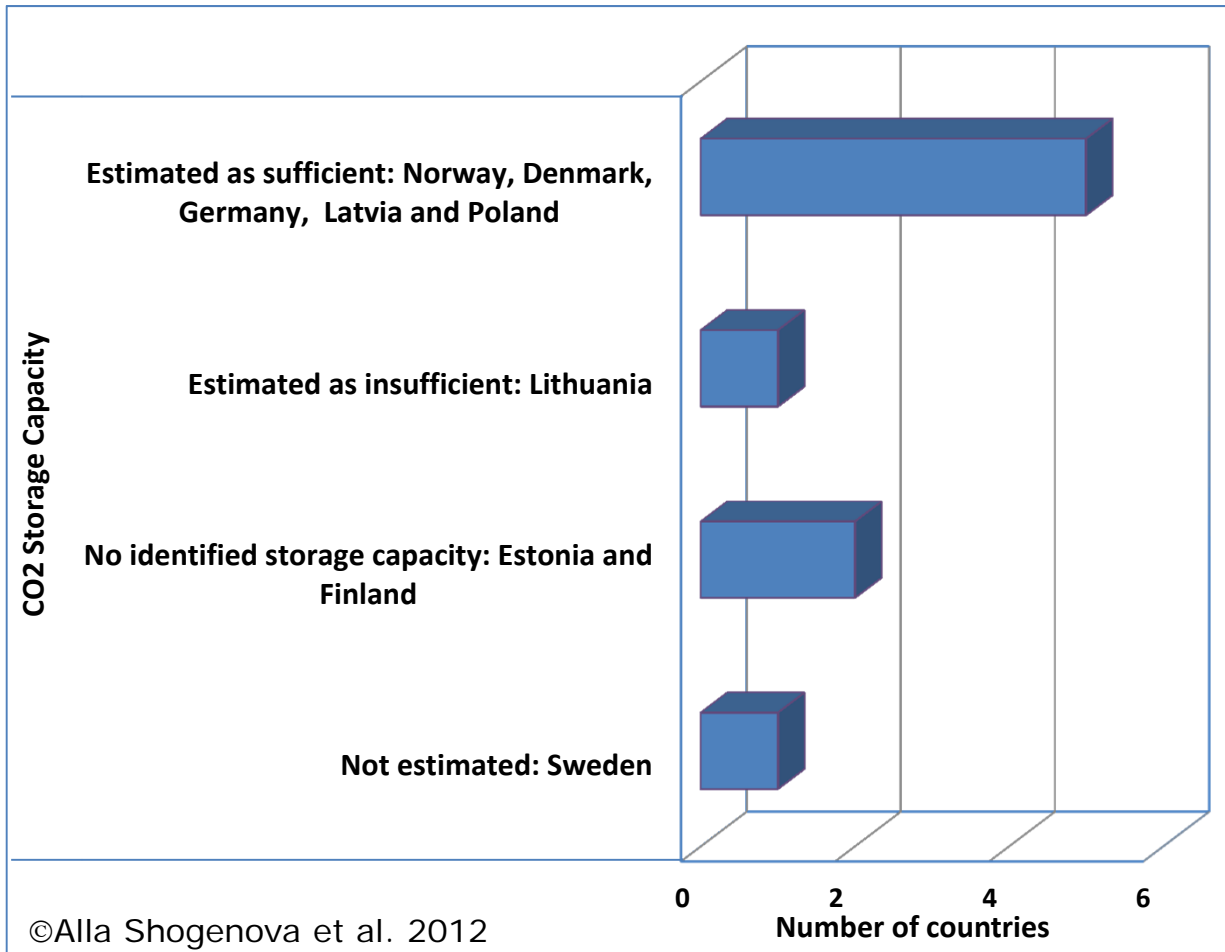
- Estimation of CO₂ storage capacity were performed in the BSR countries in the frame of EU FP5 GESTCO project, EU FP6 EU Geocapacity project and national projects in some countries (Christensen and Holloway 2004, Vangkilde-Pedersen et al. 2009, Wójcicki A. 2011, Halland, Johansen and Riis 2011).
- EU Geocapacity project estimated European conservative storage capacity as 127 Gt CO₂, including 97 Gt in saline formations, 20 Gt in hydrocarbon fields and 1 Gt in coal fields (Vangkilde-Pederson et al, 2009).
- After implementation of the CCS Directive into national laws, CO₂ storage capacity could be considered as a geological resource, which either has equal rights with other resources (Lithuania), or has the lower priority (Poland).
- According to the CCS Directive all national regulations do not/should not permit conflicting uses of CO₂ storage capacity with other natural resources.
- Except for Finland, all studied BSR countries reported conflict of interests.
- The conflict of interests is usually reported with hydrocarbons (Norway, Denmark, Lithuania, Germany), drinking water (Estonia), natural gas storage (Latvia) and geothermal resources (Germany).
- In the case of hydrocarbon production permit given earlier, the new CO₂ storage permit usually cannot overlap it, although the exception of this rule could take place.
- The use of CO₂ injection within the same reservoir where hydrocarbon production is ongoing nearby might enhance hydrocarbon production of the field.
- Use of CO₂ for EOR in Lithuania does not require any permits.
- The production of other mineral resources could make conflict if these are within a comparable depth range and deeper than CO₂ storage complex. Shallow use of the subsurface is not an obstacle to CO₂ storage and vice versa.

Geothermal applications might constitute conflict with the use of saline aquifers onshore. However the joint use of geothermal exploitation and CGS in the same place have been already proposed by number of authors. The example of CO₂ storage in basalts in geothermal area is already available in Iceland.





Sufficiency estimation of CO₂ storage capacity in the Baltic Sea Region countries



Classification chart of the BSR countries compared by readiness of CCS Directive transposition and demonstration projects by the end 2011

	Very good	Good	Satisfactory	Very good	Good	Bad	Very good	Some prospects	Only cross border storage	Very good			
	CCS Directive transposition			CO ₂ storage (already in law, or planned)			CO ₂ storage capacity			Demonstration and pilot CCS projects			
	Ready in 2011 at EC level	Ready in 2011 at national level	Ready later	Permitted for the whole territory	Permitted offshore	Forbidden	Sufficient	Insufficient	Absent	Total	Operating (O)	Developing (D)	Submitted to EU NER300 in 2011
Lithuania													
Latvia						Until 2013							
Estonia													
Sweden					Planned	Temporarily	Not reported						
Denmark						Until 2020							
Finland													
Norway										2O+1D	1. Sleipner 2. Snøhvit	1. Mongstad CCS	
Poland						Until 2026 except for demo projects				1D		Belchatow (CCS - EEPR*)	Belchatow
Germany										2 O+1D	1.Ketzin (storage) 2.Schwarze Pumpe (oxyfuel capture)	1. Jämschwalde (CCS-EEPR)**	Jämschwalde**

EEPR* - European Energy Programme for Recovery, under which the first six demonstration projects have been selected for European co-funding in 2009
Jämschwalde (CCS-EPR)** - Vaternfall decided to withdraw from the project, because of the problems with the Directive transposition in Germany



A summary of some of the main findings

- Most of the studied countries made significant progress towards implementation of CCS technology through a national climate and energy strategy, research, transposition of the CCS Directive into national law and development of pilot and demonstration projects. However, the transposition process met various barriers and problems and was challenged by the on-going economic crisis.
- By the end of 2011 the transposition of the CCS Directive into national law was completed at national level in five BSR countries.
- Four BSR countries (Finland, Germany, Poland and Norway) postponed the final transposition to 2012.
- The countries with the most advanced level of CCS research and technology, CCS plans included in the energy and climate strategies, supported pilot and demo projects (Germany and Norway) did not use their advantages to finish CCS transposition before the EC deadline.
- The situation in Germany, where two versions of CCS Bill have been rejected in 2010 and 2011, seems to be the most problematic.



A summary of some of the main findings

- In the studied countries CO₂ storage capacity was estimated as sufficient in 5 countries, insufficient in Lithuania, and no capacity was found in Estonia and Finland. No estimations are available for Sweden.
- By the end 2011 only Lithuania permitted CO₂ storage for the whole territory, while two countries (Norway and Sweden) permit/will permit offshore storage.
- Two countries decided to prohibit CO₂ storage permanently in their territory, except for research (Estonia and Finland), or temporarily (Denmark until 2020, Latvia until 2013, Poland until 2026 except for demoprojects, and Sweden).
- The high influence of Green parties and NGOs, and their ability to involve the public in debates negatively influenced the transposition process in Germany, and led to a ban on onshore storage in Denmark until 2020, and abandonment of the plans for onshore demonstration projects in Denmark (Nordjylland Coal Power Station) and Germany (Jänschwalde Lignite Power Station).
- The readiness of the CCS Directive transposition into national laws depends on different national conditions and problems, but does not directly correlate with national policy, financial situation or storage capacity.



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