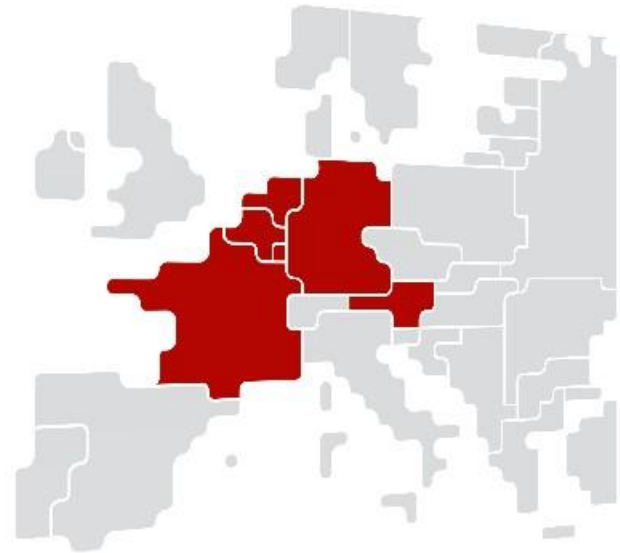


Evaluation of ALEGrO impact on CID results

12 SPAIC Day assessment

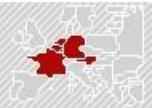


21/02/2020



1. ALEGrO implementation

Goal & Methodology



Goal

Share the obtained insights on the effects of

- the introduction of ALEGrO with Evolved Flow based into the CWE region (only) on the CIA Methodology (correctness of implementation) and;
- on the distributional effects on the CIA flows (delta comparison)
- Provide a transparent overview of how the analysis was done

Methodology:

- Calculations are made using the prepared Excel CRDS templates with and without ALEGrO as provided by Logarithmo which implement the introduced changes in the CWE CIA Methodology
- Input parameters used + assumptions made are elaborate
- Results are represented for several indicators in order to
 - Evaluate the correctness of the introduction of update CWE CIA Methodology (Based on outcomes of the scenario with ALEGrO)
 - Evaluate the impact of the introduction of ALEGrO on each indicator (comparison of the outcomes of scenario with and without ALEGrO)

Way Forward:

- Conclusions on the assessed results are included
- Next steps for the way forward for the CIA approval package are proposed

1. ALEGrO implementation

Analysis of 12 SPAIC Days



Following 12 SPAIC days were used for the analysis.

CWE official representative SPAIC days for the 12 month period after DE/AT split (1/10/2018 – 30/09 2019):

- 05.10.2018
- 17.11.2018
- 28.11.2018
- 28.12.2018
- 22.01.2019
- 21.03.2019
- 01.05.2019
- 10.05.2019
- 13.06.2019
- 16.06.2019
- 27.08.2019
- 11.09.2019

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1. ALEGrO implementation

Input parameters & assumptions made



- **LTA values:**
 - For the existing CWE borders, the LTA values of the respective BD were included (source: JAO CRDS files)
 - For the BE-DE border the LTA values of respectively 500 MW in winter period and 400 MW in summer period are used
- **LTN values:**
 - 0 MW, no LTN were applied on the respective SPAIC days (source: JAO CRDS files)
- **CIA PTFD values:**
 - A reference F151 day file was prepared which included ALEGrO values
 - For the CIA calculations without ALEGrO the same reference F151 day was used but the ALEGrO-related PTFDs were removed
 - → see tab "Aggregated PTFDs" in each excel file
- **Market Parameters (prices, Net positions):**
 - Market simulations were performed by external provider (EPEX) which resulted in Net Positions & market prices
 - Market simulations for a scenario with ALEGrO and without ALEGrO were executed:
 - This would allow a more 1 to 1 comparison of the effect of the introduction of ALEGrO
 - Outcomes of the Net positions & prices were included in the Excel files
 - Simulations were made in flow Flow Based Intuitive & Flow Based Plain (see next slide for explanation)

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1. ALEGrO implementation

Encountered issues during the assessment



While performing the 12 SPAIC day assessment some issues were encountered by Elia/Amprion/Logarithmo & EPEX

1. Issue on External Constraint for BE in Euphemia 10.4

- An inconsistency was detected by the way how the External constraint was implemented in E 10.4. This occasionally lead to very high price peaks for Belgium, despite that there were no net positions in Belgium surpassing the EC.
- It resulted in strange effects on the CI for CWE in both w and w/o ALEGrO
- For the assessment the EC for Belgium was removed in order to obtain representative results (which was confirmed).
- Error was communicated to NEMOs/PCR who are currently investigating the issue.

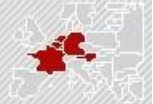
2. Issue related to the interaction between the intuitiveness patch and the introduction of Evolved Flow based

- On regional level the revenue adequacy principle seemed to be breached, leading to more situations & higher amounts of negative net congestion income hours
- First impression seems to indicate that the intuitiveness patch cuts too severely on the BE-DE border leading to a 0 MW flow while still a price difference between BE-DE exists
- The issue is under further investigation by Elia/Amprion experts in collaboration with NEMO experts. First reasoning:
 - The initial FB domain provided to EUPHEMIA ensures LTA coverage and revenue adequacy. If this initial domain is fully considered – as is the case in FB –, the CI will always be sufficient to cover LT resale costs.
 - The FBI patch in EUPHEMIA “cuts off” a part of the initial FB domain (to prohibit non-intuitive exchanges). This can lead to cases where an LTA corner is not part of EUPHEMIA’s solution space anymore and where the CI is then not sufficient to cover LT resale costs anymore.
 - This issue can also occur currently in CWE with 5 hubs (under investigation). With the new market topology with 7 hubs and new borders, this effect is intensified.
- Additional simulations were performed with ALEGrO and Flow Based Plain, which resolved this issue

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1. ALEGrO implementation

Shown Results



The results are therefore calculated for the following 4 scenario's:

Scenario 1

- FB Intuitive
- Without ALEGrO

Scenario 2

- FB Intuitive
- With ALEGrO

Scenario 3

- FB Plain
- Without ALEGrO

Scenario 4

- FB Plain
- With ALEGrO

In the result slides each time results for each of the 4 scenario's are provided

Focus is on

- The correctness of the introduction of ALEGrO (results of Scenario 2 & 4)
- The distributional effects of ALEGrO on the CIA flows (delta comparison Scenario 1 vs Scenario 2 and Scenario 3 vs Scenario 4)

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1. ALEGrO implementation

Evaluation of ALEGrO impact on CID results



Scenario 2

- FB Intuitive
- With ALEGrO

High negative CWE net CI observed in some hours for the case with ALEGrO when using **FBI** market results:

- Out of 288 hours, in 11 hours there is a negative CWE net CI of < -200 €

date	hour	sum TSOs
05.10.2018	6	-265
05.10.2018	7	-992
05.10.2018	11	-2.150
05.10.2018	23	-1.311
17.11.2018	21	-426
28.11.2018	7	-787
22.01.2019	1	-2.730
22.01.2019	8	-544
22.01.2019	9	-971
22.01.2019	10	-388
21.03.2019	8	-473

- FBI with this introduction of Evolved Flow Based is "incompliant" with principle of revenue adequacy (which now becomes clearer in a scenario with additional borders and a new topological situation)

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1. ALEGrO implementation

Evaluation of ALEGrO impact on CID results



The problem of high negative CWE net CI disappears when using ALEGrO with **FBP** market results

- The minimum CWE net CI (with ALEGrO) is -27 € over the whole time period which can be explained by rounding errors
- Similar effects as experienced today in CWE

The methodology for ALEGrO works as expected for **FBP**

- Prices of the virtual Hubs are always equal
- The ALEGrO flow is indeed sometimes 0 MW, but this only occurs when there is also full price convergence in CWE, hence it does not lead to additional socialization on this border in such cases
- The CI on the BE-DE border is indeed equal to the ALEGrO flow x the spread between DE-BE (before rescaling)
- It holds that: Total CI – Resale costs = net CI
- The overall amounts paid and received for socialization are identical. Therefore, the net total is zero, as it should be. The socialization mechanism works also with ALEGrO

Listed points above also apply to **FBI** (except for bullet point 2)

- Thus the methodology seems to behave also well on almost all parts when applying FBI, except for the bullet 2 which is linked to the revenue adequacy
- The ALEGrO flow is also in case of FBI sometimes 0 MW, but this is not only in case of full price convergence
- Hence when there is still a delta P between BE-DE it leads, for the case of FBI only, to additional socialization on this border

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1. ALEGrO implementation

Conclusion for the CIA methodology & the CIA approval package



Conclusions

Results included in the slides below give following main conclusions

	FB Intuitive + ALEGrO	FB Plain + ALEGrO
Effect Regional CWE-level	✘	✔
Correctness of CIA Methodology with ALEGrO	✔	✔
Effect of ALEGrO on CI distribution	✔	✔

Scenario FB Plain with Evolved FB with ALEGrO

- The simulations prove that the introduction of ALEGrO as currently foreseen & developed in the CIA Methodology is correctly working:
- The introduction of ALEGrO in the CRDS files does not lead to any deficiencies or imbalance effects in the distribution of the congestion income, socialisation costs

Scenario FB Intuitive with Evolved FB with ALEGrO

- The current results for this scenario shows that the interference of the FB Intuitive and the introduction with ALEGrO leads to negative effects for the Congestion in the entire CWE region
 - FBI is "incompliant" with revenue adequacy (which now becomes clearer in a scenario with additional borders and a new topological situation)
- Despite the negative effects on the CWE regional level the Introduction of ALEGrO seems to be working correctly and does not lead to any inefficiencies for the distribution of CI

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1. ALEGrO implementation

Next steps & way forward for the CIA methodology & the CIA approval package



Way Forward

- Ongoing discussions on Flow Based Plain vs Flow Based Intuitive → switch to Flow Based Plain is sought after before the Go live of ALEGrO
- Within this context the results of the assessment of the FB Plain scenario show that the introduction of ALEGrO in the CIA Methodology is compliant with the main principles of the methodology
 - Methodology proves to work correctly
 - No imbalances in the distributions of CI or socialization costs
- *Since FB Plain will most likely be introduced before the Go live of ALEGrO, the inclusion of ALEGrO in the CIA Methodology proves to be working correctly. No disclaimer is needed for this scenario.*
- However it is acknowledged that an introduction of ALEGrO with Flow Based Intuitive is not fully reassuring yet.
 - Further investigations might be required if it concerns an incorrectness or an incompliance
 - The incompliance of FBI with the revenue adequacy becomes more explicit with this introduction of topology
- *For this situation an introduction of a disclaimer in the current version of the CIA Methodology for the approval package seems to be the best option available*
 - The disclaimer specifies that if ALEGrO is introduced in the context of FBI, then there is the need to develop a methodology on how to split the negative CI between the TSOs
 - In the meanwhile discussions with Regulators on the way forward on the switch for FB Plain can continue and take into account this additional insight as another advantage of the implementation of Flow Based Plain

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1. ALEGrO implementation

Evaluation of ALEGrO impact on CID results



Percentage of congested hours

- Indicates the percentage of hours where at least two different prices occurred in the flow-based capacity calculation region.

FBI

- Price convergence increases with ALEGrO by about 4 percentage points (from 65% of congested hours to 61%).

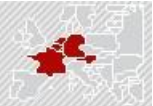
FBP

- Price convergence increases with ALEGrO by about 4 percentage points (from 65% of congested hours to 61%).

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1. ALEGrO implementation

Evaluation of ALEGrO impact on CID results



Total CI

- CWE total

Case	FBI	FBP
W/O ALEGrO	10.297.947	9.987.165
W/ ALEGrO	10.187.032	9.811.531
Diff	-110.915	-175.634

As expected, less total CI is generated with FBP compared to FBI and less total CI is generated with ALEGrO than without ALEGrO. This is because ALEGrO as well as FBP will lead to more market exchanges and thus smaller price differences which in turn will lead to a reduction of congestion income.

- Per hub

FBI

Case	BE	FR	NL	DE	AT	SL
W/O ALEGrO	1.167.117	1.922.924	1.918.051	3.082.059	1.041.811	1.165.986
W/ ALEGrO	1.294.399	1.599.461	1.488.688	3.429.133	1.178.071	1.197.280
Diff	127.282	-323.462	-429.363	347.074	136.260	31.294

FBP

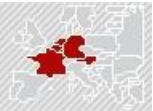
Case	BE	FR	NL	DE	AT	SL
W/O ALEGrO	1.118.571	1.761.663	1.936.363	2.985.241	1.071.094	1.114.234
W/ ALEGrO	1.286.345	1.452.612	1.452.216	3.317.655	1.179.708	1.122.994
Diff	167.774	-309.051	-484.147	332.414	108.614	8.761

With the implementation of ALEGrO, the ALEGrO parties receive more total CI while most other parties lose total CI due to the lower price differences.

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1. ALEGrO implementation

Evaluation of ALEGrO impact on CID results



Internal pot

- CWE total

Case	FBI	FBP
W/O ALEGrO	7.965.974	7.758.698
W/ ALEGrO	7.792.472	7.565.542
Diff	-173.502	-193.156

External pot

- CWE total

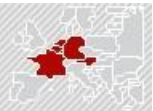
Case	FBI	FBP
W/O ALEGrO	2.331.973	2.228.467
W/ ALEGrO	2.394.560	2.245.989
Diff	62.587	17.522

The internal pot decreases with ALEGrO compared to without ALEGrO whereas the external pot marginally increases.

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1. ALEGrO implementation

Evaluation of ALEGrO impact on CID results



Remuneration costs

- CWE total

Case	FBI	FBP
W/O ALEGrO	7.499.023	7.642.679
W/ ALEGrO	8.817.599	8.746.380
Diff	1.318.576	1.103.701

Remuneration costs increase with ALEGrO. The effect is slightly less pronounced with FBP.

- Per hub

FBI

Case	BE	FR	NL	DE	AT	SL
W/O ALEGrO	997.721	1.106.947	980.080	2.336.684	1.090.063	987.528
W/ ALEGrO	1.217.510	1.045.451	956.626	3.035.303	1.369.937	1.192.773
Diff	219.789	-61.496	-23.454	698.619	279.874	205.244

FBP

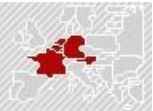
Case	BE	FR	NL	DE	AT	SL
W/O ALEGrO	999.036	1.085.547	1.064.370	2.402.289	1.097.387	994.050
W/ ALEGrO	1.219.007	1.010.388	952.314	2.996.404	1.382.853	1.185.415
Diff	219.972	-75.159	-112.056	594.115	285.465	191.365

Remuneration costs increase for those hubs which receive more CI, while resale costs decrease for those hubs which receive less CI.

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1. ALEGrO implementation

Evaluation of ALEGrO impact on CID results



Socialization → received due to the socialization

- CWE total

Case	FBI	FBP
W/O ALEGrO	1.805.115	1.899.659
W/ ALEGrO	2.217.341	2.221.029
Diff	412.226	321.370

Socialization → paid due to the socialization

- CWE total

Case	FBI	FBP
W/O ALEGrO	1.805.115	1.899.659
W/ ALEGrO	2.217.341	2.221.029
Diff	412.226	321.370

Socialization → total

- CWE total

Case	FBI	FBP
W/O ALEGrO	0	0
W/ ALEGrO	0	0

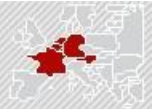
The amounts paid and received are identical for FBP and also FBI. Therefore, the net total is zero, as it should be. The socialization mechanism works also with ALEGrO.

With ALEGrO there is more socialization needed. The effect is less pronounced with FBP.

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1. ALEGrO implementation

Evaluation of ALEGrO impact on CID results



Socialization → total

- Per hub

FBI

Case	BE	FR	NL	DE	AT	SL
W/O ALEGrO	87.097	-192.173	-290.011	87.888	120.594	186.605
W/ ALEGrO	56.220	-284.087	-209.428	55.861	213.460	167.974
Diff	-30.878	-91.914	80.583	-32.026	92.866	-18.632

FBP

Case	BE	FR	NL	DE	AT	SL
W/O ALEGrO	100.892	-180.284	-297.984	136.617	89.201	151.559
W/ ALEGrO	58.521	-302.564	-178.716	56.699	217.082	148.978
Diff	-42.370	-122.280	119.268	-79.918	127.881	-2.580

A positive value indicates that the hub is a net receiver. A negative value indicates a net payer.

The effect of ALEGrO is that:

- The hubs NL and AT receive more/have to pay less for socialization,
- While the hubs BE, DE and FR receive less/have to pay more for socialization.

This effect is more pronounced with FBP.

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1. ALEGrO implementation

Evaluation of ALEGrO impact on CID results



Socialization → total

- Per border

FBI

Case	BE-FR	BE-NL	DE-FR	DE-NL	DE-AT	BE-DE	AT-SL	DE-SL	FR-SL
W/O ALEGrO	414.468	-321.608	-445.517	-272.950	252.397		140.954	466.556	-234.300
W/ ALEGrO	339.211	-222.078	-508.486	-219.760	382.895	-107.729	255.383	353.405	-272.841
Diff	-75.257	99.530	-62.969	53.190	130.498	-107.729	114.429	-113.152	-38.541

FBP

Case	BE-FR	BE-NL	DE-FR	DE-NL	DE-AT	BE-DE	AT-SL	DE-SL	FR-SL
W/O ALEGrO	434.929	-321.413	-383.993	-292.403	259.764		72.443	504.496	-273.821
W/ ALEGrO	361.506	-179.674	-514.042	-199.510	412.641	-178.876	234.273	376.336	-312.652
Diff	-73.423	141.739	-130.049	92.893	152.877	-178.876	161.830	-128.160	-38.831

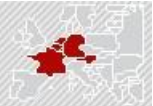
ALEGrO is a net payer and even more so under FBP.

For a lot of borders, ALEGrO helps to even out the net payers and the receivers. For example, the DE-NL border is always a net payer, but has to pay less with ALEGrO.

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1. ALEGrO implementation

Evaluation of ALEGrO impact on CID results



Net CI

- CWE total

Case	FBI	FBP
W/O ALEGrO	2.798.924	2.344.486
W/ ALEGrO	1.369.433	1.065.151
Diff	-1.429.491	-1.279.335

As expected, less net CI is generated with FBP compared to FBI and less net CI is generated with ALEGrO than without ALEGrO.

- Per hub

FBI

Case	BE	FR	NL	DE	AT
W/O ALEGrO	316.536	955.751	695.693	724.540	106.403
W/ ALEGrO	174.872	503.306	310.887	349.200	31.167
Diff	-141.664	-452.445	-384.806	-375.340	-75.236

FBP

Case	BE	FR	NL	DE	AT
W/O ALEGrO	260.649	815.217	541.419	634.732	92.470
W/ ALEGrO	144.244	407.990	156.762	335.111	21.043
Diff	-116.405	-407.227	-384.656	-299.620	-71.427

All hubs receive less net CI with ALEGrO.

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1. ALEGrO implementation

Evaluation of ALEGrO impact on CID results



Net CI

- Per TSO

FBI

Case	Amprion	APG	Elia	RTE	Tennet BV	TenneT	
						GmbH	Transnet
W/O ALEGrO	635.517	106.403	316.536	695.693	724.540	108.788	211.446
W/ ALEGrO	377.926	31.167	174.872	310.887	349.200	55.254	70.127
Diff	-257.592	-75.236	-141.664	-384.806	-375.340	-53.534	-141.319

FBP

Case	Amprion	APG	Elia	RTE	Tennet BV	TenneT	
						GmbH	Transnet
W/O ALEGrO	550.313	92.470	260.649	541.419	634.732	93.751	171.153
W/ ALEGrO	322.417	21.043	144.244	156.762	335.111	49.074	36.500
Diff	-227.896	-71.427	-116.405	-384.656	-299.620	-44.677	-134.653

All TSOs receive less net CI with ALEGrO.