



**ALSTOM**



**entsoe**

Reliable Sustainable Connected

# Nordic Operational Information System (NOIS)

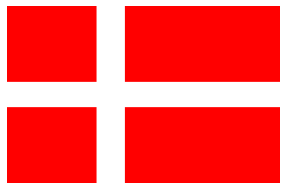
2011-05-03, RTE – IEEE Conference in Paris

Christer Norlander, Senior Advisor, Swedish National Grid (SvK)

Claude Galzin, Support Manager, NOIS Project Manager Alstom Grid

## Even back to "The Old times" .....you needed to be a Team!

- Historical and Traditionally we normally act together in Scandinavia
- Due to we are small countries... perhaps?
- Common understanding





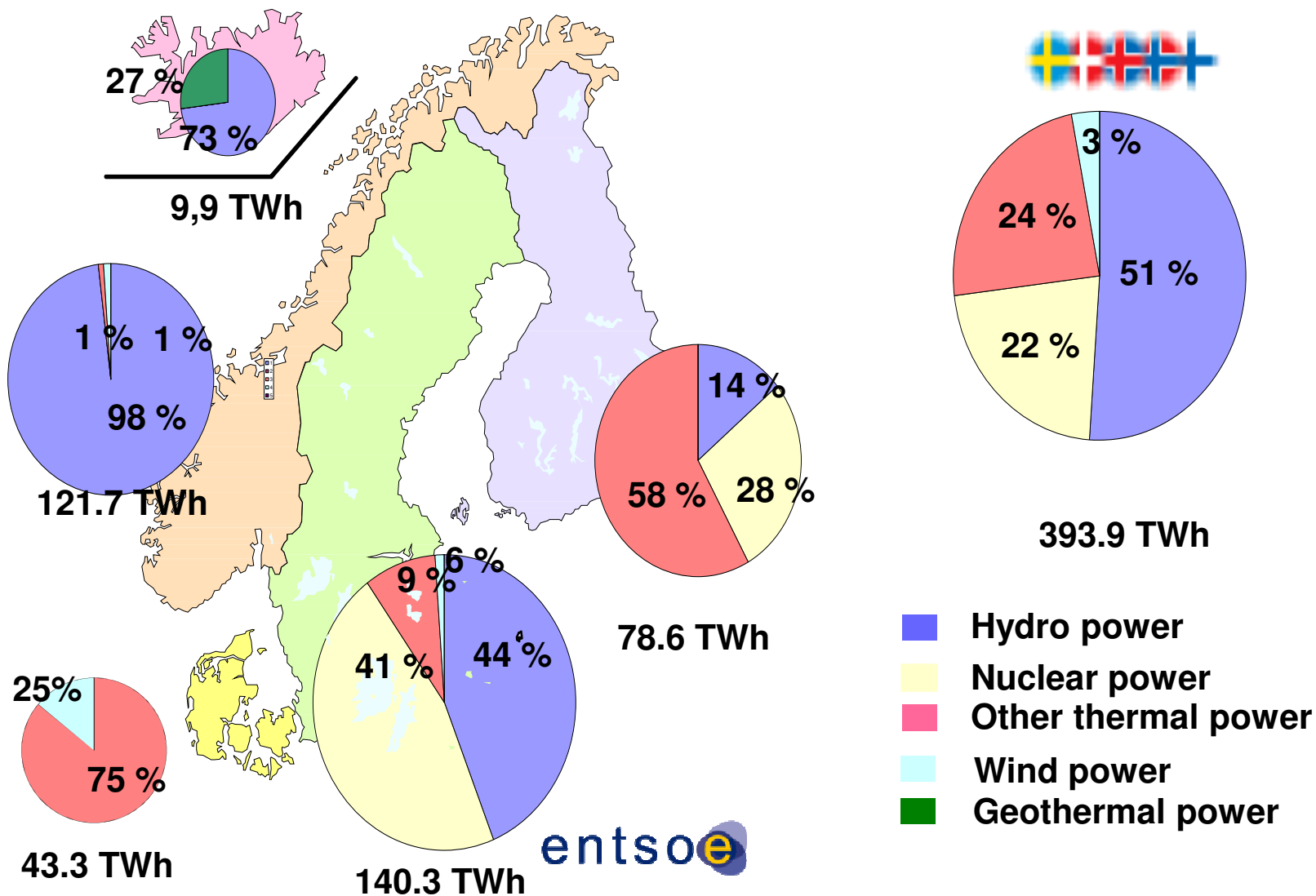
## Nordic Cooperation Origin: Main Drivers

- Early by Deregulating Energy/Electricity Sector and open up the Nordic Market mid – 90
- Need of "Bridge" between Market – Operation - IT
- Humans – Individuals – Professional – Create Synergies
- The Area / Region / Power System You Operate today are much more Dynamic, closer to the limit !
  - How to handle it in the future ?
- The Nordic TSO:s (Organisations) "Trust in each others"

The four countries have different kind of  
Production types - also different kind of traditions!

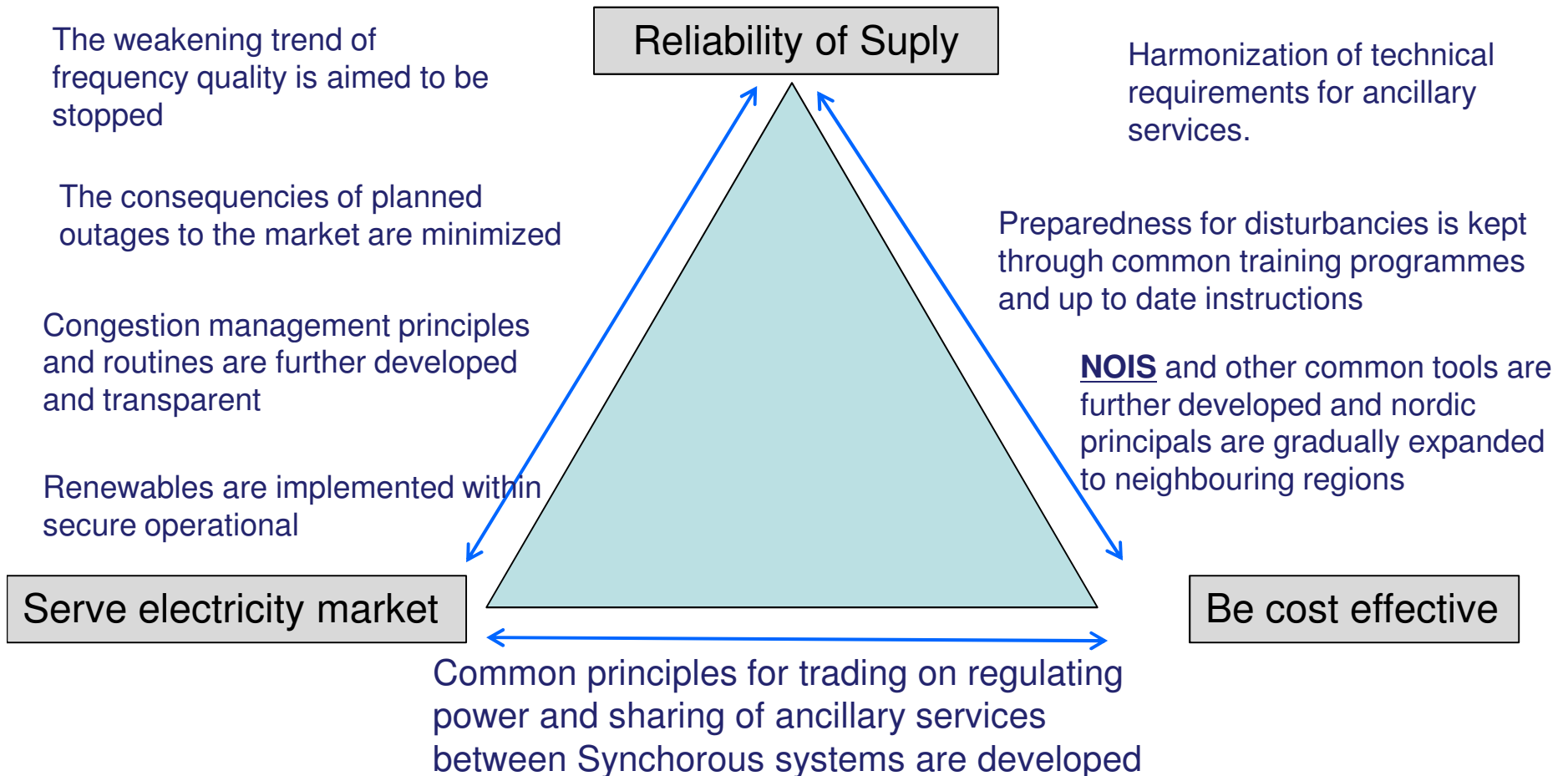


# Power generation in Nordic countries



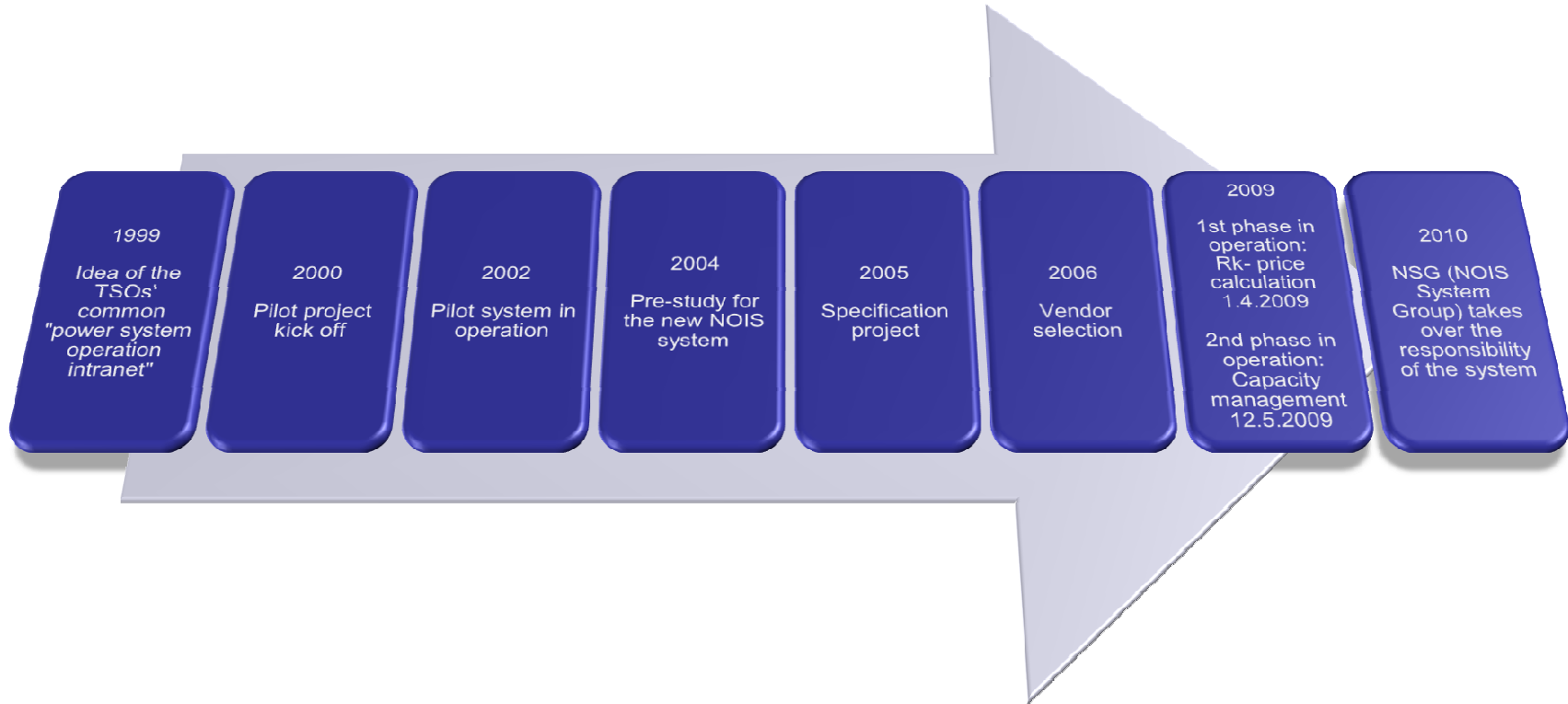


# Nordic Coordination : Strategic Vision

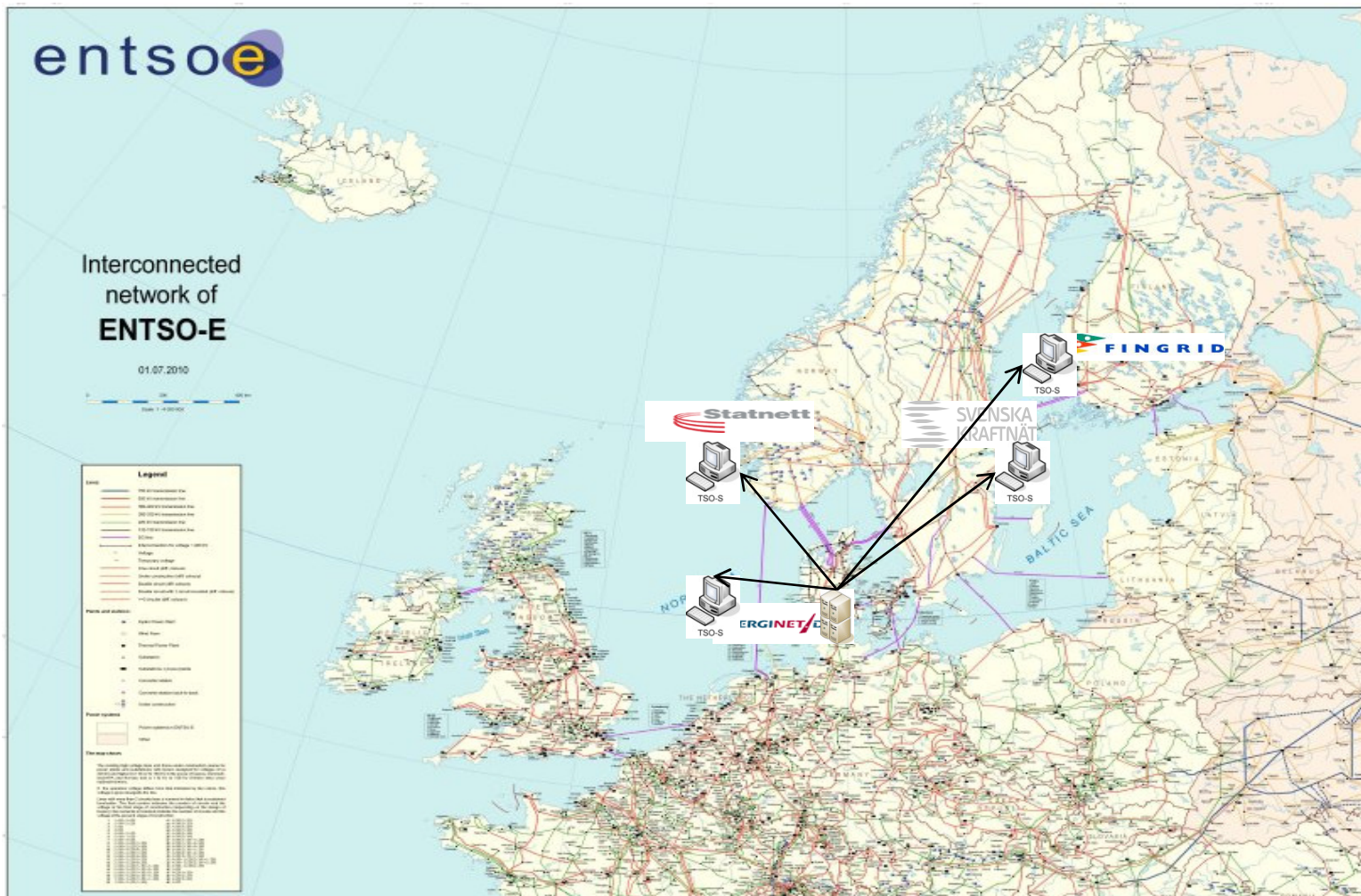


# NOIS - History


"Just beginning" We see lot of Future improvements!



# NOIS – Users: National Control Centers



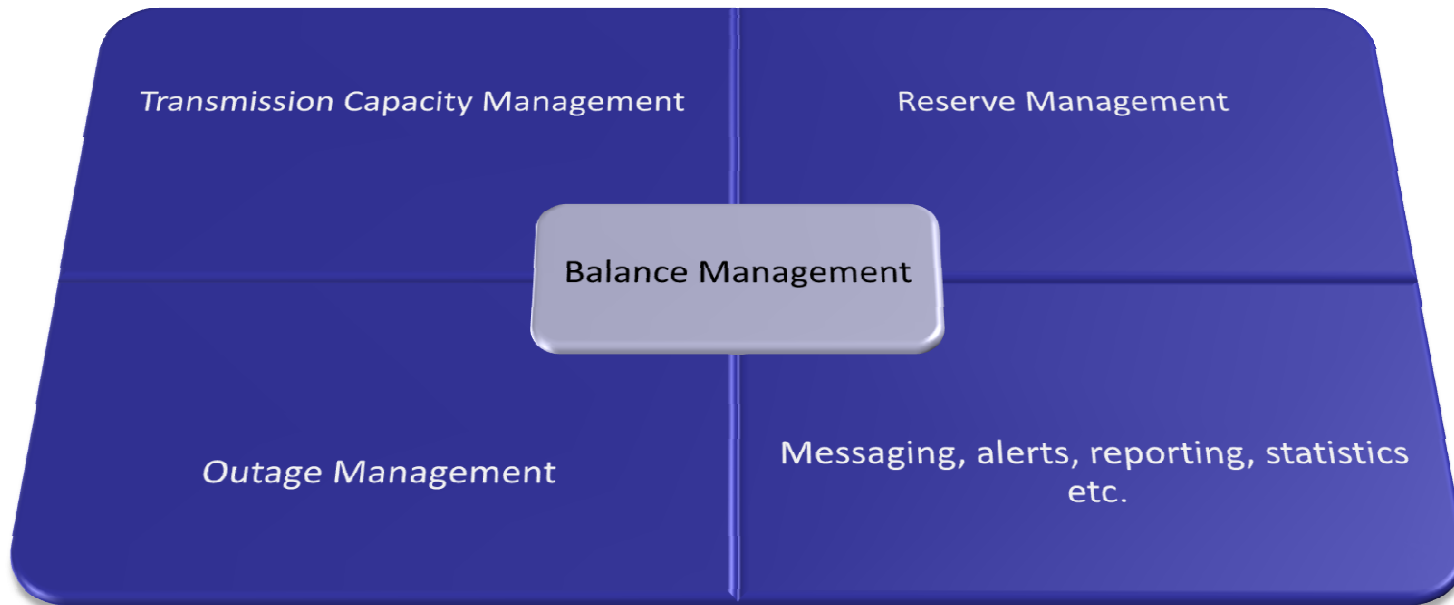




## NOIS - Goals

- To improve the co-operation between the Nordic TSOs
  - An easy to use tool for handling common tasks
  - Improved co-ordination operational planning and balance management
  - An overview of the Nordic power system
  - A common view of the power system for all TSOs
  - Improved data exchange between TSOs
  - Better co-ordination of the data exchange with the Power Exchange
  - Increased transparency
- A system that meets the functional and technical requirements set out by power system operation
- A supplement to the TSOs own systems

## NOIS - Corner stone's of functionality



# Balance Management: integration with Nordic Market

Financial market	Elspot	Elbas	Regulating Power Market
3 years - 13 h	36-12 h 0,1 MW	33-1 h 0,1 MW	The operating hour 10 / 25 MW

## Nordic Power Exchange

**Organize :**


- Elspot
- Elbas
- Financial markets
- Emissions market



Grid  
Transfer  
Capacities

## TSOs

Regulating Power Market  
Balance control and settlement  
Operational reliability  
Hourly Pricing

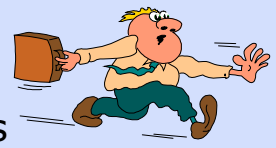


Trading plans

Bids to Elspot /  
Elbas markets

## Market players

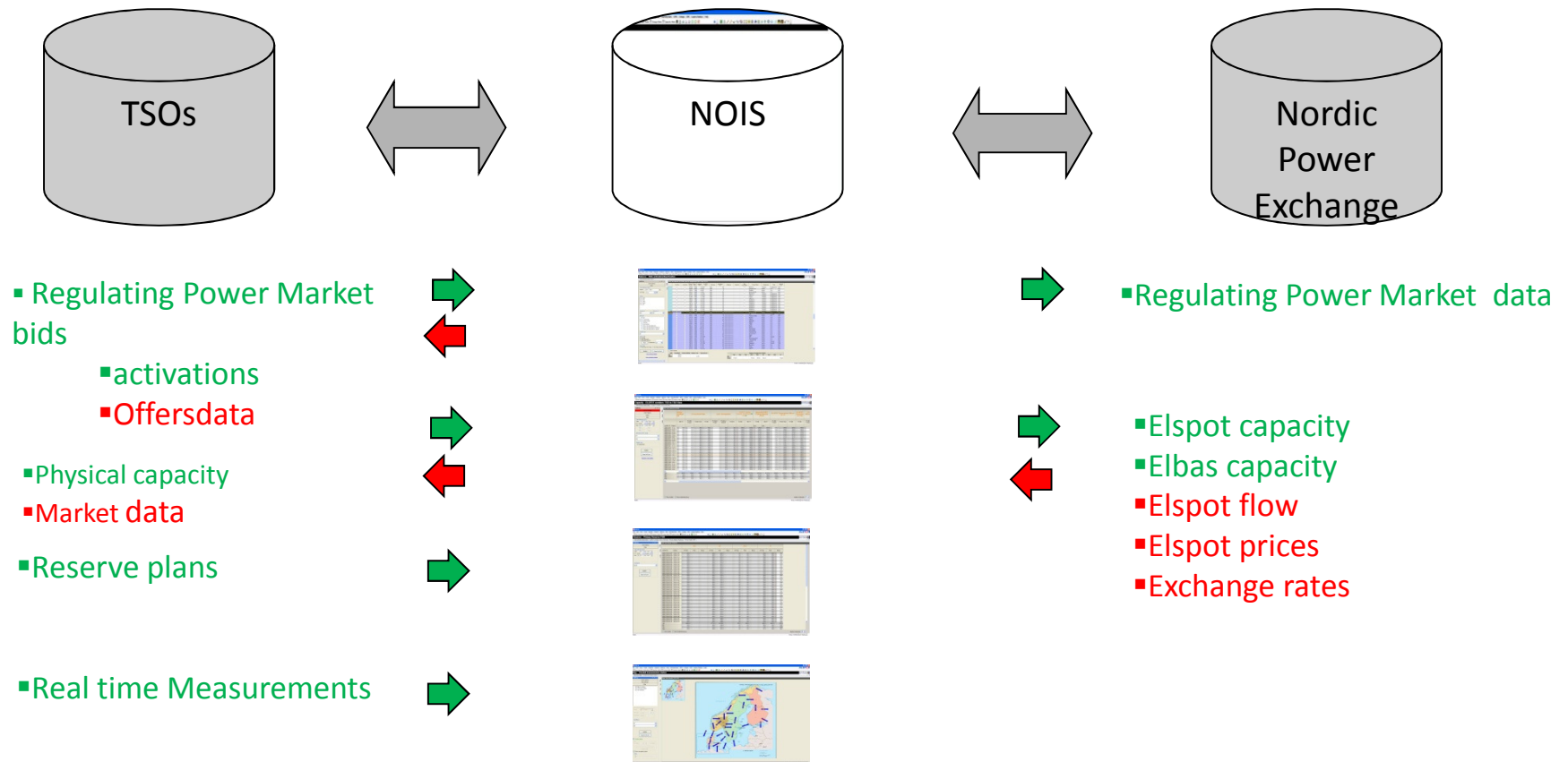
Generators  
Distributors  
Grid Owners  
Traders / Brokers  
Large consumers/Industries



Upward and downward  
regulation adjustments

Generation Schedules  
Bids to the Regulating  
Power Market

# NOIS Data Exchange – Bridge efficiently between TSO and PX





# Balance Management: Common Nordic Merit ordered List

NOIS-A

File Edit View Tools Capacity Reserve Balance Map Standing Data SPPS Outage DER Legacy Displays Help

New Frequency Disturbance Operator Alerts Outage Alerts Capacity Alerts

Balance : Bids activation/deactivation entsoe

Nordel outage network status Nordel outage status Outage Overview Primary Reserve Monitoring Primary Reserve FNR Dimensioning fault cases:area view Dimensioning fault cases:Nordel view Automatic reserves Prim

Grid: last refresh 13:30:04, day mardi 1 février 2011, hour 13-14

	Tick	Ear Mark	Price / SEK	Price / DKK	Amount / MW	ELSPOT area	Bid type	Activation time	Balance	Special	Bid unavailable	Power Plant	Duration time	Resting time	Usage type
			600	505	10	SE	CIAL	5				Jämtland JKAB	0	0	Hydro
			599	504	14	DK1	CIAL	15				DONGP-W	1	1	Thermal
			598	503	22	DK1	CIAL	15				DONGP-W	1	1	Thermal
			597	502	14	DK1	CIAL	15				DONGP-W	1	1	Thermal
			594	500	20	DK1	CIAL	15				VFDK-W	1	1	Thermal
			592	498	50	NO1	CIAL	15				Aurland	0	0	Hydro
			588	495	20	DK1	CIAL	15				VFDK-W	1	1	Thermal
			586	493	40	NO4	CIAL	15				Siso	0	0	Hydro
			584	491	25	DK1	CIAL	15				DONGP-W	1	1	Thermal
			581	489	50	NO1	CIAL	15				Aurland	0	0	Hydro
			581	489	40	NO1	CIAL	15				Bergund	0	0	Hydro
			581	489	70	NO5	CIAL	15				Naddvik	0	0	Hydro
			575	484	49	NO2	CIAL	15				Lyserest	0	0	Hydro
			575	484	40	NO1	CIAL	15				Hallingdal	0	0	Hydro
			571	480	11	DK1	CIAL	15				DONGP-W	1	1	Thermal
			571	480	14	DK1	CIAL	15				DONGP-W	1	1	Thermal
			560	471	12	SE	CIAL	5				Faxälven Övre	0	0	Hydro
			556	468	13	DK1	CIAL	15				NEAS-W	1	1	Thermal
			552	465	10	SE	CIAL	10				Nedre ume älv	0	0	Hydro
Down			547	460	-20	SE	CIAL	10	+++++			Messaure	0	0	Hydro
			547	460	-30	SE	CIAL	10	+++++			Messaure	0	0	Hydro
			545	459	-13	SE	CIAL	10	+++++			Ligga	0	0	Hydro
			542	456	-10	SE	CIAL	10	+++++			Nedre ume älv	0	0	Hydro
			540	454	-42	SE	CIAL	3	+++++			Blåsjön	0	0	Hydro
			539	454	-16	SE	CIAL	10	+++++			Järpen	0	0	Hydro
			539	454	-69	SE	CIAL	10	+++++			Järpen	0	0	Hydro
			535	450	-26	SE	CIAL	10	+++++			Trängslet BKB	0	0	Hydro
			532	448	-39	SE	CIAL	10	+++++			Messaure	0	0	Hydro
			525	442	-52	SE	CIAL	3	+++++			Blåsjön	0	0	Hydro
			525	442	-40	NO5	CIAL	15	+++++			BKK	0	0	Hydro
			522	439	-95	SE	CIAL	10	+++++			Ljusnan Övre	0	0	Hydro
			522	439	-11	SE	CIAL	10	+++++			Järpen	0	0	Hydro
			520	438	-70	SE	CIAL	5				Faxälven Övre	0	0	Hydro
			517	435	-20	DK1	CIAL	15				VFDK-W	1	1	Thermal
			515	433	-40	SE	CIAL	5				Åseleälv	0	0	Hydro
			514	432	-18	NO5	CIAL	15				Åskåra	0	0	Hydro

Up

Down

Balance

MW	Total Bids	Selected Bids	Balance act.	Special act.
Up	15119			
Down	-11562		-463	

	Balance Margin Price (SEK)								
	NO1	NO2	NO3	NO4	NO5	SE	DK1	DK2	FI
Up									
Down					524,95	522,00			

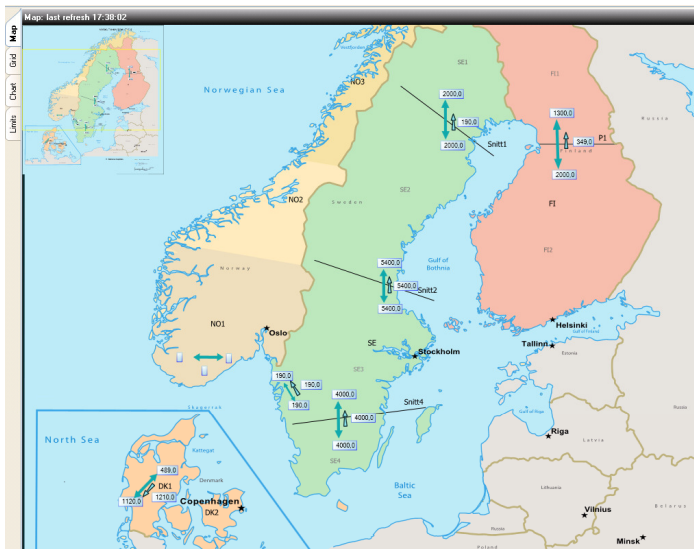
Ready

Nois1.0-rev61895 User: svk\_u1

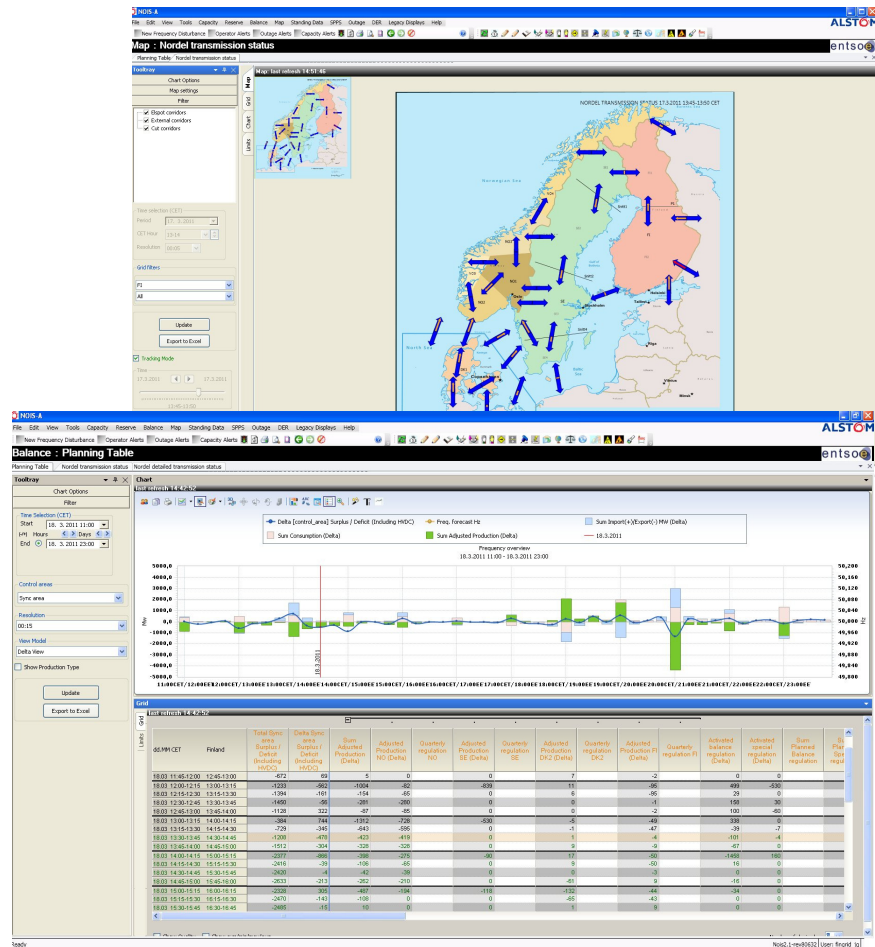
# Capacity Management

- Market oriented
  - Central repository for trading capacity and external exchanges – capacity, plans and measures
  - Trading capacity determination / contribution of non-market corridors
  - Acceptation process of physical and trading capacities (Elspot/Elbas) between TSOs.
  - Reduction codes: Handle codes to document trading capacity reductions
- TSO Oriented
  - Definition of transmission margins (hourly profiles: peak –non-peak )
  - Send agreed trading capacity declarations to the Nordic Power Exchange.
  - Handle capacity and plans of structural weak zones ( cuts)

# Capacity management: Security Coordination



- Physical Lines
- Tie Corridor
- Internal interfaces





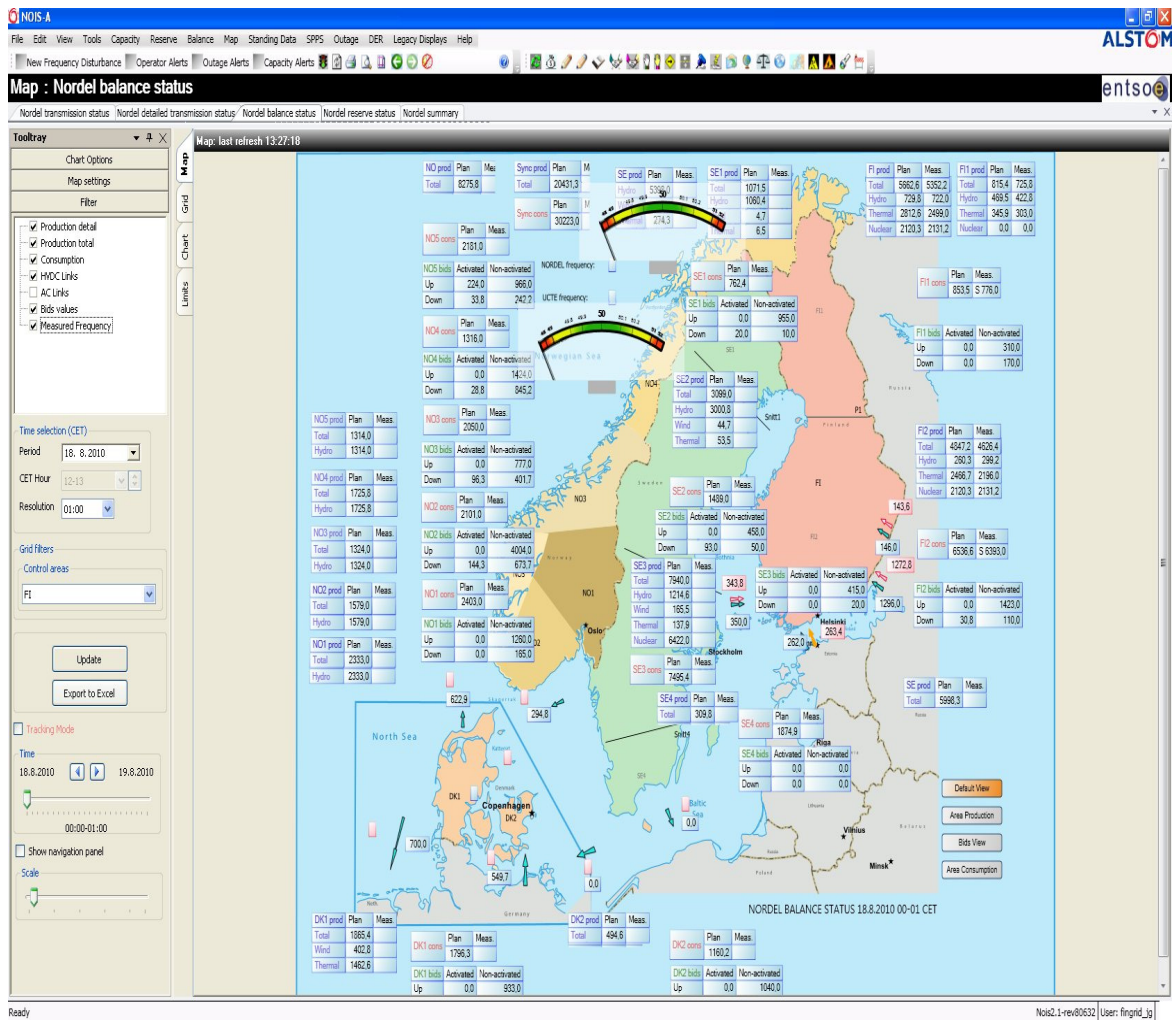
## Reserve management

- TSOs maintain the operational reserves:
  - The Frequency controlled Normal operational Reserve (FNR)
    - handling the small frequency deviations during the operational hour.
    - The deviations are due to the errors in the plans submitted by the Nordic BRPs.
  - The Frequency controlled Disturbance Reserve (FDR)
    - are activated by a sudden frequency drop due to a grid or a production failure.
  - FAR The Fast Active disturbance Reserve (FAR)
    - is the manual reserve available within 15 minutes
    - loss of unit, line, transformer, bus bar etc. / Restores the FDR
- NOIS provides info in order to:
  - Visualize Reserve, the dimensioning fault, the plans/ traded reserves
  - Monitoring of reserves based on measurements
  - Improve reserve cost efficiency



# Reserve Management

- Provide information
  - Planned / trade reserve
  - Dimensioning fault
- Monitor reserve
  - Based on measurements
  - Alarming sound
- Global View on the reserve availability



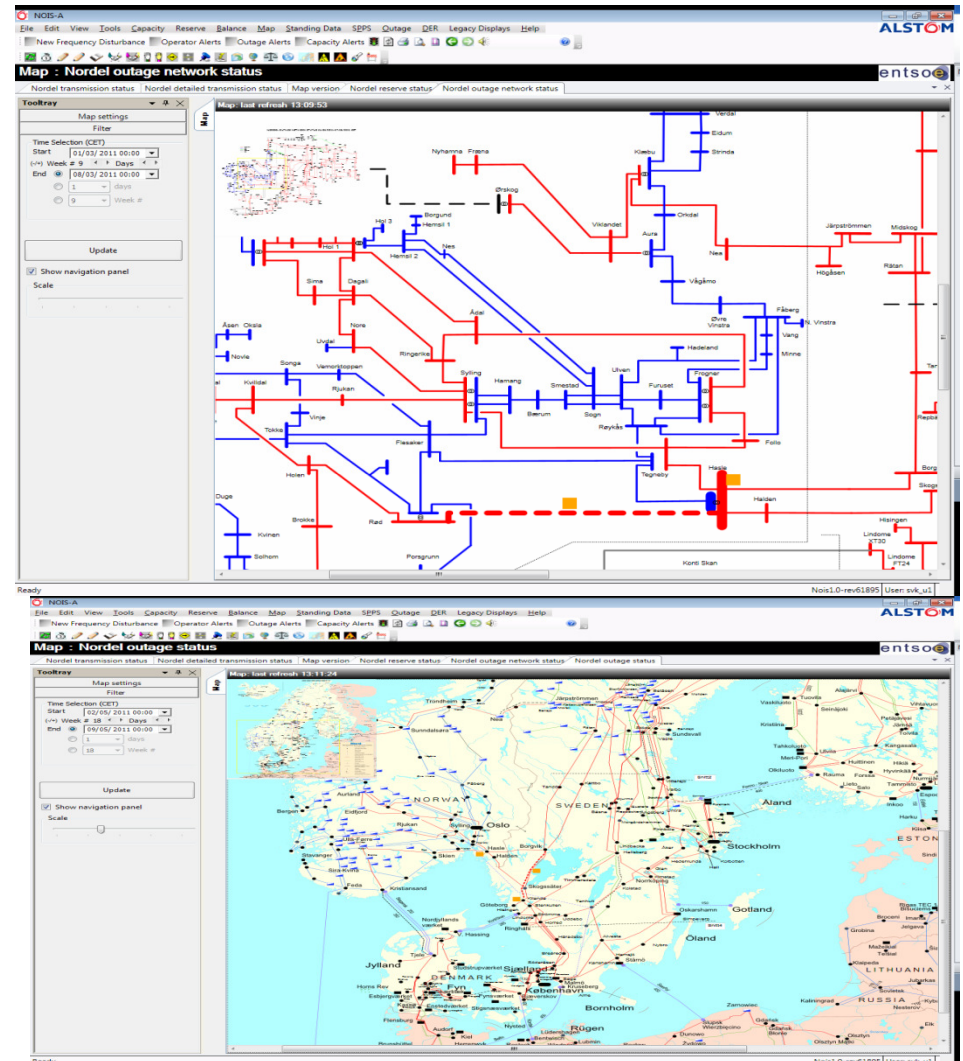


## Outage Management

- Coordination between TSOs of the outage planning for equipments that have effects on transmission capacity.
- Outage acknowledgment and confirmation between TSOs.
- Register outages within NOIS, interface with TSOs outage management systems, define outage impacts over corridors.
- Gantt view, map view of registered outages

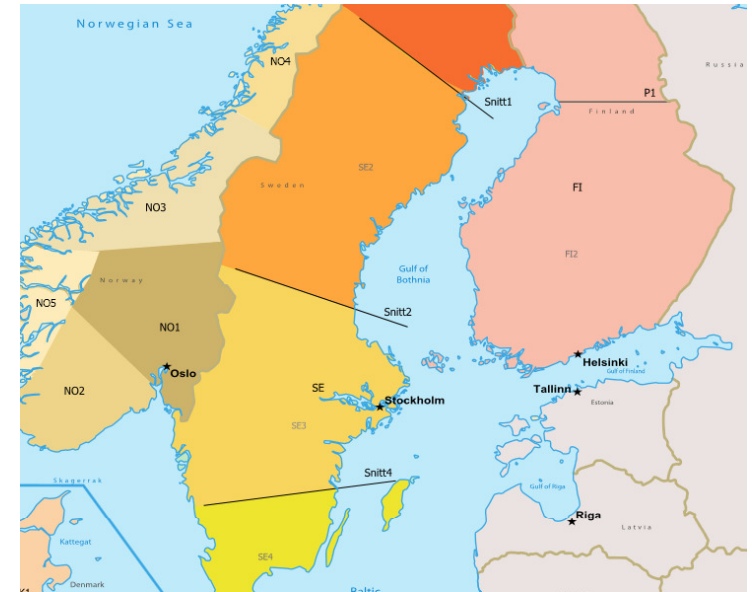
# Outage management at glance

- Outage Management are defined locally at each TSO System
- Acknowledgment mechanism.
- Information is transferred and available for each user
- Include power factor for main transmission corridors
- Provide awareness for the different TSO
- A key component for balance management.



## NOIS - Short term development

- Introduction of 4 Elspot areas in Sweden and in NOIS
  - ELBAS Capacity management
  - Additional interfaces to the system NOIS
    - ICCP real time measurements
    - hourly measurements, hourly plans etc.
- Improvements of current functionality (REX after 2 years of operation)
  - Usability for Operators
- ENTSO-E Wide Awareness System (EAS) gateway interface





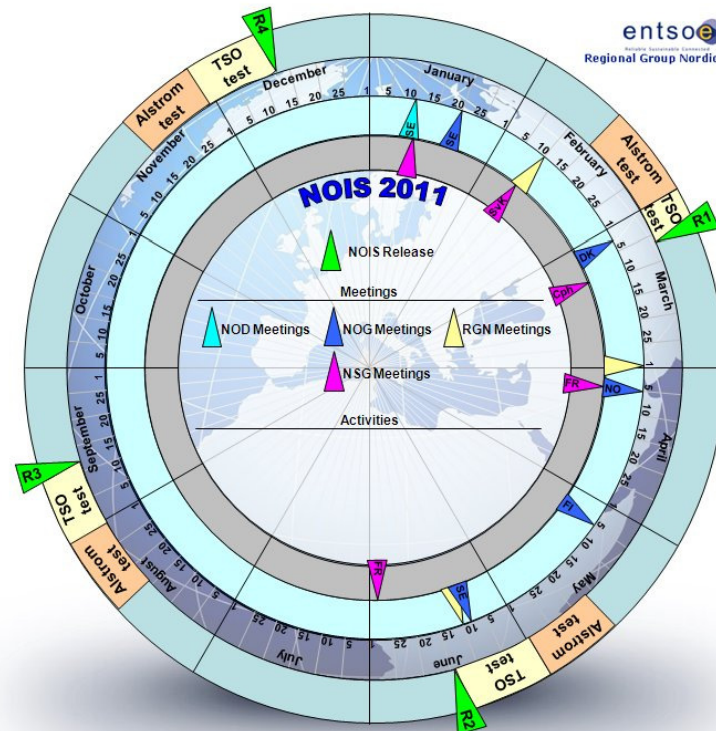
# NOIS – Rolloing provess to cope with evolutions

## Regular planning

- Manage rate of change
- Allow for acceptance by all uses

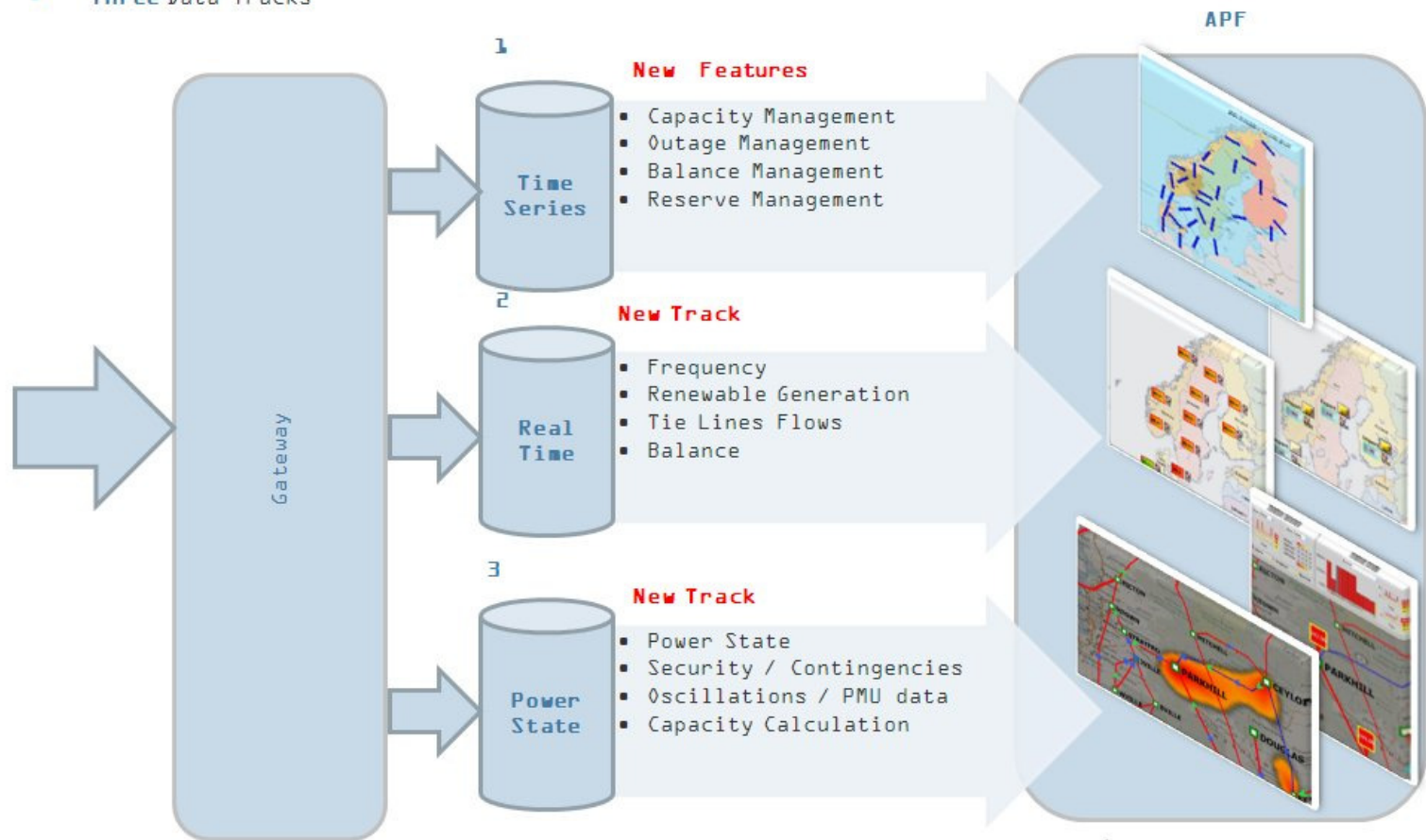
## 2011 schedule

- R1 deployed 8 March
- R2 planned 14 June
- R3 planned 13 September
- R4 planned 13 December



# NOIS - Long term development

- Three Data Tracks





## Conclusion

- **New approach in cooperation / Trust**
  - provide efficiency and cost saving
  - Improved security
  - Operate closer to the limit
  - Common view of the system
- **Provide transparency to the Grid and Market users**
  - Promote common operational process
  - Common understanding of rules



Questions ?