



SCC – Present and future

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Brief company history

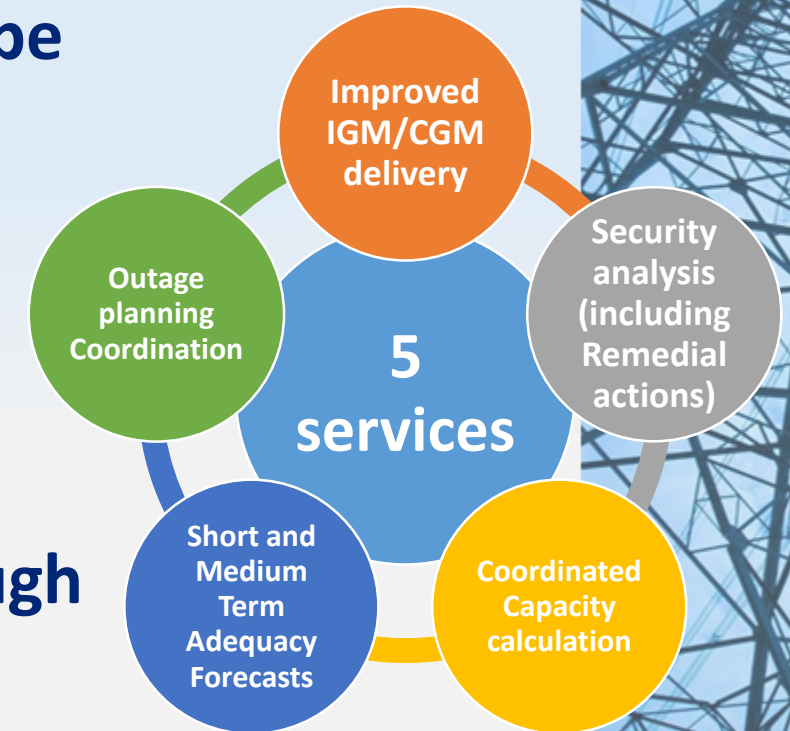


- ❖ Region of SEE was not covered by existing RSC(I)s (TSCNET, CORESO).
- ❖ Following the form defined by ENTSO-E's Policy Paper *“Core strategy for TSO Coordination”* and European NC/GL, SEE TSOs recognized the need for regional cooperation.
- ❖ *April 2015*: EMS, CGES and NOSBiH established SCC as the first RSC(I) in SEE, based in Belgrade.
- ❖ *1st of August 2015*: SCC started operational activities.



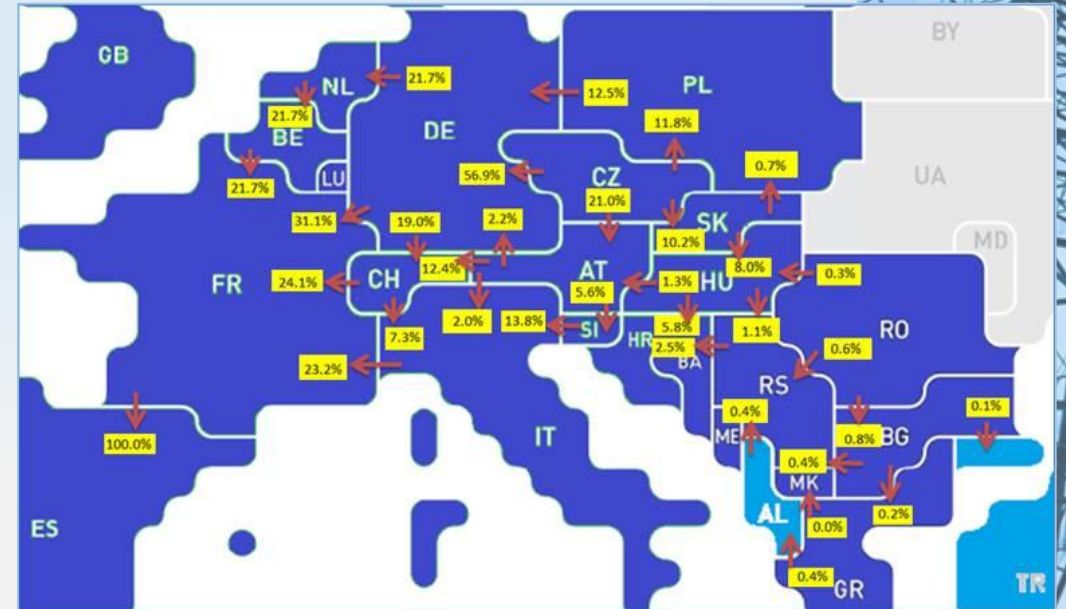
❖ Services and main activities:

1. Validation of DACF and IDCF Continental Europe (CE) IGMs/creation and delivery of CE CGMs
2. N-1 security analysis for TSOs founders of SCC
3. Test Run of daily NTC Calculations for TSOs founders of SCC
4. Contribution to SEE Maintenance Group through model creation and N-1 security analysis
5. Participation in ENTSO-E projects SMTA & OPC



Additional services

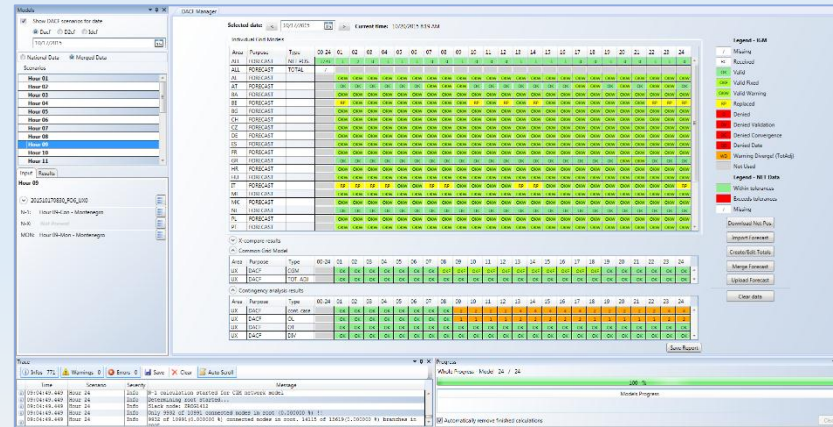
- ❖ SCC is open to provide additional services to TSO members as well as to other parties like ENTSO-E.
- ❖ The example of such a service is analysis of loop flow indicators for Continental Europe based on PTDF data for 2015, on an hourly resolution (for bidding zone and country levels) done for ENTSO-E upon their request.



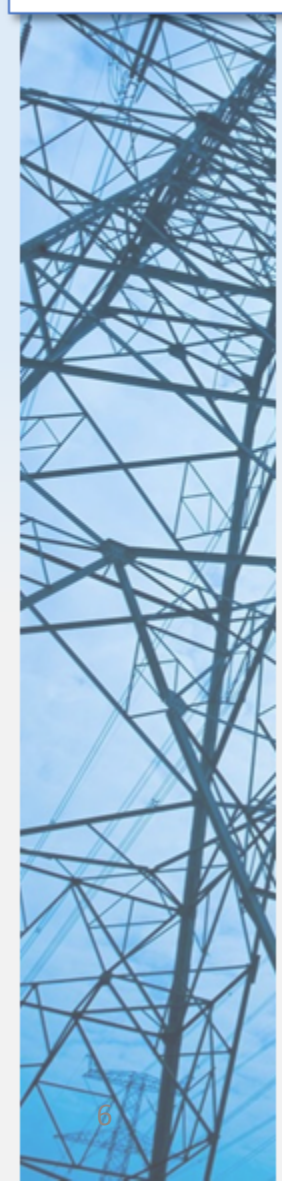
Application and Specialized Tools



❖ TNA (Transmission Network Analyzer)

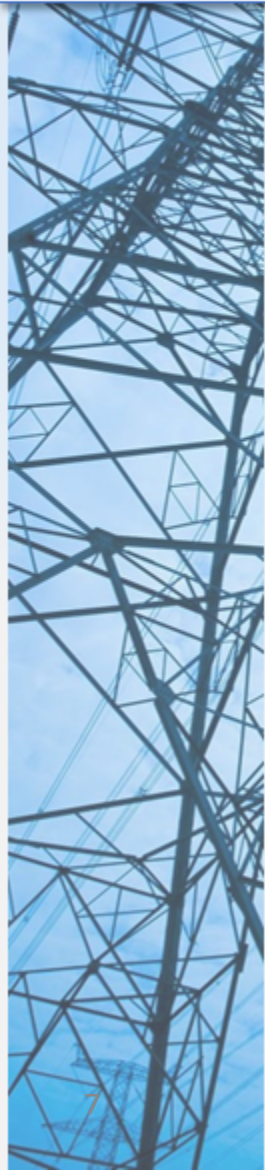


❖ QAS Portal (Quality Assessment Service)



Future development

- ❖ **SCC plans to develop the following services:**
 - **Upgrade of software tools for IGM validation and CGM merging process according to latest ENTSO-E EMF (European Merging Function) requirements.**
 - **Extension of Security analysis with Remedial actions functionality,**
 - **Coordinated Capacity Calculations,**
 - **Outage Planning,**
 - **System Adequacy Assessment.**



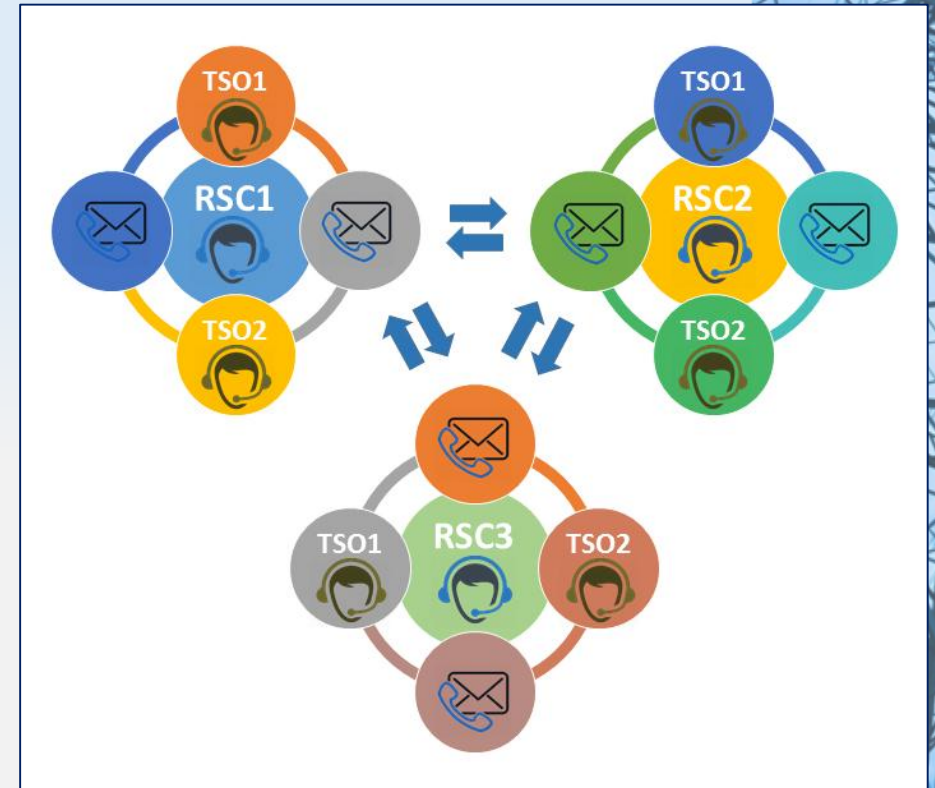
Upgrade of SW for IGM validation and CGM creation according to EMF



- ❖ **All RSCs have to upgrade their software according to ENTSO-E EMF requirements**
 - **Core functions required for IGM and CGM validation and merging already supported by TNA tool**
 - **CGMES compliant tool (import and merge supported)**
 - **Upgrade of validation according to ENTSO-E QoD for CGMES in progress**
 - **Non-functional EMF requirements will be implemented within the project that is scheduled to start in the beginning of 2017**
 - **Additional requirements will be also implemented within same project**

Security analysis including Remedial Actions

- ❖ Actual practice in SEE: Remedial Actions are agreed upon on bilateral agreement between TSOs.
- ❖ Different models of security analysis that include RA are being used in Coreso and TSCNET.
- ❖ ENTSO-E activities towards defining of Pan-European Remedial Action coordination process.
- ❖ Necessary close cooperation among all RSCs and especially between neighboring RSCs.



OPC – From SEE to Pan-European concept

Concept before 2016

- Based on expert's experiences
- Security analysis:
 - during preparation of Annual Maintenance Plan
 - if some important changes happen (in relation to Annul Plan)

SEE TSOs



Concept in 2016

- Based on expert's experiences
- Security analysis:
 - during preparation of Annual Maintenance Plan
- Regular N-1 security analysis performed by SCC



Future Concept

- SEE OPC based on uniform Pan-European OPC concept and common SW

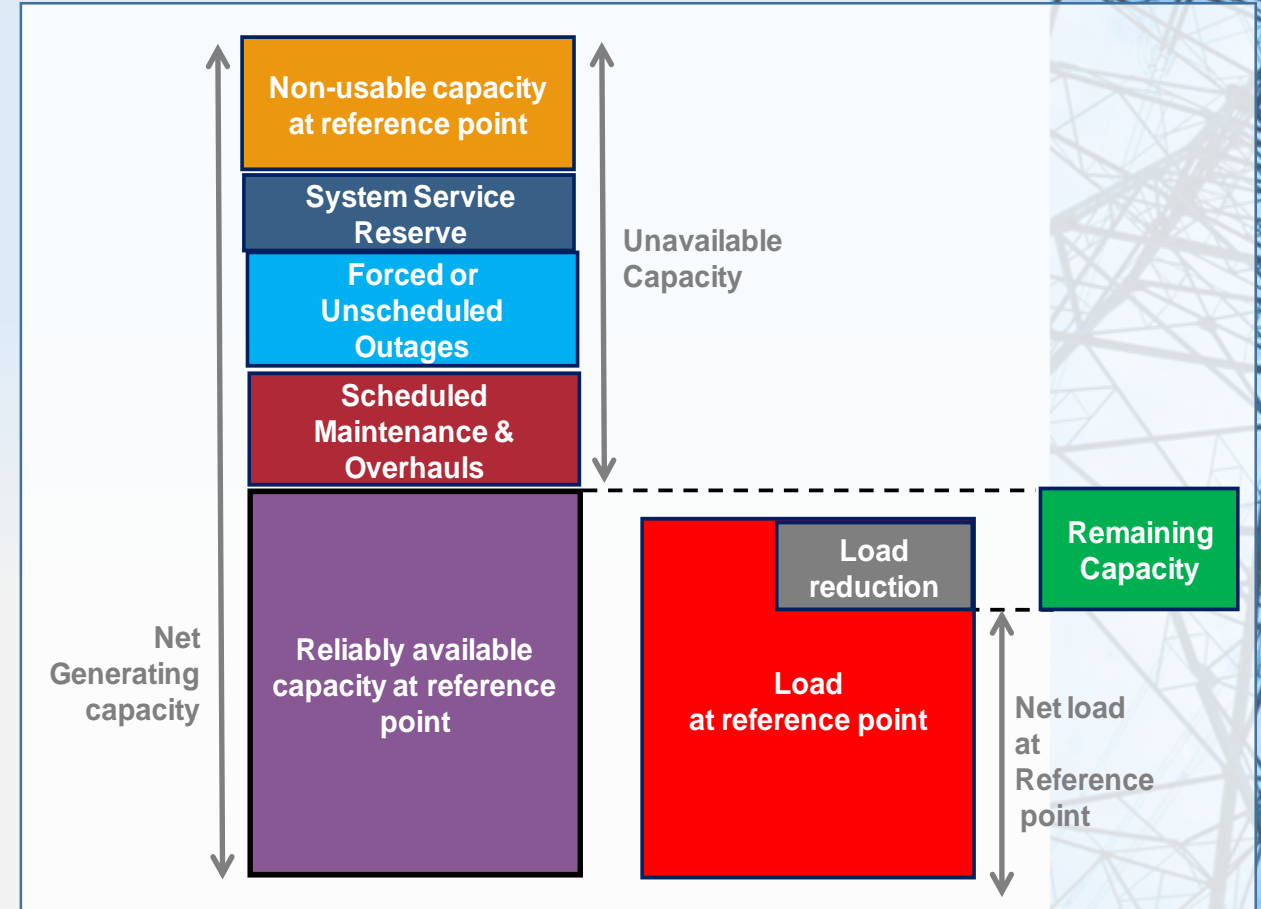
All TSOs
All RSCs

SEE RSCs

SEE TSOs

Short and Medium Term Adequacy (SMTA) – Dry Run

- ❑ Deterministic approach
 - Remaining capacity RC
 - Net Transfer Capacity NTC
- ❑ Control area can:
 - Import energy
 - Export energy
 - Be a transit area
- ❑ All transactions are limited by NTC values.
- ❑ SMTA Winter Dry Run Report 2015-2016 ✓
- ❑ High Level Business Process document ✓



PART 2 - COORDINATING CAPACITY CALCULATION

- ❖ **EC Regulations**
- ❖ **Regions for Coordinating Capacity Calculation (CCC)**
- ❖ **Methods of Capacity Calculation**
- ❖ **CCC in SEE region**
- ❖ **CCC in SCC**
- ❖ **CCC– SCC possibilities and next steps**
- ❖ **Conclusion**



EC Regulations

❖ Capacity Allocation and Congestion Management (CACM)

Subject matter and scope

This Regulation lays down detailed guidelines on cross-zonal capacity allocation and congestion management **in the day-ahead and intraday markets**, including the requirements for the establishment of **common methodologies for determining the volumes of capacity simultaneously available between bidding zones**, criteria to assess efficiency and a **review process for defining bidding zones**.

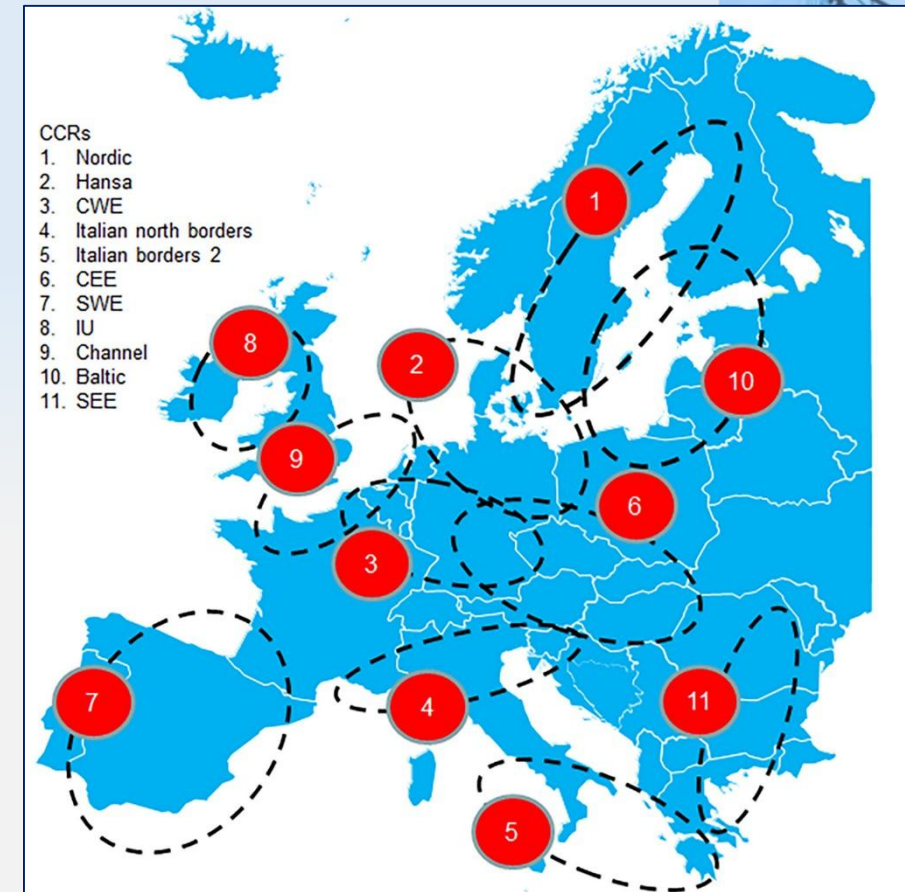
❖ Forward Capacity Allocation (FCA)

Subject matter and scope

This Regulation lays down detailed rules on cross-zonal capacity allocation in the **forward markets**, on the establishment of a **common methodology to determine long-term cross-zonal capacity**, on the establishment of a single allocation platform at European level offering long-term transmission rights, and on the possibility to return long-term transmission rights for subsequent forward capacity allocation or transfer long-term transmission rights between market participants.

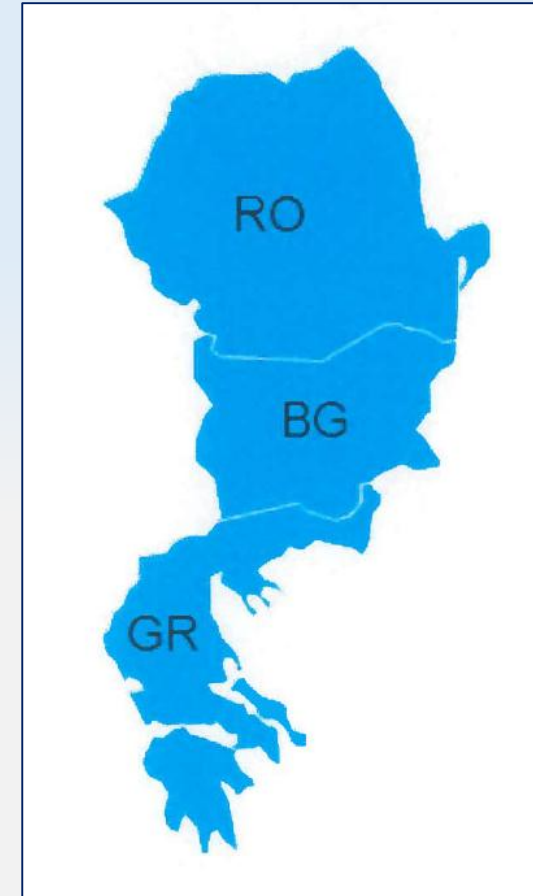
Regions for Coordinating Capacity Calculation

- ❖ ENTSO-E's has submitted the proposal for Capacity Calculation Regions (CCRs) in Europe to ACER
- ❖ ACER has defined CCRs (November 17, 2016), following should be pointed out:
 - CCR 3: Core (merging of CWE and CEE CCRs into one CCR)
 - CCRs shall include a bidding zone border between Germany/Luxembourg and Austria in defining the bidding zone borders



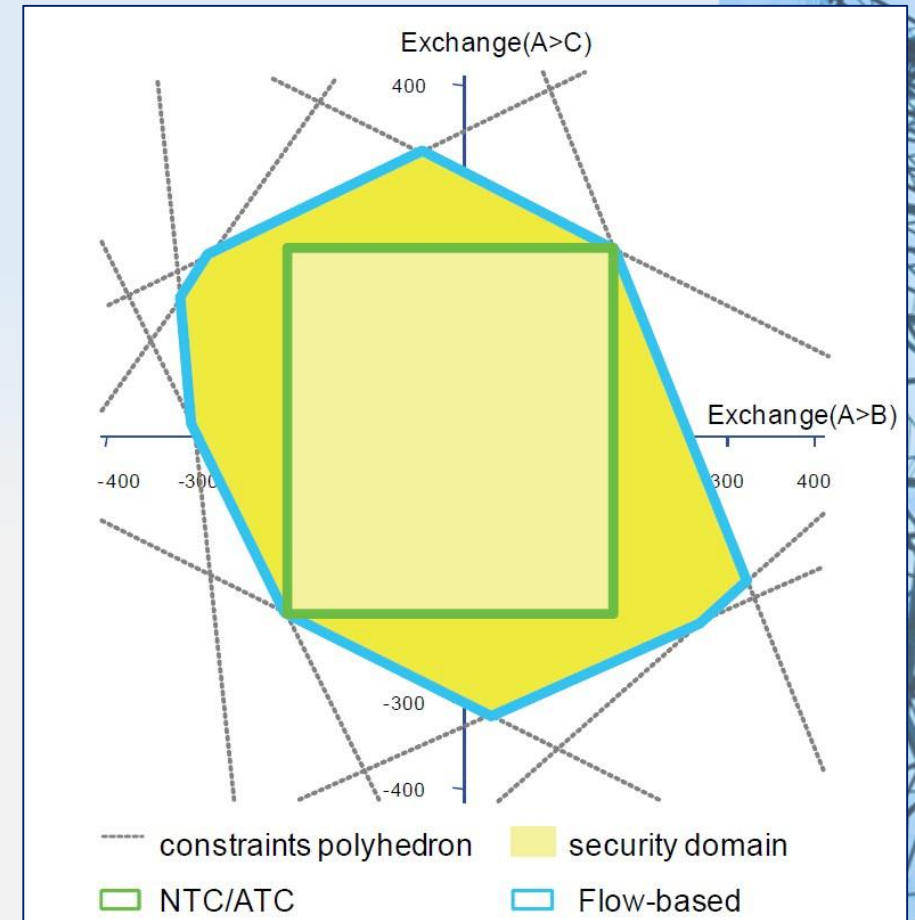
Coordinating Capacity Calculation in SEE

- ❖ **Specificity of SEE:**
 - EU TSOs (mandatory implementation of CACM and FCA)
 - NON-EU TSOs ("early implementation" of CACM and FCA?)
- ❖ **SEE Coordinated Capacity Calculation methodology and business process - to be defined and developed.**
- ❖ **Cooperation between SEE RSCs is necessary.**
- ❖ **Coreso and TSCNET future common Coordinated Capacity Calculations for Core CCR (based on MoU of CWE and CEE TSOs) could be an example for SEE**



Methods of Capacity Calculation

- ❖ NTC(ATC)-based calculation and allocation is widely applied across Europe (in SEE at all borders)
- ❖ Flow-based approach is the main future option for strongly meshed grids (as Continental Europe is, including SEE)
- ❖ Flow-based calculation and FB-Market Coupling applied in Central West Europe since May 2015
- ❖ Further spreading FB approach is expected



Methods of Capacity Calculation

NTC, i.e. ATC-based:
single program constraint per border for commercial transactions



Flow-based (PTDF/MF):
set of physical constraints MF per network elements, and sensitivity factors (PTDF)



Coordinating Capacity Calculation in SCC

- ❖ Test run process on NTC capacity calculation is being performed every Monday on D2CF models of SEE region for Wednesday.
- ❖ Results of NTC calculation is delivered to TSOs.
- ❖ Aim is gaining of experience for this process



Coordinating Capacity Calculation in SCC

- ❖ SCC has application software for NTC (Y/M) and NTC for day-ahead allocation, tailored to D-2 calculation process (automated calculation for 24 hours)
- ❖ SCC is testing 24 hours automatic NTC calculation, for all borders of SCC TSOs
- ❖ SCC has application software for Flow-based capacity calculation solution



SCC – 24h automatic NTC calculation



Date: 05-Oct-16 Export Areas: RS Import Areas: BA, HR

Hour:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Step size:	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	75	75	75	50	60
Initial ΔE:	50	50	50	50	50	50	50	50	50	50	50	50	50	50	200	50	50	50	50	50	50	50	50	50
Export Method:	PR	PR	PR	PR	PR	PR	PR	PR	PR	PR	PR	PR	PG	PR	PR	PR	PG	PR	PR	PR	PR	PR	PR	PR
Import Method:	PR	PR	PR	PR	PR	PR	PR	PR	PR	PR	PR	PR	PG	PR	PR	PR	PG	PR	PG	PR	PR	PR	PR	PR
Export Max available:	1117.3	1219.0	1219.0	1249.0	1241.0	1206.5	1119.4	1044.2	884.7	864.8	844.8	834.0	862.6	912.5	905.5	925.4	904.7	902.7	878.0	665.0	675.9	826.6	943.9	982.0
Import Max available:	665.0	639.0	619.0	619.0	619.0	660.0	867.0	977.0	1093.0	1158.0	1173.0	1168.0	1108.0	1153.0	1186.0	1216.0	1186.0	1176.0	1196.0	1311.0	1266.0	1148.0	997.0	815.0
Limit:	1000	1000	1000	1000	1000	1000	1000	1000	900	1000	1000	1000	1000	1000	1000	1000	1500	1000	1500	1000	1000	1000	1000	1000
Cont:	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mon:	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Apply to all
Apply to all
Apply to all
Apply to all
Apply to all

- Legend**
- PR - Proportional To Reserve
 - PG - Proportional To Engagement
 - PC - Proportional To K
 - GS - Generation Shift Lists

Initial Info

Current Calculation

Step No.:	14/20	13/20	13/20	13/20	13/20	14/20	18/20	20/20	18/18	18/20	17/20	17/20	20/20	19/20	19/20	30/30	19/20	18/30	9/14	10/14	12/14	19/20	14/17	
ΔE:	665.0	639.0	619.0	619.0	619.0	660.0	867.0	977.0	884.7	864.8	844.8	834.0	1000.0	912.5	905.5	925.4	1500.0	902.7	877.9	665.0	675.9	826.6	943.9	815.0
TTF:	420.3	334.4	315.8	305.0	314.6	324.9	652.2	779.1	749.0	753.6	761.3	808.5	934.5	856.9	814.1	815.5	1182.6	911.8	759.8	713.0	766.2	739.4	543.5	487.5
No. Crit. outages Crit. overloads:	0/0	0/0	0/0	0/0	0/0	0/0	2/1	5/1	8/2	8/2	9/2	15/2	27/2	20/4	8/2	8/2	35/7	25/5	3/1	2/1	18/1	2/1	0/0	0/0
Max loading:	0	0	0	0	0	0	112.2	124.2	130.2	129.4	130.4	135.6	155.9	138.8	131.4	130.8	174.8	142.8	170.4	120.4	123.9	118.3	0	0

Final Calculation

Step-accepted:	0/20	13/20	13/20	13/20	13/20	14/20	18/20	20/20	18/18	18/20	17/20	17/20	20/20	19/20	19/20	30/30	19/20	18/30	9/14	10/14	12/14	19/20	14/17	
ΔE _{max} :	0.0	639.0	619.0	619.0	619.0	660.0	867.0	977.0	884.7	864.8	844.8	834.0	1000.0	912.5	905.5	925.4	1500.0	902.7	877.9	665.0	675.9	826.6	943.9	815.0
NTF:	122.1	46.5	36.4	24.0	34.1	26.6	277.7	356.7	371.1	386.0	401.6	452.5	445.9	470.1	438.2	433.4	469.3	537.1	400.2	428.7	487.1	200.1	149.8	127.5
TTF:	122.1	334.4	315.8	305.0	314.6	324.9	652.2	779.1	749.0	753.6	761.3	808.5	934.5	856.9	814.1	815.5	1182.6	911.8	759.8	713.0	766.2	739.4	543.5	487.5
BCE:	122.1	46.5	36.4	24.0	34.1	26.6	277.7	356.7	371.1	386.0	401.6	452.5	445.9	470.1	438.2	433.4	469.3	537.1	400.2	428.7	487.1	200.1	149.8	127.5
TRM:													100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
TTC:													1286.5	1445.5	1382.6	1343.7	1358.7	1969.2	1439.8	1286.5	1445.5	1382.6	1343.7	1358.7
NTC:													1186.5	1345.5	1282.6	1243.7	1258.7	1869.2	1339.8	1186.5	1345.5	1282.6	1243.7	1258.7
TTF RS-BA:													382.4	460.4	407.5	421.8	428.4	683.9	453.3	382.4	460.4	407.5	421.8	428.4
TTF RS-HR:													426.2	474.1	449.4	392.3	387.0	498.8	458.5	426.2	474.1	449.4	392.3	387.0
NTC RS-BA:													561.1	663.1	609.9	644.4	661.3	1080.9	666.1	561.1	663.1	609.9	644.4	661.3
NTC RS-HR:													625.4	682.9	672.7	599.3	597.4	788.3	673.7	625.4	682.9	672.7	599.3	597.4

Scenario: 20161116_NTC Model: 20161116_1030_FO3_UX0

Calculated parameters

NTC	112.0 [MW]	TTC	212.0 [MW]
NTF	-287.99 [MW]	TTF	-123.66 [MW]
BCE	-288.0 [MW]	TRM	100.0 [MW]
DE _{max}	500.0 [MW]	DF _{max}	164.33 [MW]
PTDF _{base}	99.99688 [%]	PTDF _{max}	-58.33008 [%]

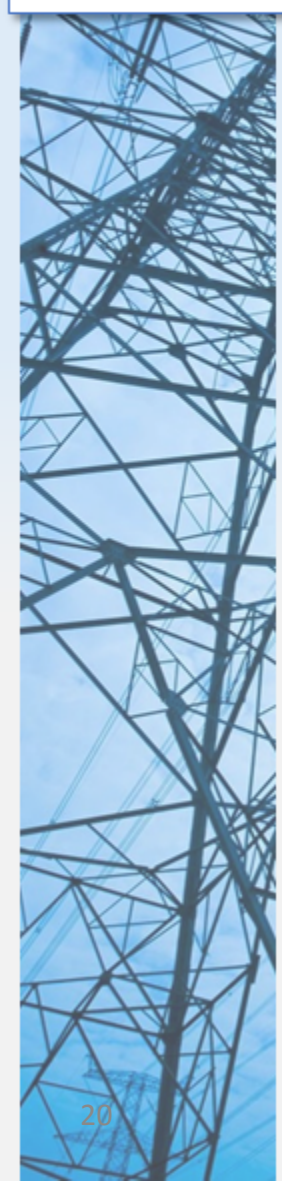
All export areas

Area	Include
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BA	<input type="checkbox"/>
BG	<input type="checkbox"/>
GR	<input type="checkbox"/>
HR	<input type="checkbox"/>
HU	<input type="checkbox"/>
ME	<input type="checkbox"/>
MK	<input type="checkbox"/>
RO	<input type="checkbox"/>

Export methods:

- Proportional To Reserve (dPg)
- Proportional To Engagement (Pg)
- Proportional To K
- Generation Shift Lists

Area	Node Code	Pg [MW]	dPg
RS	JTENTB11	490	
RS	JTENTB12	580	
RS	JTENTA12	246	
RS	JTENTA23	238	



Capacity Calculation – SCC possibilities and next steps

- ❖ In cooperation with its TSOs, SCC is developing application software for automatic deployment of Remedial Actions into contingency analyses and NTC calculation
- ❖ SCC is prepared and ready to start providing its services as Capacity Calculation Calculator when requested by potential users
- ❖ Especially, time-demanding 24xNTC processes is suitable to be transferred to RSC
- ❖ SCC is ready to cooperate with other RSC(I)s on regional as well as on pan-European level
- ❖ SCC has skilled personnel constantly in cooperation with TSO experts
- ❖ Next steps – awaiting TSOs decisions and requests

Conclusion

- ❖ **SCC has developed procedures and tools, and trained engineers to perform capacity calculations for TSOs both:**
 - **NTC-based (as currently applied in SEE)**
 - **and Flow-based (as obvious target model)**
- ❖ **SEE Coordinated Capacity Calculation methodology and business process have to be defined and developed.**
- ❖ **There is need for close cooperation between SEE TSOs and RSCs.**
- ❖ **TSOs, ENTSO-E, EnCS, SEE CAO and RSC(s) can jointly facilitate further development and coordination of Capacity Calculation and Allocation procedures in SEE**

Thank you for your attention!



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