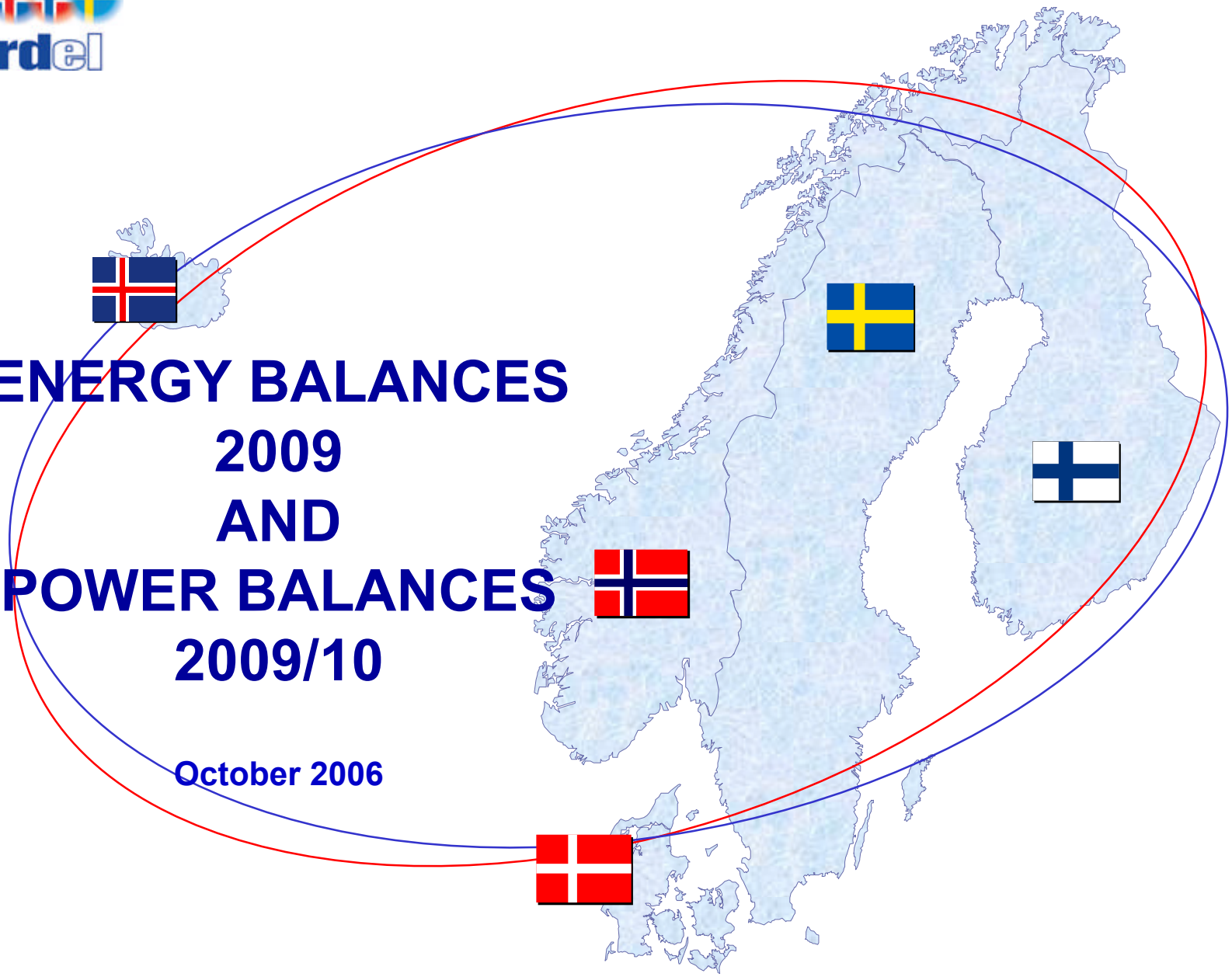
ENERGY BALANCES 2009 AND POWER BALANCES 2009/10

October 2006



CONTENTS

Prepared by Nordel's Balance Group October 2006

Organisation for Nordic Transmission System Operators

SUMMARY OF THE FORECASTS

The annual electricity consumption in the Nordic market is estimated to grow about 16 TWh by the end of year 2009 (1.0%/a) from 402 TWh in 2005 (temperature corrected, including electrical boilers).

The sum of the national peak demands in average temperature conditions is estimated to grow to 72 000 MWh/h in the winter period 2009/10. The forecast for the corresponding demand in the cold temperature conditions (statistically once in ten years nationally) is 3 700 MWh/h higher (75 700 MWh/h). On the Nordic level this corresponds to a probability of once in 30 to 40 years. Simultaneous peak demand is expected to be 1 000 to 2 000 MWh/h lower. Simultaneous all time high has been 69 000 MWh/h in 2001.

Investments in production capacity by the end of 2009 are estimated to increase the available production capacity by about 2 400 MW. The decided and planned investments would increase the production capability by about 7 TWh/a in 2009 and by about 13 TWh/a in 2010 assuming the new nuclear unit in Finland comes into operation mid of 2010.

Iceland is presented separately and it is not included in the other figures.

CONCLUSIONS

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Both the energy balance in 2009 and power balance in 2009/10 are better than the former Nordel estimate for 2008. This is due to additional investments in new generation capacity especially in 2009. Thus, the situation before the year 2009 and winter period 2009/10 will be more strict in the Nordic power system.

The Nordic electricity system is able to meet the estimated consumption and the corresponding typical power demand pattern in average conditions even without imports.

In order to meet the energy demand in low inflow conditions the Nordic power system needs to import from neighbouring countries.

The Nordic production capacity is sufficient to meet the simultaneous peak power demand also in cold conditions but the margin remains small.

In practice, the balance between Nordic supply and import/export will be based on the prevailing market situation between the Nordic electricity market and the neighbouring markets.

Some areas in Norway can be exposed to a risk for rationing or other measures in case of extremely low precipitation.

FORECASTS

CONSUMPTION AND DEMAND

	Energy 2005 TWh/a 1)	Energy 2009 TWh/a	Growth %/a	All time peak MWh/h	Peak 2009/10 MWh/h Cold
Denmark	36.0	38	1.6	6 480	7 400 2)
Finland	85.9 4)	95	2.5	14 800	15 700 2)
Norway	129.5	133	0.7	23 050	24 000 2)
Sweden	150.7	152	0.2	27 300	28 500 2)
Nordel	402.1	418	1.0	69 000	75 600 3)

1) Temperature corrected, including electrical boilers
2) Probability once in 10 years
3) Sum of national peaks (probability once in 30 to 40 years)
4) Estimated reduction due to the industrial labour dispute about 3.5 TWh

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NET ADDITIONS IN GENERATION CAPACITY 2006 to 2009 (decided and planned)

	Hydro	Nuclear	Other thermal	Wind	Installed capacity	Available capacity at peak
Denmark			-160	550	390	-160
Finland	50	0	140	40	230	130
Norway	410		620	350	1380	1010
Sweden		600	900	1250	2750	1420
Nordel	460	600	1500	2190	4750	2400

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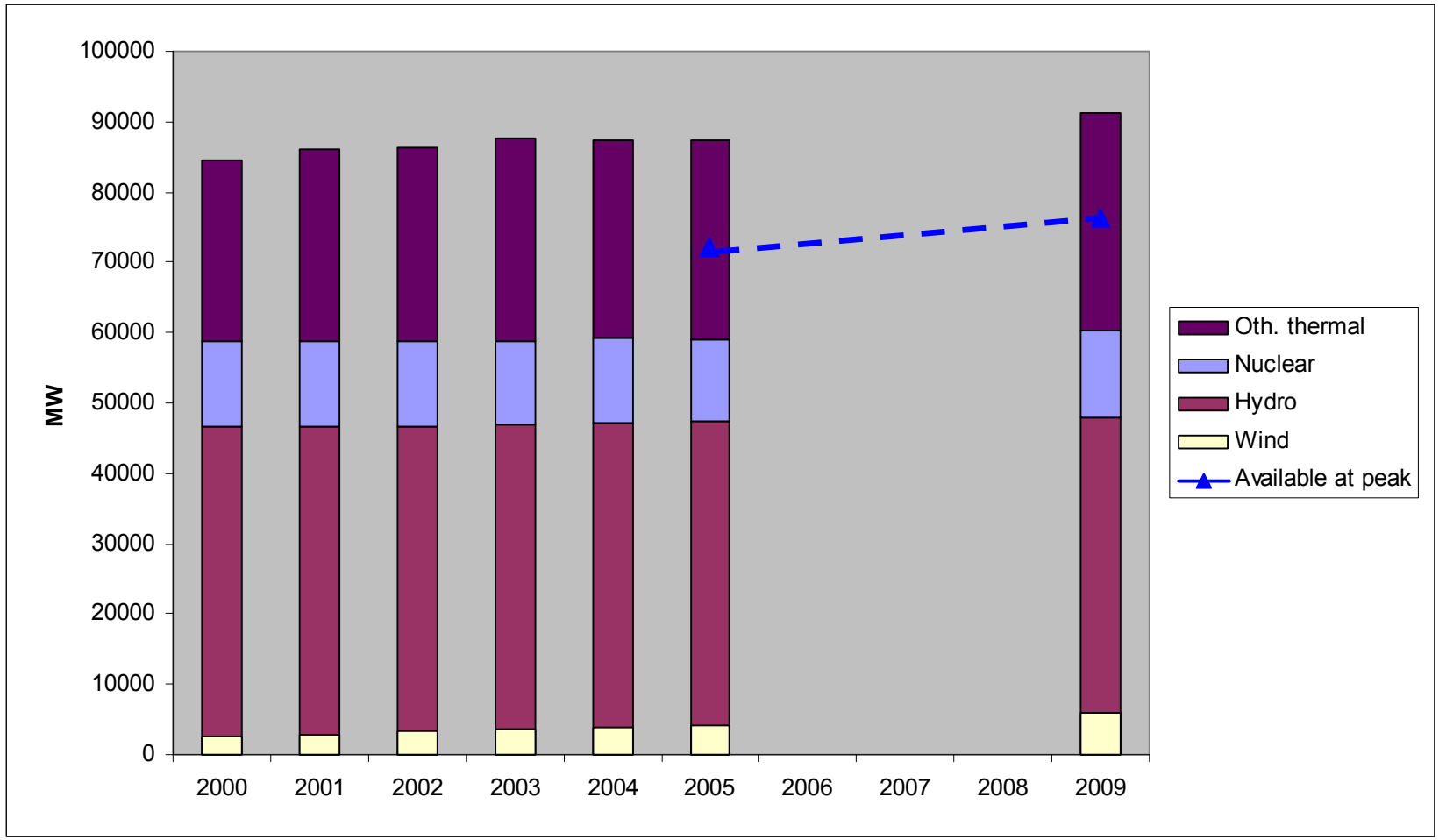
INSTALLED PRODUCTION CAPACITY

(at the end of year)



CHANGES IN INTERCONNECTIONS

Interconnections

New interconnections Estlink (between Finland and Estonia) 350 MW (end of 2006) and NorNed (between Norway and the Netherlands) 700 MW (by the beginning 2008) will increase the transmission capacity to outside Nordel.

Of the five prioritised Nordic grid investments Nea - Järpströmmen between Norway and Sweden is expected to be commissioned in autumn 2009. Also Storebælt, 600 MW connection between Eastern and Western Denmark, is expected to be commissioned 2009/10.

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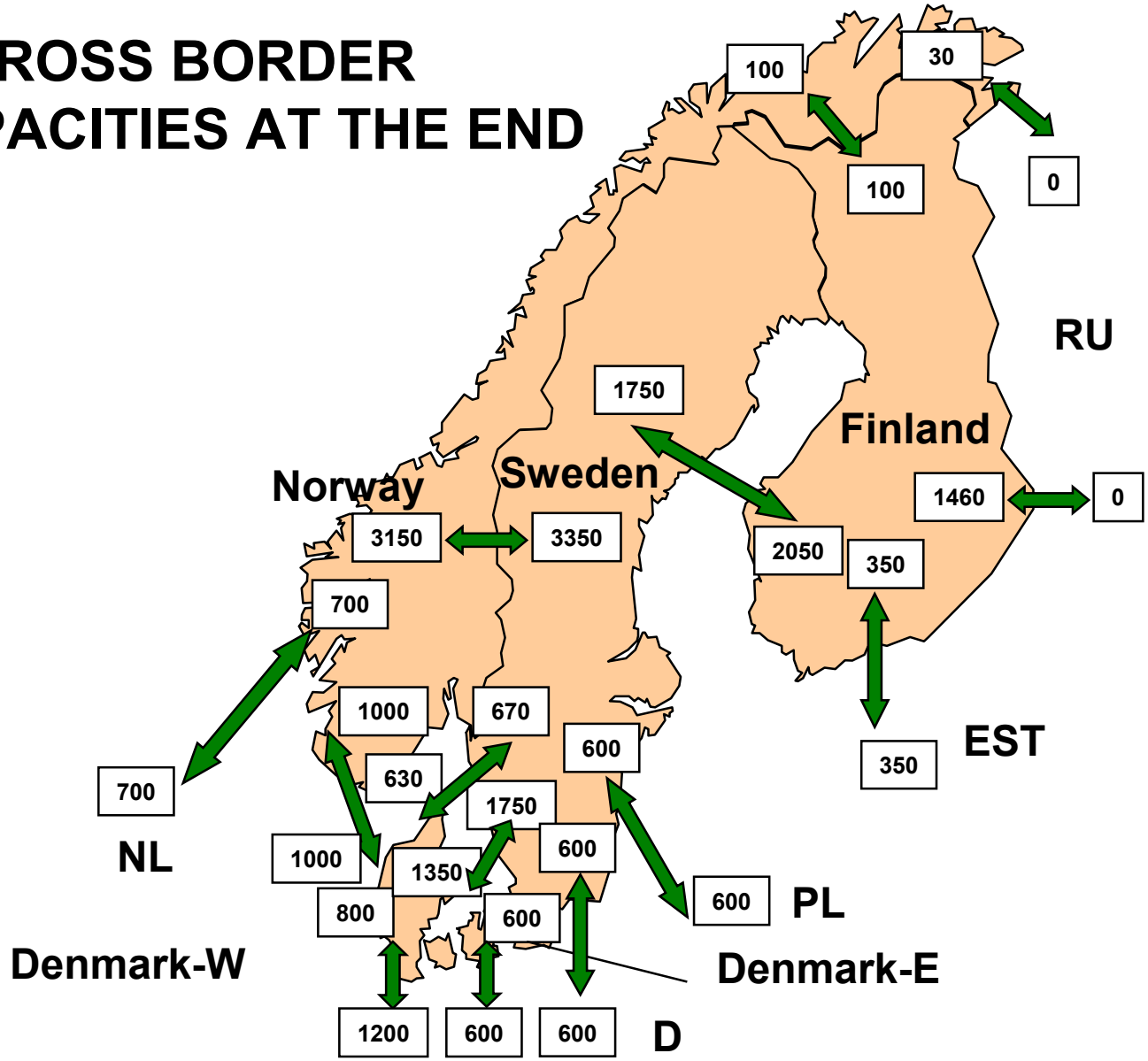
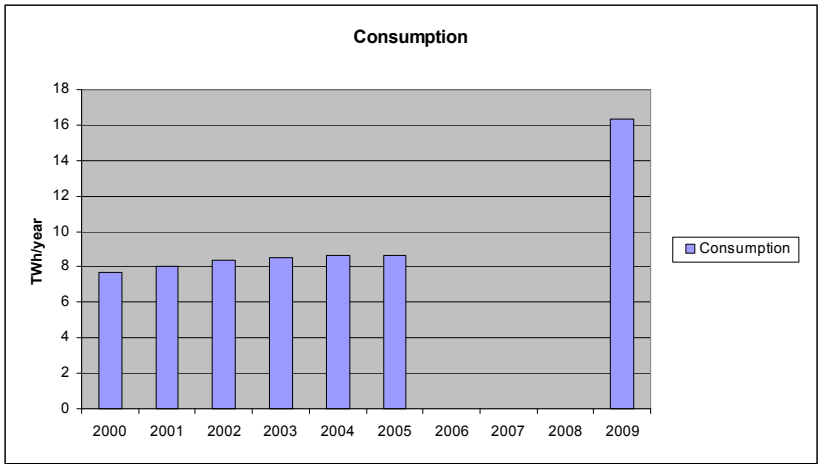
AVAILABLE CROSS BORDER TRADING CAPACITIES AT THE END OF 2009, MW

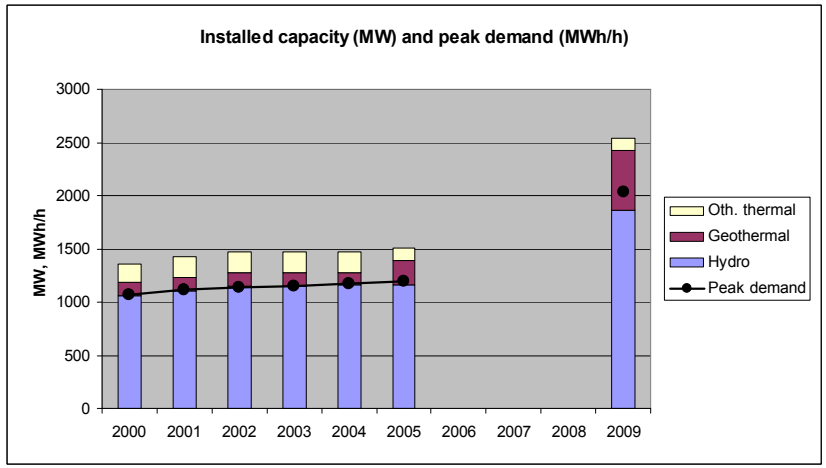


ICELAND

Iceland is not included in the figures elsewhere in the report.

The annual energy consumption in Iceland is estimated to grow by about 7.5 TWh by year 2009 (16 %/a) due to one new aluminium plant to be started in 2007 and extensions in existing plants.





SIMULATED ENERGY BALANCES 2009

Energy balances

SIMULATED ENERGY MARKET BALANCE 2009

Average conditions

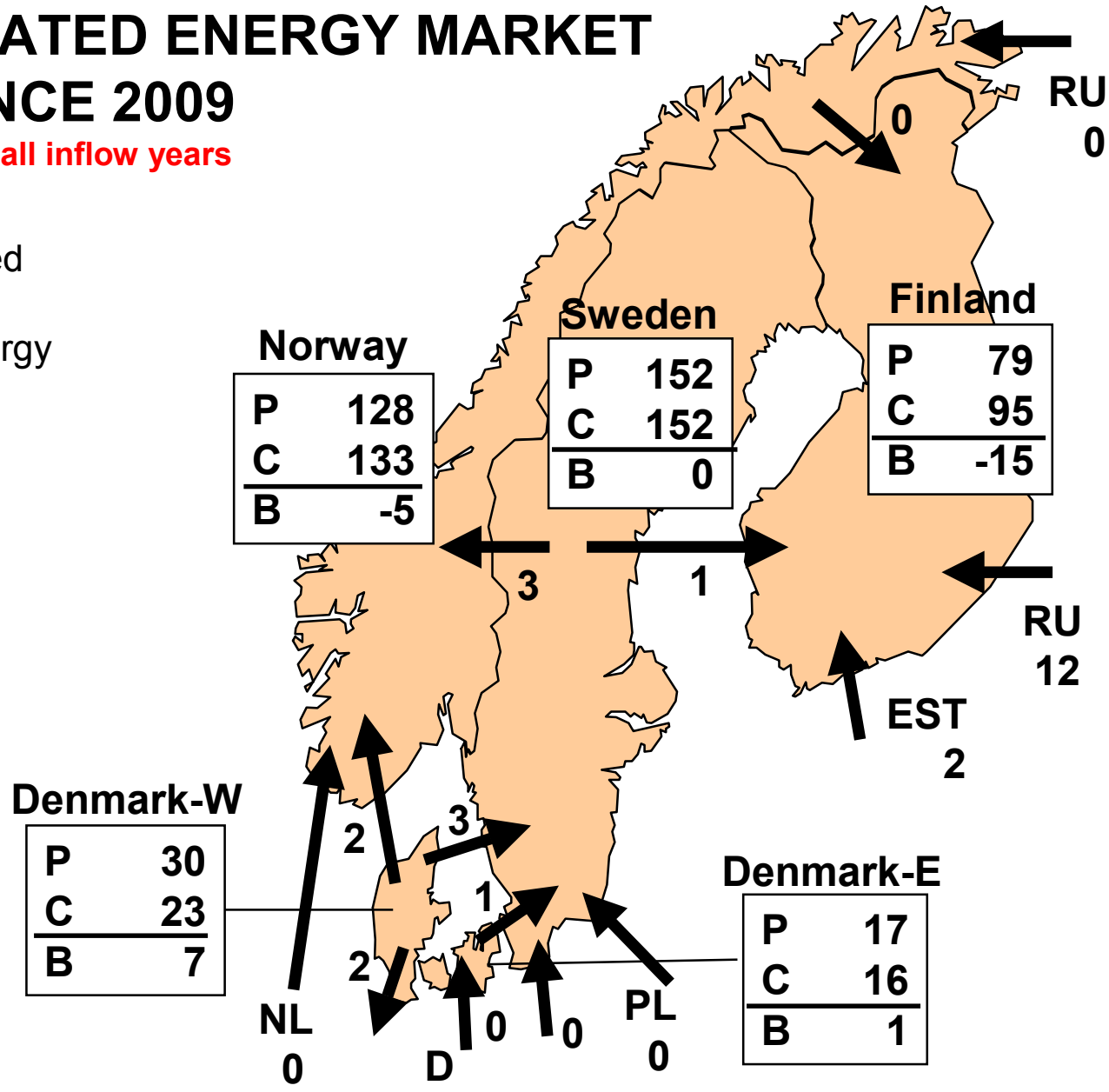
The *Simulated Energy Market Balance* on pages 14 to 16 illustrates the simulated physical exchanges between areas. The exchange between the Nordic and Continental markets is based on simulations in the Nordic market and the price forecast in the Continental market.

- ⇨ Due to imports the production in the Nordic countries remains remarkably lower than the production capability.
- ⇨ There is remarkable import from Estonia and Russia while net exchange with Central-Europe remains small.

SIMULATED ENERGY MARKET BALANCE 2009

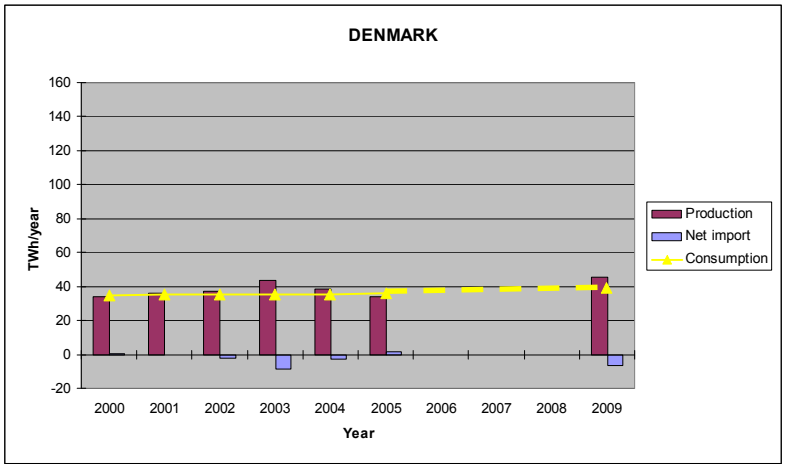
Average of all inflow years

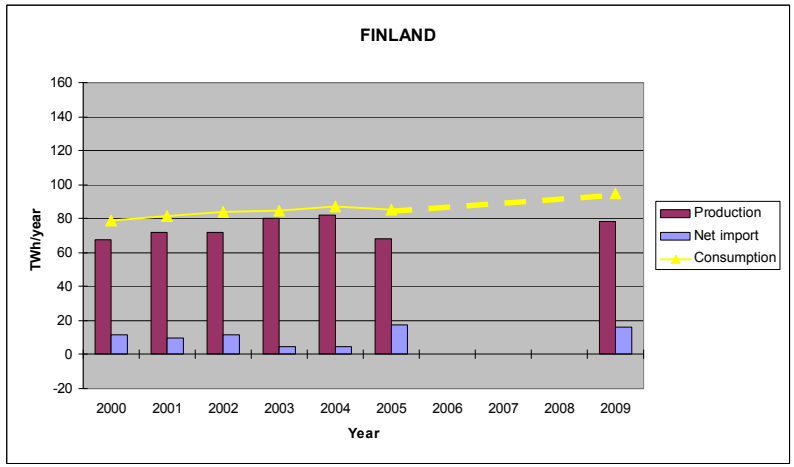
P = Production, simulated
C = Consumption
B = Balance without energy exchange
All units in TWh

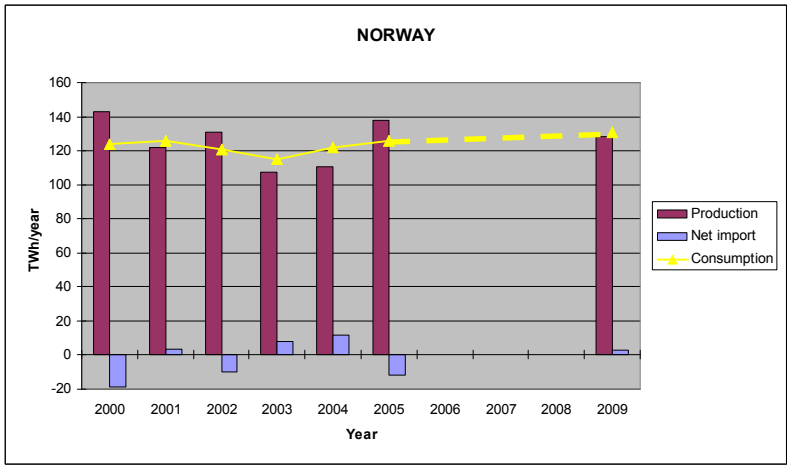


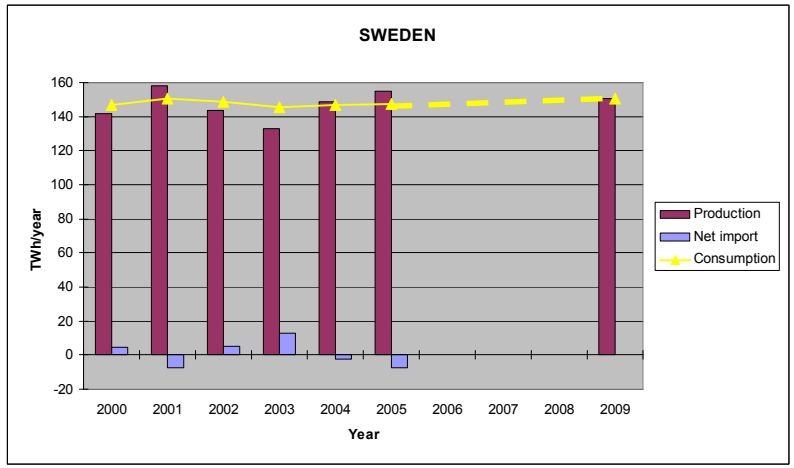
Nordel	
P	406
C	418
	-12

SIMULATED MARKET BALANCE 2009
(average of all inflow years)









2000 to 2005 actual values

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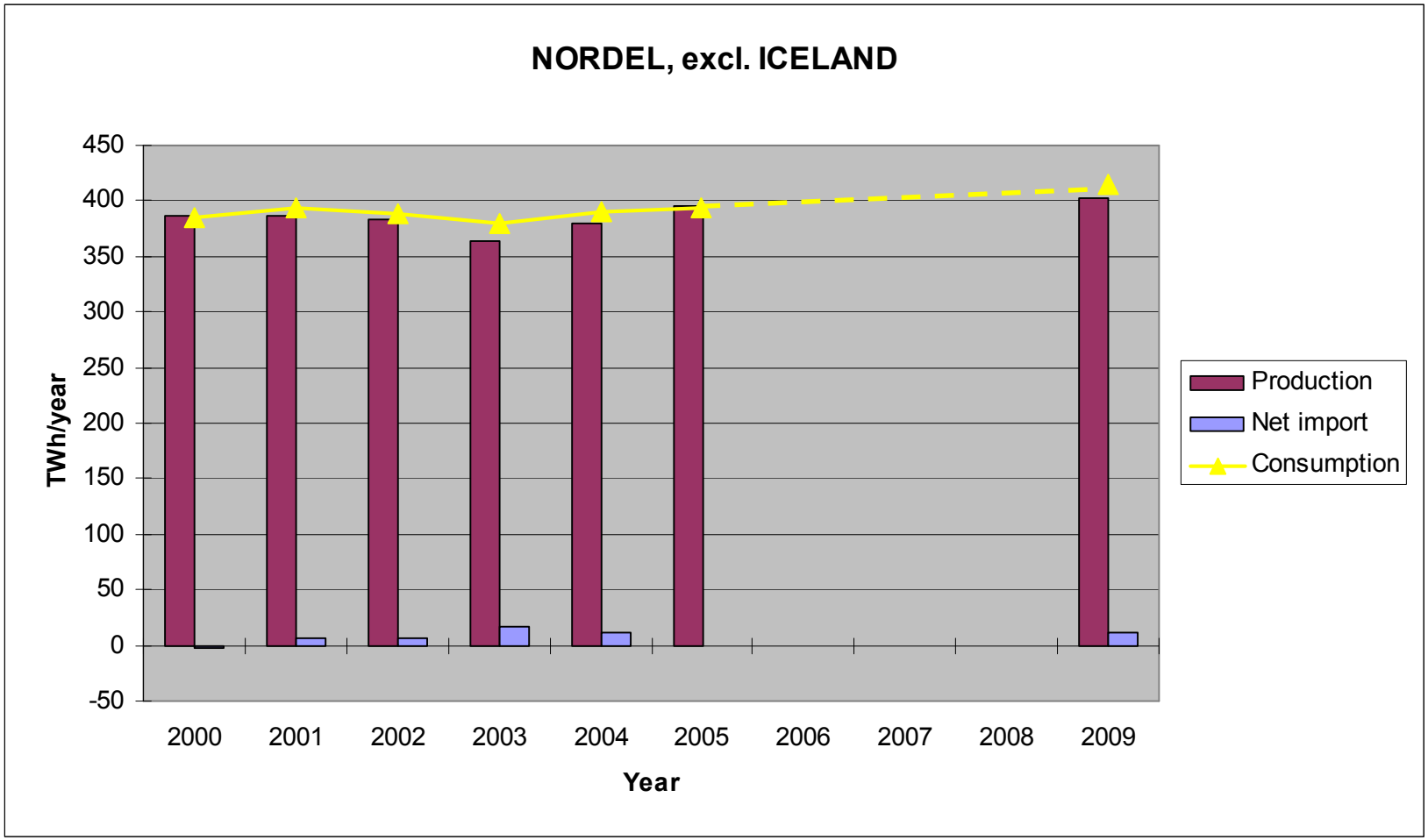
SIMULATED MARKET BALANCE 2009
(average of all inflow years)



2000 to 2005 actual values

ESTIMATED MARKET BALANCE 2009 (low inflow)

The S*imulated Energy Market Balance* on page 18 illustrates the simulated market balance in low inflow conditions. The inflow series used is 1960. It results in hydro power production once in 10 years.

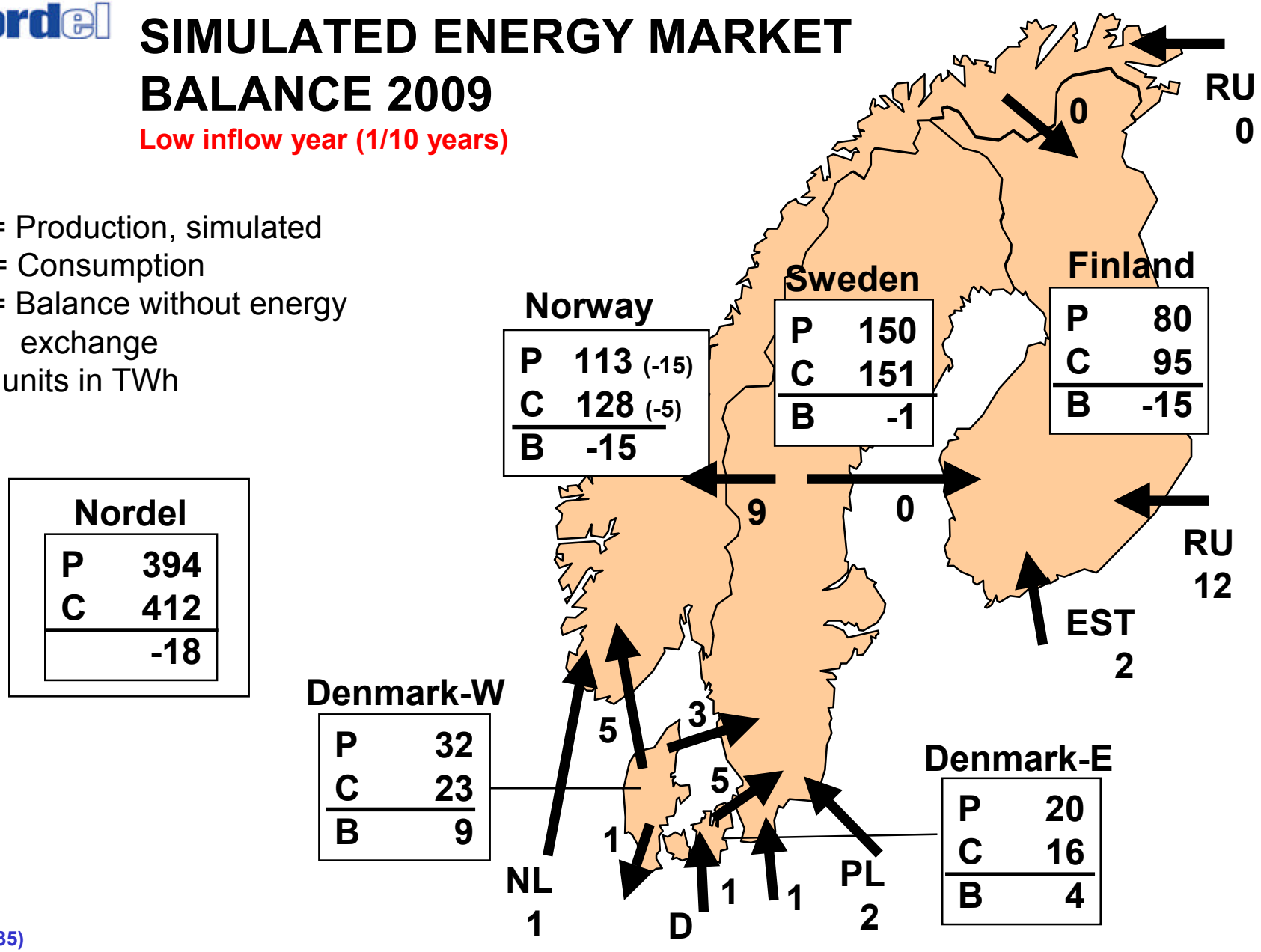
The simulation results show compared to average situation

- hydro production is decreased by 24 TWh
- thermal production is increased by 11 TWh
- demand is decreased by 6 TWh (demand response)
- import from outside is increased by 6 TWh

SIMULATED ENERGY MARKET BALANCE 2009

Low inflow year (1/10 years)

P = Production, simulated
C = Consumption
B = Balance without energy exchange
All units in TWh



SIMULATED MARKET BALANCE 2009 (extremely low inflow)

The *Simulated Energy Market Balance* on page 21 illustrates the simulated market balance in extremely low inflow conditions. The year used is 1970 which followed another low inflow year 1969. It results in lowest hydro power production among the 50 inflow series used in simulations.

In this case water reservoirs are used more than the inflow thus resulting in decreasing water levels.

SIMULATED MARKET BALANCE 2009 (cont.) (extremely low inflow)

An extremely low inflow corresponds to a reduction of about 42 TWh in hydropower production compared to average conditions (sum of extremes in Finland, Norway and Sweden). The simulation results show that compared to the average of all simulated inflow series

- hydro power production is decreased by 33 TWh
- thermal production is increased by 15 TWh
- demand is decreased by 11 TWh (demand response)
- import from outside is increased by 8 TWh

⇨ In a hydro-based system the market price can temporarily be very high during dry years and can result in decreased demand.

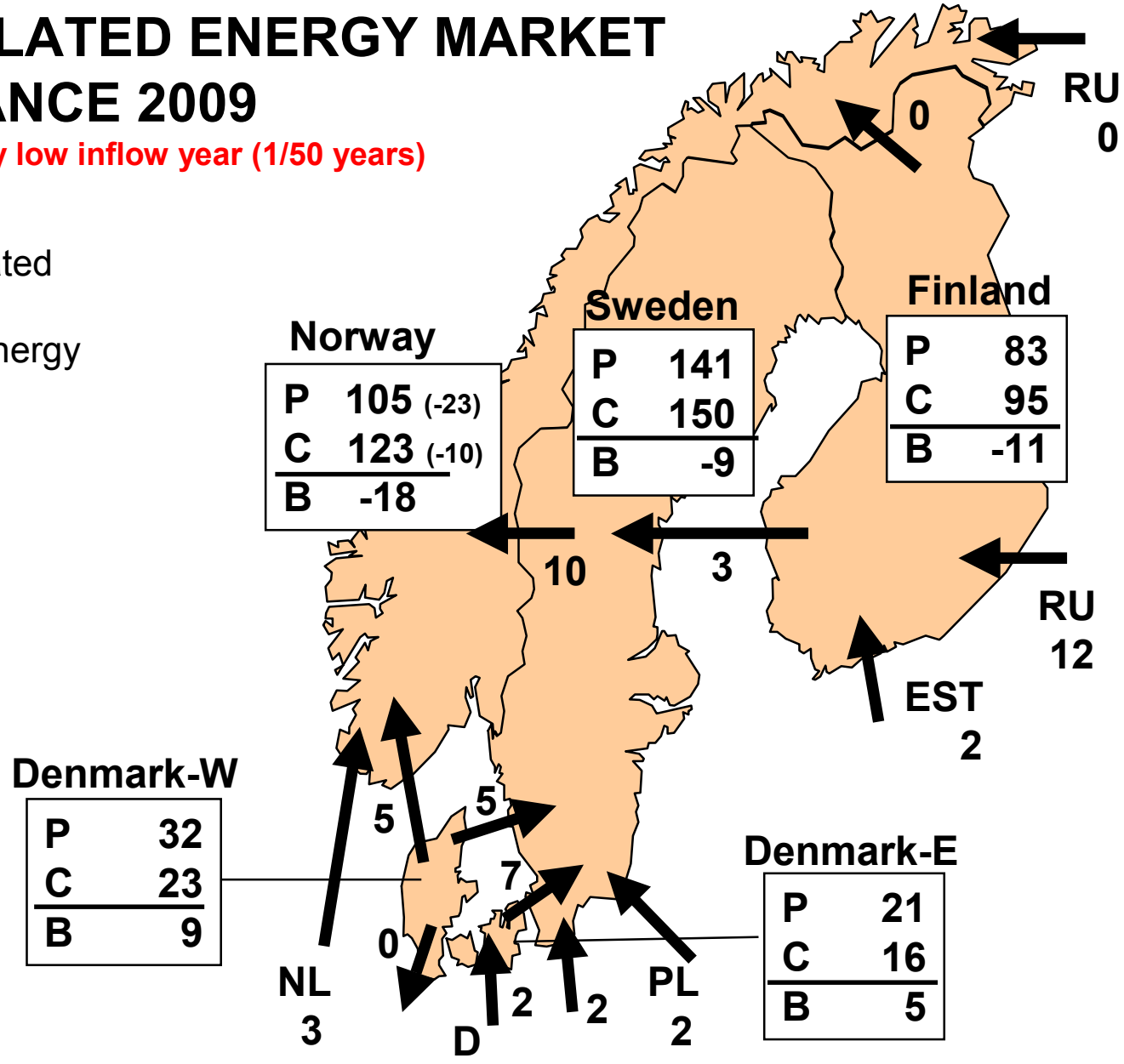
⇨ Some areas in Norway can be exposed to a risk for rationing or other measures in case of extremely low precipitation.

SIMULATED ENERGY MARKET BALANCE 2009

Extremely low inflow year (1/50 years)

P = Production, simulated
C = Consumption
B = Balance without energy exchange
All units in TWh

Nordel	
P	382
C	407
	-25



ESTIMATED POWER BALANCES 2009/10

AVAILABLE POWER CAPACITY AND PEAK DEMAND 2009/10

Average winter temperatures

The maximum available production capacity exceeds the peak demand by 4 200 MWh/h.

Sum of national peak demands is used in the forecasts. The simultaneous peak is 1000 to 2000 MWh/h lower. Considering this the capacity margin is even bigger and exceeds export capacity outside the area. The sum of national peaks corresponds to a probability of once in 30 to 40 years.

- ⇨ **Peak load situation is remarkably easier than in previous power balances due to investments in new generation capacity mainly in 2009. This means that the years before this are more strict.**
- ⇨ **Every Nordic country except Finland is able to meet an average winter day peak demand with its own production capacity. As a whole the Nordic area is able to meet the demand without import.**

AVAILABLE POWER CAPACITY AND PEAK DEMAND 2009/10

No exchange between areas

Average winter temperatures

P - maximum available production capacity (operational reserves excluded)

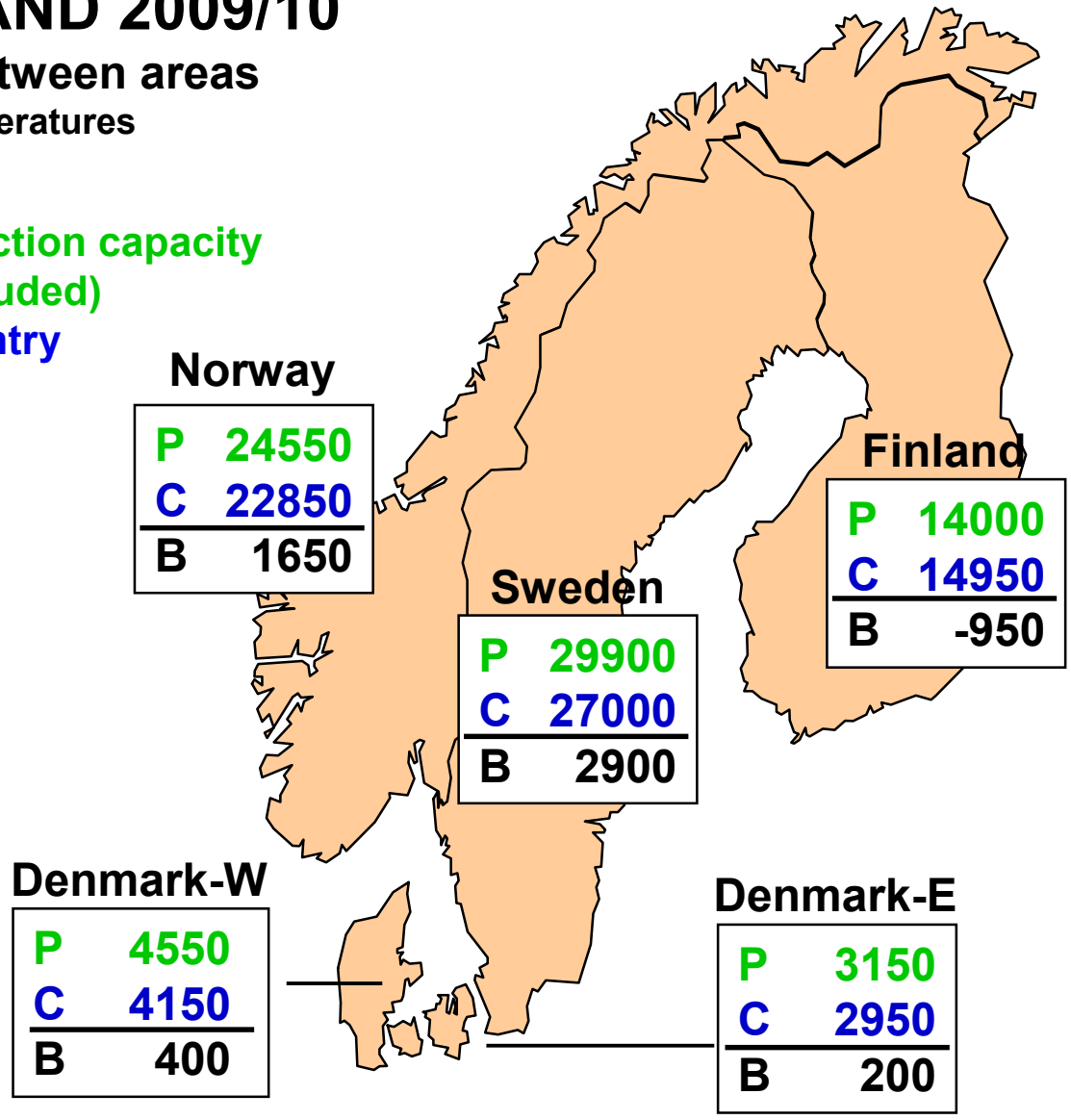
C - peak demand in each country

B - power balance

All units in MWh/h

Total of national values

P	76200
C	72000
B	4200



ESTIMATED POWER MARKET BALANCE 2009/10

Cold winter day

The national peak demands correspond a probability of once in ten years. The sum of these corresponds a probability of once in 30 to 40 years.

The sum of peak demands in cold conditions is estimated to be 3700 MWh/h higher than in average temperature conditions. The simultaneous peak is 1000 to 2000 MWh/h lower. The power balance is expected to come under strain in this situation.

⇨ Nordic production capacity is sufficient to cover the simultaneous peak demand without import.

⇨ Finland is a deficit area which is balanced by import from neighbouring areas. The other countries have potential for a surplus.

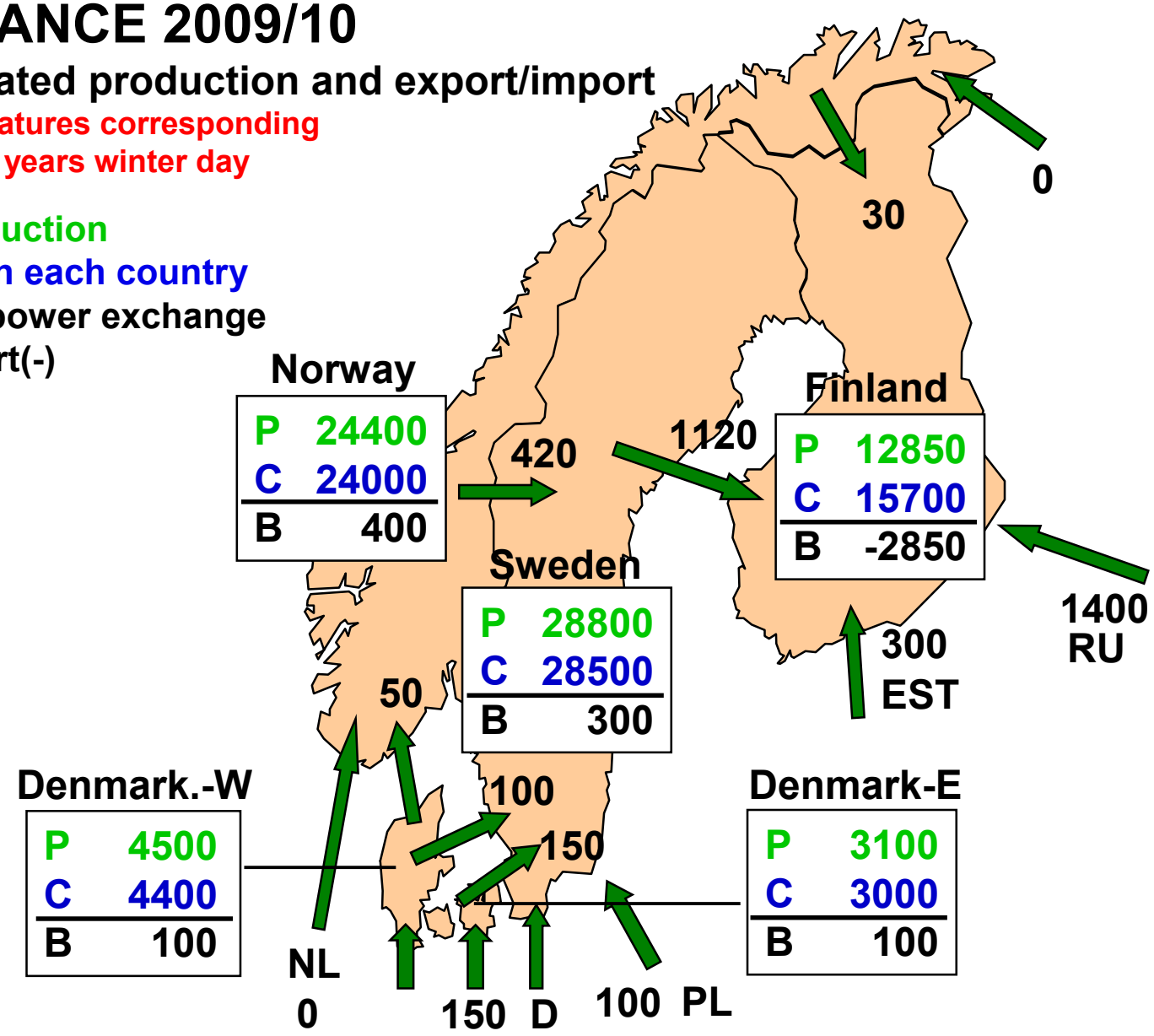
ESTIMATED POWER MARKET BALANCE 2009/10

Estimated production and export/import

Temperatures corresponding to a ten years winter day

P - estimated production
C - peak demand in each country
B - estimated net power exchange export(+)/import(-)

All units in MWh/h



APPENDICES

Appendix 1

ENERGY

Purpose

The purpose of this presentation is to give a picture of the energy balance for each country and the whole Nordic electricity market. Focus is set on production capacity and need for import from the neighbouring countries outside Nordel.

Definitions

Low inflow = There is a probability of 10 % to obtain energy below the estimated value.

Extreme low inflow = There is a probability of 2 % to obtain energy below the estimated value (1 out of 50 years)

Fundamentals

The exchange between the Nordel countries are market based. Hence it is the spot price that decides flow directions and volumes. The exchange between the Nordel countries and its neighbours is developing towards a market based operation.

The method does not necessarily indicate possible problems in certain areas.

Forecasted consumption/demand includes demand response during extreme dry years.

Consumption/demand includes network losses.

Appendix 2.1

POWER

Definitions

Available capacity **= installed capacity - unavailable capacity - reserves**

Reserves **= frequency controlled momentary and fast disturbance reserves.**

Peak Demand **= maximum one hour load in temperature circumstances with occurrence probability one winter during respectively two and ten years, denoted as an average winter day and a cold winter day.**

Ten years winter. **The peak demand is based on a temperature that has an occurrence of one out of ten years in each country separately. A simultaneous peak demand in all the countries at a working day has an occurrence probability less than 7 %.**

Appendix 2.2

POWER

Fundamentals

Estimated power exchange takes into account limitations both in transmissions and production capabilities. The method does not necessarily indicate possible problems in certain areas.

Unavailable capacity is based on experiences from earlier peak demand situations. Minimum unavailable hydropower is approximately 12 % (6000 MW) of installed capacity.

Nuclear power output is supposed to be 100 % of full capacity.

Availability of other thermal power is reduced by e.g. forced outage rate, max heat production in combined heat and power plants, use of fuel other than oil etc.

The available wind power during peak load is assumed to be 10% in Norway, 5% in Sweden and 0% both in Finland and Denmark.

Demand forecast for ten years peak load includes demand response.

Nordel has recommended common fast disturbance reserves. From a total of 5 200 MW (3 200 MW in production capacity and 2 000 MW in dispatchable load) it can be reduced to a minimum of 600 MW in a connected system without severe bottlenecks before load shedding is executed. The recommended reserves have been subtracted from available production capacity.

Appendix 3.1

ENERGY

Retrospect 2005

Total consumption in 2005 was 394.0 TWh (390.9 TWh in 2004). The temperature corrected consumption was 396 TWh. During 2005 reservoir levels followed the long term median, a little above that at the end of the year. The Nord Pool spot price was higher than ever before. High price spikes were characteristic to the year. Both Danish price areas had remarkably higher prices than the rest of the market area.

Demand increased in all countries except Finland. The biggest increase of demand was in Norway (3.9 TWh) due to suppressed demand in 2004. Demand decreased in Finland by 1.9 TWh mainly due to prolonged paper industry dispute. Denmark and Sweden showed minor changes.

The total production in 2005 was 394.9 TWh (379.3 TWh in 2004).
The hydro power production was 222 TWh (184 TWh), wind power 8 TWh (8 TWh), thermal power excluding nuclear was 73 TWh (91 TWh) and nuclear power was 92 TWh (97 TWh).

In 2005 the Nordel countries together had a net export of 0.9 TWh (11.6 TWh in 2004). The import was from Russia 11.5 TWh, Poland 0.4 TWh while there was net export of 12.8 TWh to Germany.

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Appendix 3.2

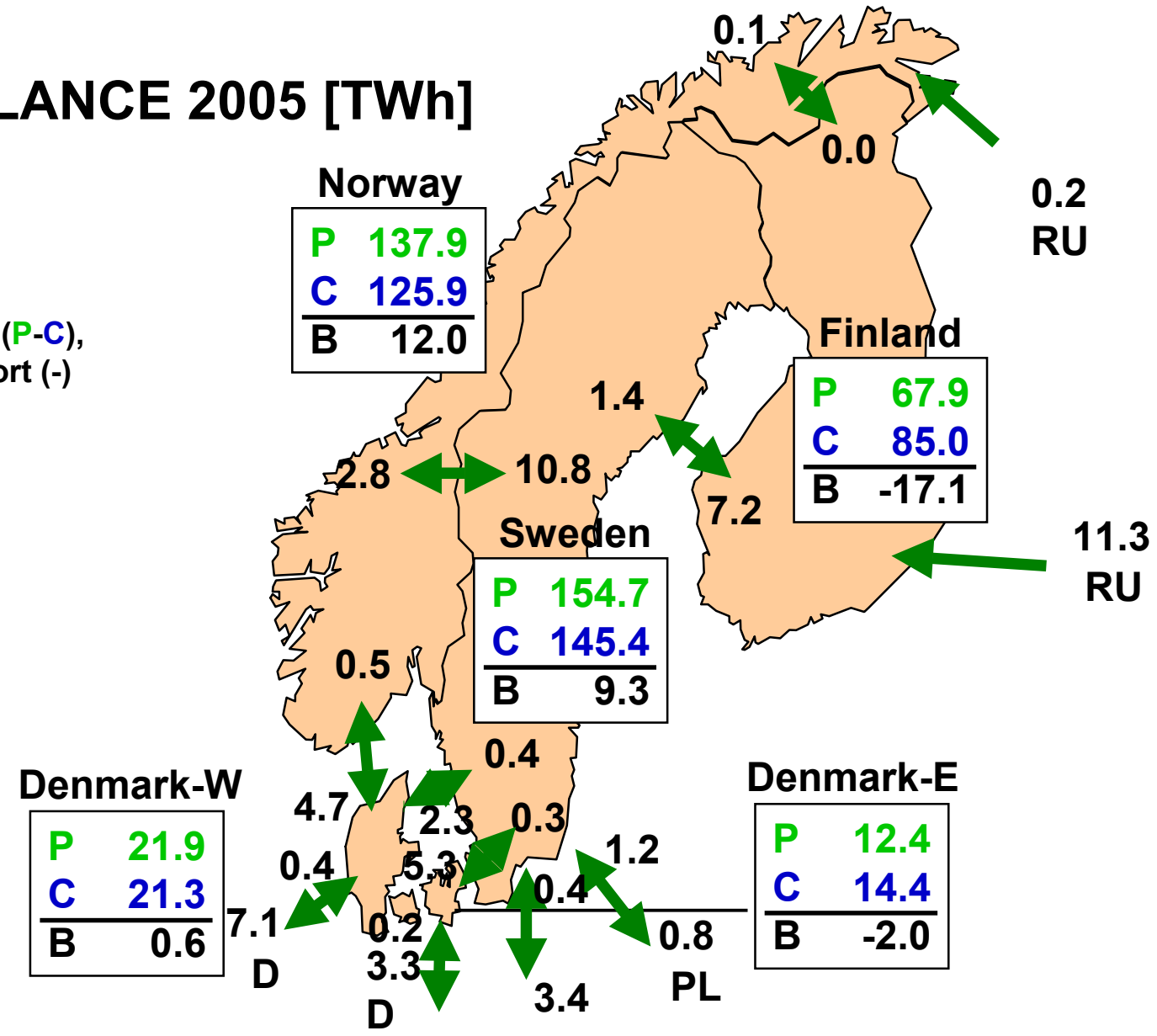
ENERGY BALANCE 2005 [TWh]

Retrospect

P - production
C - consumption
B - energy balance (P-C), export (+) / import (-)

Total Nordel

P	394.9
C	394.0
B	0.9



Appendix 4.1

POWER BALANCE, Retrospect 2005/06

Synchronous Peak Demand
20 January 2006, hour 8-9 a.m. CET

Peak demand this winter was 67 500 MWh/h, while a peak demand with a ten years temperature was estimated to 73 800 MWh/h. The total maximum winter peak demand 2000/2001 was 69 000 MWh/h which is the all time high peak demand in the Nordel system.

The operation of the Nordel system was in general normal during the peak load situation. The import from Russia to Finland was reduced due to internal problems in the Russian system.

It was very cold in Finland during the winter peak 2005/2006 while in the other Nordic Countries temperatures were near average. All time peak load was recorded in Finland one hour before the synchronous peak.

Compared to estimated peak demand for ten years winter the difference was between 1% and 17% in the individual areas.

Country specific peak demands

The different nordic countries had their peaks between January 4 and March 6, 2006. The sum of the individual peaks was 2,4% higher than the synchronous peak.

Appendix 4.2

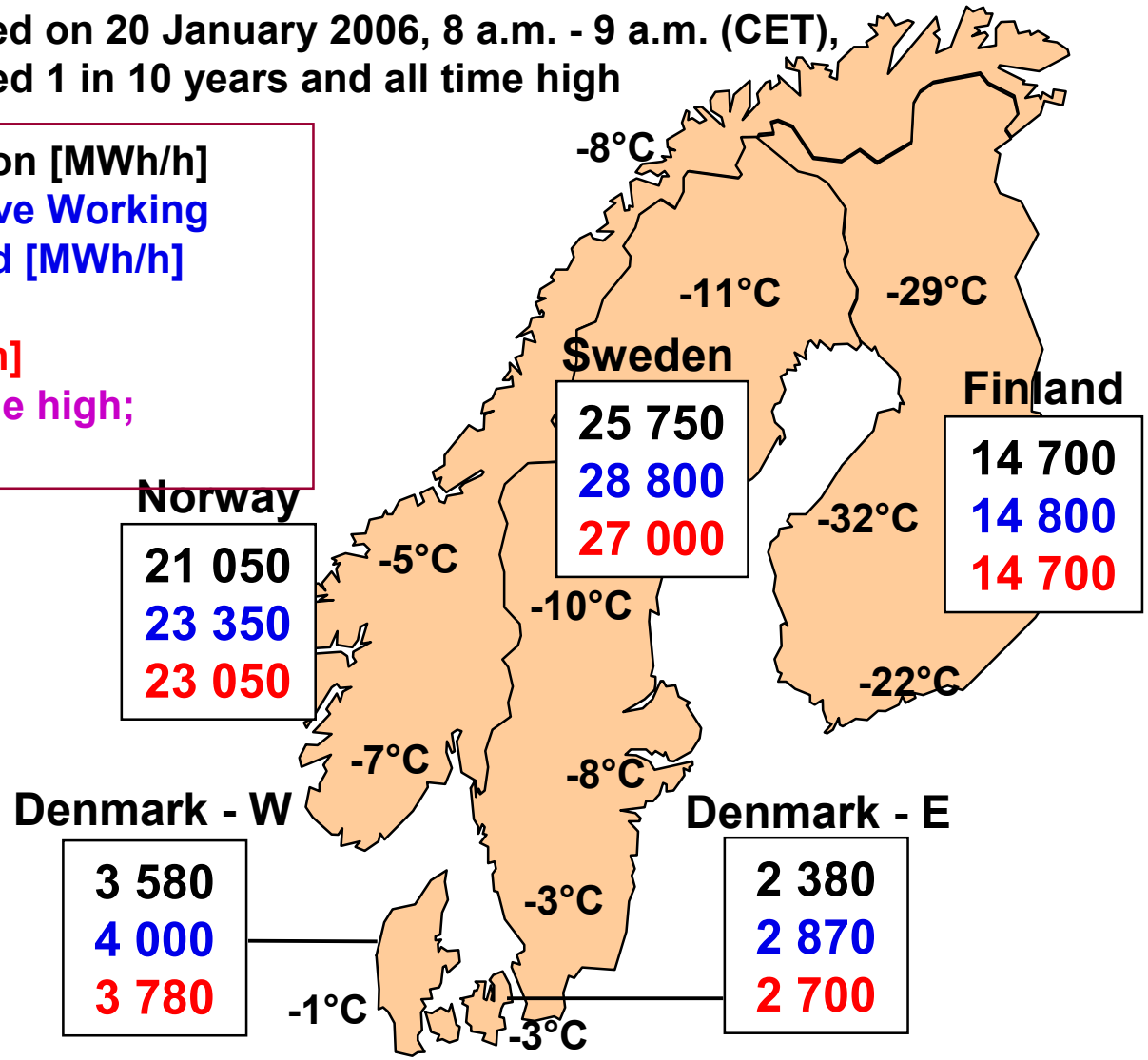
PEAK LOAD 2005/2006 IN THE TOTAL NORDEL AREA

Measured on 20 January 2006, 8 a.m. - 9 a.m. (CET), estimated 1 in 10 years and all time high

Organisation for Nordic Transmission System Operators

Measured consumtion [MWh/h]
Forecasted (Operative Working Group) peak demand [MWh/h] (one of 10 winters)
All time high [MWh/h]
Simultaneous all time high; 5 Feb 2001 [MWh/h]

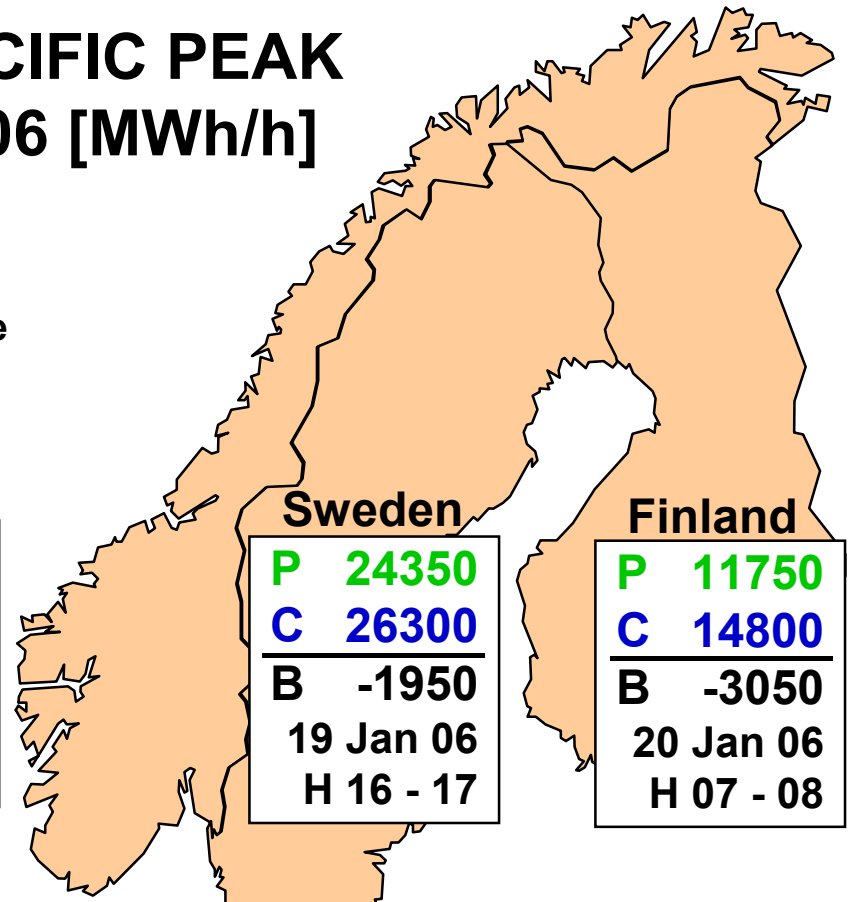
Nordel
67 500
73 800
69 000



Appendix 4.3

COUNTRY SPECIFIC PEAK DEMAND 2005/06 [MWh/h]

P - production
C - consumption
B - power balance excluding exchange
export (+) / import (-)
H - hour, CET



Norway

P	23750
C	21600
B	2150
	6 Mar 06
	H 08 - 09

Sweden

P	24350
C	26300
B	-1950
	19 Jan 06
	H 16 - 17

Finland

P	11750
C	14800
B	-3050
	20 Jan 06
	H 07 - 08

Denmark - W

P	4110
C	3750
B	360
	4 Jan 06
	H 17 - 18

Denmark - E

P	2740
C	2690
B	50
	24 Jan 06
	H 17 - 18