Appendix 3: Methodology and criteria applied to the grid connection study part of an orientation study (to regional or federal transmission grids) or to the grid connection study part of a detailed study to the federal transmission grid.

1.1 Introduction and objective

This appendix describes the methodology and criteria applied to the grid connection study part of an orientation study (to regional or federal transmission grids) or to the grid connection study part of a detailed study to the federal transmission grid.

The objective of the grid connection study is to propose to the applicant (Grid User or Candidate Grid Users) a series of variants for connection to the electricity grid of the requested connection capacity for its installation at its requested geographical location while complying with the needed technical criteria for Elia to fulfil its mission as a network operator.

The study also makes it possible to identify the points of attention specific to this request in order to facilitate the connection of the installation of the applicant while respecting the rules in force.

The installation of the applicant is either a Power Generating Module (PGM), a Storage Park Module (SPM), a Demand Facility (DF) or a combination of several elements in the context of a mixed site.

1.2 Principle and context of the study

1.2.1 Clarification of the reference context

The reference context corresponds to the expected situations of the power system in the future years impacted by the study. It is established and updated regularly[1] based on:

- The evolution in the overall level of offtakes (from consumption facilities and storage units) and injections (from production and storage units);
- The geographical distribution of offtakes;
- The geographical distribution of injections;
- The evolutions of the electricity grid, constituting the reference network;
- The estimation of the functioning of the electricity market, taking into account typical annual profiles for temperature, solar irradiance and wind;
- Reactive power control and voltage adjustment options.

The overall level of offtakes and their geographical distribution in the Belgian control area for a reference year is compiled by Elia, on the basis of statistical data from the past, announced

[1] This reference context is typically updated yearly.

changes of offtake at existing or new connection points, as well as macroeconomic information for Belgium and its various sectors of activity.

The overall level of injections and their geographical distribution in the Belgian control area for a reference year is compiled by Elia and takes into account the latest known agenda for the commissioning and decommissioning of production units and storage systems as well as expected developments in the macroeconomic scenarios for generation and storage.

The evolution in offtake and injections may therefore result from evolution of allocated and reserved capacities, but also from growth potential by technology, geographically distributed, not yet reserved or allocated, but taken into account for the establishment of the grid infrastructure project portfolio.

It must be noted that the reference context aims at representing a best estimation of the future situation at Belgian level which could differs from the best estimate and reserved capacities at local level. An adaptation of the reference context at local level to represent this best estimate is therefore presented in section 1.2.2[2].

At the level of the foreign grids, the reference context in the other countries covered by the ENTSOe TYNDP is established by Elia on the basis of the information exchanged between transmission system operators as part of the data collection organised by ENTSOe as well as on the basis of other bilateral information exchanged between Elia and neighbouring system operators.

The reference network is the network as it is expected to evolve based on the portfolio of infrastructure projects having at least a status “in study”. The latest published Development Plans, or any publicly communicated update of the timing of the projects at the date of the study are considered.

1.2.2 Adaptation of the reference context as part of the grid connection study

Depending on the type and localization of the installation of the applicant, this reference context is adapted in order to achieve the following key objectives:

- Remain consistent with contractual engagement Elia and DSOs have already made to other Grid Users or candidate Grid Users with either firm or flex access where a cap is defined on the volume of modulated energy borne by the Grid Users or candidate Grid Users.
- Ensure that grid hosting capacities will be present for evolutions in low-voltage generation and consumption which do not require capacity reservation and can therefore connect without further notice.
- Ensure that grid hosting capacities will be present for the growth potentials considered as one of the objectives for federal and regional network development plans. Connection requests realizing this growth potential will then benefit from these grid hosting capacities while only the remaining grid hosting capacities prior to grid reinforcement will be available for the connection requests outside of the identified growth potential.

  It must therefore be concluded that low-voltage connections and connection requests within identified growth potential come first before other connection requests. Doing

[2] The local best-estimate growth potentials are updated asynchronously at the time of the establishment of the local grid infrastructure project portfolio (long term grid development study).

otherwise would lead to an unwanted situation where opportunistic connection requests could be made to tap in a developed hosting capacity that was initially intended and approved for another purpose. Within these categories of connection requests or for the other connection requests, the principle of first come first served applies.

- Give the possibility to the installation of the applicant to connect to the grid before the realization of grid reinforcements with a flexible access.
- Provide a reasonable approach for the estimation of the expected flexibility volume of connection with flexible access that is balanced between risk of overestimation of flexibility volumes (which could negatively impact the business case of the applicant installation project) and risk of underestimation of flexibility volumes (which could lead to higher socialization of congestion management costs resulting from the market position of the applicant (injection or consumption profiles) that cannot be anticipated).

Concretely, a local zone of network influence is defined to be around the location of the installation of the applicant and to cover the set of capacities of existing, reserved allocated capacities or of consumption and generation growth potentials that have a significant influence on the conclusions of the grid connection study.

In this local zone of network influence, the following adaptations to the reference context are made:

- Reserved or allocated capacities with firm access that are not already included in the reference context are taken into account.
    - Note that this is done in order to be coherent with the contractual engagements of Elia and DSOs towards those other Grid Users or candidate Grid Users. It must be noted that the consideration of these capacities[3] could either increase or decrease the hosting capacity for the installation the applicant.
- Reserved or allocated capacities with flexible access that correspond to capacities that are within the growth potential and that would not already be included in the reference context are taken into account. Their flexibility will not be used to reduce the modulation of the requested power.
    - Note that this is done in order to be coherent with the contractual engagements of Elia and DSOs towards those other Grid Users or candidate Grid Users; the flexibility of these other Grid Users or candidate Grid Users will therefore not be used to reduce the flexibility of connection request.
- Evolutions in low-voltage generation and consumption, for which a capacity reservation is not required, are taken into account.
    - Note that these capacities correspond to generation or consumption growth that do not need to follow a connection reservation procedure to the distribution grid[4] and can therefore connect without further notice. It must be noted that the consideration of these growth potentials could either increase or decrease the hosting capacity for the installation of the applicant.

[3] Either reserved or allocated for a connection to the distribution or transmission grid.

[4] The capacities that need to follow the connection reservation procedure to the distribution grid are also reserved and allocated capacities (CAPAC process – that has the same implication as the EDS process) like any other capacities to the transmission grid.

- The local best-estimate consumption and generation growth potentials of other types than the one of the installation of the applicant, are taken into account.
- Depending on the situation, whether or not the connection request corresponds to a capacity identified in the growth potential for the zone and technology of the request:
    - If the connection request corresponds to a capacity that is in the growth potential, all reserved or allocated capacities with flexible access that correspond to capacities that are outside their growth potential are set to zero and all reserved or allocated capacities with flexible access that correspond to capacities that are inside their growth potential are taken into account.
        - Note with such an approach the need for flexibility means is not computed twice and the hypothesis made for the connection grid study of the connection request is coherent with the hypothesis made for the connection grid study of the reserved or allocated capacities with flexible access that correspond to capacities that are outside the growth potential.
    - If the connection request corresponds to a capacity that is outside the growth potential, all reserved or allocated capacities with flexible access are taken into account, whether or not they are inside their growth potential.
        - Note that this is done in order to be coherent with the contractual engagement Elia has made with the reserved or allocated capacities with flexible access. The expected volume of flexibility for these other Grid Users or candidate Grid Users would then not be increased to facilitate the connection of the installation of the applicant.

The adaptations in the local zone of network influence can therefore be illustrated and summarized by the following table:

	Connection request in line with the growth potential considered for the establishment of the local infrastructure project portfolio	Connection request outside the growth potential considered for the establishment of the local infrastructure project portfolio
Existing firm and flexible capacities & firm reserved or allocated capacities & expected low-voltage growth potential	Considered present for the study	Considered present for the study
Reserved or allocated flexible capacities in their growth potential	Considered present for the study	Considered present for the study
Reserved or allocated flexible capacities outside their growth potential	Not considered for the study	Considered present for the study
Injection or consumption growth potential of the same type of technology	Not considered for the study	Not considered for the study

Injection and consumption growth potential of other technologies	Considered present for the study	Considered present for the study

Table 1 : Adaptation of the reference context in the local zone of network influence

As the above-mentioned adaptations in the local zone of network influence may have an impact on the Belgian level of offtakes and injection identified in the reference context described in Section 1.2.1, adaptations are also made in geographical areas other than the one concerned by the connection study in order to avoid significant deviations in total installed capacity per type as well as in Belgian power balance compared to the reference context.

In terms of production or consumption profile for the installation of the applicant:

- In the context of a renewable energy production units, the connection request is considered with a realistic specific production profile is applied.
- In the context of a conventional generation or of a consumption, the connection request will be considered to be operating permanently at maximum power and under all realistic reactive power setpoints.
    - Note that wind and PV installations (without embedded storage) are not considered capable of producing more than the available power and producing less at these moments is not expected to create issues in the grid, as currently the requested connection capacity of the applicant is not present. For dispatchable generation, storage and demand facilities, an expected profile cannot be ensured and contractually secured.
- In the context of a storage facility, two studies are carried out, one with a constant injection profile and the other with a constant withdrawal profile. These profiles will be taken into account when determining the contractual conditions associated with connection and access to the network.
- In the case of a connection request for a mixed installation, different combinations of the profiles of the individual parts, for the determination of injection capacity or withdrawal capacity, are considered as illustrated by the table below:

	For the assessment of the connection request with respect to	
	Offtake capacity	Injection capacity
Profile for the consumption part	constant consumption profile	zero profile
Profile for the conventional generation part	zero profile	constant production profile
Profile for renewable generation	specific production profile (PV, Wind, etc.)	specific production profile (PV, Wind, etc.)

Profile for the storage system	constant consumption profile	constant production profile

Table 2 : Combinations of the profiles for connection request of mixed installation

In terms of production or consumption profile for the existing, reserved or allocated capacities in the local zone of network influence:

- The capacity of existing (in operation for more than one year) consumption facilities or non-renewable non-market driven generation are represented by a realistic profile based on historical measurements and a projection of this profile for future years such that all its capacity is used at least once in the future year.
- The capacity of reserved, allocated or recently connected facilities (in operation for less than one year) consumption facilities or non-renewable non-market driven generation are represented by a profile that is representative of the sector of activity and such that all its capacity is used at least once in the future year.
- The capacity of existing, reserved or allocated renewable generation are represented by a realistic specific profile such that all its capacity is used at least once in the future year.
- The capacity of existing, reserved or allocated conventional generation or storage facilities are represented by a profile generated as part of a simulation of the future functioning of the electricity market.

1.2.3 Specific cases of the substantial modernization of existing sites

In the specific context of the connection of storage or local generation within an existing demand facility and without adaptation of the contractual connection capacity (PPAD) of this demand facility, no active power flow constraints need to be verified in the context of the connection study. Grid studies for the validation the connection would then be limited to short-circuit power, voltage & reactive power other dynamic constraints.

In case the connection study requests an adaptation of the contractual connection capacity (PPAD), the study will focus on the impact of the increased capacity above the existing connection capacity of the full substantially modernized site following the same approach as for a new industrial site with mixed installation.

Finally, in the context of a modification of an existing installation of generation with non-market driven profile (such as renewable generation) for which a specific production profile was considered in the context of the connection contracting, the new constraints could be identified below the existing maximum capacity (but above the existing firm capacity) linked to the new profile of the full substantially modernized site.

1.2.4 Technical characteristics of the installation of the applicant

Unless explicitly stated at the time of the application, typical technical characteristics resulting from a conventional design of the production, consumption or storage unit will be considered.

- For production units, these characteristics cover the limits in active and reactive power, current limits, impedances, regulators (speed, frequency, voltage, etc.), the step-up transformer, the consumption of auxiliary services, etc.

- For consumer installations, these characteristics cover reactive behaviour, three-phase short-circuit power contributions, etc.
- For storage units, these characteristics include active and reactive power limits (MW, Mvar), storage capacity, ramping rate, impedances, regulators (frequency, voltage, etc.), step-up transformer, auxiliary consumption, etc.
- …

1.2.5 Analyzed situations.

In future years, evolutions in the reference context, as well as periods of network infrastructure works may lead to different connection or operating constraints for the subject of the application. Phases, periods during which the constraints will be considered equivalent, are identified.

For each identified phase, different possible operational situations are considered. They are the result of the synchronized combination of production profiles, consumption profiles and of the market.

The situations considered are chosen in such a way as to identify the main constraints of the power system in the presence of the applicant's new installation(s)/unit(s), for each phase and for each of the proposed connection solutions.

Typically, 100 situations per year will be analysed in order to best represent all the different market situations of an average year in terms of temperature, wind or sunshine profile. Each of the 100 situations will therefore have a weight, resulting from a grouping of the 8760 hours of the average year and will be used to determine the conditions of the connection, including the average annual flexibilization volumes required in the case of a connection with flexible access.

1.2.6 Analyzed system states.

For each of the identified situations, the currents and voltages in the system, the dynamic stability and the compliance with the requirements in terms of voltage quality are checked for different system states. A state is characterized by a planned or unplanned outage of one or more grid elements (line, cable, busbar, network user, etc.) in relation to the reference context and the analyzed situation.

Typically, the following states are studied:

- N state, where all the grid elements available in the reference context are operational. For each phase of network evolution, a new N state is studied.
- N-1 state, where relative to the N state, a grid element or Grid User installation is disconnected (either planned or unplanned) from the system.
    - With the exception of specific situations linked to certain types of grid elements or to the phasing of network development works, the average unavailability of grid elements is 1% of the time. This unavailability rate includes both maintenance work on the grid element (planned N-1 state) and incidental disconnection of the grid element (unexpected N-1 state). It should be noted that since the frequency of maintenance is not annual, the annual volume of

flexible energy that could be needed, may therefore vary around the average value determined in the grid connection study.

- In the context of the realization of network infrastructure works, the unavailability of certain grid elements can be significantly greater. For network development works in the zone of the installation of the applicant, in progress or planned within 3 years after the commissioning date of the connection request, as well as for network development works to upgrade the 400kV network and which would impact the determination of the firm power or the volume of needed flexible energy, phases of work realization will be taken into account as part of the grid connection study.

- N-1-1 state, where a grid element is preventively taken out of service in order to carry out maintenance, updates or repairs and during which an unplanned incident occurs. It should be noted that this state must respect operational criteria only during a sufficient number of situations (or periods of the year) (and not during the whole year) to carry out the tasks of the network operator. It is also important to identify, during the study, whether specific agreements need to be made between the network operator and the connection applicant in order to enable each party to manage its own system.

1.2.7 Technical criteria

1.2.7.1 Limits for a responsible system operation

The grid development criteria of application in the context of the grid connection study are deemed to be met, for each situation and state, if:

- The requirements set out in the contingency list of the "methodology for coordinating operational security analysis in accordance with EU 2017/1485 (SOGL)"[5] and the requirements of Regulation (EU) 2019/943 of June 2019 on the internal market for electricity are met;
- The voltage at each point of the network remains within the specified limits;
- The currents in the various grid elements do not exceed the maximum specified values provided; the maximum values of grid elements that must not be exceeded are divided into permanent and temporary maximum values. Temporary maximum values can be used in an unplanned N-1 situation when curative actions are available to reduce currents below permanent maximum values within a 15' timeframe;
- The short-circuit currents do not exceed the maximum specified values;
- The dynamic and transient stability of the production units is ensured;
- The requirements in terms of voltage quality are met.

[5]https://www.acer.europa.eu/sites/default/files/documents/Individual%20Decisions_annex/Annex%20I%20-%20ACER%20Decision%20on%20CSAM.pdf

1.2.7.2 Limits for a responsible system development

Additionally, in the context of connection studies, criteria exist for the proposal of the connection point of the installation of the applicant:

- If a voltage level or substation is planned to be dismantled (e.g. 70kV grid), as mentioned in the network development plan, generally no connection options on this substation or at this voltage level are proposed as the installation of the applicant would then need to be connected to another location or voltage level later. It could however still be proposed if this variant is techno-economically interesting for the applicant even if he would then need to foresee multi-voltage transformers and connection links.
- If a new voltage level is created in a zone (e.g. 150kV), a connection option is proposed to the applicant if the network evolution is within the relevant time horizon or if an anticipation of the infrastructure project is possible.
- Currently, the following metrics and thresholds are deemed appropriate in order to ensure that investments in public grid infrastructure benefit more than a single Grid User. Based on the current typical ratings of existing and planned grid elements and depending on the full capacity of the new or substantially modernized installation of the applicant, the figure below defines a maximum full capacity for the installation of the applicant per voltage level for source substations (i.e. a substation of a given voltage level supplied by transformers from a higher voltage level in N & N-1) and for remote substations. Taken this metric and thresholds into account, a connection option having the adequate voltage level will be proposed.

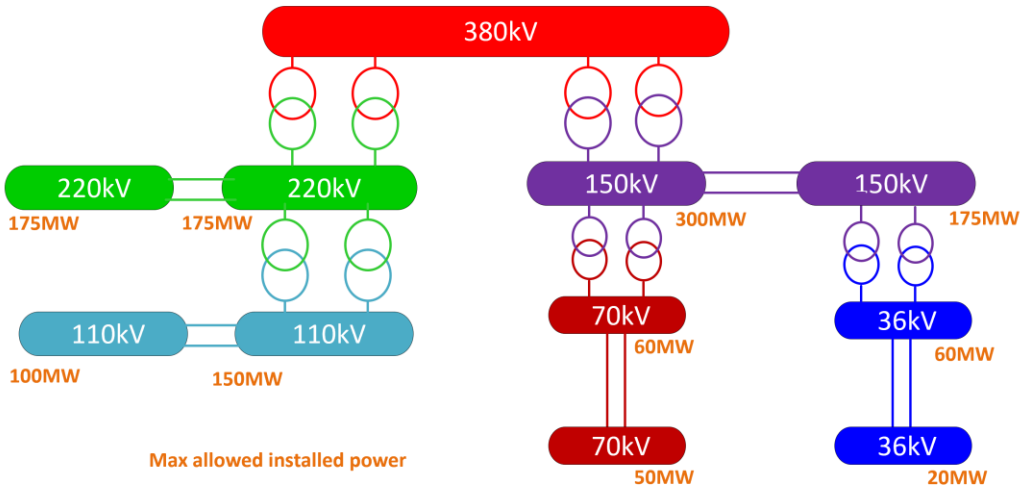

Figure 1 : Maximum full capacity of the installation of the applicant per voltage level for source and remote substations.

1.2.7.3 Connection solutions considered.

For illustration purposes, here is a non-exhaustive list of considered connection solutions:

- A standard connection to a substation of the transmission network. This connection may consist of one or two bays (for a redundant connection). In the case of a redundant connection, Elia will specify in the orientation study the authorised operating mode(s)

in the customer's facilities in order to avoid any transit flow through the customer's facilities in N or N-1 in the transmission network (diagram on the left in the figure below).

- A double-tapping connection with the unavailability of only one of the customer's two connection in the event of maintenance or works on the concerned transmission grid element[6] (diagram in the middle of the figure below).
- A single tapping connection at voltages below 400kV and for a production or storage facility with an interruptible connection contract. The customer connection is unavailable in the event of an incident, maintenance or work on the concerned transmission grid element[7].
- A standard connection to a substation of the transmission system through one or more links temporarily made available to the customer for exclusive use (Part B)[8] but which could possibly be partly integrated into the transmission network and part of which will then become Part Z[9]. This will involve the construction of a substation and the relocation of the customer's connection point (diagram on the right in the figure below).

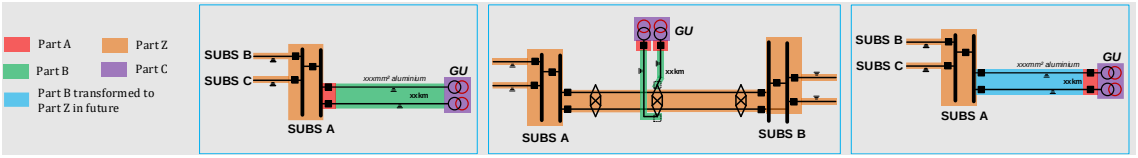

Figure 2 : Considered connection solutions.

1.2.7.4 Actions considered for controlled network operation.

- **Standard operating topologies and preventive actions**

In the context of the grid connection study, network security is ensured by proposing a network infrastructure and operating topologies that can be adapted for sufficiently identifiable, predictable and stable situations. The potentially very fast ramping rates of storage units rule out the use of real-time adaptation of the operating topology to manage potential network congestion.

The main objective of preventive actions is to ensure that in a planned N, the grid elements are not overloaded beyond their permanent maximum value and, at the same time, to ensure that after an unplanned incident the grid elements are not overloaded beyond their temporary maximum value.

If these preventive actions are not sufficient another connection variant, a network adaptation and/or a connection with flexible access (pending network reinforcement) are proposed. In the case of a connection with flexible access, the active power of the connection request will be modulated in the network situations that require it up to a level where all technical criteria are met again.

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[6] Max one tapping per grid element allowed.

[7] Max one tapping per grid element allowed.

[8] Part B = all equipment making up the connection link between the connection bay at Elia substation (Part A) and the installation of the applicant (Part C)

[9] Part Z = equipment's and infrastructure part of the electricity grid

- **Actions in case of planned outage (planned N-1 state)**

The main objective of these actions is to ensure that in a system state where a grid element is planned to be taken out of service, the other grid elements are not overloaded beyond their permanent maximum value and, at the same time, to ensure that after an unplanned incident the grid elements are not overloaded beyond their temporary maximum value.

The occurrence of these actions is therefore the product of the occurrence of the need to plan the outage on the grid element (e.g. to perform maintenance) and of a situation where the other grid element's permanent capacity in N-1 state would be exceeded.

- **Curative actions in case of unexpected N-1 state.**

After the loss of an element, certain technical criteria will be between their permanent and temporary limits. The return of the system within the permanent limits of these technical criteria will require the use of a limited number of curative actions that can be carried out in less than 15 minutes.

If these curative actions are not sufficient, network reinforcement and/or connection with flexible access (possibly pending network reinforcement) is proposed. In the case of a connection with flexible access, the active power of the connection request will be curatively modulated in N-1 or N-1-1 situations.

The probability of a curative activation is therefore the product of the probabilities of an unplanned N-1 and of a situation where the grid element's permanent capacity in N-1 would be exceeded.

- **Modulation of the connection request (in case of connection with flexible access)**

In cases where preventive or curative internal Elia's RAs are not sufficient and in the event that network reinforcement alternatives cannot be implemented before the requested capacity is connected, a modulation of the requested power is proposed. These modulations therefore only concern situations where the installation of the applicant is still connected to the network and exclude situations where the installation of the applicant is disconnected from the network following an N-1 situation. (Note that these specific situations will be covered by non-redundant or interruptible connection contracts).

The flexibilization volumes determined in the grid connection study are based on the assumption that the new connection request will be modulated in the event of congestion caused or exacerbated by the connection of the installation of the applicant, before the other Grid Users or candidate Grid Users taken into account in the reference context adapted for the study (see Section 1.2.2) except in cases where the connection request has a low influence on a congested grid element and, *in line with Art. 22 § 1er 1° and 2° of the code of conduct,* a more efficient means is available in real time to resolve the congestion. Under these conditions, the constraint is not taken into account for the calculation of the flexibility energy volume.

Currently, the following metrics and thresholds are deemed appropriate to determine the influence of a connection request on grid elements:

- The critical network element is only being considered if the product of the PTDF[10] of the applicant on this element and the ratio of the power of the request to the power of the network element is greater than a threshold or if no other means to manage the congestion are available in real time.

$$\left(\left|PTDF_{GU,CNECGU}\right| \times \frac{P_{max}{}_{GU}}{S_{perm}{}_{CNEC}{}_{GU}}\right) > 1\ \%$$

- Additionally, for congestion located at a voltage level lower than the voltage level of the proposed connection point for the installation of the applicant, the critical network element is only being considered if, in addition to the previous criteria, the PTDF of the connection request on this element is above a threshold or if other means to manage the congestion are available in real time.

$$U_{CNE} < U_{GU}; \qquad PTDF_{GU,CNECGU} > 10\ \%$$

1.3 Methodology and conclusion of the study

The connection request is integrated into the reference situation either at different grid connection locations in the physical vicinity of the installation of the applicant in de context of an orientation study or as defined in the selected variant in the context of a detailed study. The resulting system is simulated in the situations and states mentioned above. The simulations cover the functioning of the market, that of the power system (load-flow, etc.) and the manual actions of dispatchers and automatic systems.

In the context of an orientation study, through an iterative process, in order for all technical criteria to be met,

- Connection variants to the electricity grid are being considered. Variants that are technically not feasible or not economically justified, in discussion with the customer, are not retained. The list of all variants considered whether or not they have been selected, shall be communicated to the applicant.
- Realistic adaptations to the timing or phasing of planned infrastructure projects and/or changes in the way the network is operated will be proposed.

Once this objective is achieved,

- An estimate of the cost (direct investment needed for the connection equipment's and applicable connection yearly fees in accordance with the tariffs as approved by the CREG) to be borne by the applicant to enable its connection is made. It is accompanied by an estimated time frame for the completion of all required network adaptations. These estimations are non-binding in the context of an orientation study.
- Where applicable, a period, during which the connection of the installation of the applicant is possible subject to flexibilization of the connection request, is determined. It should be noted that, if the need for flexibility is only present in rare situations, representing less than 0.1% of the time and if other means for real-time preventive or curative flexibility are available to ensure the sound operation of the network, a

[10] Power Transfer Distribution Factor (PTDF): the PTDF describes how an exchange between two nodes is distributed over all grid elements.

connection with firm access will be proposed. Among these rare situations, we will find the need for flexibility in the case of N-1-1 for the maintenance of grid elements (N-1-1 for infrastructure project not included here).

The maximum active power that is never modulated, considering the GU profile, will be referred to as "firm power". If this “firm power” is less than the power requested, then the remained power which can be modulated is called "flexible power".

In line with Art. 61 § 1 of the code of conduct, for connection studies proposing a connection with flexible access to the federal transmission network, a technical report mentions the conditions for flexible access to the network. A confidential version of this report is sent to the competent regulator for approval. The non-confidential version of this report is sent to the applicant and to the Directorate General for Energy.

- The additional non-exhaustive technical requirements from the technical regulation of application to the connection solution (federal technical regulation, local transmission network technical regulation, regional transmission network technical regulation, etc.) are communicated.
- In the event of a potential impact of the installation of the applicant on the stability of the network, the study mentions the need to carry out a detailed dynamic stability study during the connection study, which follows the grid connection study. The dynamic stability study may possibly lead to additional or different investments at the expense of the applicant, such as a different choice of design of the production unit or the step-up transformer. The dynamic stability study may also result in additional network investments, which may lead to a delayed commissioning of the installation of the applicant.
- In the event of a potential impact of the installation of the applicant on the voltage quality, the study mentions the need to carry out a detailed Power Quality study during the connection study, which follows the grid connection study. The Power Quality study may possibly lead to additional investments at the cost of the applicant, such as filters. The Power Quality study may also result in additional network investments, which may lead to a postponement of the commissioning of the installation of the applicant.

In addition, the following technical information is provided to the applicant:

- Connection variants considered:

Connection variant	Access type	Connection point	Explanation
Variant 1	FLEX	*PPPPPUUU*	*Considered / Discarded*
Variant 2	FLEX	*PPPPPUUU*	*Considered / Discarded*
Variant 3	FLEX	*PPPPPUUU*	*Considered / Discarded*
FIRM variant	FIRM	*PPPPPUUU*	*e.g. Discarded given length of the connection link that is not technically-economically justified.*

- Relevant network evolution phases

Phases	Period	Description
Phase 1	2027 - Q4 2028	e.g. before commissioning of infrastructure project X
Phase 2	20xx - 20xx	…
Phase 3	20xx - 20xx	…
Phase 4	20xx - 20xx	…
Finale Phase	20xx - 20xx	…

- In the case of connection solutions with flexible access, and in order to provide the applicant with factual information on the risks of modulation of the connection request, the information in the following table is provided.

Profile consumption/injection		**Variant 1**			**Variant 2**
		Phase 1	**Phase X**	**Finale Phase**	**... (idem)**
Injection Capacity	Flexible Power (MW)	xx			
	Firm Power (MW)	yy			
	% preventive flex (time)	aa (= $aa_{[0-25]}$ + $aa_{[25-75]}$ + $aa_{[75-100]}$)			
	% curative flex. (time)	bb			
	% flex. (active energy)	cc			
	MWh flex./y (active energy)	zz			
	Description of market conditions with power modulation of the connection request (eg.				

	high offtake and low production in the zone, or high imports from FR combined with high offshore wind infeed)				
Consumption Capacity	... (idem)				

To understand this table, it is important to remember that the need for power modulation of connection request in the event of congestion is typically linked to one, the other or both phenomena described below:

- A high flow (higher than its permanent maximum power in N or higher than its temporary maximum power in N-1) on a critical grid element linked to a combination of the position of several players on the Belgian and EU markets. This phenomenon is the main cause of preventive flexibilized volume (see table above). A description of the market conditions, among the 100 situations per year analyzed of the average year in terms of temperature profile, wind or sunshine, and correlated to these modulation needs is provided in the table.
- Unplanned or planned disconnection of grid elements (lines, cables, transformers, etc.), resulting in a high flow on another critical network element. This phenomenon is the main cause of curative flexible volume (see table above).
- Additionally, in order to provide additional information to the applicant, the % of time with preventive flex (aa) is separated in 3 sub-categories ($aa_{[0-25]}$, $aa_{[25-75]}$ and $aa_{[75-100]}$ where
  - $aa = aa_{[0-25]} + aa_{[25-75]} + aa_{[75-100]}$
  - $aa_{[0-25]}$ is the % preventive flex when the expected modulated power is between [0 - 25]% of the flexible power range
  - $aa_{[10-90]}$ is the % preventive flex when the expected modulated power is between [25 - 75]% of the flexible power range
  - $aa_{[90-100]}$ is the % preventive flex when the expected modulated power is between [75 - 100]% of the flexible power range
- The split of the % of time with preventive flex in 3 sub-categories as well as the description of market conditions with power modulation are non-binding piece of information and will not be written in the connection contract.