

Paris, 26 february 2009

## Power plants connected to natural gas transmission networks: rules relating to gas transmission

Since 2006, a number of projects for gas fired power plants have considered the feasibility of linking to natural gas transmission system operators (TSOs). These gas fired power plants are large gas consumers, and their supply requirements fluctuate over the day; the TSOs GRTgaz and TIGF see these factors as constraints on the operation of their networks.

The impact of these new users and the necessary changes to the rules for accessing the natural gas transmission networks are currently under review, as part of a working group on the gas transmission networks led by the TSOs.

Gas fired power plants play an important role in ensuring that the electricity system operates properly : they help to match supply to demand, and to reduce CO<sub>2</sub> emissions from generating facilities powered by fossil fuels.

In addition, since part of their supply will come from newcomers in the French market, these gas fired power plants will help stimulate the gas market. In view of these factors, it is important that the entire gas system is adapted to provide these sites with the best possible access.

In a letter to CRE dated 26 January 2009, GRTgaz stated that when the gas fired power plants operate at semi-baseload and at peakload, they will *"require particularly high intraday flexibility in gas supply, which GRTgaz is not currently in a position to fulfil. In these circumstances, GRTgaz recommends reviewing the rules concerning pricing and operation that apply to such installations"*. GRTgaz also enclosed with its letter a Statement of Intent, describing the particular features of combined cycle gas turbines (CCGT) relevant to TSOs and setting out the principles that GRTgaz proposes to use to define the new access rules.

Since installing gas fired power plants on the natural gas transmission networks will have a profound effect on the electricity and gas markets, CRE wishes to carry out a public consultation to obtain the views of all market players on the rules for transmission and balancing that could be applied to these power plants.

After the public consultation, CRE intends to set the agenda for further work by the Working Group responsible for this matter.

Interested parties are invited to answer the questions at the end of this document, **at the latest by Tuesday, 31 March 2009**.

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## 1. Background

### 1.1. Development prospects for gas fired power plants

Electricity cannot be stored, so that as changing consumption or generation patterns, varying climatic conditions and technical contingencies cause demand to fluctuate, the supply of electricity must immediately be adjusted to suit. Fossil-fuel generating facilities play a leading role in this adjustment, because they are flexible and may be employed at any time.

In France, fossil-fuel facilities<sup>1</sup> amount for 10% of the total power and 6.6% of the energy produced (2007 figures) and are mostly coal- or oil-fired power plants used for semi-baseload and peakload production. They include two gas fired power plants: the combined cycle gas turbine (CCGT) DK6 operated since 2005 by GDF Suez at Dunkerque, and the gas turbine (*Turbine À Combustion - TAC*) at Gennevilliers, operated since 1992 by EDF.

The EC Directives on Large Combustion Plants, National Emission Ceilings and Quotas mean that since 2008, operators have either decommissioned or restricted production from the oldest coal- and oil-fired plants. The 2006 long-term program for investment in electricity production recommended that semi-baseload requirements for the electricity market should be met *“by bringing into service combined cycle gas turbines as semi-baseload plants between now and 2015, because of their environmental advantages”*.

Thus since 2006, plans for around forty power plants asked for a connection to the transmission networks.

To date, 12 connection contracts have been signed with GRTgaz : four will be connected in 2009, four in 2010 and four in 2011. These projects represent a capacity of the order of 6,000 MW.

### 1.2. Balancing rules for the natural gas transmission networks

Article 21 of the French law no. 2003-8 dated 3 January 2003<sup>2</sup> stipulates that TSOs shall be responsible for physically balancing the transmission networks : *“The operator shall at all times ensure that the network is secure and efficient, and that the flows of natural gas are balanced, taking account of the technical constraints in the network”*. To this end, Article 30-1 gives TSOs priority access to underground storage facilities: *“Stocks of natural gas must ensure as a priority the correct operation and balancing of networks connected to underground storage facilities”*.

To balance the gas flows in their networks as required, TSOs use gas stored in the pipelines (*“linepack”*), gas stored underground and gas bought on the gas market.

In order to facilitate network balancing, requirements have been introduced for shippers. Thus the balancing rules approved by CRE for gas transmission networks run by GRTgaz and TIGF state that for each balancing zone in the transmission network, each shipper must balance the daily quantities injected and withdrawn to supply its customer portfolio.

The balancing rules for transmission networks do not include restrictions on the intraday use of network capacity.

## 2. The impact of gas fired power plants on the functioning of gas transmission networks

A site's intraday flexibility is defined by two parameters:

- the difference between the site's hourly real flow and the hourly average flow over 24hours;
- the adjustment to the load, corresponding to the volume of gas injected or withdrawn as a function of the time during which the site operates.

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<sup>1</sup> excluding cogeneration

<sup>2</sup> French law no. 2003-8 dated 3 January 2003, as amended by the French law no. 2006-1537 dated 7 December 2006 relating to the gas and electricity networks and to the energy public service.

## 2.1. Flexibility required to balance the supply of electricity to the demand

In France, with the gas and electricity markets in their current form, CCGT are economically optimal when they operate at semi-baseload. (A review of reference costs for electricity production published by the *Ministère de l'Écologie, de l'Énergie, du Développement durable et de l'Aménagement du Territoire* in 2008 showed that where supplies are required for between 2,000 and 4,700 hours, the CCGT option is the best.) For gas turbines (TAC) (fewer than 2,000 hours per year) peakload production is the economic optimum.

The development of power plants fired by natural gas will help secure supply to the electricity market because it will :

- cover semi-baseload requirements (CCGT) and peakload requirements (TAC) ;
- compensate for fluctuations in electricity produced from new and renewable energies ;
- contribute to the system services<sup>3</sup> and the balancing mechanism provided in the French Law dated 10 February 2000 and the French Order of April 2008 relating to technical regulations for designing and operating power plants.

This means that gas fired power plants systematically adjust their output throughout the day to match variations in electricity demand (dipping at night and rising to peak load in the morning). The time for which the installations operate depends on the difference between the price of electricity, and the combined price of gas and CO<sub>2</sub> (the “*clean spark spread*”). This “*clean spark spread*” is defined the day before for the following day.

## 2.2. Estimating the flexibility requirements of gas fired power plants on gas transmission networks

In its Statement of Intent, GRTgaz states that the gas market's current hourly offtake is higher than average at two periods during the day (from 7:00am to 3:00pm and from 6:00pm to 8:00pm). GRTgaz states that the corresponding energy adjustment is 80 GWh, for an annual consumption of 500 TWh. The adjustment is also spread relatively evenly across the GRTgaz network, with 4,500 delivery points. The consumption peak in the morning requires a flow rate of around 1.2 times the average flow rate during the day.

According to GRTgaz, adding twenty gas fired power plants to the gas market would cause an estimated energy adjustment of 100 GWh, and a flow rate three times higher than the average hourly flow rate.

GRTgaz indicates in its Statement of Intent that it does not alone have the technical resources to meet these requirements.

## 2.3. Constraints on the gas transmission networks

There is still some uncertainty as to the number, geographical location, and mode of operation of the gas fired power plants that will subsequently be installed on the gas transmission networks.

However, the 2006 long-term program for investment (*Programmation pluriannuelle des Investissements - PPI*) in electricity production set the objective of installing CCGT delivering 3,000 MW by 2015 ; and the subsequent forecasts of supply-demand balance published by the operator of the public electricity transmission network (Réseau de Transport d'Electricité – RTE) revise this objective upwards. These documents state clearly:

- the capacity that would be installed ;
- the expected availability of the gas infrastructure, without specifying intraday flexibility ;
- the time for which these new installations would operate, calculated as a function of the difference between the price of electricity, and the combined price of the gas and CO<sub>2</sub> required to produce it (the “*clean spark spread*”).

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<sup>3</sup> Frequency and voltage settings.

The two gas fired power plants already on the GRTgaz network also provide the operator with experiential insights into how such sites function.

In addition, GRTgaz has signed twelve contracts since 2006 to connect gas fired power plants to its network. They contain no wording constraining their defined operation or subjecting it to conditions.

GRTgaz informed the gas fired power plant operators of its problems in maintaining those power plants in operation in June 2008, in the course of the work of the working group. Some participants have therefore said that a change to the rules should not jeopardize the profitability of projects that have already been agreed.

### **3. The GRTgaz proposal relating to the flexibility requirements for gas fired power plants**

#### **3.1. The GRTgaz proposal**

GRTgaz considers that daily balancing is preferable for shippers. Nevertheless, its Statement of Intent indicates that for consumers presenting an exceptional consumption profile (due to their size and intraday flexibility), such as CCGT, specific rules based on an hourly balancing should be introduced for operational and economic reasons.

Indeed, since GRTgaz has indicated that it does not have the intraday flexibility required to meet the requirements of gas fired power plants, it makes in its Statement of Intent a proposal for transmission rules specific to gas fired power plants. This would:

- impose an obligation to nominate an hourly consumption profile to the TSO the previous day for the next day ;
- make it a requirement for shippers supplying the gas fired power plants to balance gas inflows to, and consumption of those power plants for each hourly time slot throughout each zone requiring load adjustment that GRTgaz identifies on its network. This obligation would not apply to other gas users, who would continue to comply with a daily balancing ;
- require the shippers supplying the gas fired power plants to provide intraday flexibility on the network. The shippers would therefore have to contract directly with players able to deliver that flexibility (for instance, storage facilities or LNG terminals) ;
- base conditional transfer of intraday flexibility by GRTgaz on the following rules:
  - the conditions under which the transfer would be made would depend on the distance between the source of flexibility and the power plant, and on the congestion of the transmission network. Subsequent developments to the gas transmission network would enable this proposal to be made firm ;
  - GRTgaz would consult Storengy and Elengy before informing the gas fired power plant operator the day before whether or not the service would be feasible for the next day ;
  - there would be a charge for the service to cover the additional costs incurred in operating the network.

GRTgaz plans to submit this proposal to the Working Group in the spring of 2009, for implementation during summer 2009.

In the course of the work of the group, offers of intraday flexibility by storage operators and LNG terminals were announced in the spring of 2009. Storengy, storage operator, has published on its web site on February 25, 2009 an intraday flexibility offer.

#### **3.2. Position of TIGF**

During the work of the group, TIGF supported GRTgaz's analysis of the flexibility requirements of gas fired power plants and of the lack of capacity in the gas transmission network alone to meet the requirements.

During its hearing by CRE on 5 February 2009, TIGF presented two contractual solutions to meet the intraday flexibility requirements of gas fired power plants :

- that TIGF Transport should meet power plants' flexibility requirements, by resorting to the storage operator to supply additional flexible resources ;
- that electricity producers should go directly to the storage operator for the flexibility they require.

#### **4. CRE's preliminary analysis**

The French law of 3 January 2003 provides that CRE proposes tariffs for using the natural gas transmission networks to the Ministers responsible for the Economy and Energy, who have a time period of two months to object.

The EC Directive 2003/55<sup>4</sup> gives regulatory authorities the power to “*fix*”, “*approve*”, or “*submit, for formal decision, to the relevant body*” the terms and conditions for the “*provision of balancing services*”. In this regard, CRE approves the balancing rules that apply to the gas transmission networks, proposed by the TSOs following consultation with market players.

Changes to the transmission terms and conditions and the balancing rules therefore form part of CRE's remit. In this context, CRE wishes to share its preliminary analysis both of GRTgaz's proposal, and of other possible models.

##### **4.1. Technical capacity of the gas infrastructure to meet the intraday flexibility requirements of gas fired power plants**

The constraints in the gas transmission networks identified by GRTgaz are based on initial analysis. These analysis need to be more thorough and much more precisely quantified. The analysis relate only to the ability of GRTgaz alone to meet the needs of gas fired power plants.

There is currently no study of the overall capacity of French gas infrastructures to meet the requirements of gas fired power plants as currently forecasted. It is important to know if it is possible to mobilize the necessary flexibility, by amending as appropriate the operating conditions or the interface contracts agreed between gas infrastructure operators, or if the flexibility is really scarce and must be shared between the various power plants.

Neither the potential offered by intraday flexibility that TSOs currently have on their networks (such as gas linepack and current contracts with storage operators for flexible supply), nor the interaction between the needs of power plants and current needs in the gas market have been studied. The same is true of the planned investment in each of the gas infrastructures.

It should be possible to analyze the capacity of the French gas infrastructures to meet the needs of the gas fired power plants up to 2012, since the planned implementation dates for the power plants are known up to this time.

TSOs are responsible for physically balancing the gas transmission networks (see paragraph 1.2). It falls to GRTgaz and TIGF to carry out this global review, and it should include contributions and analysis from other gas infrastructure operators (operators of underground storage and LNG terminals, distributors and if relevant, TSOs in adjoining countries).

CRE considers that carrying out such a review and presenting it to the Working Group is a prerequisite to any significant change either to the transmission access conditions or to the balancing rules.

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<sup>4</sup> EC Directive 2003/55/EC from the European Parliament and Council dated 26 June 2003 on common rules for the internal market in natural gas



## **4.2. Continuation of a daily balancing on the French gas system**

CRE thinks it important that the French gas transmission networks are balanced on a daily basis, and this is also recommended by the ERGEG (European Regulators' Group for Electricity and Gas), who considers that *“daily balancing is preferable unless there are technical/operational reasons that mean that hourly balancing is necessary to ensure that system can be balanced and/or for safety/security reasons”*<sup>5</sup>.

European regulators consider that in general, daily balancing helps the gas market function correctly and improves competition within it.

In addition, were a system of hourly balancing to be imposed on shippers, the entire French market would become more complex and incur additional costs (of management and information systems and in penalties, etc.).

In such circumstances, introducing hourly balancing could only be envisaged if the gas system had clearly evident technical constraints.

## **4.3. Visibility necessary to TSOs to ensure the network functions correctly**

CRE considers that the TSOs must have the visibility they need to plan and manage their networks at all times. This means that gas fired power plants whose operation makes demands on the network's physical balance must provide natural gas TSOs with their hourly programme of natural gas consumption, at least the day before for the following day.

It will be the task of the Working Group to propose both ways in which this information will be supplied and means by which it will be changed during the day (renomination during the day and advance notice) that comply with the safety constraints in the electricity network.

## **4.4. The two possible models to meet the intraday flexibility requirements for gas fired power plants**

### **4.4.1. Model 1: the GRTgaz proposal**

The GRTgaz proposal summarized in paragraph 3.1 above is given in an Appendix to this consultation document.

### **4.4.2. Model 2: intraday flexibility is provided by gas TSOs, as part of their regulated transmission offer**

In this model, TSOs offer intraday flexibility for all consumers, including gas fired power plants. For this, they use their available resources (gas linepack and contracts for storage services) and if necessary, include new sources of flexibility provided by other gas infrastructures.

This model does not require any fundamental change either to the transmission conditions or to the balancing rules. It is simply a development from existing modes of operation.

If needed, it will fall to gas TSOs to prove firstly that costs are incurred in operating the power plants on their networks and secondly that those costs are not covered by the transportation tariffs currently in place.

If it can be proved that operating the gas fired power plants occasions real and directly-related additional costs, then CRE could (as provided in the legislation) propose new transmission tariffs to the Ministers, in order to cover those costs.

Were this the scenario, it might also be possible for the two models to coexist. The regulated offer from the TSOs would be optional, and shippers would still have the option of buying directly the intraday flexibility they needed.

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<sup>5</sup> GGP Balancing – April 2006

#### **4.5. Preliminary analysis of the two models**

CRE places the highest importance on enabling gas fired power plants to function under conditions that are optimal for the correct operation of the electricity market and the safety of the electricity system. This implies that whichever model is selected, and unless the gas infrastructures prove to be physically incapable of doing so, the necessary intraday flexibility in gas supply must be guaranteed to the gas fired power plants.

The two models described above exist today in Europe. The model proposed by GRTgaz is similar to the one adopted recently in Germany. By contrast, in the United Kingdom, Italy and Spain, the TSO is responsible for meeting gas fired power plants' flexibility requirements.

In France, the legislation stipulates that physical network balancing is the TSOs' responsibility (see paragraph 1.2), nevertheless, an hourly balancing for shippers is not incompatible with this legislative provision.

The model selected must not discriminate between the different categories of players. Any difference in treatment must be based on objective criteria. The Working Group has examined different criteria :

- based on the geographical location of the gas fired power plants on the gas transmission network ;
- based on the project's state of progress : for instance, different rules might be applied to gas fired power plants already in service, to those that have already signed a connection contract with the gas TSO, and to those that are still at the planning stage ;
- if hourly balancing is introduced, it might apply only to power plants (as GRTgaz proposes), or be extended to other large consumers, or even to all gas consumers.

CRE wishes to consult market players on the advantages and disadvantages of each of the two models, and on the points raised in the preliminary analysis above.

#### **4.6. Follow up to the public consultation and further work by the Working Group**

CRE considers that it is now important to give clear direction on the rules for transmission and balancing to be used for gas fired power plants connected to gas transmission networks.

The immediate requirement is to define the rules that will apply to gas fired power plants coming into commercial use in 2009. In addition, many projects will shortly require final investment decisions, and such decisions could well be delayed or hindered by the current uncertainty.

After the public consultation, CRE intends to give orientations to the Working Group. On this basis, the Working Group would present, before summer 2009, to CRE the transmission and balancing rules for natural gas transmission networks to be applied to gas fired power plants.



CRE invites submissions from interested parties, by **31 March 2009** at the latest:

- by electronic mail to the address [webmestre@cre.fr](mailto:webmestre@cre.fr);
- by adding comments directly to CRE website ([www.cre.fr](http://www.cre.fr)) in the section Publications / Public consultations;
- by letter addressed to 2, rue du Quatre Septembre - F-75084 Paris Cedex 02;
- by telephoning the Directorate of Gas Infrastructure and Networks on +33.1.44.50.42.39;
- by requesting a hearing by the Commission.

CRE will, subject to laws on confidentiality, publish a summary of the submissions. The confidentiality and/or anonymity of the information will be ensured for those contributors who request it.

Interested parties are invited to respond to the following questions, giving where possible reasons for their answers based in particular on their experience in practice of rules applied in other countries; and, for gas fired power plant operators, of the way in which they envisage that their power plants will work and what their requirements will be for their gas fired power plant(s).

- Q1** Do you think that the technical analysis by GRTgaz is sufficient to justify a change of transmission and balancing rules for gas fired power plants? If not, how should it be complemented ?
- Q2** Do you think that it is desirable to maintain a daily balancing on the French gas system ?
- Q3** Do you think that gas fired power plant operators should be required to provide the TSO on the previous day with their hourly programme of natural gas consumption for the following day ?
- Q4** What are your views on the GRTgaz proposal to introduce an hourly balancing requirement for gas fired power plants ?
- Q5** What are your views on the model in which "*Intraday flexibility is provided by gas TSOs, as part of their regulated transmission offer*", described in paragraph 4.4.2 of the Consultation Document? If TSO's offer of intraday flexibility is not free, do you think that the offer should be optional ?
- Q6** Irrespective of which model is selected, are you in favour of different treatments based on a gas fired power plant's geographical location, or based on a project's state of progress? If so, what differences and according to what criteria ?
- Q7** Assuming that hourly balancing obligations are introduced, do you think that they should apply to shippers just for supplies to gas fired power plants, to shippers for supplies to all the largest consumers (based on thresholds to be defined), or to all shippers for all their customers ?
- Q8** What are your views on the follow up to the public consultation and the further work of the Working Group as set out in paragraph 4.5 of the Consultation Document ?
- Q9** Have you any other comments or suggestions ?