FB external report for w2, 2017

Contents of the report

Comments

Highlights

- Social Economic Welfare (SEW) increases on average for the Nordics as well as external markets
- Denmark and Sweden experience increases in SEW. DK due to more export of wind SE due to import in SE4
- Norway and Finland expericens losses in SEW. NO due to loss of congestion rents FI due to overloads

Known errors

In a few hours there is a loss in SEW for both the Nordics and external markets, this is due to remedial actions that were considered in NTC and not in FB. There would have been a need for modification in the CNE's to solve this issue which has not been done. In parallel run and after go-live FB and NTC would have access to the same remedial actions, which means that this result for the few hours is not representative of the result in go-live

Missing hours

Some hours are missing in the weekly simulations. This can be due to different issues:
-The input data for this hour was not available.
-They were differences in the available input data for NTC and FB, which made the comparison between the two impossible.

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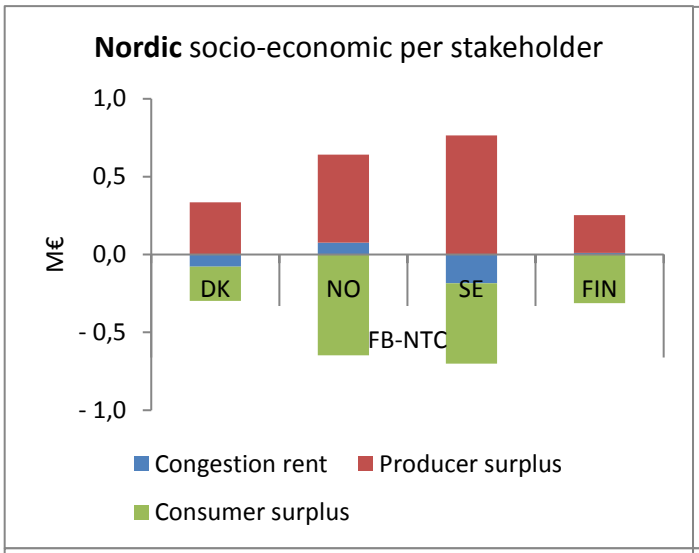
Market analysis

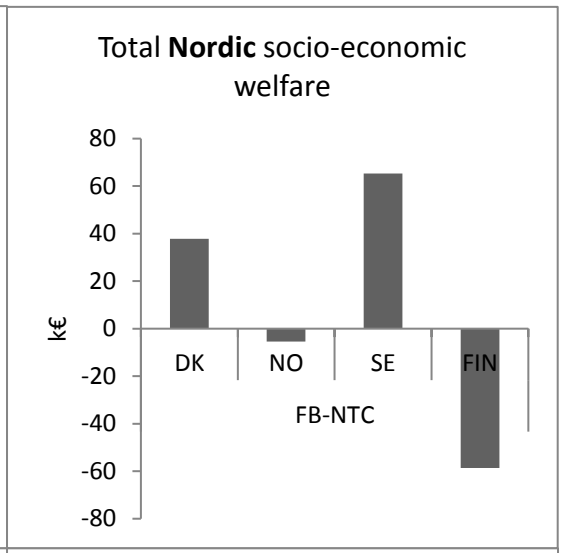
Summary of market analysis

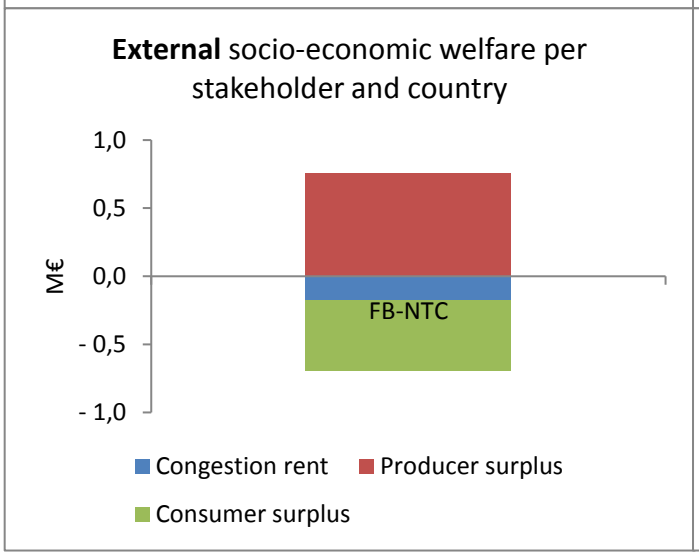
Nordic	The SEW increases in the Nordic Area this week. The congestion rent drops, especially between SE2 and SE3. The Net Position decreases slightly in FB compared to NTC. The external markets also experience an increase in SEW.
Denmark	Denmark experiences a gain in SEW this week. For Denmark the biggest ingrease in SEW happens in the early hours of the 12th. On the 12 th Denmark is able to export more power in FB compared to NTC, which increases prices in both Danish areas, this is a gain for the producers, in a time with quite a large wind production in Denmark. This means that the netposition is higher in FB compared to NTC.
Norway	Norway experiences a loss of SEW this week. Norway experiences a loss in congestion rents primarily on the border between DK1 and NO2. Norway has a lower net position in FB compared to NTC. While prices in Norway are more or less unchanged from NTC compared to FB.
Finland	In Finland the SEW decreses this week. It depends on higher average prices in FB and loss of consumer surplus as a consequence. The producer surplus increases but not as much the loss in consumer surplus. During the hours with a welfare loss we observe several hours with overloads on the Swedish - FInnish border.
Sweden	Sweden is the major winner this week. It is due to the fact that Sweden gets lower prices in SE4 where there is a lot of consumtion. This leads to an increase of consumer surplus. The congestion rents is reduced mainly depending on less CR between SE3 and SE4. For some hours SE1 and SE2 gets higher in FB and this is positive from a SEW point of view.

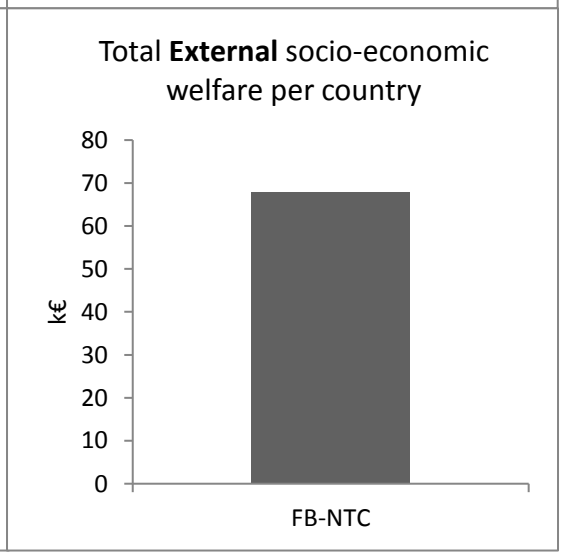
Socio-economical welfare

The socio-economical welfare, i.e. the sum of consumer surplus, producer surplus and congestion rent, for Flow Based (FB) compared to Net Transfer Capacity (NTC) are shown in the following charts.

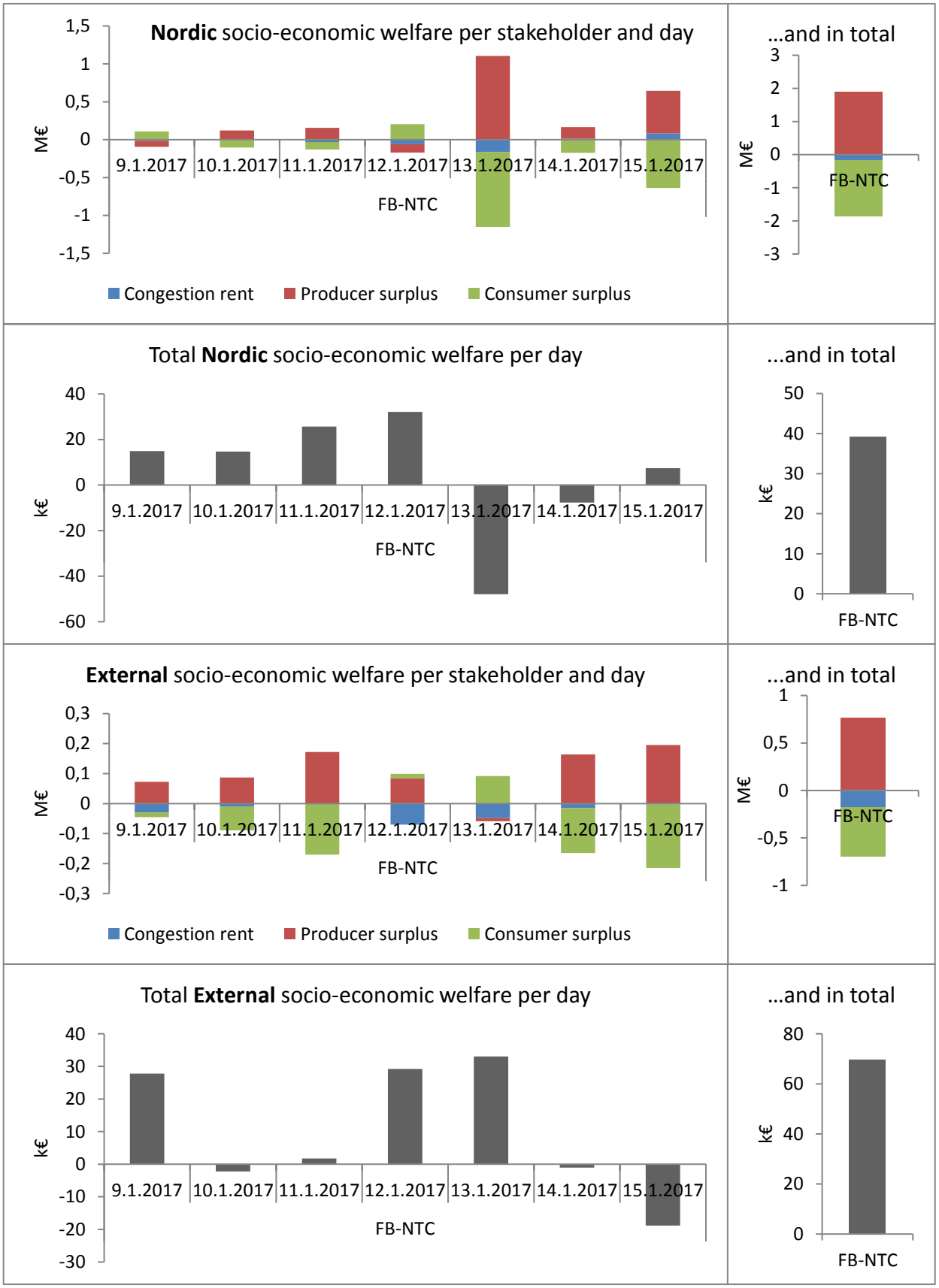




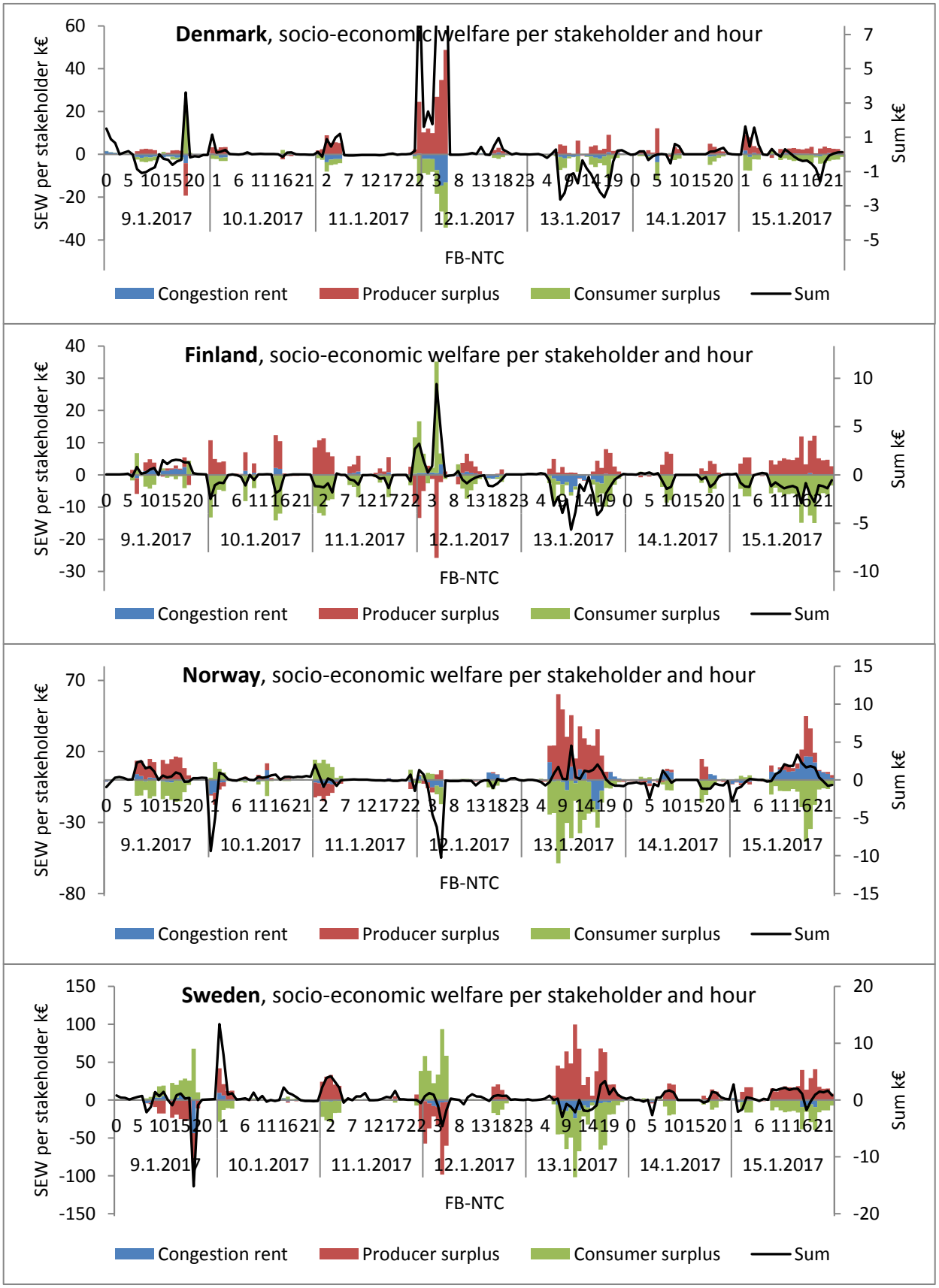




The weekly socio-economical welfare per day and in total are shown in the following charts.

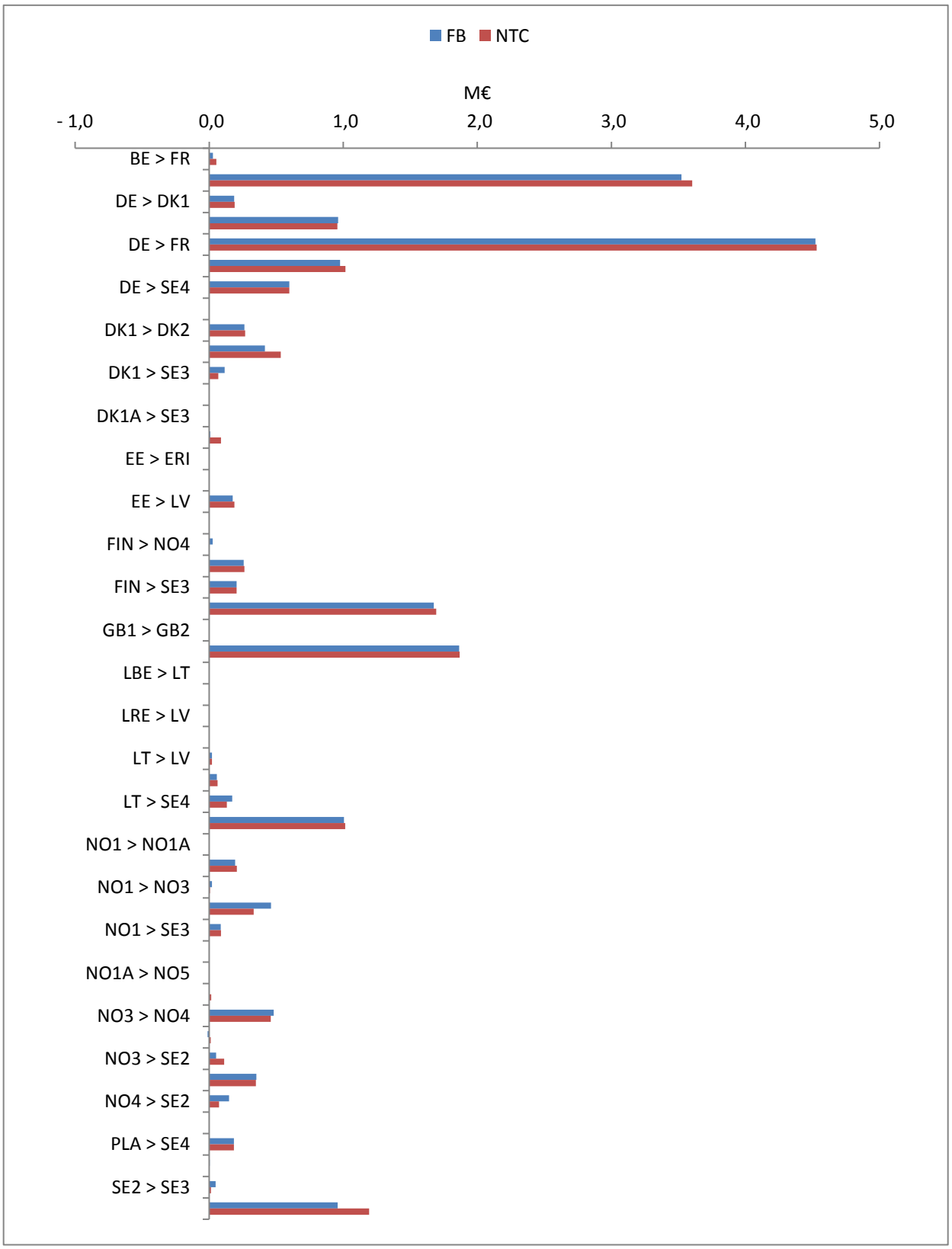


The hourly socio-economical welfare for each country are shown in the following charts.



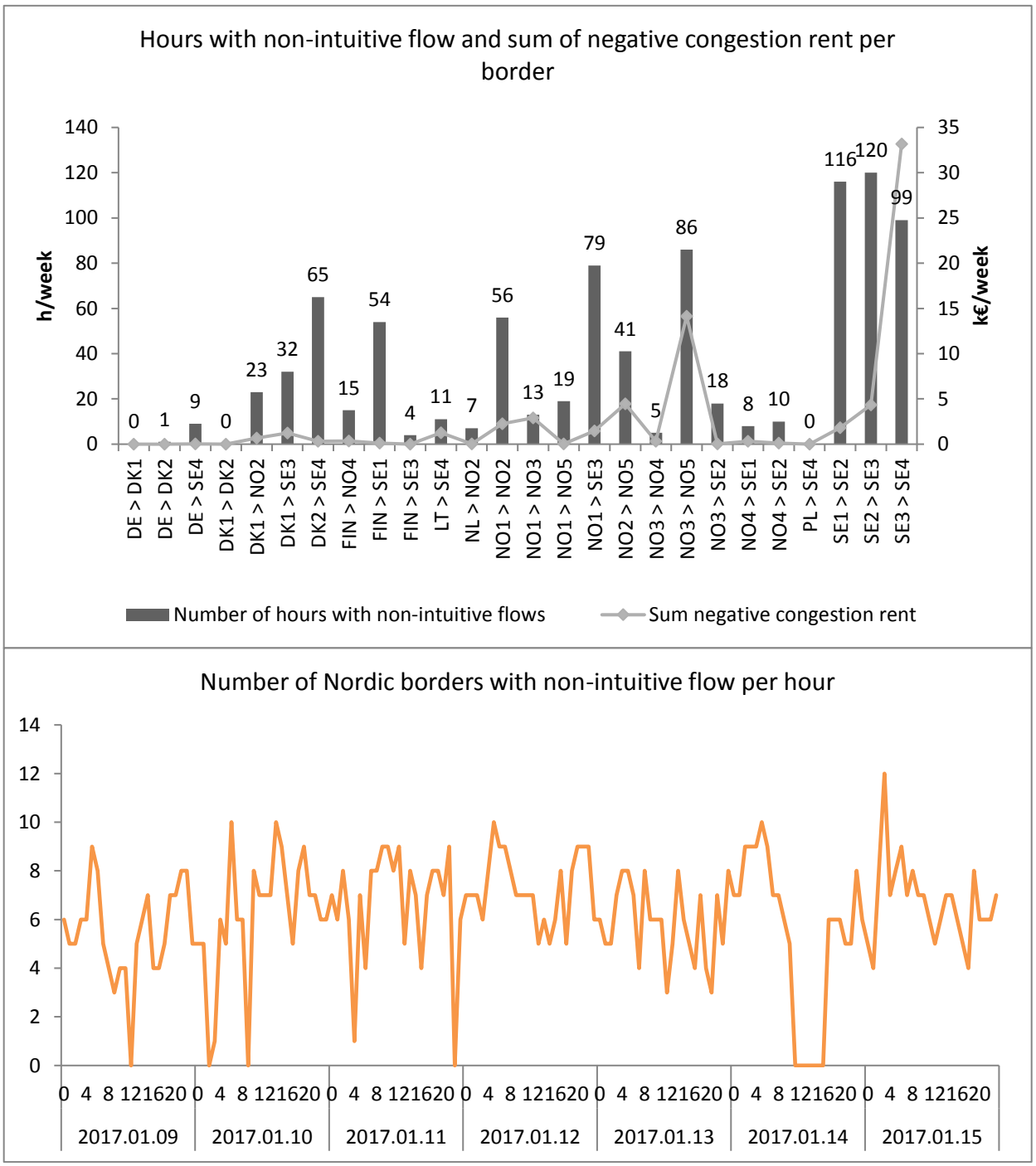
Congestion rent

The total congestion rent, i.e. the product of flow volume and price difference, per border is shown in the following chart. Some borders are experience negative congestion rent with Flow Based due to non-intuitive netflows from a higher priced bidding area to a lower priced bidding area. A decrease in congestion rent is due to less border flow and/or smaller price area difference.



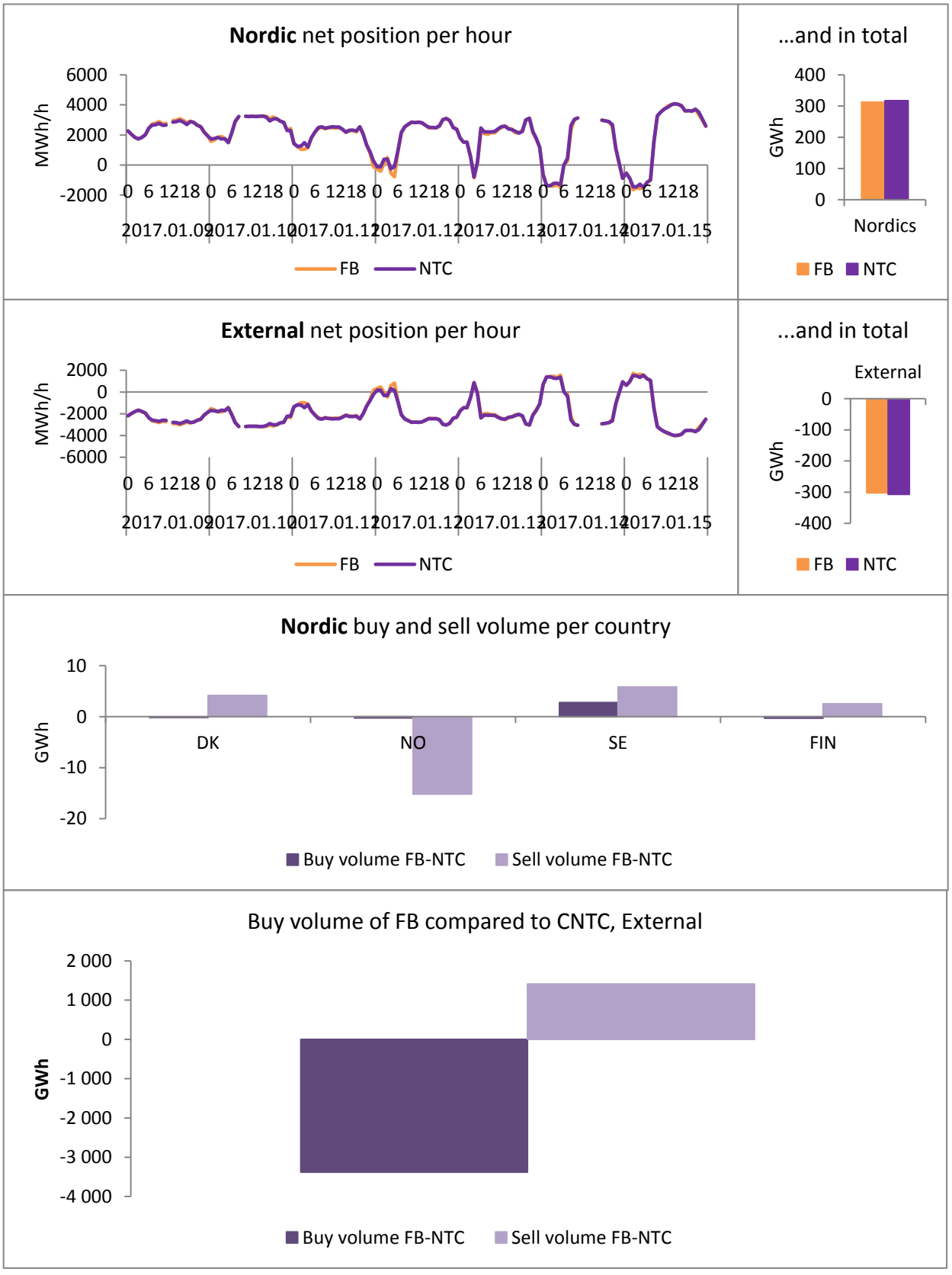
Non-intuitive flow

The number of hours with "non-intuitive flow", i.e. hours with flow from a high priced area to a low priced area, and the sum of the resulting negative congestion rent is shown in the following diagram.

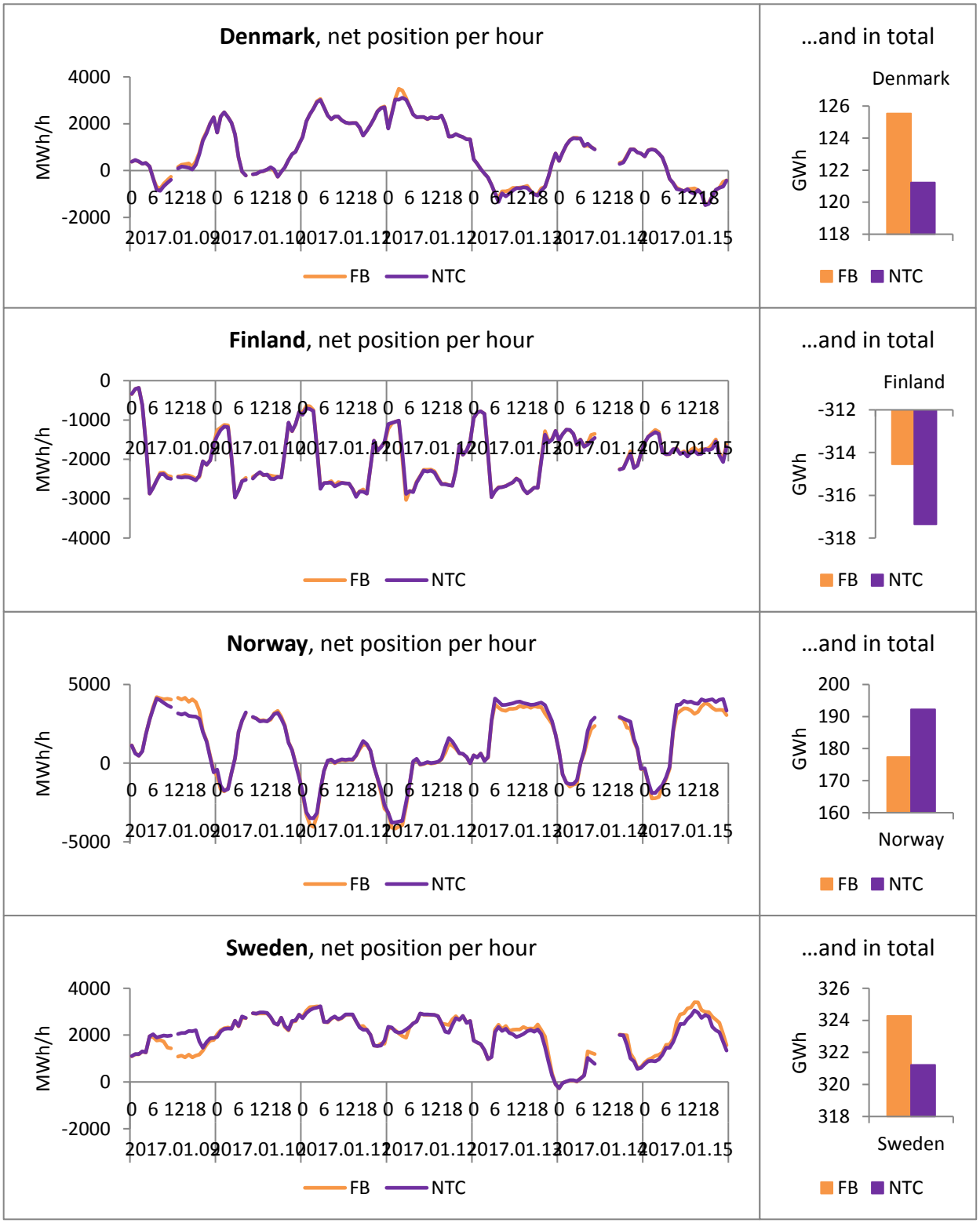


Nordic net position

The Nordic and External countries daily average net position, i.e. the netted sum of electricity export and import for each market time period ,is shown in the following charts along with the change of buy and sell volymes.



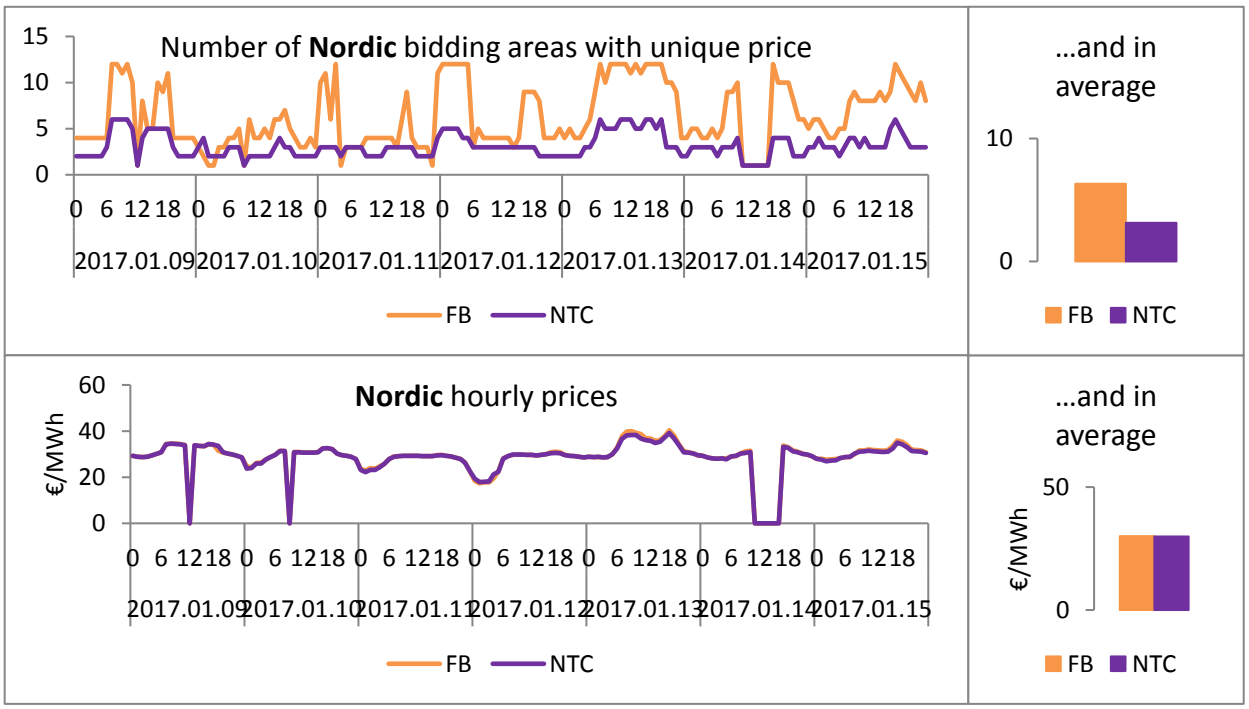
The hourly average net position per Nordic country is shown in the following charts .

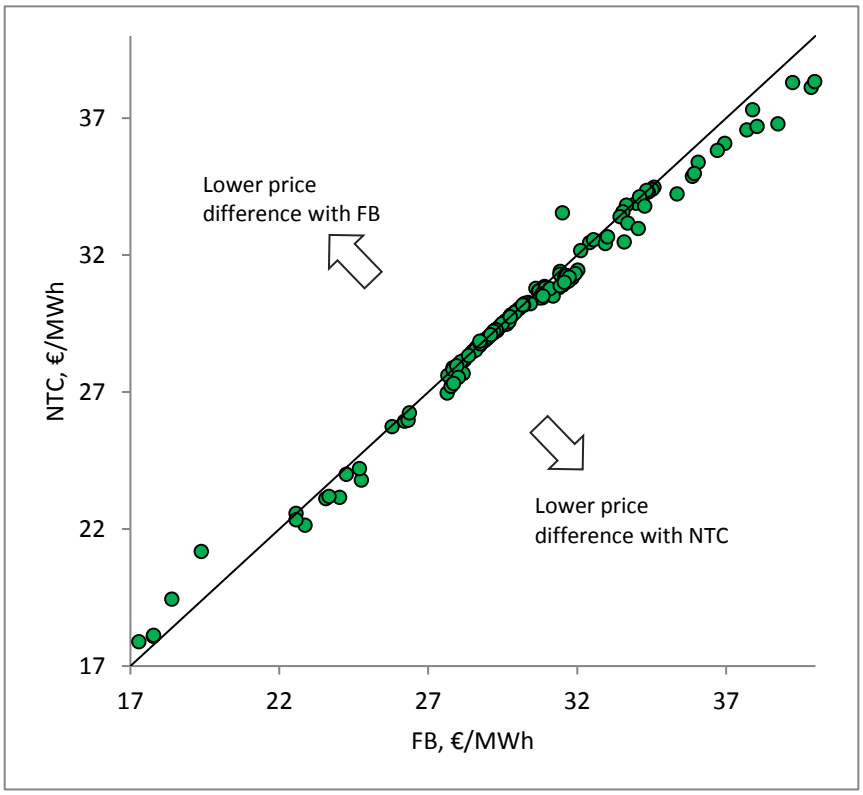


Unique prices and price difference

The average number of Nordic bidding areas with unique hourly prices, and the price area difference is shown in the following charts. The number of uniquely priced bidding areas is increasing with FB but the average price differences between the bidding areas are lower in FB compared to NTC.

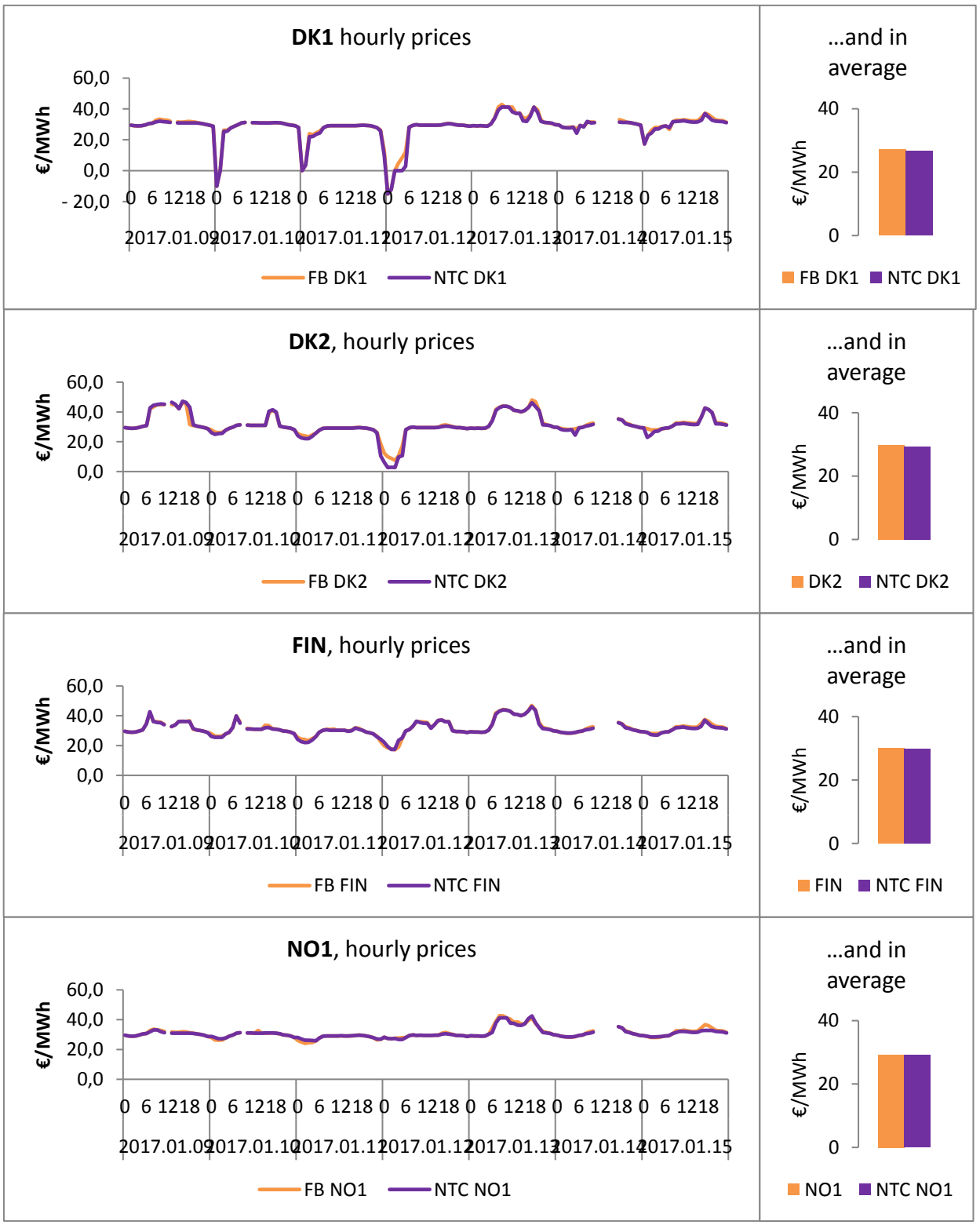
In the shatter diagram below the price with FB and the price with NTC for each hour are plotted. The straight line represent the outcome if FB-price would be equal NTC-price. The plotted prices show more frequent above the straight line which indicates a decreased electricity price with Flow Base.

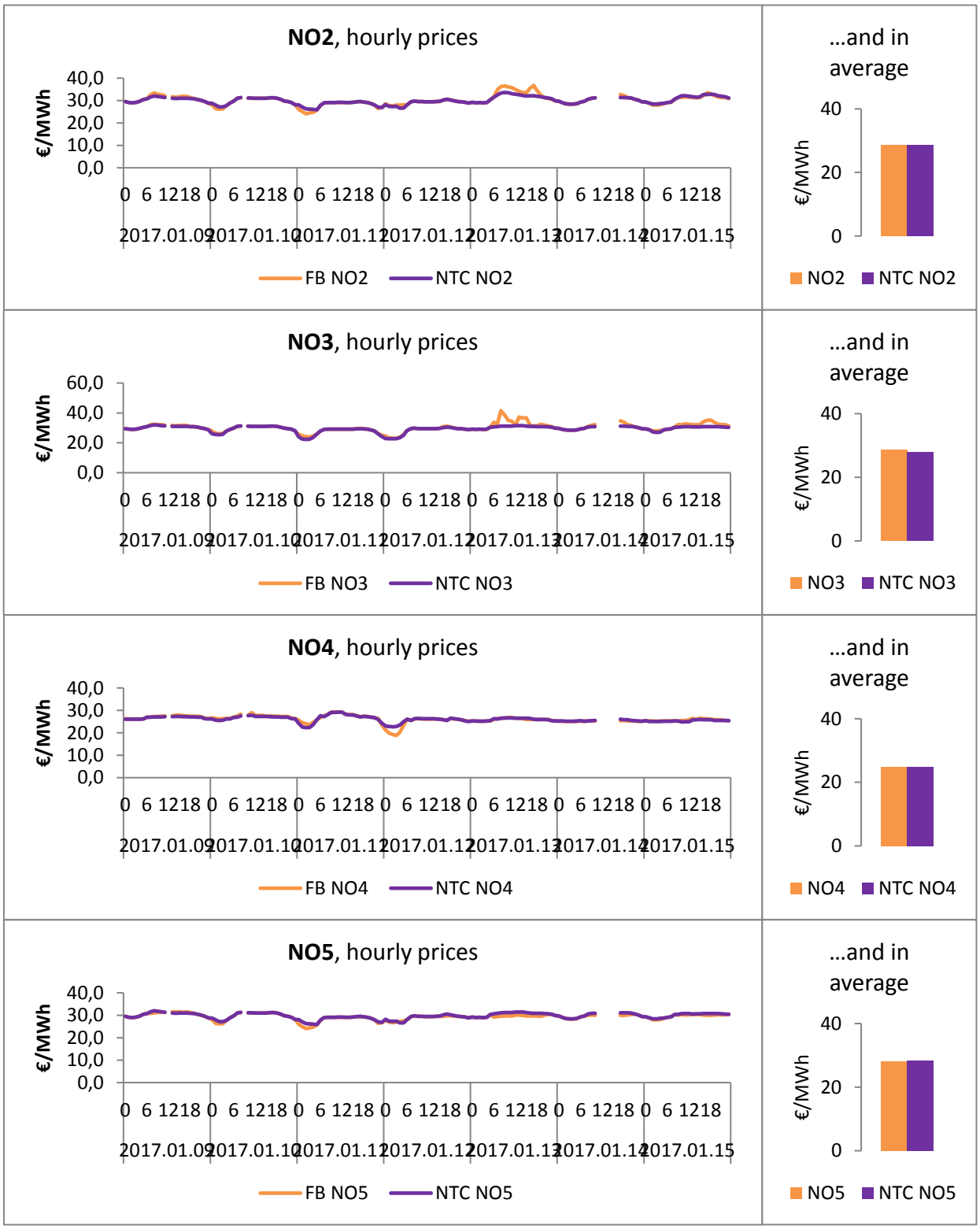


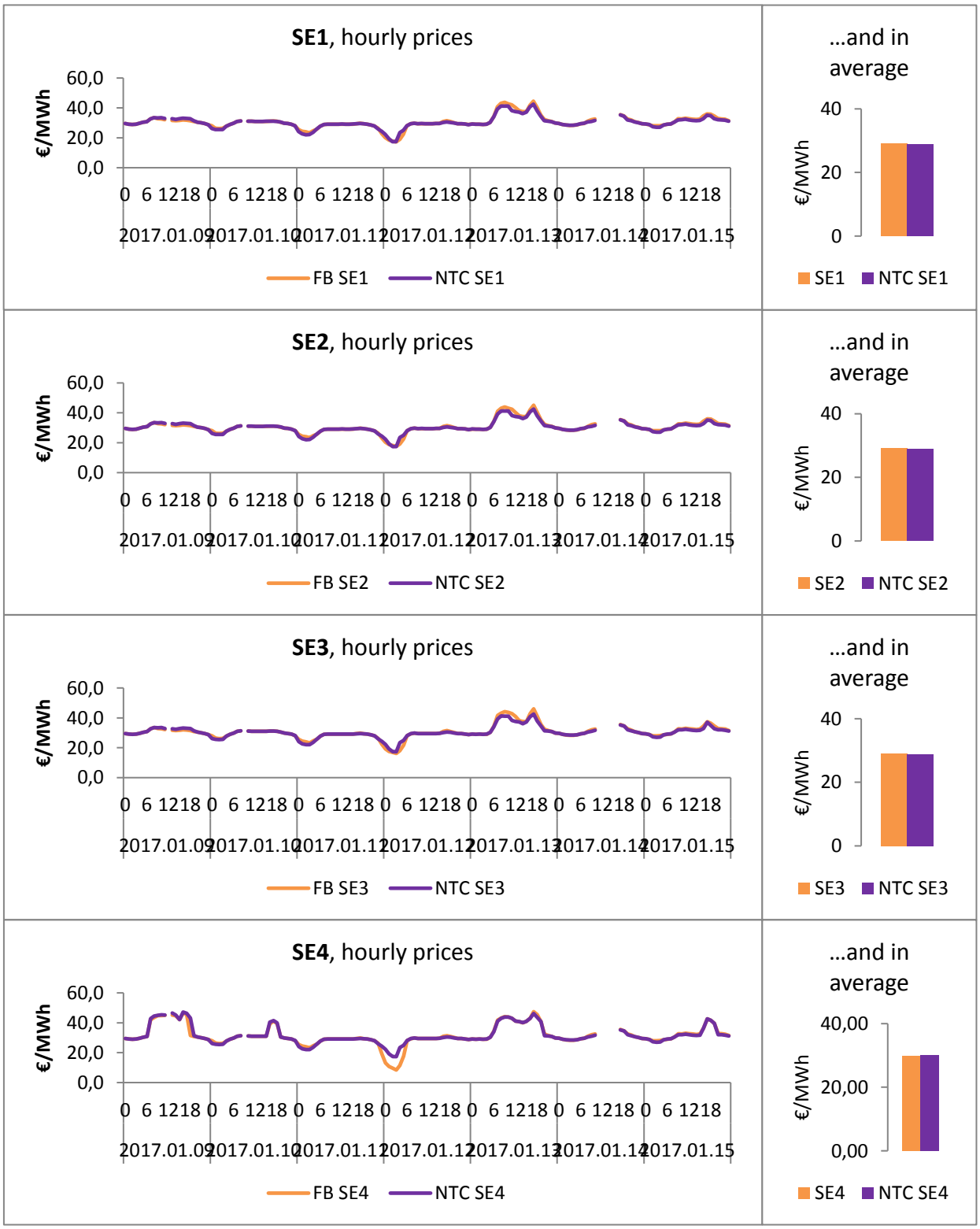


Area Price

The hourly area price for FB and NTC for each Nordic bidding area are shown in the following charts.




NO2, hourly prices
€/MWh
40,0
30,0
20,0
10,0
0,0
0 6 12 18 0 6 12 18 0 6 12 18 0 6 12 18 0 6 12 18 0 6 12 18 0 6 12 18
2017.01.09 2017.01.10 2017.01.11 2017.01.12 2017.01.13 2017.01.14 2017.01.15
FB NO2
NTC NO2
…and in average
40
20
0
NO2
NTC NO2
NO3, hourly prices
60,0
40,0
20,0
0,0
FB NO3
NTC NO3
NO3
NTC NO3
NO4, hourly prices
FB NO4
NTC NO4
NO4
NTC NO4
NO5, hourly prices
FB NO5
NTC NO5
NO5
NTC NO5

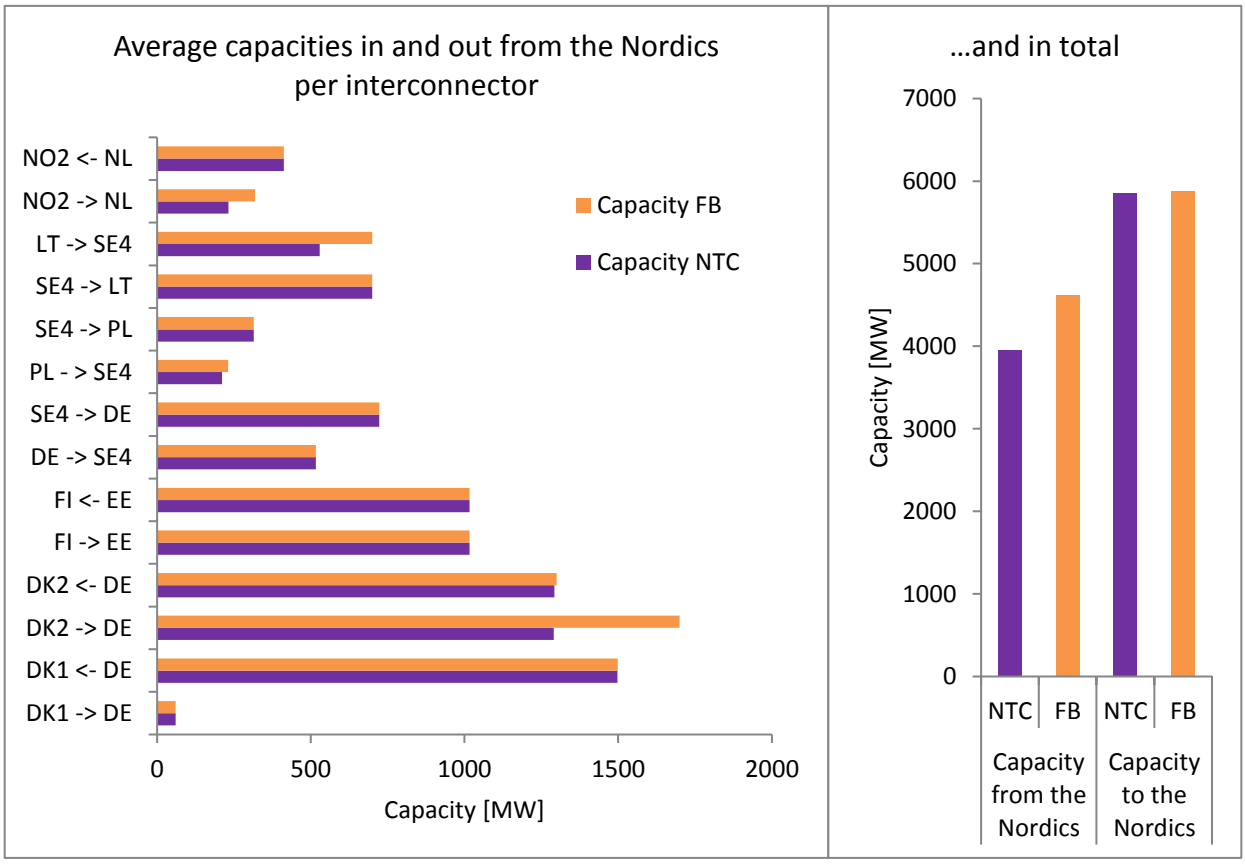

SE1, hourly prices
€/MWh
60,0
40,0
20,0
0,0
0 6 12 18 0 6 12 18 0 6 12 18 0 6 12 18 0 6 12 18 0 6 12 18 0 6 12 18
2017.01.09 2017.01.10 2017.01.11 2017.01.12 2017.01.13 2017.01.14 2017.01.15
FB SE1
NTC SE1
…and in average
€/MWh
40
20
0
SE1
NTC SE1
SE2, hourly prices
€/MWh
60,0
40,0
20,0
0,0
0 6 12 18 0 6 12 18 0 6 12 18 0 6 12 18 0 6 12 18 0 6 12 18 0 6 12 18
2017.01.09 2017.01.10 2017.01.11 2017.01.12 2017.01.13 2017.01.14 2017.01.15
FB SE2
NTC SE2
…and in average
€/MWh
40
20
0
SE2
NTC SE2
SE3, hourly prices
€/MWh
60,0
40,0
20,0
0,0
0 6 12 18 0 6 12 18 0 6 12 18 0 6 12 18 0 6 12 18 0 6 12 18 0 6 12 18
2017.01.09 2017.01.10 2017.01.11 2017.01.12 2017.01.13 2017.01.14 2017.01.15
FB SE3
NTC SE3
…and in average
€/MWh
40
20
0
SE3
NTC SE3
SE4, hourly prices
€/MWh
60,0
40,0
20,0
0,0
0 6 12 18 0 6 12 18 0 6 12 18 0 6 12 18 0 6 12 18 0 6 12 18 0 6 12 18
2017.01.09 2017.01.10 2017.01.11 2017.01.12 2017.01.13 2017.01.14 2017.01.15
FB SE4
NTC SE4
…and in average
€/MWh
40,00
20,00
0,00
SE4
NTC SE4

System price

The Nordic system price is calculated without network constraints within the Nordic area, i.e. copper plate. In the parallel simulations of FB and NTC the Nordic system price is not calculated. The different modelling approach can though have an impact of system price due to different allocation of capacity to the interconnectors between the Nordics countries and the rest of Europe.

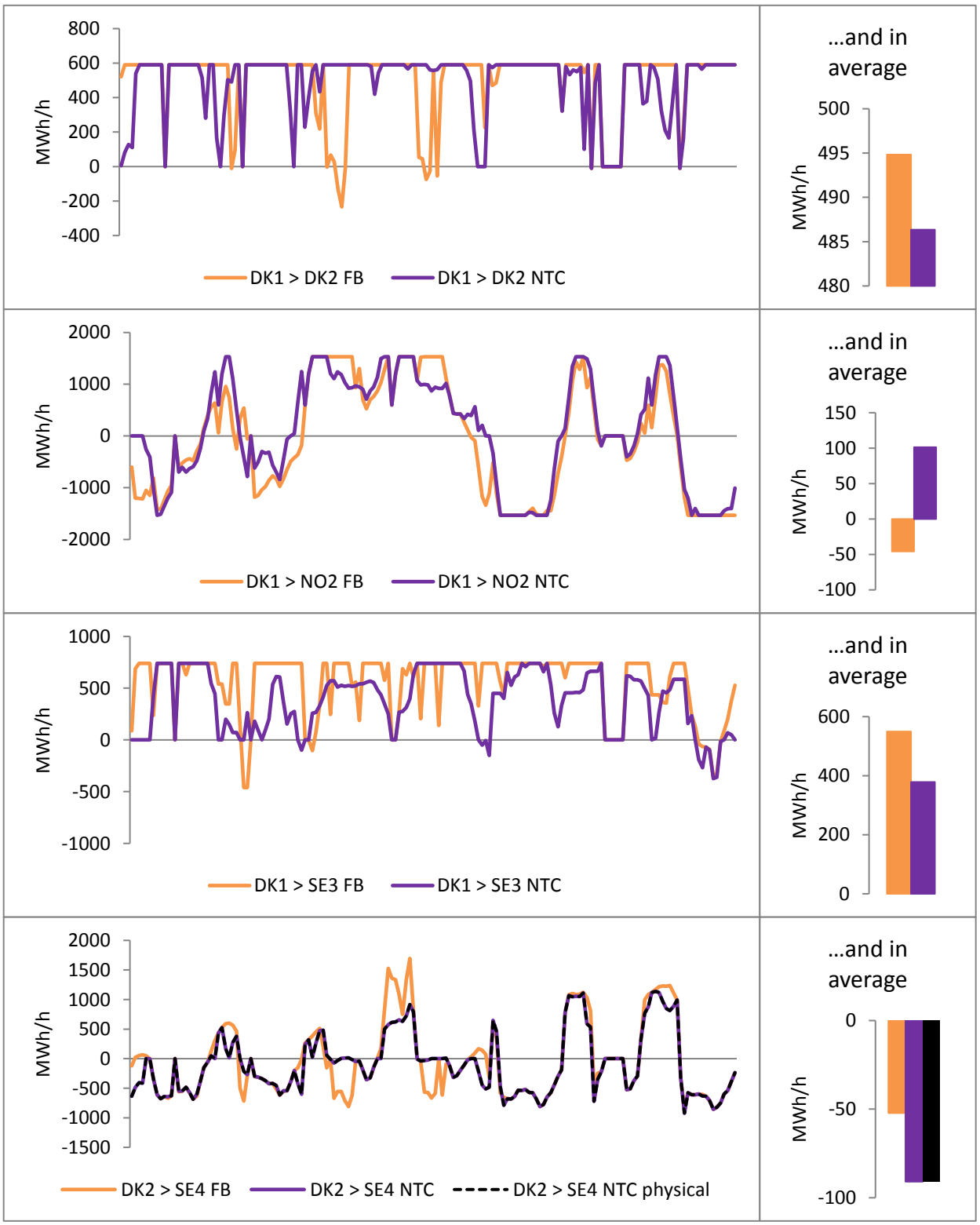
The system price is calculated locally at Nord Pool after PCR, area price calculation. Calculated flows between the Nordics and the Netherlands/Germany are taken into account as either price independent import or as price independent export for NO2, DK1, DK2 and SE4.

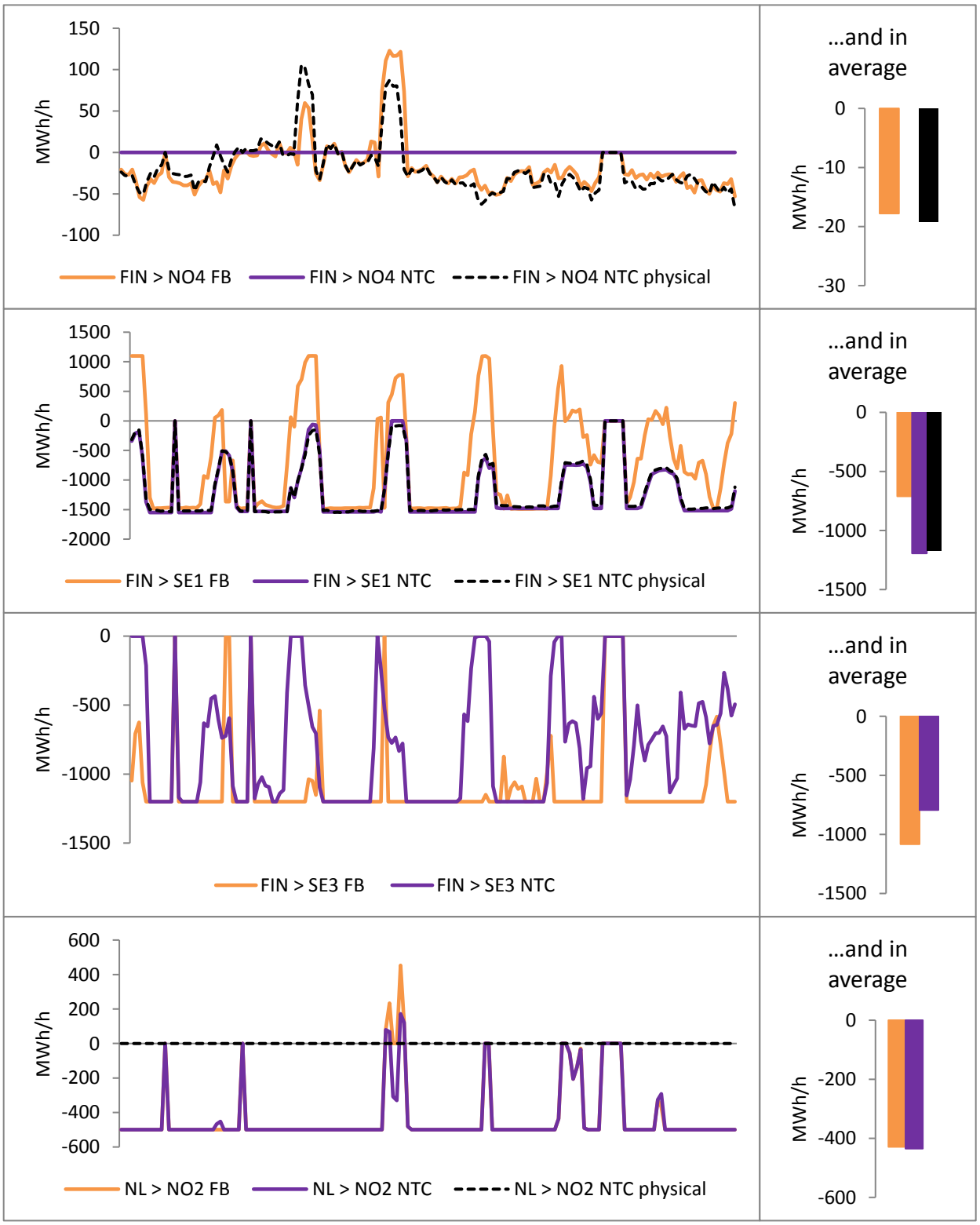
System price calculation has a different area configuration compared to areas price calculation. Norway, Denmark, Sweden and Finland constitute one bidding are. Baltic countries and Poland are configured as one area each, just as when calculating area prices. Between the Nordic region and the Baltic region + Poland the same capacities as in the PCR, area price calculation, are used when calculating the system price.

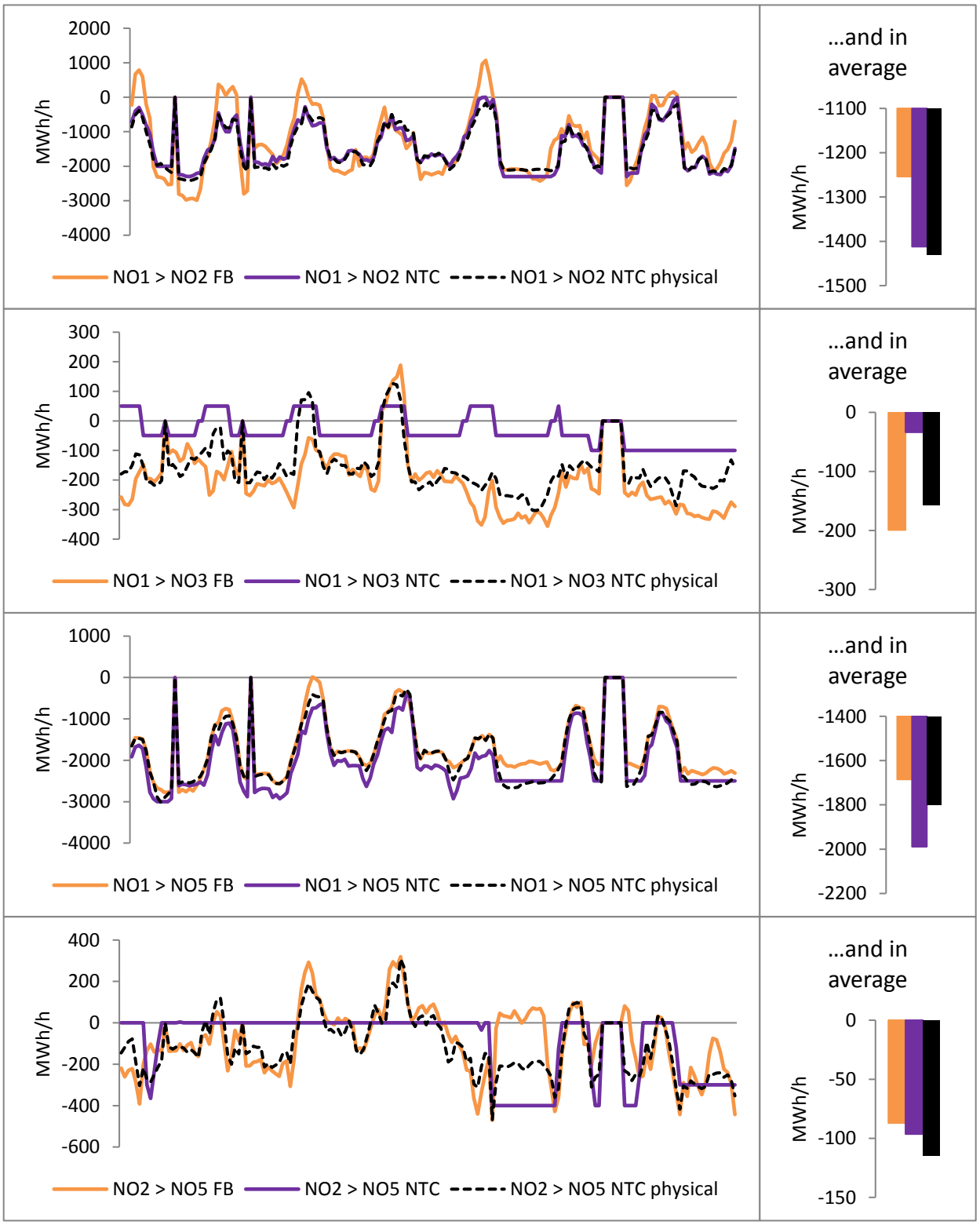


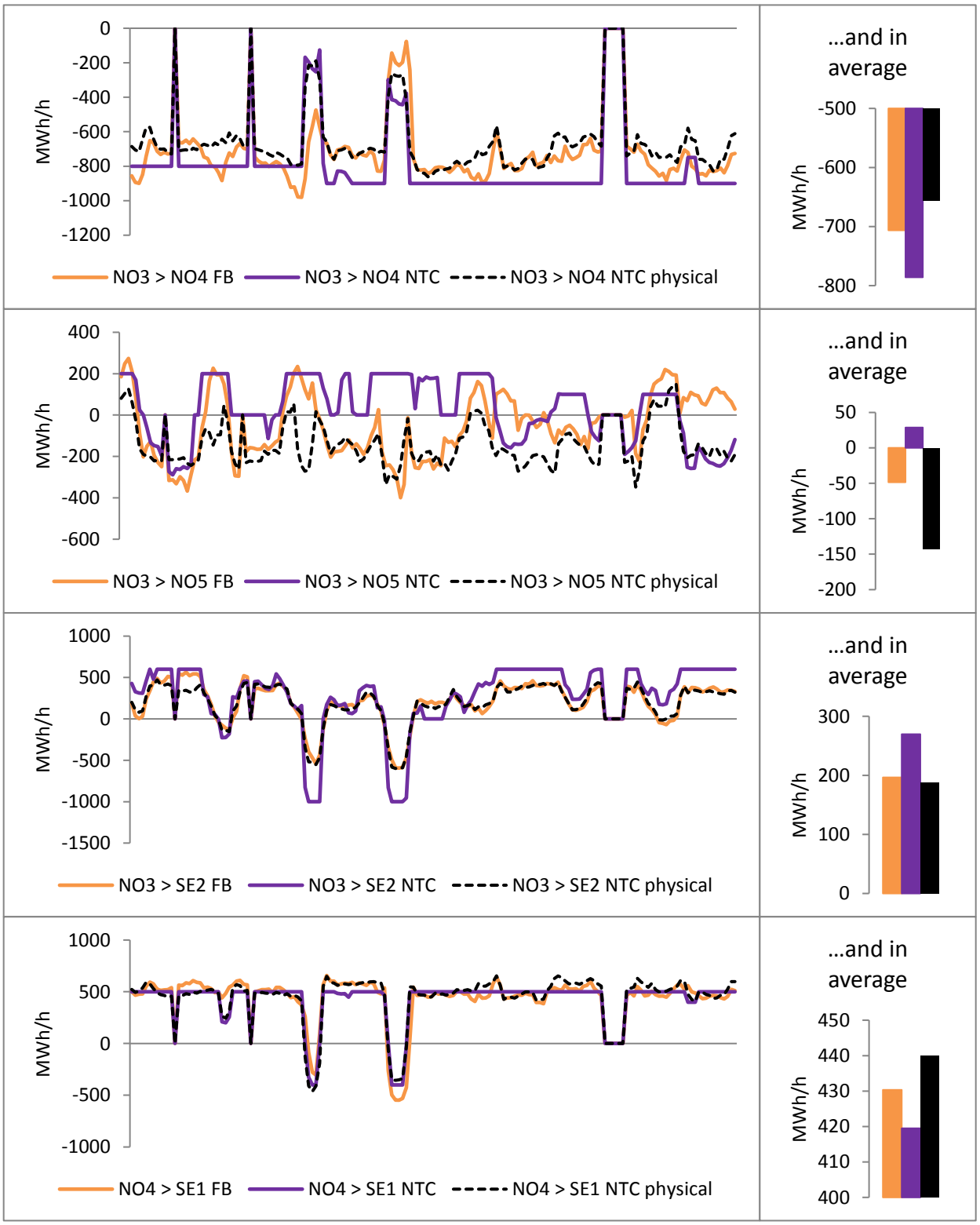
Border flows

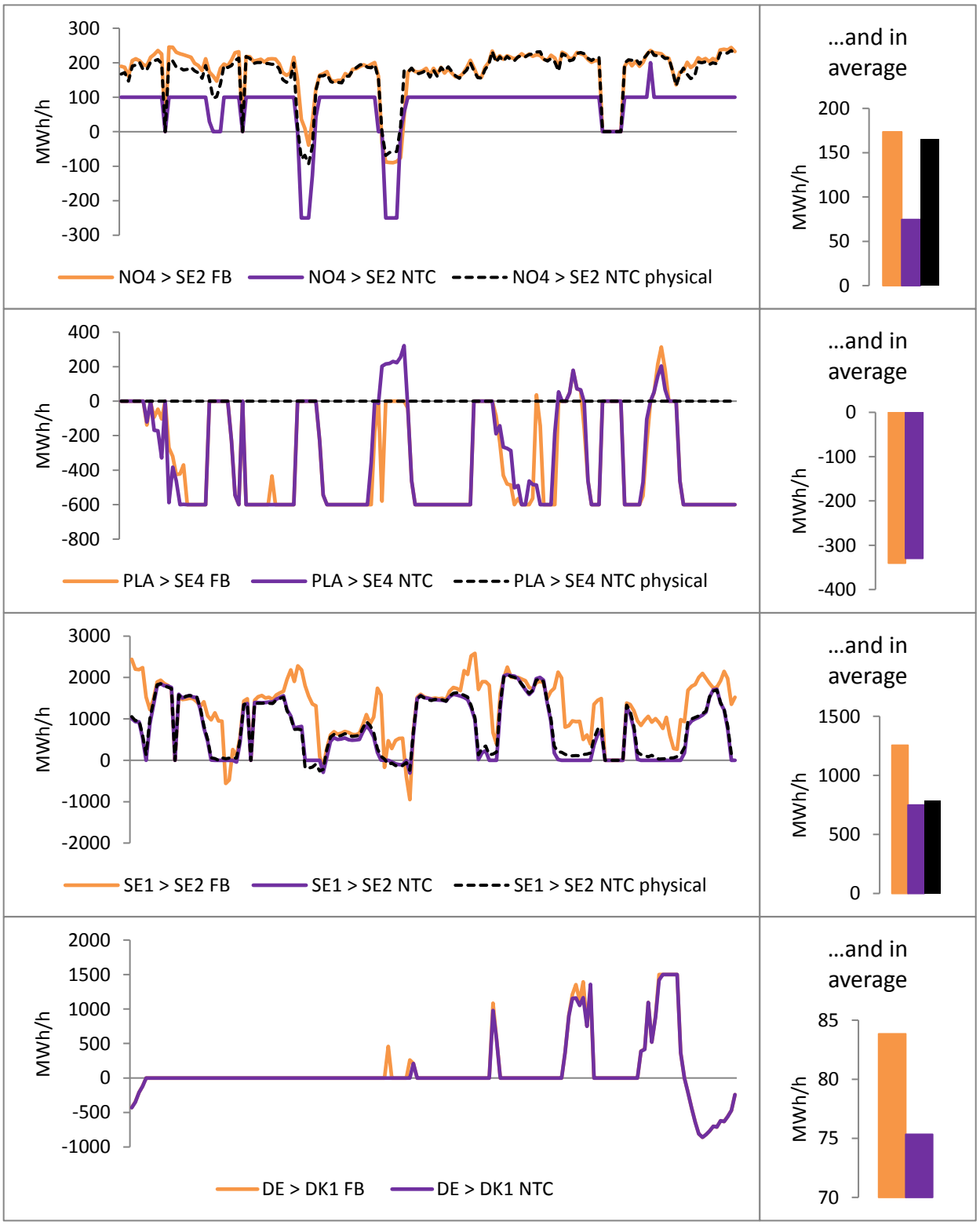
The flow on the borders between bidding areas are shown in the following charts.

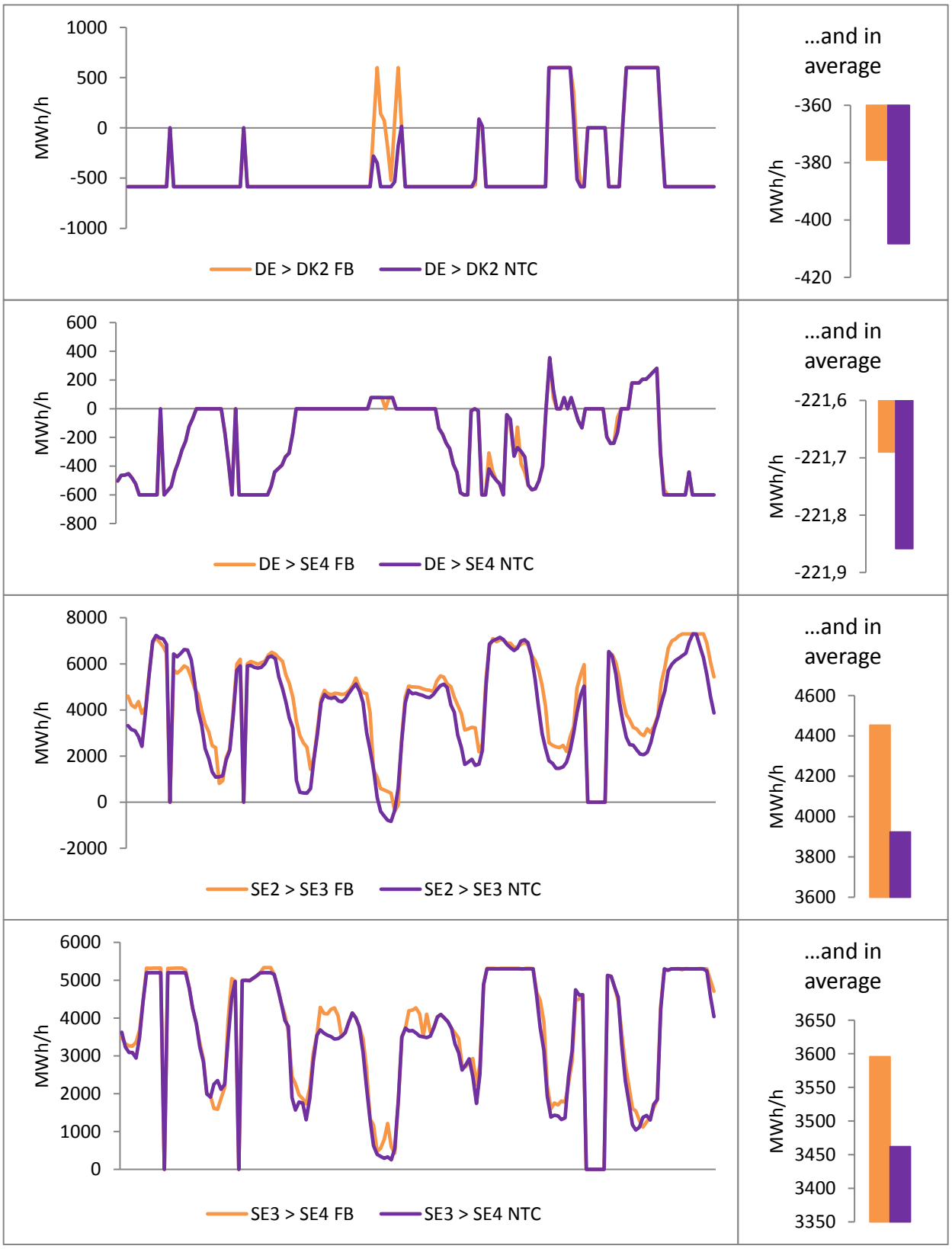


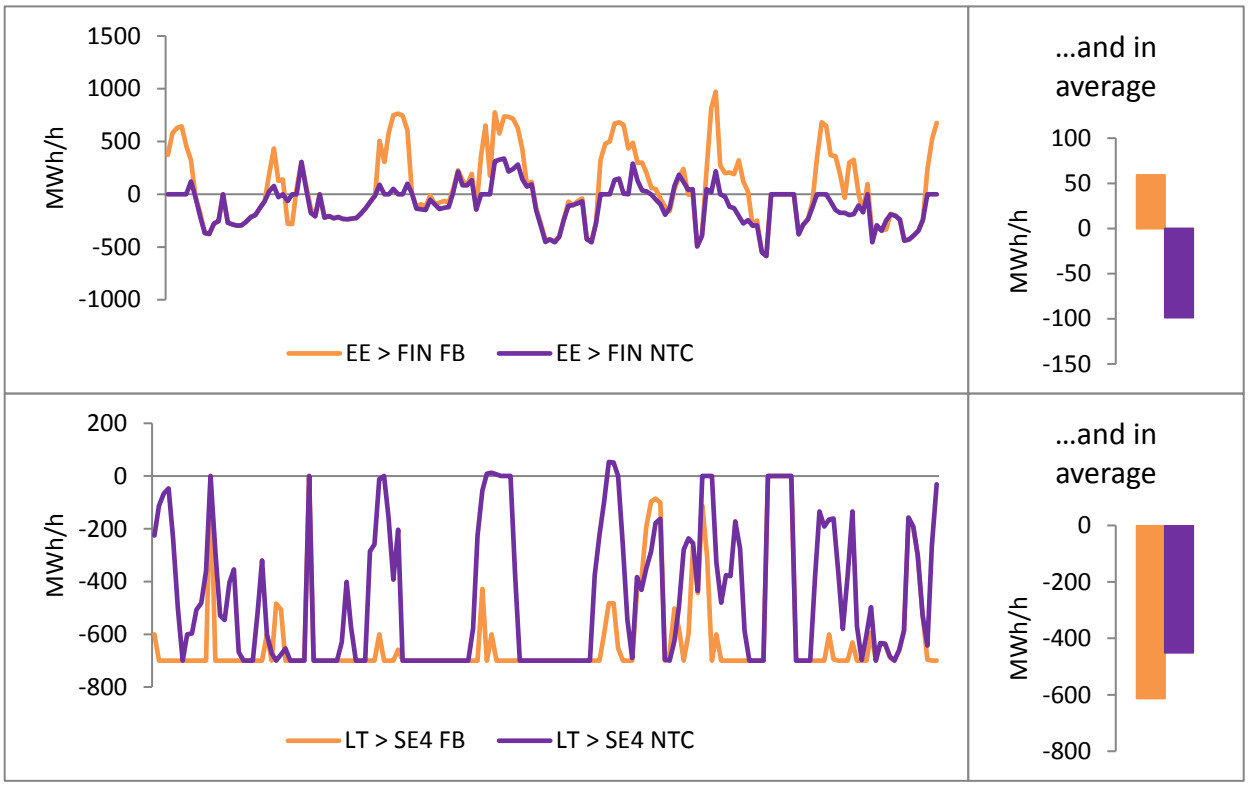

150
100
50
0
-50
-100
MWh/h
FIN > NO4 FB
FIN > NO4 NTC
FIN > NO4 NTC physical
...and in average
0
-10
-20
-30
MWh/h
1500
1000
500
0
-500
-1000
-1500
-2000
MWh/h
FIN > SE1 FB
FIN > SE1 NTC
FIN > SE1 NTC physical
...and in average
0
-500
-1000
-1500
MWh/h
0
-500
-1000
-1500
MWh/h
FIN > SE3 FB
FIN > SE3 NTC
...and in average
0
-500
-1000
-1500
MWh/h
600
400
200
0
-200
-400
-600
MWh/h
NL > NO2 FB
NL > NO2 NTC
NL > NO2 NTC physical
...and in average
0
-200
-400
-600
MWh/h


2000
1000
0
-1000
-2000
-3000
-4000
MWh/h
NO1 > NO2 FB
NO1 > NO2 NTC
NO1 > NO2 NTC physical
...and in average
-1100
-1200
-1300
-1400
-1500
MWh/h
300
200
100
0
-100
-200
-300
-400
MWh/h
NO1 > NO3 FB
NO1 > NO3 NTC
NO1 > NO3 NTC physical
...and in average
0
-100
-200
-300
MWh/h
1000
0
-1000
-2000
-3000
-4000
MWh/h
NO1 > NO5 FB
NO1 > NO5 NTC
NO1 > NO5 NTC physical
...and in average
-1400
-1600
-1800
-2000
-2200
MWh/h
400
200
0
-200
-400
-600
MWh/h
NO2 > NO5 FB
NO2 > NO5 NTC
NO2 > NO5 NTC physical
...and in average
0
-50
-100
-150
MWh/h

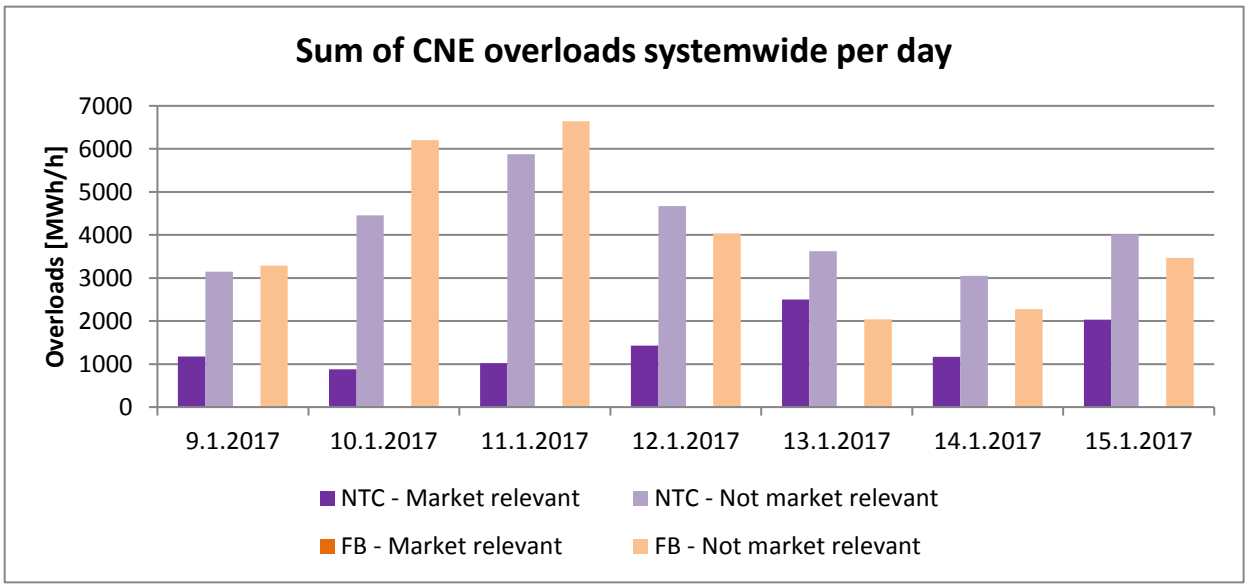

0
-200
-400
-600
-800
-1000
-1200
MWh/h
NO3 > NO4 FB
NO3 > NO4 NTC
NO3 > NO4 NTC physical
...and in average
-500
-600
-700
-800
MWh/h
400
200
0
-200
-400
-600
MWh/h
NO3 > NO5 FB
NO3 > NO5 NTC
NO3 > NO5 NTC physical
...and in average
50
0
-50
-100
-150
-200
MWh/h
1000
500
0
-500
-1000
-1500
MWh/h
NO3 > SE2 FB
NO3 > SE2 NTC
NO3 > SE2 NTC physical
...and in average
300
200
100
0
MWh/h
1000
500
0
-500
-1000
MWh/h
NO4 > SE1 FB
NO4 > SE1 NTC
NO4 > SE1 NTC physical
...and in average
450
440
430
420
410
400
MWh/h

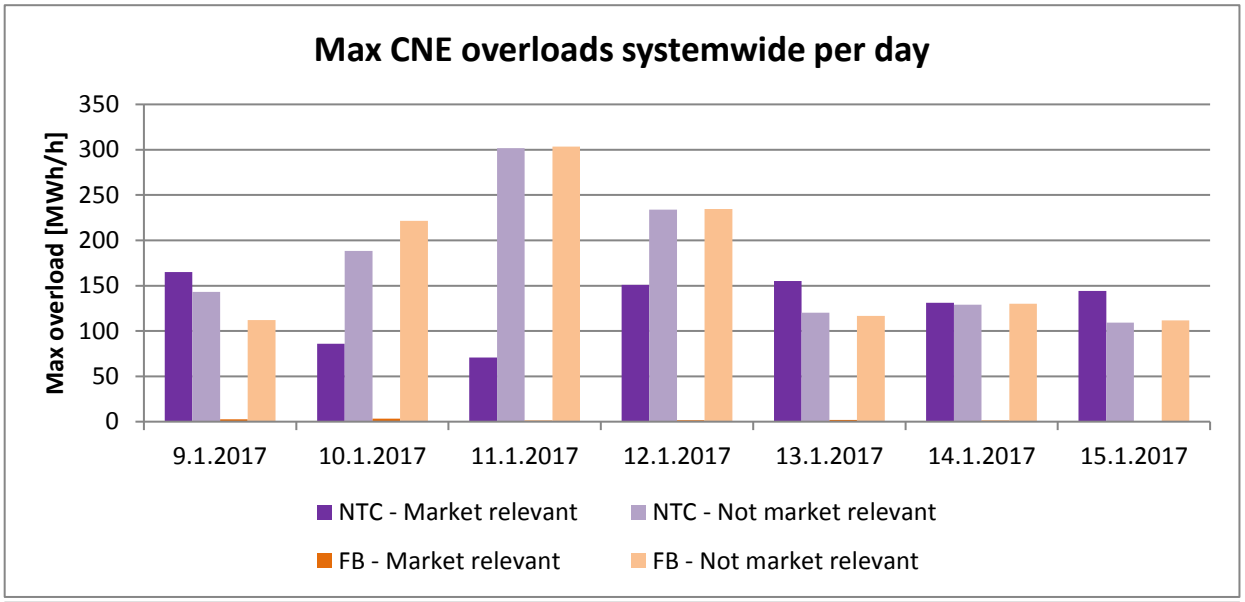

300
200
100
0
-100
-200
-300
MWh/h
NO4 > SE2 FB
NO4 > SE2 NTC
NO4 > SE2 NTC physical
...and in average
200
150
100
50
0
MWh/h
400
200
0
-200
-400
-600
-800
MWh/h
PLA > SE4 FB
PLA > SE4 NTC
PLA > SE4 NTC physical
...and in average
0
-100
-200
-300
-400
MWh/h
3000
2000
1000
0
-1000
-2000
MWh/h
SE1 > SE2 FB
SE1 > SE2 NTC
SE1 > SE2 NTC physical
...and in average
1500
1000
500
0
MWh/h
2000
1500
1000
500
0
-500
-1000
MWh/h
DE > DK1 FB
DE > DK1 NTC
...and in average
85
80
75
70
MWh/h

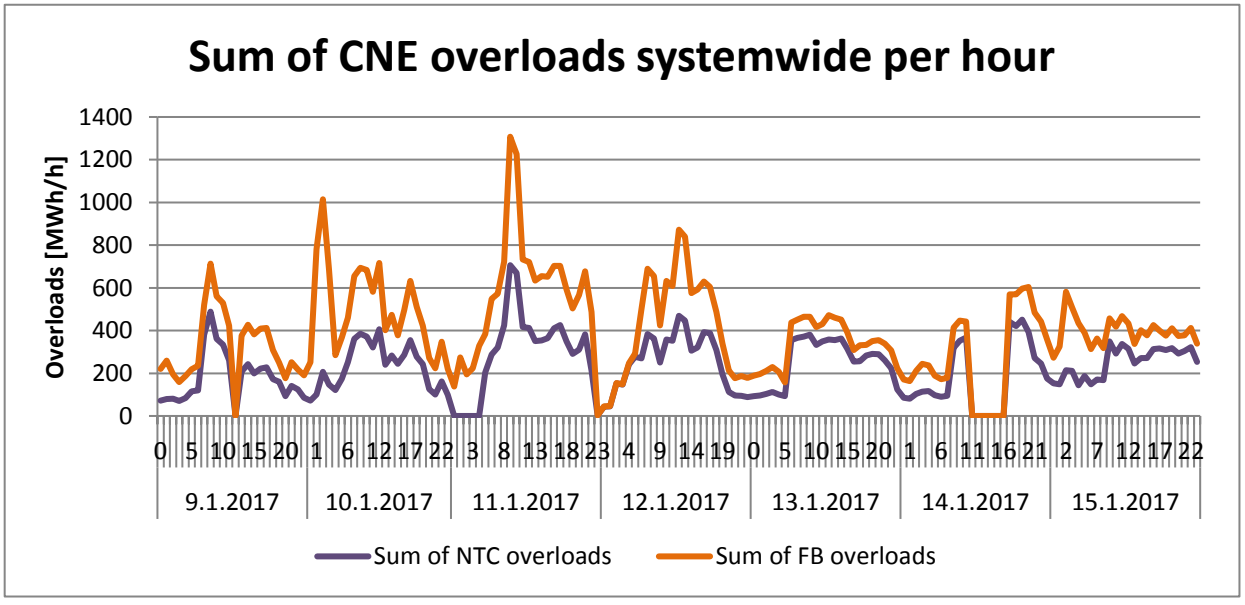

1000
500
0
-500
-1000
MWh/h
DE > DK2 FB
DE > DK2 NTC
...and in average
-360
-380
-400
-420
MWh/h
600
400
200
0
-200
-400
-600
-800
MWh/h
DE > SE4 FB
DE > SE4 NTC
...and in average
-221,6
-221,7
-221,8
-221,9
MWh/h
8000
6000
4000
2000
0
-2000
MWh/h
SE2 > SE3 FB
SE2 > SE3 NTC
...and in average
4600
4400
4200
4000
3800
3600
MWh/h
6000
5000
4000
3000
2000
1000
0
MWh/h
SE3 > SE4 FB
SE3 > SE4 NTC
...and in average
3650
3600
3550
3500
3450
3400
3350
MWh/h


1500
1000
500
0
-500
-1000
MWh/h
EE > FIN FB
EE > FIN NTC
...and in average
100
50
0
-50
-100
-150
MWh/h
200
0
-200
-400
-600
-800
MWh/h
LT > SE4 FB
LT > SE4 NTC
...and in average
0
-200
-400
-600
-800
MWh/h

Power system impact analysis







The figure below shows the net increase in welfare against the net reduction in overloads when using FB instead of NTC. Each dot represents one hour of the week addressed in this report. Values in the quadrant A correspond to higher welfare and larger overloads with FB. Values in quadrant B correspond to higher welfare and smaller overloads with FB. Values in the quadrant C correspond to lower welfare and smaller overloads with FB. Values in the quadrant D correspond to lower welfare and larger overloads with FB.

Average welfare gain: 245 k€ Average reduction in overloads: 69 MWh/h
Median welfare gain: 115 k€ Median reduction in overloads: 61 MWh/h