



## Integrated power markets in Europe

### Electricity markets open seminar

*29.01.2018*  
*Tokyo*

Matti Supponen

European Commission, DG Energy  
Unit B.2 - Wholesale markets; electricity & gas

## Usual steps towards integration of electricity markets

- Building interconnectors for system security purposes
- Sharing surpluses through interconnectors between vertically integrated national electricity utilities
- Allowing Independent Power Producers (IPPs)
- Opening markets for industrial customers
- Unbundling networks from other activities, or providing third party access to networks
- Opening markets for cross-border exchanges for increasing social welfare through trading
- Opening markets for all customers
- Deepening cooperation between national Transmission System Operators (TSOs)
- Integrating markets and system operation cross-border in all timeframes (long term products, day-ahead spot products, balancing products and ancillary services)



# European electricity market basics

- Liberalisation at the European level started in 1999
- Third internal energy market package from 2009 provides the current legal framework
- National Regulatory Authorities (NRAs)
- Agency for Co-operation of Energy Regulators (ACER)
- Ownership unbundling of Transmission System Operators (TSOs), with some exceptions
- Electricity market is based on zonal pricing
- System size is about 1000 GW and 3000TWh
- One main synchronous system in the Central and Southern Europe (former UCTE)
- Other synchronous systems: Nordic, Great-Britain, Ireland, Baltic states (with Russia), numerous islands

# Challenges in developing the European electricity market

- Different starting points: state monopolies, private monopolies, local and regional energy companies
- Traded markets first in Great-Britain and in the Nordic countries
- Different energy mixes: hydro dominated, coal dominated, gas dominated, nuclear dominated
- Agreeing on a target model took ~3 years (2008-2011)
- Market coupling links countries and markets at the wholesale level, but retail markets largely national

# ACER

- **Agency for Co-operation of European Energy Regulators**
- **In Ljubljana, Slovenia**
- **Decision powers on cross-border issues when National Regulators are not able to agree**
- **Drafts Framework guidelines and approves Network codes**
- **Follows implementation of the European Electricity Market target model**
- **Market monitoring**
- **Evaluation of infrastructure projects**

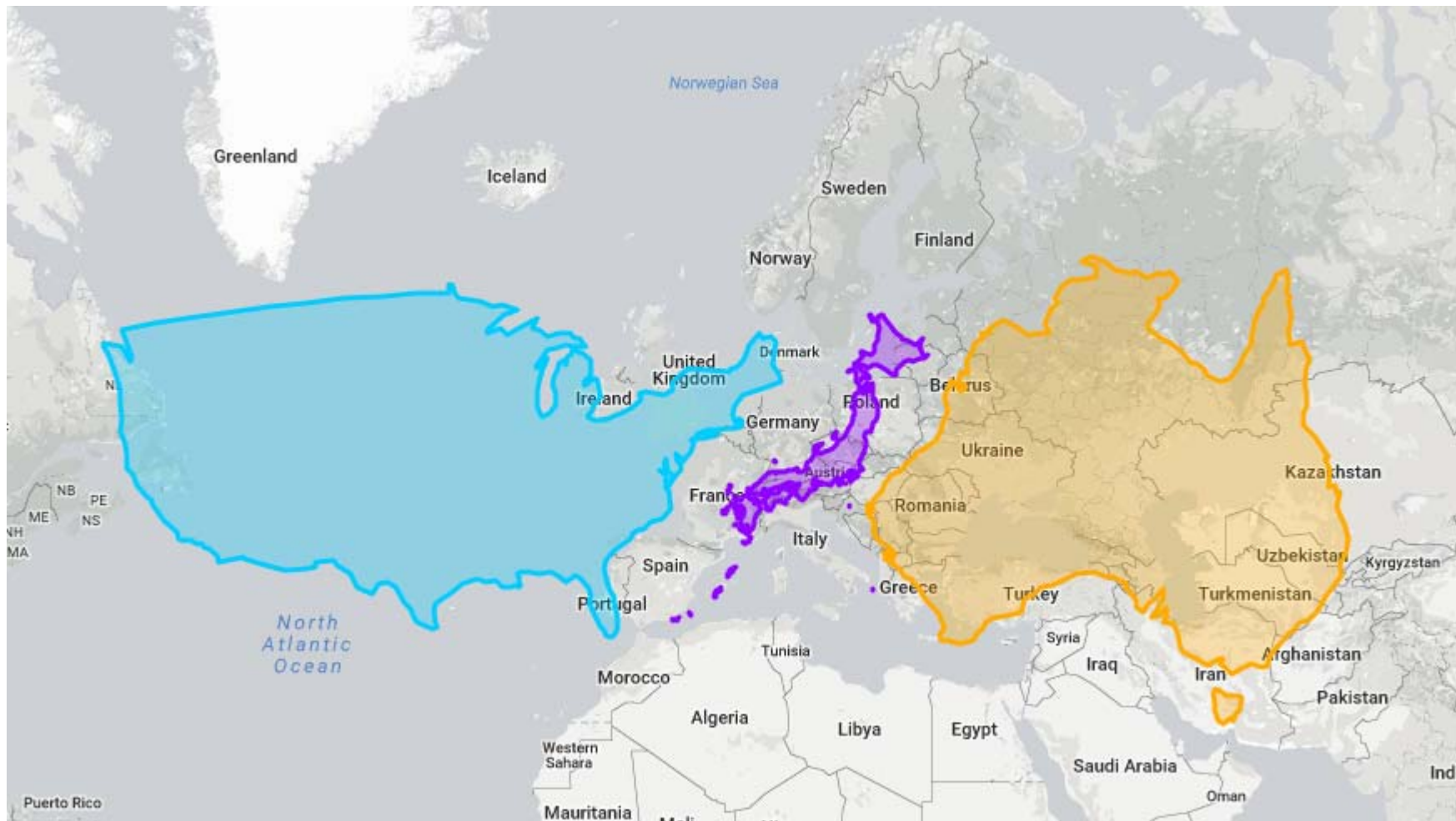
# ENTSO-E

- **Organisation for co-operation between European Transmission System Operators**
- **In Brussels, Belgium**
- **Drafts network codes**
- **Drafts methodologies provided by network codes**
- **Ten year network development plan**
- **European generation adequacy assessment**
- **Development of common network operational tools**

# Selected electricity markets in the world

- **North America**
  - Main synchronous systems are Eastern interconnection (including PJM), Western interconnection (including California) and Texas.
  - Some parts of Canada are interconnected with the United States
  - Mixture of open markets with competition and non-liberalised fully regulated markets.
  - Where markets are open, nodal pricing widely used.
- **Australia**
  - Zonal pricing like in Europe
  - Gross pool (central dispatch of all generators)
- **Europe**
  - Zonal pricing
  - Mainly self-dispatch by generators, some countries have central dispatch (Poland, Italy, Hungary, Ireland)

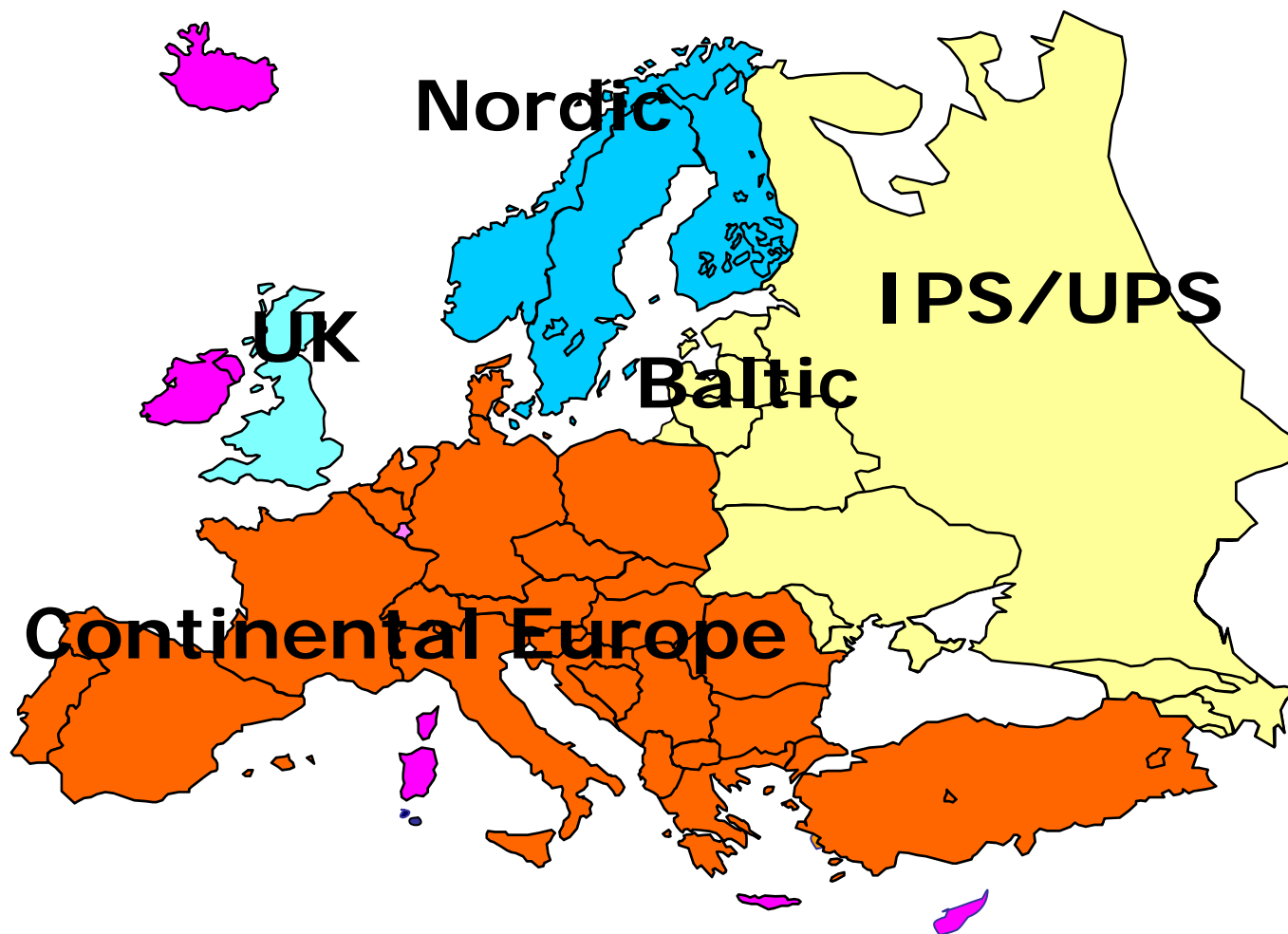
# Japan, U.S.A, Australia and Europe



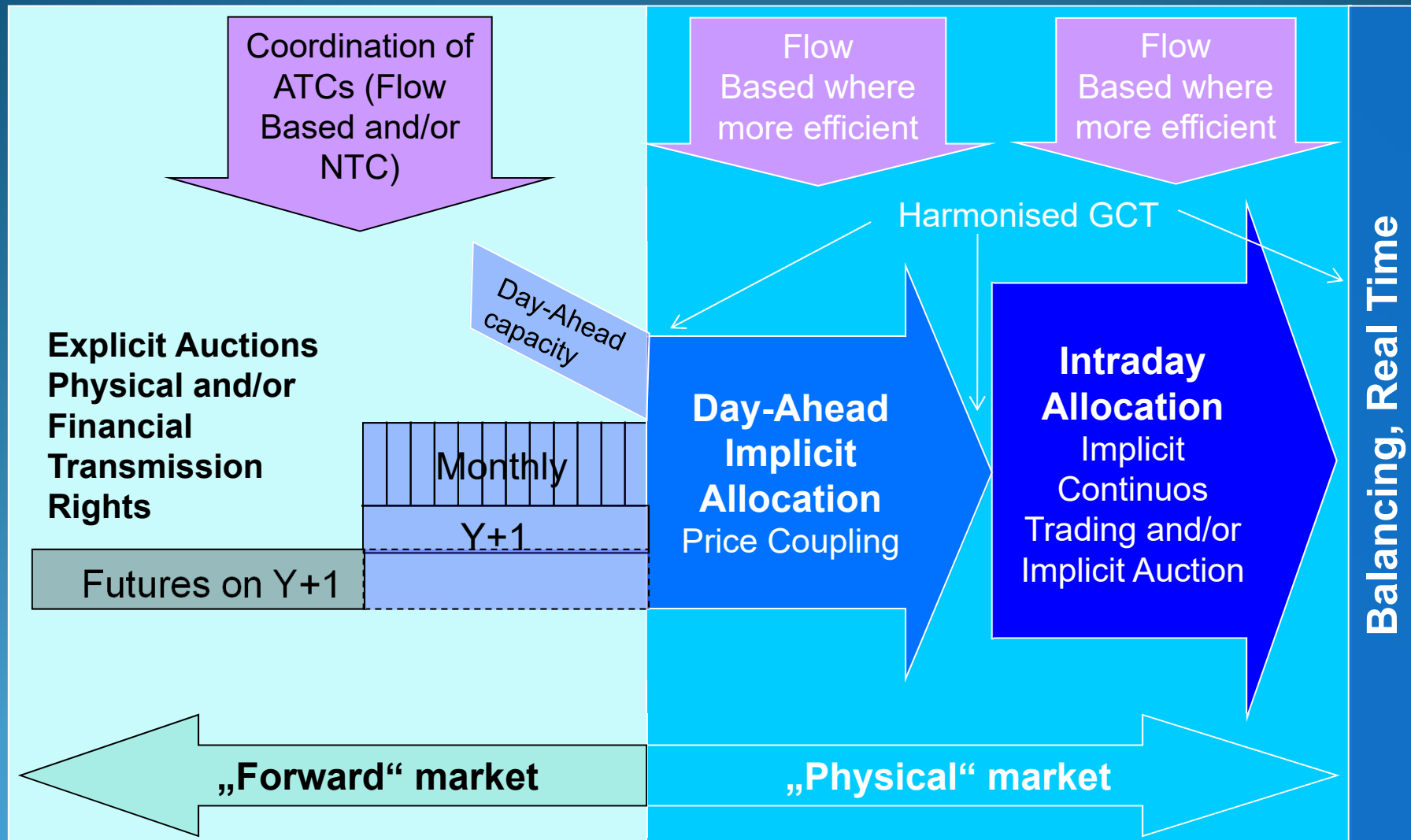
Source: True size of... 8



## Synchronous zones in Europe



# Target Model

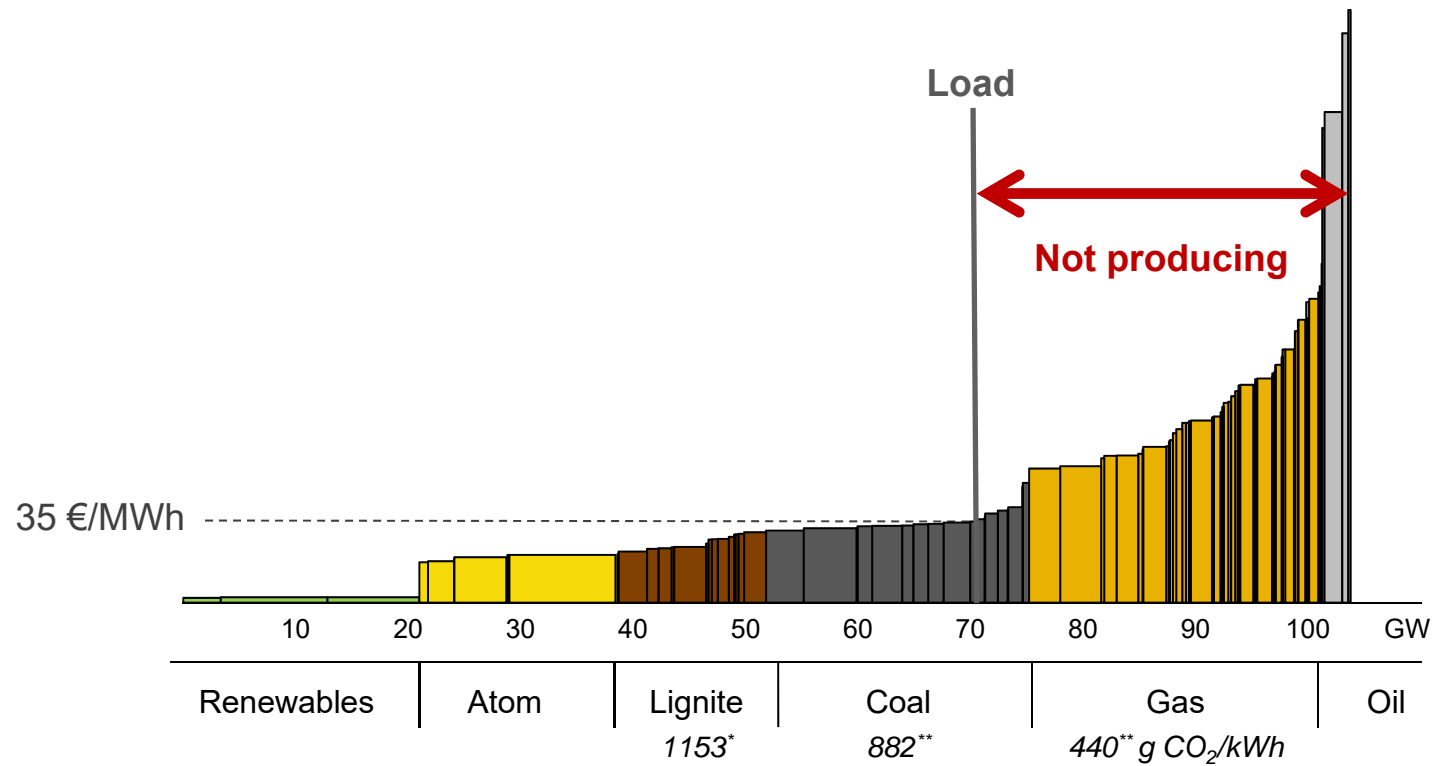


# European electricity market target model

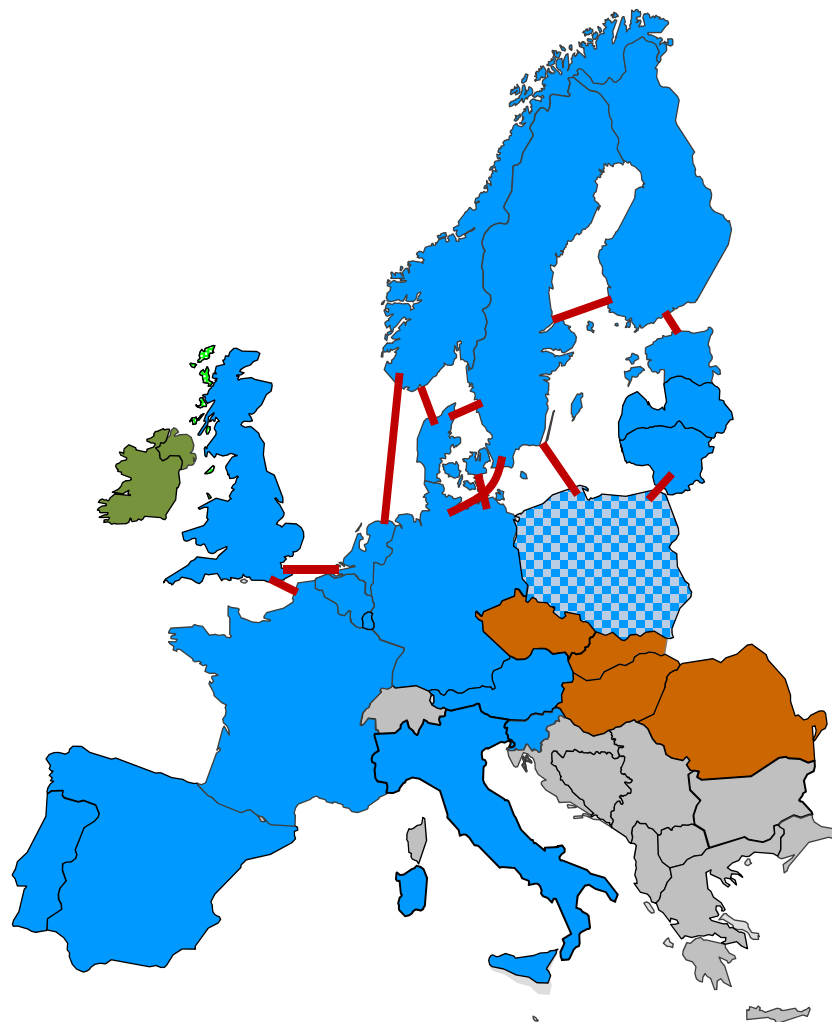
- Forward markets based on day-ahead spot markets
- Cross-border trade optimisation based on day-ahead market coupling
- Long term cross border trade with financial products
- Further cross-border trade optimisation through allowing intraday trade with the remaining capacity (pan-European intraday platform "XBID")
- Final optimisation through pan-European balancing platforms (under development)


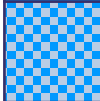


# Merit order in the day-ahead spot market

Merit Order Austria/Germany 2014



## Day-ahead market coupling status in January 2018



REGIONAL DAY AHEAD IMPLICIT AUCTIONS		
	<b>North West Europe (NWE)</b>	Price coupling
	<b>Poland</b>	Poland price coupled within NWE through SwePol-link
	<b>Ireland and Northern Ireland</b>	All Island market, single price zone
	<b>Czech – Slovak – Hungary-Romania</b>	Price coupling

Source: APX, updated by Matti Supponen

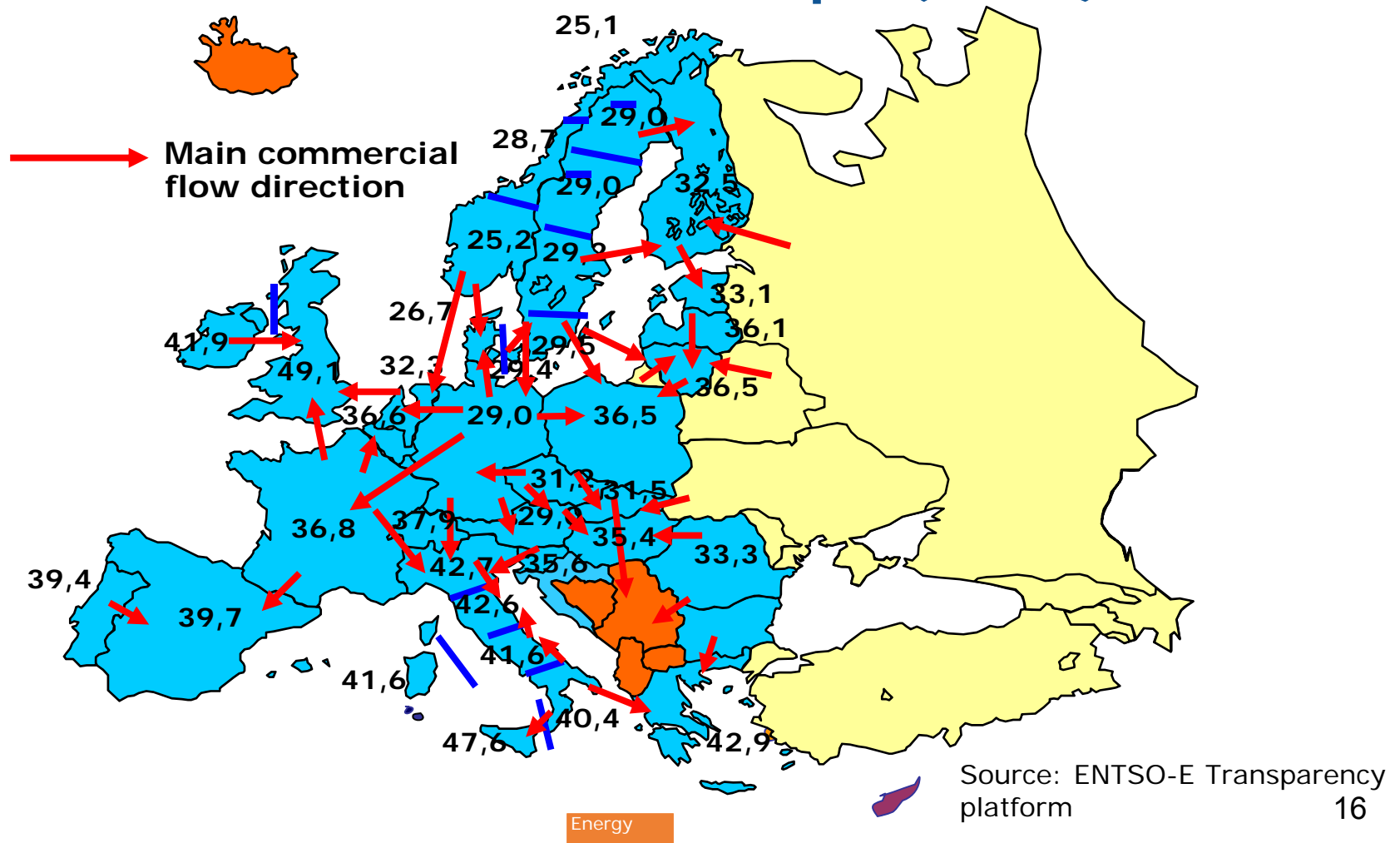
# Success factors of the European Electricity market

- **Transparency of network and market fundamentals (partly voluntary, partly introduced by legislation)**  
<https://transparency.entsoe.eu/>
- **Governments, Regulators and Transmission System Operators committed to prepare harmonised of rules, and to promote competition and market liquidity**
- **Companies need to be committed to competition**
- **End consumers need to believe in competition rather than in regulated prices**
- **Market coupling links countries and markets at the wholesale level, even if retail markets remain largely national**

## Network codes and guidelines

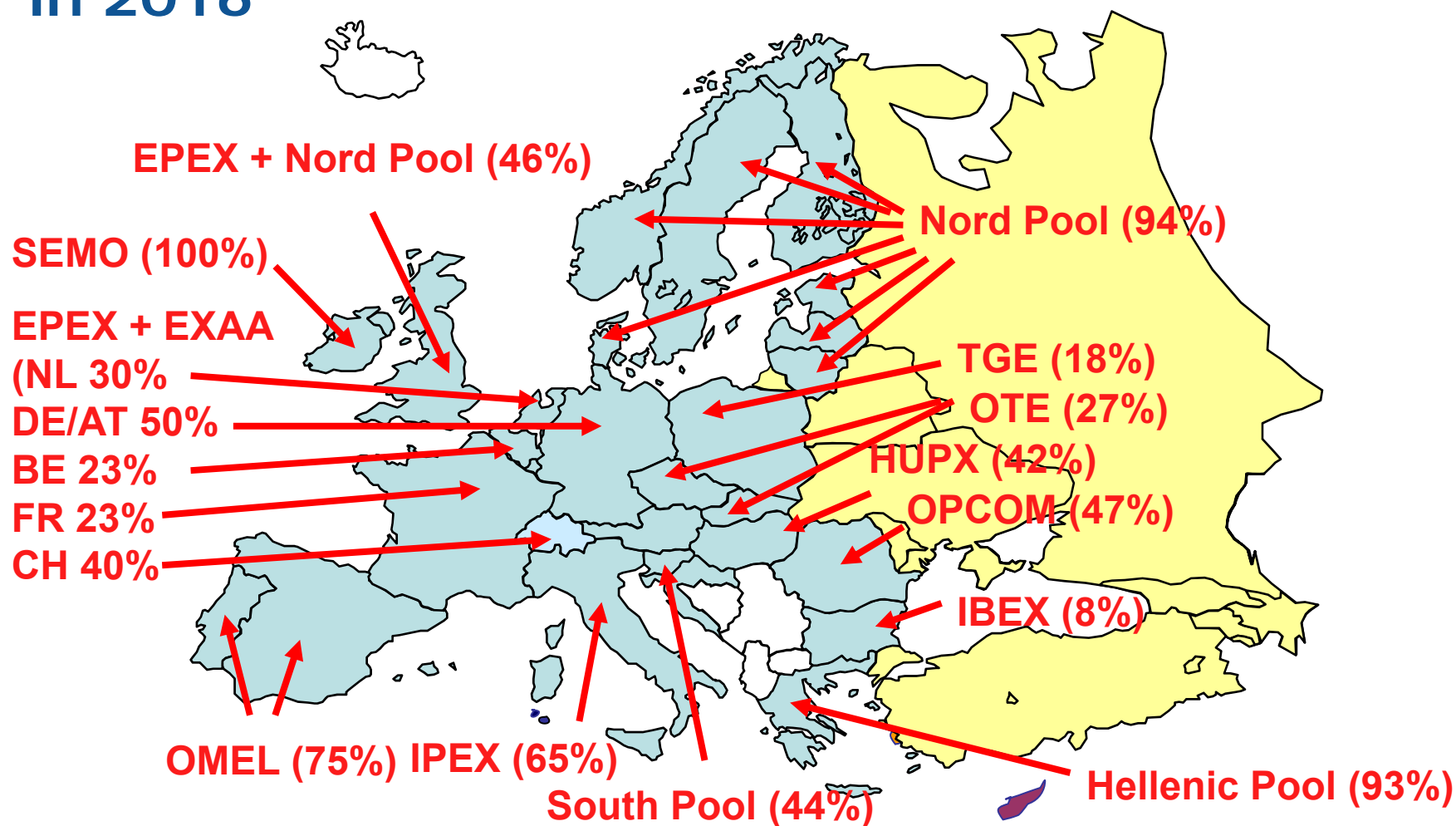
- **Third internal energy market package provides for detailed rules for:**
  - **Electricity market**
  - **Grid connection**
  - **System operation**
- **Drafted in co-operation between NRAs, ACER, ENTSO-E and the European commission with extensive consultation of stakeholders**

# Average spot prices (€) and electricity cross-border trade in Europe (2016)



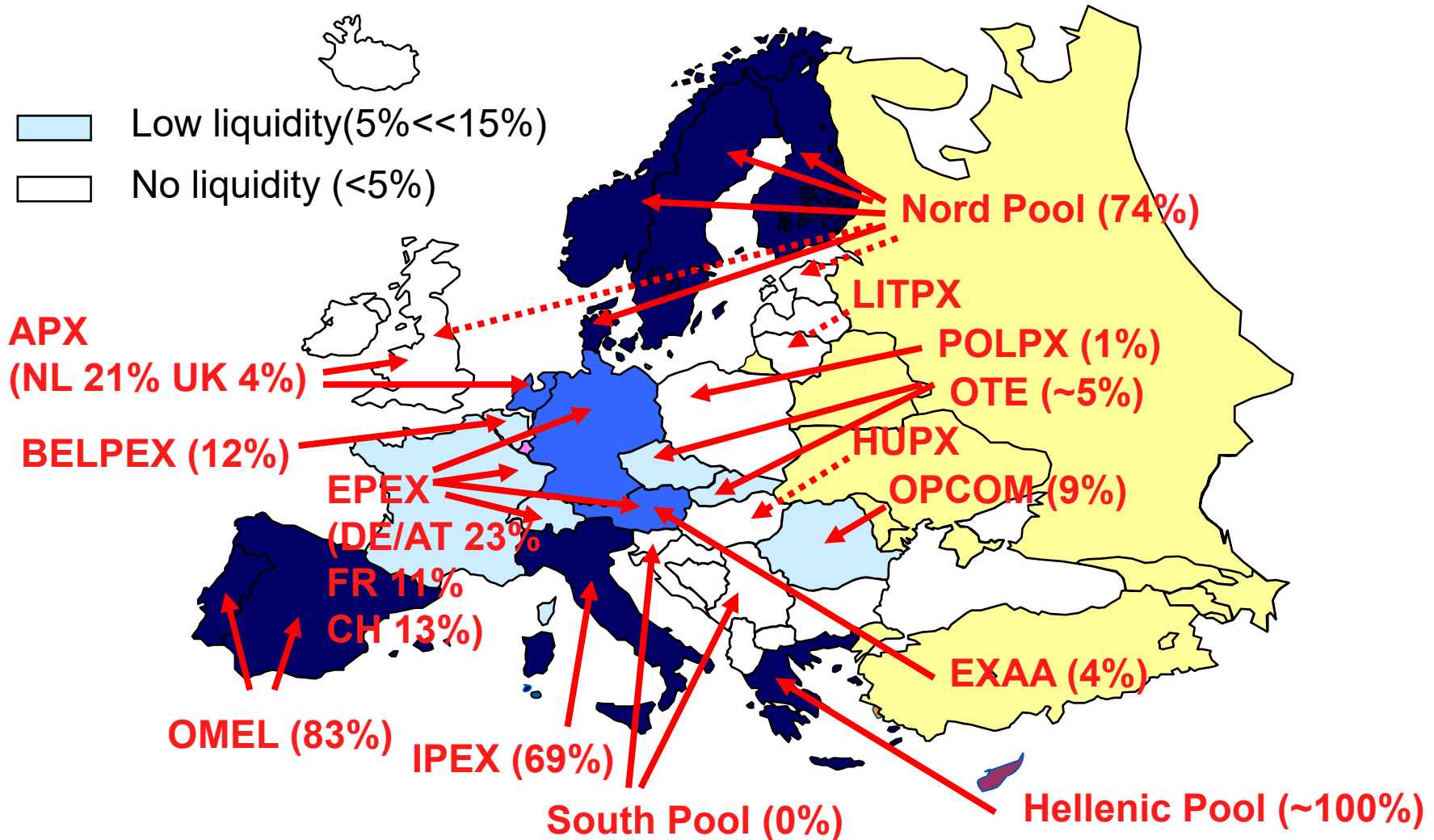


# Share of day-ahead spot trading of consumption in 2016



# European day-ahead spot markets in 2008

- Liquid (>30% day-ahead spot/consumption)
- Somewhat liquid (15% < <30%)
- Low liquidity (5% < <15%)
- No liquidity (<5%)



# Clean Energy Package for All Europeans

- **Energy Union Governance**
  - No legally binding targets but active follow-up of progress
- **Energy efficiency**
- **Renewable energies**
- **Electricity market design**
  - To enable integration of much more renewable energies
  - Focus on end customers and on distributed generation
  - Cooperation between Transmission system operators
  - Cooperation between Transmission system operators and distribution system operators

## Future issues regarding electricity markets

- **Design issues**
  - Capacity mechanisms
  - New forms of trading (for example peer-to-peer)
  - Local markets (including DSO congestion management)
  - Role of DSOs vs. TSOs
  - Who will manage data platforms?
  - Concepts for demand response
- **Digitalisation**
  - Cybersecurity, Internet of Things, Big data
  - More active control of assets for balancing
- **Sector coupling**
  - Power to gas, power to liquids, interplay between electricity and heat, electrification of transport, etc.)

# Capacity mechanisms





European  
Commission

# Regulation versus market



# Regulation versus market

## Regulation

- Grid tariffs
- Regulated prices
- Capacity mechanisms
- RES targets
- Subsidies
- Energy efficiency targets
- Mandatory ancillary services
- Priority dispatch

## Regulation/Market

- Emissions trading
- Trading of green certificates
- Auctions for generation capacity

## Market

- Competition
- Free price formation
- Liquidity
- Markets for ancillary services
- Right to self-produce/-consume and store electricity
- Right to be aggregated

- Part I: REMIT Framework
  - Legal background
  - REMIT architecture
  
- Part II: Approach to market monitoring
  - Market monitoring framework
  - Approach to market monitoring

REMIT = Regulation on Wholesale Energy Market Integrity and  
Transparency



- The global financial crisis originated in the U.S. in 2008 led to a wide reform of the surveillance framework
  
- Gap and inconsistent surveillance regimes:
  - Financial regulation (Markets in Financial Instruments Directive MiFID and Market Abuse Directive, MAD) does not (properly) cover all energy market segments
  
- Need of market abuse definitions and prohibitions **tailor-made for the energy sector**
  
- Necessity to act at EU level:
  - To avoid loopholes and fragmented legislation in relation to *cross-border cases*;
  - With the liberalisation, there are increasing cross-border flows and interrelations

## REMIT in a nutshell

- Regulation (EU) No 1227/2011 of the European Parliament and of the Council of 25 October 2011 on wholesale energy market integrity and transparency, said “REMIT”
- As a European Regulation, REMIT is **directly applicable** in the Member States of the EU
- REMIT :
  - organises the **monitoring** of wholesale energy markets
  - Prohibits **insider trading**
  - Prohibits **market manipulation** and attempted market manipulation
  - Obliges market participants to publically disclose their **inside information**
- These prohibitions and obligation entered into force on **28 December 2011**

## Application scope of REMIT

- REMIT **applies** to the trading in wholesale energy products:
  - Contracts for the **supply of elec/gas** where delivery is in the EU, including day-ahead spot, intraday and balancing markets
  - **Transportation contracts** of elec/gas in the EU
  - **Derivatives** relating to these contracts
  
- REMIT **does not apply** to :
  - Contracts for the supply/distribution of elec/gas to **final customers** (except for big final customers consuming above a certain threshold)
  - Contracts for green certificates and **emission allowances**
  - The prohibitions of market abuse do not apply to wholesale energy products which are also financial instruments and to which the **financial legislation** applies.

## Insider Trading

Using inside info to trade or trying to trade

Disclosing inside info to 3<sup>rd</sup> parties

Recommending 3<sup>rd</sup> parties to trade based on this inside info

## Market Manipulation

False/Misleading Signals

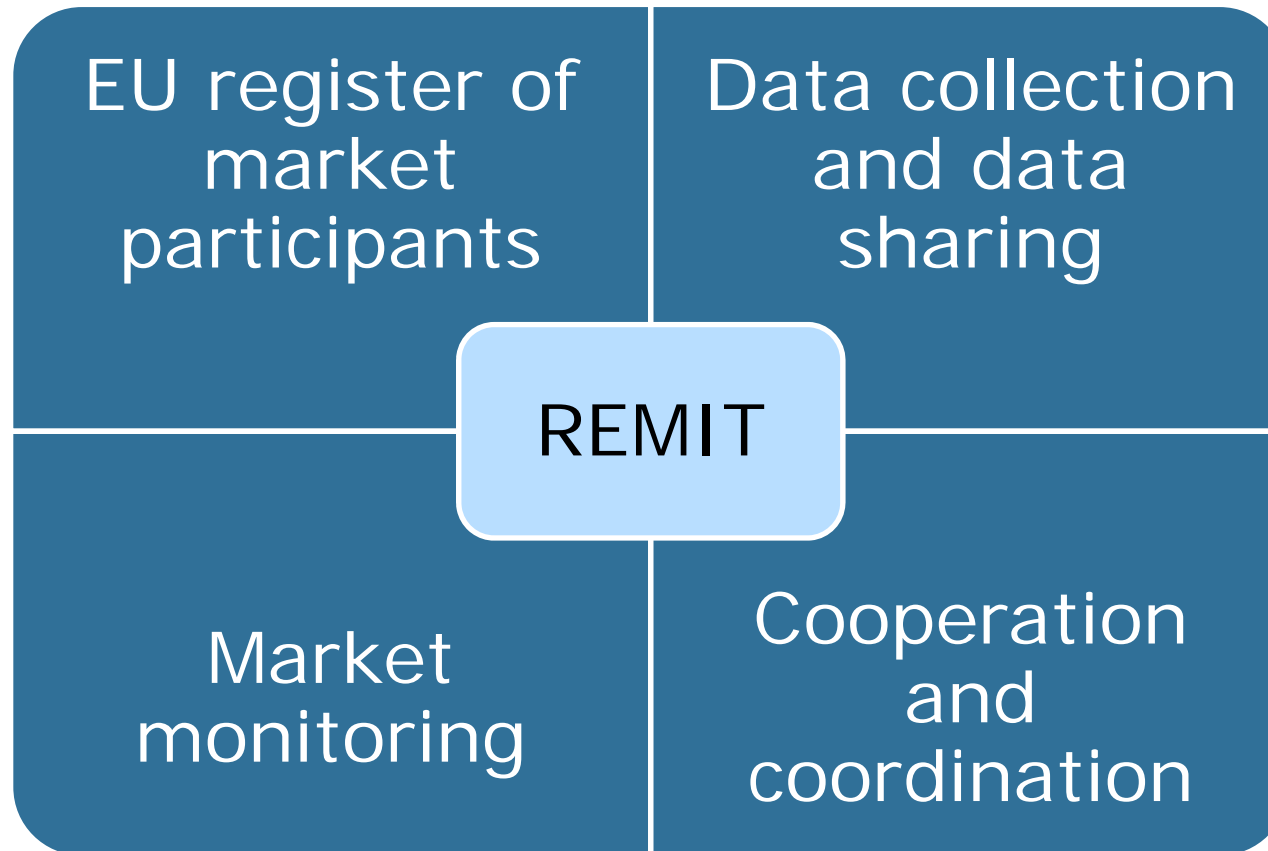
Price Positioning

Transactions involving Fictitious Devices/Deception

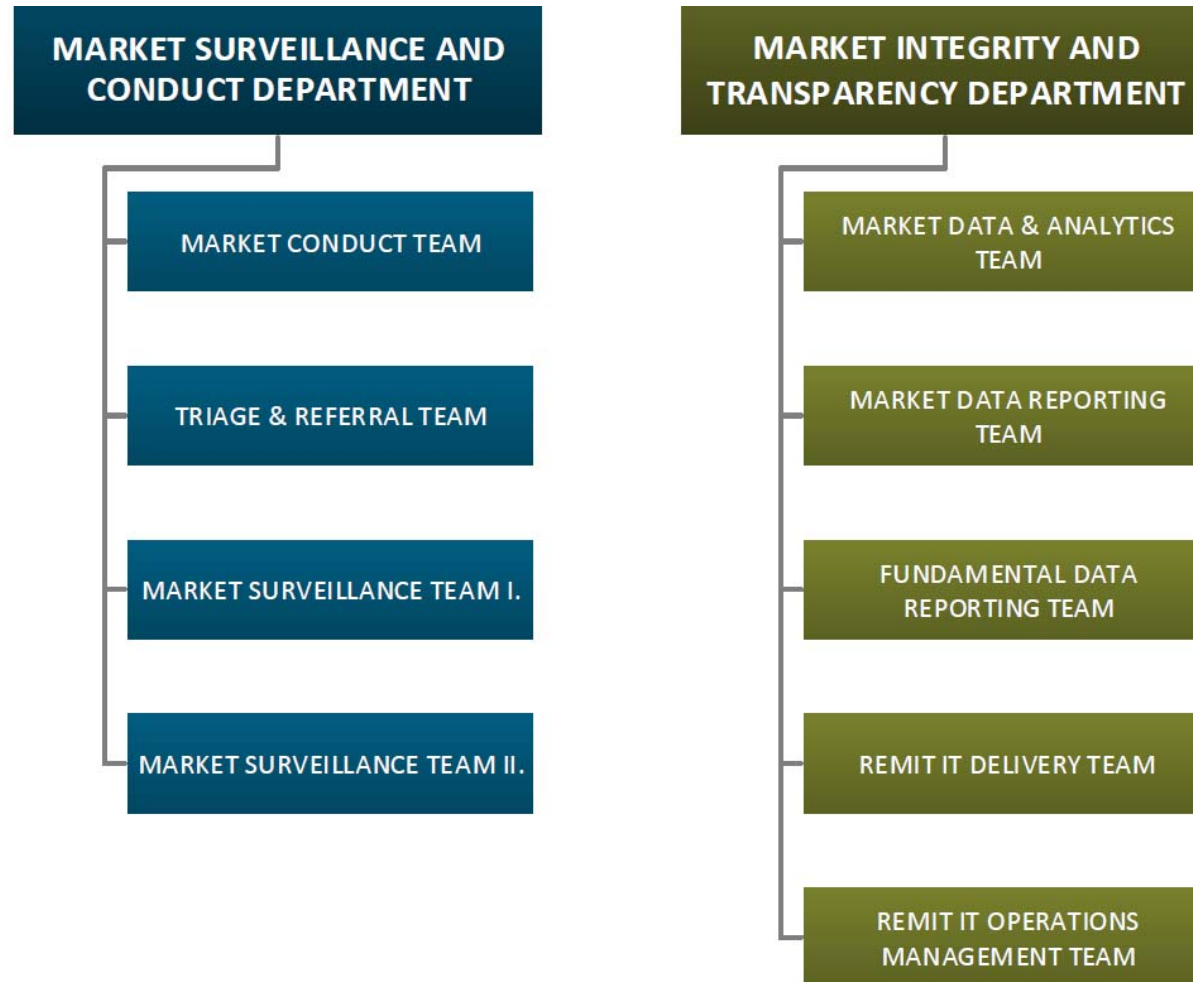
## Attempted Market Manipulation

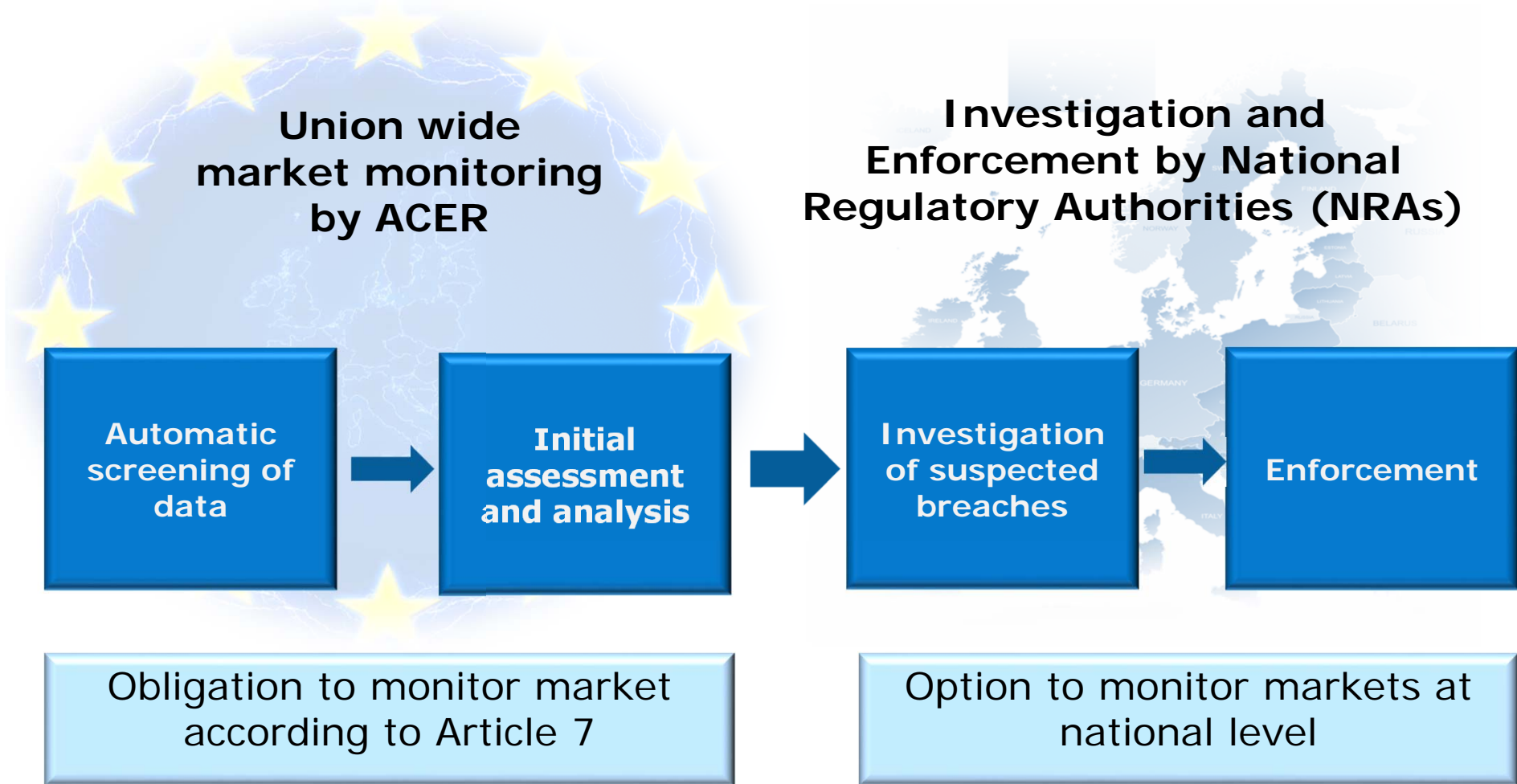
Dissemination of False or Misleading Information

## ACER's core activities under REMIT



## Two REMIT departments since November 2016





## Surveillance

**NRAs**  
 may monitor  
 markets at  
 national level

ACER shall  
 ensure there is  
 a coordinated  
 and consistent  
 approach

**ACER**  
 shall monitor  
 wholesale energy  
 markets at pan-  
 European level

**PPATs\***  
 shall monitor  
 their venues

case initiation

## Case Handling

**NRAs**

- Investigate suspected breaches of REMIT
- Take appropriate action if a breach is found

ACER shall  
 ensure there is  
 a coordinated  
 and consistent  
 approach

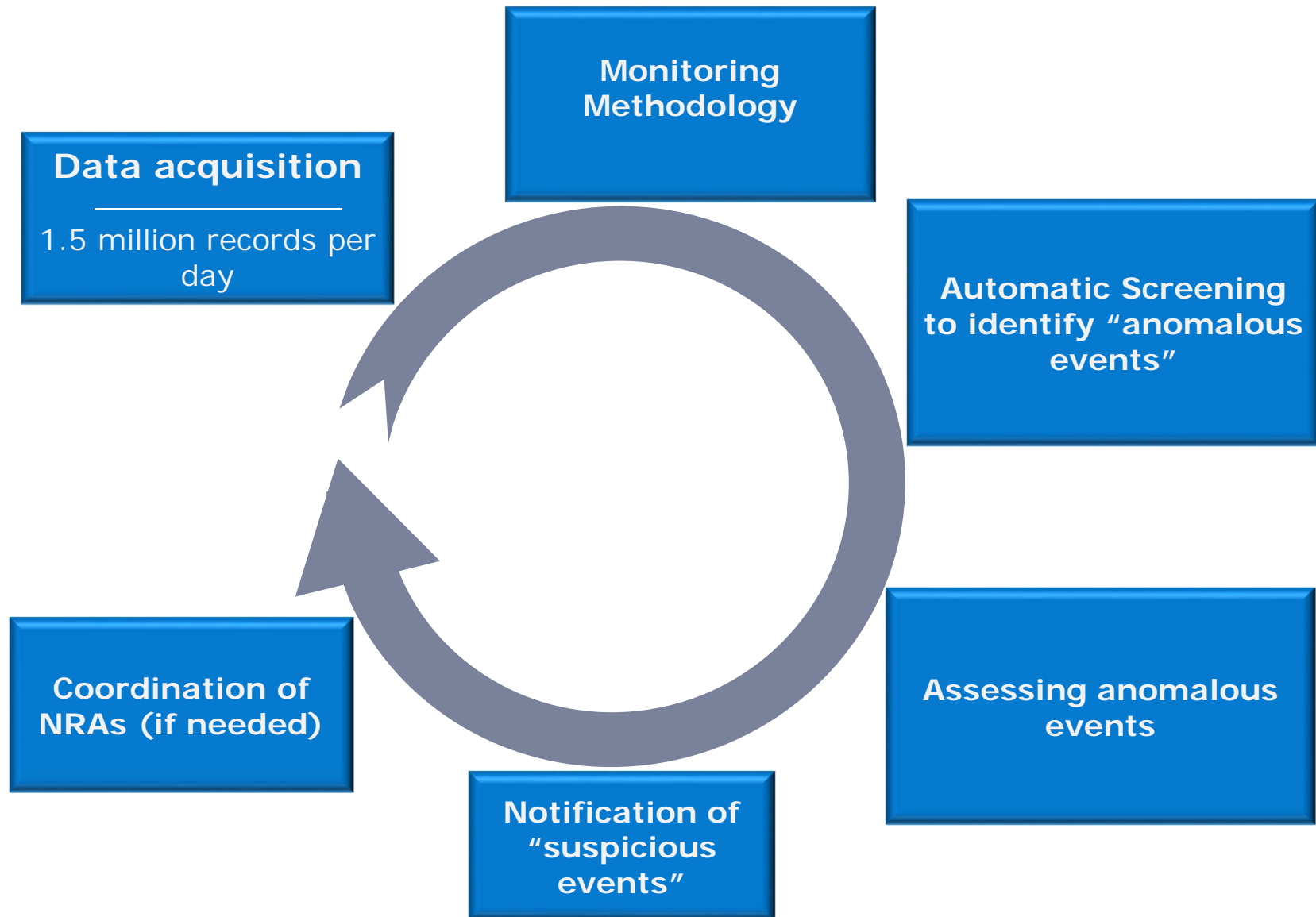
**ACER**  
 Assists NRAs:  
 preliminary assessment  
 requests to commence an  
 investigation  
 coordinate investigatory groups

\* Persons professionally arranging transactions



- With **NRAs**, through ACER Working Groups and Task Forces, using the tools (e.g. the Case Management Tool) developed by ACER
- MoUs with:
  - **European Securities and Markets Authority** (ESMA, EU Financial Authority)
  - **Organised Market Places**
  - **Federal Energy Regulatory Commission** (FERC, US)
- Notification obligations of national **financial and competition authorities** if energy regulators suspect a breach falling within their jurisdiction

## Approach and logistics of market monitoring



- Suspicious transaction reports (STRs)
  - » Notifications from Organised Market Places and other PPATs
  - » Notifications from National Regulatory Authorities
  - » Notifications from Market participants or third parties
- Market information
  - » Market news
  - » ACER's market observations and regular monitoring
  - » Reference data

- **REMIT data reporting (Alerts)**

- » Transaction reporting
- » Fundamental data reporting
- » Urgent Market Message

Collected by the Market  
Integrity and Transparency  
Department

- Nasdaq's SMARTS Integrity modules
  - Alert development environment
  - Alert management tool
    - ALMAS
  - Continuous market surveillance modules
    - SPREAD
    - REPLAY
  - Auction market surveillance module
  - Reporting tools (standardised and custom queries)
  - Fundamental data viewer (market participant granularity)

Nasdaq SMARTS Integrity | ALMAS - 6.5.0.50

File Window Help

Official Europe [acer] 20 June 2017 Set Filters Clear Filters SMARTS Integrity

Alert table

By Levels: Alert Code[44] Clear 70 | 347 1 | 1 24 | 176 8 | 37 8 | 23 35 | 70

Alert ID	Market	Date	Time	Product Code	Intensity	User	Folder	Notification	Alert Code	Delivery Point Or Zone Code	Reissue Count	Documents	Labels	New	BenchmarkType	Threshold	Result	Alert Set Name	Extra Folder
28	acer	20/06/2017	06:26:21	EL_DE_F_20170624_WE_BL_0000	96	-	Incoming		441	10YDE-RWENET---I	0			No	Pre-defined_Min_Val	x1,000 / 1	1	ACER Bespoke Alerts Set	1427_454072_FW
29	acer	20/06/2017	06:26:21	EL_DE_F_20170624_WE_BL_0000	96	-	Incoming		441	10YDE-RWENET---I	0			No	Pre-defined_Min_Val	x1,000 / 1	1	ACER Bespoke Alerts Set	1427_454072_FW
31	acer	20/06/2017	06:39:07	EL_DE_F_20180101_Y_BL_0000	80	-	WatchList		441	10YDE-RWENET---I	0			Yes	Pre-defined_Min_Val	x1,000 / 1	1	ACER Bespoke Alerts Set	EBPBRWCY18P
32	acer	20/06/2017	06:39:07	EL_DE_F_20180101_Y_BL_0000	80	-	WatchList		441	10YDE-RWENET---I	0			Yes	Pre-defined_Min_Val	x1,000 / 1	1	ACER Bespoke Alerts Set	EBPBRWCY18P
33	acer	20/06/2017	06:42:11	EL_DE_F_20180101_Y_BL_0000	80	-	WatchList		441	10YDE-RWENET---I	0			Yes	Pre-defined_Min_Val	x1,000 / 1	1	ACER Bespoke Alerts Set	158_2018_01_01
34	acer	20/06/2017	06:42:11	EL_DE_F_20180101_Y_BL_0000	80	-	WatchList		441	10YDE-RWENET---I	0			Yes	Pre-defined_Min_Val	x1,000 / 1	1	ACER Bespoke Alerts Set	158_2018_01_01
39	acer	20/06/2017	07:26:36	EL_DE_F_20180101_Y_BL_0000	80	-	WatchList		441	10YDE-RWENET---I	0			Yes	Pre-defined_Min_Val	x1,000 / 1	1	ACER Bespoke Alerts Set	EBPBRWCY18P
40	acer	20/06/2017	07:26:36	EL_DE_F_20180101_Y_BL_0000	80	-	WatchList		441	10YDE-RWENET---I	0			Yes	Pre-defined_Min_Val	x1,000 / 1	1	ACER Bespoke Alerts Set	EBPBRWCY18P
49	acer	20/06/2017	08:03:28	EL_DE_F_20170701_M_BL_0000	80	-	WatchList		441	10YDE-RWENET---I	0			Yes	Pre-defined_Min_Val	x1,000 / 1	1	ACER Bespoke Alerts Set	158_2017_07_01
50	acer	20/06/2017	08:03:28	EL_DE_F_20170701_M_BL_0000	80	-	WatchList		441	10YDE-RWENET---I	0			Yes	Pre-defined_Min_Val	x1,000 / 1	1	ACER Bespoke Alerts Set	158_2017_07_01
51	acer	20/06/2017	08:06:46	EL_DE_F_20180101_Y_BL_0000	80	-	WatchList		441	10YDE-RWENET---I	0			Yes	Pre-defined_Min_Val	x1,000 / 1	1	ACER Bespoke Alerts Set	EBPBRWCY18P
52	acer	20/06/2017	08:06:46	EL_DE_F_20180101_Y_BL_0000	80	-	WatchList		441	10YDE-RWENET---I	0			Yes	Pre-defined_Min_Val	x1,000 / 1	1	ACER Bespoke Alerts Set	EBPBRWCY18P
60	acer	20/06/2017	09:18:33	EL_DE_F_20190101_Y_BL_0000	80	-	WatchList		441	10YDE-RWENET---I	0			Yes	Pre-defined_Min_Val	x1,000 / 1	1	ACER Bespoke Alerts Set	1427_114070_FW
61	acer	20/06/2017	09:18:33	EL_DE_F_20190101_Y_BL_0000	80	-	WatchList		441	10YDE-RWENET---I	0			Yes	Pre-defined_Min_Val	x1,000 / 1	1	ACER Bespoke Alerts Set	1427_114070_FW
64	acer	20/06/2017	09:27:13	EL_DE_F_20180101_Y_BL_0000	80	-	WatchList		441	10YDE-RWENET---I	0			Yes	Pre-defined_Min_Val	x1,000 / 1	1	ACER Bespoke Alerts Set	158_2018_01_01
65	acer	20/06/2017	09:27:13	EL_DE_F_20180101_Y_BL_0000	80	-	WatchList		441	10YDE-RWENET---I	0			Yes	Pre-defined_Min_Val	x1,000 / 1	1	ACER Bespoke Alerts Set	158_2018_01_01
88	acer	20/06/2017	13:59:16	EL_DE_F_20170623_D_BL_0000	96	-	Incoming		441	10YDE-RWENET---I	0			No	Pre-defined_Min_Val	x1,000 / 1	1	ACER Bespoke Alerts Set	EBPBRWFRIDAY2C
89	acer	20/06/2017	13:59:16	EL_DE_F_20170623_D_BL_0000	96	-	Incoming		441	10YDE-RWENET---I	0			No	Pre-defined_Min_Val	x1,000 / 1	1	ACER Bespoke Alerts Set	EBPBRWFRIDAY2C
22	acer	20/06/2017	09:40:07	EL_FR_F_20170621_D_PL_0800	98	-	Incoming		441	10YFR-RTE-----C	1			No	Pre-defined_Min_Val	x1,000 / 1	2	ACER Bespoke Alerts Set	8_75_14_4921
23	acer	20/06/2017	09:40:07	EL_FR_F_20170621_D_PL_0800	98	-	Incoming		441	10YFR-RTE-----C	1			No	Pre-defined_Min_Val	x1,000 / 1	2	ACER Bespoke Alerts Set	8_75_14_4921

Alert comments

49 WASH TRADE ABA [441]

80 acer : EL\_DE\_F\_20170701\_M\_BL\_0000 WatchList  
20/06/2017 08:03:28  
10YDE-RWENET---I - TFS\_Ltd -  
WASH TRADE ABA:Participant sold volume x5,000 of EL\_DE\_F\_20170701\_M\_BL\_0000 at 07:52:39.733 for price €32.600 to and reverted the trade at 08:03:28.103 for price €32.500. The last price before the first trade in ABA was €32.600. The total volume of wash trades today for this MP pair is x5,000, and the number of wash trades is 1

Product memos | acer - EL\_DE\_F\_2017... Days: 30 Ticker Table

Type new memo and press [Enter]

Alert aggregation

Grouped by: Alert Code Folder Custom

Level Code	Alerts	Alerts % of Total	Average Intensity	Processing Time Average	In
Total	347	100%	78		
441	70	20%	88		
4040	53	15%	100		
2011	50	14%	65		
490	39	11%	90		
1001	35	10%	61		
1005	28	8%	53		
2002	27	8%	44		
470	24	7%	100		
4002	12	3%	89		
4009	6	2%	100		
4023	3	1%	1		

Assign to folder 23/06/2017 02:27:28  
WatchList  
"Alert statement automatic folder assignment"

Analyse 23/06/2017 02:27:28

Issue 80 20/06/2017 08:03:28

The REMIT Portal is the public access to relevant REMIT documents and tools - [www.acer-remit.eu](http://www.acer-remit.eu)

The screenshot displays the REMIT Portal interface. At the top left is the ACER logo (Agency for the Cooperation of Energy Regulators). To its right is the ARIS logo (ACER REMIT Information System). Below these are navigation links: European Register of Market Participants, List of Organised Market Places, List of Standard Contracts, List of RRM's, List of Inside Information Platforms, ARIS Applications, and Documents. A search bar is located on the right side of the navigation area. The main content area features a banner with the European Union flag, a power line, and a castle on a hill, with the text "Welcome to the REMIT Portal". Below the banner, there is a heading "Welcome to the REMIT Portal" followed by a paragraph explaining the portal's purpose: "The REMIT Portal is a single entry point to a compilation of information and all applications that ACER has made available to market participants and other stakeholders in order to implement Regulation (EU) No 1227/2011 on wholesale energy market integrity and transparency (REMIT) and its implementing acts provided in Commission Implementing Regulation (EU) No 1348/2014 (REMIT Implementing Regulation)." A link is provided for more information: <http://www.acer.europa.eu/remit/>. At the bottom, contact information for the ARIS Central Service Desk (CSD) is given: [servicedesk@support.acer-remit.eu](mailto:servicedesk@support.acer-remit.eu).



European  
Commission

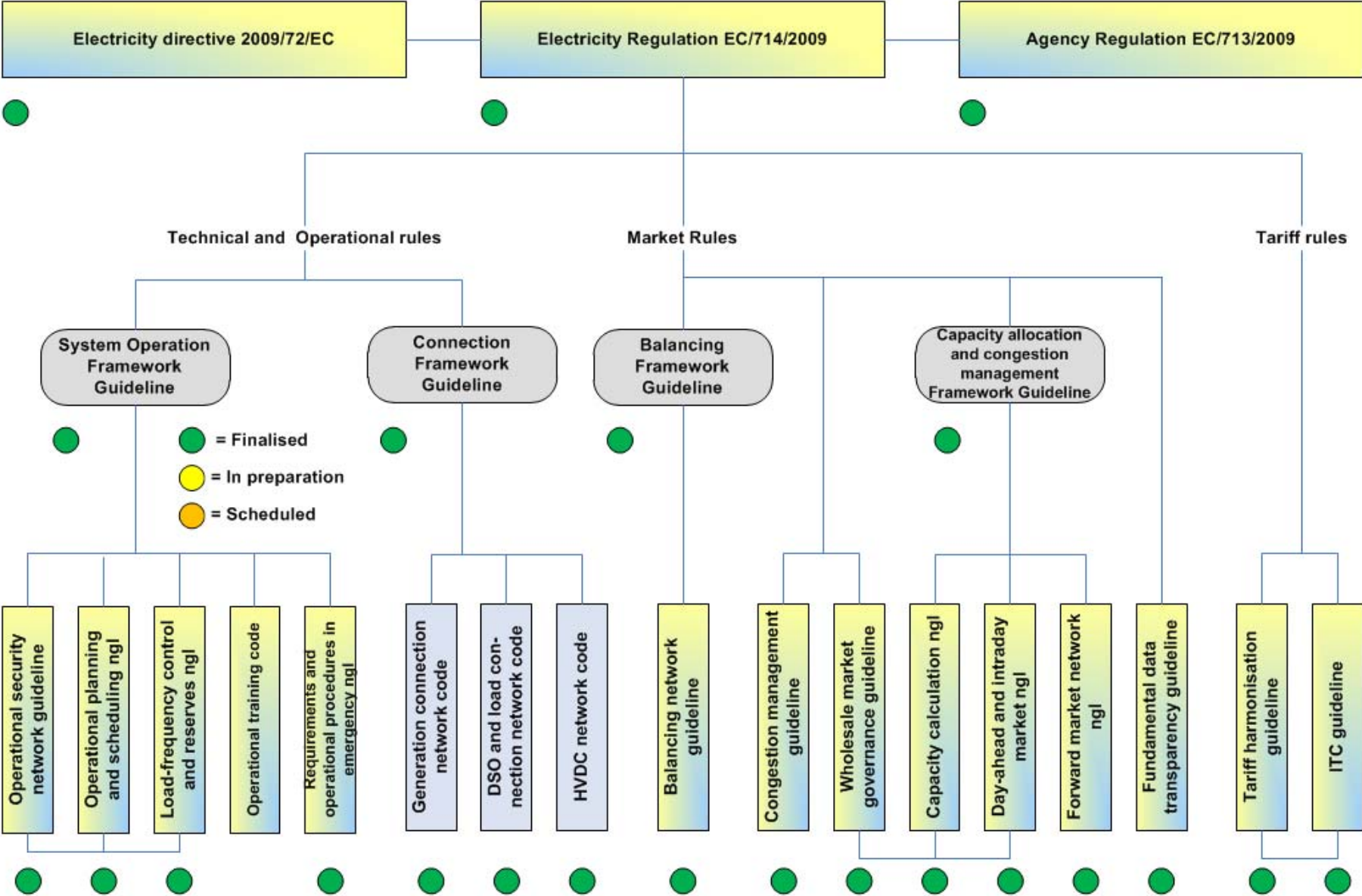


Thank you for your

**Attention!**

Energy

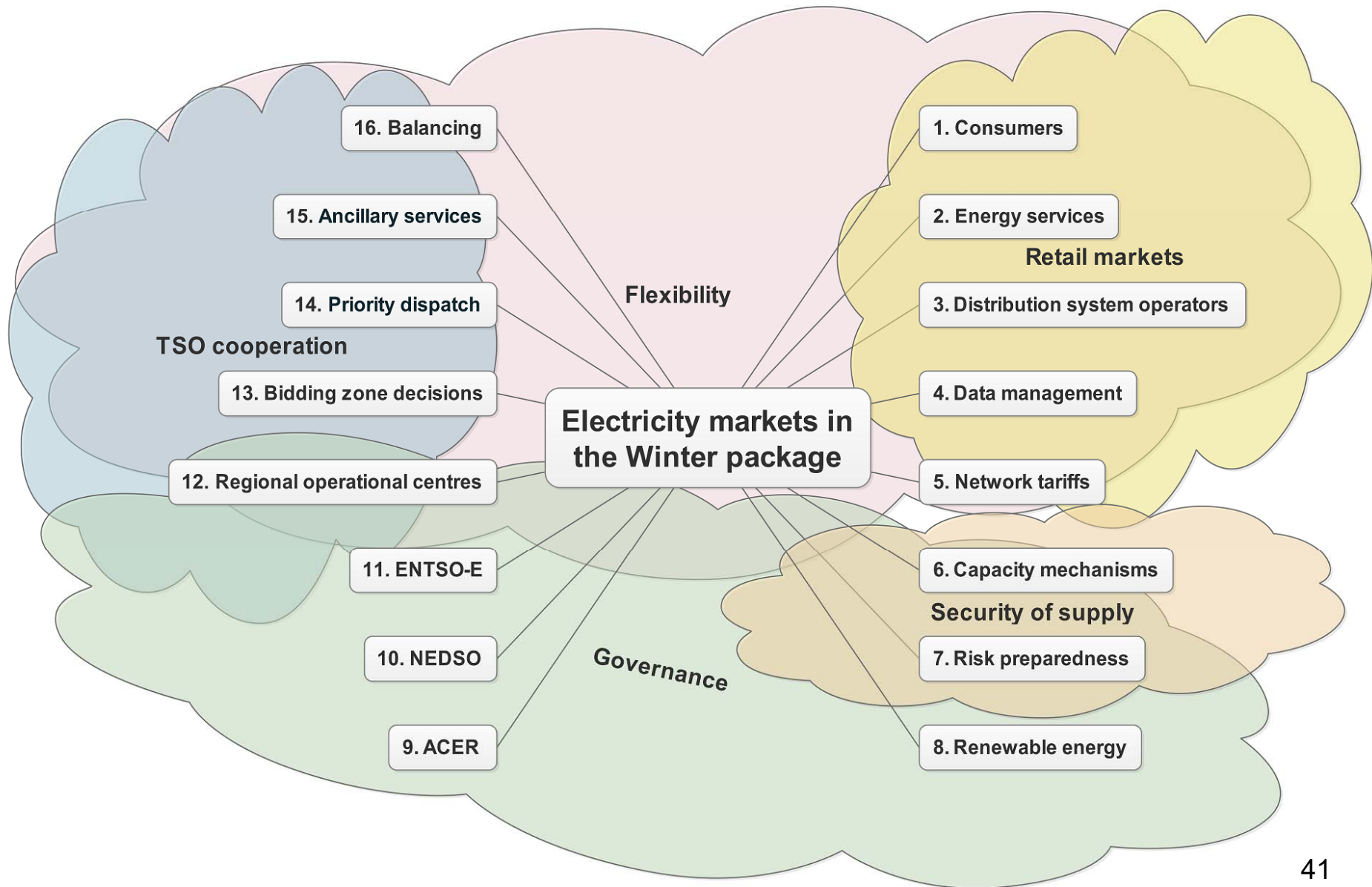
# European Electricity Rules





# Electricity markets in the Winter package

MS/DG ENER/B2/28.2.2017



Application	Description
ADMIN	ADMIN is an <b>administration module</b> that lets the user manage user accounts, passwords and permissions in SMARTS Integrity. You can also retrieve and export usage logs for accounts, modules and markets.
ALMAS	ALMAS is the <b>alerts management system</b> which displays alerts when unusual behaviour is detected and allows the analyst to prioritize and classify the alerts for further investigation. Alerts are transitioned through a workflow from open, to a number of final states such as discard, explained, and investigate. ALMAS also provides dashboard-like information on the number of alerts in total, per security (i.e. wholesale energy contract), per Market Participant, per Trader Username, per beneficiary and per alert type.
SPREAD	SPREAD is a <b>graphical presentation of trading data</b> focused on the bid-ask spread and trade executions across time. SPREAD contains a large variety of overlays depicting different trading information such as the best bid, ask, trades, last trade price, mid-point price, index values, news events and alerts. Trading market share of participants is easily obtained and trading relationships between participants can be highlighted.
REPLAY	REPLAY <b>reconstructs and replays the order book</b> for any contract (quotes, orders, or combination of both). The application shows market events for both historical and real-time days, tick by tick in the sequence that the trading engine received them. The order-book can be viewed as discreet orders, or accumulated at each price step. Orders are filterable, and the complete order history of any given order can be obtained with a simple mouse click.
ALDIT	ALDIT provides the <b>alerts development environment</b> which empowers users with the ability to write and edit alerts and report definitions, and execute test runs to see the results of their queries.
REPORT	A data <b>query tool</b> which extracts data directly from the database depending on the filters requested by the user. In contrast with ARC, there is no complex logic or mathematical manipulation of data provided by the REPORT module
INFORM	Stores and <b>retrieves relevant news messages</b> broadcast by the listed companies. INFORM requires a news source to be provided by the customer.
ARC	Allows an analyst to retrieve <b>structured reports such as</b> : management reports, market abuse detection reports, market maker reports, and general trading information reports. ARC allows the user to apply a set of filters and parameters to tailor the existing report templates to their needs. Reports are shown in table format linked to other SMARTS applications and output can be extracted in PDF or text (Excel) form.
MARKET OVERVIEW	MARKET OVERVIEW is a monitoring tool that gives you a <b>high-level summary</b> events currently occurring in a market overall wholesale energy contracts.
AUCTION ANALYSIS	Allows the analyst to <b>visualize auctions</b> by plotting the aggregate demand and supply curve for each auction. The application allows the analyst to include or exclude a chosen set of participant schedules from the aggregate view to visualize the impact on the final auction price for the chosen participant.
REPORTSTOOLKIT	This is <b>query tool</b> which extracts data directly from the database depending on the filters requested by the user. In contrast with REPORT, this tool can query all Tier III data which includes <b>fundamental data</b> .