

# Description of the AOF of the RR-Platform

## Abbreviations

AOF	Activation Optimisation Function
ATC	Available Transmission Capacity
CBMP	Cross-border marginal price
IF	Implementation Framework
MTU	Market time unit
RR	Replacement Reserves
UAB	Unforeseeably accepted bid
URB	Unforeseeably rejected bid

## Inputs to the AOF

The AOF will accept as input all standard RR product bids submitted to the platform before TSO energy bid gate closure, which have been successfully validated and not declared as unavailable by the TSO.

The presence of at least one TSO demand is a prerequisite for executing the algorithm.

ATC values are expected for both directions on interconnectors. If not provided for whatever reason, a zero value is assumed. Defined loss factors for DC interconnectors will be taken into account.

Optionally, flow constraints<sup>1</sup> may be submitted in the form of minimum and maximum desired flows accompanied by the schedule describing the aggregated resulting flows from previous time horizons (long term, day ahead and intraday). Minimum and maximum values may be provided in either one or both directions. If provided in both directions the minimum values must both equal zero.

## Outputs from the AOF

The results from the AOF consist of bids selected for activation, satisfied demands, CBMPs, resulting cross-border energy flows, net positions and remaining ATC.

## AOF execution - general

The MTU is set to 15 minutes. Every execution of the algorithm optimises the selection of bids for activation for a 60-minute delivery period with MTU granularity, coinciding with the full clock hour.

Three minutes are allotted to the algorithm for its execution. The AOF is executed in coupled and decoupled mode in parallel. In the decoupled mode, ATC is set to zero on all borders between control areas. The results of the decoupled mode are intended as a fallback, in case the coupled mode does not find any solution to the optimisation problem.

Needs are satisfied and divisible bids accepted with 0.1 MW precision. Resulting XB flows are determined with 0.1 MW precision. Prices are determined with 0.01 EUR/MWh precision.

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<sup>1</sup> Referred to as controllability of interconnection in the RR IF

## Objectives

The AOF attempts to fulfil several objectives in strict priority order: maximizing the satisfaction of inelastic needs<sup>2</sup>, maximizing the satisfaction of desired flow constraints, maximizing social welfare, minimizing tolerance matching<sup>3</sup>, minimizing XB flows, maximizing traded volume and minimizing URBs.

## CBMP determination

The AOF establishes a single CBMP per scheduling area and MTU period. CBMPs are determined without considering desired flow constraints<sup>4</sup>. Price convergence is enforced at cross-border scheduling step level in coupled optimisation mode; if the cross-border scheduling step level equals to MTU period the same CBMP shall apply in all scheduling areas joined by uncongested interconnectors (i.e. constituting an uncongested area) without flow constraints, taking applicable loss factors into account.

The marginal price method is applied; within a given uncongested area, the CBMP shall be the price of the least competitive accepted bid or satisfied elastic demand activated for balancing purpose, except for price indeterminacy case when the CBMP could be between the prices of the least competitive accepted bids or satisfied elastic demands activated for balancing purpose. The AOF ensures that for the balancing purpose activations within the given uncongested area the price of the most expensive accepted upward bid or satisfied downward elastic need is lower or equal to the price of the cheapest accepted downward bid or satisfied upward elastic need, allowing the marginal pricing method to effectively prevent UABs.

## Business rules

The AOF will prevent adverse flows, being defined as the flows that result in a negative rent on the interconnector at the cross-border scheduling step level. For the interconnectors with cross-border scheduling step equals to MTU the adverse flow is a flow from an area with more expensive CBMP to an area with a less expensive CBMP. However, this rule is not enforced on borders where a desired flow constraint has been submitted for at least one of the interconnectors.

Energy neutrality is respected; the sum of all net positions plus losses shall equal zero during all MTU periods.

ATC and the maximum value of desired flow constraints are always enforced. The minimum value of a desired flow constraint will be fulfilled as far as possible, taking also other optimisation objectives into account<sup>5</sup>. To satisfy desired flow constraints, bids may be activated pay-as-bid rather than pay-as-cleared. The corresponding uplifts are settled outside of the AOF.

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<sup>2</sup> An inelastic need does not have a price and may be understood as a need that has to be satisfied “at all cost”.

<sup>3</sup> A tolerance band is an additional need quantity that may be satisfied (partially or entirely) in order to accept a bid that is not fully divisible. It should be noted though that any surplus related to such tolerance matching does not enter the calculation of social welfare.

<sup>4</sup> Pending reassessment during 2021 given the Pricing Methodology finally approved by ACER

<sup>5</sup> Technically the minimum value is implemented as a soft constraint carrying a heavy penalty on the objective function in case not fulfilled.

As they provide the best liquidity, acceptance of fully divisible bids is prioritised over bids of other types. It should be noted that while occurrence of URB is minimized, it is not strictly prevented.

Currently no minimization or prevention of counter-activations<sup>6</sup> is applied, apart from the special case when no needs are submitted within a decoupled area; in such area no bids whatsoever will be activated.

On borders having a scheduling step longer than the MTU, the AOF will ensure constant resulting XB flows, price convergence and prevention of adverse flows for the duration of the border's scheduling step.

### Specific considerations

More detailed rules apply to rounding, interconnectors loss factors or scheduling step longer than one MTU period and price determination in situations when demand/supply curves do not intersect. Additional rules apply regarding UAB prevention, bid prioritisation and URB minimisation in case of marginal<sup>7</sup> complex bids covering more than one MTU period.

A higher version of the AOF will be deployed by October 2020, in which a second URB minimization step is introduced, taking into account the marginal complex bids and elastic needs covering more than one MTU period. The volume weighted average prices across all MTU periods of such bids and elastic needs will then also be taken into consideration when determining the bounds of the CBMP.

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<sup>6</sup> Counter-activation is a simultaneous activation of upward and downward bids.

<sup>7</sup> "Marginal" meaning a partially accepted or rejected bid for which it would be possible to increase the accepted quantity