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Laying the groundwork for Joint Transnational Research

Review of topics for transnational cooperation

NL-Agency

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Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

1. Introduction

The objective of WP5 is to establish areas of collaboration and getting experience on executing transnational cooperation. This review concludes with a gross list of topics that formed the base for a priority setting exercise, resulting in a ranked list of areas for collaboration.

The review forms part and parcel of the earlier published “Memo on general accepted approach and the developed framework for transnational cooperation” and is based on work in WP2, WP3 and WP4 that was carried out to collect and present the fossil energy situation in European countries, on findings at a FENCO workshop in January 2007 and on insights developed during a number of ExCo meetings.

2 Reviewing expertise in member states

To make up a list of topics for co-operation, the expertise of the EU-FENCO-ERA participating member states was reviewed against three benchmarks:

- *First outline benchmark:* to get a brief insight into areas member states are active in
- *Second outline benchmark:* to get more insight into member states’ availability of storage opportunities and capability to design, supply, operate and monitor complex fossil projects
- *Third benchmark:* focusing on five general topic areas: in depth assessment of expertise within member states regarding defined fossil topics. Based on inputs of the above

2.2 First outline benchmark

In the FENCO project proposal to the Commission the first indication was given concerning the activities or “fossil topics” of the EU-FENCO-ERA participating countries. Based on four types of activities the following outlines of interest were determined, see Table 1.

Table 1. First outline benchmark of EU fossil ERA-topics

Criteria	Denmark (DK)	Germany (DE)	Estonia (EE)	Spain (ES)	Greece (EL)	Latvia (LV)	Netherlands (NL)	Austria (AT)	Poland (PL)	Portugal (PT)	(UK) United Kingdom	Norway (NO)
Strategic analysis	0	+	0	0	+		+			+	+	+
Technical development (conversion technology, power production)	+	+		+	+	0	+	0	+	+	+	+
CO ₂ -Storage	+	+	0	+			+	0	+	0	+	+
Non-technical		+		0		0	+	0	+	0	+	+

Level of involvement: + Major activity on first outline topics
0 Some activity on first outline topics
- No activity on first outline topics

Based on table 1, the participating countries can be divided into three groups according to the intensity of activity regarding the four main fossil topics:

1. *Full covering first outline topics:* Germany, the Netherlands, Norway and the United Kingdom
2. *Average covering first outline topics:* Denmark, Greece, Poland, Portugal and Spain
3. *Less covering first outline topics:* Austria, Estonia and Latvia

This “*first outline benchmark*” offers a general description. A more detailed approach was then offered in the second outline benchmark.

2.3 Second outline benchmark

The “*second outline benchmark*” used the following criteria:

1. Capability to design and supply fossil fuel plants
2. Capability to operate and monitor CO₂ store site
3. Availability of CO₂ storage sites (Mt per year)

25 EU member states (plus Norway) conduct fossil fuel power generation. The trend for 2020 is an increase of CO₂ emissions related to electricity generation.

Table 2. Second outline benchmark on EU-FENCO-ERA-topics for participating EU-member states

Topics/criteria	DK	DE	EE	ES	EL	LV	NL	AT	PL	PT	UK	NO
1. Capability to design and supply fossil fuel plants	-	+	-	?	-	-	-	-	?	-	+	-
2. Capability to operate and monitor CO ₂ store site	+	+	-	+	-	-	+	+	-		+	+
3. Availability of CO ₂ storage sites (Mt)	16k	25k	?	?	2k	?	11k	5k	?		25k	26k

Level of involvement: + Yes, country is capable
 - No, country is not capable
 ? Information not supplied yet whether the country is capable (ad. 1 and 2) or has CO₂ storage capacity (ad. 3)

From table 2 we have learned, regarding to opportunities for transnational cooperation, the following:

- Opportunity group I:* Germany and the United Kingdom have the capability to design and supply fossil fuel plants
- Opportunity group II:* Denmark, Germany, The Netherlands, Norway, Spain and the United Kingdom have the capability to operate and monitor CO₂ store sites
- Opportunity group III:* Denmark, Germany, Greece, The Netherlands, Norway and the United Kingdom have the possibility to store CO₂

In Table3, the “second outline benchmark” is conducted, but only for the other, not participating, EU-member states.

Table 3. Second outline benchmark on EU-FENCO-ERA-topics for non-participating EU-member states

Topics/criteria	Belgium (BE)	Czech Rep. (CZ)	Ireland (IE)	France (FR)	Italy (IT)	Cyprus (CY)	Lithuania (LT)	Luxembourg (LU)	Hungary (HU)	Finland (FI)	Malta (MT)	Sweden (SE)	Slovenia (SI)	Slovakia (SK)
1. Capability to design and supply fossil fuel plants	-	?	-	+	+	-	-	-	?	+	-	-	-	?
2. Capability to operate and monitor CO ₂ store site	?	?	-	+	+	-	-	-	?	?	-	?	?	?
3. Availability of CO ₂ storage sites (Mt per year)	?	?	?	?	?	?	?	?	?	?	?	?	?	?

Level of involvement: + Yes, country is capable
 - No, country is not capable
 ? Information not supplied yet whether the country is capable (ad. 1 and 2) or has CO₂ storage capacity (ad. 3)

From table 3 we have learnt, that the following countries can be added to:

- Opportunity group I:* Finland, France and Italy have the capability to design and supply fossil fuel plants
- Opportunity group II:* France and Italy have the capability to operate and monitor CO₂ store site

From the “second outline benchmark” it was also learnt that: there are, at this moment, still numerous question marks in the Table and Table. Further research should be conducted in order to complete the above mentioned opportunity groups for transnational cooperation.

2.4 Third benchmark: focusing on five general topic areas

After determining global outlines for topics for transnational cooperation (Memo 5.2.1 chapter I. and II.), a further break down of the topics, as presented under II. has been conducted. The “third benchmark” used as criteria therefore the following topics for transnational cooperation:

1. Advanced fossil plant and CO₂-Capture
2. CO₂-use and -storage
3. Infrastructure and transport
4. Market regulation and policy
5. Communication and public acceptance

The “third benchmark” only focuses on the participating FENCO-ERA-countries.

The third benchmark is conducted in two ways, namely:

1. What are the expertise fields (also national programming) of the participating member states regarding actions on zero emission power plants? See from Table 44 till Table 8
2. What is the interest of the participating member states regarding actions on zero emission power plants? See Table 919.

Table 4. Summary of member state's expertise considering advanced fossil plant and CO₂ Capture

Topics/criteria	DK	DE	EE	ES	EL	LV	NL	AT	PL	PT	UK	NO
1. Advanced fossil plant and CO₂ capture												
a. Conversion technology in general	+	+	?	+	+	-	+	+	-	+	+	+
b. CO ₂ capture in general	-	+	?	+	+	-	+	-	-	+	+	+
c. Fuel extraction	-	+	?	+	-	-	+	-	-	-	+	-

Level of expertise:
 + Expertise
 - No expertise
 ? Information regarding the expertise of the country is not supplied yet

Table 5 Summary of member state's expertise considering CO₂ use and storage

Topics/criteria	DK	DE	EE	ES	EL	LV	NL	AT	PL	PT	UK	NO
2. CO₂ use and storage												
a. EOR; EGR; & ECBM	-	+	?	+	-	-	+	-	-	-	+	+
b. CO ₂ storage in general	-	+	?	+	-	-	+	+	-	-	+	+
c. Enabling technologies in general	+	+	?	+	+	-	+	+	-		+	+

Level of expertise:
 - No expertise
 ? Information regarding the expertise of the country is not supplied yet

Table 6. Summary of member state's expertise considering infrastructure and transport

Topics/criteria	DK	DE	EE	ES	EL	LV	NL	AT	PL	PT	UK	NO
3. Infrastructure and transport												
a. Transport of hydrogen, syngas, carbon dioxide	-	+	?	+	-	-	+	-	-	+	-	+
b. Use of existing infrastructure	-	+	?	+	-	-	+	-	-	+	+	+

Level of expertise:
 + Expertise
 - No expertise
 ? Information regarding the expertise of the country is not supplied yet

Table 7. Summary of member state's expertise considering market regulation and policy

Topics/criteria	DK	DE	EE	ES	EL	LV	NL	AT	PL	PT	UK	NO
4. Market regulation and policy												
a. CO ₂ legal issues &	-	+	?	?	+	?	+	+	?	+	+	-

liabilities												
b. Monitoring and regulation	-	+/-	?	?	+	?	+	-	?	-	+	+
c. Long term ownership and liability	-	-	?	?	-	?	-	-	?	-	+	-
d. Financial in general	+	-	?	?	+	?	+	+	?	+	+	+

Level of expertise: + Expertise
- No expertise
? Information regarding the expertise of the country is not supplied yet

Table 8. Summary of member state's expertise considering communication and public acceptance

Topics/criteria	DK	DE	EE	ES	EL	LV	NL	AT	PL	PT	UK	NO
5. communication and public acceptance												
a. Communication in general	?	?	?	?	+	?	+	+	?		?	?
b. Social acceptance programme	-	-	?	?	+	?	+	-	?	-	+	-

Level of expertise: + Expertise
- No expertise
? Information regarding the expertise of the country is not supplied yet

3. Determination of interest in member states

After determining the “expertise”, the “interest” of the countries is identified. Below, in Table 919, these topics of “interest” of each EU-FENCO-ERA member state are presented.

Table 91. Summary of member state's interests being considered for action on zero emission fossil fuel technology

Topics/criteria	DK	DE	EE	ES	EL	LV	NL	AT	PL	PT	UK	NO
1. Advanced fossil plant and CO ₂ capture	++	++	?	++	+	0	++	+	0	++	++	++
2. CO ₂ use and storage	?	++	?	++	+	0	++	+	0	+	++	++
3. Infrastructure and transport	+	+	?	?	+	?	+	0	?	+	+	+
4. Market regulation and policy	+	+	?	?	+	?	+	0	?	+	+	+
5. Communication and public acceptance	?	+	?	?	+	?	+	0	?	+	+	?

Level of interest: ++ R&D plus demonstration interest
+ R&D interest
0 Interested in topic, no involvement in the sense of + or ++
- Not interested in topic
? The information regarding the involvement of the country is not supplied yet

4. Gross list of topics for transnational cooperation

Bringing together the expertise as outlined in chapter 2 with the member state's interest of chapter 3 results in a gross list of possible topics for transnational cooperation. They are rubricized along the lines that were set out during FENCO ExCo meetings.

This gross list has to undergo a prioritising exercise to allow FENCO to plan its activities in the period to come. That prioritising exercise is carried out in deliverable 5.2.1. "Memo on general accepted approach and the developed framework for transnational cooperation".

Only EU-FENCO-ERA participating member states	# countries with expertise	Joining the transnational cooperation's		Type		
		Interested to be leading member state	Interested to be observing MS	Study	R&D	DEMO
Topics for transnational cooperation						
1. Advanced fossil plant and CO₂ capture		DK; DE; ES; EL; NL; AT; PT; UK; NO	LV; PL		X	X
a. <i>Conversion technology in general</i>						
(1) Novel concepts	6					
(2) Oxyfuel	6					
(3) USC	5					
(4) Coal Gasification	5					
(5) Combustion	8					
(6) Biomass co-firing, multifuel	7					
b. <i>CO₂ capture in general</i>						
(1) advanced coal plus CO ₂ capture	5					
(2) CO ₂ capture - pre/post combustion and chemical looping	6					
(3) STEG IGCC	5					
(4) ZERO-emission	6					
(5) In-progress CO ₂ capturing with steam reforming	6					
c. <i>Fuel extraction</i>						
(1) Underground coal gasification (UCG)	3					
(2) Coal mine methane (CMM) extraction /utilisation	3					
(3) Coal bed methane extraction/utilisation	3					
(4) Abandoned mine methane	4					
2. CO₂ use and storage		DE; ES; EL; NL; AT; PT; UK; NO	LV; PL		X	X
a. <i>EOR; EGR; & ECBM</i>	5					
b. <i>CO₂ storage in general</i>	5					
c. <i>Enabling technologies in general</i>	8					
3. Infrastructure and transport		DK; DE; EL; NL; PT; UK; NO	AT		X	X
a. <i>Transport of hydrogen, syngas, carbon dioxide</i>	5					
b. <i>Use of existing infrastructure</i>	6					
4. Market regulation and policy		DK; DE; EL; NL; PT; UK; NO	AT	X	X	
a. <i>CO₂ legal issues & liabilities</i>	6					
b. <i>Monitoring and regulation</i>	5					
c. <i>Long term ownership and liability</i>	1					
d. <i>Financial in general</i>	7					
5. Communication and public acceptance		DE; EL; NL; PT; UK	AT	X	X	
a. <i>Communication in general</i>	0					
b. <i>Social acceptance programme</i>	3					

Appendix 1.

EU-countries: names, codes and protocol order

Short name (source language)	Short name (English)	Official name	Code ⁽¹⁾
Belgique/België	Belgium	Kingdom of Belgium	BE
България (*)	Bulgaria	Republic of Bulgaria	BG
Česká republika	Czech Republic	Czech Republic	CZ
Danmark	Denmark	Kingdom of Denmark	DK
Deutschland	Germany	Federal Republic of Germany	DE
Eesti	Estonia	Republic of Estonia	EE
Éire/Ireland	Ireland	Ireland	IE
Ελλάδα (*)	Greece	Hellenic Republic	EL
España	Spain	Kingdom of Spain	ES
France	France	French Republic	FR
Italia	Italy	Italian Republic	IT
Κύπρος/Kıbrıs (*)	Cyprus	Republic of Cyprus	CY
Latvija	Latvia	Republic of Latvia	LV
Lietuva	Lithuania	Republic of Lithuania	LT
Luxembourg	Luxembourg	Grand Duchy of Luxembourg	LU
Magyarország	Hungary	Republic of Hungary	HU
Malta	Malta	Republic of Malta	MT
Nederland	Netherlands	Kingdom of the Netherlands	NL
Österreich	Austria	Republic of Austria	AT
Polska	Poland	Republic of Poland	PL
Portugal	Portugal	Portuguese Republic	PT
România	Romania	Romania	RO
Slovenija	Slovenia	Republic of Slovenia	SI
Slovensko	Slovakia	Slovak Republic	SK
Suomi/Finland	Finland	Republic of Finland	FI
Sverige	Sweden	Kingdom of Sweden	SE
United Kingdom	United Kingdom	United Kingdom of Great Britain and Northern Ireland	UK

Other countries

Short name (source language)	Short name (English)	Official name	Code
Norge	Norway	Kingdom of Norway	NO

¹ (ISO 3166 alpha-2)