Explanatory Note of the Coordinated Redispatching and Countertrading methodology for Greece-Italy (GRIT) CCR

Consultation document

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Contents

1. Introduction

This technical document sets out the main principles of a methodology for coordinated redispatching and countertrading affecting the borders of the capacity calculation region (CCR) Greece-Italy. The participating TSOs to the coordinated redispatching and countertrading are Terna (Italy), ADMIE (Greece).

The proposed methodology follows the Article 35 of the COMMISSION REGULATION (EU) 2015/1222 of 24 July 2015 establishing a guideline on Capacity Allocation and Congestion Management (CACM) requires that:

1. Within 16 months after the regulatory approval on capacity calculation regions referred to in Article 15, all the TSOs in each capacity calculation region shall develop a proposal for a common methodology for coordinated redispatching and countertrading. The proposal shall be subject to consultation in accordance with Article 12[1];
2. The methodology for coordinated redispatching and countertrading shall include actions of cross-border relevance and shall enable all TSOs in each capacity calculation region to effectively relieve physical congestion irrespective of whether the reasons for the physical congestion fall mainly outside their area of responsibility or not. The methodology for coordinated redispatching and countertrading shall address the fact that its application may significantly influence flows outside the TSO's area of responsibility.
3. Each TSO may redispatch all available generation units and loads in accordance with the appropriate mechanisms and agreements applicable to its control area, including interconnectors.

By 26 months after the regulatory approval of capacity calculation regions, all TSOs in each capacity calculation region shall develop a report, subject to consultation in accordance with Article 12, assessing the progressive coordination and harmonization of those mechanisms and agreements and including proposals. The report shall be submitted to their respective regulatory authorities for their assessment. The proposals in the report shall prevent these mechanisms and agreements from distorting the market.

4. Each TSO shall abstain from unilateral or uncoordinated redispatching and countertrading measures of cross-border relevance. Each TSO shall coordinate the use of redispatching and countertrading resources taking into account their impact on operational security and economic efficiency.
5. The relevant generation units and loads shall give TSOs the prices of redispatching and countertrading before redispatching and countertrading resources are committed.

Pricing of redispatching and countertrading shall be based on:

a) prices in the relevant electricity markets for the relevant timeframe; or

[1] TSOs responsible for submitting methodologies or their amendments shall consult stakeholders, including the relevant authorities of each Member State, on the draft proposals for methodologies.

b) the cost of redispatching and countertrading resources calculated transparently on the basis of incurred costs.

6. Generation units and loads shall ex-ante provide all information necessary for calculating the redispatching and countertrading cost to the relevant TSOs. This information shall be shared between the relevant TSOs for redispatching and countertrading purposes only.

In this light, this paper addresses an high level design of a common methodology for coordinated redispatching and countertrading to comply with the provisions set by Article 35 of GL CACM, Article 35.

In detail, this document:

- Provides the principles for a common methodology for coordinated redispatching and countertrading which will be consulted with stakeholders of the involved Parties;
- Paves the way to a future pragmatic implementation of the redispatch and countertrading processes, which will follow after the approval by the relevant Authorities of the present methodology.

The Italian and Greek systems are directly connected only via a DC link, while the AC interconnection to the synchronous Continental European takes place via the two borders electrically far each other. The two Control Areas are practically decoupled and changes in one system have no relevant effect on the other. For these reasons, at the border Italy-Greece, cross border redispatching has no effect[2] and is considered meaningless, being the Countertrading the only action to be taken into account.

2. Definitions

Detailed definitions and interpretations to be used in the scope of the countertrading and redispatching common methodology, and the timeframes in which its different processes apply (with different purposes, such as guarantee firmness of capacity, emergency delivery, etc.) are listed in Annex 2.

3. Area of Common Interest (ACI)

The Area of Common Interest (ACI) is the set of grid elements with a cross-border relevance and whose potential physical congestions can be effectively relieved by cross border Redispatching and Countertrading measures.

In order to improve efficient and fair application of Redispatching and Countertrading and to keep operations as smooth, reliable and secure as possible, it is essential to have simple and clear procedure to identify and agree upon the elements of the transmission grid belonging to the ACI.

The definition of the ACI has to respect the following principles:

[2] Redispatching remains useful for the Italian internal bidding zones.

a) **Effectiveness**: the grid elements must have a cross-border relevance and their potential physical congestions must be effectively relieved by the Redispatching and Countertrading measures.

b) **Consistency**: the ACI has to be consistent with the one used during the Capacity Assessment at any stage.

c) **Flexibility**: the ACI shall be continuously adapted in line with the most updated information about the grid (e.g. unplanned outages, topological modifications, etc.).

d) **Transparency**: the criteria for the inclusion of grid elements in the ACI have to be shared and agreed among the involved TSOs.

The definition of the ACI is a key point of this methodology since only violations occurring on its elements will be taken into account for RDCT applications. For the reasons mentioned at the end of paragraph 1, the Region involved by this methodology represents a really peculiar case being built up by two AC areas which are independent because they are connected only by a DC cable. The system security of Italian and Greek grids can therefore be monitored separately, being each TSO responsible for its own part.

The Area of Common Interest (ACI) refers to the parts of the grids of each TSO that are influenced by the flow in the cable and all other Italian areas which are sensitive to the exchanges between internal Italian bidding zones.

In order to respect the above mentioned principles and to be coherent with the operational experience, while defining the ACI, TSOs define a list of grid elements which are supposed to have a cross-border relevance and whose potential physical congestions can be effectively relieved by cross border Redispatching and Countertrading measures available in the CCR or that are affected by the flow in the DC link. The elements in this list can be referred to normal conditions (N state) and to specific N-1 situations (e.g. an element can become relevant after the tripping/outage maintenance of a specific line). The elements whose potential physical congestions cannot be effectively relieved by cross border Redispatching and Countertrading measures available in the CCR or that are not affected by the flow in the DC link will not be taken into account in the process.

4. Resources for RDCT

Considering that any redispatching action in one system has practically no effect on the other one, it's agreed that:

- redispatching resources are only used for internal congestion management;
- there is no need to share redispatching operational processes with the counterpart.

For Countertrading between Italy and Greece the TSOs have to declare the resources for the following services:

1. Schedule increase in the direction Italy to Greece (e.g. increasing the flow in the direction Italy to Greece or decreasing the flow in the direction Greece to Italy);

2. Schedule increase in the direction Greece to Italy (e.g. increasing the flow in the direction Greece to Italy or decreasing the flow in the direction Italy to Greece).

Each TSO has to specify the available countertrading capacities and their prices. The declared prices must be best estimations of the costs expected by the TSO (e.g average cost for increasing area control balance by * MWh) in accordance with the appropriate mechanisms and agreements applicable to their control areas.

Specific procedures could be agreed by TSOs in order to allow the change and update of declared information before resources are committed.

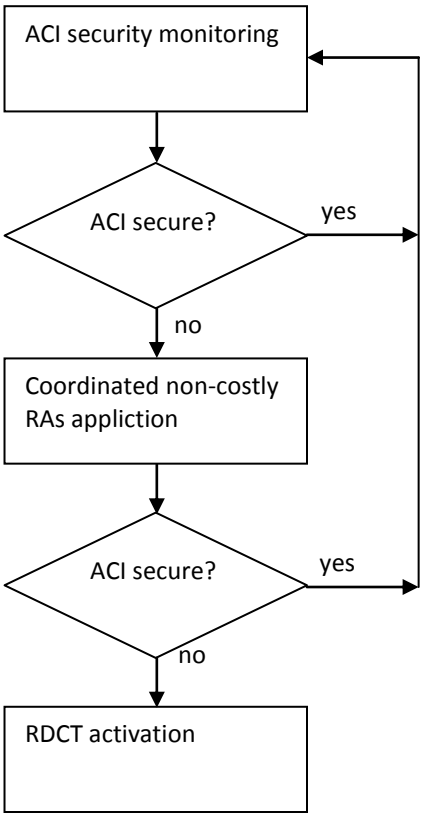
5. Overall process and RDCT resources calculation and commitment

The aim of RDCT is to relieve congestions in the ACI but such costly remedial actions will only be used after all other effective non-costly remedies (e.g. grid topology variations, coordinated use of PSTs) have been taken into account. Hence, in case security violations occur in the ACI, TSOs use their available topological remedial actions in order to restore the security or at least to reduce the extent of the violations. Afterwards, they can turn to RDCT. As already stated at paragraphs 1 and 3, the two AC systems will be monitored and managed independently by the respective TSOs. RDCT activation must be preceded by a security monitoring process and by a phase of selection and application of effective non-costly remedial actions.

The overall process can be summarized by the following steps:

- Step 0: ACI definition.
- Step 1: ACI security monitoring[3].
- Step 2: non-costly remedial actions (RAs) application and security assessment.
- Step 3: RDCT activation.

[3] The security of the ACI is monitored for selected timeframes ahead (e.g. the 24 hours in day ahead, the next 6 hours in Intraday, etc.).



Additional details about roles during the each step of this process can be found at paragraphs 6 and 7.

Detailed requirements for time frames and time needed for resources activation will be specified during the implementation phase.

In case RDCT is necessary, the resources to be activated are selected with the objective to recover every security violation in the ACI at the minimum estimated cost and without raising overload in any other part of the system.

Every TSO will shift its internal generation/loads and take into account countertrading with the other TSO until there are no more violations after having considered the effects of the Remedial Actions (both preventive and curative) identified in the steps before. The selection of any kind of resources (the DC link is considered as a generator/load available for countertrading) will be performed by two independent optimization procedures with the aim of minimizing the costs for the Parties.

A TSO may consider to internally implement a Security-Constrained Optimal Power Flow (SCOPF) function to guarantee the security of its own part of the ACI at the minimum cost. This function will guarantee a continuous automatic optimization of the overall resources.

Fast activation process for sudden critical situations

In case of sudden critical situations (e.g. due to an unplanned outage in real time), that leads to an overload of an ACI element and requires very fast actions, which cannot be effectively and promptly treated with the Regular process, a Fast Activation process will be adopted in order to cover the time horizon until the Regular process can be applied effectively. This second process can also be considered as a backup in case RDCT regular process is not properly working (e.g. missing data, tools failure).

Considering the application of this process should be very infrequent, being linked to extraordinary and unusual events, and that it must be characterized by fast activation and additional flexibility, a lower degree of optimization is accepted and a simplified calculation approach could be used.

This process would be triggered by one TSO who detect security violations during their own real time monitoring activities. TSOs, will first try to coordinate non-costly RAs in order to avoid or to reduce the need for RDCT resources. As soon as RDCT is considered to be necessary, the involved entities calculate the amount of RDCT resources to be activated. The aim of the calculation will always be relieving congestions without raising overload in any other part of the system but, considering the short time available for actions, the objective of cost minimization could be neglected and, as a consequence, only the total volume of resources would be minimized. The final output will be the amount and type (RD or CT) of resources to be activated by each TSO.

The calculation could be performed using Snapshot files, also for next future hours, and the internal tools of TSOs

A different cost sharing methodology may be defined for RDCT costs arisen from the fast activation process as it will be detailed in the Cost Sharing Methodology.

6. Timeframes for RDCT application

RDCT measures could be applied starting from the day-ahead stage, after the cross border exchange schedules are fixed. However, considering the uncertainties of the day-ahead datasets and in order to avoid unnecessary costly measures, the application should be postponed to Intraday and to Real Time stages, when a better overview of the factual conditions of the grid is available. Activation of RDCT measures in the day ahead should be limited to extreme cases, such as when huge amounts of countertrading are expected and they could require the start up of additional conventional power plants for balancing the load and keeping suitable reserve margins.

In **Day ahead**, the RDCT process described at paragraph 5 is executed for the 24 hours of the next day using DACF models. In case the activation of RDCT measures prove to be necessary, their amount is calculated but the decision on the final activation is left to the TSOs. In case the TSOs consider they cannot postpone the activation to the next stages (e.g. Intraday or real time) the RDCT is implemented immediately, otherwise they consider this indication only as early warnings to better tackle the potential issue in the next hours.

In **Intraday**, the RDCT process described at paragraph 5 is executed for a rolling time window of N[4] hours by using IDCF models. RDCT measures proposed by the process in intra-day will be implemented without any postponement.

The RDCT intraday process should normally guarantee the security of real time operations but it is not possible to completely exclude that security risks still pop up in real time. In fact, out-of-range events

[4] The exact number of process runs for a day and the size of the time window to be monitored will be decided during the implementation phase in line with what is considered as feasible and reasonable.

affecting the ACI could always occur (e.g. unpredicted outage of grid elements or generation, unavailability of remedial actions declared beforehand, uncertainty associated with capacity calculation, etc.) and normal differences between forecasts and real operation may have a relevant impact.

In **Real Time**, the RDCT process described at paragraph 5 is executed for a time window which goes from the present till the next Intraday timeframe for RDCT application. Snapshots or IDCF models will be used and RDCT measures proposed by the process at this stage promptly activated. In case a SCOPF is implemented, any action may be left to this automatic function.

7. Involved parties and roles

The framework of the methodology for RDCT (see paragraph 5) relies on two main activities:

1. **Coordinated security monitoring of the ACI for RDCT application**[5]: this step includes the ACI definition, security monitoring and the selection of coordinated non-costly remedial actions.
2. **RDCT measures calculation and selection**: this step is triggered once the need of RDCT is identified and it includes the selection of the RDCT.

For RDCT purposes TSOs monitor the security of their own parts of the ACI. When they detect a security violation they apply available non-costly RAs. In case RDCT measures need to be activated, the resources, their duration and quantities are calculated by the involved TSO.

8. Dataset and tools

8.1. Grid models

Coordinated security monitoring of the ACI will be performed using the latest available Common Grid Models (CGMs) depending on the time of the application (e.g. DACF for day ahead, IDCF for intraday, Snapshots for real time).

8.2. RDCT resources

The RDCT resources (capacities and prices) made available by each TSO for the other will be declared via ad-hoc files defined for each time frame and using the latest updated information.

Format and content of the files will be defined and detailed during the implementation phase.

8.3. Common tool

For the security monitoring, the definition of non-costly RAs and the calculation of the amount of RDCT, considering the independency of the two systems involved, each TSO will use its own tools.

For the calculation of RDCT resources TSOs could implement their own tools.

[5] This security monitoring is only intended for RDCT purposes and doesn't replace the usual security monitoring which is part of TSOs activities and required by OH Handbook and guideline on System Operation.

9. Connection between RDCT and Capacity Calculation processes

RDCT procedures and Capacity Calculation (CC) processes have to be harmonized in order to avoid contradictory results endangering the security and efficiency of the interconnected system. In this light, following links between consequential process should be enforced:

1. Low results of CC could be early warnings for RDCT.
2. The results of RDCT processes have to be made available for the following IDCC process. As an example, if for a future hour CT has to be activated, this info could be taken into account during the CC process.

10. Transparency

The involved parties commit to guarantee the transparency of the results of RDCT processes.

Each TSO must share the criteria it will use to define the prices of its resources. These prices have to be based on the actual market prices and have to reflect the effective costs incurred by the TSOs (CACM c.3 a.35). In particular, TERNA and ADMIE compute the hourly prices of up and down regulation according to the actual costs incurred by the TSOs for the activation of internal resources.

11. Implementation roadmap

The entry into force of this RD and CT Methodology is subject to:

1. Regulatory approval of this RD and CT Methodology in accordance with Article 9 of the CACM Regulation;
2. Regulatory approval of Redispatching and Countertrading Cost Sharing Methodology required by Article 74 of the CACM Regulation in accordance with Article 9 of the CACM Regulation;
3. Implementation of the capacity calculation methodology of the GRIT CCR for the day ahead and intraday timeframe.
4. Development and implementation of the systems required to support the RD and CT Methodology.

The TSOs of GRIT region shall implement the proposed coordinated redispatching and countertrading methodology no later than 12 months after the conditions specified in paragraph 11 points 1 to 3 are fulfilled.

Annex 1 Acronyms

ACI: Area of Common Interest

CC: Capacity Calculation

CGM: Common Grid Model

CRA: Curative Remedial Action

CRAC: Contingencies, Remedial actions, Additional Constraints

CT: Counter Trading

D2CC: D-2 Capacity Calculation

DACF: Day Ahead Congestion Forecast

GSK: Generation Shift Key

IDCC: Intra Day Capacity Calculation

IDCF: Intra Day Congestion Forecast

PRA: Preventive Remedial Action

PST: Phase Shifting Transformer

RA: Remedial Action

RD: ReDispatching

RDCT: ReDispatching Counter Trading

RSC: Regional Security Coordinator

SCOPF: Security-Constrained Optimal Power Flow

SN: Snapshot

SO GL: System Operations Guide Line on Electricity Transmission System Operations

TSO: Transmission System Operator

Annex 2 Definitions and interpretations

On the base of these definitions the Parties developed a shared glossary aimed at reaching a common understanding on the matter.

In the interest of a common comprehension, additional definitions are given in the Article 2 of the guideline on Capacity Allocation and Congestion Management (CACM GL) and Article 2 of the Transmission System Operation (SO GL).

For the avoidance of doubt, following definitions and interpretations do not replace any provision of national or European law that may apply to any of the Parties. They shall comply with and be complementary to the applicable regulations. In case of contradictions between these definitions and interpretations and the applicable law, and especially with the CACM GL and the SO GL coming into force after this glossary, its provisions shall be interpreted in line with the applicable regulations or amended accordingly.

Aggregated Netted External (ANE) Schedule	Means a Schedule representing the netted aggregation of all External TSO Schedules and External Commercial Trade Schedules between two Scheduling Areas or between a Scheduling Area and a group of other Scheduling Areas.	
Cross-border relevant Remedial Action	Means a remedial action which is performed with the goal to relieve a constraint(s) with XB-Relevance.	
Internal relevant Remedial Action	Means a remedial action which is performed with the goal to relieve a constraint(s) without XB-Relevance.	
Internal Commercial Trade (ICT) Schedule	Means a Schedule representing the commercial exchange of electricity within a Scheduling Area between different Market Participants or between Nominated Electricity Market Operators and Market Coupling Operators.	
Redispatching/Countertrading Measures	Defines all the different type of measures, modifying the injection of one or more power plants, taken to ensure system security and firmness of Capacity and Exchange Programs on and around the border of countries and to possibly increase the NTC under particular circumstances. All the Redispatching Measures can be applied bilaterally or among several TSOs.	
	Countertrading	This Redispatch Measure is a TSO-initiated transaction between two control areas in order to relieve a congestion between these two areas. The location in the two control areas where the increase or decrease of energy takes place is arbitrary, in the sense that it is not a specific action on a predefined generation unit, but rather a choice based on the merit order or any other location-independent method if such exists. This measure implies the modification of schedule.

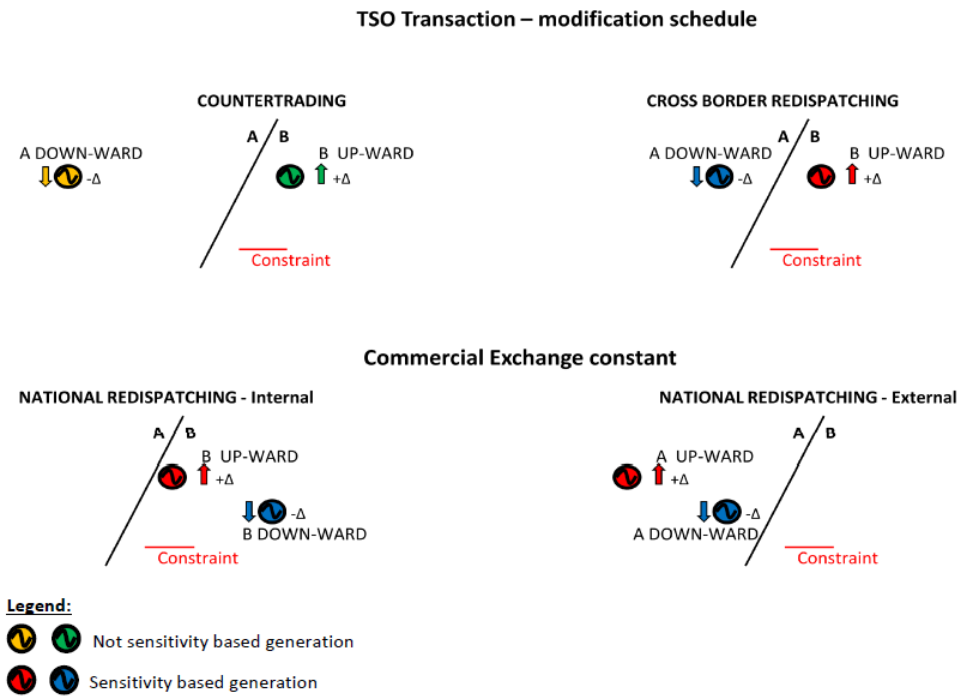
	Redispatching **(National redispatching)**	This Redispatch Measure is about increasing (decreasing) the level of production of a designated generation unit in one country (control area) and decreasing (increasing), by the same volume, the level of production of another designated generation unit located in the same country (control area), aiming to relieve a constraint in one control area (the affected generation units are mainly selected based on their sensitivity on that constraint). There are two distinct types of Redispatching, Internal Redispatching and External Redispatching and, both these types imply no modification of schedule between TSOs.	
		Internal **Redispatching**	This Redispatch Measure is implemented when a TSO decides to do Redispatching in its own country.
		External **Redispatching**	This Redispatch Measure is implemented when TSO A requests TSO B to do Redispatching in country B in order to relieve constraints in country A.
	Cross Border **Redispatching**	This Redispatch Measure is about increasing (decreasing) the level of production of a designated generation unit in country A and decreasing (increasing), by the same volume, the level of production of another designated generation unit in country B. To that end, TSO A increases or decreases the production by activating upward or downward offers based on both the location and costs of the generation units and TSO B counteracts in his country. In detail, generating units are mainly selected based on their sensitivity on the constrained element (and not only according to the economical merit order). Moreover at the same time, the TSO will have to initiate a	

		transaction between the two control areas, corresponding to the amount of generation Redispatching done in each country. This measure implies the modification of schedule between TSOs.
Schedule	Means a reference set of values representing the Generation, consumption or exchange of electricity between actors for a given time period.	
Remedial action (RA) (according to UCTE Operational Handbook Policy 3)	RA refers to any measure applied in due time by a TSO in order to fulfill the n-1 security principle of the transmission power system regarding power flows and voltage constraints.	
	Preventive Remedial Actions (PRAs)	PRAs are those launched to anticipate a need that may occur, due to the lack of certainty to cope efficiently and in due time with the resulting constraints once they have occurred.
	Curative Remedial Actions (CRAs)	CRAs are those needed to cope with and to relieve rapidly constraints with an implementation delay of time for full effectiveness compatible with the Temporary Admissible Transmission Loading. They are implemented after the occurrence of the contingencies.

Annex 3 Redispatching and Countertrading measures summary table

	Shift TSO A	**Shift TSO B**	**Location dependence**	**Modification of schedule**
Countertrading	Increasing/decreasing	Decreasing/increasing by the same volume	Independent method (economical merit order)	YES
Internal Redispatching	Increasing and decreasing by the	---	Geographical dependent	NO transaction between control

	same volume		method (sensitivity factor)	areas
External Redispatching	---	Increasing and decreasing by the same volume	Geographical dependent method (sensitivity factor)	NO transaction between control areas
Cross Border Redispatching	Increasing/decreasing	Decreasing/increasing by the same volume	Geographical dependent method (sensitivity factor)	YES



Picture 1: Redispatching and Countertrading examples