Position Paper of CWE NRAs on Flow-Based Market Coupling

March 2015

Note: This document presents the view of the CWE NRAs once it has been approved / validated by them, according to their national procedures. This will be done at the latest at the end of April 2015.

1. Context

Flow Based (FB) is a key element of the implementation of the target model for capacity calculation and allocation at day-ahead timeframe as described in the regulation on Capacity Allocation and Congestion Management which is expected to come into force in June/July 2015[1] (CACM Regulation hereafter). Its implementation in the Central West Europe (CWE) region started on the basis of the Annex issued end 2006 of Regulation 1228/2003 repealed later by Regulation 714/2009.

Its purpose is to further improve the optimization allowed by Market Coupling (MC) based on a more precise capacity calculation which makes it possible to benefit from the interdependency between commercial flows on affected transmission network elements called "Critical Branches" (CB hereafter) by maximizing as much as possible their use by the most valuable exchanges. Commercial capacities do not have to be shared *ex-ante* between several borders as implemented with ATC methods, leading to potential inadequacy between the needed and the possible exchanges.

In the CWE region, covering Belgium, France, Germany, Luxembourg and The Netherlands, a first market coupling called the TLC (Trilateral Market Coupling) linking France, Belgium and the Netherlands was launched in November 2006. In February 2007, the national regulatory authorities (hereafter NRAs) of the CWE region published their so-called Action Plan recommending the implementation of a Flow-Based Market Coupling (FB MC) in line with the Annex of Regulation 1228/2003. This agreement between CWE NRAs was supported in June 2007 by the signature of a

[1] The CACM related timings mentioned in this paper only represent the estimation of CWE NRAs, and do not necessary fit the official and effective implementation planning.

Memorandum of Understanding (MOU)[2] involving the 5 Members States, the NRAs, the Transmission System Operators (TSOs), the power exchanges (PXs) and representatives of large producers of the CWE region. One of the main objectives of this MOU was the implementation of a FB MC in the CWE region in 2009. In July 2008, project partners (TSOs and PXs) announced that the CWE MC would start with a non-FB approach based on coordinated NTC[3] calculations. These developments have led to the launch of the CWE market coupling together with the ITVC (Interim Tight Volume Coupling) with the Nordic region in November 2010. The objective of a European wide integration led to the launch of the NWE price coupling in February 2014. In the meantime, the work of TSOs and PXs on the implementation of the FB MC in the CWE region was monitored by the CWE NRAs through the so-called "expert meetings" and the Support Group 1 (SG1) of the Pentalateral Energy Forum (PLEF). These meeting were initially set up by the 5 countries that signed the MOU in 2005 and later, in 2012, gradually expanded by full membership status to Austria and via observer status for Switzerland. The CWE Flow Based methodology (principles and details) has been developed by the project partners (TSOs and PXs) under the supervision of CWE NRAs.

The methodology has been tested through an internal parallel run in 2012 and "at real scale" through two years of external parallel run in 2013 and 2014. The principle of this external parallel run was to compute every day, as in real operations, the transmission capacity domain, and the resulting market outcomes. All these tests have allowed a better understanding and a greater confidence into the methodology. It has moreover allowed adaptations of the methodology so that it delivers better results and a better design of the transparency tools.

In order to prepare go-live two public consultations have been organized. The first one was organized by the project partners (with an access to all answers by CWE NRAs) in May/June 2013 and another consultation was directly organized by the CWE NRAs in June 2014. The outcome of these consultations have been communicated to the public[4] and taken on board for further improvements.

2. European legal context

Regulation 714/2009 and its Annex 1 on the Guidelines on the Management and Allocation of Available Transfer Capacity of interconnections between national systems constitute the main legal basis for the implementation of the CWE FB MC.

Article 16.1 of Regulation 714/2009 foresees that "Network congestion problems shall be addressed with non-discriminatory market-based solutions which give efficient economic signals to the market participants and transmission system operators involved."

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[2] http://www.benelux.int/files/7513/9565/1442/Memorandum_of_understanding_Pentalateral_2007_-_EN.pdf

[3] Net Transfer Capacity

[4] The outcome of the second consultation resulted in requests to the Project Partners, which can be found on http://www.creg.info/pdf/Opinions/2014/FBMC/CWE_FBMC_NRA_requests.pdf

Article 16.3 provides that “The maximum capacity of the interconnections and/or the transmission networks affecting cross-border flows shall be made available to market participants, complying with safety standards of secure network operation.”

Article 16.5 of the regulation states that “Transmission system operators shall, as far as technically possible, net the capacity requirements of any power flows in opposite direction over the congested interconnection line in order to use that line to its maximum capacity. Having full regard to network security, transactions that relieve the congestion shall never be denied.”

Article 1.7 of Annex 1 provides that “When defining appropriate network areas in and between which congestion management is to apply, TSOs shall be guided by the principles of cost-effectiveness and minimisation of negative impacts on the internal market in electricity. Specifically, TSOs shall not limit interconnection capacity in order to solve congestion inside their own control area, save for the above mentioned reasons and reasons of operational security”.

Article 3.1 of Annex 1 provides that “Capacity allocation at an interconnection shall be coordinated and implemented using common allocation procedures by the TSOs involved. In cases where commercial exchanges between two countries (TSOs) are expected to affect physical flow conditions in any third-country (TSO) significantly, congestion-management methods shall be coordinated between all the TSOs so affected through a common congestion-management procedure. National regulatory authorities and TSOs shall ensure that no congestion-management procedure with significant effects on physical electric power flows in other networks is devised unilaterally.”

Article 3.2 of Annex 1 requires that “A common coordinated congestion-management method and procedure for the allocation of capacity to the market at least annually, monthly and day-ahead shall be applied by 1 January 2007 between countries in the following regions:...(b) North-West Europe (i.e. Benelux, Germany and France),...”

Finally, Article 3.5 of Annex 1 provides the technical details of the method to be implemented: “With a view to promoting fair and efficient competition and cross-border trade, coordination between TSOs within the regions set out in point 3.2. shall include all the steps from capacity calculation and optimisation of allocation to secure operation of the network, with clear assignments of responsibility. Such coordination shall include, in particular: (a) the use of a common transmission model dealing efficiently with interdependent physical loop-flows and having regard to discrepancies between physical and commercial flows, (b) allocation and nomination of capacity to deal efficiently with interdependent physical loop-flows,...”

After the entry into force of the CACM Regulation – expected in June/July 2015 – the existing legal framework will be complemented by the provisions from this Regulation. For capacity calculation methods in general, and more specific for flow based, Title II - chapters I and II contain the most relevant provisions. Flow Based market coupling is a key element of the target model for capacity allocation and calculation at day-ahead timeframe.

3. Description of the FB methodology

The main objective of the FB MC is to make the maximum capacity of the interconnections and/or the transmission networks affecting cross-border flows available to market players, while taking into

account the physical limits imposed by the transmission network. Through the application of the laws of physics together with a welfare optimization function, this method selects exchanges from different zones thereby allowing an efficient use of the transmission network.

A subset of all network elements considered as critical by network operators, called Critical Branches (CB), is explicitly taken into account in the optimization process. CBs may be any part of the interconnections and of the transmission networks affecting cross-border / cross-zonal flows and thus for instance any transmission line crossing a country border or located inside a bidding-zone significantly influenced by cross-border / cross-zonal exchanges.

The zone to zone Power Transmission Distribution Factor (PTDF) represents the impact in terms of flows of a power exchange between two zones on a given CB. PTDFs between zones are built on the basis of assumptions on the participation of specific generation units of the corresponding zones to a given power exchange (increase or decrease in generation): these assumptions are called Generation Shift Keys (GSKs).

To ensure the efficiency of the congestion management on a CB located inside a bidding-zone, the TSOs have developed a selection criterion based on a threshold value that is to be met by at least one of the values of the zone to zone PTDF for that particular CB. Today's threshold value is 5%: if all PTDFs of a line fall below that value, the efficiency of the Market Coupling for managing a congestion on this CB is very low compared to re-dispatching actions performed internally to the bidding-zone. In addition, very low PTDFs may have a huge impact on prices and may exacerbate non-intuitive results.

The base-case (BC) represents the starting point of the evaluation of the feasibility and efficiency of cross-border trade. This base-case is constructed on the basis of a snapshot of exchanges and system conditions observed 2 days before real-time and where other parameters (load, topology, generation) are adapted to reflect expected conditions for day D. In the current implementation of the CWE FB MC, net (import or export) positions of the 4 bidding zones[5] of the snapshot are used as reference for the exchanges for day D. The BC is built on the basis of these net positions. The chosen approach may have as a consequence that the whole capacity of the transmission network may not be enough to accommodate for more than the exchanges corresponding to the base-case. These particular cases were referred to as "pre-congested cases".

As already indicated above, GSKs are assumptions on the participation of a power generation unit to a power shift. As the effective participation of a generation unit depends on the results of the MC and on the clearing price, this results in a circular problem (as the result is needed as input). Current harmonized (to avoid difference of treatment) rules implemented in the CWE region correspond to a proportional allocation of a power shift on all units participating in power transfers in function of their size. The setting of GSKs is important for the determination (through zone to zone PTDF) of the physical impact of power shifts on transmission lines. Matched bids are selected on the basis of a combination of their impact on the active critical branch, if any, and on their price.

[5] Belgium, France, Germany/ Austria/ Luxembourg, the Netherlands

Flow Reliability Margins (FRMs) are security margins taken on CB in order to cope with uncertainties on the flows expected on CB. These uncertainties result from all unexpected events occurring between the determination of the FB parameters and the real time (change of generation and consumption patterns, change of exchanges on the other borders, …) and also from uncertainties linked to the absence of exact locational information on the origin and destination of trades available at clearing time. Reliability margins are key for ensuring security of the grid, nonetheless they do not have to be oversized: they reduce the capacities available to the market and the welfare of the MC. FRMs are determined and justified by the TSOs on the basis of statistical analysis applied on observed data.

In the current implementation of the CWE FB MC, the tripping of a transmission line (or more generally N-1 constraints) is explicitly taken into account in the optimization process. Remedial actions (such as network topology measures including the setting of phase-shifters, re-dispatching etc.) may also be explicitly taken into account in the Flow-Based parameters of the CB. Nevertheless, some (complex) remedial actions can indirectly be taken into account by the use of a negative Final Adjustment Value (FAV) parameter which increases the maximum capacity of a transmission line reflecting the additional capacity that may derive from the remedial action (change in topology).

Additional constraints called “external constraints” are used to represent global import or export limitation of a given bidding zone. These constraints may be linked to voltage stability issues or to the risk perceived by TSOs from deviating too much from known system conditions.

Fallback principles have been developed. The goal of these processes is to avoid as much as possible that the FB mechanism is not in a position to deliver transmission capacity (FB parameters), with the consequence that no exchange can be authorized. The project has therefore developed two ways to cope with these missing parameters:

- a spanning functionality if parameters are missing for only a few hours, on the basis of the parameters of the adjacent hours,
- a calculation of fallback parameters from the Long-Term Allocation values in the case more parameters are missing.

4. Consistency with European legislation

The main legal basis for the implementation of a FB MC in the CWE region is achieving compliance with the Regulation 714/2009 and its Annex 1.

The requirements as provided in chapter 2 may be synthesised for the day ahead-market as follows: a common and coordinated FB MC making the maximum capacity of the interconnections and/or the transmission networks affected by cross-border flows available to market participants for cross-border exchanges, efficiently dealing with interdependent physical loop-flows and having regard to

discrepancies between physical and commercial flows shall be applied by 1 January 2007[6] in the CWE region. The method should be non-discriminatory and market-based and should allow for fair and efficient competition and cross-border trade. If more structural congestions appear, TSOs - when defining appropriate network areas in and between which congestion management is to be applied - shall be guided by the principles of cost-effectiveness and minimisation of negative impacts on the internal market.

The current TSO proposal complies with most of the above-mentioned legal requirements (a flow based approach coordinated at CWE level, efficiently dealing with interdependent physical transit flows and having regard to discrepancies between physical and commercial flows) and constitutes an improvement compared to the currently applied method[7]. The proposed FB method is built on a common transmission model which better takes into account the physical impact of commercial exchanges on the affected transmission grid and which benefits from the interdependency between commercial flows at different bidding zone borders. This transmission model translates into parameters that represent the possibilities for the market for cross-border exchanges, thus allowing an efficient competition between supply and demand in the different bidding zones. Flow based therefore deals efficiently with so called interdependent physical transit flows and allows to make more transmission capacity available to market participants.

Due to the application of the Flow based method on the EU electricity market zonal approach instead of on a nodal approach, some specific adjustments had to be made to the mechanism (base-case definition, GSK, CB,…).

The definition of a base-case implicitly gives priority to internal trade on cross-border trade. Therefore, the CWE NRAs stress the importance of the base-case not to load the grid in a disproportionate way and of the GSK to be determined according to clear and transparent rules, defined *ex-ante* by TSOs and approved by NRAs. Otherwise the proposed methododology could be in breach with Article 16.1 of Regulation 714/2009, which provides that network congestion shall be addressed with non discriminatory market-based solutions.

A more precise definition of flows allows another explanation of the base-case question. In this new definition, loop-flows are physical flows resulting from internal trades within one bidding zone through another bidding zone[8]. As these internal trades are included mainly in the base-case and thus create a pre-market loading of the transmission grid which is used as the starting point of flow based, loop-flows cannot be better managed in FB than in ATC. The only way to have this model deal with loop-flows is by creating appropriate network areas between which congestion management is applied. It is to be noticed that loop-flows are better manageable by TSOs in a FB environment as far as the base-case hypotheses are shared. Moreover, transit flows (physical flows induced in a given

[6] Annex 1 to Regulation 1228/2003 entered into force end 2006 and was immediately applicable in all member states. This Regulation was repeled by Regulation 714/2009. This requirement is repeated in Art. 3.2 of Annex 1.

[7] Cf. Chapter 5

[8] In Regulation 714/2009, the meaning of loop-flows corresponded more (no definition was provided at that time) to flows not taking the shortest path between source and sink.

zone by a commercial flow between two other zones) are explicitly taken into account by the FB mechanism to reach a better use of the grid and an optimized set of exchanges.

A CB located inside a bidding zone, if corresponding to a structural congestion, may, if bidding zones are not optimised, constitute a source of non-compliance with article 1.7 of Annex 1 of Regulation 714/2009 dealing with congestions observed on internal network elements systematically pushed to the borders and not solved by other methods (re-dispatching). Transmission grid reinforcements can also address the above issue. The monitoring of the most frequently active CB is thus a key element of the monitoring tool required by CWE NRAs.

Nonetheless, it has to be highlighted that the above-mentioned sources of possible non-compliance do not intrinsically derive from the use of FB. Such risks are inherent to a zonal approach where either bidding zones have not been optimised yet, as precisely requested by the bidding zone review prescribed by the CACM Regulation[9], or necessary grid developments are not in place yet.

The use of external constraints (and the dimensioning of the Flow Reliability Margins "FRM" hereafter) shall be fully justified. Failing that, it may raise a risk of non-compliance in light of article 16.3 of Regulation 714/2009, which calls for the maximum capacity of the transmission system affected by cross-border flows to be offered to the market complying with safety standards of secure network operation. The studies listed in section 9.7 are to mitigate this risk. The studies should justify the external constraints currently foreseen in the Approval Package. If they cannot be justified, these external constraints will have to be either removed or adapted to ensure the compliance of the methodology with the legislation.

5. External parallel run

The external parallel run consisted in the application of the FB mechanism on data provided by the daily NTC MC in parallel to the current NTC based market coupling. These calculations allow a comparison of the results provided by the FB mechanism with results of the ATC coupling. The external parallel testing has been run over the last 24 months - and will keep running up to go-live. This is a key element to demonstrate the advantage of the Flow-Based methodology (not only from a theoretical perspective) in the frame of the technical choices made by the project for its practical implementation in the CWE region. Its results are one of the main inputs for the CWE NRAs' decision.

The external parallel run also allowed market players to better understand the functioning of the FB market coupling mechanism, and to get prepared for its go-live.

This parallel run has demonstrated:

- a welfare increase (compared to the ATC method) of 117 M€ for the CWE region for the simulated days of 2013 and of 136 M€ in 2014, with unequal distribution of welfare benefits between bidding zones;
- acceptable market results on the simulated days;

[9] Articles 32 - 34

- a good and sufficient level of reliability[10], stability and robustness of the system: the capability of the project to have an acceptable number of missing days (there has been none of them for 8 months[11]). This was key for CWE NRAs (after the beginning of the parallel run where there were quite a lot of missing days) to have evidence that the methodology can issue Flow Based parameters and consequently market results every day,
- a significant decrease of congested hours and a better price convergence between the different bidding zones;
- a risk of distributive effects linked to the flow-factor competition[12] issue to be tackled by CWE NRAs' Memorandum of Understanding (CWE NRA MOU)[13].

To sum-up, the external parallel run has demonstrated a good level of efficiency of the *Flow Based* methodology such as submitted by the CWE project partners for regulatory approval. It has nevertheless given some insight into new developments and improvements which are listed in chapter 9.

CWE NRAs underline the commitment made by the Project in the Approval Package (in the Fallback section) **"**CWE TSOs commit to deliver Flow Based parameters over the entire day to the Market Coupling system".

6. Transparency

Transparency is a core element towards the confidence of the market in this new methodology.

The CWE NRAs have welcomed the transparency proposal of the CWE-TSOs, and have made additional requirements during these last years, taking into account the outcome of the Public Consultations or discussions with the market.

The CWE NRAs have asked, among other elements, for the publication of the following pieces of information which are key for the approval of the FB MC:

- Anticipated publication of FB parameters at 8:00 am before long term adjustments.
  The utility tool has been developed in order to provide the information equivalent to the ATCs on the CWE borders for all hours of the following day. Moreover, the equivalent of NTCs calculated in D-2 by the TSOs will be provided for information before the long-term nomination at 8:00 am by the CWE-TSOs. Every change in the parameters which evolves on a longer path than daily will have to be clearly communicated to the market.
- Publication of fixed, anonymized Critical Branches and Critical Outages (CBCOs), 2 days ex-post.
  The ex-post publication of the CBCOs with anonymized, fixed specifications is assessed as a

[10] Reliability of the FB MC is a key issue as missing days may endanger the profitability of the new method
[11] The fallback parameters process was nevertheless triggered one day during this period, respecting the foreseen process.
[12] The result of the FB MC is linked to the « competition between flow factors » (or PTDFs)
[13] see section 9.5

positive solution, making it possible for market players to make statistical studies between external events, FB parameters and market outputs in order to forecast market prices.

- Publication of non redundant CBs, via the CASC utility tool,
- Provision of "typical" FB parameters matrices.
  The provision of FB matrices is required by market parties to have a better understanding of the impact of specific assumptions on the FB parameters. The matrices should be developed in cooperation with the market participants.
- Publication of a simplified static grid model of the CWE region.
  In article 17 of the CACM Regulation, a Common Grid Model is required. As a first step towards this demand and to create a level playing field, CWE NRAs ask for the publication of grid elements characteristics (length, resistance, reactance, nominal capacity) for the CWE region with a topology level at least equivalent to the level given on the ENTSO-E grid map. This information should be provided in a format that can be used for further analysis by market participants.
- Aggregated D2CF publication to come

Moreover, the Project will have to continue publishing monthly market reports.

7. Monitoring and evaluation

A detailed monitoring of this new methodology will be conducted by CWE NRAs, in order to make sure that the methodology is correctly applied and does not lead to unexpected or undesirable market outcomes.

Therefore, and as stated in the Approval Package, the project will have to:

- keep all Flow-Based calculation data available on a reasonable time upon request of CWE NRAs;
- provide an exhaustive monthly monitoring report containing several indicators chosen by the CWE NRAs.

These monitoring tools are derived from those currently in place to monitor the external parallel run. They are designed to make it possible to easily assess, among other elements:

- whether Flow-Based parameters are correctly calculated,
- whether there is no unexpected market outcome,
- which grid elements are frequently constrained.

A list of all expected indicators is provided in the Approval Package. CWE NRAs may ask the project to add some indicators to this agreed monitoring report in future.

Specific monitoring will be dedicated to the issue of "Flow factor competition" as indicated in CWE NRAs' MOU and to the comparison between Flow Based Intuitive and Flow Based Plain. This monitoring will be the basis to check whether the methodology is efficient, but also for CWE NRAs to propose evolution.

Other possible evolutions and improvements of the current design are listed in chapter 9 below.

8. Approval process

Each CWE NRA has entered into a national approval / validation process. In some countries there are national consultations in addition to the CWE-wide ones.

To decide on the implementation of the Flow-Based capacity calculation and market coupling methodology, CWE NRAs have asked their national TSO(s) to submit a comprehensive set of national rules / methods. The CWE common Approval Package mostly consists of the elements delivered in August 2014, complemented by recent additions to address CWE NRAs' requirements (mainly linked to generation adequacy and long-term rights inclusion).

The decision of each CWE NRA is made on the basis of the common analysis presented in this position paper, on the feedback from the CWE public consultation, on the outcome of possible national consultation, on the demonstration by the project up to the end of the parallel run that the FB algorithm can deliver results and on the MOU agreed between CWE NRAs, fostering their cooperation in future monitoring and possible developments.

9. Requirements for further improvements of the CWE Flow Based methodology

The CWE NRAs consider that the proposed methodology is good in order to launch the implementation of *Flow Based* in the coming weeks in the CWE region. Nonetheless, CWE NRAs consider that this methodology can be further improved in the months following the go-live on several aspects.

The entry into force of the CACM Regulation, expected by June/July 2015, will trigger the steps by which CWE TSOs will be obliged to deliver a proposal for a common capacity calculation method in accordance with articles 20 and 21 of this regulation by January/February 2017. Although the elements listed under sections 9.6 to 9.15 are covered by the CACM Regulation and have to be addressed by TSOs accordingly and in the foreseen timing, CWE NRAs expect an earlier implementation for some of them. Detailed timings are to be found below.

Moreover, other elements were judged key for CWE NRAs to smooth the transition to Flow Based: these elements are detailed under sections 9.1 to 9.5 and do have a high priority. These elements are not there from go-live, but shall be put in place in a tight planning.

9.1. Adequacy issue (mitigation of curtailment of price taking orders)

CWE NRAs have identified a theoretical issue known as "adequacy issue" and have asked the project partners to assess the phenomenon and to find solutions.

A solution has been identified and presented in February 2015 to the CWE NRAs. It is part of the latest version of the Approval Package.

This solution has to be implemented before November 2015.

9.2. Intraday capacity calculation

Upon request of CWE NRAs, the CWE FB project has presented several scenarios to develop a capacity calculation methodology at intraday timeframe.

The CWE NRAs are open to a stepwise approach, implementing in a first step ATC coordinated calculation, before implementing Flow-Based calculation at this timeframe. CWE NRAs recall the requirements contained in Article 1.9 of the Annex 1 of Regulation 714/2009 on the implementation of a coordinated allocation at intraday, and the provisions imposed in articles 14.1. and 21 of the CACM Regulation which states that Flow Based methodology shall be developed also for the intraday timeframe. The CWE NRAs also insist on the importance of this methodology to be thought and designed in consistency with the pan-European intraday allocation solution.

Before these improvements are made, CWE NRAs ask for intraday capacity recalculation to be properly implemented in ATC by the beginning of November 2015. This interim solution is intended to allow for more capacity at this timeframe, taking stock of more accurate information on grid, consumption and generation parameters.

9.3. Belgium – Luxembourg interconnection

CWE NRAs expect that the Belgium – Luxembourg interconnection might come online by the end of 2015. As a consequence, CWE NRAs ask the Project to study the impact of this interconnection on the CWE FBMC.

CWE NRAs expect that the upcoming interconnection between Belgium and Luxembourg is properly tackled in CWE FBMC, including the allocation of congestion income. CWE NRAs expect a formal proposal from the respective TSOs 4 months before the interconnection will come into operation.

9.4. Implementation of FTRs

The agreement between Project Parties on the inclusion of long term allocation capacities in the day-ahead FB domain is considered as a non-optimal, intermediate solution for allowing the go-live.

The implementation of FTRs, already asked years ago by CWE NRAs, is considered as the enduring solution, at least on the Belgium-France and Belgium-Netherlands borders, for mitigating the impact of difference in shape of the FB domain with the ATC based long-term rights domain.

CWE NRAs request TSOs to prepare FTRs design so that they can be implemented for the 2016 delivery period on Belgium-France and Belgium-Netherlands borders. For this CWE NRAs expect that the proposal is submitted on time for an approval by the first auctions on the Dutch borders.

9.5. Flow factor competition

As indicated in their MOU (“CWE NRAs Memorandum of Understanding of the Implementation of Flow Based Market Coupling in the CWE Region”), CWE NRAs will monitor the “flow factor competition” issue and will require, if needed, appropriate improvements to the current design of the FB MC.

This MOU as this position paper, is also annexed to CWE NRAs’ decisions / validations.

9.6. Completion of agreed transparency requirements

As discussed above, several transparency tools have been agreed in order to allow a smooth insertion of Flow Based in the market. Some of them have been agreed lately and it could be that the project partners cannot manage developing them before the Flow Based go-live.

For the following items, even if CWE NRAs have a strong preference for the tool to be available before the go-live date, CWE NRAs have accepted the idea of having them delivered slightly after the go-live:

- Static model publication
- D2CF publication according to the minimum approved template

This needs to be done at the latest 3 months after go-live.

9.7. External constraints

The current CWE Flow Based domain is limited by constraints which are not only the Critical branches-Critical Outages. These – so called – external constraints represent what TSOs explain to be a maximum import or export position for their system due to other aspects of secure system operation such as voltage stability.

These constraints limit quite often the Flow-Based domain (42% of congested hours in 2013). The CWE NRAs therefore require that a justification of the external constraints (in their principle and in their values/calculation mechanism) is provided by each TSO to its NRA. These explanations will be shared among the CWE NRAs.

On the basis of these studies, to be provided 9 months after go-live, it could be decided to adapt or remove these external constraints in the frame of the FB MC methodology.

9.8. Closer cooperation with other regions and extensions to other borders – potentially advanced hybrid coupling

Given the need to transform the regional approach towards a cross-regional and ultimately a pan-European[14] one, CWE NRAs request CWE project parties to closely cooperate with neighbouring regions and be open to contribute to their projects. Depending on the progress, maturity and type of calculation (flow-based or NTC) of neighbouring projects, the cooperation may differ (from acting as an advisory-on-request partner up to an active project partner). These cooperations are needed to ensure consistency in case of differences between methodologies and may be performed on a border per border approach or for entire regions, with the objective to integrate new price zones in the Market Coupling.

Advanced hybrid coupling (including borders with NTC calculation) is considered as a first, and easier, step into the direction of a new border into the Flow-Based area and of a wider optimization.

[14] Article 20.5 of the CACM Regulation

CWE NRAs ask TSOs to provide, 12 months after go-live, a feasibility study and the design of the hybrid solution for borders where ATC and FB capacity calculation coexist.

9.9. Allocation of congestion rents

The allocation or sharing of congestions rents on the different CWE countries constitutes one of the most difficult issue encountered in the implementation of the CWE FB MC project.

The current TSOs proposal has been accepted by all parties, under the condition of a close monitoring of this sharing and the possibility to review and propose a new scheme under the request of CWE NRAs.

Not later than 12 months after the entering into force of the CACM Regulation, all TSOs will have to develop a proposal for a methodology for sharing congestion incomes. CWE NRAs ask to CWE TSOs to show the impact of the new EU proposal on the CWE sharing rule.

9.10. Flow-based intuitive or plain

CWE NRAs made the choice, upon the results of the CWE NRA-led public consultation to begin with FB Intuitive (FBI). It has been agreed that the project will keep running and simulating the other version (as during the external parallel run) and provide CWE NRAs with a detailed monitoring on the results that would have been engendered by Flow Based Plain (FBP). After 12 months, CWE NRAs will consider if a change towards the other version of the methodology is relevant and justified. To this end, CWE NRAs expect a comprehensive comparison report.

The following elements could be used in this respect:

- The capability of market parties to make good price forecasts and to bid efficiently under either FBP or FBI. For this criterion the impact on volatility and liquidity should also be taken into account.
- The impact on global welfare. FBI adds restrictions to the flow based methodology, which leads to lower global welfare. This has been demonstrated in the external parallel run, where relatively small differences have been observed between FBI and FBP.
- Distribution of welfare, in particular between small and large bidding zones. Structurally and theoretically, smaller areas are more likely to be involved in non-intuitive exchanges than larger areas (i.e. the smaller areas “help” the larger areas more often than the reverse), and this is what is empirically observed. This ultimately means that welfare is lost in the smaller areas in favour of the bigger areas in a structural manner. For this criterion the frequency of occurrence of non-intuitive flows is of importance. How FBP scores depends on the extent of the redistribution of welfare.
- Impact on intraday timeframe. Welfare should be optimized for the whole time frame ranging from intraday to years ahead. Specifically, there is a risk that the gain of FBP versus FBI could be traded away in the intraday timeframe.
- Impact on investments and security of supply. Energy companies could let their investments depend on the frequency of non-intuitive situations. For example countries which experience import while having the lowest price in the CWE region (a non-intuitive situation), might be less attractive for an investment in generation power.

When analysing these criteria, future expansion of the Flow Based methodology in Europe should also be taken into account. In addition, attention should be paid to a range of expected outcomes. For example the difference in global welfare and the redistribution of welfare between FBP and FBI is relatively small based on past results, but it is also of importance what range of differences could be expected in the future.

The project therefore has moreover to provide a comparison of the two methodologies at least in terms of welfare and price difference in the frame of the monthly report.

9.11. FRM

CWE NRAs also ask the project to investigate all possible aspects which may reduce the values of the applied security margins while respecting the security criteria (such as improved scheduling processes,…) and propose modifications if appropriate.

CWE NRAs ask TSOs to provide the results of this study 12 months after go-live.

9.12. CBCO selection

The project has proposed the rule of 5% to identify a critical branch (the 5% criterion means that a CBCO, to be selected, has to have at least one zone-to-zone PTDF which exceeds 5%). It is stated in the Approval Package that this rule was assessed inside the project to be efficient. This has nevertheless not been demonstrated to CWE NRAs. If there is room for improving this CB selection rule, this could lead to a higher global welfare. As a matter of fact, a network element not considered as a CB in the Flow-Based methodology cannot limit cross-border exchanges. If an overload is expected on this line, the relevant TSO(s) may have to activate potentially costly remedial actions such as re-dispatching. Moreover, the current rule does not prevent the fact that constraints with very low PTDF are active and may have huge impact on prices.

Therefore, CWE NRAs consider that the project has to demonstrate, at the latest when applying for a capacity calculation methodology in the frame of the CACM Regulation, whether the 5% rule is optimal, or what other rule could lead to such optimality. The Flow-Based methodology would have to be adapted consequently.

9.13. D2CF composition

50Hz and APG are part of the common grid area and the German / Austrian / Luxembourg bidding zone, but without direct border for allocation. They are involved in the project and within the D2CF composition, their grid situation is appropriately taken into account. Having the grid data of both TSOs considered in the D2CF makes the results more accurate. The NRAs ask the project to continue with further cooperation steps as foreseen, while continuously investigating whether the current processes are sufficient or additional steps are needed.

9.14. GSK evolution

With the current implementation of FB, there is room for improvement of the GSK determination. The three following orientations should be looked at for determining the future design of GSKs:

- Harmonize the methods, in order to create of a level playing field in the CWE region and to avoid discrimination,
- Apply clear and transparent rules, agreed ex-ante, and avoiding as much as possible TSO real-time intervention,
- Seek a good level of representativeness of effective power shifts, through the application of automatic, harmonised and transparent measures taking into account weather and wind forecasts (for solar and wind generation)

All GSKs shall be hourly updated.

CWE NRAs ask this improvement to be implemented at the latest when applying for a capacity calculation methodology in the frame of the CACM Regulation.

9.15. Common Grid Model and base-case

In relation to article 16 of CACM Regulation, CWE NRAs invite the project team to actively participate to the development of the Common Grid Model methodology.

As the lack of harmonization in the current determination of the base-case constitutes a weak point of the proposed FB methodology, CWE NRAs request the CWE FB project partners to improve the harmonisation of the current method within this proposal.

Moreover, the base-case could further be improved taking on board more probable hypothesis or considering a better optimisation (and modelling) of the use of remedial actions.

CWE NRAs require this development of the Common Grid Model and harmonization of the base-case to be implemented at the latest when applying for a capacity calculation methodology in the frame of the CACM Regulation.

CWE NRAs Memorandum of Understanding of the Implementation of Flow Based Market Coupling in the CWE Region

Considering their long-standing cooperation in the framework of ACER CWE regional initiative,

Considering their active role in the Pentalateral Energy Forum, as to foster regional energy market integration as a stepping stone to the European internal energy market,

Considering the successful launch of market coupling in the region and its successive enlargements to other areas in Europe, and the short term go-live of the CWE Flow-Based Market Coupling,

Considering the commitment of the CWE Flow-Based market coupling project to design and implement a flow-based market coupling,

Considering the important progress made in this complex and highly innovative project,

Considering the impact national network or adequacy specificities still have on cross-border trade,

The representatives of the Regulatory Authorities of the Central Western European (CWE) region, hereinafter referred to as “CWE NRAs”, commit to give regulatory backing to the continuous improvement towards a fully EU-entrenched flow-based market coupling. The development of this enhanced flow-based market coupling will further facilitate cross-border trade by making more efficient use of transmission capacities in the context of changing generation patterns and flows, better enable the integration of renewables in a market environment and lead to a more secure and reliable electricity system.

To this end, CWE NRAs agree to monitor the impact of the “flow factor competition” phenomenon linked to the implementation of Flow-Based Market Coupling on the fairness of competition in the electricity market in an appropriate manner, including market behavior and agree to require, if and where deemed necessary, structural improvements of the methodology.

CWE NRAs shall request project partners to hire a consultant who will monitor the flow factor competition phenomenon and propose, if deemed necessary by CWE NRAs, a structural solution. CWE NRAs will provide to the project partners with a first draft of the terms of reference (ToR) for hiring a consultant, will finally approve these ToR and will ultimately choose the consultant. The budget for hiring the consultant

should be adequate to study flow factor competition in a satisfactory way, but not higher than 200.000€. The consultant shall refer to a committee composed by CWE NRAs and representatives of the project partners. All data needed for the monitoring shall be shared by the project partners with the consultant and with CWE NRAs .

The results of the monitoring of the phenomenon shall refer to the data of 12 months of an operating CWE Flow Based Market Coupling. Nevertheless, first results can be established after 6 months, and will have to be confirmed after 12 months. The monitoring will encompass base case construction, PTDF and GSK determination and observed and expected flows monitoring in important transmission elements.

Based on the monitoring results, CWE NRAs will decide whether the consultant shall propose possible structural solutions. In this case, the solution has to mitigate the issue itself. This means any solution needs to be reliable for the Flow-Based mechanism in general and not only for some border(s). The solution has to be developed by Transmission System Operators (TSO) and Power Exchanges.

The outcome of the study will be finally assessed by CWE NRAs no later than 15 months after the CWE Flow-Based Market Coupling go-live and, if needed, the solution agreed by CWE NRAs will be included in the proposal to be submitted by TSOs to CWE NRAs 19 months after regulation on Capacity Allocation and Congestion Management (CACM Guideline) has entered into force.