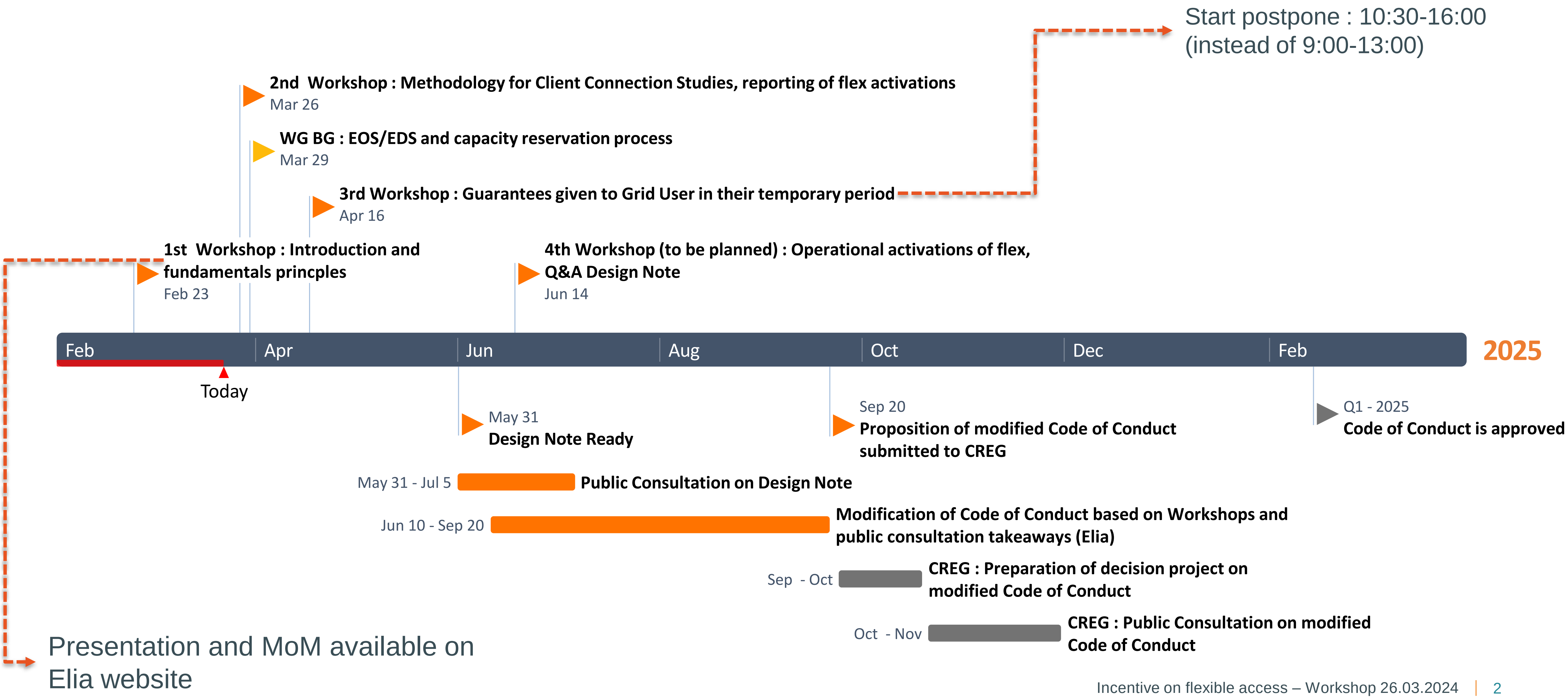
Incentive on connection with Flexible access – 2nd Workshop

Workshop 2 – 26/03/2024

26.03.2024 | Elia

Planning of workshops and public consultations



Part I : **Wrap-up 23/02/2024 Workshop**

Part II : **Methodology for client connection studies (EOS/EDS)**

1. Reference Context
2. Connection proposals
3. Access

Part III : **Reporting of Flexibility activations**

1. Context
2. Reporting proposal for the flexibility activation

Part I : Wrap-up 23/02/2024 Workshop

Given the accelerating energy transition, flexibility has an important role to play

Given the rapid increase in EOS/EDS (for RES, storage and demand), the importance of flexible connections – allowing Grid Users to connect before the realization of required grid reinforcements – will increase

Considering the flexibility of Grid Users – when capable and when willing – is key as a new design factor for the future power system to strive for a techno-economic optimum for society, as anchored in EU legislation

Long Term Grid Planning* : Cost-Benefit Analysis for Flexibility

In **Long Term Grid Planning**, **Cost-Benefit Analysis** will be realized to **compare Grid Reinforcements** and **Remuneration of Grid Users' flexibility** – within a **limited range** - as a **complementary solution.**

To ensure a **harmonious development of the Grid**, **bounds** should be put on the **expected usage of flexibility**

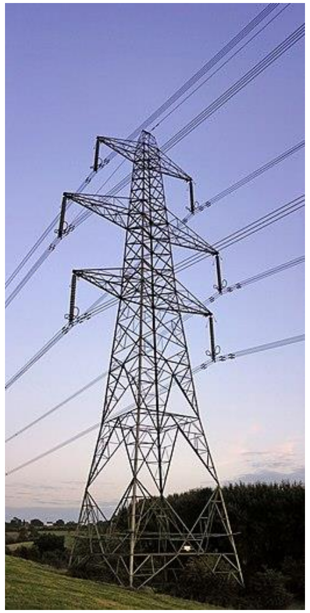
- **Investments** are **triggered** when the **expected** (societal) **costs** of **using Grid Users' flexibility** are **higher** than the **expected costs of reinforcing the grid**
- **Investments** are **triggered** when the **expected usage of flexibility** is **above predefined bounds**

* Long Term planning of the grid to cope with electrification of demand, integration of renewables, changes of energy mix, assets end-of-life…

Temporary Period

The **connection request** of a **Grid User**…

… may **require** a (planned or not identified nor planned) **grid reinforcement project**



- If **agreed** by the **Grid User**, the Grid Operator can **propose** a **connection before the realization of the grid infrastructure** identified in the **context of the development plans**
- In **those conditions**, **flexibility** will be **applied**. As it is the **Grid User's choice to connect earlier**, those inherent **flexibility costs shall not be socialized** but **shall be borne by the Grid User until the end of the temporary period**

Temporary Period : Summary

The **Temporary period** can **apply** on the request of **Grid Users** in **areas** where **not enough firm hosting capacity** is **available**

During the **Temporary Period**, **the flexibility costs** are **borne by** the **concerned Grid Users**

Clarity should be given to **the Grid Users** related to the **definition** of the **Temporary Period**

Guarantees should ideally be given to **the Grid Users** related to **maximal bounds** to the **flexible volume** during the temporary period – under the condition that **gaming risk** is **avoided**

→ Will be discussed in the next workshops

Part II : Methodology for Client Connection Studies (EOS/EDS)

Methodology for Client Connection Studies (EOS/EDS) : Content

1. **Reference context**
   - Reference network
   - Reference capacities
   - Reference market
2. **Connection proposals**
   - Considered voltage levels
   - Connection configurations
3. **Access**
   - How is a study executed
   - How to define flex volumes

1

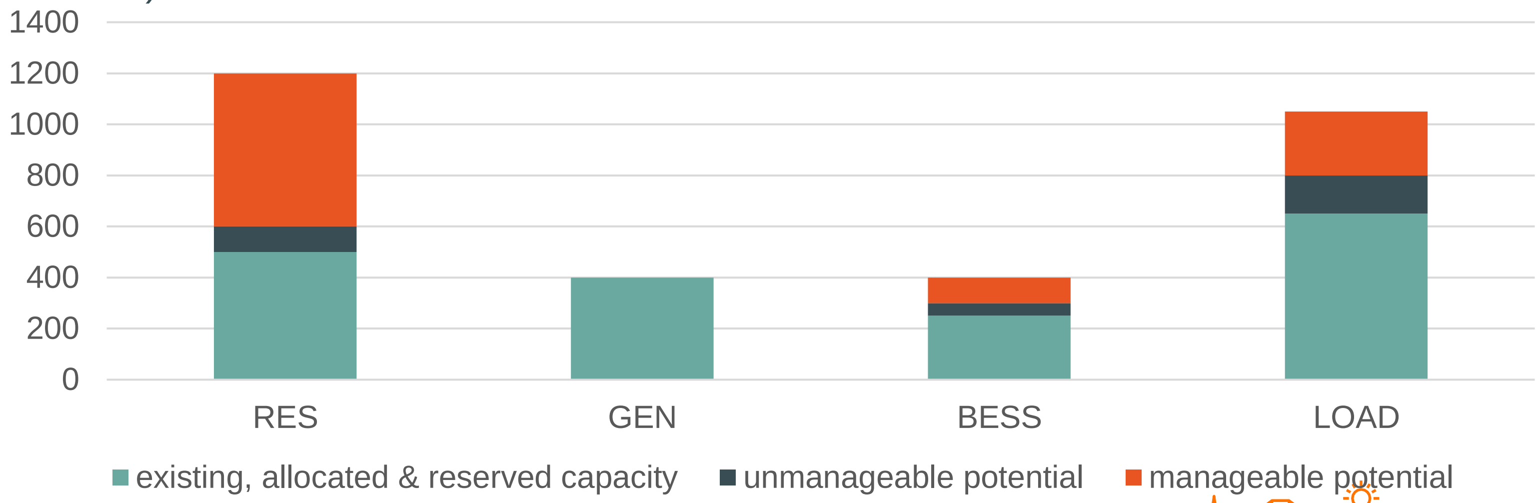
Reference context

Context – Reference Grid

- **The reference grid** is the grid used for **performing client connection studies**
- **The reference grid is the network as it is expected to evolve according to the project portfolio at the time of the study.** The project portfolio included in the latest validated federal and regional plans may evolve as part of the evolution of LT visions, portfolio management and project contingencies. A vision of network evolution beyond the horizon of the plans is also taken into account in the choice of different connection variants, to ensure sustainable solutions (e.g. gradual exit from a voltage level). **The most up-to-date network developments will be taken into account in the EDS/EOS.**
- Following the evolution of load and production assumptions, as well as the state of assets (and their end-of-life), **long-term studies are carried out on a regular basis on different areas of the network, in order to define the necessary investments in the network.** These studies give rise to a revised project portfolio.
- In case of a connection with flexible access, different phases will be defined by the infrastructure projects impacting the connection request.

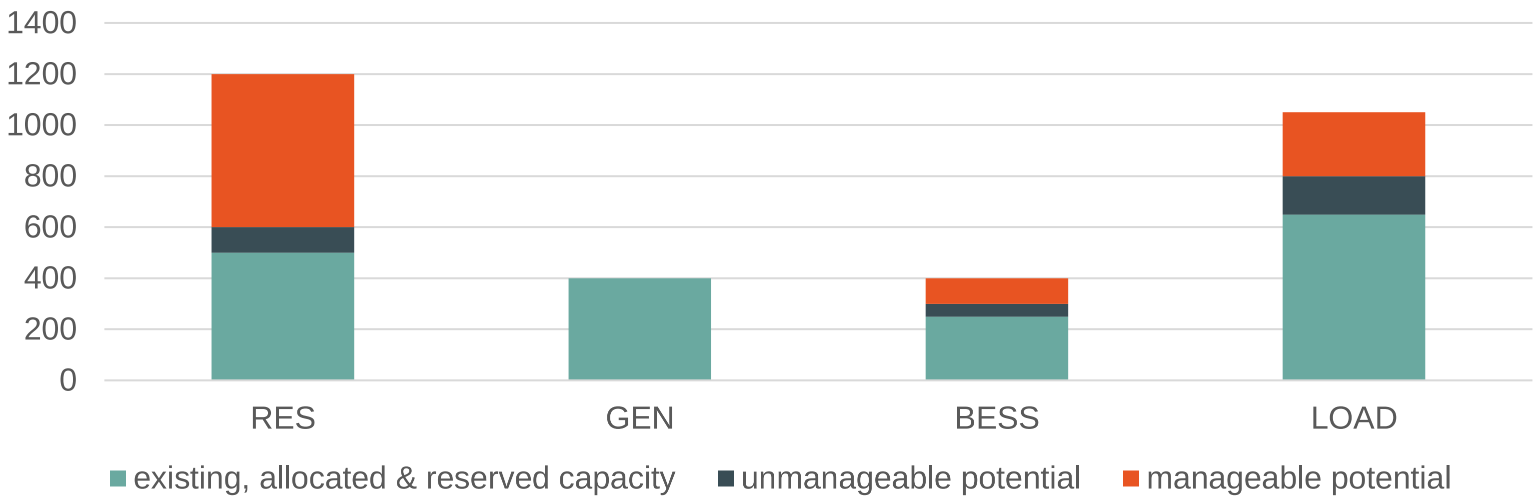
Context – Load & Generation

- **The scenarii building process**, including public consultation on hypotheses, defines the evolution of the consumption and production to be accounted for in Belgium and Europe.
- On a regular basis the Load & Generation context is reviewed based on the latest scenarii. **This context is composed by existing, allocated and reserved capacities and by the foreseen evolutions** on different time horizons**.**
- **The reference grid is developed to host those capacities** (existing, reserved, allocated and foreseen evolutionsl) in order to be able to realize the Belgian and EU ambitions in terms of the energy transition, **in the interest of society.**
- **For a given study**, this Load & Generation context is updated with **the latest information on capacity reservation and allocation.**
- This results for each type of Load & Generation in **a baseline** (existing + reservation & allocation) **and a foreseen potential** which will evolve on different time horizons.
- In the foreseen potential, we distinguish **evolutions** which must follow the capacity reservation process (manageable potential), and **evolutions** which don't follow the capacity reservation process (unmanageable potential - e.g. residential load and generation).



Context – Load & Generation

- Three possible approaches:
  1. First come first served
  2. Limit to potential
  3. Scenario based



Note that for **all approaches**, we **consider the reserved and allocated capacity**. In some situations, **reserved capacity** can **help to alleviate the identified congestion** (e.g. reserved capacity in offtake in an area congested in injection). If this reserved/allocated capacity will eventually not come, the identified congestions issues can be more severe than expected.

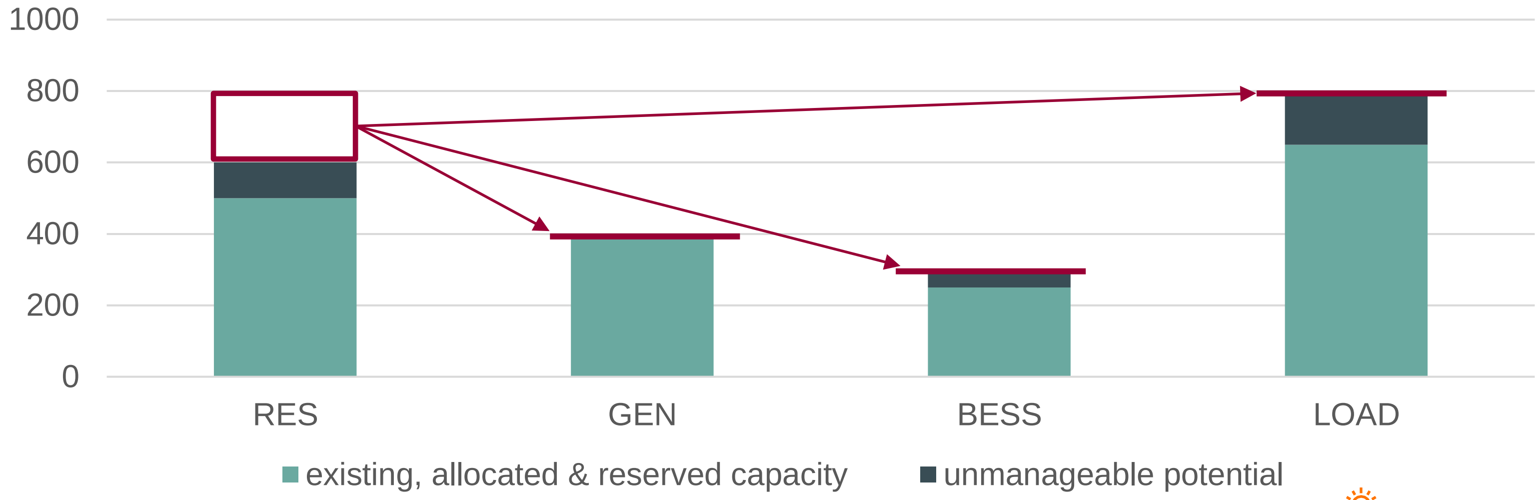
Context – Load & Generation

1. First come first served

- For a new connection request, **we only take unmanageable potential (e.g. residential growth) and existing, allocated and reserved capacity into consideration.**

GU 1 – reservation of 200 MVA RES

We only consider unmanageable potential and existing, allocated and reserved capacity in the flex calculation.



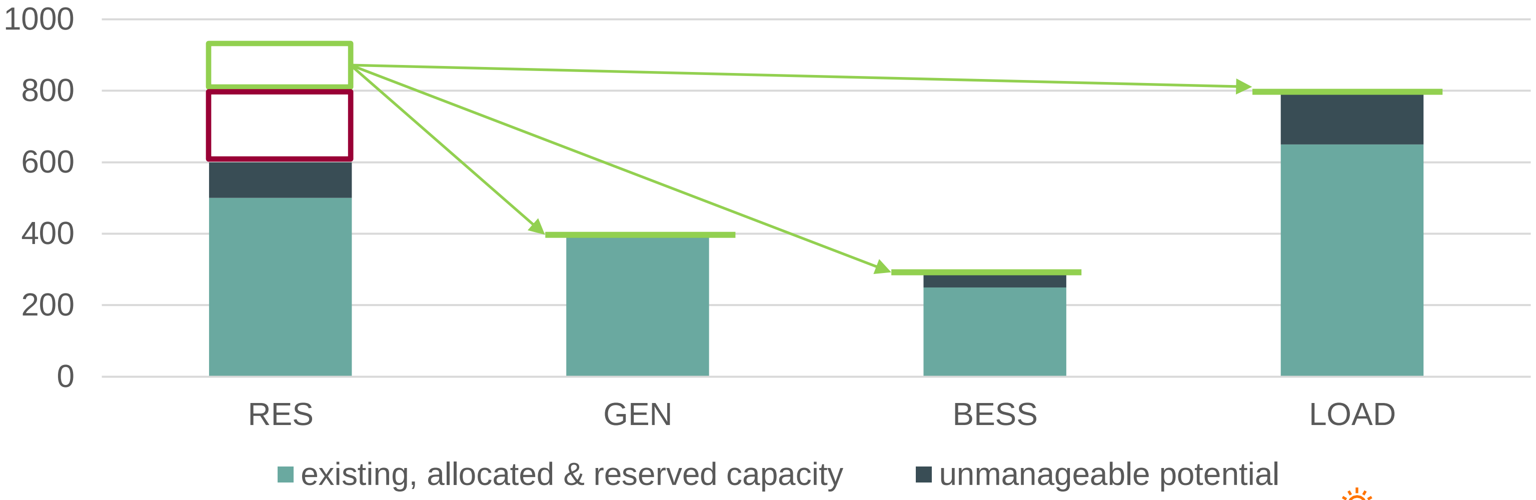
Context – Load & Generation

1. First come first served

- For a new connection request, **we only take unmanageable potential (e.g. residential growth) and existing, allocated and reserved capacity into consideration.**

GU 2 – reservation of 150 MVA RES

We only consider unmanageable potential and existing, allocated and reserved capacity in the flex calculation.



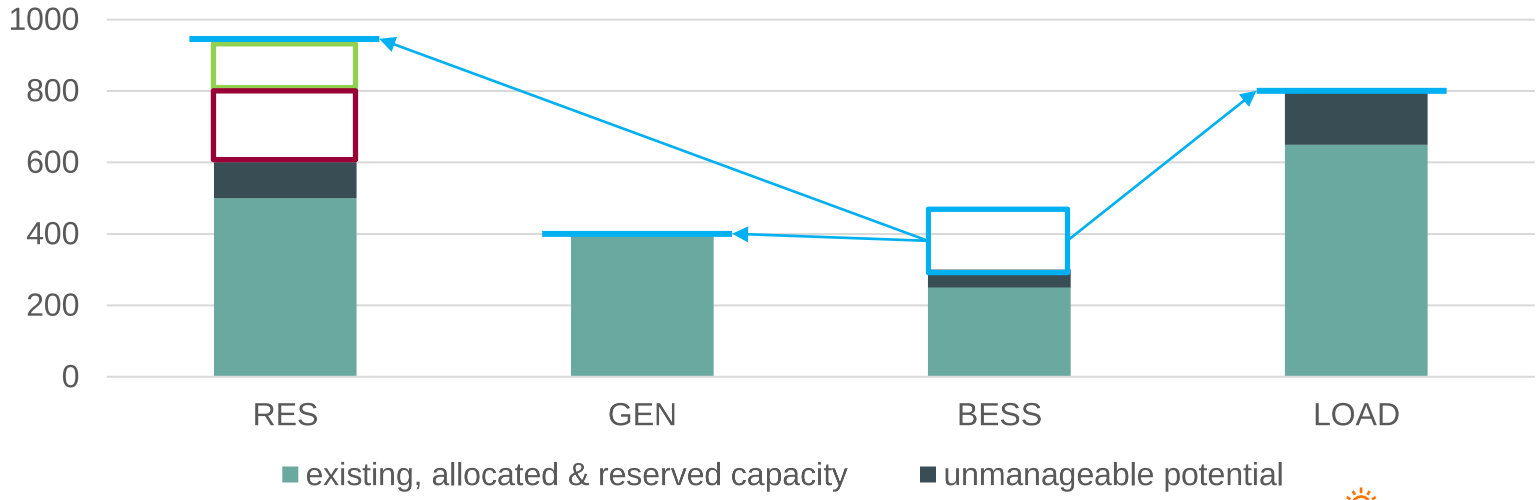
Context – Load & Generation

1. First come first served

- For a new connection request, **we only take unmanageable potential (e.g. residential growth) and existing, allocated and reserved capacity into consideration.**

GU 3 – reservation of 200 MVA BESS

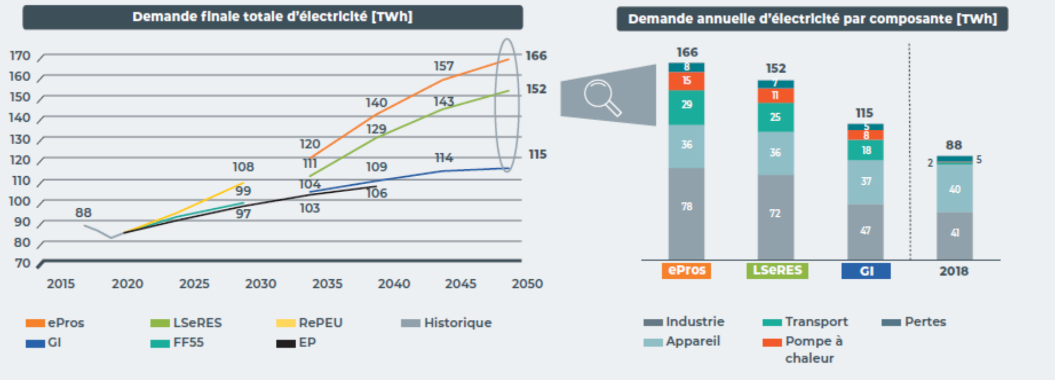
We only consider unmanageable potential and existing, allocated and reserved capacity in the flex calculation.



Federal Development Plan : scenario related to electrification of demand and renewables integration

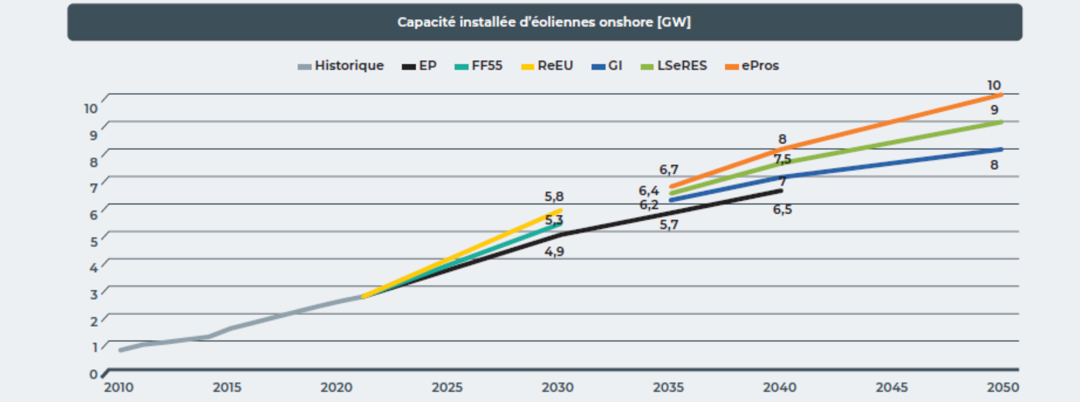
Electrification of demand (TWh)

FIGURE 2.15 : ÉVOLUTION DE LA DEMANDE ANNUELLE TOTALE D'ÉLECTRICITÉ EN BELGIQUE DANS LES SCÉNARIOS PDF EN TWH - Y COMPRIS LES PERTES SUR LE RÉSEAU, Y COMPRIS L'AUTOCONSOMMATION, HORS P2X. LES VALEURS SE RAPPORTENT À LA DEMANDE ÉLECTRIQUE NORMALISÉE SUR LA BASE DU CLIMAT HISTORIQUE



Wind (onshore and offshore) – installed capacity (GW)

FIGURE 2.19 : CAPACITÉ INSTALLÉE DE PRODUCTION D'ÉLECTRICITÉ ÉOLIENNE TERRESTRE (ONSHORE WIND) EN BELGIQUE POUR LES DIFFÉRENTS SCÉNARIOS [GW]



Photovoltaic – installed capacity (GW)

FIGURE 2.18 : CAPACITÉ DE PRODUCTION PHOTOVOLTAÏQUE INSTALLÉE EN BELGIQUE POUR LES DIFFÉRENTS SCÉNARIOS [GW]

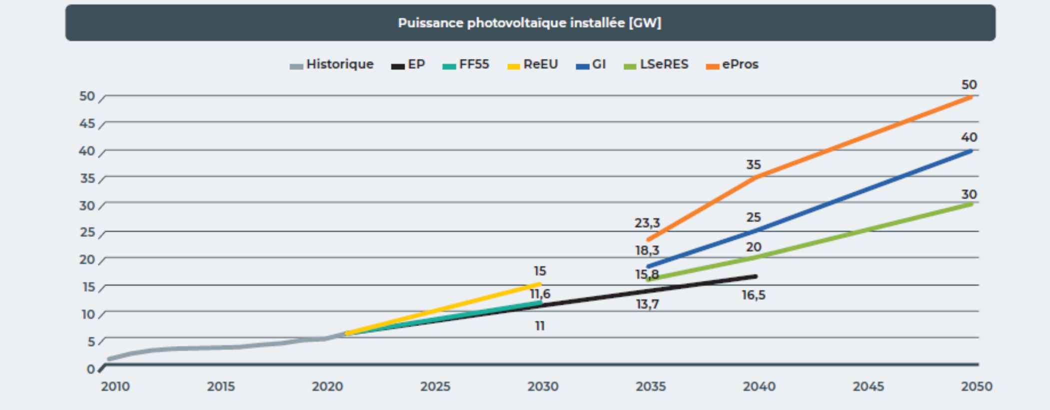
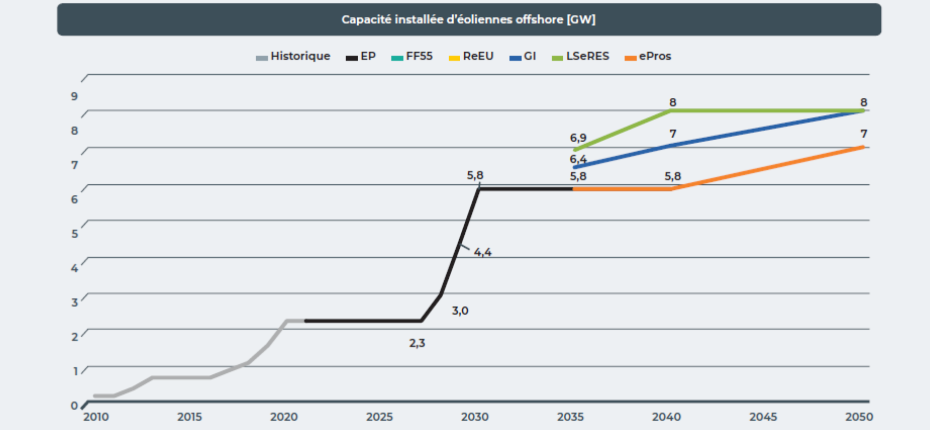


FIGURE 2.20 : CAPACITÉ INSTALLÉE DE PRODUCTION D'ÉLECTRICITÉ ÉOLIENNE OFFSHORE (OFFSHORE WIND) EN BELGIQUE POUR LES DIFFÉRENTS SCÉNARIOS [GW]



Context – Load & Generation

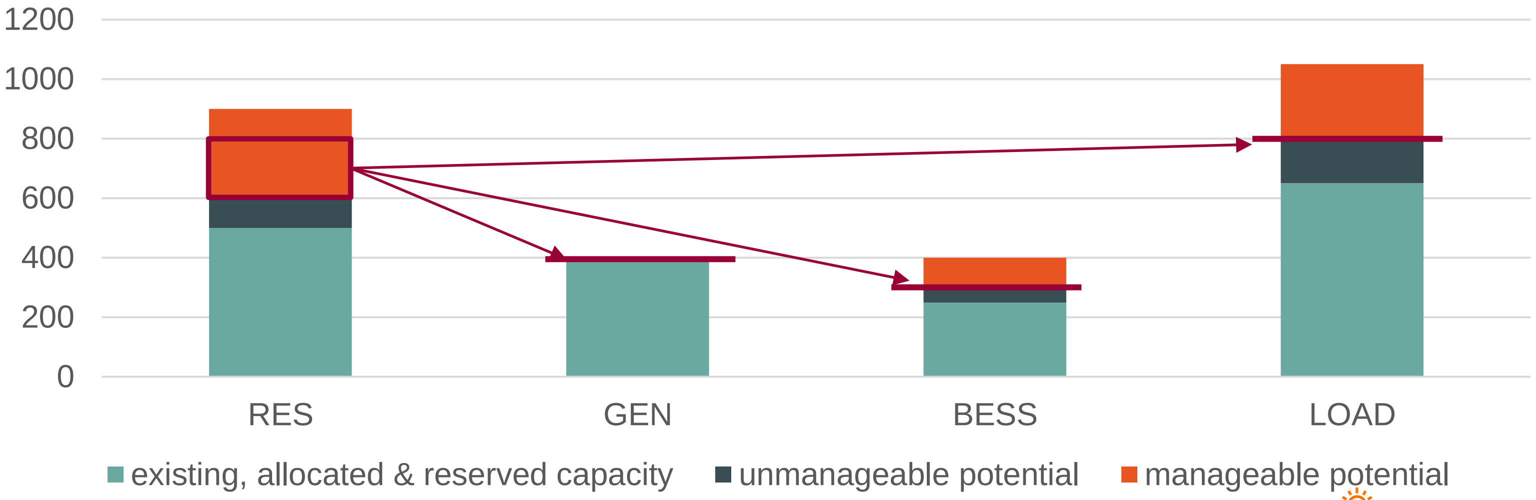
2. Limit to potential

- For a new connection request, **we only take unmanageable potential (e.g. residential growth) and existing, allocated and reserved capacity into consideration BUT if the demand exceeds the foreseen potential we temporarily give a flexible access without volume limitation**

GU 1 – reservation of 200 MVA RES

200 MVA falls inside the potential

We don't consider manageable potential of other types in the flex calculation. Only unmanageable potential is taken into account.



Context – Load & Generation

2. Limit to potential

- For a new connection request, **we only take unmanageable potential (e.g. residential growth) and existing, allocated and reserved capacity into consideration BUT if the demand exceeds the foreseen potential we temporarily give a flexible access without volume limitation.**

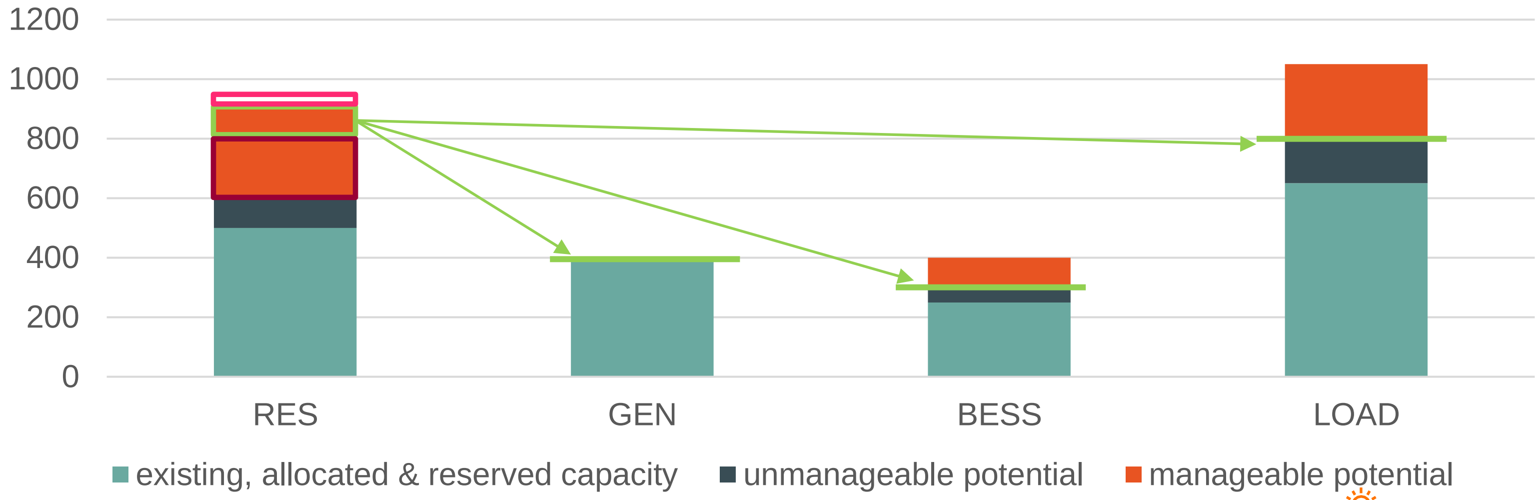
GU 2 – reservation of 150 MVA RES

100 MVA in the potential

For the first 100 MVA, we don't consider manageable potential of other types in the flex calculation. Only existing, allocations and reservations as well as unmanageable potential are taken into account.

50 MVA outside potential

For the 50 MVA **outside foreseen potential** we only accept **flexible access without volume limitation**



Context – Load & Generation

2. Limit to potential

- For a new connection request, **we only take unmanageable potential (e.g. residential growth) and existing, allocated and reserved capacity into consideration BUT if the demand exceeds the foreseen potential we temporarily give a flexible access without volume limitation.**

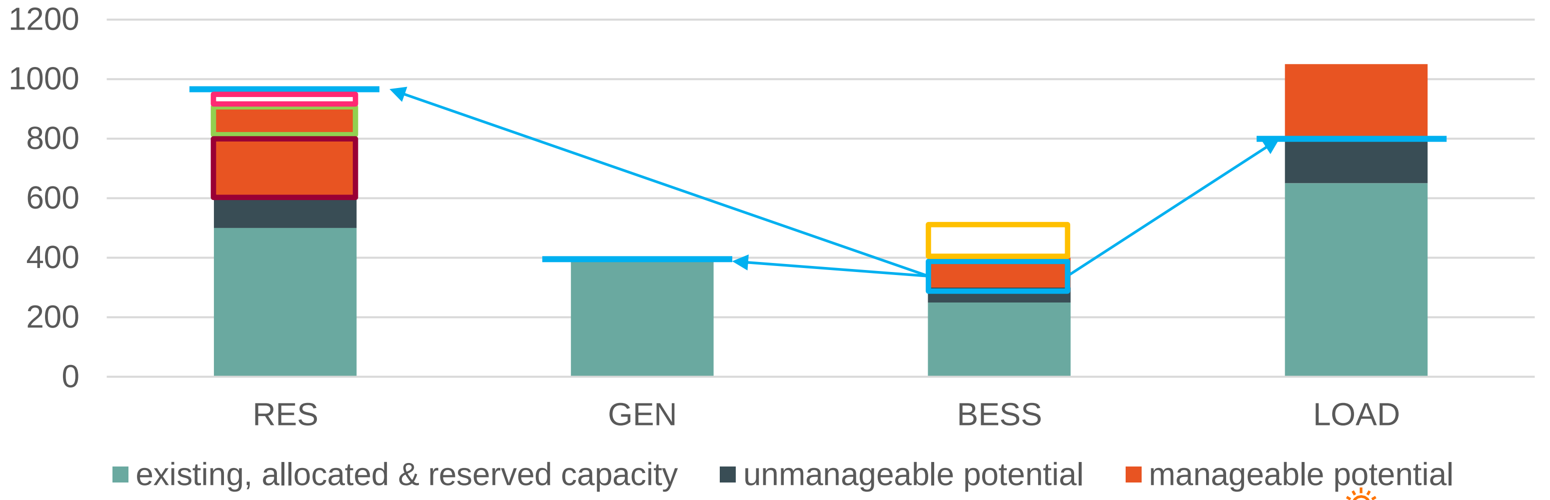
GU 3 – reservation of 200 MVA BESS

100 MVA in the potential

For the first 100 MVA, we don't consider manageable potential of other types in the flex calculation. Reservations - considering their flexibility level - and unmanageable potential is taken into account.

100 MVA outside potential

For the 100 MVA **outside foreseen potential** we only accept **flexible access without volume limitation**



Context – Load & Generation

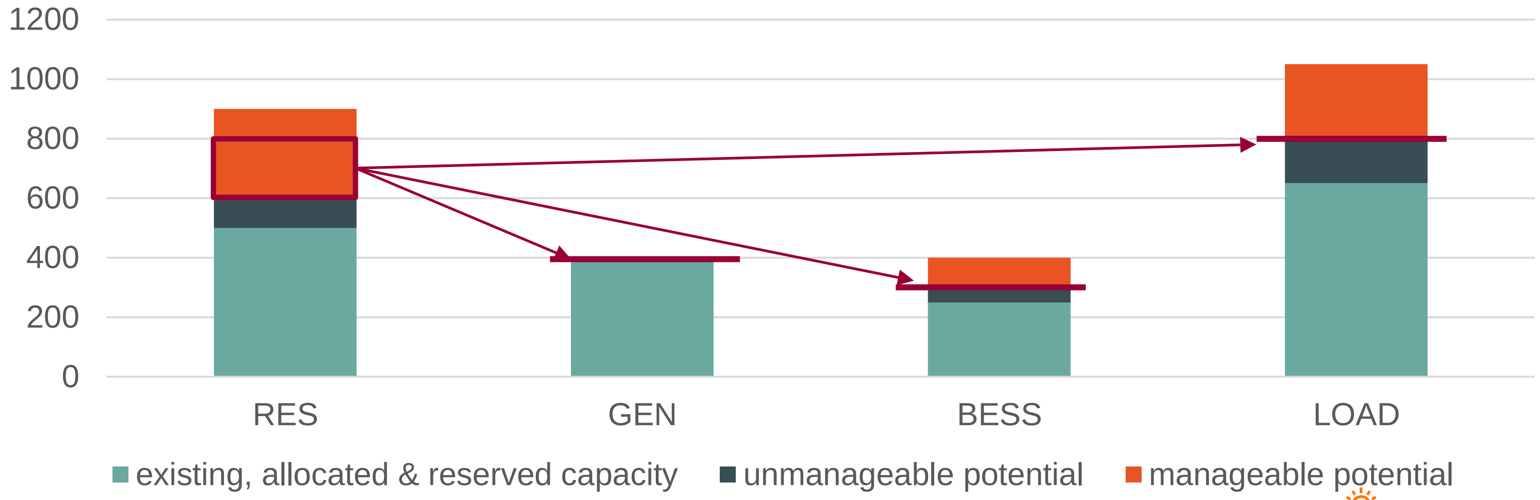
3. Scenario based

- For a new connection request, **we fill the leftover foreseen potential of the concerned GU type in priority** over the potentials of other types. **If this foreseen potential is already fully used, we take the foreseen potentials of all other GU types into account** in the flexibility calculations if they are impacting the congestion.

GU 1 – reservation of 200 MVA RES

200 MVA in the potential

We don't consider manageable potential of other types in the flex calculation. Only unmanageable potential is taken into account.



Context – Load & Generation

3. Scenario based

- For a new connection request, **we fill the leftover foreseen potential of the concerned GU type in priority** over the potentials of other types. **If this foreseen potential is already fully used, we take the foreseen potentials of all other GU types into account** in the flexibility calculations if they are impacting the congestion.

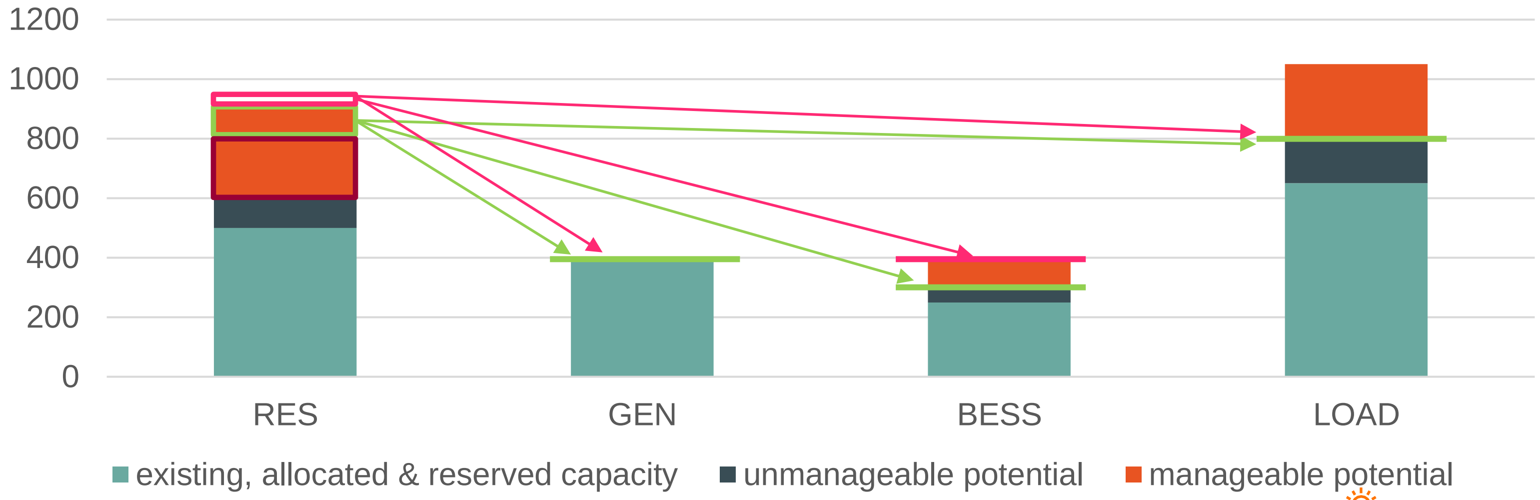
GU 2 – reservation of 150 MVA RES

100 MVA in the potential

For the first 100 MVA, we don't consider manageable potential of other types in the flex calculation. Only unmanageable potential is taken into account.

50 MVA outside potential

For the 50 MVA outside foreseen potential we consider all foreseen potentials impacting the congestion in the same direction.



Context – Load & Generation

3. Scenario based - alternative

- For a new connection request, **we fill the leftover foreseen potential of the concerned GU type in priority** over the potentials of other types. **If this foreseen potential is already fully used, we take the foreseen potentials of all other GU types into account** in the flexibility calculations – **even those with a positive impact on the identified congestions**

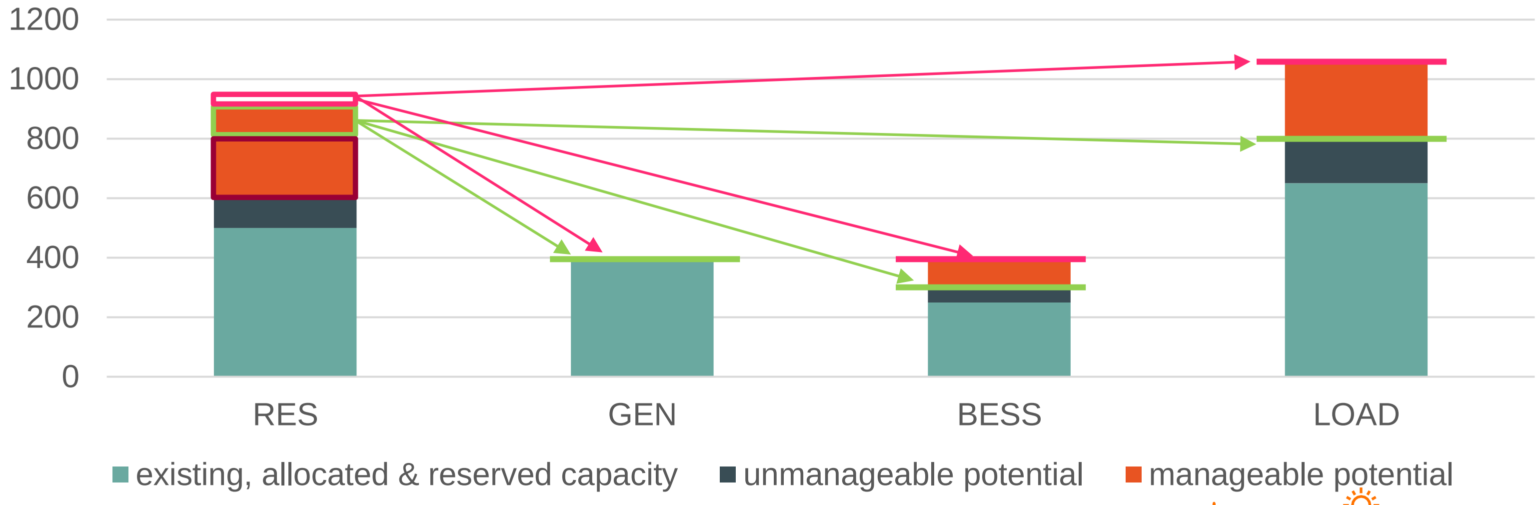
GU 2 – reservation of 150MVA RES

100 MVA in the potential

For the first 100 MVA, we don't consider manageable potential of other types in the flex calculation. Only unmanageable potential is taken into account.

50 MVA outside potential

For the 50 MVA outside foreseen potential we consider all foreseen potentials of other types



Context – Load & Generation

3. Scenario based

- For a new connection request, **we fill the leftover foreseen potential of the concerned GU type in priority** over the potentials of other types. **If this foreseen potential is already fully used, we take the foreseen potentials of all other GU types into account** in the flexibility calculations if they are impacting the congestion.

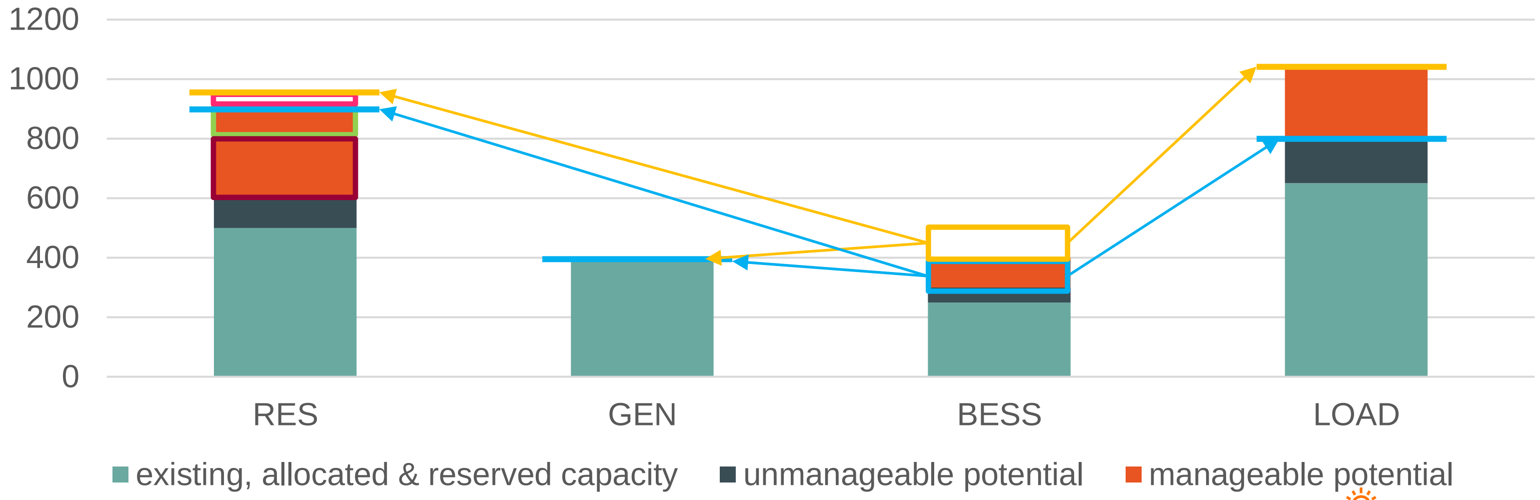
GU 3 – reservation of 200 MVA BESS

100 MVA in the potential

For the first 100 MVA, we don't consider manageable potential of other types in the flex calculation. Only unmanageable potential is taken into account. We don't consider capacity above potential as the potential was taken into account by GU 2.

100 MVA outside potential

For the 100 MVA outside potential we consider all existing, allocated and reserved capacities and all the foreseen potentials impacting the congestion in the same direction.



Proposed approaches : summary

- **First come first served** : For a new connection request, we only take **unmanageable potential and existing, allocated and reserved capacities into consideration** when performing the connection studies and calculating the flex volumes**.** While this approach is the most straightforward, it might create the adverse effect of blocking the foreseen potential of certain (more constrained) GU types by requests of other types arriving earlier.

- **Limit to potential** : For a new connection request, **we only take unmanageable potential and existing, allocated and reserved capacity into consideration BUT if the demand exceeds the foreseen potential we give a flexible access without volume limitation.** While still reasonably straightforward, this approach mitigates the blocking of foreseen potential of certain GU types, however it creates an uncertainty on flex volumes for requests outside of the foreseen potential.

- **Scenario based** : For a new connection request, **we fill the leftover foreseen potential of the concerned GU type in priority** over the potentials of other types. **If this foreseen potential is already fully used, we take the foreseen potentials of all other GU types into account** in the flexibility calculations [all or only if they are impacting the congestion]. This approach is more complex to execute, however it mitigates the blocking of foreseen potential of certain GU types, while still providing a cap on the flex volumes for requests outside of the foreseen potential.

No bidding vote !

The goal is to **grasp a first feedback**

(one vote / company)

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What is your preferred approach ?

ⓘ Start presenting to display the poll results on this slide.

Context – Profiles

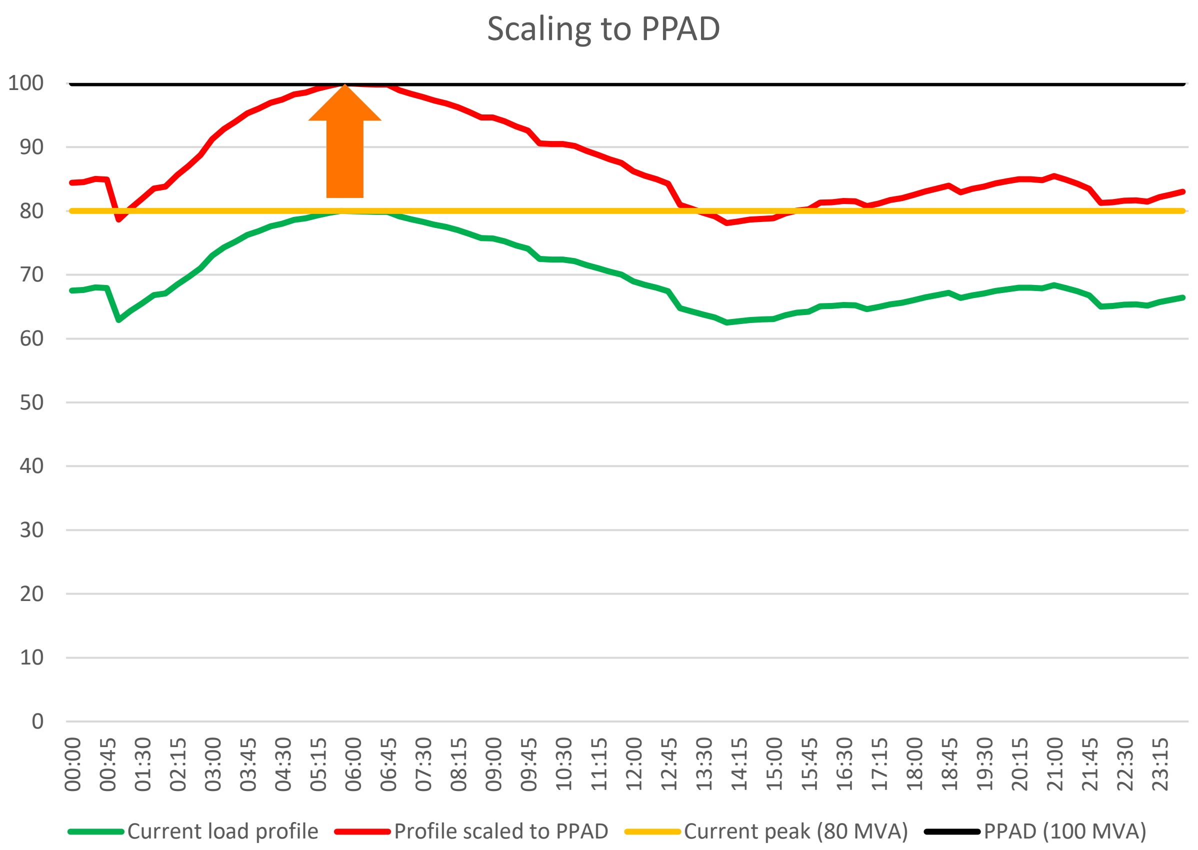
When a connection request is evaluated, which generation/consumption profiles are used when performing the grid simulations, both for the concerned new connection request, as well as for all other generation/consumption in the system?

	Profile of existing + allocated/reserved + foreseen potential GU	Profile of new GU (*)
RES	RES profile	RES profile
Load	**Existing:** profile scaled to PPAD **reserved/allocated:** flat at PPAD.	Flat profile at the PPAD
GEN	Market profile	Market profile
Batteries	Market profile in the same direction on the congestion, 0 if the market goes in the opposite direction.	Flat profile + and – at nominal capacity

(*) The profiles used to define the flexible volume are consistent with the measurement of the use of the flexibility – see next workshop

Existing load profile scaled to PPAD : example

	Profile of existing + allocated/reserved + foreseen potential GU	Profile of new GU (*)
RES	RES profile	RES profile
Load	**Existing:** profile scaled to PPAD **reserved/allocated:** flat at PPAD.	Flat profile at the PPAD
GEN	Market profile	Market profile
Batteries	Market profile in the same direction on the congestion, 0 if the market goes in the opposite direction.	Flat profile + and –



- Current peak = 80 MVA
- PPAD = 100 MVA

→ **Homothetic scaling** of existing load profile to reach the 100 MVA peak (PPAD)

2

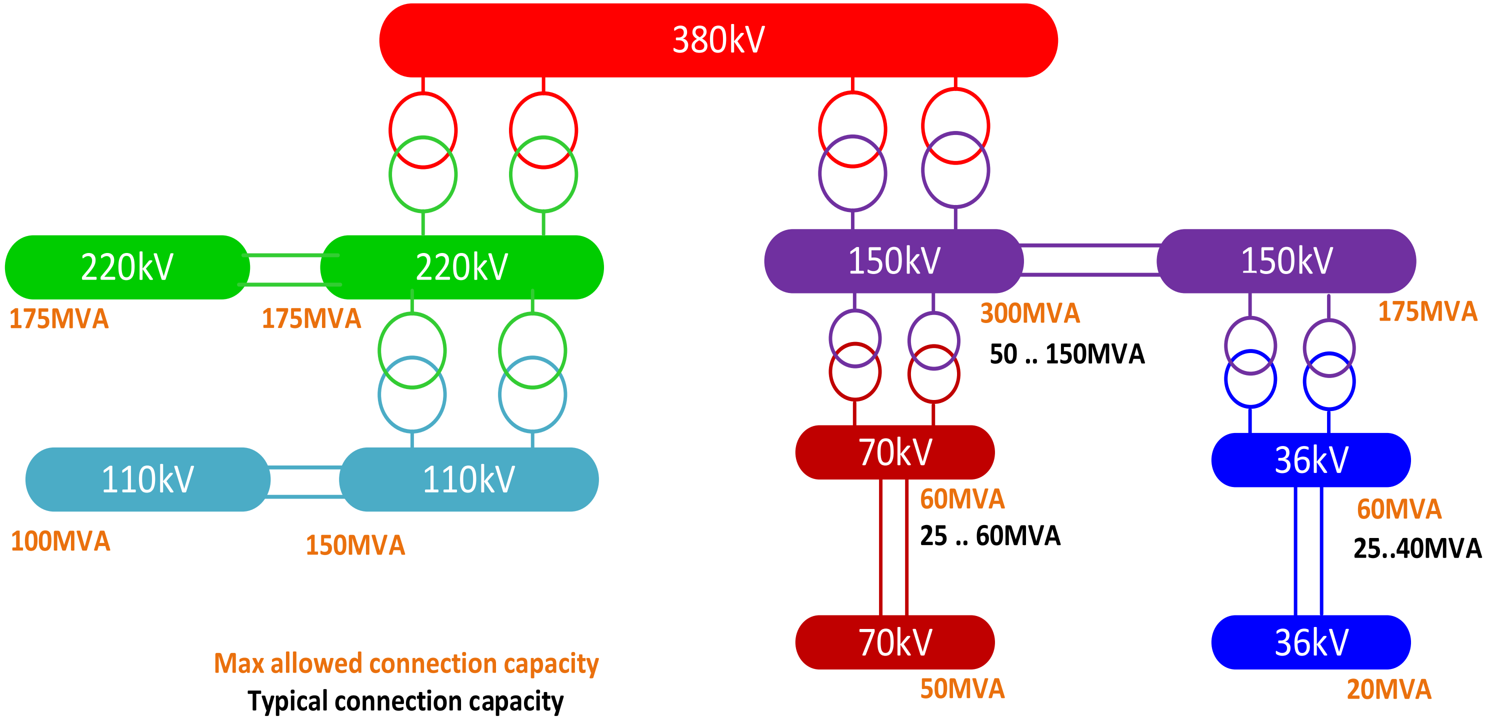
Connection proposals

General principes which cannot be fully exhaustive, exceptions can occur in specific cases

Studied connection options

- Studied connection options mainly determined by:
  - Location of the GU site
  - Requested connection capacity

- Considered voltage levels nearby GU site depend on:
  - Existing voltage levels
  - Planned grid developments in zone:
    - Removal of a voltage level in zone (e.g. 70kV) → generally no connection options on this voltage level are proposed (1)
    - Creation of new voltage level in zone (e.g. 150kV) → connection option proposed to GU if evolution is within relevant time horizon or anticipation is possible
- Based on typical ratings of assets a requested connection capacity can be designated to a specific voltage level:
  - Capacity of connection cables
  - Capacity of transmission grid elements (part Z) (2)



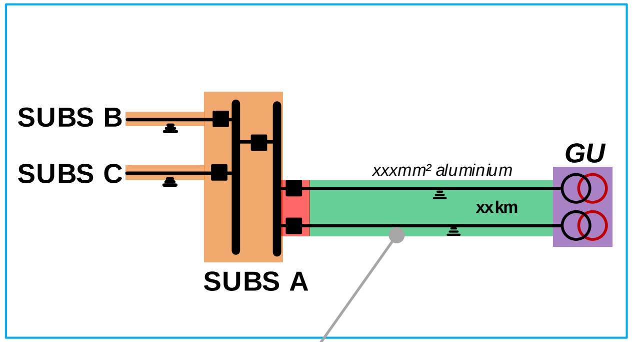
(1) GU will need to switch to other voltage level later on = big impact: multi voltage GU assets + additional investments in connection links + complex to secure contractually
(2) Only a fraction of the capacity can be dedicated to one GU, e.g. 30% to 50%

Connection configurations (not exhaustive)

Part A
Part B
Part B transformed to Part Z in future
Part Z
Part C

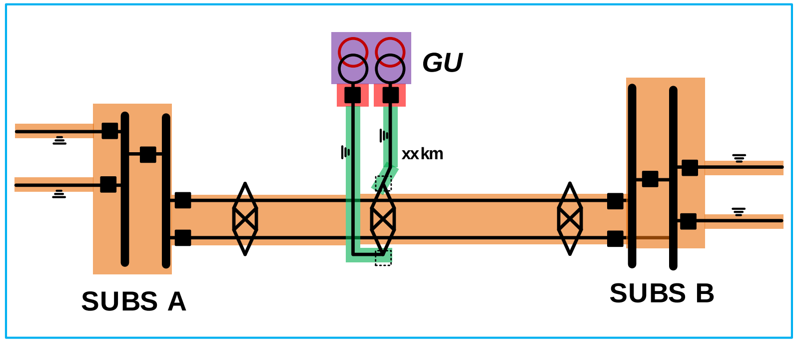
Non-standard solution

Standard connection



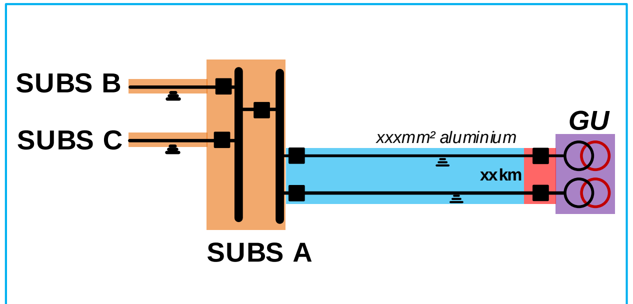
With or without redundancy
(1 or 2 connections)

Tapped connection

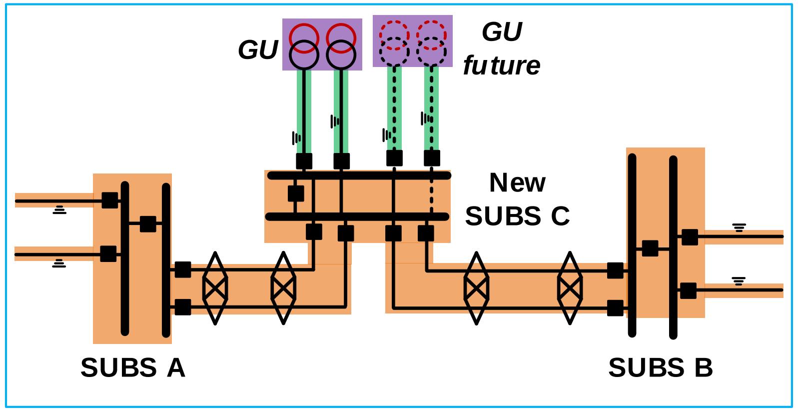


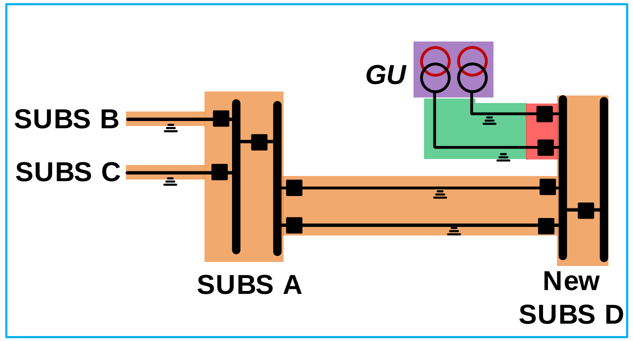
Non-standard solution

Connection anticipating planned grid development



e.g. if creation of 150kV subs cannot be accelerated





Connection to a new Elia substation

In the context of a long term study, a new Elia substation can be considered to connect several GU in zone, of for an evolution towards other voltage level (e.g. 70kV → 150kV)

If the existing substation cannot be extended anymore → we could create connection bays via new substation

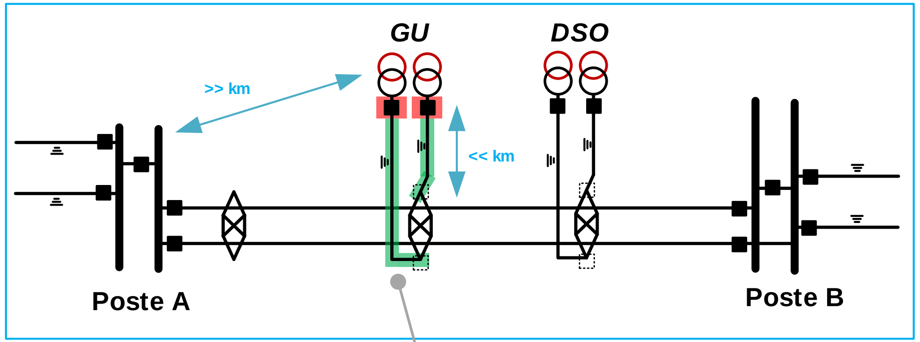
Next to a capacity reservation, an EDS also results in a reservation of connection bays in a substation

Tapped connection

- In general not proposed as it has a high impact on the operation of the transmission grid:
  - Connection of GU not available in case of planned or unplanned outage of the transmission link (especially for long overhead lines)
  - Reduction of available capacity on transmission link
  - Fault probability increases
  - …

- Option can be acceptable if:
  - Standard connection on Elia substation requires a very long connection cable and/or has a high complexity to realize
  - Elia plans to create a new substation nearby the tapping point on which the GU will be connected later on
  - …

- Excluded if:
  - Connection 380kV
  - Already too many tapping points on link (including Elia transformers)(1)
  - A standard connection on an Elia substation is feasible (acceptable distance, cable installation works/routing are feasible, …)
  - The voltage level disappears (e.g. 70kV) – general rule
  - The connection capacity is high (e.g. 60 MVA) and it does not concern a temporary solution
  - …

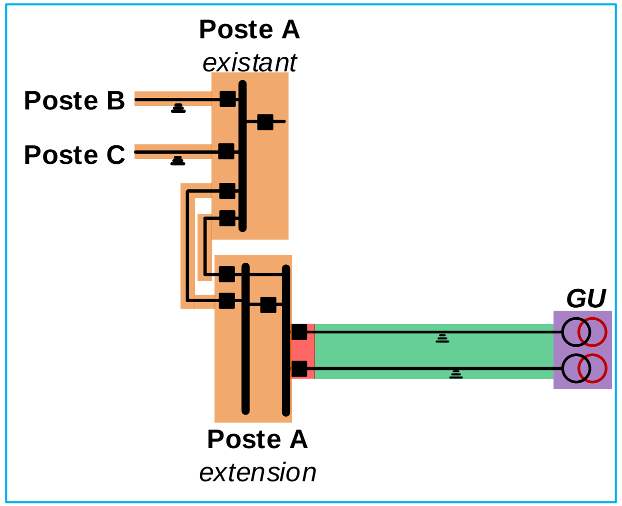


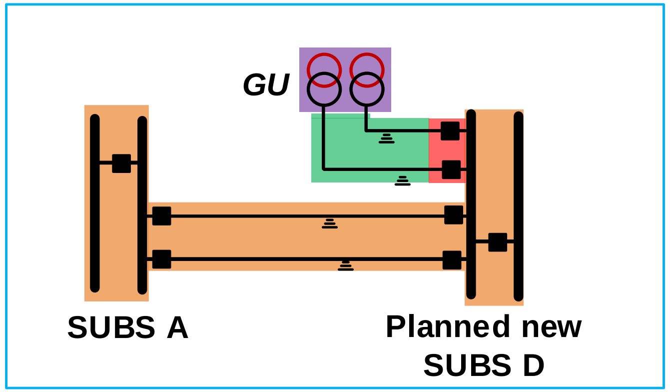
In case of only one connection this becomes an interruptible connection

(1) 2 in case of an overhead line, 1 in case of an underground cable

Adaptations to part Z linked to GU connection

- Adaptations in the context of the GU study:
  - New substation infrastructure in order to extend an existing substation with connection bays for GU (e.g. extend AIS with GIS)
  - Accelerate a planned grid development, e.g. to increase transmission capacity or create a new substation to connect grid user
- Adaptations in the context of a LT study:
  - Study solutions for new identified congestions
  - Create new substation to connect new GU's in the region





3

Access

Analyzed situations

Analyzed situations

- For each phase identified, different realistic situations are considered. They result from the synchronized **combination of generation profiles, consumption profiles and market operation**.
- The situations considered are chosen so as to identify the main constraints on the power system in the presence of the applicant's new installation(s)/unit(s), for each of the proposed connection solutions.
- Typically, **100 situations per year** will be analyzed in order to represent the different market situations that may have different influences on system constraints and flexible access volumes and conditions. In the latter case, **an average year** is used in terms of temperature profile and renewable energy production. The effective annual ‘flexibilized’ volume may therefore vary around the average value determined in the study.

Limit of Grid Elements

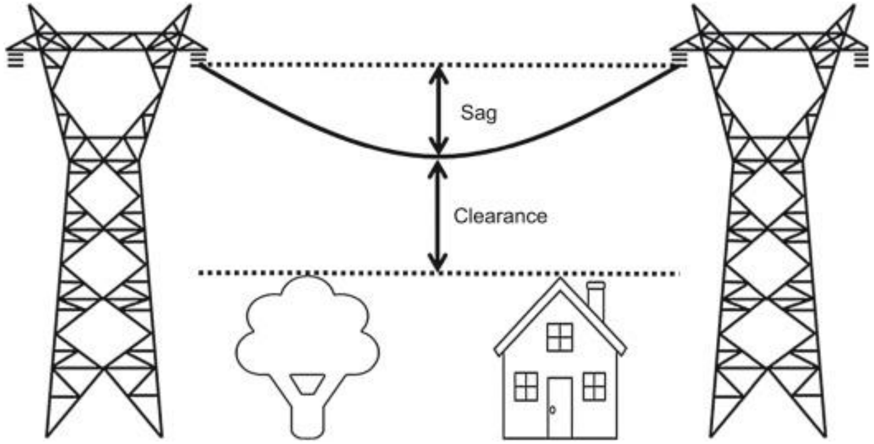
Permanent and temporary limits of Grid Elements

- **Permanent** admissible **limits** : **loading** (in A or MVA) that can be **accepted by a Grid Element** for an **unlimited duration without any risk for the material**
  - For some **types of Grid Elements** (e.g. overhead lines), the **permanent limits depend on the temperature** (we therefore have **seasonal limits**)

- **Temporary** admissible **limit : loading** (in A or MVA) that can be **accepted by a Grid Element** for a **certain limited duration** (e.g. **115 %** of **permanent limit** during **15 min**). This loading depends on the **initial operating conditions** of the considered Grid Elements (e.g. linked to thermal inertia)
  - The temporary limits also depend on the temperature
  - Some **types of Grid Elements** don't have temporary admissible limits

Dynamic Line Rating

- The **capacity limits** of our assets are linked with their **heating**
- For overhead lines, the heating of the conductors will increase the **sag**, on which **legal limitations** apply.
- **Weather conditions** (sun, wind, temperature) have a huge impact on the sag.
- With **Dynamic Line Rating**, Elia can secure the network based on effective sag of the lines.
- Not possible on HTLS lines.



- In grid planning, **we only take DLR into account if there is a direct correlation between the congestions and the wind conditions.**

Grid Studies : analyzed situation and criteria

Grid Connection Studies – analyzed situations

The following **grid situations** are **analyzed within the Grid Connection studies :**

- **N** state : **all the grid elements** are **available**
  - For **each planned step of grid evolution**, a **new N state is studied**

- **N-1** state : **with respect to N** state, **one grid element** **or** **one Grid User** is **disconnected** (in a **planned** **or** **unplanned way**)

- **N-1-1** state: **with respect to N** state, **one grid element** is **preventively** taken **out of service** (for *maintenance*, *work* or *repair*) and then an **unplanned outage** takes place
  - This state must be "respected" during sufficient time periods so that the Grid Operator can plan the needed work, outages …

Operational limits for the analyzed states

The following **technical planning criteria** are respected for the different analyzed states if :

- The **voltage** on each node remains between the operational limits
- The **short-circuit currents** don't exceed the maximal admissible values
- The **dynamic** and **transitory limits** of the production units are ensured
- The **power quality** requirements are satisfied
- The **current** in the **grid elements don't exceed** the **maximal admissible values**

Which limitations need to be followed?

Which limitations need to be followed?

General philosophy :

- **Preventive actions** : in **N state** – to **avoid unacceptable situations**
  - **All Grid Elements** are **below their permanent limits**
  - **All Grid Elements** are **below their temporary limits** for **each simulated N-1 situation**
    - **Preventive action** is needed if the **temporary limits** of **Grid Elements** are **exceeded in N-1**
- **Curative actions in N-1 : actions** taken when **a problematic situation appears** in order to **get back to safe state**
  - All **Grid Elements** should be **put back below their permanent limits**

* Gflex : modulation signal sent in RT

Some definitions

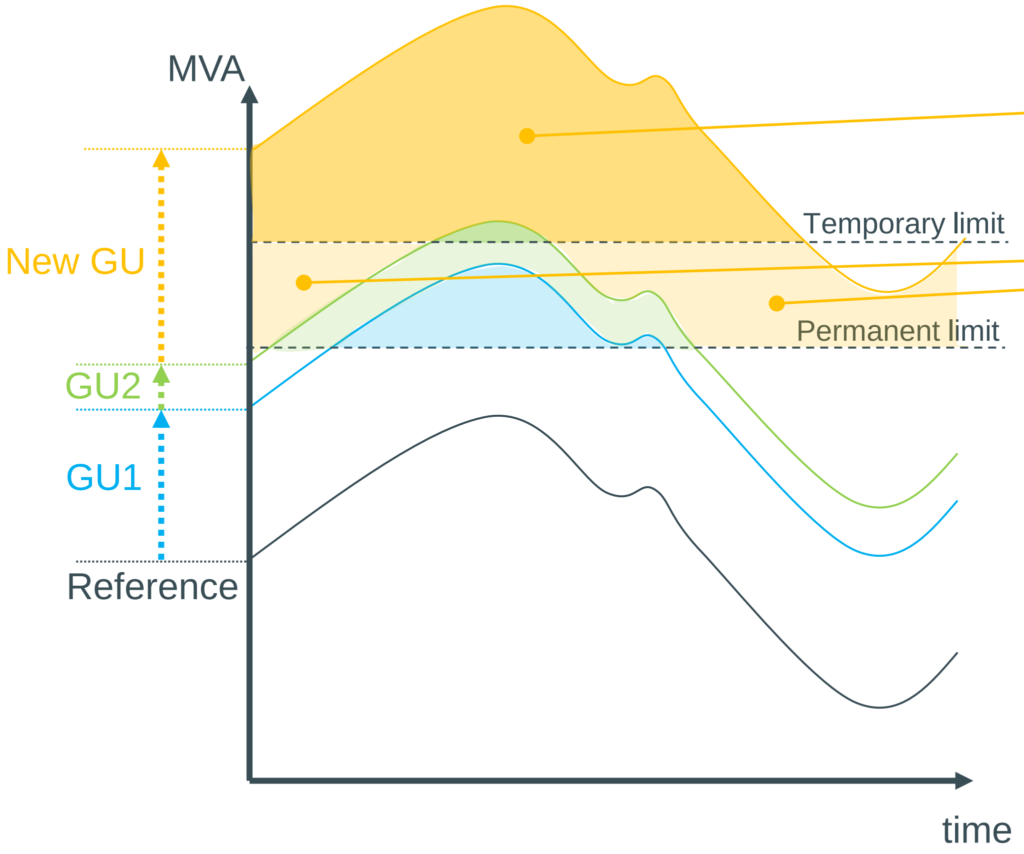
- **Critical Network Element** (**CNE**)* : **network element** that **limits the power flows** under certain operational conditions
  - **Congested Network Element** where the **congestion** can be **caused** or **aggravated** by the **Grid User** requiring a connection

- **Critical Network Element and Contingency** (**CNEC**)* : CNE limiting the power flows **associated to a contingency**
  - **CNE** + mentioning of the **contingency (N-1) leading to a congestion** on the CNE

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

* Definitions from ENTSO-E

How to determine flex volumes



Preventive volumes are to be considered directly

Curative volumes are to be multiplied by the probability of the curative situation

Actions for solving congestions

Actions for solving congestions

To reduce flows below the **temporary/permanent limits** Elia performs following **actions** in the study:

1. **Topology actions**
   - Tapping transformers
   - Phase Shifting Transformer adjustment
   - Closing or opening breakers (redistributing flows)
2. **Gflex on the new GU**

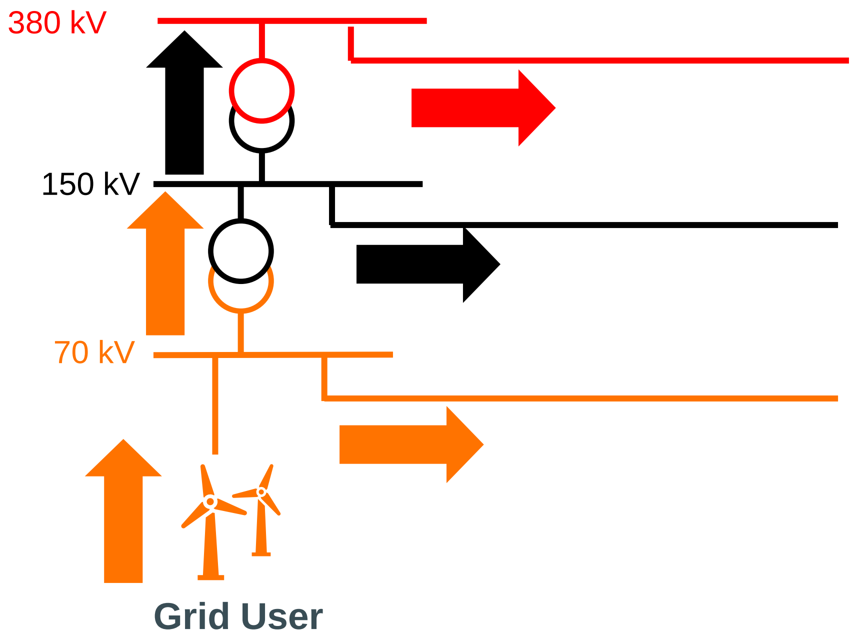
In grid planning and in the EDS/EOS, Actions 1 and 2 are simulated. Gflex is foreseen with a LIFO to determine the activation duration and volume.

Thresholds

Should we consider all congestions ? (1/3)
→ proposal to introduce a threshold for flex access

For **congestions** at an **equal** or **higher voltage level** than the **voltage level where the Grid User is connected**, the **CNE** will be **considered** only if the **power flows** on that CNE are **significantly impacted** (PTDF, Snom ratio) by the Grid User – unless no other means (topology & redispatching) are available to solve the congestion

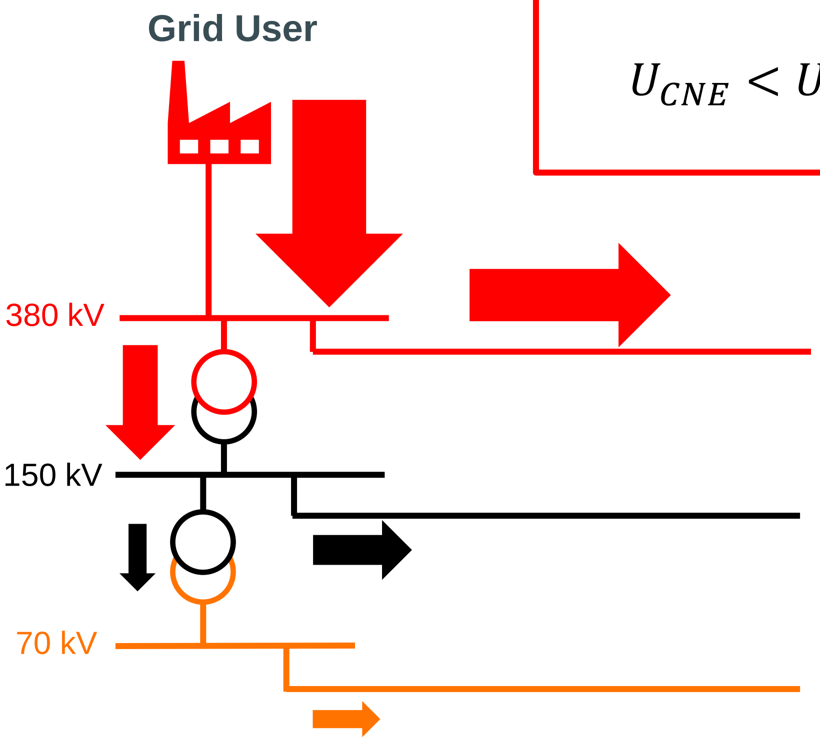
$$U_{CNE} \geq U_{GU};\left(\left|PTDF_{GU,CNECGU}\right| \times \frac{S_{nom_{GU}}}{S_{nom_{CNEC_{GU}}}}\right) > x\ \%$$



Only consider the CNE if the Grid User significantly impacts the power flows on 70 /150 / 380 kV lines/transformers !

Should we consider all congestions ? (2/3)
→ proposal to introduce a threshold for flex access

For **congestions** at a **strictly lower voltage level** than the **voltage level where the Grid User is connected**, the **CNE** will be **considered** only if the **PTDF (Power Transfer Distribution Factor)** of the Grid User on those CNE is above a predefined value – unless no other means (topology & redispatching) are available to solve the congestion



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

Only consider the CNE in 150 and 70 kV grid elements if the PTDF of the Grid User is above a predefined value

Should we consider all congestions ? (3/3)
→ proposal to introduce a threshold for flex access

Only foresee a flexible access when the **effective probability of occurrence** of the congestion is above a predefined value - unless no other means (topology & redispatching) are available to solve the congestion

$$\%\ time > z\ \%$$

Where % time represents the effective probability of occurrence taking into account GU profile and probability of failure.

Other thresholds to consider?

→ Put a **maximal threshold** (volume/time) on **admissible flexibility** and refuse connection at the concerned connection point when the expected flexibility is **above this threshold** ?

Rationale : no societal interest to connect the Grid User with an excessive amount of flexibility at a given connection point

slido

Should we put a maximal threshold on admissible flexibility ?

ⓘ Start presenting to display the poll results on this slide.

slido

What should be this threshold ?

ⓘ Start presenting to display the poll results on this slide.

Part III : Reporting of Flexibility Activations

Reporting of Flexibility Activations

1. **Context**
    - Objective of the reporting
    - Methodology to calculate the activated flexibility
    - Considered baselining methodologies
2. **Reporting proposal for the flexibility activation**
    - Solar/Wind
    - BESS
    - Conventional Units

Context - Objective of the reporting

The objective of the reporting is to create:

- A detailed view on the activated flexibility for each GU at a specific moment in time.
- Global insights on the activated flexibility and its evolution over time.
- An official report made available to the regulators and the GU.

Context - Methodology to calculate the activated flexibility

The methodology to calculate the activated flexibility should be:

- In balance between:
    - Simplicity ~ Easy to understand, implement & calculate
    - Accuracy ~ The results should be representative, not necessarily exact
- Adequate for the specific production type
- Officialized and published

Context - Considered baselining methodologies

Baseline Methodology	Description	Resulting Baseline
AAP	The GU needs to send the Available Active Power in real time to Elia. Untough the unit is being activated for flexibility it is still able to estimate the AAP without flexibility activation. Note: This methodology is only available for specific technologies.	Approximate, dynamic during the entire activation period
Declarative Baseline	The GU needs to send in a baseline (schedule) prior to gate closure of the product of any other predefined deadline.	Exact, dynamic during the entire activation period
Control Group	This baseline methodology uses a reference control group which is not influenced by the flexibility activation. This control group is of the same type as the impacted GU.	Approximate, dynamic during the entire activation period
Historical Baseline	Historical baseline methodologies make use of historical measurement data taken quit recently (several days up till 1 month prior to the day of activation) to calculate the baseline for the period of activation.	Approximate, dynamic during the entire activation period
Meter Before Meter After (MBMA)	Take a single meter reading or the average of multiple meter readings before and after activation of the product and compare them to calculate the flexibility activation.	Approximate, constant during the entire activation period.

Reporting proposal for the flexibility activation of Solar & Wind

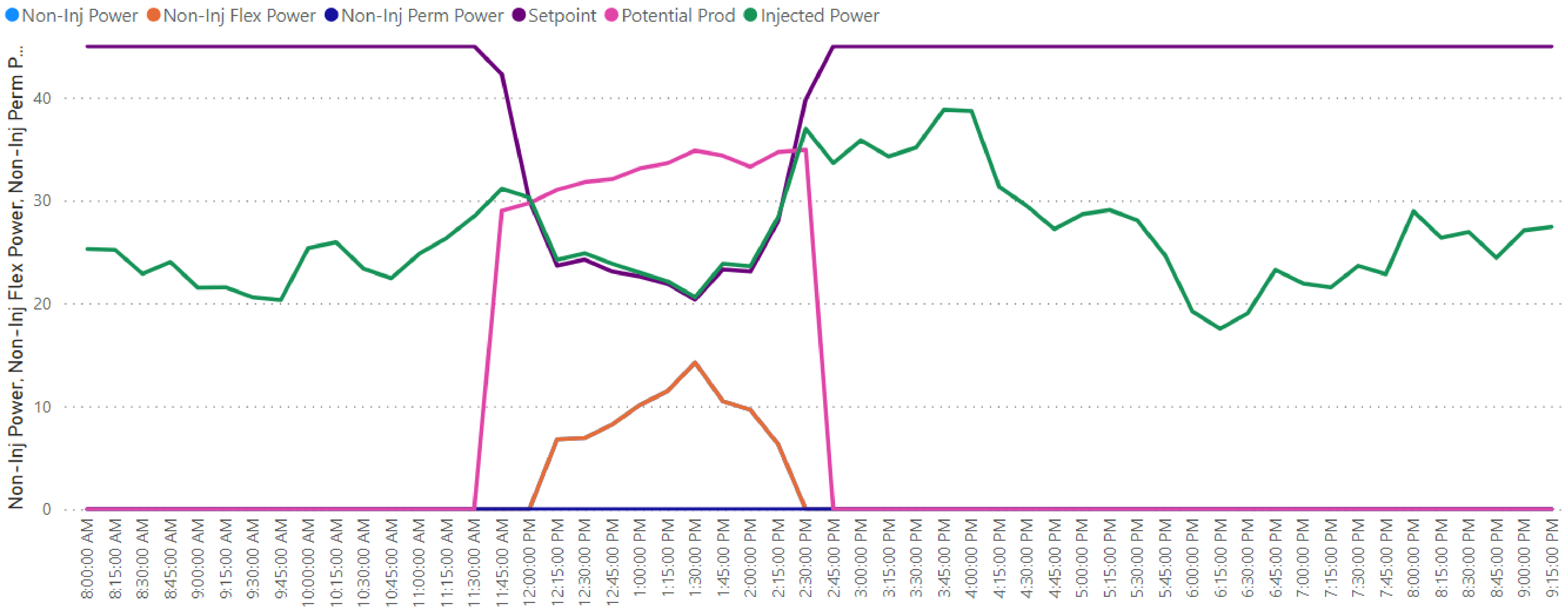
Proposal: “AAP” and “Control Group" are the baseline methodologies to be used for wind and solare parks.

Elia would like to propose 2 possible baselines for calculating the flexible activation of Wind & Solar:

- AAP: The Available active power baseline is used as potential production. By calculating the difference between this available active power and the setpoint send by Elia we obtain the volume of modulated energy.
- Control Group: The control group exists of one or multiple reference units (*) situated in the same area as the production unit. The power output of the control group will be scaled to calculate the potential production of the production unit. By calculating the difference between the potential production and the setpoint send by Elia we obtain the volume of modulated energy.

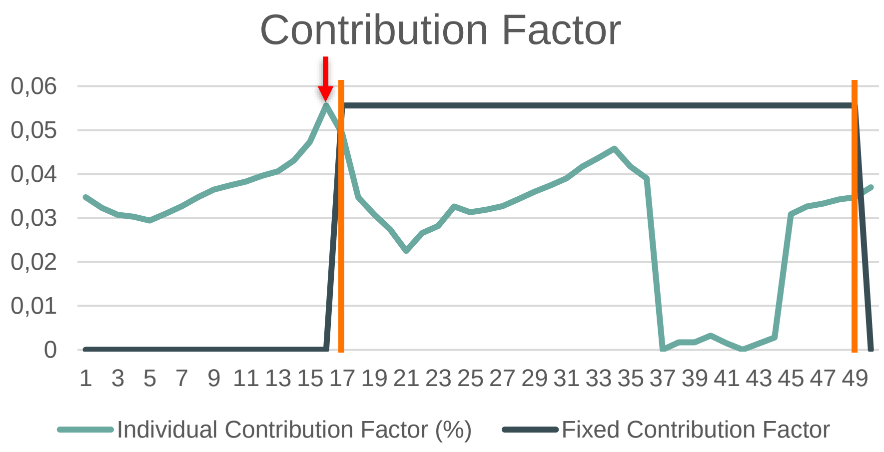
(*) Special case: In case no reference units are available we could also use the total production of a region as reference.

Reporting proposal for the flexibility activation of Solar & Wind



Reporting proposal for the flexibility activation of Solar & Wind

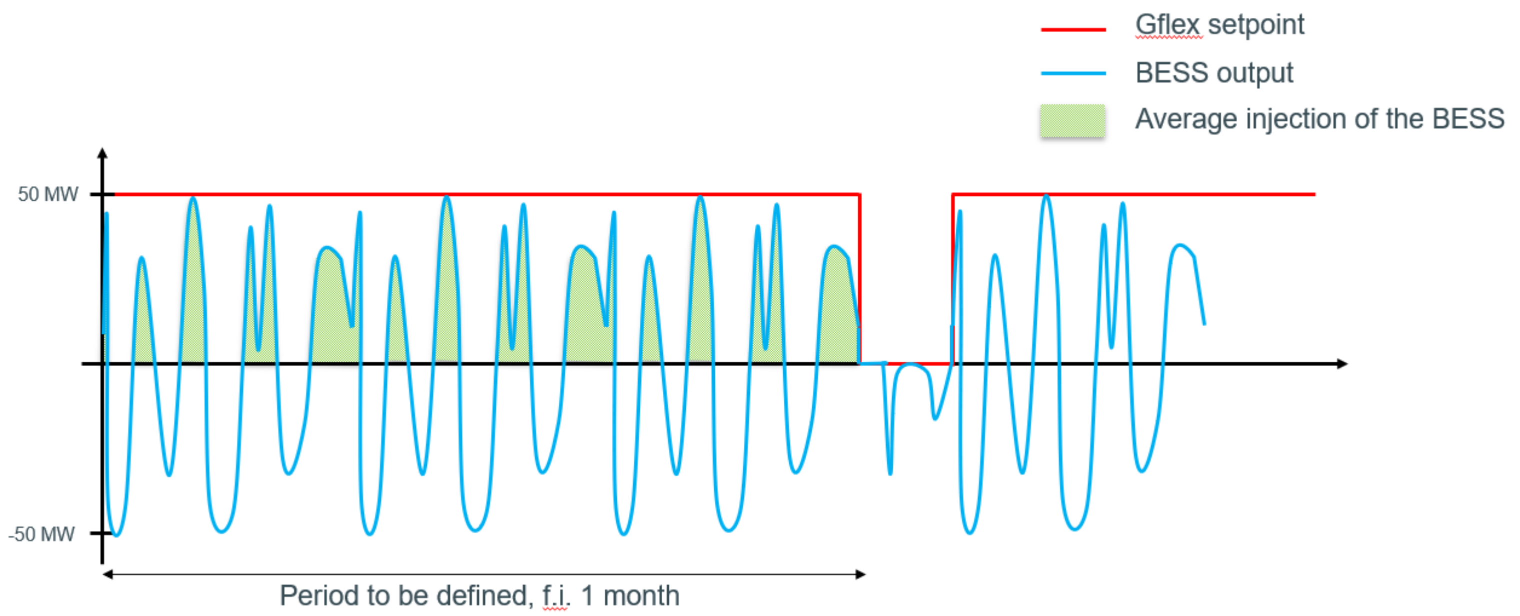
- (*) Control region:
  - As soon as a flexibility activation (~ FA) starts, the "Individual Contribution Factor" (~ICF) of the production unit to the total production of the region is being calculated based on the values of the previous qH.
  - The ICF is fixed during the entire activation period.
  - This ICF is used then to calculate the potential production of the production unit.
  - By calculating the difference between the potential production and the setpoint send by Elia we obtain the volume of modulated energy.



Reporting Proposal for the flexibility activation of BESS

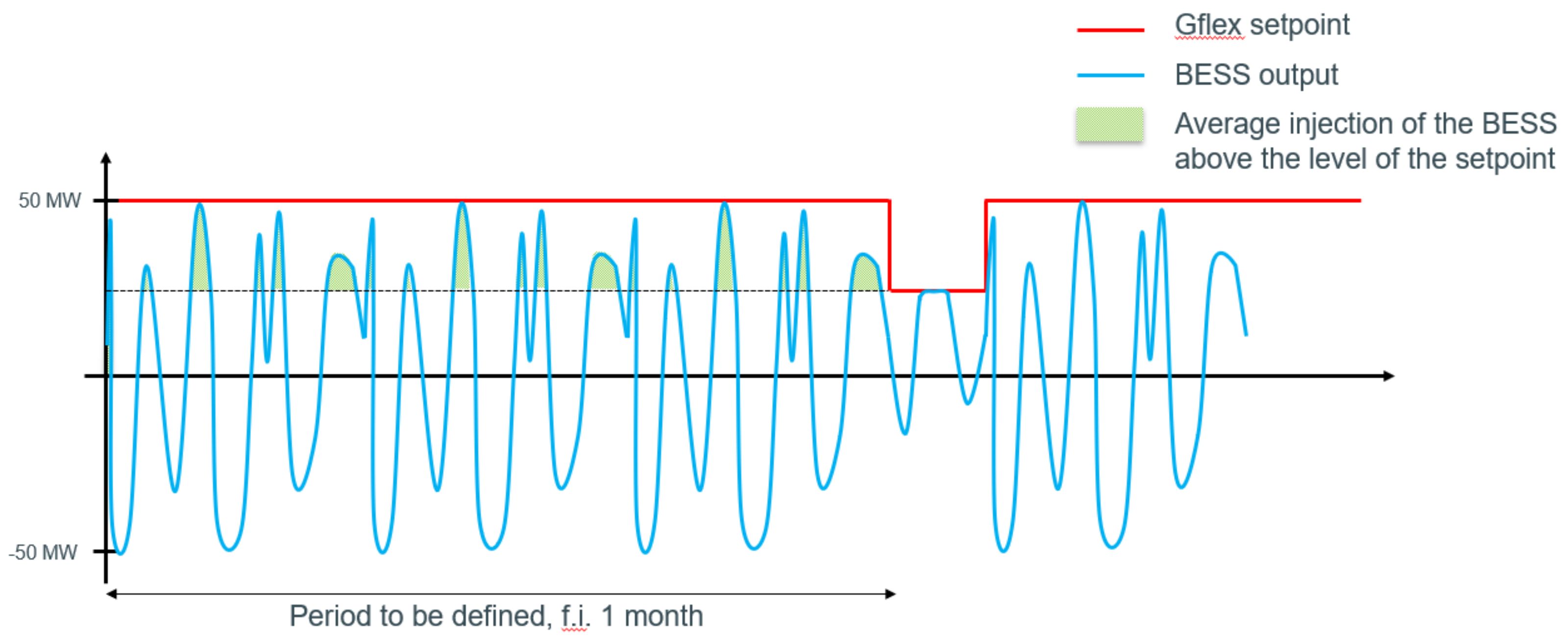
Proposal: BESS flexibility activation will be evaluated compared to an historical baseline.

- The injected energy over the last month is measured in % of time at full power, f.i. 30%
- This value is applied to the duration of the modulation to determine the energy not injected during the flexibility activation.



Reporting Proposal for the flexibility activation of BESS

- When the setpoint is not equal to 0MW, we measure the injected energy above the level of the setpoint over the last month, expressed in % of time at full power, f.i. 10%
- This value is applied to the duration of the modulation to determine the energy not injected during the flexibility activation.



Reporting Proposal for the flexibility activation of Conventional Units

Proposal: Conventional units can choose between the “MBMA” or “Historical”-baseline.

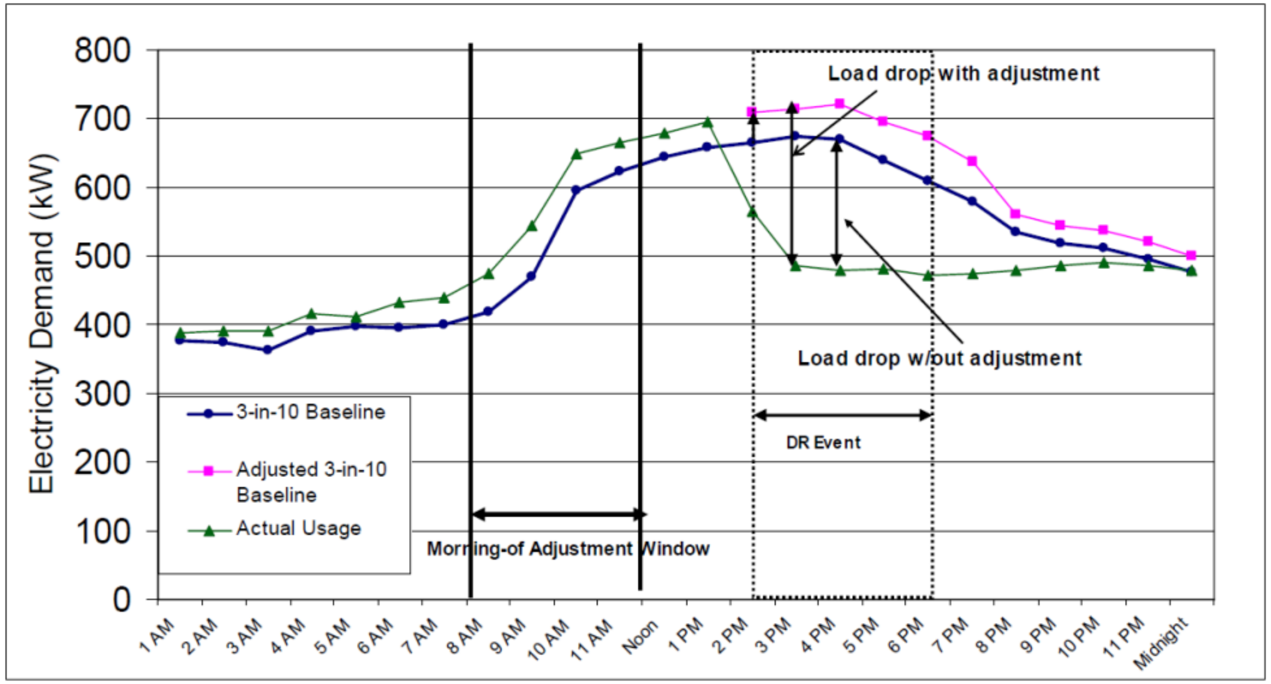
Elia would like to propose 2 possible baselines for calculating the flexible activation on conventional units:

- MBMA: Using the value of the last qH as a reference to calculate the total amount of energy not injected by the flexibility activation.
- Historical: High X of Y (~ 3 steps)
    1. Selecting the candidate days for calculating the baseline out of # previous days. Some basic rules to take into account:
        - Exclude days with flexibility activations prior to the event.
        - Excluding weekends and holidays when determining the baseline for an activation that takes place on a week day, and vice versa
        - Exclude additional days (extremes low/high) based on the offtake/injection characteristics.

Reporting Proposal for the flexibility activation of Conventional Units

- Historical: High X of Y (~ 3 steps)

  2. Calculating for each interval the mean based on the selected days including same day adjustment method



  3. Calculate the energy not injected by comparing this mean to the setpoint for every interval in the activation period.

Next steps

Next steps

- You can send your **questions** or **feedback** to guflex@elia.be by 02/04/2024
- **MoM** will be sent by 10/04/2024
- **Next workshop** planned on the **16/04/2024** (10:30-16:00) on **Guarantees given to Grid Users in their temporary period**
- **Additional workshop** is planned on the **14/06/204** (13:00-17:00)
- As communicated by email to user's group, an **internal reorganization** is taking place as of 1st April. Specifically for these workshops, **Benjamin Genêt** (Head of *Market: Grid & Offshore Concepts*) will **chair the workshops** going forward

7. Questions ?

Thank you.

Appendix