

# ***European Electricity Blackout, November 2006***

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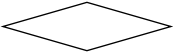




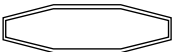

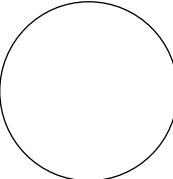
# *INCIDENT ANALYSIS*

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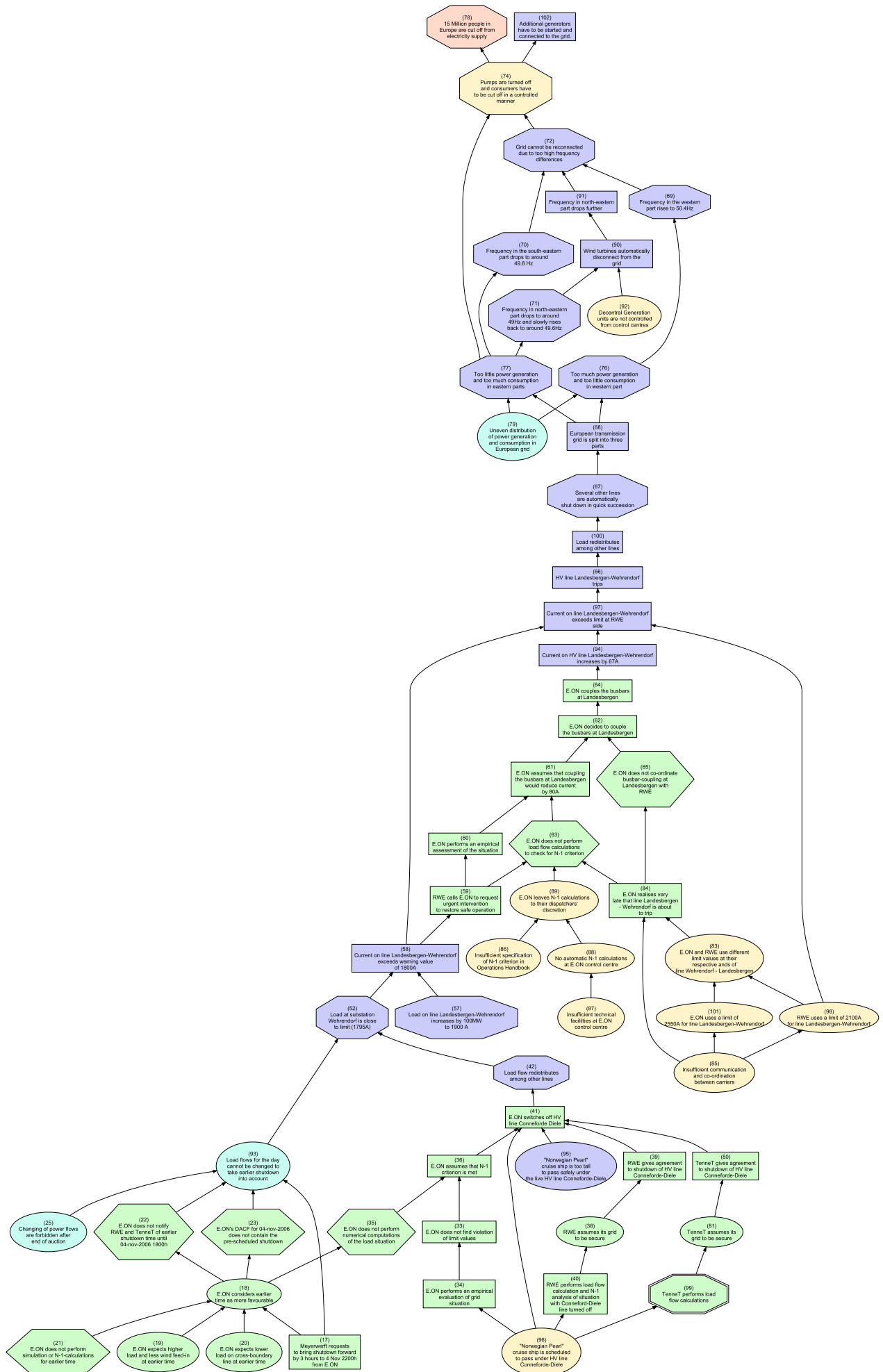
## **Incident description:**

A Why-Because Analysis of the Disruption in the European Power Grid in the night between the 4 and 5 November 2006. A high-voltage line had to be turned off to let a cruise ship pass underneath. The following load redistribution caused many other lines to trip, splitting the European power grid into three parts with a generation/consumption imbalance. In areas with under-generation, consumers had to be disconnected from the grid. During the peak up to 15 million people in Europe were without electricity.

# *Legend of Factorshapes*

<b><i>Factortype</i></b>	<b><i>Factorshape</i></b>
Unspecified Factortype	
Event	
Un-Event	
State	
Process	
Assumption	
Countermeasure	
Contraindication	

# Why-Because Graph

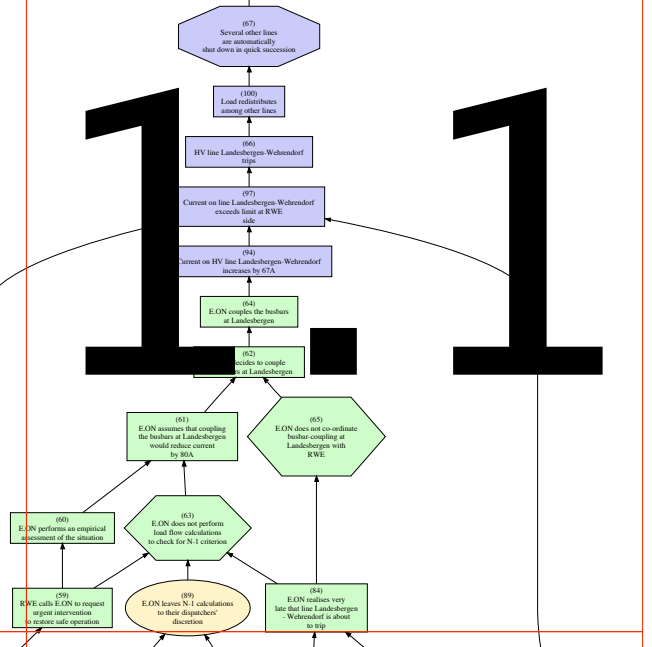


# Graph Atlas

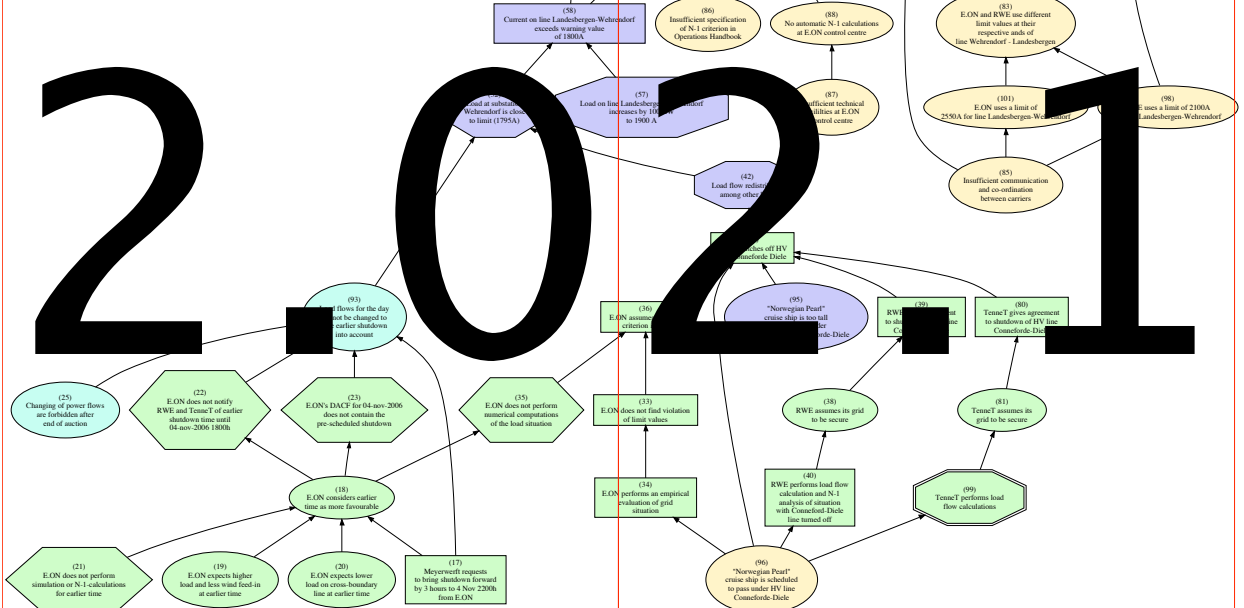
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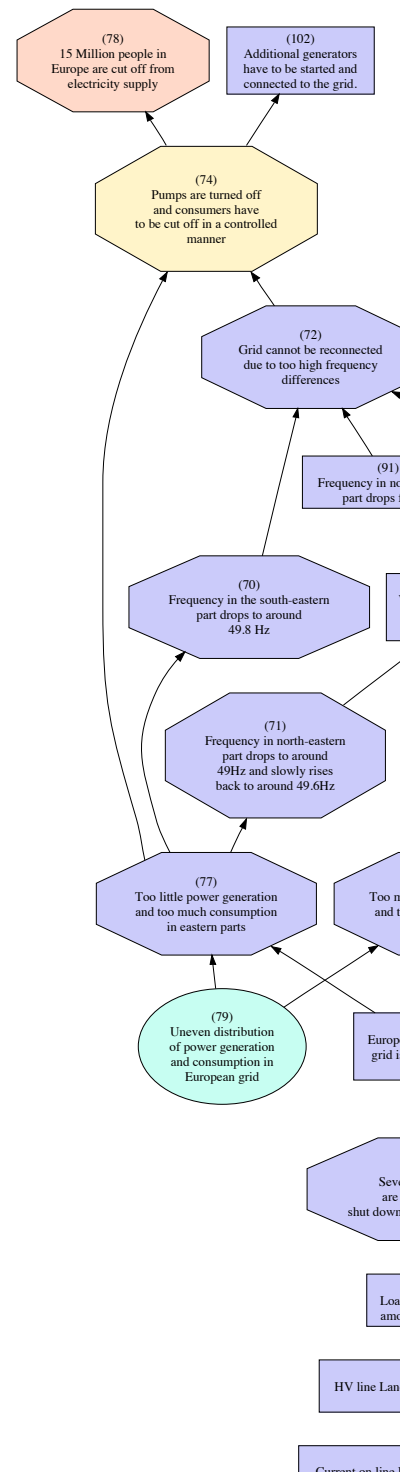
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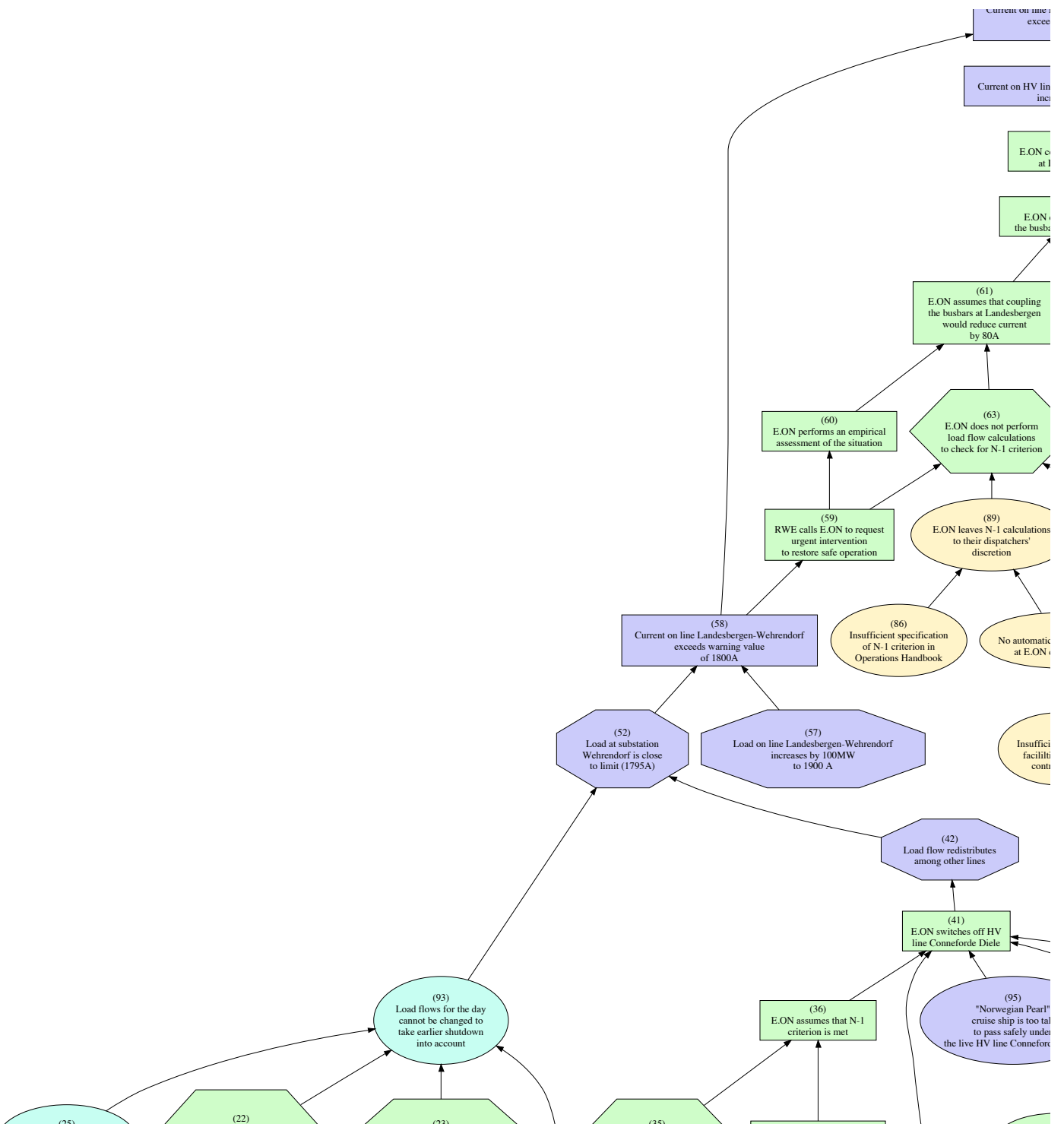
2.002



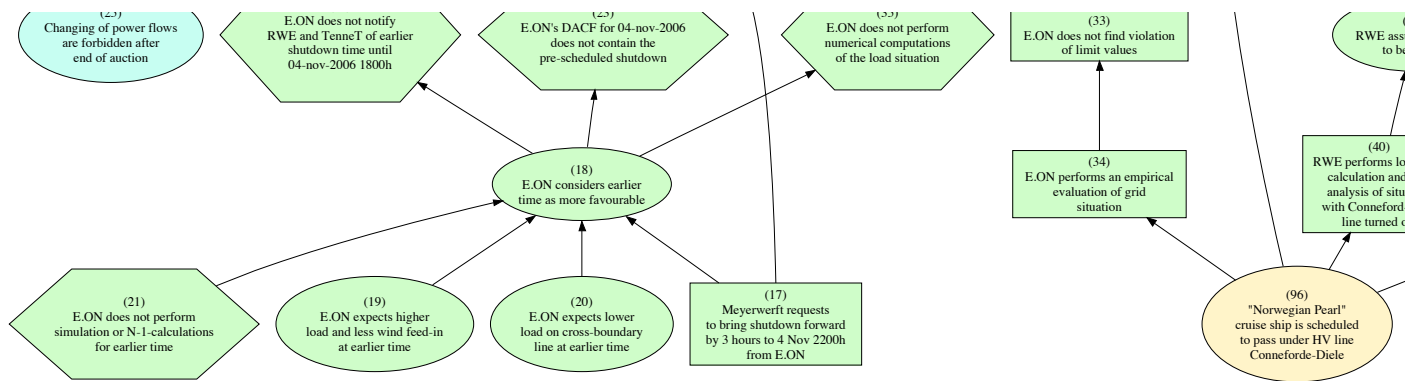
# Graphtile 0.0



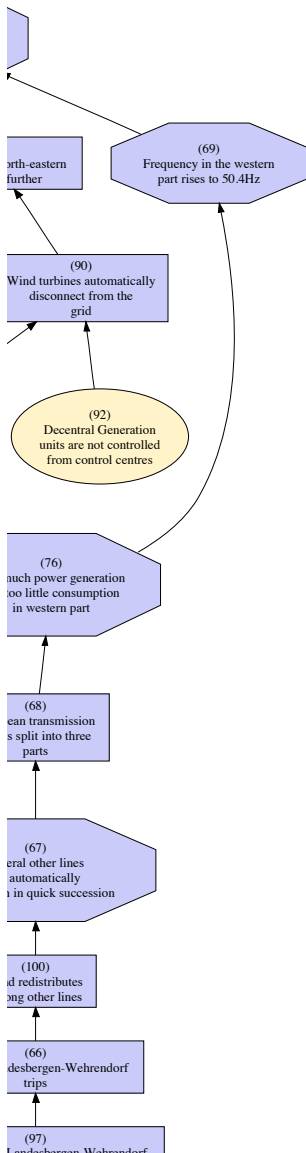
# Graphtile 1.0



# Graphtile 2.0

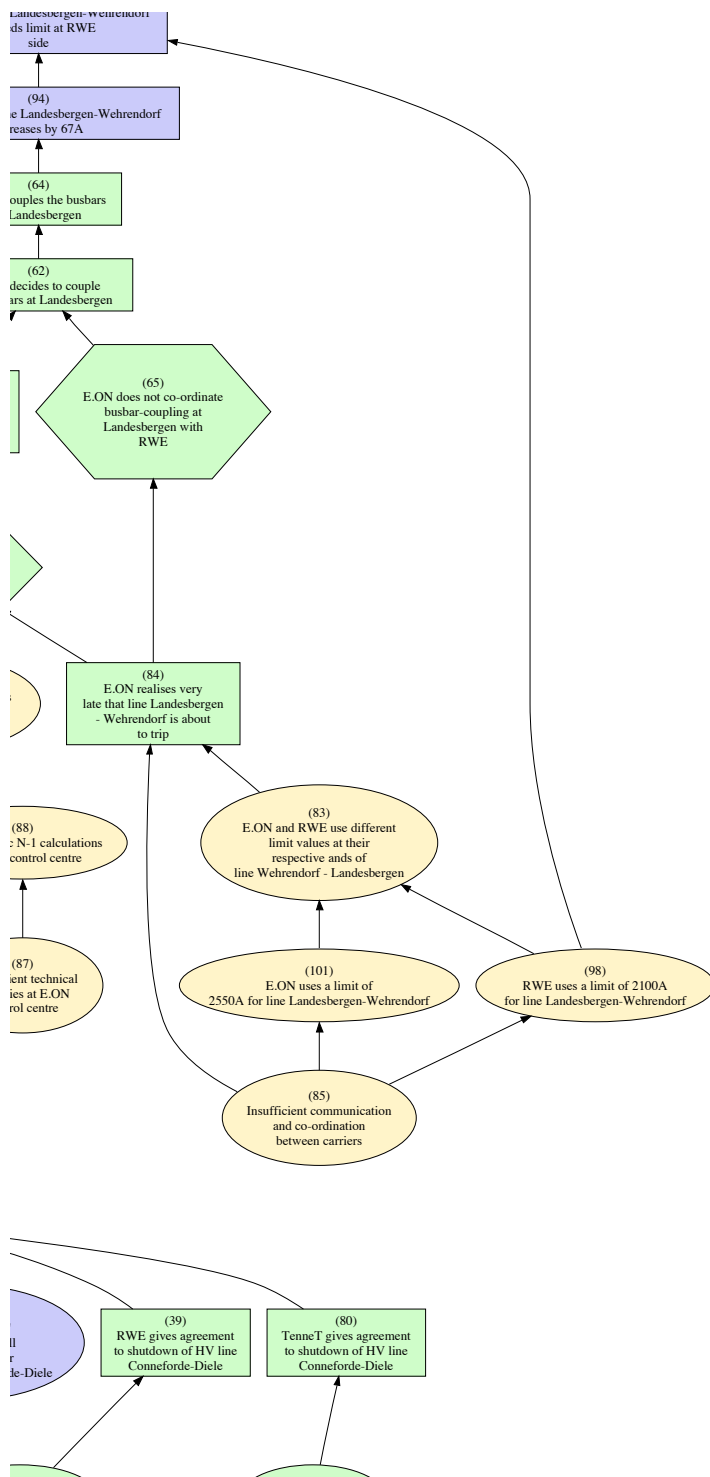


# Graphtile 0.1

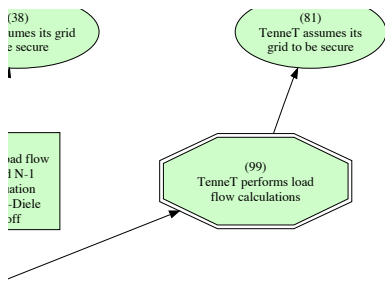




# Graphtile 1.1



# Graphtile 2.1



# Timeline of Events

		E.ON Netz GmbH	RWE Transportnetz Strom	TenneT	Meyerwerft	Vattenfall
Meyerwerft asks E.ON to turn off HV line Conneforde-Diele	18.09.2006 00:00:00	X			X	
E.ON Netz gives provisional approval for shutdown of HV line to Meyerwerft	27.10.2006	X			X	
E.ON performs analysis of load situation for shutdown of HV line		X				
E.ON has no detailed information about load situation on day of shutdown		X				
E.ON informs Dutch network carrier TenneT about planned HV line shutdown		X		X		
E.ON informs network carrier RWE about planned HV line shutdown		X	X			
RWE performs N-1 calculations for situation with HV line shut down			X			
TenneT performs N-1 calculations for situation with HV line shut down				X		
RWE anticipates high load but secure operation with HV line shut down			X			
TenneT anticipates high load but secure operation with HV line shut down				X		
E.ON Netz and TenneT agree to reduce cross-boundary flow by 350MW between 0 and 6 a.m. on 05-nov-2006		X		X		
Meyerwerft requests to bring shutdown forward by 3 hours to 4 Nov 2200h from E.ON	03.11.2006	X			X	
E.ON considers earlier time as more favourable		X				
E.ON expects higher load and less wind feed-in at earlier time		X				
E.ON expects lower load on cross-boundary line at earlier time		X				
E.ON does not perform simulation or N-1-calculations for earlier time		X				
E.ON does not notify RWE and TenneT of earlier shutdown time until 04-nov-2006 1800h		X				
E.ON's DACF for 04-nov-2006 does not contain the pre-scheduled shutdown		X				
TenneT expects increased infeed from wind turbines	04.11.2006			X		
TenneT decides to reduce cross-boundary flow further for 2006-11-04		X				
E.ON, TenneT and RWE agree to change tap position at Meeden phase shifter	19:00:00	X	X	X		
TenneT changes tap position at Meeden phase shifter	19:33:00			X		
E.ON does not find violation of limit values	21:29:00	X				
E.ON performs an empirical evaluation of grid situation		X				
E.ON does not perform numerical computations of the load situation		X				
E.ON assumes that N-1 criterion is met		X				
RWE performs load flow calculation and N-1 analysis of situation with Conneford-Diele line turned off		X				
Frequency UCTE area very close to nominal 50 Hz	21:30:00					
RWE confirms to E.ON that corss-border-flows would be high				X	X	
RWE assumes its grid to be secure				X	X	
RWE gives agreement to shutdown of HV line Conneforde-Diele				X	X	
TenneT gives agreement to shutdown of HV line Conneforde-Diele						
TenneT assumes its grid to be secure						
TenneT confirms to E.ON that corss-border-flows would be high						
E.ON switches off HV line Conneforde Diele	21:38:00	X				
Load flow redistributes among other lines						
E.ON receives warning messages about high power flow on line Elsen-Twistetal	21:39:00	X				
E.ON receives warning messages about high power flow on line Elsen-Bechterdissen		X				
E.ON sees no need for immediate action		X				
E.ON phones RWE to find if it everything is ok	21:41:00	X	X			
RWE maintains that N-1 criterion is met in their net			X			
RWE points out the security margin for line Landesbergen (E.ON)-Wehrendorf (RWE)			X			
RWE points out the limit of substation Wehrendorf			X			
Load at substation Wehrendorf is close to limit (1795A)						

		E.ON Netz GmbH	RWE Transportnetz Strom	TenneT	Meyerwerft	Vattenfall
N-1 criterion is met in internal RWE net			X			
E.ON issues passage approval for Norwegian Pearl to Meyerwerft	21:42:00	X			X	
E.ON and Vattenfall still consider situation as tight	21:46:00	X				
Load on line Landesbergen-Wehrendorf increases by 100MW to 1900 A	22:05:00					
Current on line Landesbergen-Wehrendorf exceeds warning value of 1800A	22:07:00					
RWE calls E.ON to request urgent intervention to restore safe operation	22:08:00					
E.ON performs an empirical assessment of the situation	22:09:00					
E.ON assumes that coupling the busbars at Landesbergen would reduce current by 80A						
E.ON decides to couple the busbars at Landesbergen						
E.ON does not perform load flow calculations to check for N-1 criterion						
E.ON does not co-ordinate busbar-coupling at Landesbergen with RWE	22:10:00					
E.ON couples the busbars at Landesbergen	22:10:11					
HV line Landesbergen-Wehrendorf trips	22:10:13					
Several other lines are automatically shut down in quick succession	22:10:15					
European transmission grid is split into three parts						
Frequency in the western part rises to 50.4Hz	22:10:30					
Frequency in the south-eastern part drops to around 49.8 Hz						
Frequency in north-eastern part drops to around 49Hz and slowly rises back to around 49.6Hz						
Grid cannot be reconnected due to too high frequency differences						
Generators have to be cut off or pumps activated in the western part	22:11:00					
Pumps are turned off and consumers have to be cut off in a controlled manner						
Too much power generation and too little consumption in western part						
Too little power generation and too much consumption in eastern parts						
15 Million people in Europe are cut off from electricity supply	22:15:00					

## ***Factor List - Details***

- 1 Meyerwerft asks E.ON to turn off HV line Conneforde-Diele**  
Type of Factor: Event  
Date/Time: 18.09.2006 00:00:00  
Actors involved: Employees of TenneT  
Employees of E.ON Netz GmbH  
Annotation:
- 2 Distance between ship and HV line too small for safe passage**  
Type of Factor: State  
Date/Time:  
Actors involved:  
Annotation:
- 3 River Ems is dammed up for passage of cruise ship**  
Type of Factor: State  
Date/Time:  
Actors involved:  
Annotation:
- 4 E.ON Netz gives provisional approval for shutdown of HV line to Meyerwerft**  
Type of Factor: Event  
Date/Time: 27.10.2006 00:00:00  
Actors involved: Employees of E.ON Netz GmbH  
Employees of TenneT  
Annotation:
- 5 E.ON performs analysis of load situation for shutdown of HV line**  
Type of Factor: Event  
Date/Time: 27.10.2006 00:00:00  
Actors involved: Employees of E.ON Netz GmbH  
Annotation:
- 7 E.ON has no detailed information about load situation on day of shutdown**  
Type of Factor: Process  
Date/Time: 27.10.2006 00:00:00  
Actors involved: Employees of E.ON Netz GmbH  
Annotation:
- 8 E.ON informs Dutch network carrier TenneT about planned HV line shutdown**  
Type of Factor: Event  
Date/Time: 27.10.2006 00:00:00  
Actors involved: Employees of E.ON Netz GmbH  
Employees of RWE Transportnetz Strom  
Annotation:
- 9 E.ON informs network carrier RWE about planned HV line shutdown**  
Type of Factor: Event  
Date/Time: 27.10.2006 00:00:00  
Actors involved: Employees of E.ON Netz GmbH  
Employees of RWE Transportnetz Strom  
Annotation:
- 10 RWE performs N-1 calculations for situation with HV line shut down**  
Type of Factor: Event  
Date/Time: 27.10.2006 00:00:00  
Actors involved: Employees of RWE Transportnetz Strom  
Annotation:

- 11 TenneT performs N-1 calculations for situation with HV line shut down**  
Type of Factor: Event  
Date/Time: 27.10.2006 00:00:00  
Actors involved: Employees of RWE Transportnetz Strom  
Annotation:
- 12 RWE anticipates high load but secure operation with HV line shut down**  
Type of Factor: State  
Date/Time: 27.10.2006 00:00:00  
Actors involved: Employees of RWE Transportnetz Strom  
Annotation:
- 13 TenneT anticipates high load but secure operation with HV line shut down**  
Type of Factor: State  
Date/Time: 27.10.2006 00:00:00  
Actors involved: Employees of RWE Transportnetz Strom  
Annotation:
- 14 E.ON Netz and TenneT agree to reduce cross-boundary flow by 350MW between 0 and 6 a.m. on 05-nov-2006**  
Type of Factor: Event  
Date/Time: 27.10.2006 00:00:00  
Actors involved: Employees of E.ON Netz GmbH  
Employees of RWE Transportnetz Strom  
Annotation:
- 15 TenneT decides to reduce cross-boundary flow further for 2006-11-04**  
Type of Factor: Event  
Date/Time: 04.11.2006 00:00:00  
Actors involved: Employees of E.ON Netz GmbH  
Annotation:
- 16 TenneT expects increased infeed from wind turbines**  
Type of Factor: State  
Date/Time: 04.11.2006 00:00:00  
Actors involved: Employees of RWE Transportnetz Strom  
Annotation:
- 17 Meyerwerft requests to bring shutdown forward by 3 hours to 4 Nov 2200h from E.ON**  
Type of Factor: Event  
Date/Time: 03.11.2006 00:00:00  
Actors involved: Employees of E.ON Netz GmbH  
Employees of TenneT  
Annotation:
- 18 E.ON considers earlier time as more favourable**  
Type of Factor: State  
Date/Time: 03.11.2006 00:00:00  
Actors involved: Employees of E.ON Netz GmbH  
Annotation:
- 19 E.ON expects higher load and less wind feed-in at earlier time**  
Type of Factor: State  
Date/Time: 03.11.2006 00:00:00  
Actors involved: Employees of E.ON Netz GmbH  
Annotation:
- 20 E.ON expects lower load on cross-boundary line at earlier time**  
Type of Factor: State  
Date/Time: 03.11.2006 00:00:00  
Actors involved: Employees of E.ON Netz GmbH  
Annotation:

- 21 E.ON does not perform simulation or N-1-calculations for earlier time**  
Type of Factor: UnEvent  
Date/Time: 03.11.2006 00:00:00  
Actors involved: Employees of E.ON Netz GmbH  
Annotation:
- 22 E.ON does not notify RWE and TenneT of earlier shutdown time until 04-nov-2006 1800h**  
Type of Factor: UnEvent  
Date/Time: 03.11.2006 00:00:00  
Actors involved: Employees of E.ON Netz GmbH  
Annotation:
- 23 E.ON's DACF for 04-nov-2006 does not contain the pre-scheduled shutdown**  
Type of Factor: UnEvent  
Date/Time: 03.11.2006 00:00:00  
Actors involved: Employees of E.ON Netz GmbH  
Annotation:
- 25 Changing of power flows are forbidden after end of auction**  
Type of Factor: State  
Date/Time:  
Actors involved:  
Annotation: Rules of energy market in Europe
- 26 E.ON, TenneT and RWE agree to change tap position at Meeden phase shifter**  
Type of Factor: Event  
Date/Time: 04.11.2006 19:00:00  
Actors involved: Employees of E.ON Netz GmbH  
Employees of RWE Transportnetz Strom  
Employees of RWE Transportnetz Strom  
Annotation:
- 27 TenneT changes tap position at Meeden phase shifter**  
Type of Factor: Event  
Date/Time: 04.11.2006 19:33:00  
Actors involved: Employees of RWE Transportnetz Strom  
Annotation:
- 28 Construction work at 380kV Borcken substation**  
Type of Factor: State  
Date/Time:  
Actors involved:  
Annotation:
- 29 Borcken substation operates in two-busbar mode**  
Type of Factor: State  
Date/Time:  
Actors involved:  
Annotation:
- 30 No power flows East->West possible at Borcken substation**  
Type of Factor: State  
Date/Time:  
Actors involved:  
Annotation:
- 31 Frequency UCTE area very close to nominal 50 Hz**  
Type of Factor: Process  
Date/Time: 04.11.2006 21:30:00  
Actors involved:  
Annotation:

- 33 E.ON does not find violation of limit values**  
Type of Factor: Event  
Date/Time: 04.11.2006 21:29:00  
Actors involved: Employees of E.ON Netz GmbH  
Annotation:
- 34 E.ON performs an empirical evaluation of grid situation**  
Type of Factor: Event  
Date/Time: 04.11.2006 21:29:00  
Actors involved: Employees of E.ON Netz GmbH  
Annotation:
- 35 E.ON does not perform numerical computations of the load situation**  
Type of Factor: UnEvent  
Date/Time: 04.11.2006 21:29:00  
Actors involved: Employees of E.ON Netz GmbH  
Annotation:
- 36 E.ON assumes that N-1 criterion is met**  
Type of Factor: Event  
Date/Time: 04.11.2006 21:29:00  
Actors involved: Employees of E.ON Netz GmbH  
Annotation:
- 37 RWE confirms to E.ON that corss-border-flows would be high**  
Type of Factor: Event  
Date/Time: 04.11.2006 21:30:00  
Actors involved: Employees of RWE Transportnetz Strom  
Employees of RWE Transportnetz Strom  
Annotation:
- 38 RWE assumes its grid to be secure**  
Type of Factor: State  
Date/Time: 04.11.2006 21:30:00  
Actors involved: Employees of RWE Transportnetz Strom  
Employees of RWE Transportnetz Strom  
Annotation:
- 39 RWE gives agreement to shutdown of HV line Conneforde-Diele**  
Type of Factor: Event  
Date/Time: 04.11.2006 21:30:00  
Actors involved: Employees of RWE Transportnetz Strom  
Employees of RWE Transportnetz Strom  
Annotation:
- 40 RWE performs load flow calculation and N-1 analysis of situation with Conneford-Diele line turned off**  
Type of Factor: Event  
Date/Time: 04.11.2006 21:29:00  
Actors involved: Employees of E.ON Netz GmbH  
Annotation:
- 41 E.ON switches off HV line Conneforde Diele**  
Type of Factor: Event  
Date/Time: 04.11.2006 21:38:00  
Actors involved: Employees of E.ON Netz GmbH  
Annotation:
- 42 Load flow redistributes among other lines**  
Type of Factor: Process  
Date/Time: 04.11.2006 21:38:00  
Actors involved:  
Annotation:



- 43 E.ON receives warning messages about high power flow on line Elsen-Twistetal**  
Type of Factor: Event  
Date/Time: 04.11.2006 21:39:00  
Actors involved: Employees of E.ON Netz GmbH  
Annotation:
- 44 E.ON receives warning messages about high power flow on line Elsen-Bechterdissen**  
Type of Factor: Unspecified  
Date/Time: 04.11.2006 21:39:00  
Actors involved: Employees of E.ON Netz GmbH  
Annotation:
- 45 Internal E.ON regulations**  
Type of Factor: State  
Date/Time:  
Actors involved: Employees of E.ON Netz GmbH  
Annotation:
- 46 Temporary overload of up to 25% is permissible**  
Type of Factor: State  
Date/Time:  
Actors involved:  
Annotation:
- 47 E.ON sees no need for immediate action**  
Type of Factor: Unspecified  
Date/Time: 04.11.2006 21:39:00  
Actors involved: Employees of E.ON Netz GmbH  
Annotation:
- 48 E.ON phones RWE to find if it everything is ok**  
Type of Factor: Event  
Date/Time: 04.11.2006 21:41:00  
Actors involved: Employees of E.ON Netz GmbH  
Employees of RWE Transportnetz Strom  
Annotation:
- 49 RWE maintains that N-1 criterion is met in their net**  
Type of Factor: Event  
Date/Time: 04.11.2006 21:41:00  
Actors involved: Employees of RWE Transportnetz Strom  
Annotation:
- 50 RWE points out the security margin for line Landesbergen (E.ON)-Wehrendorf (RWE)**  
Type of Factor: Event  
Date/Time: 04.11.2006 21:41:00  
Actors involved: Employees of RWE Transportnetz Strom  
Annotation:
- 51 RWE points out the limit of substation Wehrendorf**  
Type of Factor: Event  
Date/Time: 04.11.2006 21:41:00  
Actors involved: Employees of RWE Transportnetz Strom  
Annotation:
- 52 Load at substation Wehrendorf is close to limit (1795A)**  
Type of Factor: Process  
Date/Time: 04.11.2006 21:41:00  
Actors involved:  
Annotation:

- 53 N-1 criterion is met in internal RWE net**  
Type of Factor: Process  
Date/Time: 04.11.2006 21:41:00  
Actors involved: Employees of RWE Transportnetz Strom  
Annotation:
- 54 E.ON issues passage approval for Norwegian Pearl to Meyerwerft**  
Type of Factor: Event  
Date/Time: 04.11.2006 21:42:00  
Actors involved: Employees of E.ON Netz GmbH  
Employees of TenneT  
Annotation:
- 55 E.ON and Vattenfall still consider situation as tight**  
Type of Factor: Event  
Date/Time: 04.11.2006 21:46:00  
Actors involved: Employees of E.ON Netz GmbH  
Annotation:
- 57 Load on line Landesbergen-Wehrendorf increases by 100MW to 1900 A**  
Type of Factor: Process  
Date/Time: 04.11.2006 22:05:00  
Actors involved:  
Annotation: The reason for this increase is unknown
- 58 Current on line Landesbergen-Wehrendorf exceeds warning value of 1800A**  
Type of Factor: Event  
Date/Time: 04.11.2006 22:07:00  
Actors involved:  
Annotation:
- 59 RWE calls E.ON to request urgent intervention to restore safe operation**  
Type of Factor: Event  
Date/Time: 04.11.2006 22:08:00  
Actors involved:  
Annotation:
- 60 E.ON performs an empirical assessment of the situation**  
Type of Factor: Event  
Date/Time: 04.11.2006 22:09:00  
Actors involved:  
Annotation:
- 61 E.ON assumes that coupling the busbars at Landesbergen would reduce current by 80A**  
Type of Factor: Event  
Date/Time: 04.11.2006 22:09:00  
Actors involved:  
Annotation:
- 62 E.ON decides to couple the busbars at Landesbergen**  
Type of Factor: Event  
Date/Time: 04.11.2006 22:09:00  
Actors involved:  
Annotation:
- 63 E.ON does not perform load flow calculations to check for N-1 criterion**  
Type of Factor: UnEvent  
Date/Time: 04.11.2006 22:09:00  
Actors involved:  
Annotation:

- 64 E.ON couples the busbars at Landesbergen**  
Type of Factor: Event  
Date/Time: 04.11.2006 22:10:11  
Actors involved:  
Annotation:
- 65 E.ON does not co-ordinate busbar-coupling at Landesbergen with RWE**  
Type of Factor: UnEvent  
Date/Time: 04.11.2006 22:10:00  
Actors involved:  
Annotation:
- 66 HV line Landesbergen-Wehrendorf trips**  
Type of Factor: Event  
Date/Time: 04.11.2006 22:10:13  
Actors involved:  
Annotation:
- 67 Several other lines are automatically shut down in quick succession**  
Type of Factor: Process  
Date/Time: 04.11.2006 22:10:15  
Actors involved:  
Annotation:
- 68 European transmission grid is split into three parts**  
Type of Factor: Event  
Date/Time: 04.11.2006 22:10:15  
Actors involved:  
Annotation:
- 69 Frequency in the western part rises to 50.4Hz**  
Type of Factor: Process  
Date/Time: 04.11.2006 22:10:30  
Actors involved:  
Annotation:
- 70 Frequency in the south-eastern part drops to around 49.8 Hz**  
Type of Factor: Process  
Date/Time: 04.11.2006 22:10:30  
Actors involved:  
Annotation:
- 71 Frequency in north-eastern part drops to around 49Hz and slowly rises back to around 49.6Hz**  
Type of Factor: Process  
Date/Time: 04.11.2006 22:10:30  
Actors involved:  
Annotation:
- 72 Grid cannot be reconnected due to too high frequency differences**  
Type of Factor: Process  
Date/Time: 04.11.2006 22:10:30  
Actors involved:  
Annotation:
- 73 Generators have to be cut off or pumps activated in the western part**  
Type of Factor: Process  
Date/Time: 04.11.2006 22:11:00  
Actors involved:  
Annotation:
- 74 Pumps are turned off and consumers have to be cut off in a controlled manner**  
Type of Factor: Process  
Date/Time: 04.11.2006 22:11:00  
Actors involved:  
Annotation:

- 76 Too much power generation and too little consumption in western part**  
Type of Factor: Process  
Date/Time: 04.11.2006 22:11:00  
Actors involved:  
Annotation:
- 77 Too little power generation and too much consumption in eastern parts**  
Type of Factor: Process  
Date/Time: 04.11.2006 22:11:00  
Actors involved:  
Annotation:
- 78 15 Million people in Europe are cut off from electricity supply**  
Type of Factor: Process  
Date/Time: 04.11.2006 22:15:00  
Actors involved:  
Annotation:
- 79 Uneven distribution of power generation and consumption in European grid**  
Type of Factor: State  
Date/Time:  
Actors involved:  
Annotation:
- 80 TenneT gives agreement to shutdown of HV line Conneforde-Diele**  
Type of Factor: Event  
Date/Time: 04.11.2006 21:30:00  
Actors involved:  
Annotation:
- 81 TenneT assumes its grid to be secure**  
Type of Factor: State  
Date/Time: 04.11.2006 21:30:00  
Actors involved:  
Annotation:
- 82 TenneT confirms to E.ON that corss-border-flows would be high**  
Type of Factor: Event  
Date/Time: 04.11.2006 21:30:00  
Actors involved:  
Annotation:
- 83 E.ON and RWE use different limit values at their respective ands of line Wehrendorf - Landesbergen**  
Type of Factor: State  
Date/Time:  
Actors involved:  
Annotation:
- 84 E.ON realises very late that line Landesbergen - Wehrendorf is about to trip**  
Type of Factor: Event  
Date/Time:  
Actors involved:  
Annotation:
- 85 Insufficient communication and co-ordination between carriers**  
Type of Factor: State  
Date/Time:  
Actors involved:  
Annotation:
- 86 Insufficient specification of N-1 criterion in Operations Handbook**  
Type of Factor: State  
Date/Time:  
Actors involved:  
Annotation:

- 87 Insufficient technical facilities at E.ON control centre**  
Type of Factor: State  
Date/Time:  
Actors involved:  
Annotation:
- 88 No automatic N-1 calculations at E.ON control centre**  
Type of Factor: State  
Date/Time:  
Actors involved:  
Annotation:
- 89 E.ON leaves N-1 calculations to their dispatchers' discretion**  
Type of Factor: State  
Date/Time:  
Actors involved:  
Annotation:
- 90 Wind turbines automatically disconnect from the grid**  
Type of Factor: Event  
Date/Time:  
Actors involved:  
Annotation:
- 91 Frequency in north-eastern part drops further**  
Type of Factor: Event  
Date/Time:  
Actors involved:  
Annotation:
- 92 Decentral Generation units are not controlled from control centres**  
Type of Factor: State  
Date/Time:  
Actors involved:  
Annotation:
- 93 Load flows for the day cannot be changed to take earlier shutdown into account**  
Type of Factor: State  
Date/Time:  
Actors involved:  
Annotation:
- 94 Current on HV line Landesbergen-Wehrendorf increases by 67A**  
Type of Factor: Event  
Date/Time:  
Actors involved:  
Annotation:
- 95 "Norwegian Pearl" cruise ship is too tall to pass safely under the live HV line Conneforde-Diele**  
Type of Factor: State  
Date/Time:  
Actors involved:  
Annotation:
- 96 "Norwegian Pearl" cruise ship is scheduled to pass under HV line Conneforde-Diele**  
Type of Factor: State  
Date/Time:  
Actors involved:  
Annotation:
- 97 Current on line Landesbergen-Wehrendorf exceeds limit at RWE side**  
Type of Factor: Event  
Date/Time:  
Actors involved:  
Annotation:

**98 RWE uses a limit of 2100A for line Landesbergen-Wehrendorf**

Type of Factor: State

Date/Time:

Actors involved:

Annotation:

**99 TenneT performs load flow calculations**

Type of Factor: Assumption

Date/Time:

Actors involved:

Annotation:

**100 Load redistributes among other lines**

Type of Factor: Event

Date/Time:

Actors involved:

Annotation:

**101 E.ON uses a limit of 2550A for line Landesbergen-Wehrendorf**

Type of Factor: State

Date/Time:

Actors involved:

Annotation:

**102 Additional generators have to be started and connected to the grid.**

Type of Factor: Event

Date/Time:

Actors involved:

Annotation: