

## **Conclusion paper**

### **Introduction**

Liquid gas hubs and efficient transmission and trade between gas hubs will be a crucial measure for the development of a competitive European gas market. A lack of hub development will be a strong indication that something is impeding the development of competition and may be an obstacle for having a European internal gas market.

Liquid gas hubs and efficient transmission and trade between gas hubs were identified as one of the priority areas of work for the N-NW Gas Regional Initiative (N-NW GRI). The issue was discussed at the SG meeting in The Hague 9 October 2006 and in the workshops at Bonn on the 9th of February.

RCC questionnaires on hubs, were distributed in late 2006. The answers to these questionnaires have now been analyzed and the barriers which constitute the biggest problem for the stakeholders have been identified.

The questionnaires and the answers will be used to clarify what the stakeholders see as the biggest problem to trading at hubs and what volumes and trades are currently happening in the different hubs. The results has guided the GRI in deciding which issues needed to be dealt with and in which order. Some of the suggested barriers in the questionnaire will not be dealt with under this workstream as they are dealt with under other workstreams within the GRI. It was decided that different issues needed to be dealt with at the specific hubs.

This paper outlines the issues, the ways to implement changes and the timetable that has been decided after analyzing the questionnaires and comments received from the SG at Bonn

This paper is split up into three parts. The first part describes the results of a questionnaire on the status of hubs in the North-Northwest region. The second part describes the results of a questionnaire on barriers to trading at the hubs. The last part deals with the way forward; which issues should be continued working on how to solve and how to implement it.

## The questionnaire on the Status of hubs in North/North-West Region

GRI has sent out questionnaires to a number of hubs in the North/North-West Region concerning key figures and services offered on hubs in the region. GRI has received answers from six hubs up to this point: NBP (UK), Zeebrugge (B), TTF (NL), BEB VP (Germany), E.ON GT VP (Germany) and GTF (Denmark).

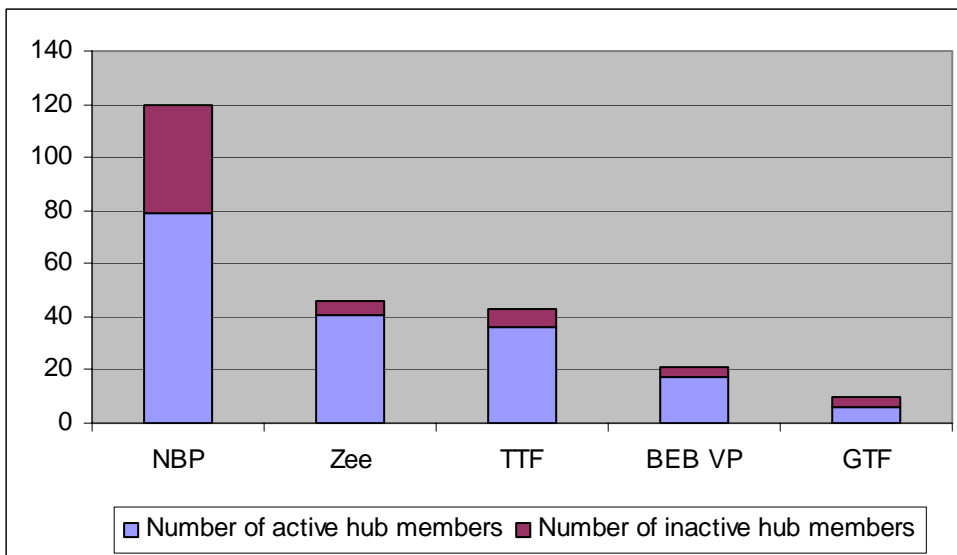
The answers are shown in Appendix.

Some of the most important facts are described in the following sections.

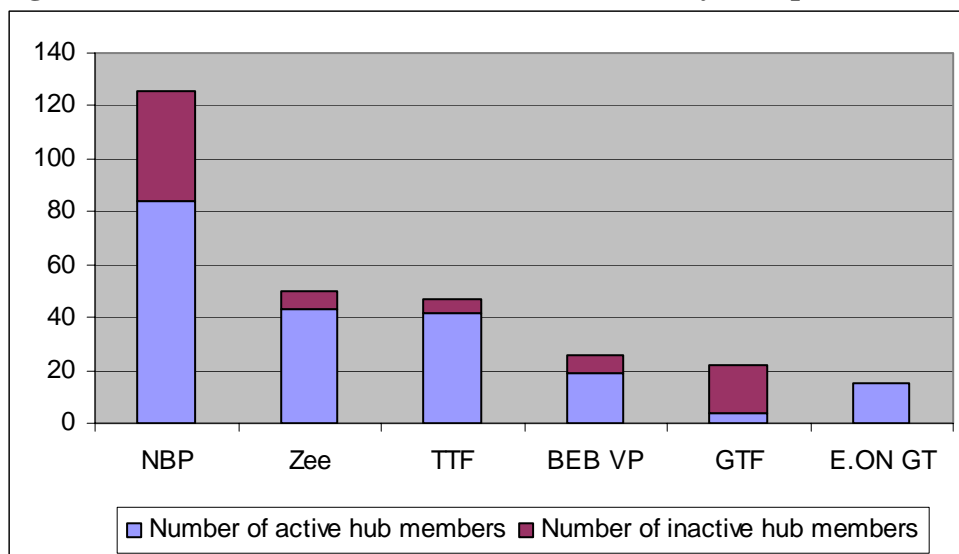
### Members of the different hubs

The number of hub members is an important indicator of the liquidity of the hubs. Thus, a high number of hub members are a high number of potential trade partners. It is though also important that hub members are also active in trading. Figure 1 and Figure 2 illustrates the number of active/inactive hub members in 2005 and 2006 respectively.

**Figure 1: Number of hub members in 2005**



**Figure 2: Number of hub members in 2006 (January to September)**



The Herfindahl-Hirschmann Index (HHI) is used as a measure for the concentration factor. HHI is calculated as the sum of the squared market shares and has a maximum of 10,000. Table 1 and Table 2 show a low or moderate concentration at Zeebrugge, TTF and BEB VP and a very high concentration at GTF.

### Key Figures and services at the different hubs

The churn factor describes how many times the same physical gas is exchanged on the hub. A churn factor of 1,00 means that the physical gas in the hub is traded only once. The more times it is traded, the more liquid is the hub. Churn factor values in Table 1 and Table 2 indicate a high liquidity at NBP, moderate liquidity at Zeebrugge and TTF and low liquidity at BEB VP, E.ON GT VP and GTF.

**Table 1: Key figures for hubs 2005**

	2005				
	NBP	Zee	TTF	BEB VP	GTF
Concentration factor (HHI)	NA	504	700	1,169	5,038
Daily average volume nominated, MWh	15,562,408	1,269,112	335,063	19,651	8,016
Daily average physical delivery, MWh	1,633,497	256,662	108,207	14,616	8,016
Churn factor	9.50	4.28	3.10	1.26	1.00

**Table 2: Key figures for hubs 2006 (January to September)**

	2006 (January to September)					
	NBP	Zee	TTF	BEB VP	GTF	E.ON GT VP <sup>2</sup>
Concentration factor (HHI)	NA	513	600 <sup>1</sup>	923	8,022	NA
Daily average volume nominated, MWh	17,093,769	1,360,992	530,019	44,371	9,459	22,000
Daily average physical delivery, MWh	1,702,407	260,222	168,265	30,453	8,772	19,000
Churn factor	10.04	4.34	3.15	1.31	1.08	1.15

Note 1: January to November 2006

Note 2: December 2006

In addition to the exchange of gas often hubs offer a number of services to their members. Table 3 provides an overview of the services offered.

**Table 3: Offered services at hubs**

	NBP	Zee	TTF	BEB VP	GTF	E.ON GT
Matching nominations	Y	Y	Y	Y	Y	Y
Title tracking	N	Y	Y	Y	Y	Y
Allocation	Y	Y	Y	Y	Y	Y
Blending services	N	N	Y	N	NA	N
Title transfer	Y	Y	Y	Y	Y	Y
Balancing	Y	Y	N	Y	Y/N	NA
Back-up/back-down	N	Y	N	N	N	Y
Parking/loaning	N	N	Y	N	N	NA
Electronic trading	Y	N	N	Y	Y	NA
Administration	N	Y	N	N	Y	Y
Risk management	N	N	N	N	N	NA
Natural gas futures trading	N	N	N	N	N	NA

Hub-to-hub transfers	N	N	N	N	N	Y
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Volumes traded on hubs are linked to trading on gas exchanges. GRI has received questionnaire answers regarding gas exchange liquidity from APX Gas NL (NL), APX Gas Zee (B), APX Gas UK (UK) and ICE Futures (UK).

The answers are shown in Appendix.

Table 4 shows key figures for each of the gas exchanges. The table shows that volume traded and the number of exchange members at APX Gas UK and especially at ICE Futures are much greater than at APX Gas NL and APX Gas Zee.

**Table 4: Key figures for gas exchanges 2005 and 2006 (January to September)**

	ICE Futures		APX Gas NL		APX Gas Zee		APX Gas UK	
	2005	2006 (Jan-Sep)	2005	2006 (Jan-Sep)	2005	2006 (Jan-Sep)	2005	2006 (Jan-Sep)
Number of exchange members	100	127	16	16	9	9	62	63
Daily average volume traded, MWh	53,000,000* (appr. 1,553,271 MWh)	72,000,000* (appr. 2,110,104 MWh)	819	781	5,200* (appr. 152 MWh)	1,158* (appr. 34 MWh)	11,576,071* (appr. 339,260 MWh)	13,152,846* (appr. 385,470 MWh)
Daily average gas price, EUR/MWh			15.90	22.24	43.46** (21.70 EUR/MWh)	45.72** (22.82 EUR/MWh)	37.03** (18.49 EUR/MWh)	40.68** (20.31 EUR/MWh)

\* Therm (1 Therm  $\approx$  0,029307 MWh)

\*\* p/Therm (1 pence  $\approx$  0,014631 EUR)

## The Questionnaire on barriers to trading at hubs

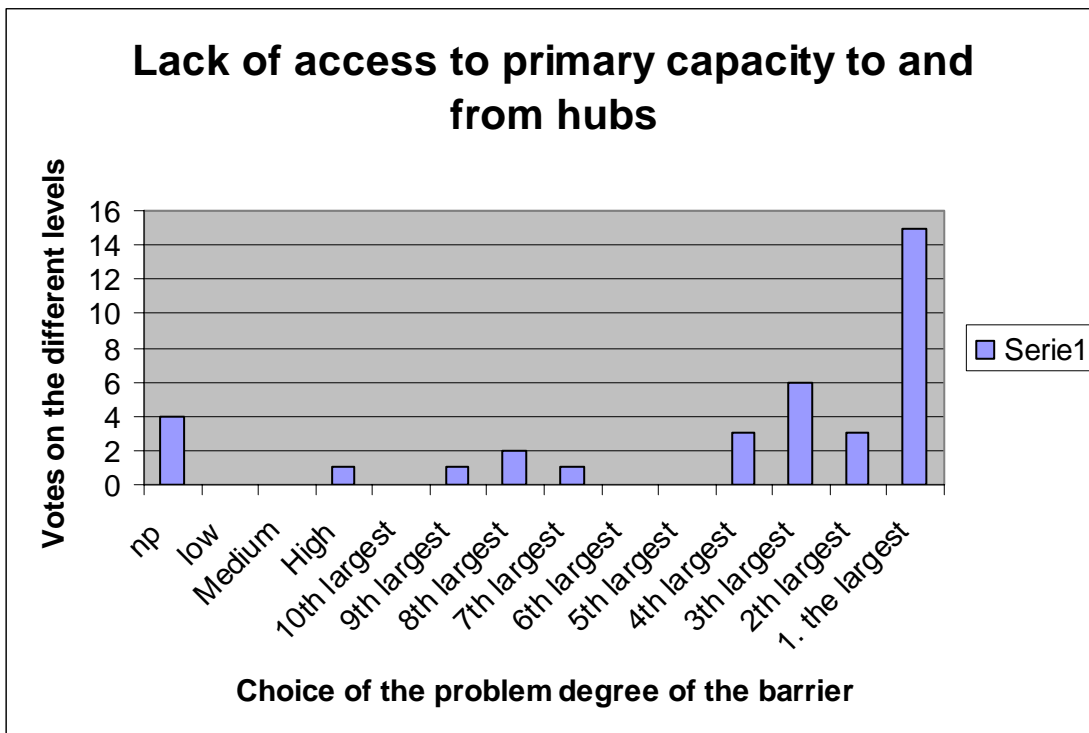
The top six problems with trading at hubs according to the answers from the questionnaire are primarily connected with access to and from the hub and the liquidity.

In this questionnaire the stakeholders had the options of either proclaiming the barrier as not a problem (np) or declaring that it was a problem. If the stakeholders declared the barrier as a problem they were asked to describe the extent of the barriers, and rank the barriers which constituted the 10 largest barriers. With 1 being the barrier that represents the largest barrier to trade at hub. The barriers that constitute a problem but do not range among the 10 largest barriers could be divided into a low problem (low), a medium problem (medium) or a big problem (high).

### Lack of access to primary capacity to and from hubs

The barrier which got the majority of votes for being the largest problem is lack of access to primary capacity to and from hubs. There were 15 stakeholders that ranked this barrier as the largest problem by setting a 1. in this barriers slot in the questionnaire. The ranking is as seen in the following diagram.

**Diagram 1: ranking of Lack of access to primary capacity to and from hubs**

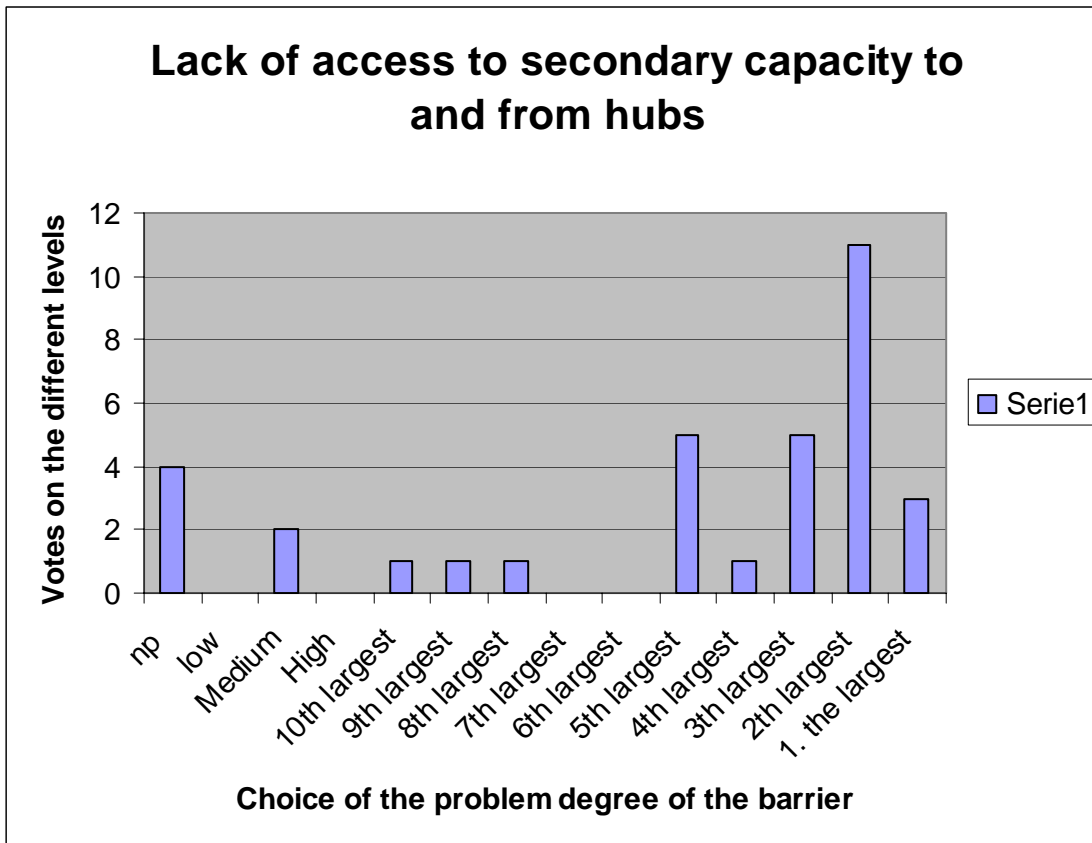


As seen from diagram 1, lack of access to primary capacity to and from hubs, is viewed as the largest barrier for many stakeholders. There are also stakeholders who do not view this as a problem. These stakeholders might be the ones who were able to get the capacity they needed.

### Lack of access to secondary capacity to and from hubs

Lack of access to secondary capacity to and from hubs is the barrier which got the largest amount of votes as being the second largest barrier.

Diagram 2: ranking of Lack of access to secondary capacity to and from hubs

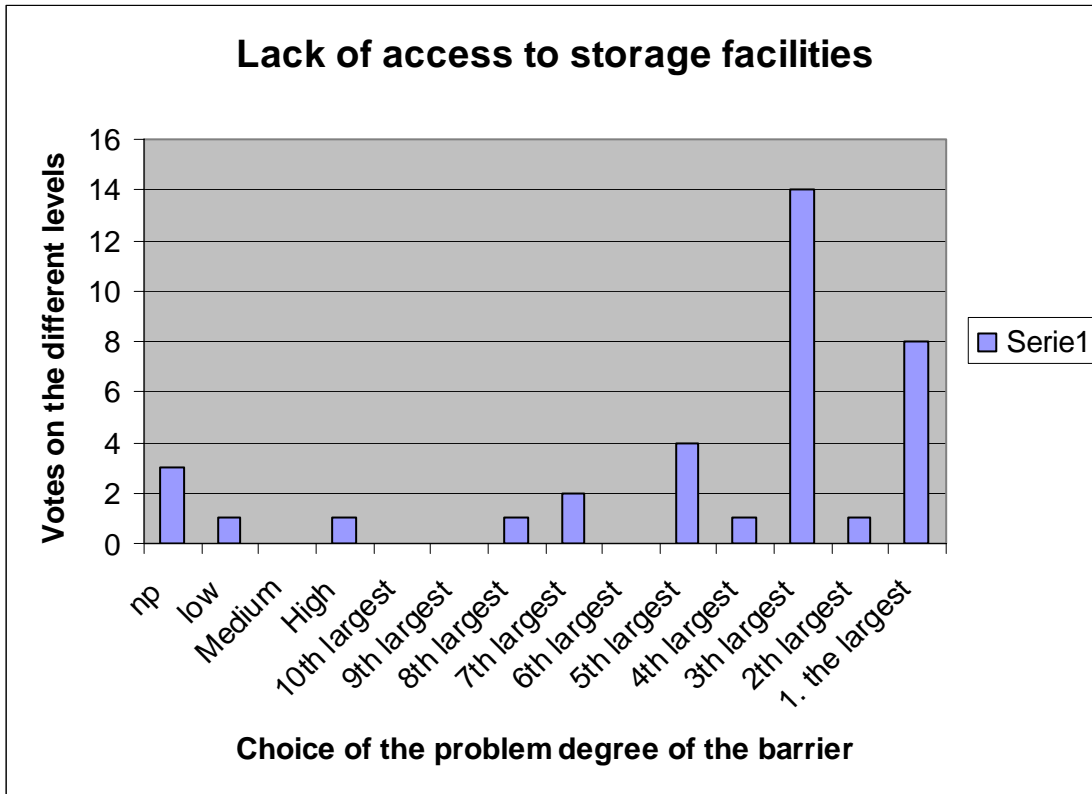


There are 11 stakeholders who have the opinion that lack of access to secondary capacity to and from hubs is the second largest barrier. There are also a few who see this as the largest problem. Again there are some stakeholders who don't think that this barrier is a problem to trade at hubs.

### Lack of access to storage facilities

Lack of access to storage facilities is the barrier which got the most votes as being the third largest barrier.

**Diagram 3: Lack of access to storage facilities**

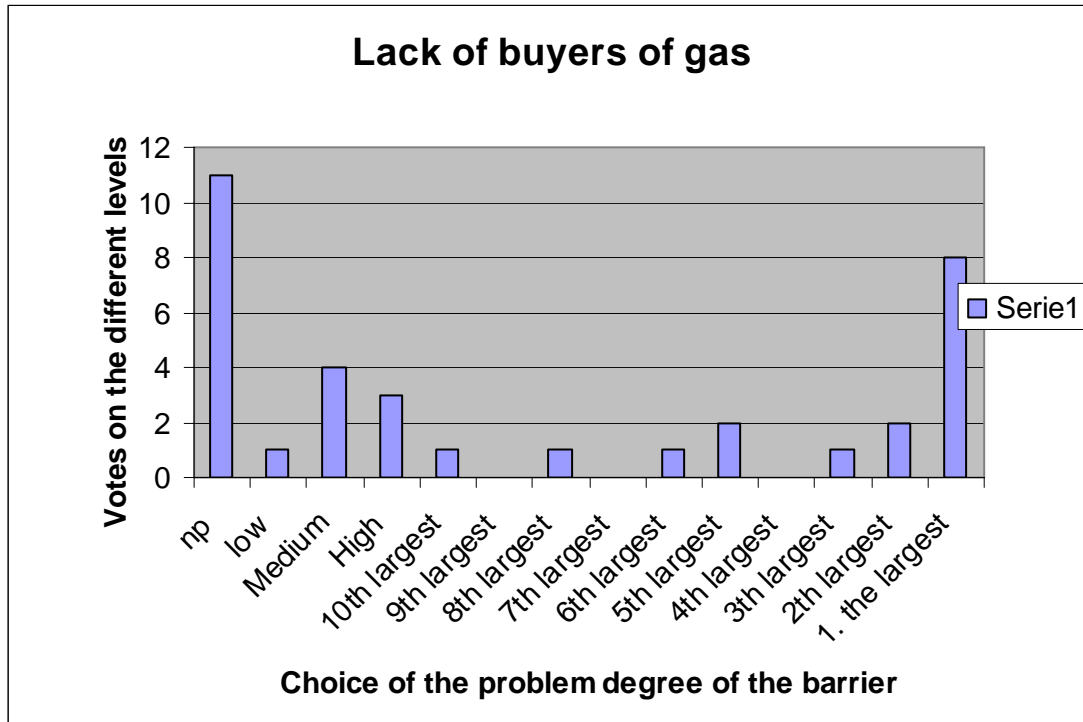


14 stakeholders think that lack of storage facilities is the third largest barrier to trade at hubs. Eight think that the barrier is the largest barrier to trade. It is clear that this is also a barrier that must be dealt with in order to improve the conditions for trade at hubs. There are only three stakeholders who do not believe this to be problem.

## Lack of buyers of gas

Lack of buyers of gas is also a problem that many stakeholders found to be the biggest barrier, but at the same time there are a lot of stakeholders who do not see this as a problem.

**Diagram 4: Lack of buyers of gas**

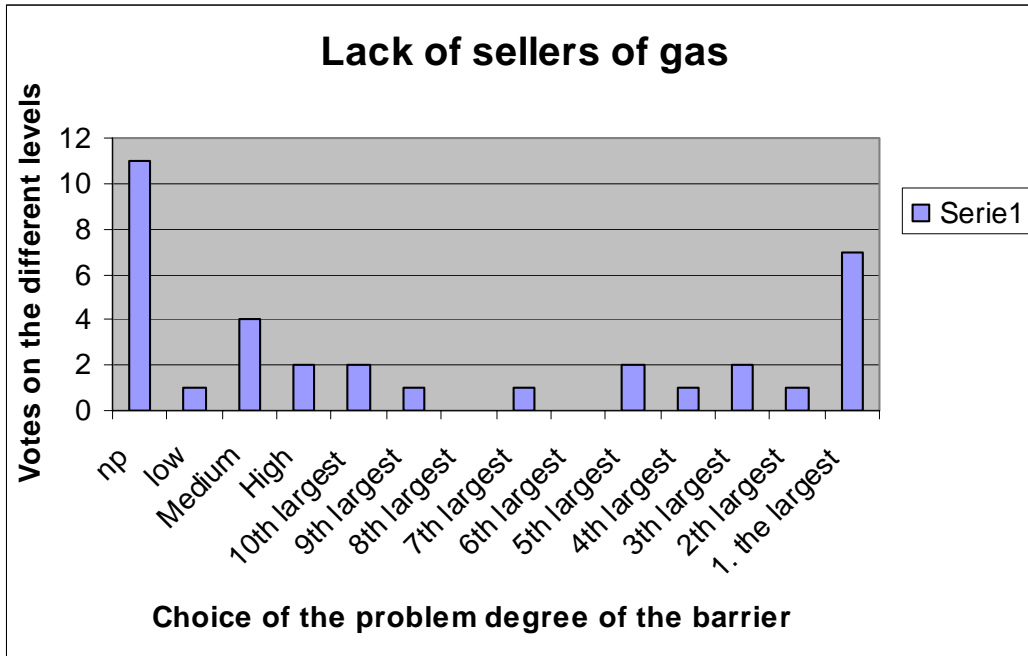


The responses to this barrier is somewhat varied, with a tendency to either vote this as a really big barrier or not a barrier at all. 8 stakeholders think that lack of buyers of gas is the largest problem to trading at hubs while 13 stakeholders do not see this as a problem. There are some votes distributed between these poles which seem to be spread quite evenly.

## Lack of sellers of gas

Lack of sellers of gas also divides the opinions of the stakeholders.

**Diagram 5: Lack of sellers of gas**

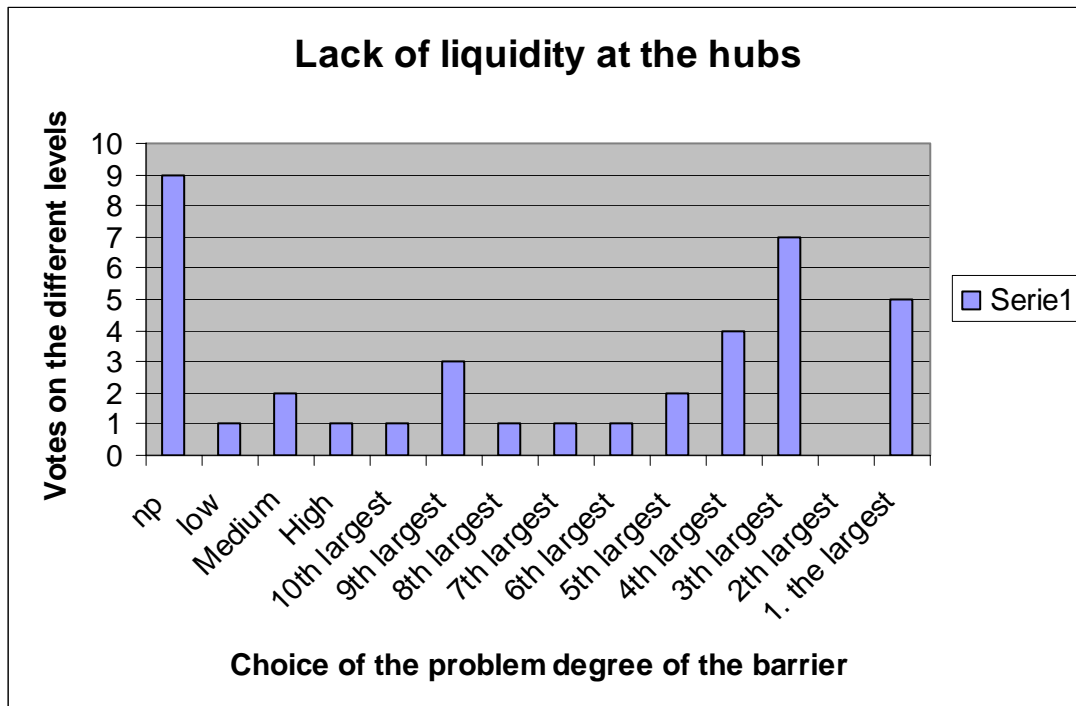


7 stakeholders believe this to be the largest problem with trading at hubs. But on the other hand 11 stakeholders have the opinion that this does not constitute a problem. Otherwise opinions are divided between these poles.

## Lack of liquidity at the hubs

Lack of liquidity at the hubs is also ranged among the barriers stakeholders voted as the largest problems for trading at hubs.

**Diagram 6: Lack of liquidity at the hubs**



5 Stakeholders believe this to be the biggest problem, and 7 think of this barrier as the 3<sup>th</sup> largest problem. But there are also 9 stakeholders who state that this barrier is not a problem. There are a lot of votes in between with 4 voting lack of liquidity at the hubs as the 4<sup>th</sup> biggest problem, and 3 voting it as the 9<sup>th</sup> largest problem.

## The barriers addressed by this workstream

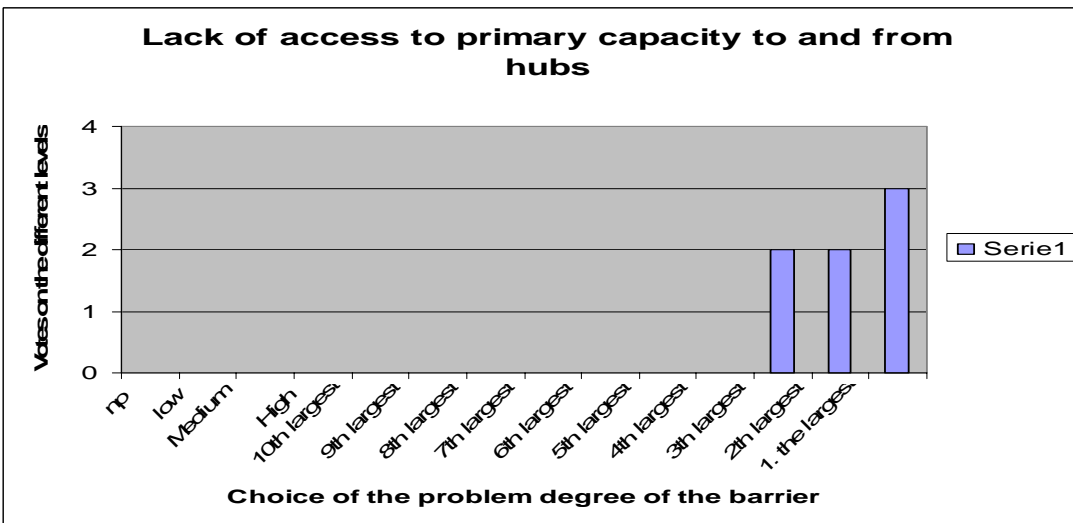
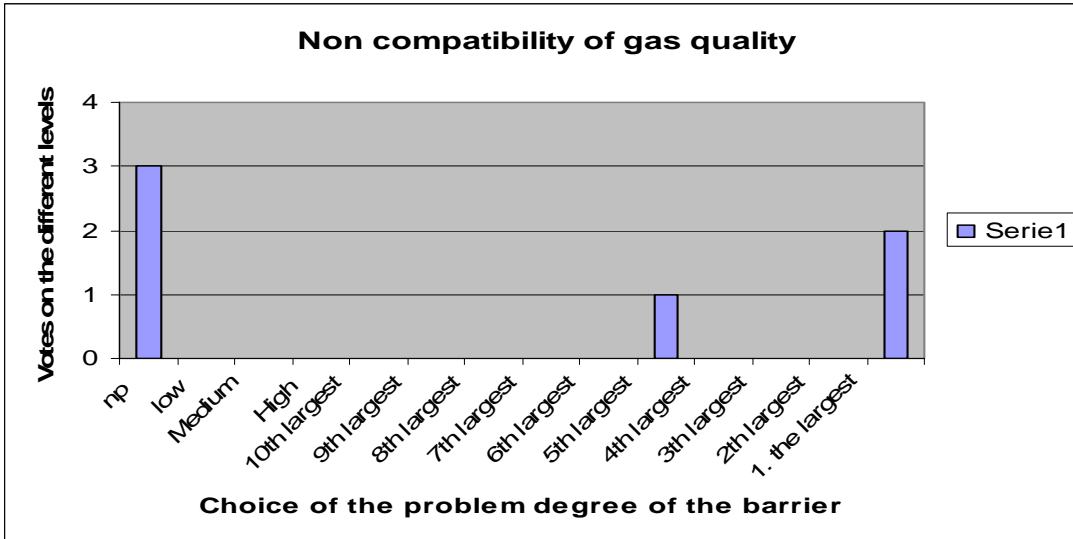
Some of these barriers will not be dealt with in the hub work stream as they will be analyzed and dealt with in other workstreams. Issues such as on capacity are addressed in the primary and secondary capacity workstreams.

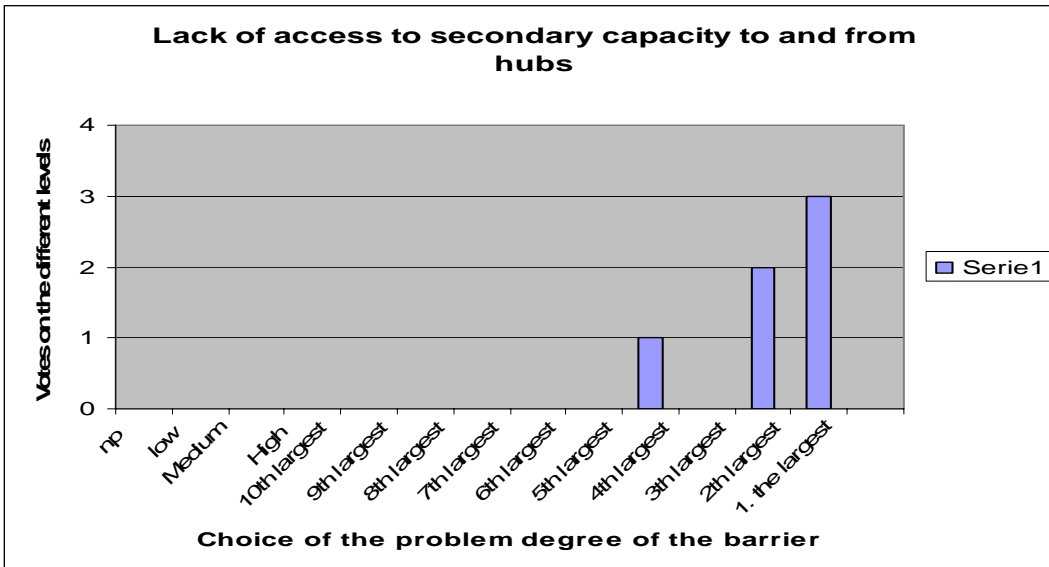
## The biggest problems at the different hubs

### Zeebrugge

At Zeebrugge there are three problems which seem to be big problems to trade at the hub: non compatibility of gas quality, lack of access to primary capacity to and from hubs and lack of secondary capacity to and from hubs.

The votes on these issues are as the following

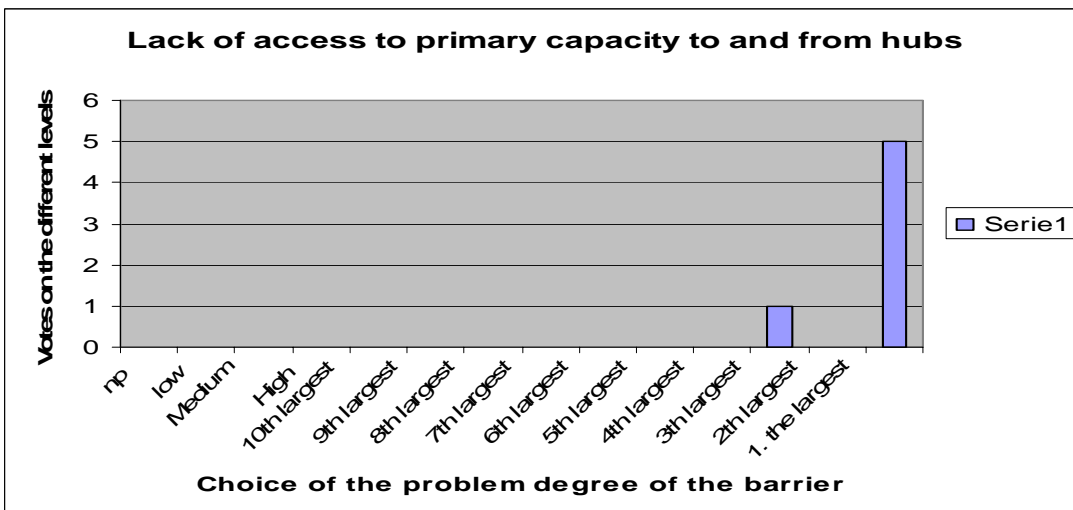


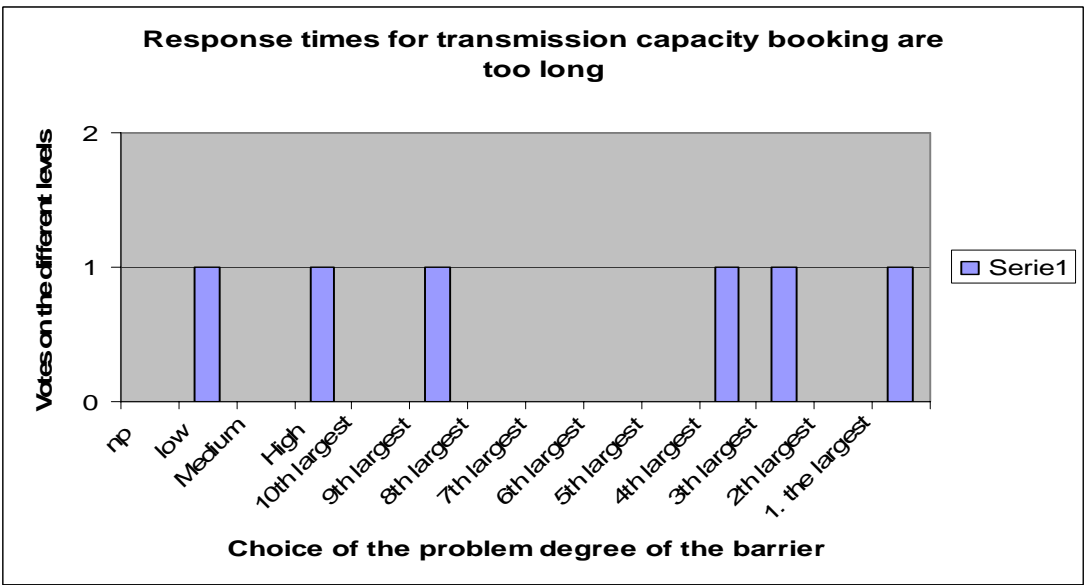
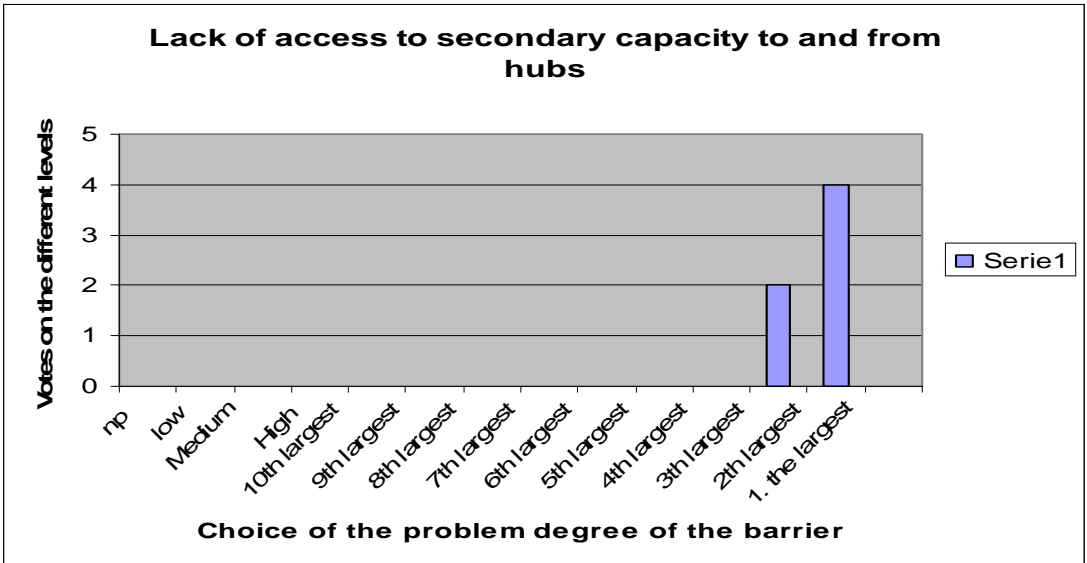


The main problem at Zeebrugge seems to be lack of access to primary capacity to and from the hub. But among the biggest problems at Zeebrugge there are a problem that was not among the 6 biggest overall problems: non compatibility of gas quality. There are 2 stakeholder who trade at Zeebrugge who voted that this was the biggest problem but also 3 who does not see this as a problem.

**TTF**

The three biggest barriers to trade at TTF seems to be lack of access to primary capacity to and from hubs, lack of access to secondary capacity to and from hubs and response times for transmission capacity booking are too long.

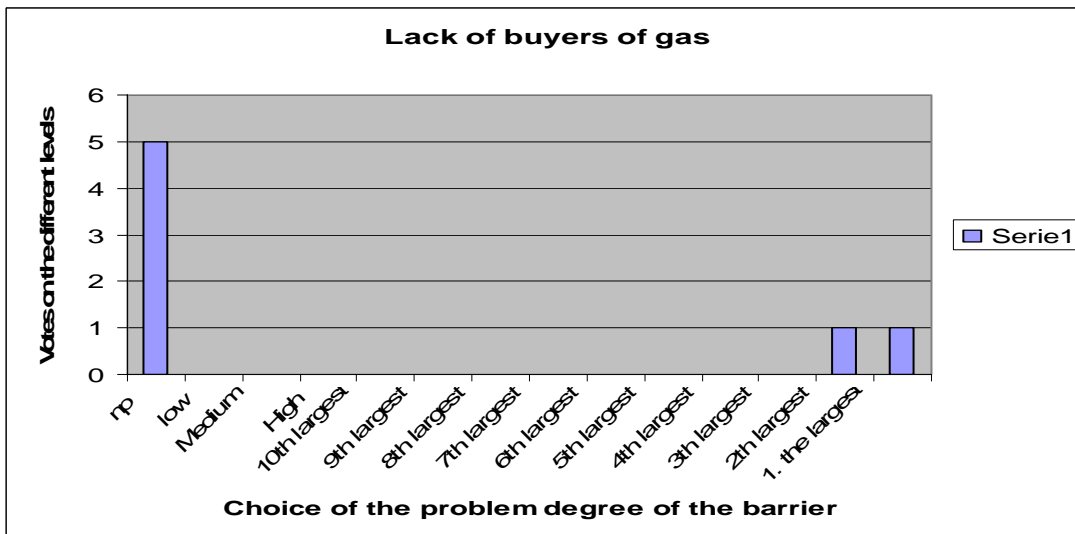
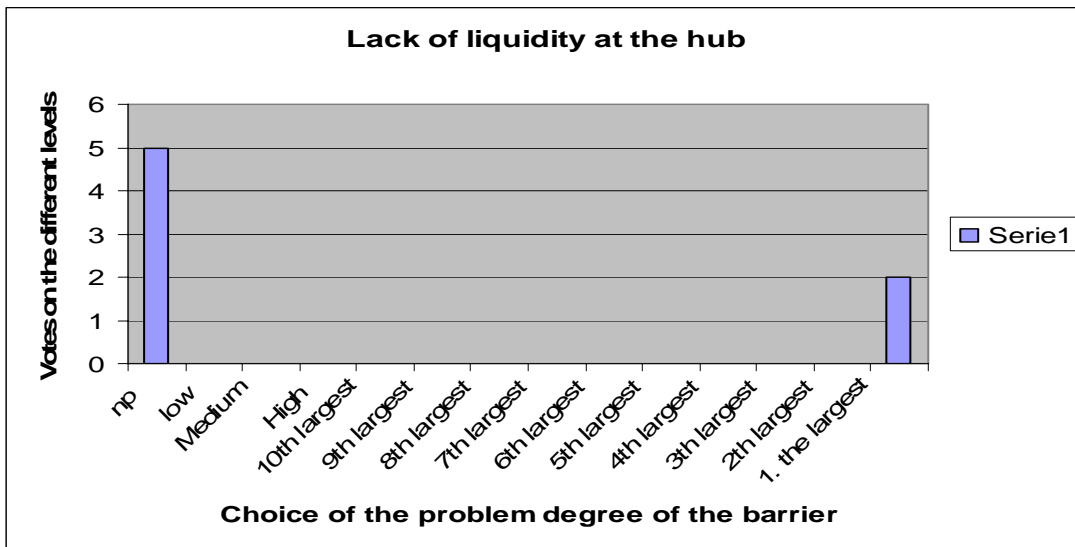


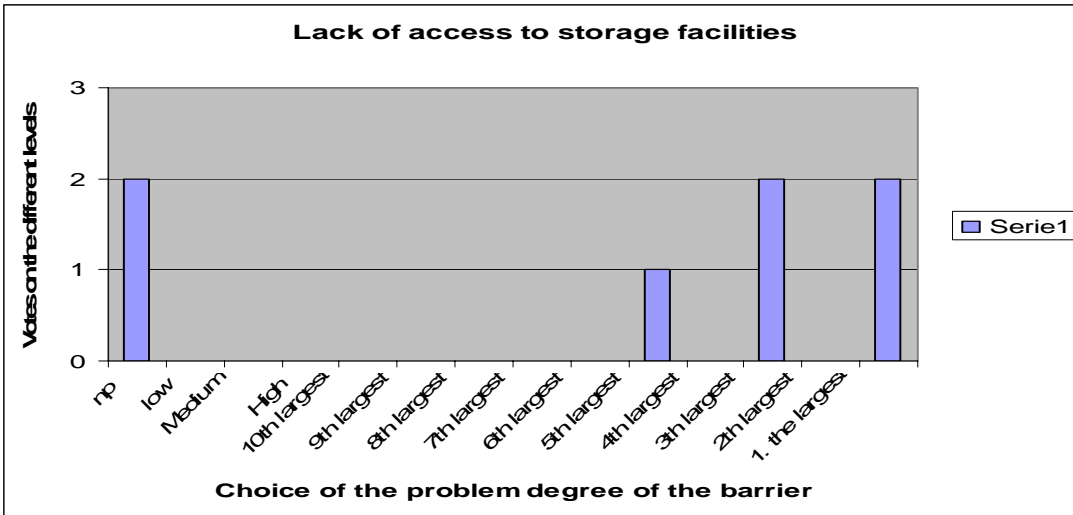


Again the biggest problem seems to be lack of access to primary capacity to and from hubs, but there at TTF there also seems to be a problem with response times for transmission capacity booking are too long. All stakeholders seem to believe that this is a problem, even though ranking it from a low problem to the biggest problem.

## NBP

The three biggest barriers at NBP seem to be lack of liquidity at the hub, lack of buyers of gas and lack of access to storage facilities.

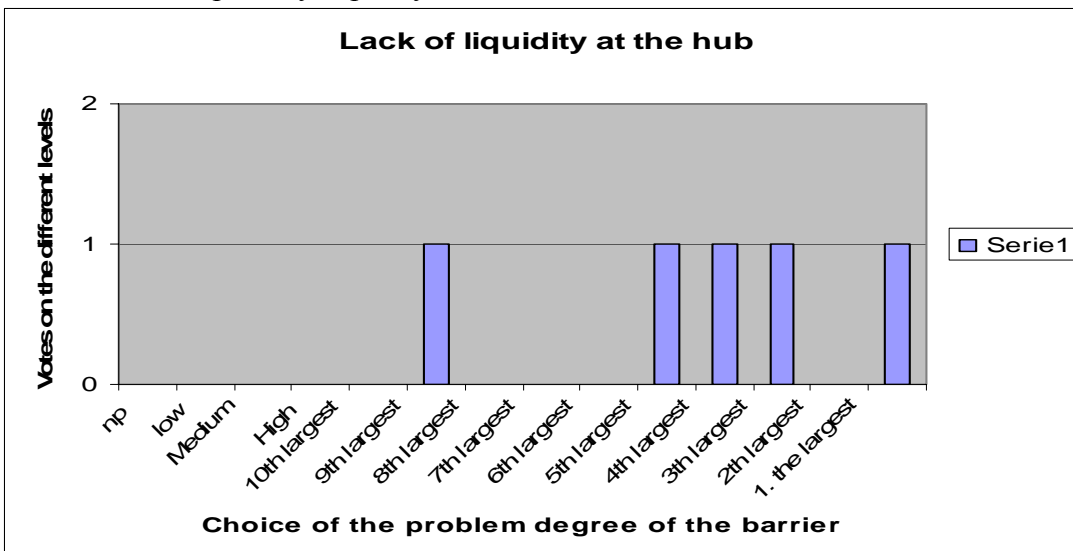


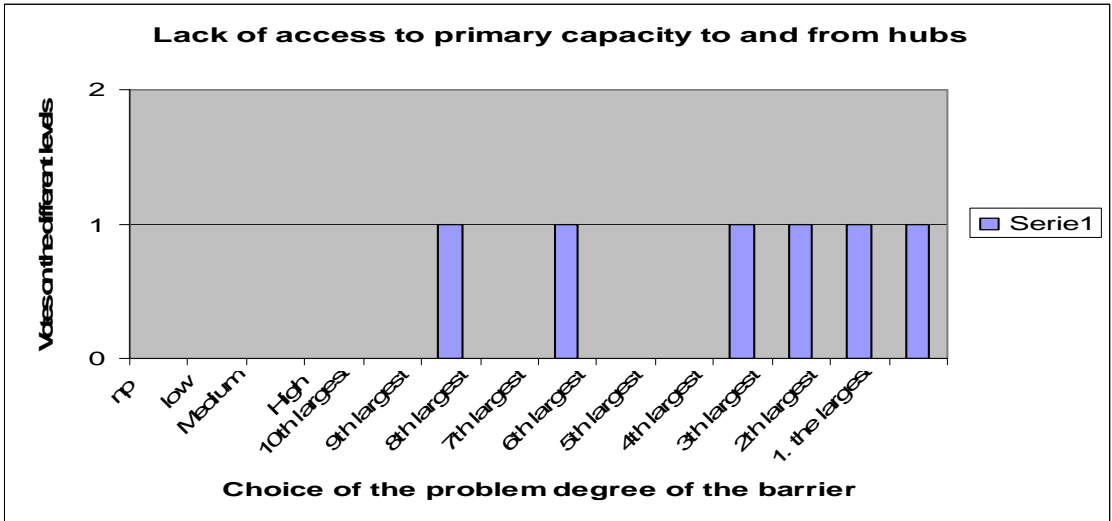
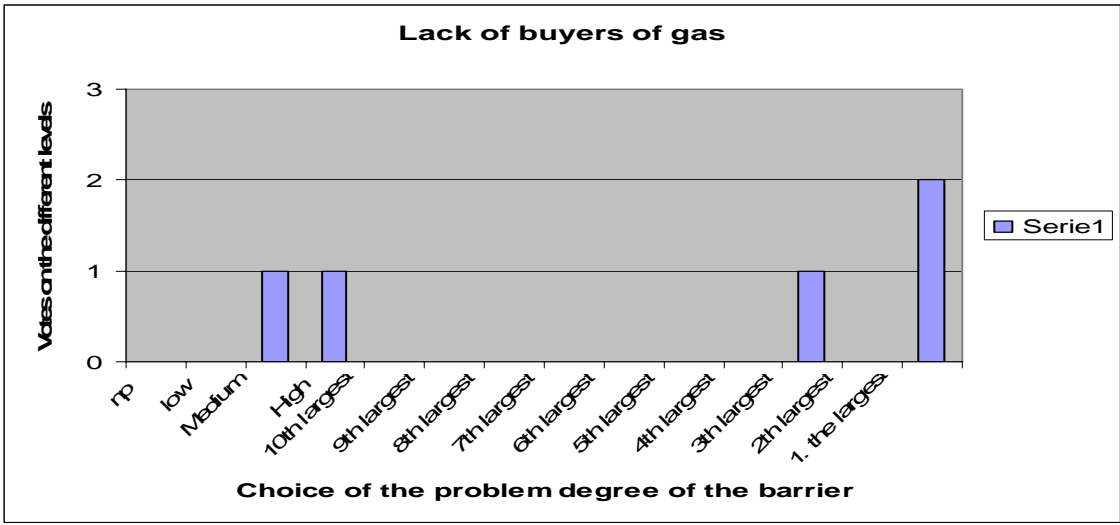


At NBP there seem to be problems with access to storage capacity. For all the problems at NBP there are a lot of division, as some stakeholders believe the barriers to be a problem and some believe that these barriers do not constitute a problem.

**BEB**

The three biggest barriers at BEB seem to be lack of liquidity at the hub, lack of buyers of gas and lack of access to primary capacity to and from hubs.

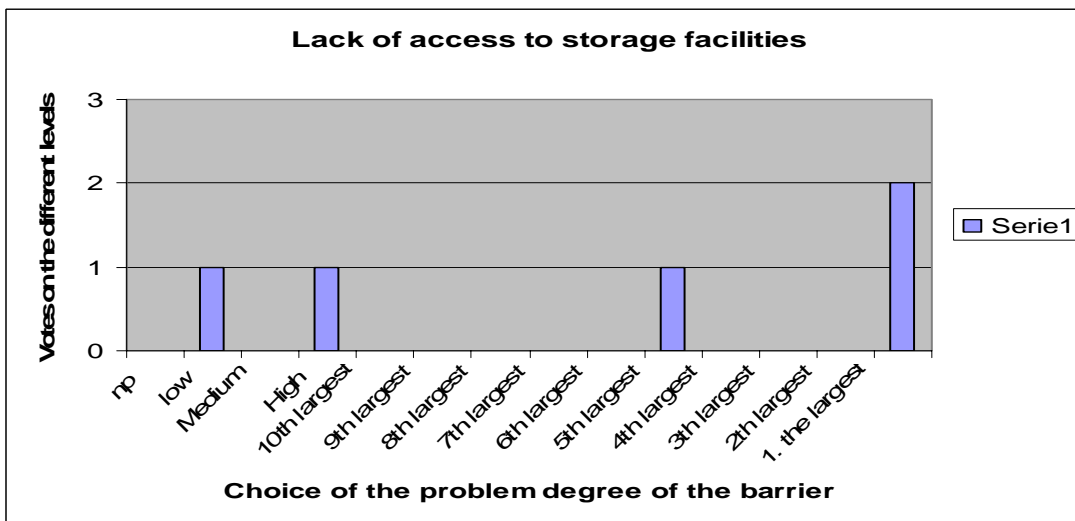
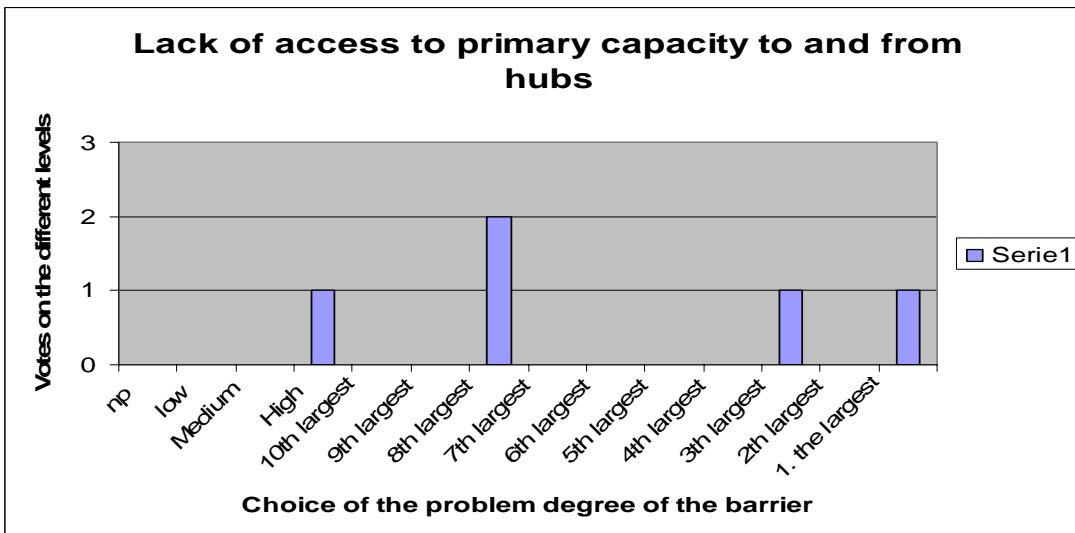
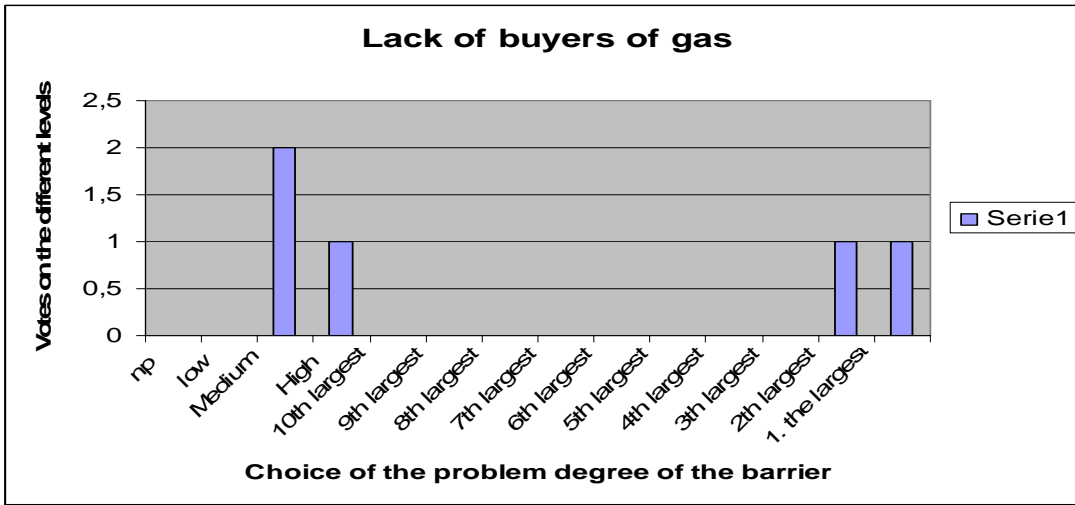




The problems at BEB seem to reflect the overall problems. The barrier that got the most votes as the biggest problem is lack of buyers of gas, and every stakeholder trading at BEB thinks that this is a problem.

## PEG Nord

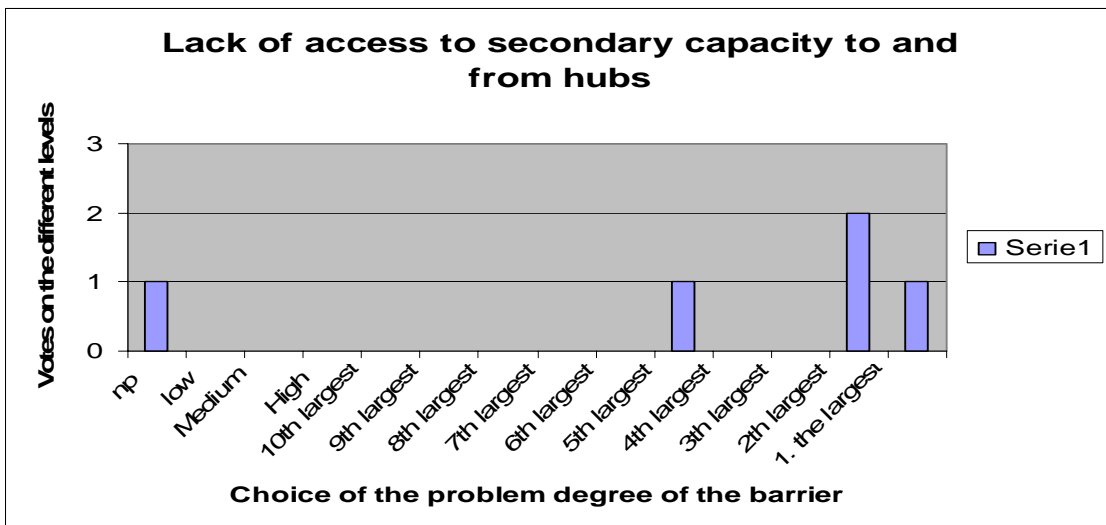
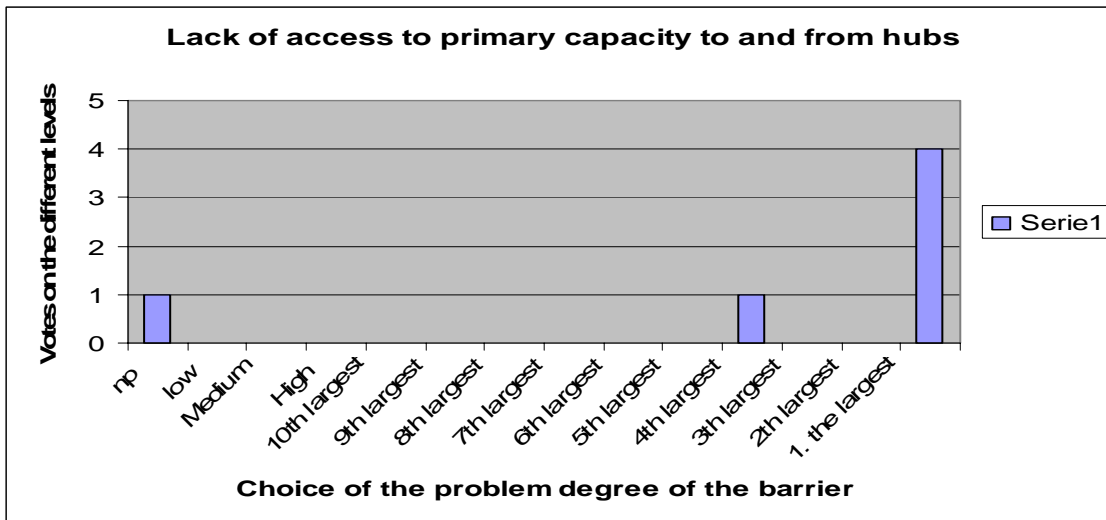
The three biggest barriers at PEG Nord seem to be lack of buyers of gas, lack of access to primary capacity to and from hubs and lack of access to storage facilities

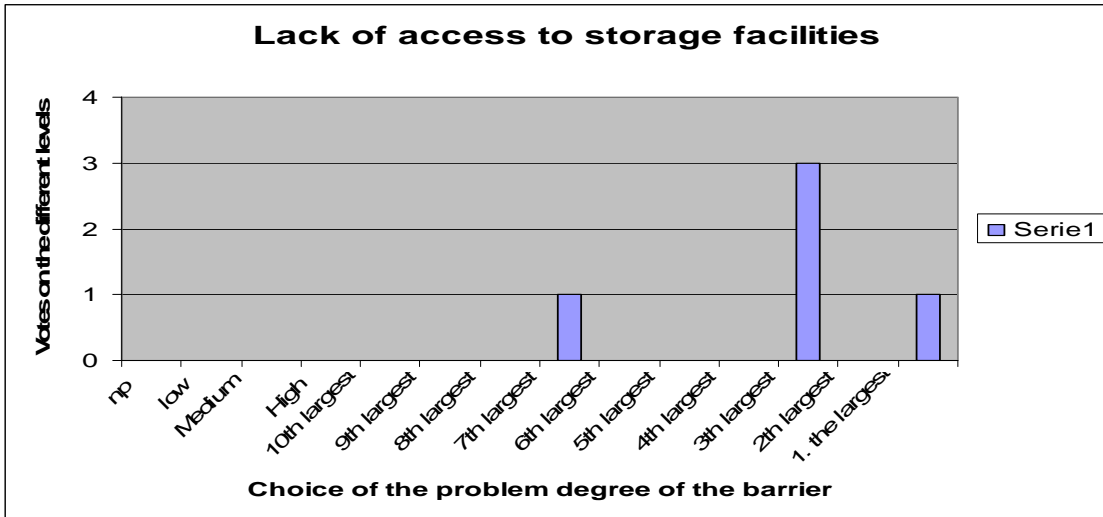


Lack of access to storage facilities seems to be the barrier which got the most votes at the biggest problem for trading at PEG Nord. Two stakeholders found that this was the biggest problem and all the stakeholders trading at PEG Nord think that it is a problem.

### E.ON-RG North

The three biggest barriers at E.ON-RG North seem to be lack of access to primary capacity to and from hubs, lack of access to secondary capacity to and from hubs and lack of access to storage facilities.





The biggest barrier at E.ON-RG North is lack of access to primary capacity to and from hubs. There are 4 stakeholders who voted this barrier as the biggest. But one stakeholder does not think this is a problem.

**PEG Est**

There was one hub mentioned under other hubs in the questionnaire. That hub was PEG Est. The three biggest barriers at PEG Est seem to be lack of access to primary capacity to and from hubs, lack of access to secondary capacity to and from hubs and lack of access to storage facilities. They all got one vote as being the biggest barrier, which will not be shown in a graph.

## Way forward

In order to have well functioning markets in the North-Northwest region efficient hubs are needed. Therefore Hubs were included as one of the primary priorities for the North-Northwest RCC. In the hub workstream the questionnaires, which have been illustrated in part one and two of this paper, were distributed for answering by stakeholders and huboperators in November 2006.

The questionnaires delivered some interesting results which afterwards were discussed at a workshop in Bonn on the 9<sup>th</sup> of February 2007.

The conclusions reached on the workshop in Bonn the 9 of February were

- The barriers mentioned in answers of questionnaires are found to be the central barriers
- Balancing and gas quality also seems to be main barriers
- All hubs are inflicted with problems

The barriers which as according to the results from the questionnaire are the largest barriers:

- Lack of access to primary capacity to and from hubs
- Lack of access to storage facilities
- Lack of access to secondary capacity to and from hubs
- Lack of liquidity
- Lack of sellers
- Lack of buyers

Some of these barriers might constitute a problem in some of the hubs and not in other hubs, but these are the six barriers which got the most overall votes as the largest barriers.

The workshop also had a debate on how to overcome the different barriers which are preventing trade on the different hubs.

The following remarks were made on the issue

- capacity release,
- main focus on framework (access, rules),
- large zones with volume based tariffs with no need for capacity booking inside the zone
- possible merger of e.g. Danish and German hubs by further harmonisation of rules (balancing and access to capacity)
- it is only beneficial with large markets if there is enough capacity and few balancing zones,
- gas quality at specific hubs
- standardize balancing (daily vs. hourly) and products, reasonable imbalances cost if not market based, grid company and TSO should work together to make trading of imbalances possible
- all liquidity need to be concentrated at the hubs

## Implementation plan

The way forward concentrates on how to implement changes at the hubs which can lead to more effective hubs and hence and better functioning market for gas in North-Northwest Europe. After the workshop several next steps has been analysed, one of the possible ways forward were to just monitor the other workstreams impact on the hubs as they implemented changes to the gas market. Another way forward was to make general initiatives this will focus on concentrating trade at the hubs, by introducing obligations to trade at the hubs. In this option further discussions and thought

processes were needed to be made. The chosen way forward deals with different issues as well as general issues that need to be solved at all the specific hubs.

For this task to be successful those with the best knowledge needs to be responsible for carrying out the implementation. For hubs this task therefore has to be taken up by the hub operators and the markets participants relevant for the specific hubs as well as the national regulators.

This section of the conclusion paper sets up deadlines and suggests actions taken up at the hubs.

## **Organisational structure**

There will be one enabler group (EG) for this workstream and one usergroup (UG) for each hub.

The EG will consist of:

Carsten Smidt (DERA), Douglas Wood (EFET), Henriette Hindrichsen (ENDK), Luc Gossuin (Fluxys), Egbert-Jan Schutte (APX), Elif Karatay (DTe) and Erik Rakhou (DTe).

The EG will be chaired by the lead regulator for the hub workstream, Carsten Smidt. And will also include a representative of the traders of Energy; Douglas Wood, representatives from the system and hub operators; Henriette Hindrichsen, Luc Gossuin and Egbert-jan Schutte, as well as two members from DTe, Elif Karatay and Erik Rakhou. The task of the EG is to monitor and coordinate the actions taken by the different UG. The EG will be overall responsible for the progress in the hub workstream.

The UG will consist of, ideally 5-7, traders which represent the whole market and who trade at the specific hubs or want to trade at the hubs but are prevented because of the barriers. An example could be pure traders, producers, incumbent wholesalers, large industrial companies and so forth. The huboperators together with the national regulators will be in charge of setting up the most qualified UG with respect to their hub. The task of the UG is to come up with specific list of action that needs to be taken at the individual hubs and carrying out these actions in cooperation with the hub operators and the national regulators. The national regulator will attend the UG meetings and lend their support they will also be needed if legal questions are raised about certain actions. The IG, EG, SG and the RCC will all come up with lists of hubs that they think should be included in the workstream. The hubs included will be chosen from these lists.

Together with the hub operators and national regulator the UGs and the EG will carry through and monitor the effect of different implementation on the specific hubs on the local markets and the overall North-Northwest European market.

The EG can charge the individual UGs with specific tasks and overrule them if they want to implement changes which are not beneficial for the overall North-Northwest European market.

These suggestions were analysed in an implementation paper which afterwards were discussed at an IG meeting on the 20<sup>th</sup> of March.

The conclusions of this meeting was that

- Operators warned for potential overlap with other workstreams

- Operators support the idea of UGs but propose that regulators initiate these groups with support from the operators
- Operators wish for a list which points out the hubs that are to be analysed in this workstream, and that liquid hubs are also included in the analysis so that it will also be possible to learn from “best practise” cases

The RCC has taking the danger of overlaps into account and will steer the workstream clear of any unnecessary overlap.

The RCC agrees with the operators proposal to let the regulators help in setting up the UGs, Dte has volunteered to assist in the creation of the UGs.

It was agreed that IG, Eg and SG make a list of the hubs they feel should be included in the analysis of this workstream, and the RCC will do the same, the final list of hubs that are to be included in the analysis will spring from these lists.

### **Tasks for the hub workstream**

The tasks that are set up for the hub workstream are the following:

- Development and implementation of a general action plan for the hub workstream and the UG.
- Monitoring the process in the hub market as the other workstreams implement their actions

The hub workstreams task will be to setup an action plan for developing the different hubs and setting deadlines for the tasks at hand and afterwards monitor and enforce the deadlines set up in the implementation plan. The task for the EG will be to coordinate the efforts of the UG and make sure that progress is made and to monitor the effect of implementation in the other workstreams on the trading at hubs. Participants in the UG meetings will be responsible for coming up with specific solutions and putting the solutions into action.

Some of the point that could be dealt with in the action plans made by the UG is:

- Integration between a future German EEX exchange and the Danish GTF hub
- Expanding the balancing and trading zones at Zeebrugge
- Introduce swap contracts between hubs
- Common contracts at each hub, which could increase trade between hubs
- Improving the frames of creditworthiness
- Decreasing the possible length of time for capacity bookings, so more short term capacity is made available
- Introducing re-entry in every exit point included in the systems surrounding the hubs
- Decreasing the amount of administrative procedures at hubs
- More information and transparency on the risk of interruption on interruptible capacity

Integration between a German EEX Exchange and the Danish GTF will create a bigger zone in which trading and transporting gas will become easier across the borders. Integration will erase the bottlenecks that can be created when to separate systems meet, in general at border points it will also increase the transparency for shippers inside the new zone and thus make it easier and more secure to trade in the new bigger zone. It will also create a larger area in which the liquidity will

flow to the hubs as the smaller hubs/exchanges are integrated into one big exchange. Integration between the exchanges requires the cooperation of the TSO across both countries as they have to agree on the specific rules and codes of conduct with that zone.

Expanding the zone at Zeebrugge will yield more or less the same benefits as integrating the German EEX Exchange and the Danish GTF. It provides the setup for more trade and liquidity within the now larger area as more traders are included in the zone and transparency increases.

Introducing swaps between hubs will have the effect that trade between hubs will potentially increase as traders now get access to gas in other systems. It will also increase the possibility for competition in the systems as more traders gain access to the different markets by being able to get gas in the markets by buying swaps at the hubs.

Common contracts at all the hubs will increase the transparency between the hubs and make shippers more certain about the products they purchase at the hubs. It will also have the potential to increase trade between hubs as more traders might be willing to expand to include trade at more hubs.

Improving the frames of creditworthiness will both make trades more secure and streamlined as the same frames are in effect for all the hubs and exchanges it may also increase the number of shippers if current demand for creditworthiness are too strict.

By decreasing the length of which traders can book capacity, it allows more short term capacity to be made available. One of the problems for trades at hubs is being able to get the capacity for gas transport to and from the hubs. By limiting the extent of which capacity hoarding is possible, more short term capacity is made available and thus more capacity is made available for trades at the hubs. More capacity will allow for more short term trade and hence increase liquidity.

The possibility for re-entry at every exit point included in the systems surrounding the hubs will create the opportunity for large consumers and traders who have an excess of gas in an exit point within the hub system to sell the gas at the hub and thereby releasing the gas back into the system from the exit point. This could increase competition and trade in the system as more gas is offered up for sale at the hubs.

Decreasing the amount of administrative procedures at the hubs will make trading easier and hence might increase trade. It will also decrease the administrative cost of both hub operators and traders making way for a more efficient gas market.

By giving more and better information on the probability of interruption on the interruptible capacity, the risk of buying these is minimised as traders can more accurately calculate the cost-benefit of engaging in interruptible capacity. Some transmissions are currently only available as interruptible, and if traders do not know the risk of interruption many avoid transporting gas in these pipes, which limits trade and competition across North-Northwest Europe.

The hub workstream also needs to monitor the effect on hubs as the other workstreams progress in making changes on the North-Northwest European market. This will be monitored by comparing the liquidity and level of trade at the hubs as the actions are implemented.

## Workplan

Phase	What	Who	Deadline
<b>Preparatory</b>	Set up Enabler Group	RCC	done
	Discuss Implementation Plan with IG, EG	RCC	20 March
	Approve Implementation Plan	RCC	30 March
	Finalize conclusion paper	RCC	30 March
	Make a list of the hubs which are included in the workstream	RCC, IG, SG and EG	10 April
<b>Phase 1</b>	Set up User groups (UGs)	Hub operator and regulators	16 April
<b>Phase 2</b>	The UGs makes a Final list of actions to be implemented at their specific hubs	UGs	15 June
	Presentation and discussion of the action plans from the different UGs at a hub seminar	EG - UGs	27 June
<b>Phase 3</b>	Follow up meeting on the conclusion reached at the hub seminar on the 27th of June 2007.	EG - UGs	October
	Status report on implementation depending on the problems implementation might go beyond phase 3	EG - UGs	December

## Key Risk

Key risk to the success of the hub workstream will be

- Lack of commitment from market players and hub operators in creating and managing the UGs

- Possible delays to solving and implementing the actions due to complexity and severity of the problems