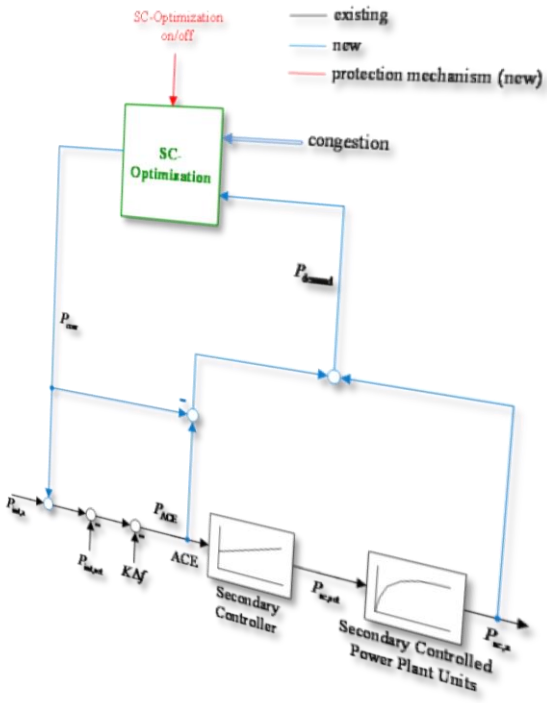
SLOVENSKÁ ELEKTRIZAČNÁ PRENOSOVÁ SÚSTAVA, a.s.

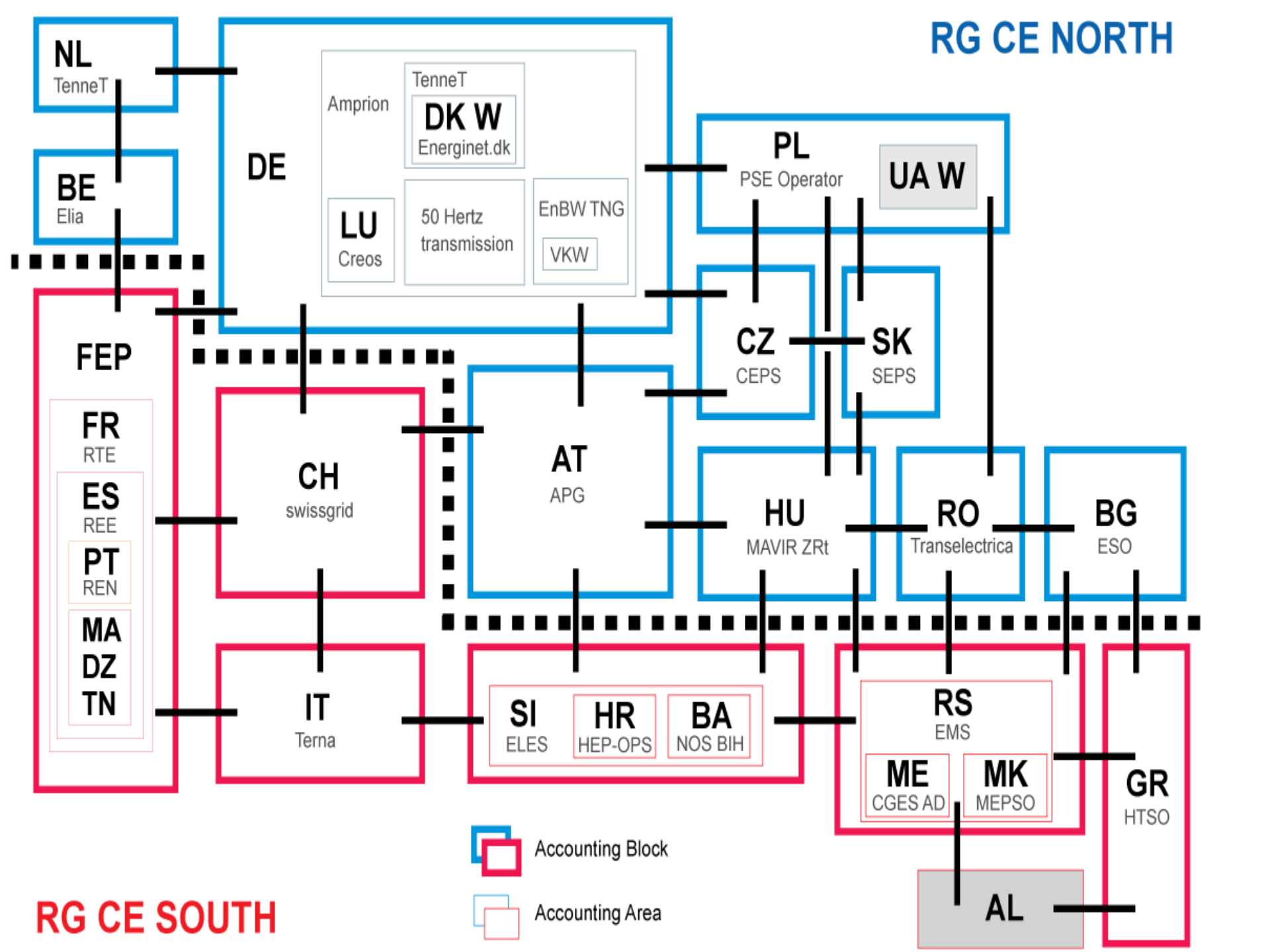
ENKO 2014

Bratislava, 24.4.2014

e-GCC



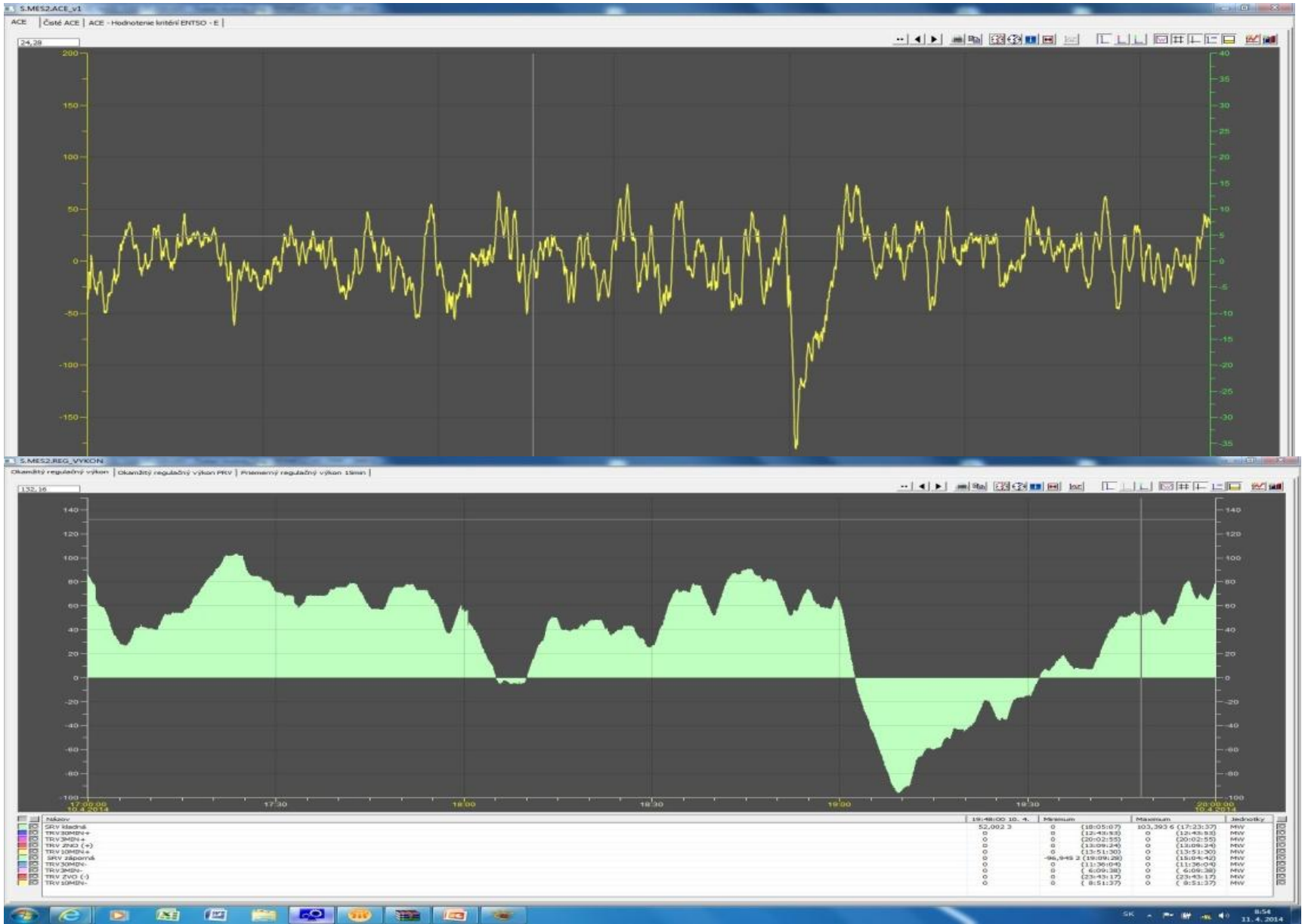
Ing. Andrej Pukač


RG CE NORTH
NL
TenneT
BE
Elia
DE
Amprion
TenneT
DK W
Energinet.dk
LU
Creos
50 Hertz
transmission
EnBW TNG
VKW
PL
PSE Operator
UA W
CZ
CEPS
SK
SEPS
FEP
FR
RTE
ES
REE
PT
REN
MA
DZ
TN
CH
swissgrid
AT
APG
HU
MAVIR ZRt
RO
Transelectrica
BG
ESO
IT
Terna
SI
ELES
HR
HEP-OPS
BA
NOS BIH
RS
EMS
ME
CGES AD
MK
MEPSO
GR
HTSO
AL
Accounting Block
Accounting Area
RG CE SOUTH

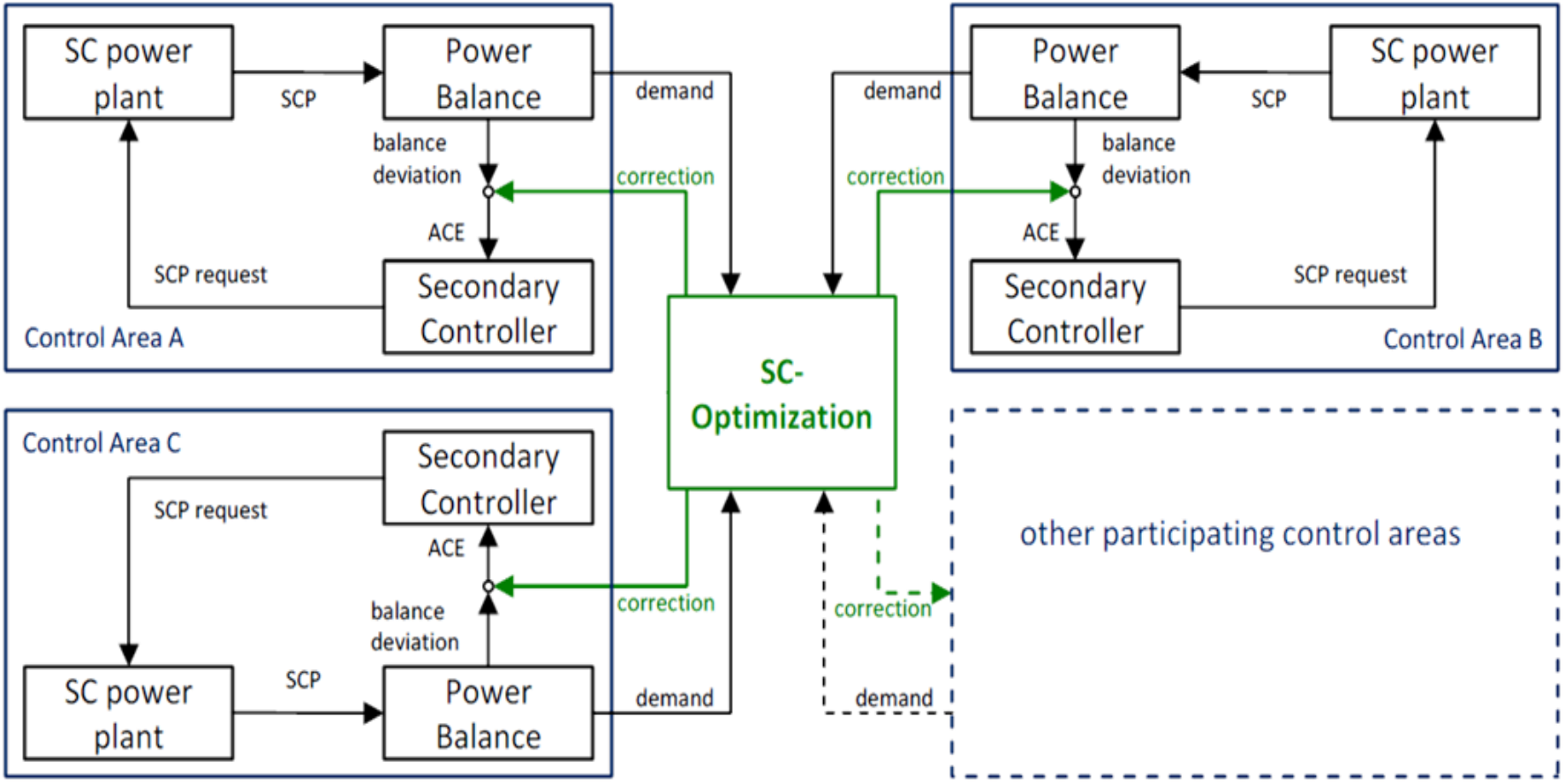
Obligations of SEPS

- SEPS is responsible for balancing the power balance in Slovakia
- SEPS is responsible as a Control Block for compliance with the planned balance towards foreign

The basic principles of balancing power balance



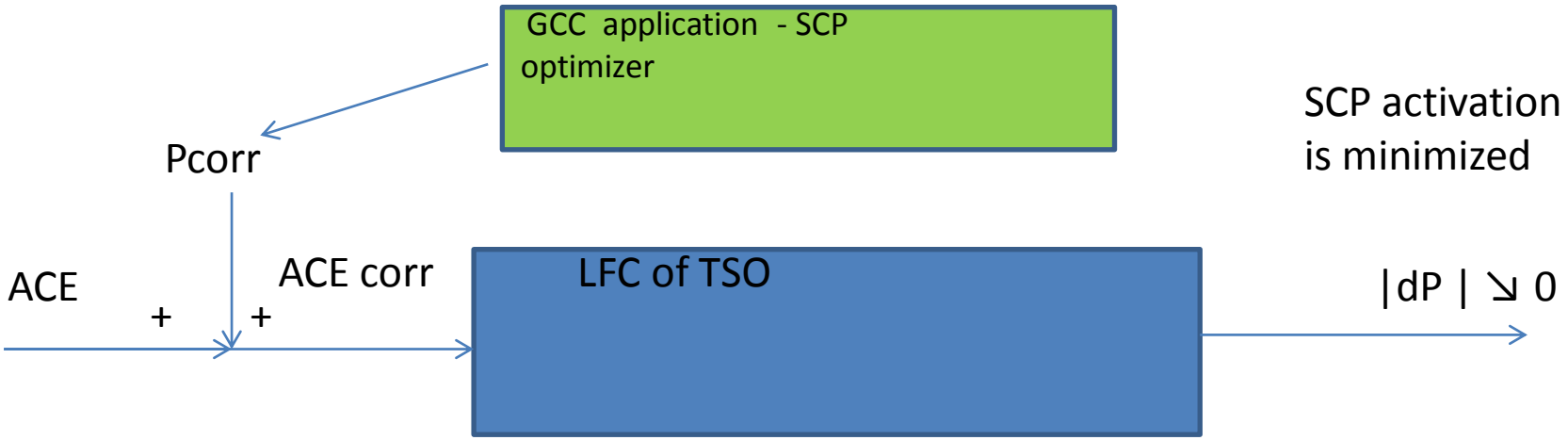
Basic principle of GCC (INP)



Pdemand = ACE + activated SCP (imbalance)

ACEcorr = ACE + Pcorrection

What is cooperation in the GCC (INP)?



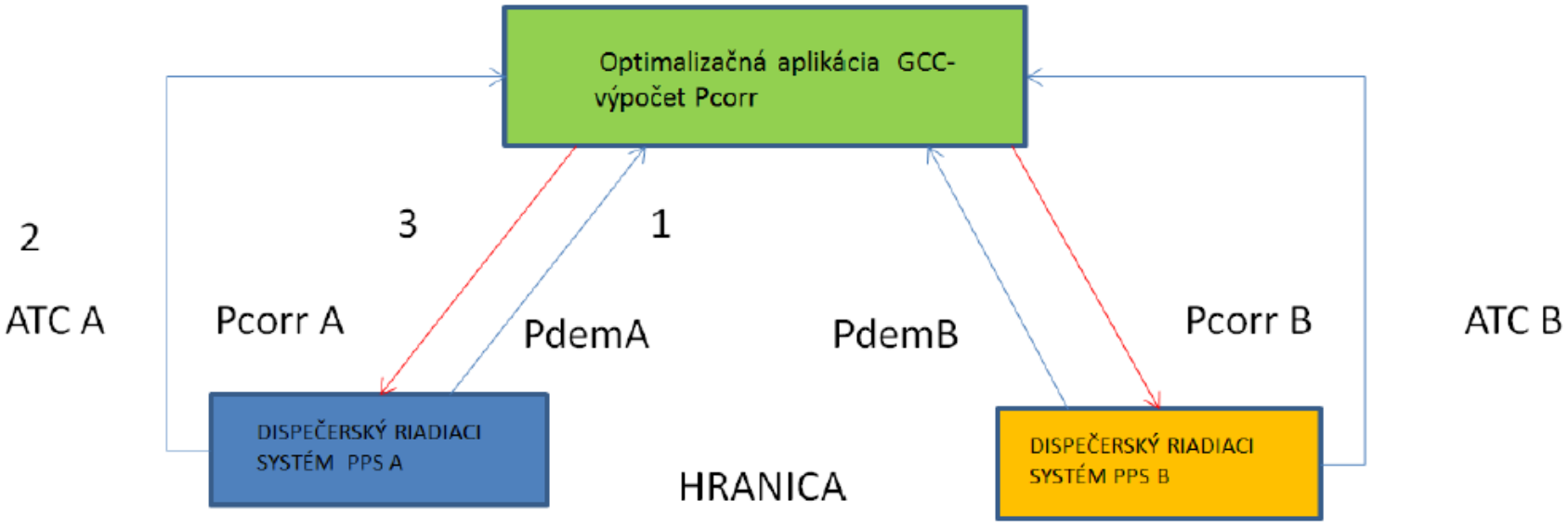
ACEcorr=ACE+Pcorr

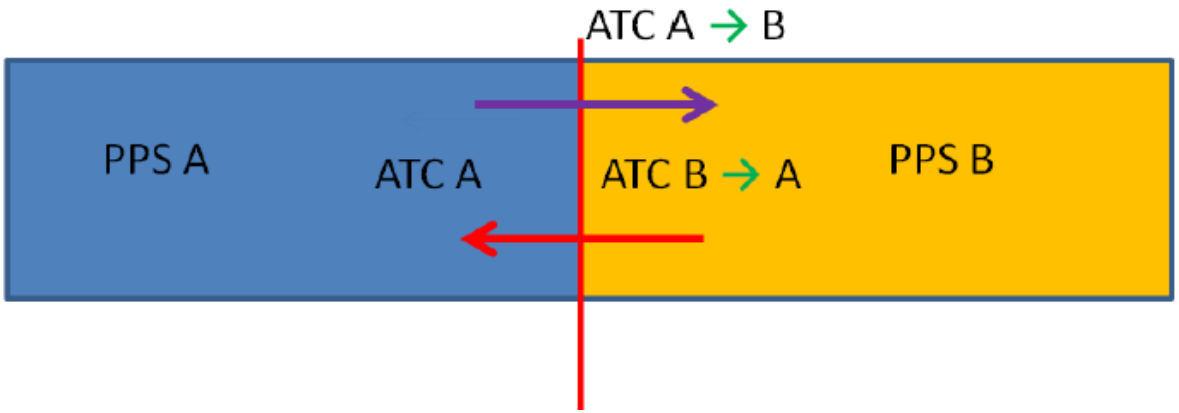
ACEcorr= Pplan-Pactual+Pcorr

When GCC, the input of central controller (physical ACE) is corrected by the calculated value Pcorr from GCC optimization application in order to minimize the size of the activation SCP

Control energy from SCP is replaced by control energy from GCC (Pcorr). GCC minimizes of SCP of GCC individual participants and minimizes the total activation of SCP

Na spoluprácu v GCC musia byť najmenej dvaja prevádzkovatelia PS





Výstupy:
Pcorr- korekčná hodnota, ktorá sa použije na korekciu ACE

Vstupy:
1.Pdemand= ACE+SRV
Vyjadruje bilančný stav jednotlivého PPS, zasiela každý PPS
+ nedostatok
- prebytok
2.**ATC** (dostupná prenosová kapacita) na hranici s partnerskými PPS v GCC
Vo výpočte sa použije menšia hodnota

Example of GCC between two TSOs

TSO A (Lack of P)

Pdemand = +60 MW

thereof ACE = +30 MW

thereof SCP = +30 MW

TSO B (surplus of P)

Pdemand = -40 MW

thereof ACE = -20 MW

thereof SCP = -20 MW

ATC (B → A) = 100 MW

P_{corr} = -40 MW

ACEcorr = 30 – 40 = -10 MW

Import = +40 MW

SCP ↘0

P_{corr} = +40 MW

ACEcorr = -20 + 40 = +20 MW

Export = -40 MW

SCP ↗ 0

Example of GCC between two TSOs

TSO A (Lack P)	TSO B (Surplus P)
Pdemand = +60 MW	Pdemand = -40 MW
thereof ACE = +30 MW	thereof ACE = -20 MW
thereof SCP = +30 MW	thereof SCP = -20 MW

ATC (B → A) = 20 MW

P_{corr} = 20 MW	P_{corr} = +20 MW
ACEcorr = 30 – 20 = +10 MW	ACEcorr = -20 + 20 = 0 MW
Import = +20 MW	Export = -20 MW
SRV ↗ 0- but less	SRV → 0

Example of GCC between two TSOs

TSO A (Lack of P)

Pdemand = +60 MW

P_{corr} = 0 MW

TSO B (Lack of P)

Pdemand= +40 MW

P_{corr} = 0 MW

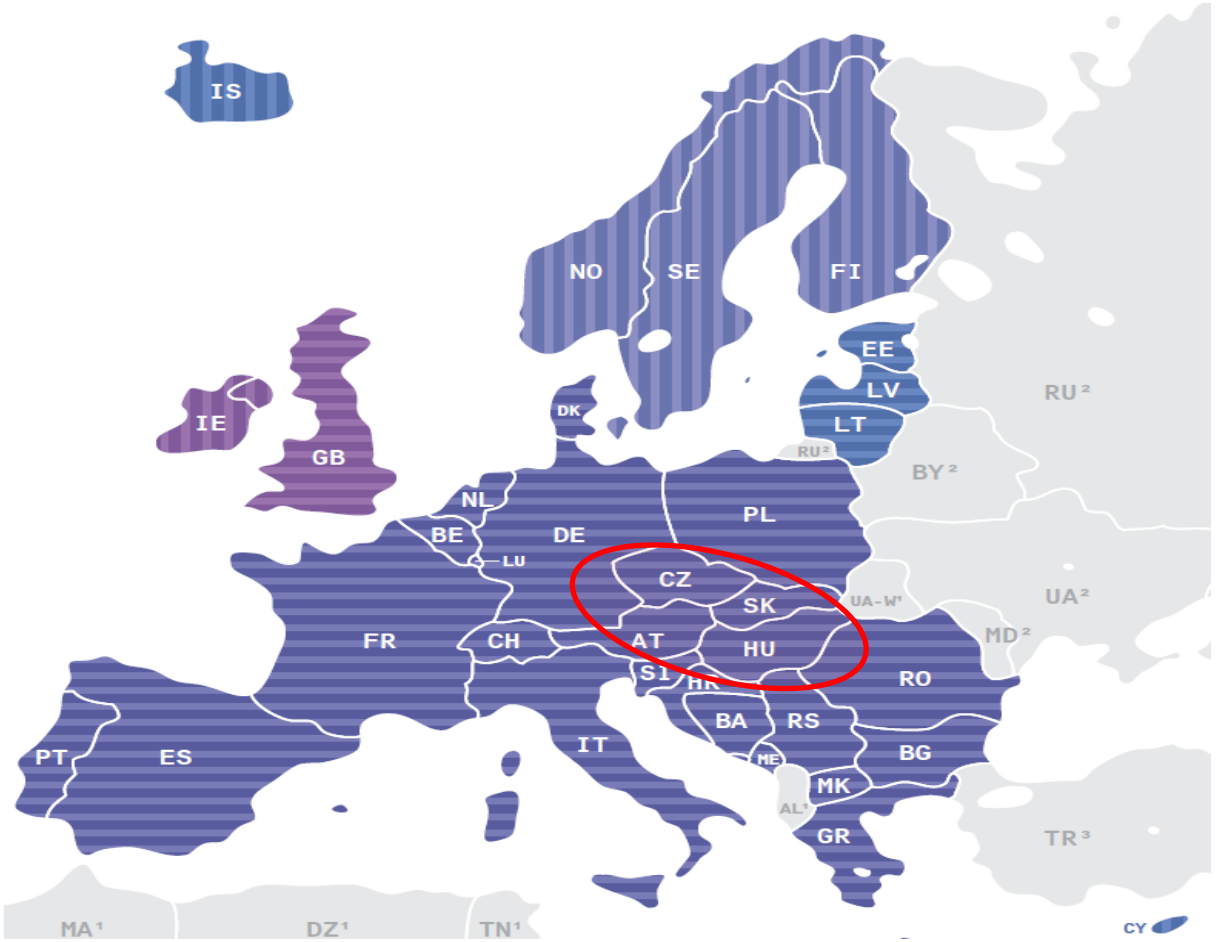
ATC (B → A) = 100 MW

If the TSO A and TSO B aRE in the same balance position =no exchange of RE

Summary-GCC basic principle (INP)

- Surplus TSO provides real-time their surplus electricity to scarce TSO
- Works in real time with the cycle 4 seconds
- Minimizing counterfactual activation SCP participating TSOs
- Exchange between the TSO is coincidental can not be planned
  GCC does not affect the size of the availability of ancillary service needs
- Increases the reliability of the operation, because system has more ancillary inactivated and the greater available reserves
- Not restrict cross-border trade is no reserve capacity for international profiles .It uses only the remaining capacity after the closure of the interior of the daily cross-border transactions
- Between TSOs are set up virtual links. These are designed to take account of the international exchange clearing unplanned exchanges.
- Control energy is evaluated based on the 15-minute integrals Pcorr particularly positive and negative

Cooperation in e-GCC

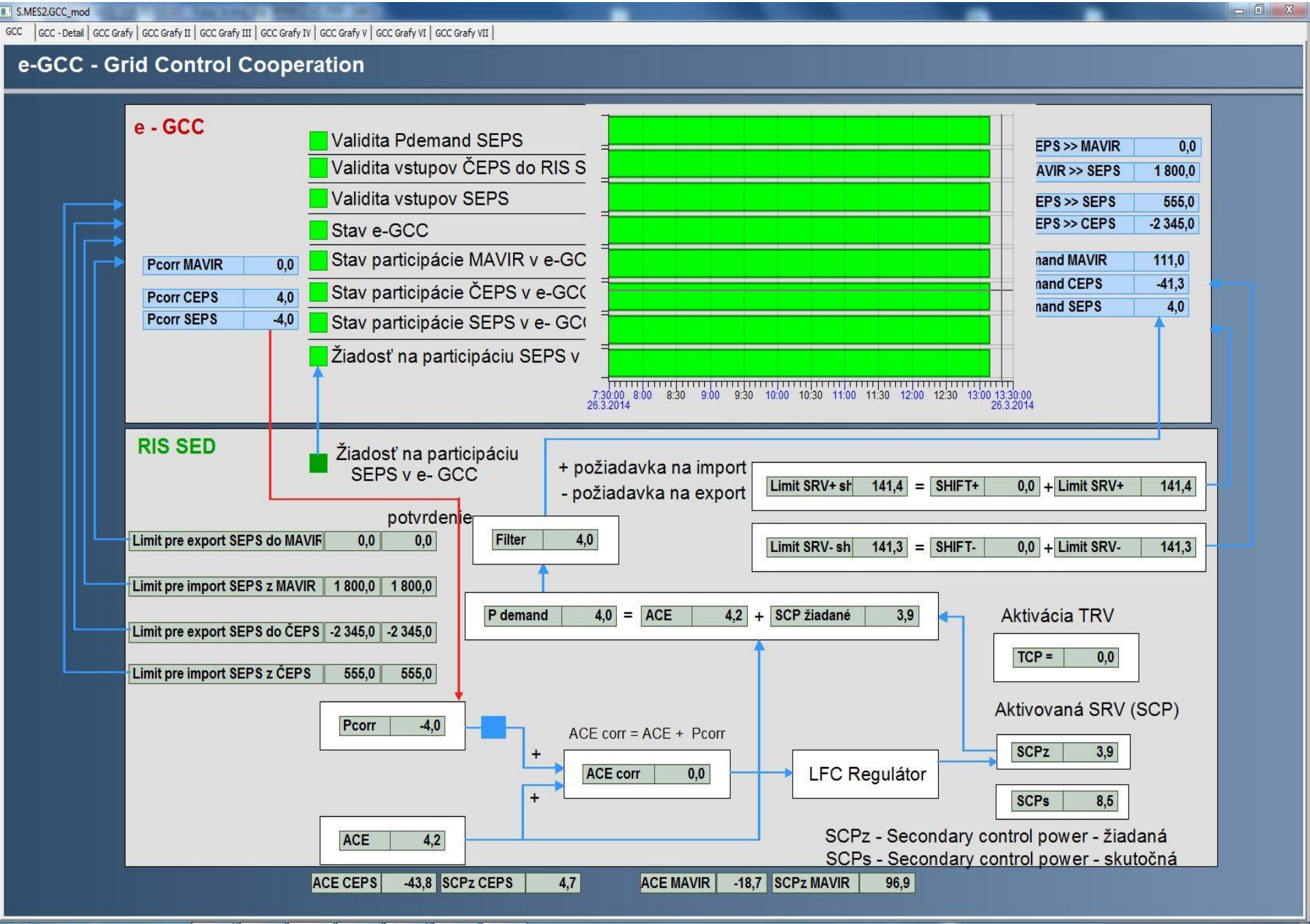


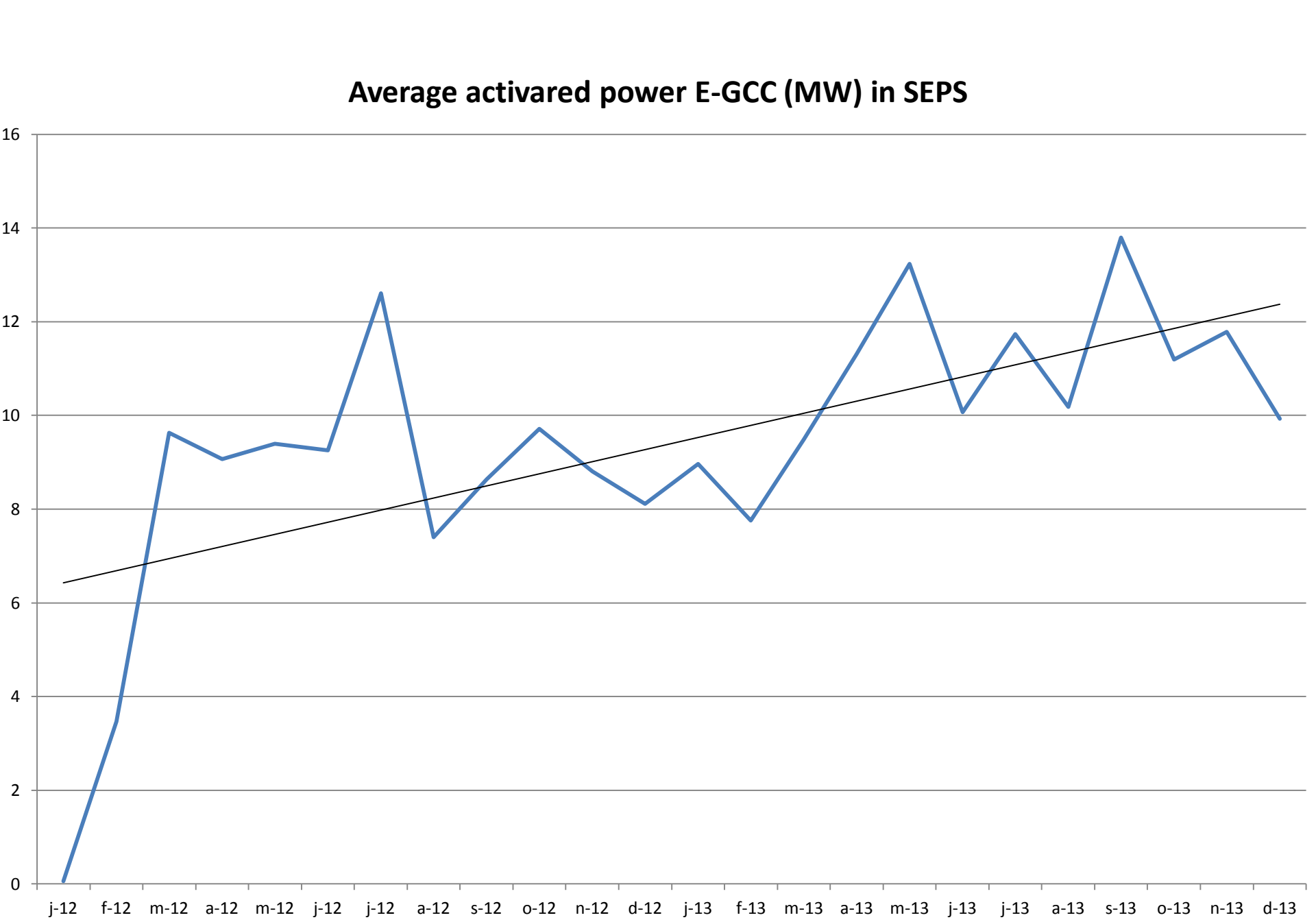
e-GCC

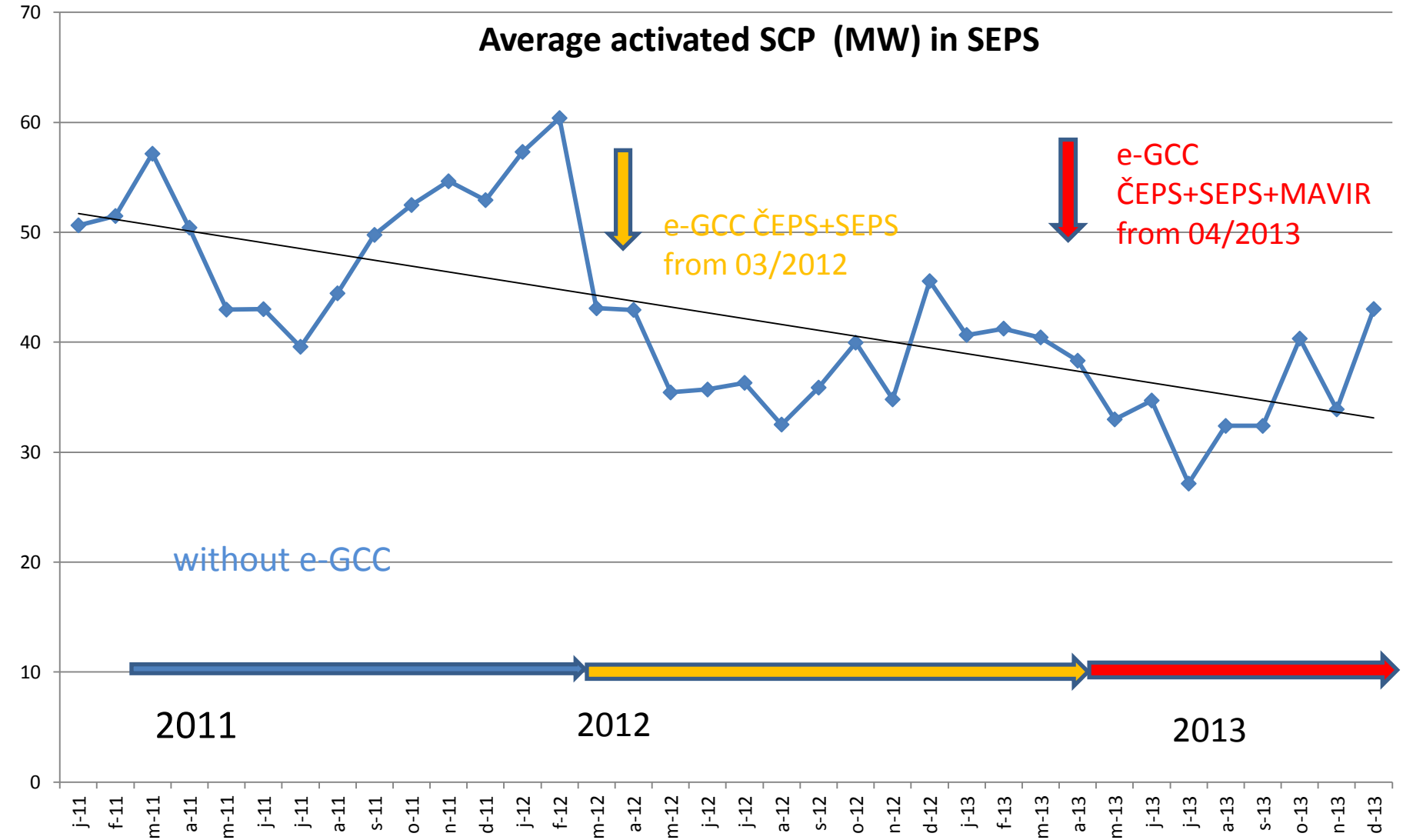
- It is a cooperation CEPS, SEPS and MAVIR
- Inspired by the German GCC (2008)
- Was established by the CEPS and SEPS
- the leading operator of e-GCC is CEPS
- SEPS and MAVIR are participants
- Optimization application e- GCC Optimizer for real-time is implemented in CEPS
  Central business module for evaluating „Data Exchange Server“
  „Billing and Invoicing module“ is implemented in the trading system CEPS
  E-GCC is an open system
  E-GCC is a pilot project ENTSOE application NC EB

History of e-GCC

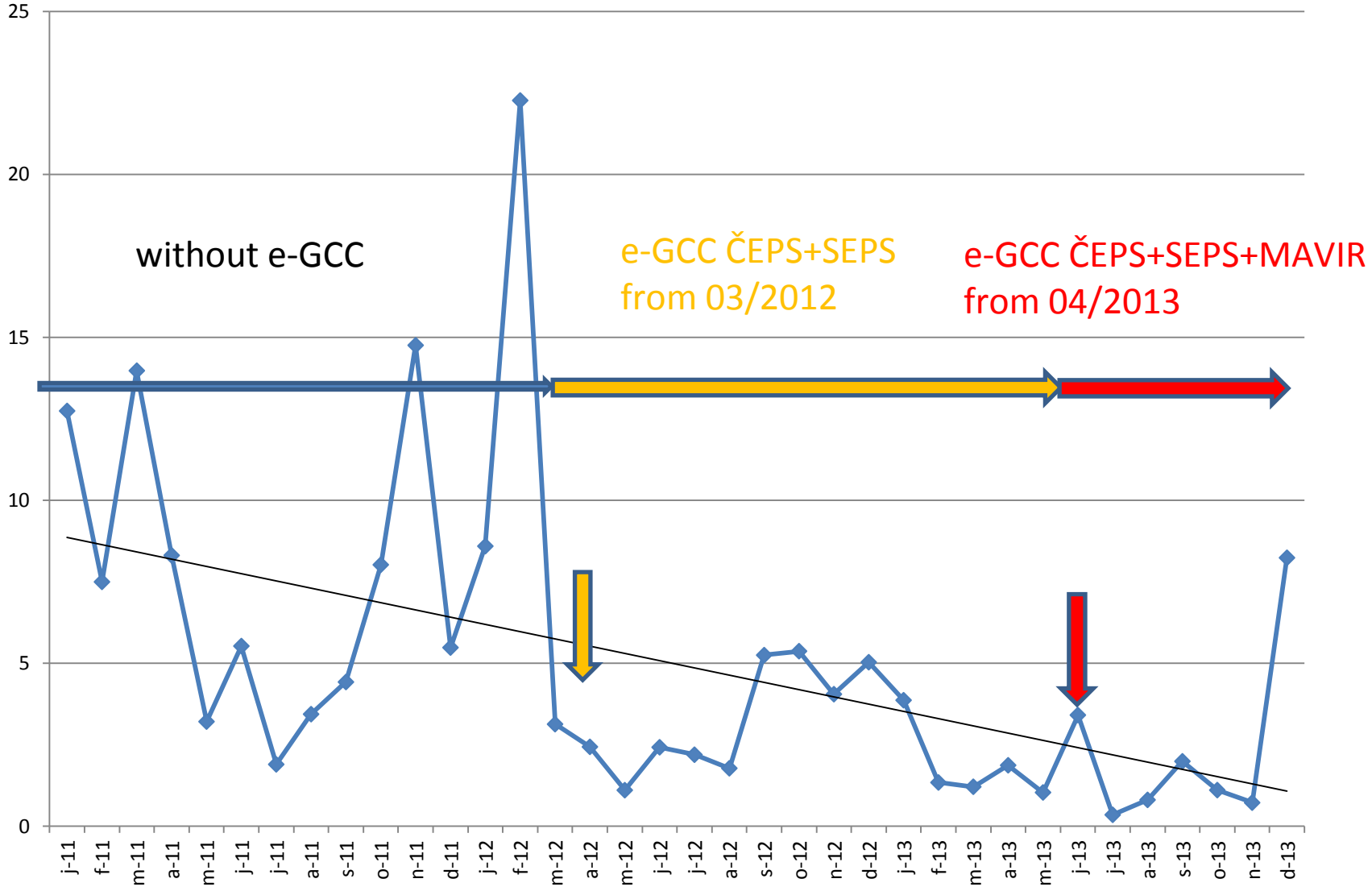
- 09 / 2010-07/2011 consultation between CEPS and SEPS, analysis CEPS
- 07/2011-SEPS decision to initiate cooperation in e-GCC
- 09/2011-01/2012 technical implementation, preparation of contracts
- 01/2012-Notifikácia the ENTSO-E
- 19.1. to 8.3.2012 preliminary testing of e-GCC between SEPS and CEPS
  18.3.2012 annual test operation according to the requirements of the ENTSO-E (Test book ENTSOE) between SEPS and CEPS
  24.3.2013 connected MAVIR (year trial run for ENTSOE)
  06/ 2013 - completion of trial operation between CEPS and SEPS
  10/ 2013 - ENTSO-E approved the transition to e-GCC normal operation of CEPS and SEPS,
- continues to MAVIR year trial operation by the end 04/2014


S.MES2.GCC_mod
GCC
GCC - Detail
GCC Grafy
GCC Grafy II
GCC Grafy III
GCC Grafy IV
GCC Grafy V
GCC Grafy VI
GCC Grafy VII
e-GCC - Grid Control Cooperation
e - GCC
Validita Pdemand SEPS
Validita vstupov ČEPS do RIS S
Validita vstupov SEPS
Stav e-GCC
Stav participácie MAVIR v e-GC
Stav participácie ČEPS v e-GC(
Stav participácie SEPS v e- GC(
Žiadosť na participáciu SEPS v
Pcorr MAVIR 0,0
Pcorr CEPS 4,0
Pcorr SEPS -4,0
7:30:00 26.3.2014
8:00
8:30
9:00
9:30
10:00
10:30
11:00
11:30
12:00
12:30
13:00
13:30:00 26.3.2014
EPS >> MAVIR 0,0
AVIR >> SEPS 1 800,0
EPS >> SEPS 555,0
EPS >> CEPS -2 345,0
nand MAVIR 111,0
nand CEPS -41,3
nand SEPS 4,0
RIS SED
Žiadosť na participáciu SEPS v e- GCC
+ požiadavka na import
- požiadavka na export
potvrdenie
Limit SRV+ sh 141,4 = SHIFT+ 0,0 + Limit SRV+ 141,4
Limit SRV- sh 141,3 = SHIFT- 0,0 + Limit SRV- 141,3
Limit pre export SEPS do MAVIR 0,0 0,0
Limit pre import SEPS z MAVIR 1 800,0 1 800,0
Limit pre export SEPS do ČEPS -2 345,0 -2 345,0
Limit pre import SEPS z ČEPS 555,0 555,0
Filter 4,0
P demand 4,0 = ACE 4,2 + SCP žiadané 3,9
Aktivácia TRV
TCP = 0,0
Aktivovaná SRV (SCP)
Pcorr -4,0
ACE corr = ACE + Pcorr
ACE corr 0,0
LFC Regulátor
SCPz 3,9
SCPs 8,5
ACE 4,2
SCPz - Secondary control power - žiadaná
SCPs - Secondary control power - skutočná
ACE CEPS -43,8
SCPz CEPS 4,7
ACE MAVIR -18,7
SCPz MAVIR 96,9
SK
13:10
26. 3. 2014

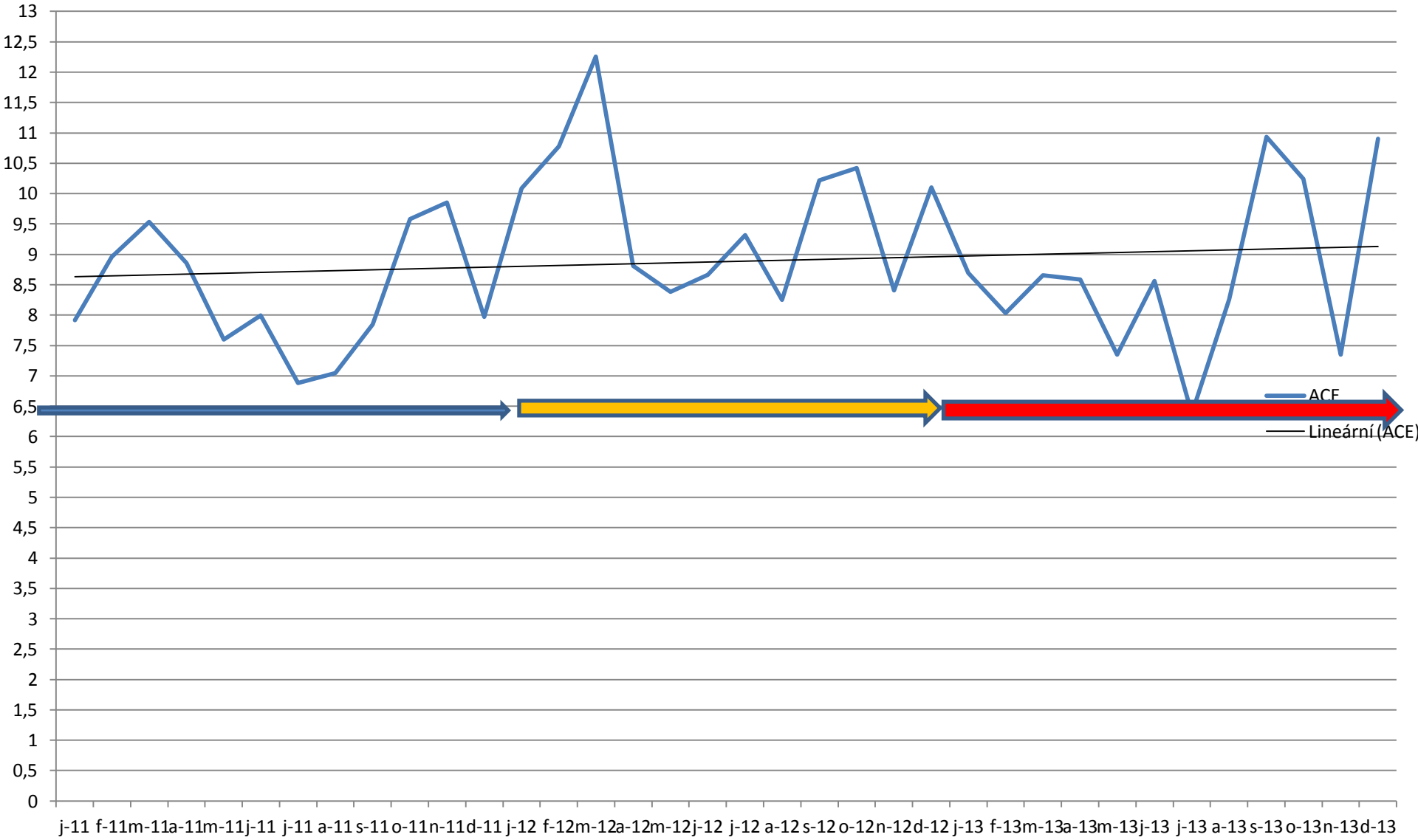

Average activared power E-GCC (MW) in SEPS
16
14
12
10
8
6
4
2
0
j-12
f-12
m-12
a-12
m-12
j-12
j-12
a-12
s-12
o-12
n-12
d-12
j-13
f-13
m-13
a-13
m-13
j-13
j-13
a-13
s-13
o-13
n-13
d-13


Average activated SCP (MW) in SEPS
70
60
50
40
30
20
10
0
e-GCC ČEPS+SEPS from 03/2012
e-GCC ČEPS+SEPS+MAVIR from 04/2013
without e-GCC
2011
2012
2013
j-11
f-11
m-11
a-11
m-11
j-11
j-11
a-11
s-11
o-11
n-11
d-11
j-12
f-12
m-12
a-12
m-12
j-12
j-12
a-12
s-12
o-12
n-12
d-12
j-13
f-13
m-13
a-13
m-13
j-13
j-13
a-13
s-13
o-13
n-13
d-13

average activated power (MW) in SEPS

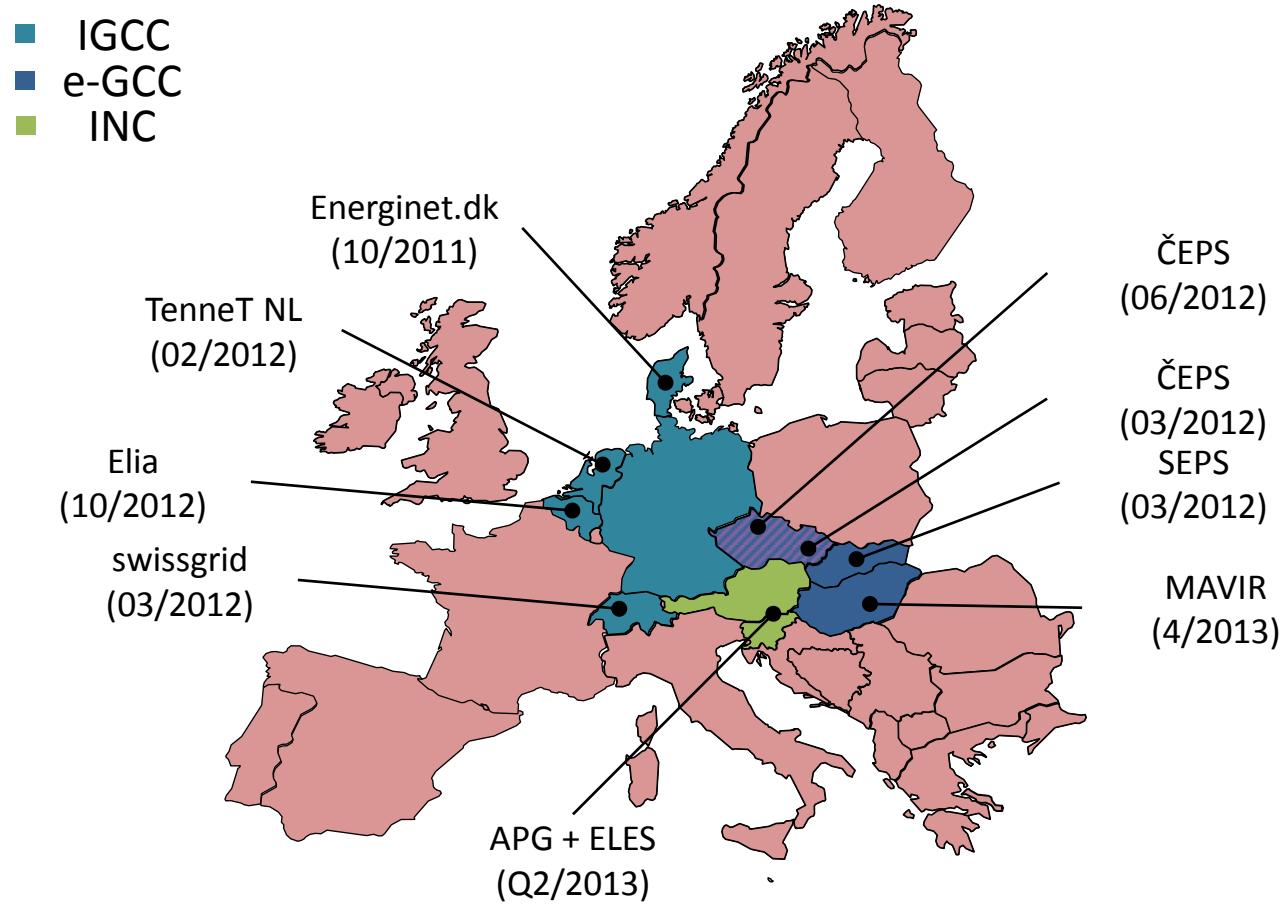


Monthly average of ACE (MW/15 min) in SEPS

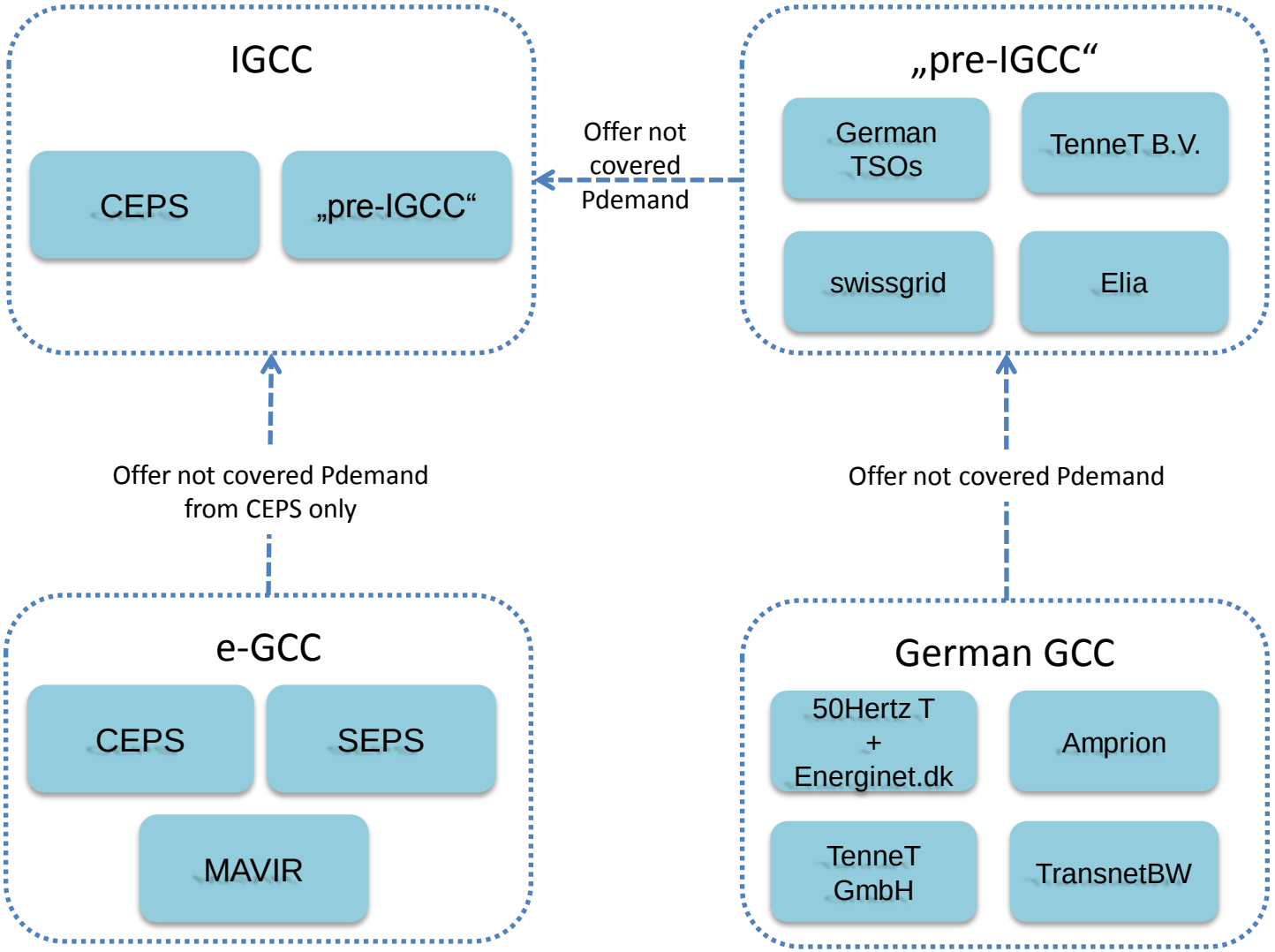


GCC in ENTSO-E

- GCC originated in Germany 12/2008
- e-GCC je jeden z projektov GCC



Cooperation between e-GCC and IGCC
(April 2013)



Conclusion

- **Requirement according to the latest draft Network Code Electricity Balancing of 23.12.2013:**

- All TSOs of a Coordinated Balancing Area shall use the Exchange of Balancing Energy from at least one Standard Product or operating the Imbalance Netting Process.

Thank you for your attention