

Leipziger Stadtwerke

Agenda

20 September, 2016

Agenda // 20 September, 2016

09:00 Registration // Venue: Eutritzscher Straße 14b, 04105 Leipzig

09:00 – 09:10 Welcome and Introductions

09:10 – 09:20 Stadtwerke Leipzig – Company Presentation

09:20 – 10:30 Presentation Part I: „German Power Market / Trading“

10:30 – 11:15 Visit: Trading Floor

11:15 – 12:00 Presentation Part II: „German Power Market / Trading“

09:00 – 12:00
Test Drive
BMW i3

Leipziger Stadtwerke Company Presentation

20 September 2016



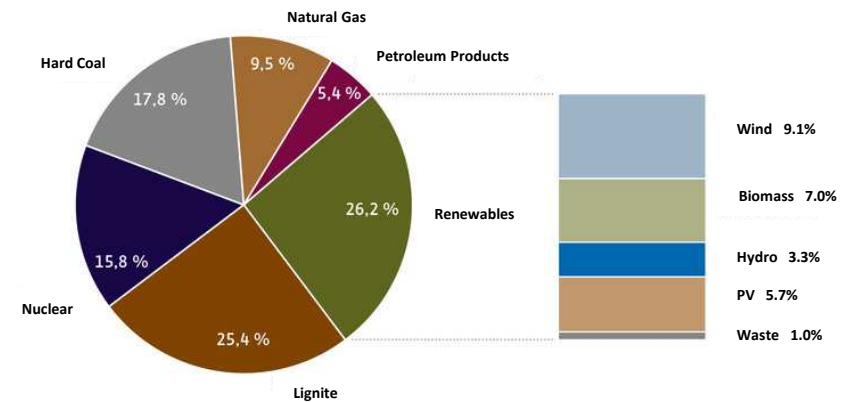
German Energy Market: Facts & Figures

- 920 DSOs, 4 TSOs
- 1,190 Suppliers of Electricity
- 130 Power Trading Entities
- 70 Power Generators > 100 MW
- About 1.5 mn decentralized generation units
- 430 district heating companies

Gross Power Generation

by energy sources

Gross Power Generation 2014 in Germany: 614 TWh



Source: BDEW, AG Energiebilanzen

Leipziger Stadtwerke is the Main Supplier of the Leipzig Metropolitan Area

A municipal utility

100 % owned by LVV
Leipziger Versorgungs- und
Verkehrsgesellschaft mbH, a
holding company belonging
to the city of Leipzig

An independent energy supplier

Acting as a competent and
reliable partner for our
customers, offering smart
and sustainable solutions for
the decentralized energy
market of tomorrow

An innovative market player

Actively participating in
managing the German
Energy transition and
tackling existing market
challenges

Portfolio of Energy Products and Services



Having an expertise of over 100 years, we are covering a wide range of services in the field of generation, transport & distribution of power, natural gas and district heating.

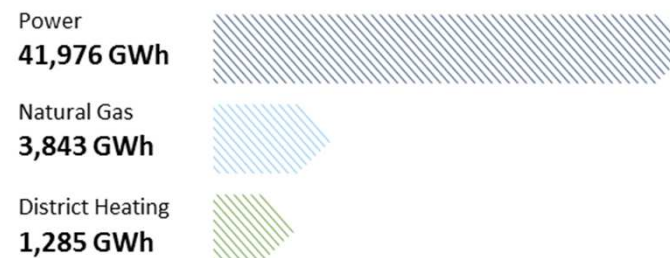
Creating Added Value for Leipzig

Key Figures

in EUR mn

Balance Sheet Total:	660.9
Revenue:	1,974.1
EBIT:	54.4
Investments:	69.6

Amounts sold



The German Electricity Market

Focus: Power Trading

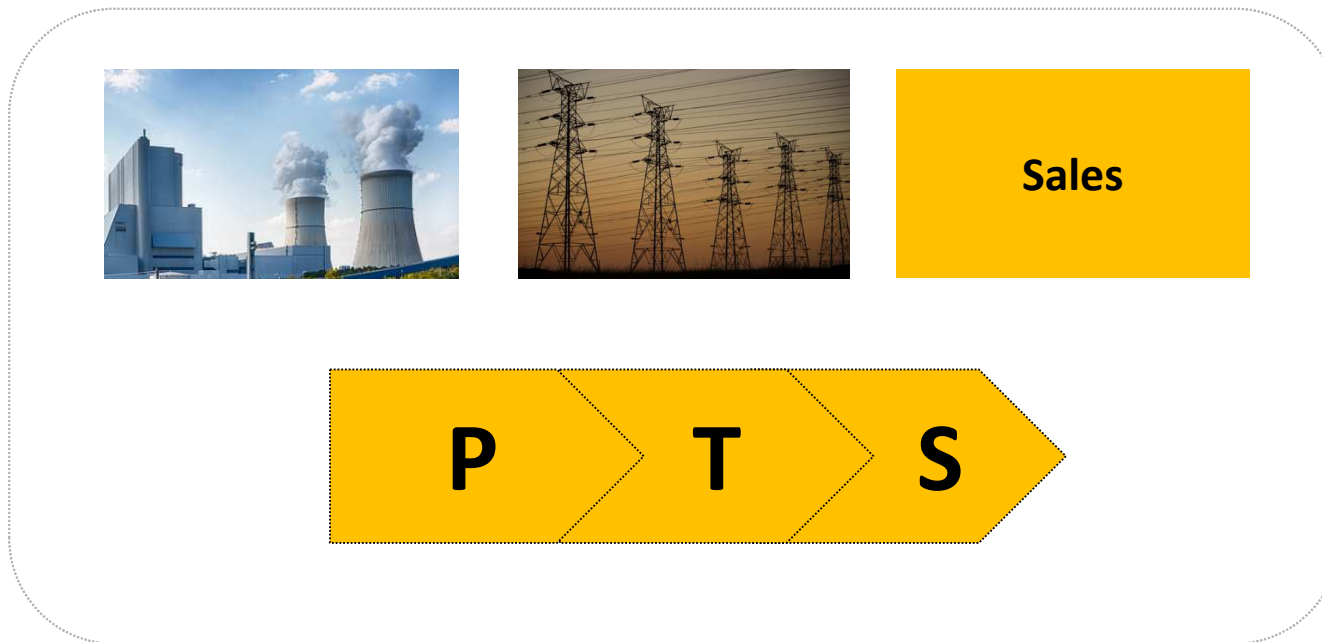
Martin Zeman
20 September 2016

Agenda

1. Power Trading: The Result of Liberalization
 2. Market Participants
 3. Power Markets & Products
 4. Market Access / The Front-End
- Appendix: Control Energy

1. Power Trading: The Result of Liberalization

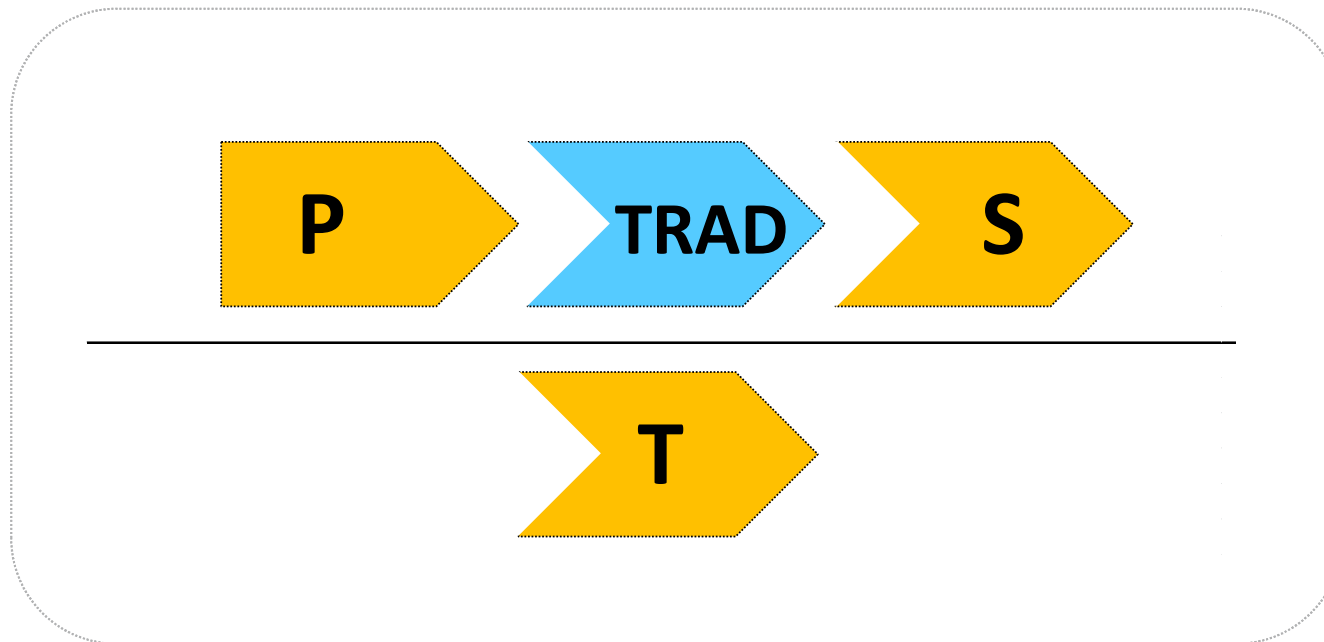
Pre-Liberalization (before 1998)



P Production
T Transportation
S Sales

1. Power Trading: The Result of Liberalization

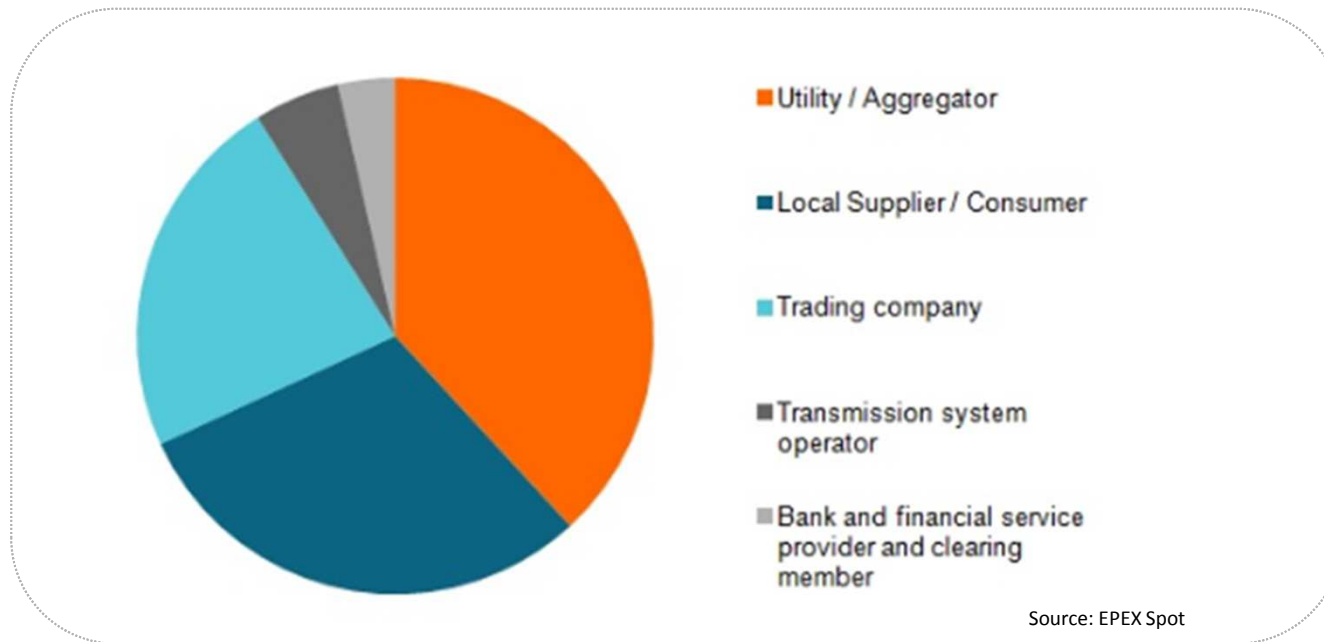
Post-Liberalization („Unbundling“)



P Production
T Transportation
S Sales
TRAD Trading

2. Market Participants

Market Participants



Motivation

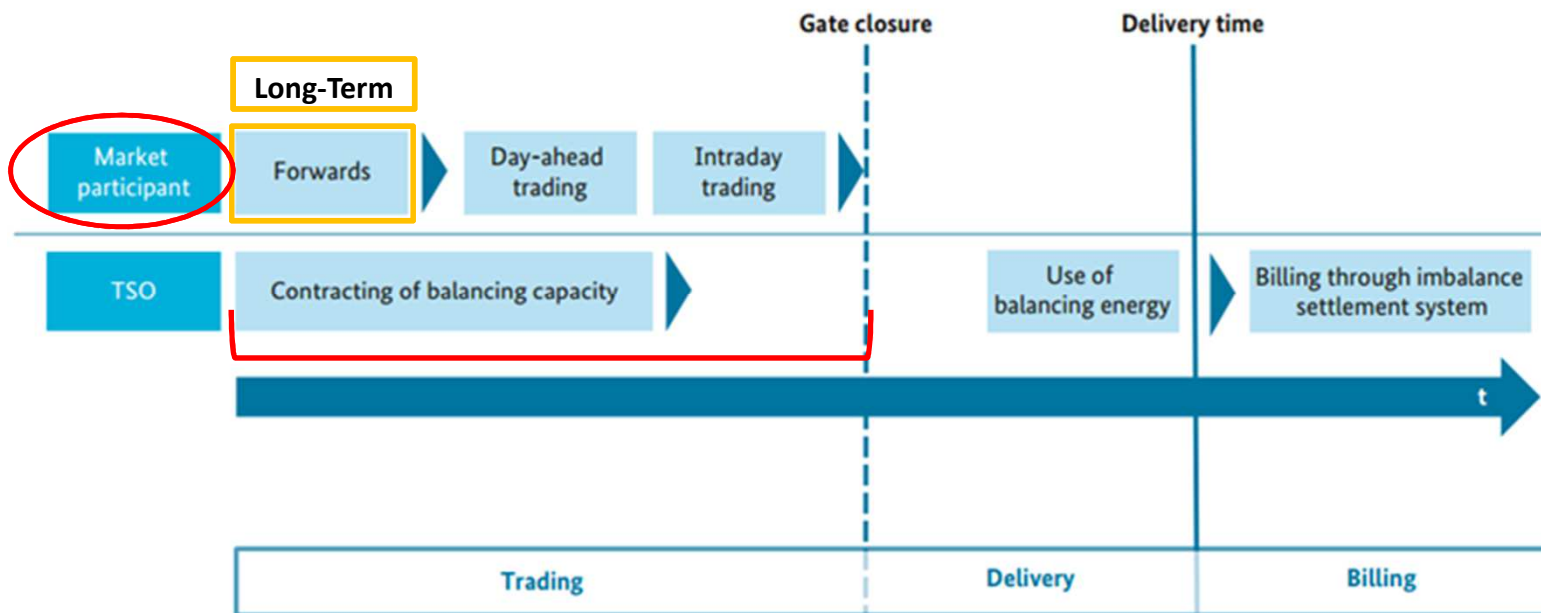
Hedging

Arbitrage

Speculation

3. Power Markets & Products

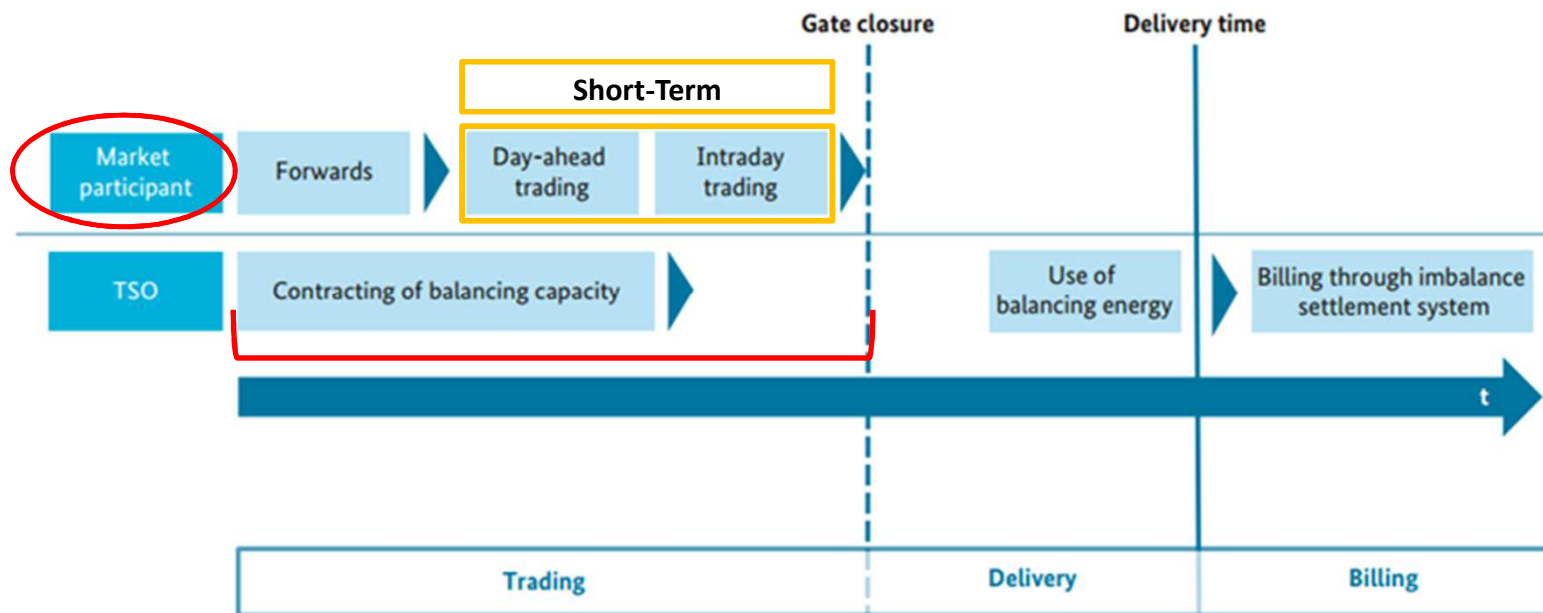
Figure 1: Submarkets of the electricity market in Germany, chronological representation



Source: BMWi

3. Power Markets & Products

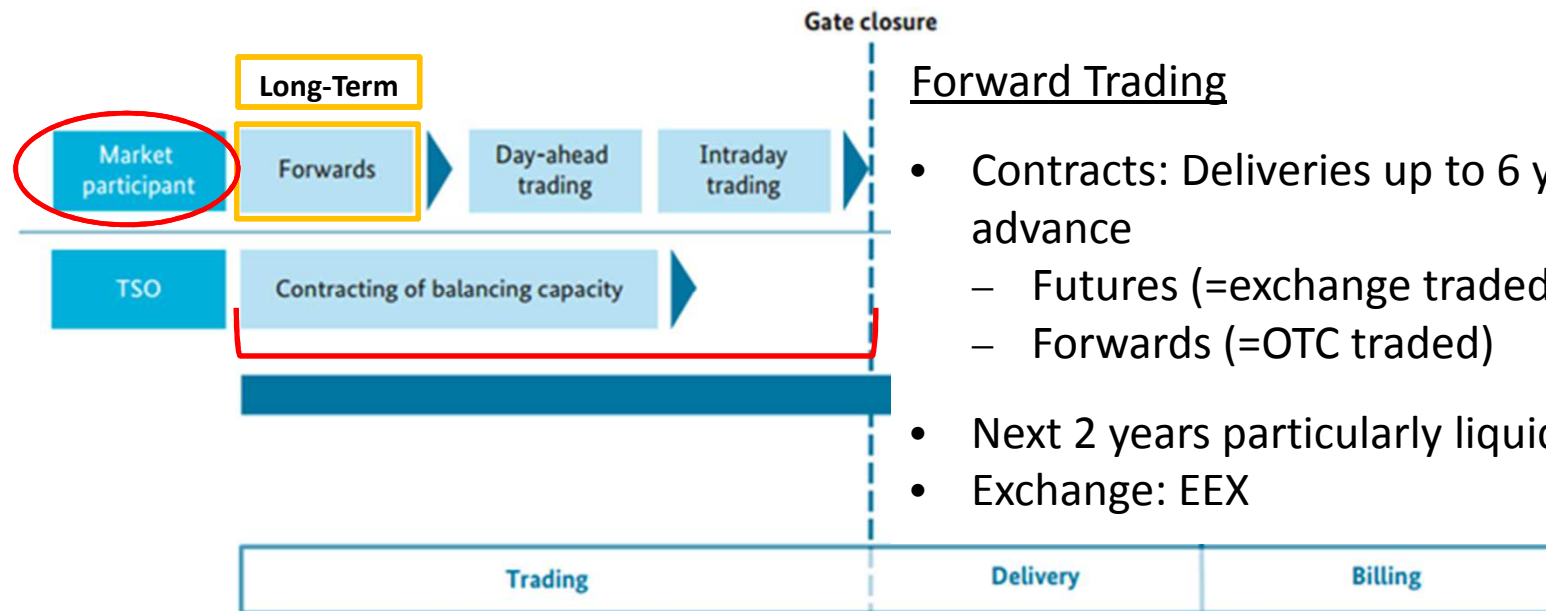
Figure 1: Submarkets of the electricity market in Germany, chronological representation



Source: BMWi

3. Power Markets & Products

Figure 1: Submarkets of the electricity market in Germany, chronological representation



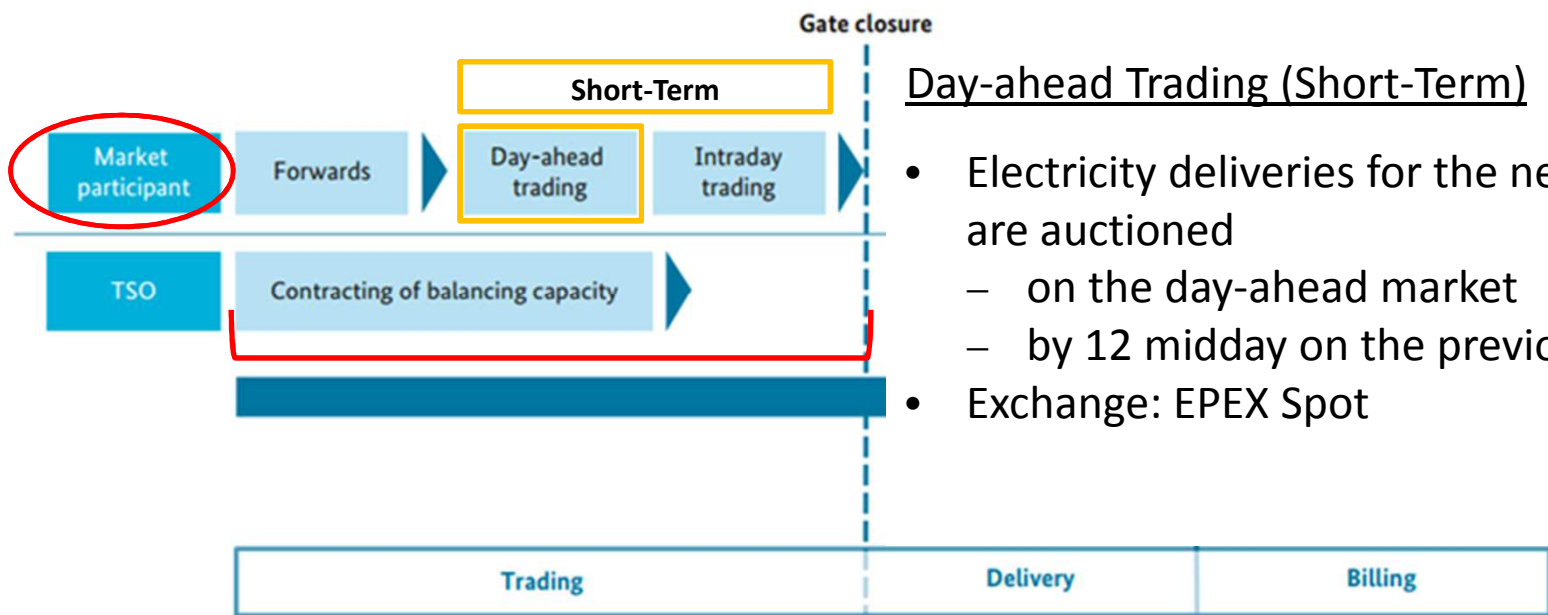
Forward Trading

- Contracts: Deliveries up to 6 years in advance
 - Futures (=exchange traded)
 - Forwards (=OTC traded)
- Next 2 years particularly liquid
- Exchange: EEX

Source: BMWi

3. Power Markets & Products

Figure 1: Submarkets of the electricity market in Germany, chronological representation



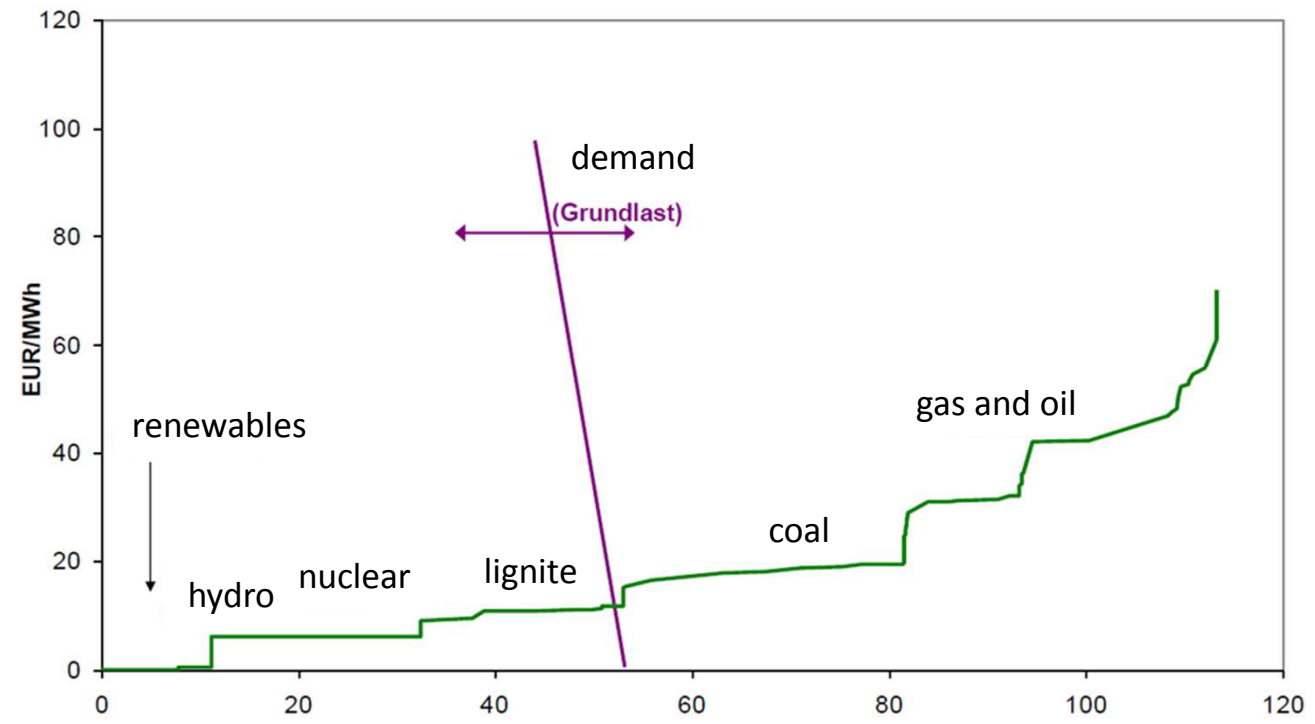
Day-ahead Trading (Short-Term)

- Electricity deliveries for the next day are auctioned
 - on the day-ahead market
 - by 12 midday on the previous day
- Exchange: EPEX Spot

Source: BMWi

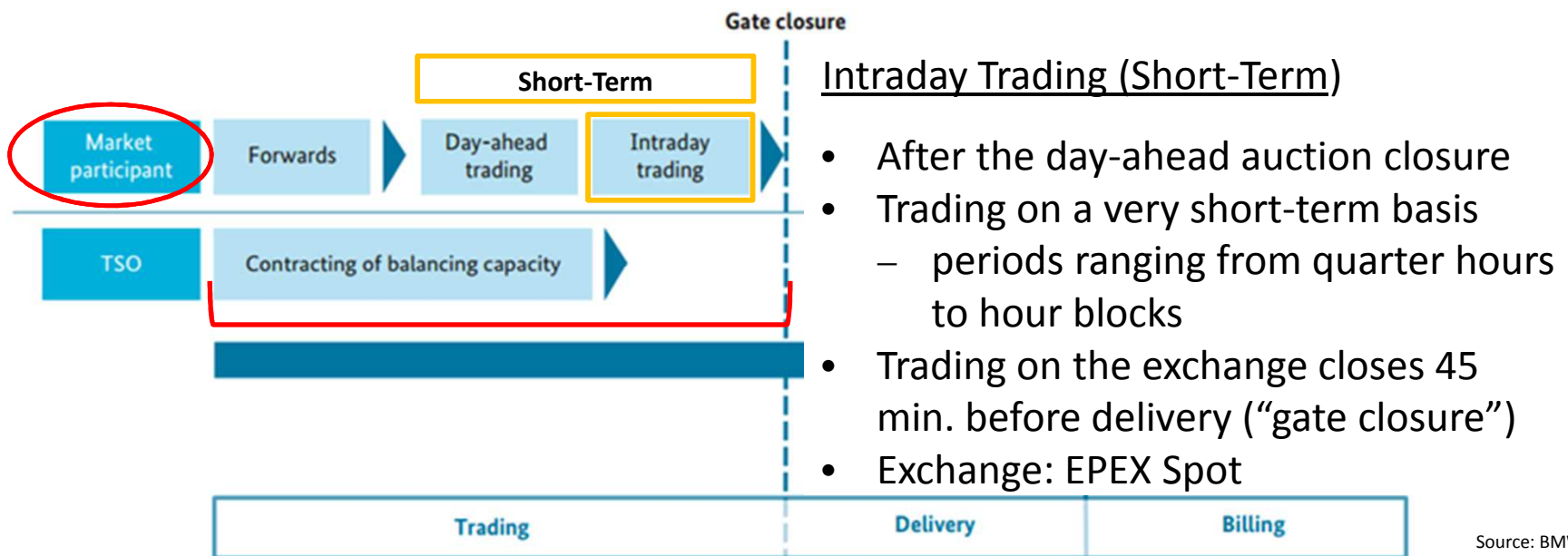
3. Power Markets & Products

Merit Order



3. Power Markets & Products

Figure 1: Submarkets of the electricity market in Germany, chronological representation



Intraday Trading (Short-Term)

- After the day-ahead auction closure
- Trading on a very short-term basis
 - periods ranging from quarter hours to hour blocks
- Trading on the exchange closes 45 min. before delivery (“gate closure”)
- Exchange: EPEX Spot

Source: BMWi

4. Market Access / The Front-End

1. Forward Market (German Power)
2. Intraday Market (German Power)

4. Market Access / The Front-End

Forward Market (German Power)

TRAYPORT JOULE																								
JOULE		View	NatGas	German Power	NatGas LocationSpreads	Coal + IronOre	+																	
New Sheet																								
Germany Baseload								Germany Off-Peaks								Germany Peaks								
	Code	Qty	Bid	Ask	Qty	Code	Last		Code	Qty	Bid	Ask	Qty	Code	Last		Code	Qty	Bid	Ask	Qty	Code	Last	
WkEnd 30-3...	SPEC	25	25,25	25,50	25	SPEC	25,25																	
	SPEC	25	25,25	25,75	25	SPEC	25,25																	
Wk 31-16 (...)																								
Wk33-16	GRFN	25	26,75	27,50	25	ICAP	27,00											25	28,83	31,93	25		31,00	
Wk34-16	SPEC	25	28,75	29,50	25	TFS	29,25											25	31,00	34,10	25			
Sep-16	ICAP	25	30,15	30,25	5*	SPEC	30,15								25,75			SPEC	10	35,10	35,50	10	SPEC	35,30
Oct-16	PREB	5	30,20	30,75	15*	PREB	30,40											25	37,23	39,18	25		38,00	
Q416		5	31,23	31,37	2		31,30					29,00	5*	TFS	26,55			5	39,38	39,93	5		39,70	
Q117		5	30,93	31,07	5		30,85					27,00	5	SPEC	24,00			5	38,68	39,20	10	SPEC	39,00	
Q217		5	24,23	24,97	10		24,45								20,55			5	28,98	30,23	10		30,20	
Q317	GRFN	9	25,30	25,67	10		25,40											5	30,98	31,88	15		31,70	
Win 16																								
2017		5*	27,48	27,55	1	SPEC	27,55								22,50			GRFN	1	34,40	34,72	5		34,55
	SPEC	2*	27,45	27,60	5	GRFN	27,55												5	34,23	34,75	5	GFI	34,50
2018	PREB	5	26,20	26,30	4	SPEC	26,25								22,40			PREB	2	32,85	33,10	5*	TFS	32,85
2017 x 2018	GFI	5*	1,20	1,35	1		1,25*												1*	1,30	1,87	2		
	GRFN	5	1,20	1,45	5	GFI	1,30*																	
2018 x 2019		2	0,40	0,72	4*													PREB	2	0,30	0,75	2*		

4. Market Access / The Front-End

Forward Market (German Power)

TRAYPORT JOULE																					
JOULE View NatGas German Power NatGas LocationSpreads Coal + IronOre +																					
New Sheet																					
PRODUCTS	Germany Baseload							Germany Off-Peaks							Germany Peaks						
	Code	Qty	Bid	Ask	Qty	Code	Last	Code	Qty	Bid	Ask	Qty	Code	Last	Code	Qty	Bid	Ask	Qty	Code	Last
== WkEnd 30-3...	SPEC	25	25,25	25,50	25	SPEC	25,25														
== Wk 31-16 (...)	SPEC	25	25,25	25,75	25	SPEC	25,25														
== Wk33-16	GRFN	25	26,75	27,50	25	ICAP	27,00								25	28,83	31,93	25			31,00
== Wk34-16	SPEC	25	28,75	29,50	25	TFS	29,25								25	31,00	34,10	25			
== Sep-16	ICAP	25	30,15	30,25	5*	SPEC	30,15						25,75	SPEC	10	35,10	35,50	10	SPEC		35,30
== Oct-16	PREB	5	30,20	30,75	15*	PREB	30,40								25	37,23	39,18	25			38,00
== Q416		5	31,23	31,37	2		31,30				29,00	5* TFS	26,55		5	39,38	39,93	5			39,70
== Q117		5	30,93	31,07	5		30,85				27,00	5 SPEC	24,00		5	38,68	39,20	10	SPEC		39,00
== Q217		5	24,23	24,97	10		24,45						20,55		5	28,98	30,23	10			30,20
== Q317	GRFN	9	25,30	25,67	10		25,40								5	30,98	31,88	15			31,70
== Win 16																					
== 2017		5*	27,48	27,55	1	SPEC	27,55						22,50	GRFN	1	34,40	34,72	5			34,55
	SPEC	2*	27,45	27,60	5	GRFN	27,55								5	34,23	34,75	5	GFI		34,50
== 2018	PREB	5	26,20	26,30	4	SPEC	26,25						22,40	PREB	2	32,85	33,10	5*	TFS		32,85
== 2017 x 2018	GFI	5*	1,20	1,35	1		1,25*								1*	1,30	1,87	2			
	GRFN	5	1,20	1,45	5	GFI	1,30*														
== 2018 x 2019		2	0,40	0,72	4*									PREB	2	0,30	0,75	2*			

4. Market Access / The Front-End

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New Sheet																				
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WkEnd 30-3...	SPEC	25	25,25	25,50	25	SPEC	25,25													
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Wk33-16	GRFN	25	26,75	27,50	25	ICAP	27,00							25	28,83	31,93	25			31,00
Wk34-16	SPEC	25	28,75	29,50	25	TFS	29,25							25	31,00	34,10	25			
Sep-16	ICAP	25	30,15	30,25	5*	SPEC	30,15					25,75		SPEC	10	35,10	35,50	10	SPEC	35,30
Oct-16	PREB	5	30,20	30,75	15*	PREB	30,40							25	37,23	39,18	25			38,00
Q416		5	31,23	31,37	2		31,30			29,00	5*	TFS	26,55		5	39,38	39,93	5		39,70
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	SPEC	2*	27,45	27,60	5	GRFN	27,55								5	34,23	34,75	5	GFI	34,50
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2018 x 2019		2	0,40	0,72	4*									PREB	2	0,30	0,75	2*		

4. Market Access / The Front-End

Forward Market (German Power)

TRAYPORT JOULE

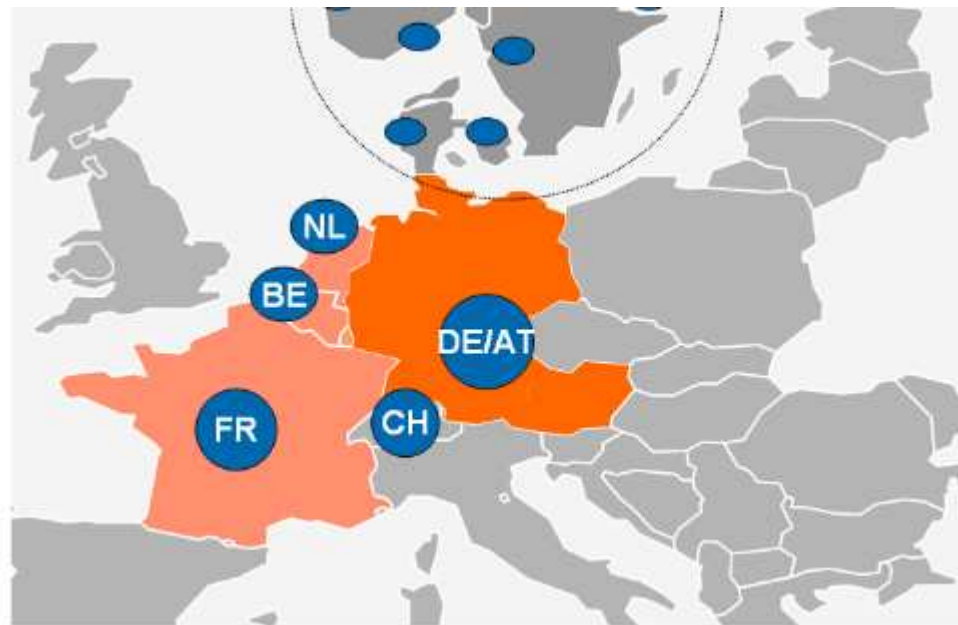
JOULE View NatGas German Power NatGas LocationSpreads Coal + IronOre +

New Sheet

	Germany BaseLoad						Last	Germany Off-Peaks						Last	Germany Peaks						Last
	Code	Qty	Bid	Ask	Qty	Code		Code	Qty	Bid	Ask	Qty	Code		Code	Qty	Bid	Ask	Qty	Code	
WkEnd 30-3...	SPEC	25	25,25	25,50	25	SPEC	25,25														
Wk 31-16 (...)	SPEC	25	25,25	25,75	25	SPEC	25,25														
Wk33-16	GRFN	25	26,75	27,50	25	ICAP	27,00							25	28,83	31,93	25		31,00		
Wk34-16	SPEC	25	28,75	29,50	25	TFS	29,25							25	31,00	34,10	25				
Sep-16	ICAP	25	30,15	30,25	5*	SPEC	30,15					25,75	SPEC	10	35,10	35,50	10	SPEC	35,30		
Oct-16	PREB	5	30,20	30,75	15*	PREB	30,40							25	37,23	39,18	25		38,00		
Q416		5	31,23	31,37	2		31,30			29,00	5* TFS	26,55		5	39,38	39,93	5		39,70		
Q117		5	30,93	31,07	5		30,85			27,00	5 SPEC	24,00		5	38,68	39,20	10	SPEC	39,00		
Q217		5	24,23	24,97	10		24,45					20,55		5	28,98	30,23	10		30,20		
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	SPEC	2*	27,45	27,60	5	GRFN	27,55							5	34,23	34,75	5	GFI	34,50		
2018	PREB	5	26,20	26,30	4	SPEC	26,25				22,40	PREB	2	32,85	33,10	5*	TFS	32,85			
2017 x 2018	GFI	5*	1,20	1,35	1		1,25*							1*	1,30	1,87	2				
	GRFN	5	1,20	1,45	5	GFI	1,30*														
2018 x 2019		2	0,40	0,72	4*								PREB	2	0,30	0,75	2*				

4. Market Access

The single price zone



Quelle: BDEW

4. Market Access / The Front-End

Intraday Trading (German Power)

Area	Ctrct	CtrSt	OBid	BQty	Bid	Ask	AQty	OAsk	LPrc	LQty	TQty
VE	13Q3	ACTE		25,7	36,00	39,00	30,0		40,00	17,7	1080,0
VE	13Q4	ACTE		25,5	26,00	37,00	27,5		36,50	25,0	1094,0
VE	14-15	ACTE		30,0	27,00	28,75	5,7		27,00	0,8	9503,9
VE	14Q1	ACTE		2,4	26,00	33,90	10,0		26,00	4,6	1356,6
VE	14Q2	ACTE		1,3	24,90	26,83	0,3		21,01	5,8	893,8
VE	14Q3	ACTE		18,4	29,00	37,50	0,9		25,00	0,1	695,4
VE	14Q4	ACTE		47,2	26,00	32,50	0,2		26,00	2,8	615,6
VE	15-16	ACTE		2,2	31,50	33,33	20,0		33,44	20,0	3112,8
VE	15Q1	ACTE		18,1	17,00	23,24	0,2		14,10	0,1	1189,2
VE	15Q2	ACTE		20,0	22,01	27,80	0,1		18,00	7,7	852,6
VE	15Q3	ACTE		21,6	26,00	33,20	1,5		25,00	3,1	613,6
VE	15Q4	ACTE		3,0	38,95	40,00	25,9		38,95	7,0	583,2
VE	16-17	ACTE		5,0	33,30	34,99	2,5		34,99	17,5	1885,2
VE	16Q1	ACTE		43,3	10,00	19,58	0,2		10,60	5,0	584,0
VE	16Q2	ACTE		64,5	21,00	34,80	0,5		20,00	1,3	353,2
VE	16Q2	ACTE		23,6	31,00	42,00	0,2		40,00	3,0	106,4

The German Electricity Market

Appendix: Control Energy

Martin Zeman
20 September 2016

Control Energy (CE)

Physical Balancing of the German Power Grid

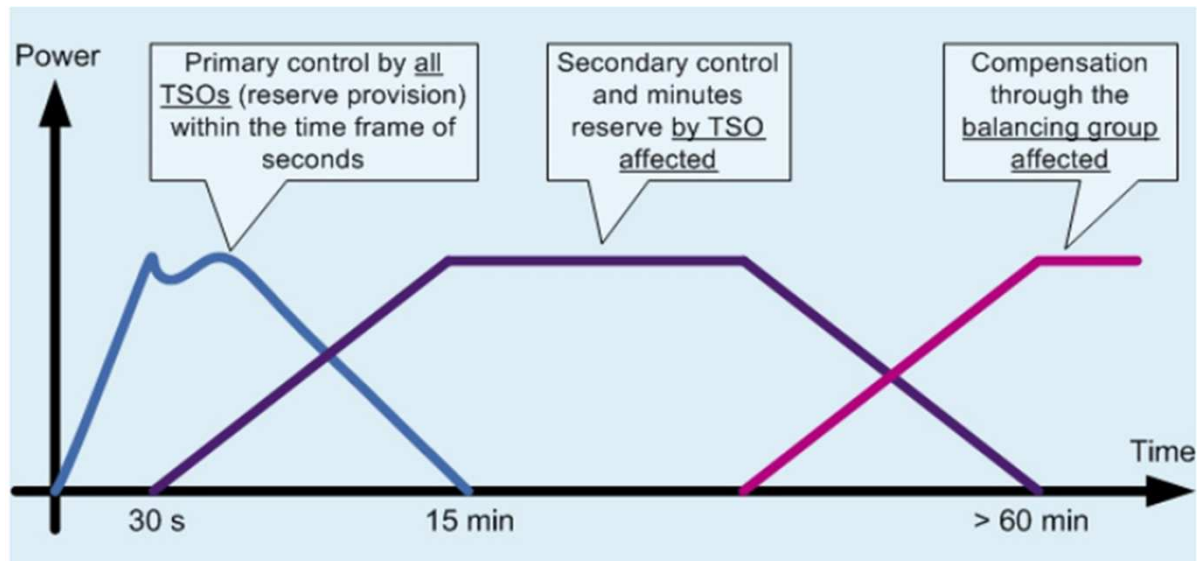
- Germany: 4 Transmission System Operators (TSOs)
 - Amprion / 50Hertz / TenneT / TransnetBW
- TSOs use CE to ensure a permanent balance between power generation and demand
- TSOs are procuring CE on a weekly/daily basis
 - www.regelleistung.net
- Total control energy demand: 7400 MW



Source:
netzentwicklungsplan.de

Control Energy

The time frame of control energy usage

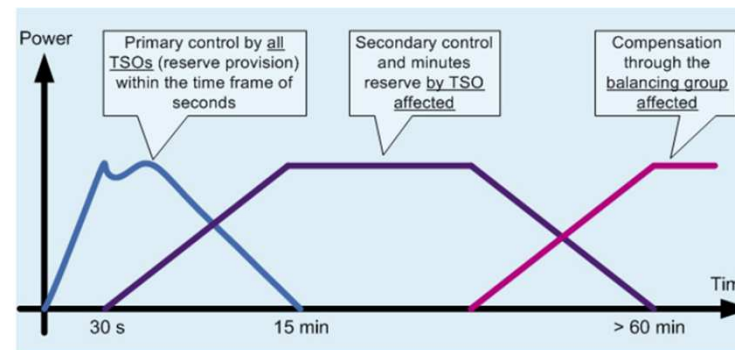


Source: Amprion

Control Energy (CE)

Technical aspects – Primary control

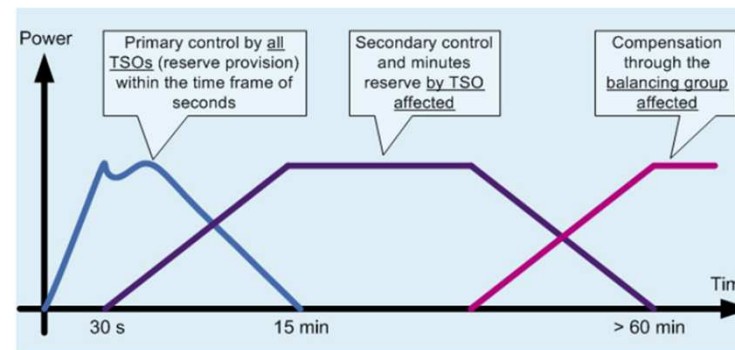
- Provided (in a way of solidarity) by all synchronously connected TSOs inside the UCTE area
 - UCTE: Union for the Coordination of the Transmission of Electricity
- Activation: within 30 sec
- Time period per single incident
 - $0 < t < 15 \text{ min}$



Control Energy (CE)

Technical aspects – Secondary control

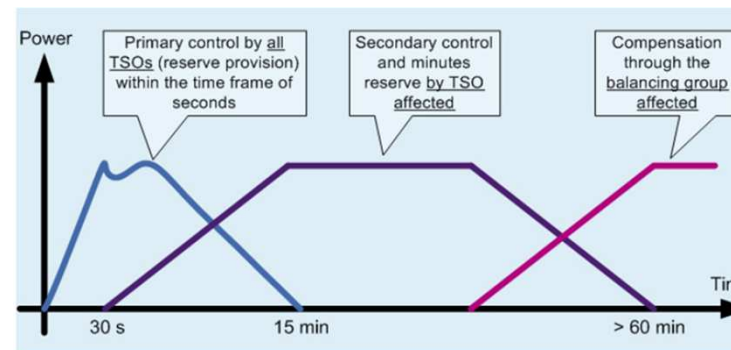
- Direct and automatic activation by the affected TSO
- Activation: within 5 min
- Time period per single incident
 - $30\text{ s} < t < 15\text{ min}$



Control Energy (CE)

Technical aspects – Minutes reserve (Tertiary control):

- Telephonic and schedule-based request of the affected TSO at the respective suppliers
- Manually activation according to the 15 min schedule time frame or rather within 15 min
- Time period per single incident:
 - $t < 15$ min up to 4 quarter hours or up to several hours in the event of several disturbances



Martin Zeman

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Energy Trading/Generation

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