INTRADAY FLEXIBILITY CONTRACT

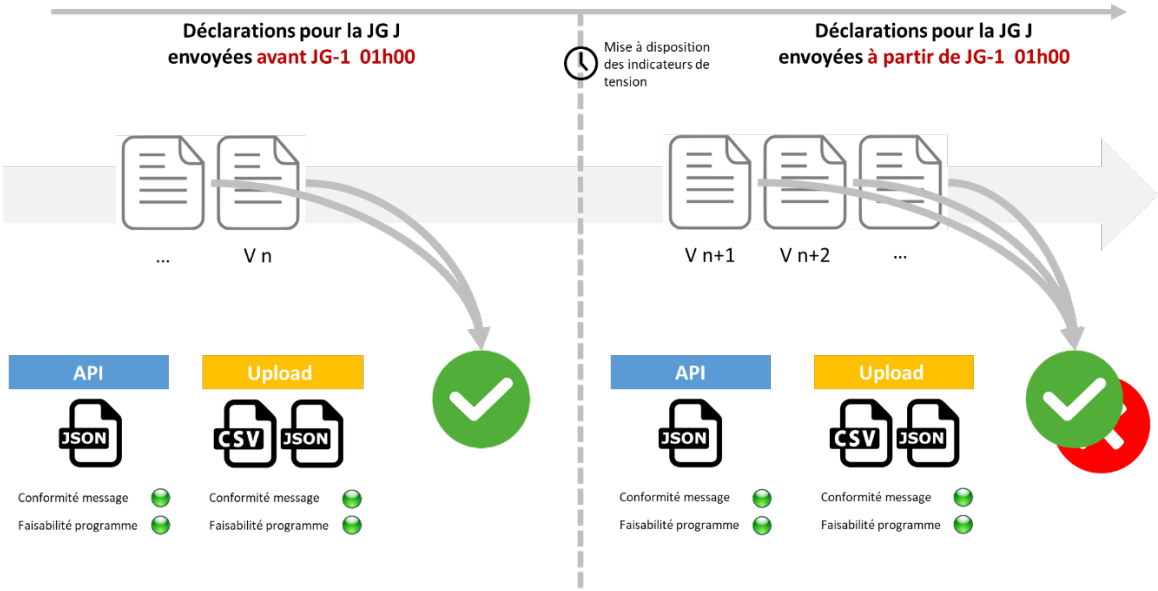
V. OVERALL PROCESS AND FORMAT OF IS EXCHANGES VERSION OF 1 JULY 2020

Contents

This document supplements the interface contract to the openAPI (.yaml) standard provided by GRTgaz as part of the renewal of the IS for managing Customer declarations and the corresponding Profiles.

Contrat d'interface swagger v0.4.yaml

CHAPTER 1 GENERAL PROCESS



1. Profile reporting documents

The IS target allows for two channels for declaring Profiles:

- API channel (see description below)
- Loading of a json or csv file via new HMS client interface

The current declaration channels (Bee3, portal TRANS@ctions) will remain available for a transitional period ending on 31 August 2020. Declarations made via these historic channels will be processed in the same way as the declarations made on the new channels. However, the responses will only be made available via the new channels.

Any new IS authorisation must be requested from the following address: transmission-ops@grtgaz.com.

2. Technical confirmation of the admissibility of declarations

Profile declarations made by a Customer will undergo the following confirmation steps:

2.1 Message format compliance

The format of the declarations (json and csv) must comply with the message format defined by this Contract (see detailed description below). In the event of non-compliance, the declaration will not be accepted (technical rejection).

2.2 Checking the Profile version number

A check will be carried out of the correct incrementation of a site's Profile version number. If a Profile is received with a pre-existing (already used) ID, the declaration will not be accepted (technical rejection).

If a Profile is declared with an increment number less than or equal to the last Profile received, it will be rejected. If a Profile is declared with an increment number equal to a Profile already received, it will be rejected. The declaration will not be accepted (technical rejection).

The ID of each Profile is set by the Customers. It must comply with the format described below

2.3 Declaration authorisation for the sites concerned

The Connection Contract mentioned in the body of the declaration and the Sites covered by this declaration will be checked for consistency. If there are any inconsistencies, the declaration will not be accepted (technical rejection).

2.4 Consistency with contractual min and max flow rates

Each of the Profile's hourly values must be between the Min and Max flow rates set out in the Connection Contract for each Site, plus a given tolerance. If there are any inconsistencies, the declaration will not be accepted (technical rejection).

2.5 Consistency of Profile timestamps

The timestamps of the hourly Profiles must be consistent with the Day specified for the Profile.

For a given Day D, the timestamps of the corresponding Profile must therefore be between Day D 6 a.m. and D+1 5 a.m.

If there are any inconsistencies, the declaration will not be accepted (technical rejection).

2.6 Confirmation by batch

Regardless of the number of Profiles, Sites and Days included in a declaration, the non-compliance of any one of these elements will result in a technical rejection of the declaration as a whole. Any Profile in this declaration will not be integrated and will not pass the feasibility tests.

3. Functional confirmation of Profile feasibility

Functional confirmation of the Profile will be carried out by checking for compliance with the management rules associated with the Flexibility Indicators.

3.1 Declarations made before Day D-1 at 1 a.m.

All Profiles for Day D received before Day-1 at 1 a.m. are automatically confirmed and integrated in the system.

3.2 Declarations made from day D-1 at 1 a.m.

All Profiles for Day D received on Day-1 at 1 a.m. are checked to ensure that they comply with the rules associated with the Flexibility Indicators.

3.2.1 Associated Mesh

Each site has an associated Mesh:

Site	Mesh	Customer	Plants
DK6	North	ENGIE	2
Pont sur Sambre	North	Total Direct Energy	1
Cycofos	Provence	ENGIE	1
Saint Avold	Lorraine	Gazel Energy	2
Combigolfe	Provence	ENGIE	1
Montoir	Brittany	ENGIE	1
Bayet	Guyenne	Total Direct Energy	1
Blenod	Lorraine	EDF	1
Martigues	Provence	EDF	2
Gennevilliers	Isle-de-France	EDF	1
Montereau	Isle-de-France	EDF	2
Toul	Lorraine	Total Direct Energy	1
Bouchain	North	EDF	1

3.2.2 Which flexibility indicator for which Profile

For all the remaining Hours[1], we compare with the reference Profile to see if the new Profile is identical, higher or lower.

- Profile time identical to the reference Profile: new Profile - reference Profile = 0
- Profile time higher than the reference Profile: new Profile - reference Profile > 0 → **The Flexibility Indicator rule Q → Q+ and the Partial Flexibility Indicator rule are applied.**
- Profile time lower than the reference Profile: new Profile - reference Profile < 0 → **The Flexibility Indicator rule Q → Q-** is applied

For the same Profile, the applicable Flexibility Indicator may be Q → Q+ and the Partial Flexibility Indicator for certain Hours, and Q → Q- for other Hours.

Example:

- The Quimper site sent a Profile on Day D-1 day for consumption of 100 on Day D.
- At 10:17 it decided to send a Profile for consumption of 110 between 11 a.m. and 12 noon and of 90 between 12 noon and 5 a.m.
- The Flexibility Indicators applicable between 11 a.m. and 12 noon are hence: Flexibility Indicator Q→Q+ and the **Partial Flexibility Indicator**. The Flexibility Indicator applicable between 12 noon and 5 a.m. is Q→Q-.

3.2.2.1 Time delay in applying flexibility indicators

The Flexibility Indicators (Q → Q+, Partial Flexibility Indicator, and Q → Q-) will be published every Hour at H-08 minutes.

To provide some Flexibility in confirming the feasibility of declared Profiles, a time delay of 23 (twenty-three) minutes will be set up between the publication of a Flexibility Indicator at hour H-08 minutes and its application at hour H+15 minutes. However, if an indicator published at Hour H-8 minutes is more favourable for the site (change from red to green) this is the one that will be used for the checks.

Example 1:

- at 9:52 a.m., the Flexibility Indicator Q → Q+ is “red”, and the Partial Flexibility Indicator is “green”,
- at 10:52 a.m., the Partial Flexibility Indicator turns “red”,

[1] We include all Hours from the current time if we refer to the feasibility check, or from Hour H-1 if the declaration is made before Hour H+15 minutes, in which case we refer to the construction of the reference Profile.

- Profiles received before 11:15 will be confirmed based on the previous status of the Partial Flexibility Indicator, i.e. “green”.

Example 2:

- at 9:52 a.m., the Flexibility Indicator Q → Q+ and the Partial Flexibility Indicator are “red”,
- at 10:52 a.m., the Partial Flexibility Indicator turns “green”,
- Profiles received after 10:52 a.m. will be confirmed based on the new status of the Partial Flexibility Indicator, i.e. “green”, without waiting for 11:15 a.m.

To enable Customers to anticipate changes in the status of Flexibility Indicators, the response of the GRTgaz IS APIs will include two statuses in instances where the upcoming status is “red” while the previous status was “green”. These two statuses will be described by the terms “currentIndicator” and “nextIndicator”. These objects will specify the timestamp at which their status was applied.

Example:

- at 9:52 a.m., the Flexibility Indicator Q → Q+ is “green”,
- Between 9:52 a.m. and 10:52 a.m., the GRTgaz APIs will return a response with a single status, via the “currentIndicator” object, which has the application timestamp “[Current day] 10:15 a.m.”.
- at 10:52 a.m., the Flexibility Indicator Q → Q+ turns “red”,
- Profiles received before 11:15 a.m. will be confirmed based on the previous status of the Partial Flexibility Indicator Q -> Q+, i.e. “green”.
- Between 10:52 a.m. and 11:15 a.m., the GRTgaz APIs will return a response with two statuses, via the “currentIndicator” and “nextIndicator” objects, the latter having the application timestamp “[Current day] 11:15 a.m.”.
- Between 11:15 a.m. and 11:52 a.m., the GRTgaz APIs will return a response with a single status, via the “currentIndicator” object, which has the application timestamp “[Current day] 11:15 a.m.”.

3.2.3 Applicable flexibility indicator

3.2.3.1 Applicable flexibility indicator: green

For all Hours between time of receipt H-1 and H+6, where the applicable Flexibility Indicator is green, the Profile is automatically considered compliant with the Flexibility Indicator.

3.2.3.2 Applicable flexibility indicator: red

1. Flexibility indicator Q → Q-:
    a. If the Profile is received by GRTgaz before Hour H+15 minutes:
        i. If, for at least one of the Hours between Hour H-1 and Hour H+5 hours, inclusive (i.e. a total of 7 checked time slots), the hourly flow rate of the new Profile is strictly lower than that of the last Profile confirmed as feasible by GRTgaz, then the new Profile is considered non-compliant with the Flexibility Indicator.
    b. If the Profile is received by GRTgaz after Hour H+15 minutes:
        i. If, for at least one of the Hours between time H and Hour H+5 hours, inclusive (i.e. a total of 6 checked time slots), the hourly flow rate of the new Profile is strictly lower than that of the last Profile confirmed as feasible by GRTgaz, then the new Profile is considered non-compliant with the Flexibility Indicator.
2. Flexibility indicator Q → Q+:
    a. If the Profile is received by GRTgaz before Hour H+15 minutes:
        i. The applicable Partial Flexibility Indicator is Green: then the new Profile is considered compliant with the Flexibility Indicator if the total hourly flow rates from Hours H-1 to H+5, inclusive (i.e. a total of 7 checked time slots), of the new Profile is less than or equal to that of the last Profile confirmed as feasible by GRTgaz before the start of Hour H-1 plus 0.8 GWh/plant. Otherwise, the new Profile is considered non-compliant with the Flexibility Indicator.
        ii. The applicable Partial Flexibility Indicator is Red: if, for at least one of the Hours between Hour H-1 and Hour H+5, inclusive (i.e. a total of 7 checked time slots controlled), the hourly flow rate of the new Profile is strictly higher than that of the last Profile confirmed as feasible by GRTgaz, the new Profile is considered non-compliant with the Flexibility Indicator.
    b. If the Profile is received by GRTgaz after Hour H+15 minutes:

i. The applicable Partial Flexibility Indicator is Green: then the new Profile is considered compliant with the Flexibility Indicator if the total hourly flow rates from Hours H to H+5, inclusive (i.e. a total of 6 checked time slots), of the new Profile is less than or equal to that of the last Profile confirmed as feasible by GRTgaz before the start of Hour H plus 0.8 GWh/plant. Otherwise, the new Profile is considered non-compliant with the Flexibility Indicator.

ii. The applicable Partial Flexibility Indicator is Red: if, for at least one of the Hours between Hours H and H+5, inclusive (i.e. a total of 6 checked time slots controlled), the hourly flow rate of the new Profile is strictly higher than that of the last Profile confirmed as feasible by GRTgaz, the new Profile is considered non-compliant with the Flexibility Indicator.

Example 1:

- On D-1 Day at 3 p.m., the Quimper site sent a Profile for a consumption of 100.
- All Flexibility Indicators applicable to the Site are green on Day D at 6 a.m.
- The Flexibility Indicator Q→Q+ changes from green to red for the first time at 9:52 a.m.
- The Partial Flexibility Indicator changes from green to red for the first time at 10:52 a.m.
- The Quimper Site sends a Consumption Profile at 12:05 pm for 90 between 1 p.m. and 2 p.m. then 110 between 2 p.m. and 8 p.m.
- The new sent Profile is thus rejected.

Example 2:

- On D-1 Day at 3 p.m., the Quimper site sent a Profile for a consumption of 100.
- All indicators applicable to the Site are always green on Day D at 6 a.m.
- The Flexibility Indicator Q→Q- changes from green to red at 9:52 a.m.
- The Quimper Site sends a Consumption Profile at 12:05 pm for 110 between 1 p.m. and 6 p.m. then for 90 between 6 p.m. and 8 p.m.
- The new sent Profile is thus confirmed.

4. Lack of flexibility

In the event of a lack of Flexibility identified by the Contract, GRTgaz will turn off the functional confirmation for all new Profiles (“GREY” Flexibility Indicators).

If new Profiles are sent via the usual channels (API, HMS Client Interface), GRTGaz responds that the lack of Flexibility is ongoing.

Specifically, for a Day D on which GRTgaz triggers the lack of flexibility on D-1 at 8:30 p.m., the disk will be greyed out from 5:52 a.m. to maintain visibility for D-1 until the end. This disk will remain greyed out until 00:51 a.m. on Day D only, to allow the visibility for the next gas day (D+1) to be displayed from 00:52.

It is recalled that regardless of the colour of the disk, the lack of flexibility applies for the entire gas day for which it was triggered, in accordance with the “Operational procedures”.

CHAPTER 2 RECONSTRUCTED PROFILE PREPARATION ("REFERENCE PROFILE")

A Site's reference Profile will be reconstructed from Profiles declared and confirmed as feasible by GRTgaz. These are sent on an ad hoc basis, according to their Declaration Time.

5. Inclusion of Profiles relating to Day D, declared before Day D

All Profiles sent before the target Day D and confirmed as feasible by GRTgaz (feasibility of the Profile) will be integrated into a rebuilt Profile, such that the last Profile confirmed as feasible by GRTgaz and sent before Day D will be the reconstructed Profile.

6. Inclusion of Profiles relating to Day D, declared during Day D

Profiles confirmed as feasible by GRTgaz during Day D (i.e. for the current Day D) will only reconstruct the reconstructed Profile for the current Hours and the coming Hours, such that the previous Hours of the reconstructed Profile will remain those of the previous reconstructed Profile.
The starting Hour H will be considered as the current hour:

- at Hour H-1 if the declaration is made before Hour H+15 minutes,
- at Hour H if the declaration is made after Hour H+15 minutes.

7. Determining the first adjustable time slot

Examples:

- a Profile declared at 2:35 p.m. confirmed as feasible by GRTgaz will result in changes to hourly Profiles from the 2 p.m. to 3 p.m. time slot.
- a Profile declared at 2:08 p.m. confirmed as feasible by GRTgaz will result in changes to hourly Profiles from the 1 p.m. to 2 p.m. time slot.

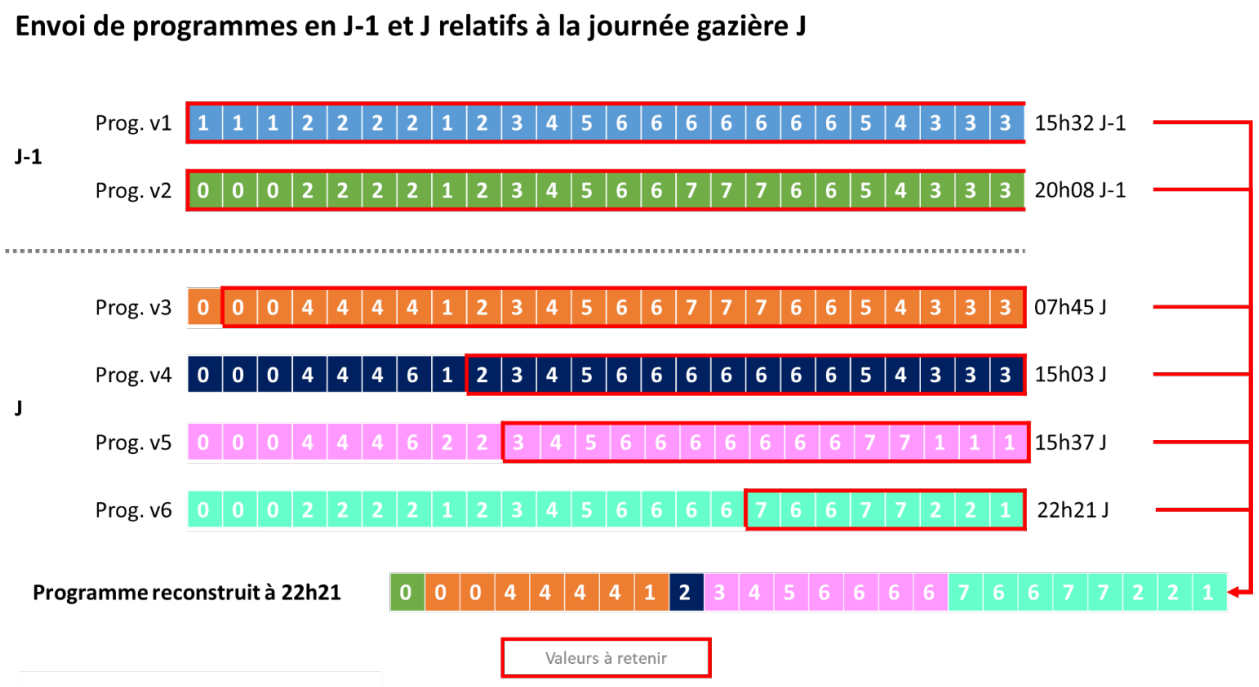
8. Non-checking of modifications to past hours

If a Profile including modifications to past Hours (i.e. Hours prior to the current Hour as defined above) is received, it will be considered as is. However, if the Profile is confirmed (feasibility), these values for past time slots will not be retained in the reconstructed Profile.

9. Sending multiple Profiles for the same site/gas day pair

If a declaration contains several Profiles with different IDs for the same Day and the same Site, the reconstructed Profile will only include the Profile confirmed as feasible by GRTgaz with the highest version number.

10. Illustration



CHAPTER 3 AUTHENTICATION

11. Authentication principles

The authentication method for the new system proposed by GRTgaz depends on the channel used.

11.1 MMI access

Authentication method: user id (email) and password

URL:

- Production environment: hms.offre.grtgaz.com
- Test environment: hms.offre-stg.grtgaz.com

Access and authentication process:

1. When accessing the URL of the MMI hms.offre.grtgaz.com for the first time, the user is redirected to the GRTgaz authentication page.
2. The user enters their user ID (email address) and password
3. If the login is successful, the user accesses the MMI. Here, according to his/her role, he/she can consult the data only or consult the data and load Profiles

11.2 API access

Authentication method: client application ID (provided by GRTgaz) and certificate
URL:

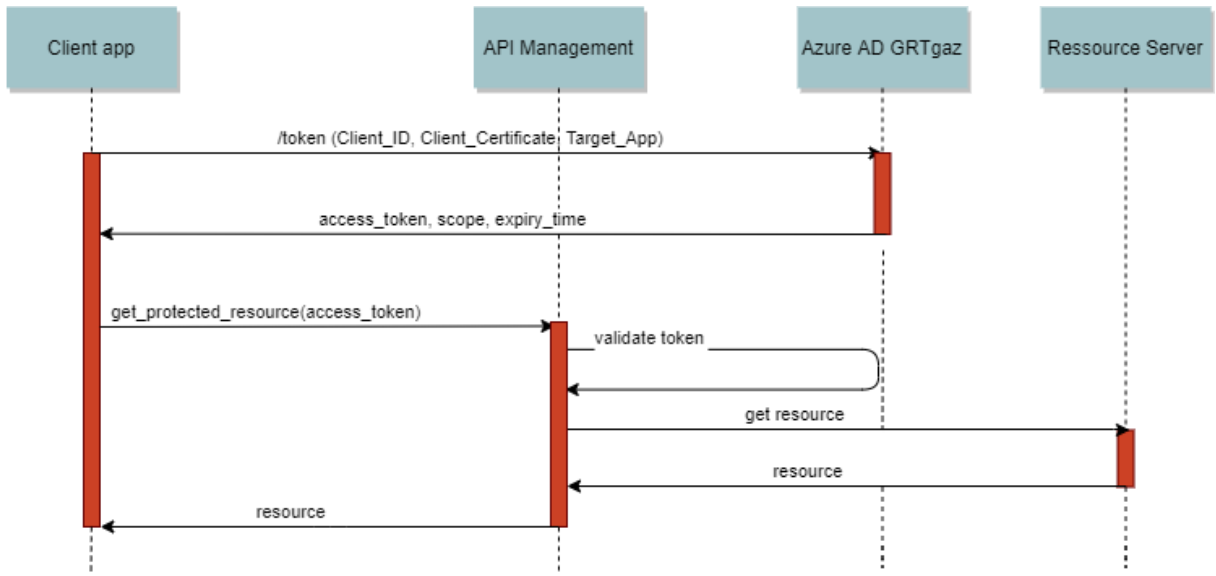
- Production environment:
  - Authentication URL: https://login.microsoftonline.com/offre.grtgaz.com/oauth2/v2.0/token
  - Resources access URL: https://api.offre.grtgaz.com/sfm/v1/{resource}
- Test environment:
  - Authentication URL: https://login.microsoftonline.com/offre-stg.grtgaz.com/oauth2/v2.0/token
  - Resources access URL: https://api.offre-stg.grtgaz.com/sfm/v1/{resource}

Access and authentication process:

1. The application generates a signed JWT token using the private key for the certificate previously sent to GRTgaz.
2. The application requests an access token via the URL https://login.microsoftonline.com/offre.grtgaz.com/oauth2/v2.0/token, including the previously generated JWT token in the body of the request
3. The application can call the resources proposed in the interface contract, including the access token previously provided in the header of the API request as the “autorization bearer jwt” field.

   This access token has a 1-hour lifespan.

11.2.1 Sequence diagram



11.2.2 Generating a JWT token using the certificate's private key: procedure

An application seeking to use GRTgaz's APIs must prove its identity using a signed JWT token via the certificate's private key.
This JWT token must contain the following information:

Part	Field	Contents	Example
Header	typ	JWT	JWT
	alg	Algorithm used. In this case: RS256	RS256
	x5t	Hexadecimal base64 encoded certificate fingerprint	tB8kYbYJbQZ6RINtsw/vmhfj2RI=
Payload	aud	Audience. The value of this field depends on the environment (staging/prod) and will be sent by GRTgaz	https://login.microsoftonline.com/cd011c38-975e-4b2a-8b1d-4eb00765d457/oauth2/v2.0/token
	iss	Matches the client application ID. The value of this field depends on the environment (staging/prod) and will be sent by GRTgaz	ae804739-1de9-4f6b-b516-79fac087bfb1
	sub	Same as the ISS field: client application ID. The value of this field depends on the environment (staging/prod) and will be sent by GRTgaz	ae804739-1de9-4f6b-b516-79fac087bfb1
	nbf	"Not Before": choice of the timestamp value before which the token cannot be used	1578992845
	exp	"Expire": choice of timestamp value after which the token cannot be used	1578999845
	jti	JWT GUID generated on the fly	19d97759-b1cc-4f57-a925-a5d610221dca
Signature	Public key	Public key of the certificate issued by GRTgaz	

	Private key	Private key of the certificate issued by GRTgaz	

The JWT token must then be encoded to be included in the request for an access token.

The hexadecimal base64 encoded certificate fingerprint can be generated using the code examples below.

- Java

```
// The all path to the certificate.
String certificateFile =  "/All/path/certifcate-rio.crt";
try (InputStream inStream = new FileInputStream(certificateFile)) {
    CertificateFactory cf = CertificateFactory.getInstance("X.509");
    X509Certificate cert = (X509Certificate) cf.generateCertificate(inStream);
    String signatureX5T = DatatypeConverter.printHexBinary(
            MessageDigest.getInstance("SHA-1").digest(
                cert.getEncoded())).toLowerCase();
    byte[] decodedHex = Hex.decodeHex(signatureX5T);
    String encodedHexB64 = Base64.getEncoder().encodeToString(decodedHex);
    LOGGER.info("X5T: "+encodedHexB64);
} catch (CertificateException | IOException | NoSuchAlgorithmException | DecoderException e) {
    e.printStackTrace();
}
```

- Linux command

```
echo $(openssl x509 -in certificate.crt -fingerprint -noout) | sed 's/SHA1 Fingerprint=//g' | sed 's/://g' | xxd -r -ps | base64
```

11.2.3 Request for an access token: procedure

An access token is obtained using the POST method at the following URLs:

- Production: https://login.microsoftonline.com/offre.grtgaz.com/oauth2/v2.0/token
  Test: https://login.microsoftonline.com/offre-stg.grtgaz.com/oauth2/v2.0/token

The request must contain the following parameters in its body, encoded in x-www-form-urlencoded format:

Parameter name	Contents	Example
client_id	Matches the client application ID (provided by GRTgaz). The client application ID depends on the environment, and will be sent by GRTgaz	ae804739-1de9-4f6b-b516-79fac087bfb1
grant_type	Value to be entered: “client_credentials”	client_credentials
scope	Corresponding to the URI of the API displayed by the target application. Format: api://{ID-app-cible}/.default The target application ID depends on the environment (test or production) and will be sent by GRTgaz	api://RIO-DSG-MAMBA/.default
client_assertion_type	Value to be entered: “urn:ietf:params:oauth:client-assertion-type:jwt-bearer”	urn:ietf:params:oauth:client-assertion-type:jwt-bearer
client_assertion	Corresponding to the JWT token signed by the client application certificate. Refer to the procedure for generating the signed JWT token with the certificate	eyJ0eXAiOiJKV1QiLCJhb…{many characters}…oefwot9AeIywNreKg

12. Account provisioning

12.1 User access

The list of users requiring access to the MMI during testing and production must be sent to GRTgaz.

Two roles can be associated with users to limit the user rights on the MMI:

- Declaring role: the user can upload Profiles
- Read-only role: users can only read Profiles uploaded for the Sites with which they are concerned.

These roles can be associated with a user in the fine detail of a Site.

12.2 Application access

The certificate enabling authentication must be provided by the Customers and sent to GRTgaz.

Certificate characteristics:

- Public certificate
- RSA X509 type
- Permitted extension: .pem, .crt, .cer

A new version of the certificate must be sent by the Customers one (1) month before its expiry.

CHAPTER 4 PROVISION OF DISPLAYED SERVICES

13. Objects handled

- Flexibility Indicator objects: **siteIndicators** (currentIndicator / nextIndicator)
- Profile-related objects:
  - **inputHmsProfile:** object corresponding to the sent Profile
  - **hmsProfile**: object corresponding to the declared Profile, as displayed, once recorded in the system
  - **rebuiltHmsProfile**: object corresponding to the reconstructed Profile
- Technical objects:
  - **Links:** object indicating the link to the integrated resource once a Profile has been sent
  - **Error:** object containing the details of the error in the event of a Profile integration problem

13.1 Details of the siteIndicators object

Oblig.	Name	Description	Type	Example
YES	**siteIndicators**	Flexibility indicator statuses related to a site	N/A	N/A
YES	**currentIndicator**	Current status of flexibility indicators	N/A	N/A
YES	siteId	Site ID	Character string in LI0000 format	LI1234
YES	siteLabel	Site name	Character string	Saint Ernestine de Louvois
YES	meshCode	Mesh ID	Character string in ME0000 format	ME0008
YES	meshLabel	Mesh name	Character string	Provence
YES	**qTo0FlexibilityIndicator**	Detail of Indicator Q to Q-	N/A	N/A
YES	status	Indicator status	Character string (RED, GREEN, GREY)	RED

YES	availabilityDateTime	Effective availability timestamp (CET/CEST)	Character string in CET/CEST format: YYYY-MM-DDTHH:mm:ss.sssZ	2019-11-18T09:52:00.000Z
YES	applicationDateTime	Application timestamp (CET/CEST)	Character string in CET/CEST format: YYYY-MM-DDTHH:mm:ss.sssZ	2019-11-18T10:15:00.000Z
YES	**partialFlexibilityIndicator**	Details of the partial flexibility indicator	N/A	N/A
YES	status	Indicator status	Character string (RED, GREEN, GREY)	RED
YES	availabilityDateTime	Effective availability timestamp (CET/CEST)	Character string in CET/CEST format: YYYY-MM-DDTHH:mm:ss.sssZ	2019-11-18T09:52:00.000Z
YES	applicationDateTime	Application timestamp (CET/CEST)	Character string in CET/CEST format: YYYY-MM-DDTHH:mm:ss.sssZ	2019-11-18T10:15:00.000Z
YES	**qToQ+FlexibilityIndicator**	Detail of Indicator Q to Q+	N/A	N/A
YES	status	Indicator status	Character string (RED, GREEN, GREY)	RED
YES	availabilityDateTime	Availability timestamp (CET/CEST)	Character string in CET/CEST format: YYYY-MM-DDTHH:mm:ss.sssZ	2019-11-18T09:52:00.000Z
YES	applicationDateTime	Application timestamp (CET/CEST)	Character string in CET/CEST format: YYYY-MM-DDTHH:mm:ss.sssZ	2019-11-18T10:15:00.000Z
NO	**nextIndicator**	Future status of Flexibility Indicators	N/A	N/A
YES	siteId	Site ID	Character string in LI0000 format	LI1234
YES	siteLabel	Site name	Character string	Saint Ernestine of Louvois
YES	meshCode	Mesh ID	Character string in ME0000 format	ME0008
YES	meshLabel	Mesh name	Character string	Provence
YES	**qTo0FlexibilityIndicator**	Detail of Indicator Q to Q-	N/A	N/A
YES	status	Indicator status	Character string (RED, GREEN, GREY)	RED
YES	availabilityDateTime	Availability timestamp (CET/CEST)	Character string in CET/CEST format: YYYY-MM-DDTHH:mm:ss.sssZ	2019-11-18T09:52:00.000Z
YES	applicationDateTime	Application timestamp (CET/CEST)	Character string in CET/CEST format: YYYY-MM-DDTHH:mm:ss.sssZ	2019-11-18T10:15:00.000Z

YES	**qToQ+FlexibilityIndicator**	Detail of Indicator Q to Q+	N/A	N/A
YES	status	Indicator status	Character string (RED, GREEN, GREY)	RED
YES	availabilityDateTime	Availability timestamp (CET/CEST)	Character string in CET/CEST format: YYYY-MM-DDTHH:mm:ss.sssZ	2019-11-18T09:52:00.000Z
YES	applicationDateTime	Application timestamp (CET/CEST)	Character string in CET/CEST format: YYYY-MM-DDTHH:mm:ss.sssZ	2019-11-18T10:15:00.000Z
YES	**partialFlexibilityIndicator**	Details of the partial flexibility indicator	N/A	N/A
YES	status	Indicator status	Character string (RED, GREEN, GREY)	RED
YES	availabilityDateTime	Effective availability timestamp (CET/CEST)	Character string in CET/CEST format: YYYY-MM-DDTHH:mm:ss.sssZ	2019-11-18T09:52:00.000Z
YES	applicationDateTime	Application timestamp (CET/CEST)	Character string in CET/CEST format: YYYY-MM-DDTHH:mm:ss.sssZ	2019-11-18T10:15:00.000Z

13.2 Details of the InputHmsProfile object sent to the API

This object corresponds to a Profile as it is sent by a Customer.

The API is used to send an InputHmsProfile object list, which allows the Client to declare several Profiles in a single call, for several Days and/or Sites.

Oblig.	Name	Description	Type	Example
YES	hmsProfileId	Profile ID	Character string in format: [Day concerned (YYYYMMDD)]-[Point PLCd code]-[Contract code]-[Declaration version number]	20191118-LI1234-[contract code]-1
YES	declarationDateTime	Declaration timestamp	Character string in CET/CEST format: YYYY-MM-DDTHH:mm:ss.sssZ	2019-11-18T10:59:16.858Z
YES	hmsSiteId	Site ID	Character string in LI0000 format	LI1234
YES	hmsSiteLabel	Site name	Character string	Saint Ernestine of Louvois
YES	connectionContractCode	Connection contract code	Character string	
YES	gasDay	Day targeted by the Profile	Character string in the format YYYY-MM-DD format	18/11/2019

YES	unit	Profile quantity unit	Constant character string: kWh25	kWh25
YES	qMin	Minimum hourly flow rate for the Day in question	Copy, in kWh 25°C	10000
YES	qMAx	Maximum hourly rate for the Day in question	Copy, in kWh 25°C	20000
YES	**hmsHourlyProfile**	Hourly Profile	List of 24 values for each time slot (see note under the table)	N/A
YES	◇ SlotStartDateTime	Time slot timestamp (CET/CEST)	Character string in CET/CEST format: YYYY-MM-DDTHH:mm:ss.sssZ	2019-11-18T06:00:00.000Z
YES	quantity	Hourly quantity	Copy, in kWh 25°C	15236.87

The hourly Profile must systematically contain 24 values (24 time slots for the Day relating to the Profile), even in the event of a change in time (23- and 25-hour days will not be managed) or an update (new Profile during the day).

- **For a 23-hour day**: add a time slot (3 hours) with an hourly Profile set to 0. Insofar as there are no checks on the hour-by-hour modulation, this will not pose any problem. Furthermore, the total daily Profile shall be equal to the actual Profile.
- **For a 25-hour day**: include the 2-hour time slot in an hourly Profile as equally as possible between the first 2-hour slot and the second 2-hour slot.

13.3 Detail of HmsProfile objects returned by the API

Oblig.	Name	Description	Type	Example
YES	hmsProfileId	Profile ID	Character string in format: Declared Profile: [Day concerned (YYYYMMDD)]-[Point PLCd code]-[Contract code]-[Declaration version number]	20191118-LI1234-[contract code]-1
YES	declarationDateTime	Declaration timestamp	Character string in CET/CEST format: YYYY-MM-DDTHH:mm:ss.sssZ	2019-11-18T10:59:16.858Z
YES	processingDateTime	Timestamp when the declaration was recognised by GRTgaz	Character string in CET/CEST format: YYYY-MM-DDTHH:mm:ss.sssZ	2019-11-18T10:59:16.858Z
YES	hmsSiteId	HMS ID	Character string in LI0000 format	LI1234

YES	hmsSiteLabel	HMS name	Character string	Saint Ernestine of Louvois
YES	connectionContractCode	Connection contract code	Character string	
YES	gasDay	Day targeted by the Profile	Character string in the format YYYY-MM-DD format	18/11/2019
YES	unit	Profile quantity unit	Constant character string: kWh25	kWh25
YES	qMin	Minimum hourly flow rate for the Day in question	Copy, in kWh 25°C	10000
YES	qMAx	Maximum hourly rate for the Day in question	Copy, in kWh 25°C	20000
YES	**hmsHourlyProfile**	Hourly Profile	List of 24 values for each time slot (see note under the table)	N/A
YES	◇ SlotStartDateTime	Time slot timestamp (CET/CEST)	Character string in CET/CEST format: YYYY-MM-DDTHH:mm:ss.sssZ	2019-11-18T06:00:00.000Z
YES	quantity	Hourly quantity	Copy, in kWh 25°C	15236.87
YES	**hmsProfileFeasibility**	Profile feasibility	N/A	N/A
YES	**indicator**	Flexibility indicators taken into account for confirmation	N/A	N/A
YES	siteId	HMS ID	Character string in LI0000 format	LI1234
YES	siteLabel	HMS name	Character string	Saint Ernestine of Louvois
YES	meshCode	Mesh ID	Character string in ME0000 format	ME0008
YES	meshLabel	Mesh name	Character string	Provence
YES	qTo0FlexibilityIndicator	Value of Indicator Q to 0	Character string (RED, GREEN, GREY)	RED
YES	qToQmaxFlexibilityIndicator	Value of Indicator Q to Q+	Character string (RED, GREEN, GREY)	GREEN
YES	partialFlexibilityIndicator	Value of the partial Flexibility indicator	Character string (RED, GREEN, GREY)	GREEN
YES	hmsProfileFeasibilityStatus	Profile feasibility status	Character string (ACCEPTED, REFUSED)	ACCEPTED
YES	comment	Status explanation	Character string	Profile accepted

Status explanation examples:

- HMS_PROFILE_NOT_RESPECT_Q0_DELAY = "The Profile does not comply with the notice period for hours %s. Flexibility indicator Q → Q- red";
- HMS_PROFILE_NOT_RESPECT_QMAX_DELAY = "The Profile does not comply with the notice period for hours %s. Flexibility indicator Q → Q+ red";
- HMS_PROFILE_NOT_RESPECT_GRAY_INDICATOR = "The Profile is rejected due to a lack of flexibility";
- HMS_PROFILE_NOT_RESPECT_FLEXIBILITY_TOLERANCE = "The Profile is rejected because it does not respect the agreed volume of Partial Flexibility";

13.4 Detail of the RebuiltHmsProfile object

Oblig.	Ownership	Description	Type	Example
YES	hmsProfileId	Profile ID	Character string in format: Reconstructed Profile: [Day concerned (YYYYMMDD)]-[Point PLCd code]	20191118-LI1234
YES	processingDateTime	Timestamp when the declaration was recognised by GRTgaz	Character string in CET/CEST format: YYYY-MM-DDTHH:mm:ss.sssZ	2019-11-18T10:59:16.858Z
YES	hmsSiteId	HMS ID	Character string in LI0000 format	LI1234
YES	hmsSiteLabel	HMS name	Character string	Saint Ernestine of Louvois
YES	connectionContractCode	Connection contract code	Character string	
YES	gasDay	Day targeted by the Profile	Character string in the format YYYY-MM-DD format	18/11/2019
YES	**hourlyQuantities**	Hourly Profile	List of 24 values for each time slot (see note under the table)	N/A
YES	◇ SlotStartDateTime	Time slot timestamp (CET/CEST)	Character string in CET/CEST format: YYYY-MM-DDTHH:mm:ss.sssZ	2019-11-18T06:00:00.000Z
YES	quantity	Hourly quantity	Copy, in kWh 25°C	15236.87
YES	energyLowThresholds	Low threshold value (energy)	Copy	
YES	energyHighThresholds	High threshold value (energy)	Copy	
YES	volume LowThresholds	Low threshold value (volume)	Copy	

YES	volume HighThresholds	High threshold value (volume)	Double	

13.5 Details of the “Links” object

This object will be used to provide additional information to the API’s technical response to the sending of the Profiles (see description below).

Oblig.	Ownership	Description	Type	Example
YES	links	List of "link" objects (1 per declared Profile)	N/A	N/A
YES	rel	Reference to the resource; specify the declared Profile ID	Character string	
YES	href	Declared integrated Profile URL	Character string	https://api.offre.grtgaz.com/hmsProfiles/20200525-LI1234-RNE.GSTF.HKL.01-10

13.6 Details of the Error object

This object is returned in the content of a response corresponding to an error code (400, 401, 403, 404, 500), and is used to specify the nature of the error.
This object is used in particular for specifying the reasons for refusing to integrate a Profile.

Oblig.	Ownership	Description	Type	Example
YES	Code	Error code	Whole number	400
YES	Message	Message describing the error	Character string	

Sample message explanation describing the error:

- UNKNOWN_HMS_SITE = "The site of this Profile is unknown";
- PAST_GAS_DAY = "Profile dealing with a gas day in the past";

- EXEEDED_QMIN_QMAX = "For hours %s value exceeded [Qmin/Qmax]";
- BAD_NUMBER_QUANTITIES = "Profile does not have 24 values";
- BAD_QUANTITIES = "Profile contains zero values for future hours";
- HOURS_NOT_BETWEEN_START_END = "Profile dealing with a gas day different from the indicated gas day";
- HMS_PROFILE_ID_ALREADY_EXISTS = "This Profile ID already exists";

14. Resources made available

GRTgaz will display several resources enabling data relating to Customers to be sent and consulted:

- resources relating to Flexibility Indicators
  - **/sites/flexibilityIndicators**: this resource presents all the Flexibility Indicators, for all sites
  - **/sites/{hmsSiteId}/relativeIndicators**: this resource presents the Flexibility Indicators for only the site passed as a parameter
- HMS Profile resources
  - **/hmsProfiles/{hmsProfileId}**: this method will retrieve the details of a specific sent Profile sent, based on its ID
  - **/sites/{hmsSiteId}/retitlesHmsProfile**: this method will retrieve the current reconstructed Profile (Virtual Profile) for a particular site, based on its ID
  - **/sites/{hmsSiteId}/hmsProfiles**: this method will retrieve the details of all the Profiles sent to a particular site, based on its ID
  - **/sites/hmsProfiles**: this method will make it possible to send one or more Profiles, over one or more Days, for one or more Sites

14.1 Details of the resource/sites/flexibilityindicators

Method used		GET		
Purpose		**Retrieval of all current and future statuses of all Flexibility Indicators for all sites**		
Endpoint		/sites/flexibilityIndicators		
Parameters: path				
	N/A			
Parameters: header				
Oblig.	authorization	Authentication token	Character string – bearer token	
Parameters: query				
	N/A			
Responses				
200		**Status: 200 - Current and next status of flexibility indicators for specified hms site** Returns a list of “siteIndicators” objects		
400		**Status: 400 – Bad request** Error while processing request		
401		**Status: 401 - Authentication error** Authentication problem when calling the API		
403		**Status: 403 – Forbidden** Access to the resource is prohibited		
404		**Status: 404 - Site or flexibility indicators not found** HMS or indicators not available		
500		**Status: 500 - Technical error occurred** Technical error		

14.2 Resource Detail /Sites/{hmsSiteId}/relativeIndicators

Method used		GET		
Purpose		**Retrieval of the flexibility indicator statuses (current and future – if applicable) of a particular site whose ID has passed as a parameter**		
Endpoint		/sites/{hmsSiteId}/flexibilityIndicators		
Parameters: path				
Oblig.	hmsSiteId	HMS ID	Character string in "LI0000" format	LI1234
Parameters: header				
Oblig.	authorization	Authentication token	Character string – bearer token	
Parameters: query				
	N/A			
Responses				
200		**Status: 200 - Current and next status of flexibility indicators for specified hms site** Returns a "siteIndicators" object		
400		**Status: 400 – Bad request** Error while processing request		
401		**Status: 401 - Authentication error** Authentication problem when calling the API		
403		**Status: 403 – Forbidden** Access to the resource is prohibited		
404		**Status: 404 - Site or flexibility indicators not found** HMS or indicators not available		
500		**Status: 500 - Technical error occurred** Technical error		

14.3 Detail of the resource /hmsProfiles/{hmsProfileId}

Method used		GET 		
Purpose		**Retrieval of the status and details of a declared Profile from its ID**		
Endpoint		/hmsProfiles/{hmsProfileId}		
Parameters: path				
Oblig.	hmsProfileId	Profile ID	Character string in format: [Day concerned (YYYYMMDD)]-[Point PLCd code]-[Contract code]-[Declaration version number]	20191118-LI1234-[contract code]-1
Parameters: header				
Oblig.	authorization	Authentication token	Character string – bearer token	
Parameters: query				
	N/A			
Responses				
200		**Status: 200 – hms profile** Returns an "hmsProfile" object		
400		**Status: 400 – Bad request** Error while processing request		
401		**Status: 401 - Authentication error** Authentication problem when calling the API		
403		**Status: 403 – Forbidden** Access to the resource is prohibited		
404		**Status: 404 - Resource not found** Resource not found		
500		**Status: 500 - Technical error occurred** Technical error		

14.4 Details of the resource /sites/{hmsSiteId}/rebuiltHmsProfile

Method used		GET		
Purpose		**Recovery of the currently valid reconstructed Profile for a particular HMS whose ID has passed as a parameter, and a given Day passed as a parameter**		
Endpoint		/sites/{hmsSiteId}/rebuiltHmsProfile		
Parameters: path				
Oblig.	hmsSiteId	HMS ID	Character string in “LI0000” format	LI1234
Parameters: header				
Oblig.	authorization	Authentication token	Character string – bearer token	
Parameters: query				
Oblig.	gasDayDate	Date of the Day in question	Character string	18/11/2018
Responses				
200		**Status: 200 - hms profile** Returns an “hmsProfile” object		
400		**Status: 400 – Bad request** Error while processing request		
401		**Status: 401 - Authentication error** Authentication problem when calling the API		
403		**Status: 403 – Forbidden** Access to the resource is prohibited		
404		**Status: 404 - Resource not found** Resource not found		
500		**Status: 500 - Technical error occurred** Technical error		

14.5 Details of the resource /sites/{hmsSiteId}/hmsProfiles

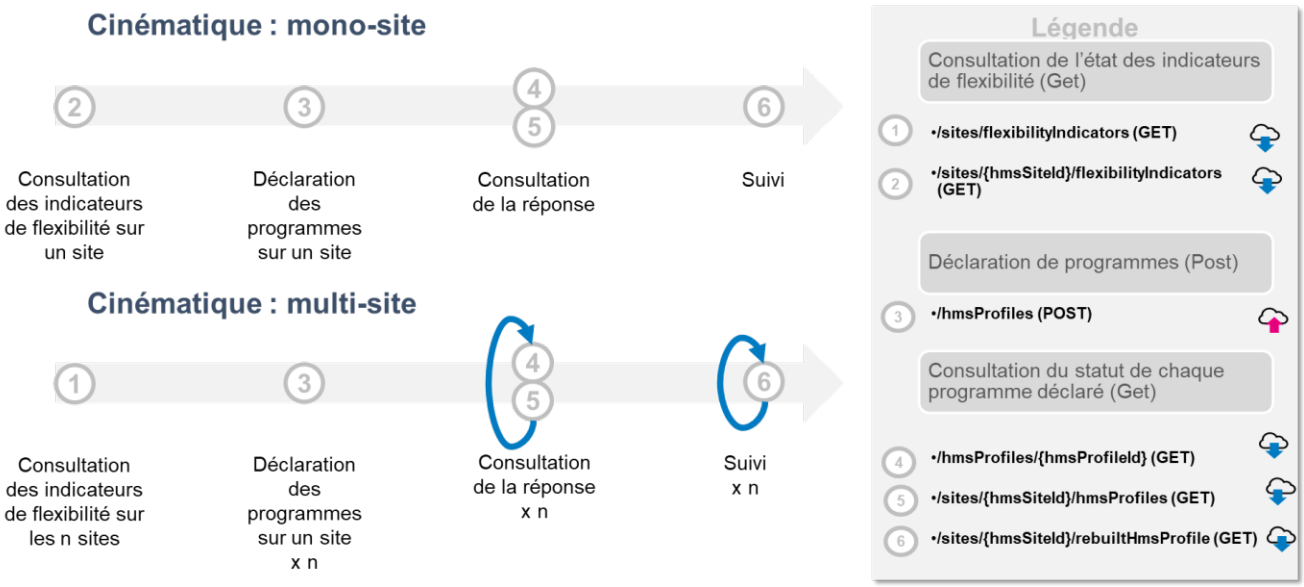
Method used		GET		
Purpose		**Retrieval of the status and details of all Profiles declared for a site whose ID has passed as a parameter, for a given Day passed as a parameter.**		
Endpoint		/sites/{hmsSiteId}/hmsProfiles		
Parameters: path				
Oblig.	hmsSiteId	HMS ID	Character string in "LI0000" format	LI1234
Oblig.	authorization	Authentication token	Character string – bearer token	
Parameters: query				
Oblig.	gasDayDate	Date of the Day in question	Character string	18/11/2018
Responses				
200		**Status: 200 – hms profile** Returns an "hmsProfiles" list of "hmsProfile" objects		
400		**Status: 400 – Bad request** Error while processing request		
401		**Status: 401 - Authentication error** Authentication problem when calling the API		
403		**Status: 403 – Forbidden** Access to the resource is prohibited		
404		**Status: 404 - Resource not found** Resource not found		
500		**Status: 500 - Technical error occurred** Technical error		

14.6 Details of the resource /hmsProfiles

Method used		POST 		
Purpose		Sending one or more Profiles, over one or more Days, to one or more sites		
Endpoint		/hmsProfiles		
Parameters: path				
	N/A			
Parameters: header				
Oblig.	authorization	Authentication token	Character string – bearer token	
Request body: application/json				
Oblig.	hmsProfiles	"hmsProfiles" list of "inputHmsProfile" objects		
Responses				
201		**Status: 201 - hms profiles successfully integrated** The declared Profiles have been successfully integrated and will be submitted for confirmation (feasibility). Returns a "links" list of "link" objects		
400		**Status: 400 – Bad request** Error while processing request		
401		**Status: 401 - Authentication error** Authentication problem when calling the API		
403		**Status: 403 – Forbidden** Access to the resource is prohibited		
404		**Status: 404 - Resource not found** Resource not found		
500		**Status: 500 - Technical error occurred** Technical error		

CHAPTER 5 USE CASES

15. General illustration



16. Use case: single-site

- Consulting the status of Flexibility Indicators for a single site
  - Resource used: /sites/{hmsSiteId}/ Indicators (GET)
  - Response: current and future statuses (if applicable) of the Flexibility Indicators for the HMS in question.
- Declaration of one or more Profiles over one or more Days on a single site
  - Resource used: /hmsProfiles (POST)
  - Message: HMS Profiles (several possible Days) with a new version increment number for each Profile update.

- Consulting the feasibility of a Profile on a single site
  - Option 1:
    - Resource used: /hmsProfiles/{hmsProfileId} (GET)
    - Response: status and details of a specific Profile, defined by its ID. Option 1 will only retrieve the status of the last declared Profile.
  - Option 2:
    - Resource used: /sites/{hmsSiteId}/hmsProfiles (GET)
    - Response: status and details of all Profiles declared on a site, defined by its ID. This option is used to systematically retrieve the history of the site's Profiles.
- Consulting the reconstructed Profile from a single site for ad hoc monitoring
  - Resource used: /sites/{hmsSiteId}/rebuiltHmsProfile
  - Response: details of the reconstructed Profile in force on a site. The ID of the reconstructed Profile of a site is constant for a given Day. However, its content is updated each time a new accepted Profile is received.

17. Use case: multi-site

- Consulting the status of Flexibility Indicators for all sites
  - Resource used: /sites/flexibilityIndicators (GET)
  - Response: current and future statuses (if applicable) of the Flexibility Indicators for all HMS.
- Declaration of one or more Profiles over one or more Days for one or more sites
  - Resource used: /hmsProfiles (POST)
  - Message: HMS Profiles (several possible sites and Days) with a new version increment number for each Profile update.
- Consulting the feasibility of a Profile on a single site; **one call per Profile and per site is required**
  - Option 1:
    - Resource used: /hmsProfiles/{hmsProfileId} (GET)
    - Response: status and details of a specific Profile, defined by its ID. Option 1 will only retrieve the status of the last declared Profile.
  - Option 2:
    - Resource used: /sites/{hmsSiteId}/hmsProfiles (GET)
    - Response: status and details of all Profiles declared on a site, defined by its ID. This option is used to systematically retrieve the history of the site's Profiles, for a given Day as a parameter.
- Consultation of the reconstructed Profile for a single site for ad hoc monitoring; **one call per site is required**
  - Resource used: /sites/{hmsSiteId}/rebuiltHmsProfile
  - Response: details of the reconstructed Profile in force on a site, for a given day as a parameter. The ID of the reconstructed Profile of a site is constant for a given Day. However, its content is updated each time a new accepted Profile is received.

CHAPTER 6 EMAIL MESSAGES

If the IS is unavailable, communications are made by email accompanied by a telephone call, in particular to confirm the feasibility of the Profiles.

18. Message format

For the following data, with the exclusion of Profile declarations, declarations on D-1 for Days D, D+1 and D+2 are made by e-mailing one file per Day processed in ".csv" format to contact-CCG@grtgaz.com , with the following information:

- The Minimum Technical Hourly Flow Rate and the Maximum Technical Hourly Flow Rate of the Site planned for the Days mentioned;
- The maintenance forecast for the Site and the forecast times for resumed availability in the event of a maintenance shutdown;

The format of the e-mail subject line must be as follows:

- [Site Name] HMS Forecast: Date of Day D (dd/mm/yyyy) – Date of Day D+2 (dd/mm/yyyy)

The name of the ".csv" file must be in the following format:

- Export_DECLARATIONS_CCG-UPLOAD-AAAAMMJG_20XXXXXXXXXXX.csv

where:

- "YYYYMMJG" is the date of Day D;
- "20XXXXXXXXXXX" the file creation timestamp;

File example:

Export_DECLARATIO
NS_CCG-UPLOAD-AAA

19. Format of the e-mail declaration import file

Field	Expected value	Format	Example	Comments
Line 1				
Field #1	DECLARATIONS_CCG	Character string		Only possible value: DECLARATIONS_CCG
Field #2	File creation date	DD/MM/YYYY	17/09/2019	Date of Profile Declaration
Field #3	File creation time	HHMMSSmsms	193355	Time of Profile Declaration
Field #4	UPLOAD	Character string		Only possible value: UPLOAD
Field #5	PROD	Character string		Only possible value: PROD
Field #6	Date of the Day concerned (D, D+1 or D+2)	DD/MM/YYYY	18/09/2019	Date of the Day concerned by the Profile
Field #7	Date of the Day concerned (D, D+1 or D+2)	DD/MM/YYYY	18/09/2019	Time of Profiles Declaration
Line 2				
Field #1	Profile ID	[YYYYMMDD-LIxxxx-GFxxxxxxxx]	20200311-LI1788-GFCCGE04	
Field #2	Date of the Day concerned (D, D+1 or D+2)	DD/MM/YYYY	18/09/2019	Date of the Day concerned by the Profile
Field #3	Site LI Code	LIxxxx	LI1788	
Field #4	Name of Highly Modulated Site	Character string	Saint Ernestine de Louvois	
Field #5	File creation date	DD/MM/YYYY	17/09/2019	Date of Profile Declaration
Field #6	File creation time	HHMMSSmsms	193355	Time of Profile Declaration
Field #7	File creation date	DD/MM/YYYY	17/09/2019	Date of Profile Declaration

Field #8	File creation time	HHMMSSmsms	193355	Time of Profile Declaration
Field #9	Minimum Technical Hourly Flow Rate for the day concerned (D, D+1 or D+2)	Copy	10000	Expressed in kWh at 25°C
Field #10	Maximum Technical Hourly Flow Rate for the day concerned (D, D+1 or D+2)	Copy	10000	Expressed in kWh at 25°C
Fields #11 to 35	Hourly Profile	Copy		List of 24 values for each time slot Expressed in kWh at 25°C