

ANNEX 3 GRTGAZ PROPOSAL FOR A SERVICE WITH INTRADAY FLEXIBILITY

Annex 3.1: costs of supplying external intraday flexibility

In accordance with the deliberations of CRE of the 30th of April 2009, the transmission system operators conducted a study on the capacity of gas infrastructures to respond to scheduled requirements from power stations. The study was presented to the members of the *Concertation Gaz* in October and November 2009 and published in January 2010. It confirms that electricity power stations, if they function as their promoters expect, will generate a major increase in terms of intraday modulation for gas consumption on the networks, which GRTgaz will only be able to respond to by an increased use of internal and external sources of flexibility (LNG storage and terminals).

This requirement entails additional expenditure, which is not included for in the current tariff trajectory. The aim of this document is to give an explanation of how these additional charges are calculated.

1. INTERNAL COSTS FOR GRTGAZ

In accordance with the letter dated the 21st of May 2010 sent to CRE, GRTgaz has calculated the costs in the following way:

	2010	2011	2012	2013	2015
Variable costs	0.7	1.5	1.9	2.4	3.0
Fixed costs	1.6	2.7	7.0	7.8	14.6
<i>Of which operating costs</i>	1.6	2.7	5.4	6.2	7.8
<i>Of which capital costs</i>			1.6	1.6	6.8

These arise from:

- Compression costs (maintenance and motor energy) relating to the transfer of the modulated volume from the source of flexibility to electricity power stations,
- Staff costs relating to strengthening the teams managing the networks,
- Investment in IT, control units and compression systems for the network (taking account of any operating costs associated with such investment).

2. COSTS RELATED TO THE PURCHASE OF EXTERNAL INTRADAY FLEXIBILITY

The costs relating to the purchase of external intraday flexibility are calculated on the basis of:

- Operating scenarios provided by the promoters of the electricity power stations within the framework of the study carried out on the capacity of gas infrastructures to respond the scheduled requirements of the power stations for intraday flexibility (an average operating time of 16 hours per day for 310 days of the year),
- The intraday flexibility service offering published by Storengy on its web site,
- The intraday flexibility service offering transmitted by Elengy to GRTgaz on the 15th of February 2010.

GRTgaz used the following scenarios:

- In order to consider power station operating schedules changes within a single gas day (re-submission of declarations to the RTE, calling on the balancing mechanism or requests



relating to reserves), the power station consumption modulation provided by the producers for a schedule known the previous day for the following day (subject of the study) has been increased by 10%.

- Given the limited capacity for transferring flexibility to the Rhône pipeline, requirements are met firstly by making a request to the Fos Tonkin terminal (up to the requirements of around two power stations), and then the Storengy storage facilities.
- It has been assumed that the new pipelines related to the planned capacity development in the GRTgaz North and GRTgaz South zones, particularly Arc de Dierrey and Eridan, have been brought on-line in accordance with the calendar for the Forecast Study on the development of the distribution network for 2009–2018.

With regard to this final point, if the infrastructures taken into account in this calculation were not to be brought on-line in accordance with the retained calendar, costs from 2014 would be reviewed significantly.

2.1. Storengy offering

The price of the interruptible intraday flexibility service for a requirement equivalent to a generating unit of 400 MWe (or 0.9 GWh/h) is made up of:

- a fixed portion of 400 kEUR,
- a variable portion proportional to the actual use of the service:
 - by injection (or a reduction in withdrawal): 8.16 kEUR/d per GWh/h,
 - by withdrawal (or a reduction in injection): 2.88 kEUR/d per GWh/h.

2.2. Elengy offering

Elengy can supply intraday flexibility to GRTgaz from the Fos Tonkin terminal by making adjustments according to the increase and decrease in emissions at the terminal within a single day, in accordance with a schedule established the previous day. This offering, which is interruptible, is then confirmed the previous day for the following day, depending on the emissions schedule at the terminal.

The price for this service communicated to GRTgaz by Elengy¹ is made up of a fixed portion (which includes the investment required to supply intraday flexibility for the requirements of two 440 Mwe power stations) and a variable portion.

Elengy makes this offer subject to a commitment from GRTgaz over a 5-year period. The terms are detailed on the current 2010–2012 tariff terms for LNG terminals. Furthermore GRTgaz considered that the 2012 cost would apply until 2015.

As a complement to these terms, the supply of flexibility requires a contribution of gas from GRTgaz in kind for the over-consumption of power gas on emission. This is estimated at 0.05 GWh/d of

¹ For deadline reasons, the calculations subsequently presented take account of the previous version of the last offer from Elengy. The Elengy offer now presents terms averaged out over the period 2010–2012.

- Average annual fixed portion over first three years of €1.14 M
- Variable term on reduction €1.88 k/d per GWh/h
- Variable term on increase €14.38 k/d per GWh/h

power gas, per day of requiring flexibility. The calculation scenario is based on 310 days of requirement and a gas price of €20/MWh.

2.3. Costs of purchasing external flexibility

Based on the scenarios detailed above, the additional costs relating to the purchase of intraday flexibility are as follows:

Purchase costs (€/year)	2010 ⁽¹⁾	2011	2012	2013	2015 ⁽²⁾
Storengy	1.1	6.2	9.4	15.3	
<i>Of which variable</i>	0.9	5.1	7.7	12.5	
<i>Of which fixed</i>	0.2	1.1	1.7	2.8	
Elengy	3.3	4.7	4.8	5.0	5.0
<i>Of which variable</i>	2.1	2.8	2.3	2.5	2.5
<i>Of which fixed</i>	1.2	1.9	2.5	2.5	2.5
Total	4.3	10.9	14.2	20.2	5.0
<i>Of which variable</i>	2.9	7.9	10.0	15.0	2.5
<i>Of which fixed</i>	1.4	3.0	4.2	5.3	2.5

⁽¹⁾ given that consumption by power stations in service was subject to very low modulation during the first quarter of 2010, no purchase of intraday flexibility was recorded for this period

⁽²⁾ subject to the development of pipelines applied in the study, i.e.: Cuvilly-Dierrey-Voisine, doubling of the North east pipeline, doubling of the Beauce pipeline

3. COSTS RELATING TO THE SUPPLY OF INTRADAY FLEXIBILITY BY GRTGAZ

Taking into account the additional internal operating and capital costs for GRTgaz (cf. § 1) and the costs of purchasing intraday flexibility from suppliers such as Storengy and Elengy (cf. § 2.3), GRTgaz will have to bear the following costs to cover the extra requirements for flexibility:

(M€/an)	2010 ⁽¹⁾	2011	2012	2013	2015 ⁽¹⁾
Internal costs	2.3	4.2	8.9	10.2	17.6
<i>Of which variable</i>	0.7	1.5	1.9	2.4	3.0
<i>Of which fixed</i>	1.6	2.7	7.0	7.8	14.6
External costs	4.3	10.9	14.2	20.2	5.0
<i>Of which variable</i>	2.9	7.9	10.0	15.0	2.5
<i>Of which fixed</i>	1.4	3.0	4.2	5.3	2.5
Total	6.6	15.0	23.1	30.5	22.6
<i>Of which variable</i>	3,6	9,3	11,9	17,4	5,5
<i>Of which fixed</i>	3,0	5,7	11,2	13,1	17,1

⁽¹⁾ subject to the same conditions and reservations as in the previous paragraph

Please note that not all of these costs have been allowed for in the current tariff schedule.



Moreover, as indicated in the letter to CRE dated the 21st of May 2010, GRTgaz spent around €1M in 2009 on study costs and strengthening the team managing the network.

Annex 3.2: proposed parameters of an intraday flexibility service

In its deliberations of the 3rd of December 2009, CRE stated its willingness to start a reflection on the development of a regulated intraday flexibility offering for the concerned users. To this end, GRTgaz carried out a certain amount of work aimed at clarifying the market in terms of the parameters to be adopted if an intraday flexibility service were to be implemented. These aspects were discussed in a consultation group, but no consensus was reached.

I. SPECIFICITY OF ELECTRICITY POWER STATIONS CONSUMPTION LEVELS

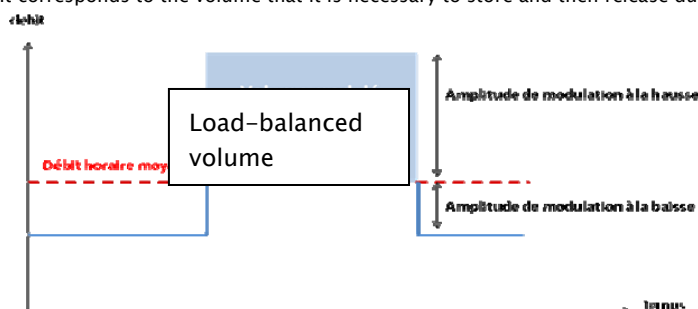
The study of the capacity of gas infrastructures to respond to the scheduled requirement for intraday flexibility by power stations confirmed that the modulation of their consumption is very specific compared to that of other types of GRTgaz network consumption: in terms of amplitude and unpredictability.

The study conducted shows that, in 2011 for example, based on the operating scenarios provided by the producers and an average of the days of operation of the power stations, modulated volumes² for planned power stations will be distinctly higher than those observed at the delivery points of the biggest consumers or interconnection points with distribution networks (including the winter period, when consumption levels and therefore load-balancing levels are nevertheless at their highest on the latter points).

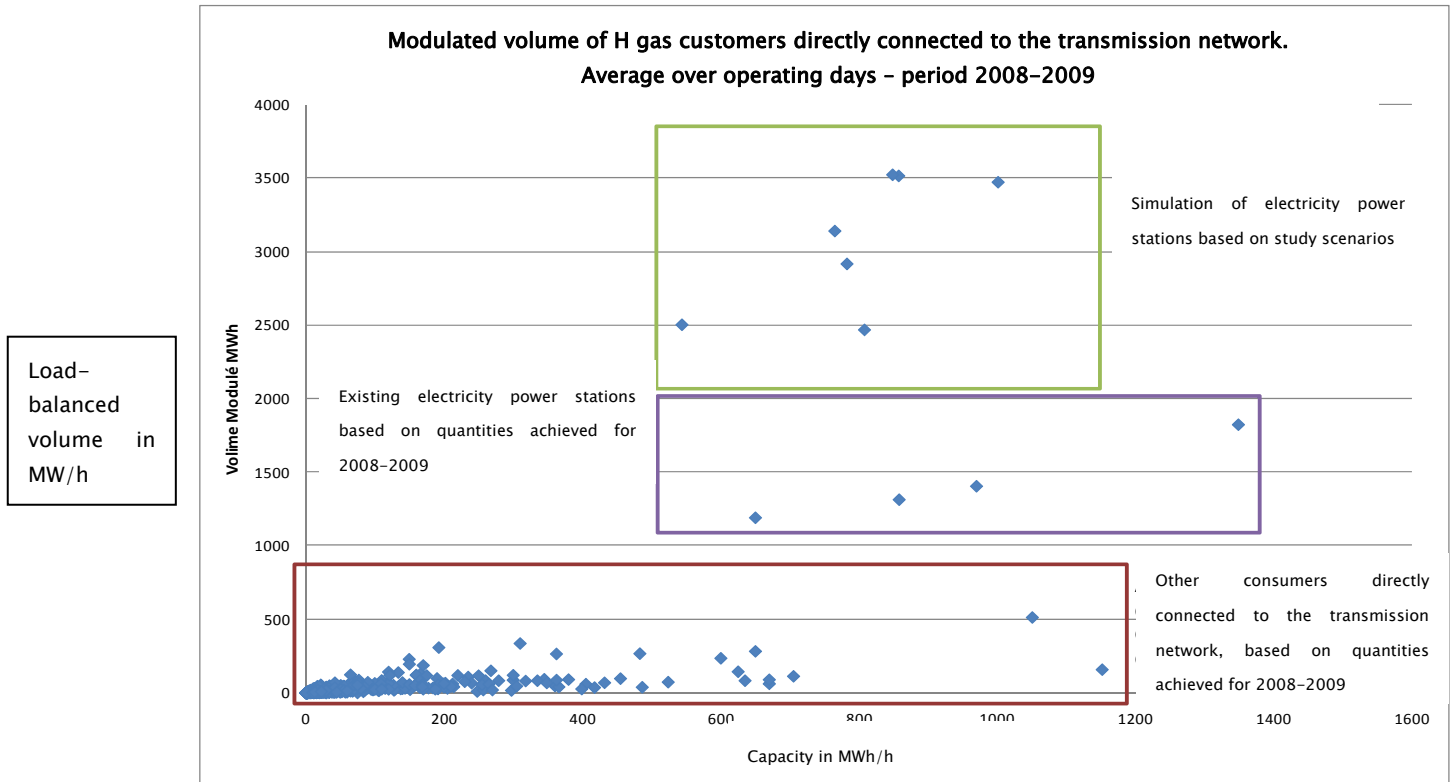
Load-balanced vol. (GWh)	Annual average	Winter average	Number of sites concerned
Market	44	52	
Transmission-distribution interface points	40	47	1,000 TDIPs for 4,000 consumption points
CI	4	3	800 directly linked customers
Power stations (*)	36	36	11 sites

(*) based on operating scenarios provided by promoters for power stations in service in 2011

² Note that the modulated volume is of a size that creates the greatest possible level of tension in terms of managing the network. It corresponds to the volume that it is necessary to store and then release during the day.



A complementary study was carried out to identify the average figure across the days of consumption in 2008 and 2009 for the modulated volume of each customer directly connected to the transmission network. The results of this complementary study are illustrated below:



Note that two consumption points, each feeding a generating unit of 400 Mwe, were considered for the Saint Avold power station, .

The modulated volumes observed for the biggest connection points with the distribution networks are lower than 800 MWh for the same period.

Note that, although load-balancing of TDIP consumption is considerable, contrary to that generated by power stations, it is strongly correlated with consumption levels and therefore with the temperature, and the daily profile is very similar from one day to another.

It is the significant modulated volume, which could be requested at any time by any of the electricity power stations, that gives rise to the following additional constraints for GRTGaz:

- Increased use of external sources of flexibility,
- Investment in control valves and compressors to maximise available line pack,
- Strengthening teams and IT for reactive network management.

II. MODULATION ASSOCIATED WITH SUPPLY CAPACITY

GRTgaz is not currently offering intraday flexibility *per se*. There is no clause that prevents a consumer from modulating consumption during a single a day to suit its own requirements, as long



as it does not exceed the hourly capacity subscribed to and it delivers onto the network as much gas as it consumes in a day.

As explained in the previous paragraph, a large number of modulations are now being observed with regard to consumption. On average, one GWh/h of delivery capacity sold by GRTgaz creates a flexibility requirement equivalent to 0.2 GWh of load-balanced volume.

	Hourly capacity – CH (GWh/h)	Average annual load- balanced volume – VM (GWh)	VM/CH ratio
Market	196	44	0.224
TDIP	155	40	0.258
CI	41	4	0.098
Power stations*	10	36	3.6

() based on the operating scenarios provided by the promoters for power stations in service in 2011 (16 h/d and 310 d/year)*

Only major hourly capacity peaks, where modulation is significant, are likely to create major operating constraints. GRTgaz is in possession of tools enabling it to respond to the greatest instances of modulation recently recorded in its historical market. The strongest modulation recently observed (apart from for electricity power stations in service) was a connection point with the distribution network that showed an average modulated volume of 0.8 GWh for the winter of 2009.

III. PRINCIPLES PROPOSED BY GRTGAZ FOR A DEDICATED SERVICE OFFERING

Without coordinated site/network management, sites that generate major modulated volumes would be likely to compromise continuity of supply. To enable these sites to operate under the best conditions, it is essential to implement:

- specific reciprocal information procedures between the sites and GRTgaz,
- the appropriate real-time network management to handle demand from the sites,
- network adaptations supported by investment to maximise line pack and use thereof.

Moreover, up to now, the modest increase in modulation related to growth in the residential/tertiary market has been dispersed and progressive, running in parallel with development in the main and regional networks. The resulting increase in flexibility requirements related to the connection of a series of electricity power stations has additionally necessitated an increased use of external sources of flexibility.

It might then seem right to allocate the corresponding costs to these sites experiencing strong levels of modulation.



The investment and operating costs relating to these elements are detailed in annex 1.

3.1. Service customers

This service would be for consumption sites (delivery points – LI) showing strong modulation. In fact, the members of the *Concertation Gaz* thought it more appropriate to target this service at operators directly in charge of scheduling operations at power stations (and not to the shippers in charge of the daily balancing of their portfolio).

Consumption sites showing an average modulated volume greater than 0.8 GWh would be considered as strongly modulated sites. The average will be assessed across total operating days:

- For the previous year for existing sites,
- For the current year for sites recently connected, for which a quarterly account would be set up, and where retroactive assessment would be applied for the elapsed period when this criterion is reached.

3.2. The service

This service would enable the sites in question to have increased intra-day flexibility, subject to this being available in sufficient quantity on French gas infrastructures.

In order to assess the suitability of the offering and the demand for intraday flexibility, and to be in a position to transfer such flexibility where required to the sites in question, these will have to declare their hourly consumption schedule the previous day for the following day and, if there is any change, during the gas day itself. Unless there is a case of force majeure, by accepting the schedule at a particular site, GRTgaz will undertake to authorise modulation for the hours of consumption at the site as requested under the schedule.

Any change to the schedule is subject to acceptance by GRTgaz, and adherence to an implementation notice period (Courtesy period) communicated by GRTgaz the previous day.

Any variation in the schedule of hourly consumption for a site that is less than +/- 10% of daily delivery capacity for the site for day 'd' divided by 24 may be effected without issuing a declaration to GRTgaz (declaration tolerance). This tolerance should allow RTE to call on sites for reserves.

The detailed principles of the procedure for information exchange to be implemented between the sites and GRTgaz are under discussion in the *Concertation Gaz* taskforce. They can be found in annex 3 of this document.

3.3. Service tariffs

In accordance with the opinion delivered in the *Concertation Gaz* taskforce, the service tariff should reflect the GRTgaz cost structure, including a fixed and a variable portion.



Fixed portion

GRTgaz internal fixed costs are essentially related to costs enabling GRTgaz to manage the requirement for intraday flexibility of over twenty sites showing strong modulation. GRTgaz therefore proposes to invoice each delivery point on the basis of a cost that can be assimilated into a long-term marginal cost of €0.6 M per year per site.

	2010	2011	2012	2013	2015	CMLT
Total cost (€/year)	1.6	2.7	7	7.8	14.6	15
Number of sites	7	11	13	15	20	25
Per site (€/year)	0.22	0.24	0.53	0.52	0.73	0.6

This fixed portion will be monthly, payable on the first month of using the delivery capacity of the site.

Variable portion

To meet this additional requirement for load-balanced volume, GRTgaz will call in over 50% from external sources of flexibility. The latter will invoice GRTgaz on the basis of a fixed portion and a variable portion depending on the demand for a reduction or increase in the hourly output.

To simplify the tariff for the service, GRTgaz proposes:

- to set fixed external costs on a variable basis,
- to cover GRTgaz variable internal costs by applying tariff terms to the modulated volume actually recorded each day,
- to cover the fixed and variable external costs by applying tariff terms to the amplitude (difference between minimum and maximum hourly consumption for the gas day) actually recorded each day.

To take account of the intraday flexibility “associated” with the subscribed supply capacity, GRTgaz proposes to apply a franchise to the modulated volume recorded each day corresponding to 1/24th of the subscribed daily capacity (i.e. 0.8 GWh per day for a site with a capacity of 19.2 GWh/d). The amplitude would also be reduced as a consequence (deduction calculated by applying the period of modulation recorded to the volume of the franchise). Given that all of the costs relating to the supply of additional intraday flexibility have not been included in the tariff trajectory, the franchise will have to be incorporated in the supply tariff. This corresponds to the costs incurred in satisfying around 30% of demand for flexibility.

The volume-related tariff term would be the unit transfer cost applied when calculating GRTgaz internal variable costs (€0.14 /MWh).

The amplitude-related tariff term would be equal to the cost of purchasing a variation in flow adjusted by the amplitude provide on average between 2010 and 2013, i.e. €5/MWh/h.

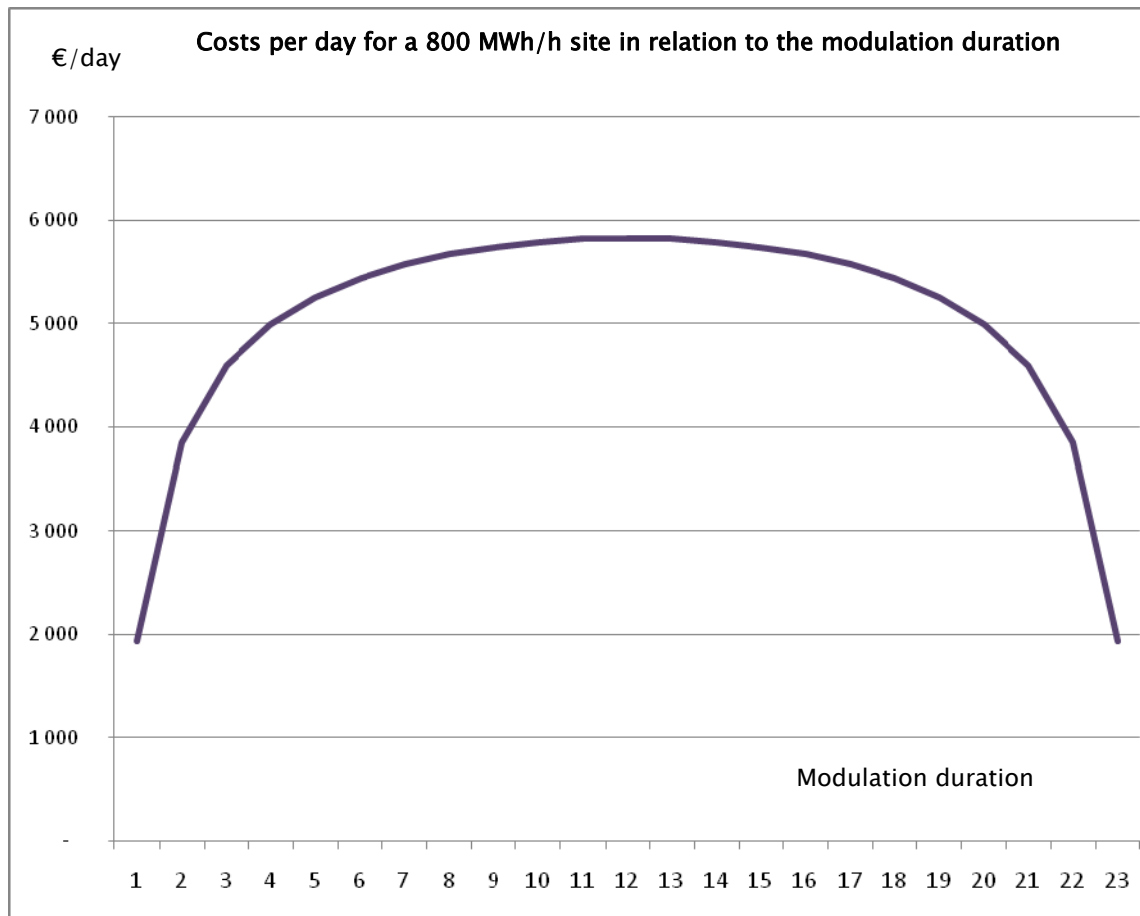
	2010	2011	2012	2013	
external variable costs (€M/year)	4.3	10.9	14.3	20.2	
Average annual amplitude for daily handling	3.1	7.2	9.3	12.5	Average 2011-2013
based on 310 operating days	4.5	4.9	5.0	5.2	5.0

3.4. Application

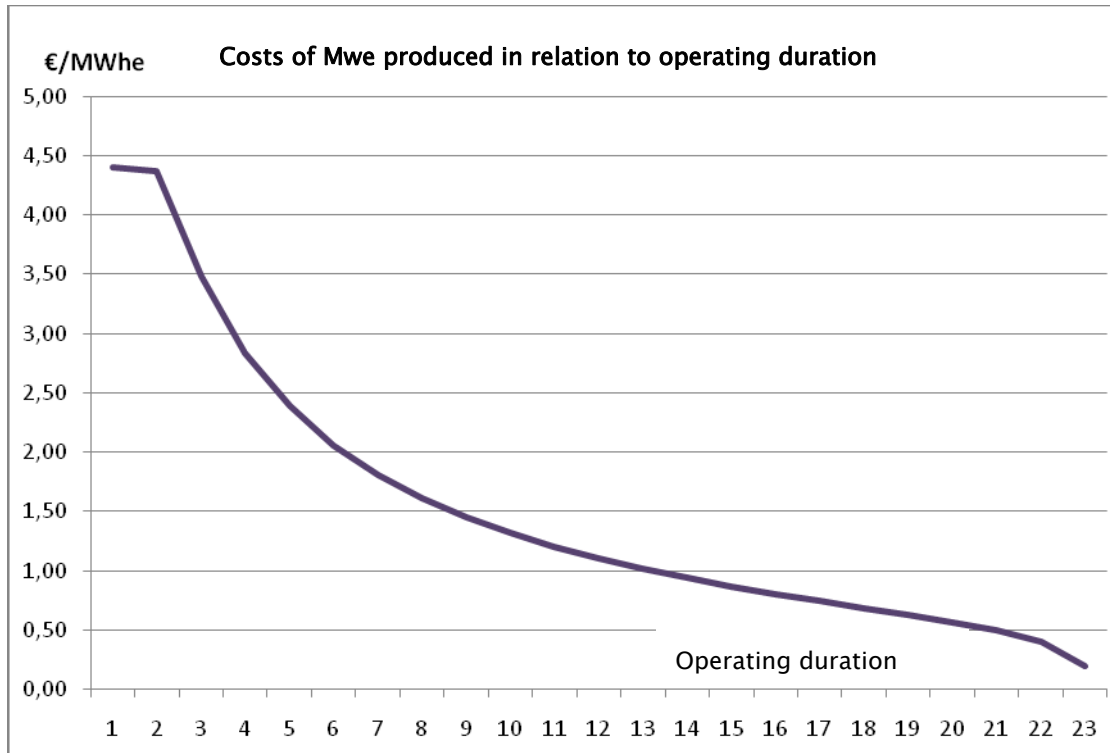
For example, below is a calculation of the tariff applicable to a site showing strong modulation with an hourly capacity of 800 MWh/h operating 310 days per year in accordance with the following schedule:

- For a period of X hours, consumption of 800 MWh
- For a period of (24-X) hours, zero consumption.

The graph below represents the daily cost paid by the site in relation to the period of load-balancing its consumption.



The graph below represents the cost of the MWh of electricity generated of the site is a 440 MWe electric power station.





Annex 3.3: operating procedure

Forecast and declaration of Schedules of hourly gas consumption by the site in question

Each day D-1 by 14.30, the Customer sends GRTgaz its Schedule of hourly gas consumption for Day D and gives an indication of the schedule for the Day D+1.

Response from GRTgaz

By 20.30 on D-1, GRTgaz confirms the feasibility or not of the schedules requested for day D.

If GRTgaz confirms the schedules for day D, the site is sure of being in a position to modulate its consumption as planned in the schedule.

In addition to this confirmation, GRTgaz sets the deadline for any change to the schedule within the day (Courtesy Period between the acceptance by GRTgaz of the schedule change and the effective change of consumption at the site).

In order to provide some indication to the sites of the likelihood of acceptance or refusal of any changes to the schedule within day D, when the schedule is confirmed the previous day for the following day, GRTgaz also gives an indication of residual intraday flexibility available for the following day (indication by geographical area).

If GRTgaz does not confirm that the requested schedules are feasible, GRTgaz gives the sites an indication of any corrections to apply to the schedules to make them compatible with the available intraday flexibility (the mechanism for allocating available intraday flexibility will be defined in the *Concertation Gaz* taskforce).

The site is requested to comply with the schedule confirmed by GRTgaz.

Any change to the schedule must be notified to GRTgaz beforehand, and in conformity with the Courtesy Period.

However, sites are still given a level of tolerance in terms of changing the schedule. A site does not have to inform GRTgaz if the change to the hourly consumption is less than $\pm 10\%$ of the site's daily delivery capacity for day D divided by 24. This provision should allow sites to participate in primary and secondary frequency regulation on the electricity system.

Changes to Schedules of hourly gas consumption for Day D

For any upwards or downwards change to the Schedule of hourly gas consumption at the site for Day D entailing a quantity greater than or equal to the Tolerance level, the Customer declares a new Schedule to GRTgaz for Day D, adhering to the associated Courtesy Period.

If flexibility is available, GRTgaz confirms the new Schedule.



If there is any significant and unexpected change in the availability of intraday flexibility, GRTgaz might have to reset the conditions for changing programmes during within day (Courtesy Period and availability indicator).