16th ΕΦΑ Roundtable

Protection and Security of the Citizen

20. – 21. February 2014, Ispra/Italy

Long-lasting and extensive Interruption of Electricity – effect of cascade

Fire & Rescue Service Frankfurt/Main Germany

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Agenda

1 Key scenario: “Power cut”
   1.1 Nothing works without electricity
   1.2 Basic assumptions
   1.3 Effects of a power cut
2 Preparations for the power cut in Frankfurt
   2.1 Risk analysis
   2.2 Strategic planning
   2.3 Plan of action
3 Conclusion

1 Key scenario – Power Cut

Why is electricity one of the weak points in our daily living / city?

“Almost all technological, administrative and social activities depend on a constant, adequate supply of electricity.” (Green Paper)

Think of ICT (Information Communication Technology) without electrical power.

1.1 Nothing works without electricity

The central aspect of infrastructure for the operation and control of industrial processes is the power supply.

Without electricity the supply (water, food), the disposal (waste, sewage), the communication (telephone, data) and much more is not available/working.

1.1 Nothing works without electricity (2)

In case of a power cut (section of a city or bigger) the fire & rescue service and other services as well are paralysed.

Think of:

- People in the subway/tunnel, an elevator or behind automatic doors
- Traffic lights
- Automatic fire alarms …

1.1 Nothing works without electricity (3)

How realistic is such scenario (long lasting power cut in a region)?

The evidence is already given:

25th Dec. 2005 Münsterland (several days)

4th Nov. 2006 western Germany (Belgian …)

14th July 2011 Hannover

1.1 Nothing works without electricity (4)

A “power cut” is the key scenario for critical infrastructure, because other elements of the infrastructure depend directly to the power supply.

1.2 Basic assumptions

The electrical energy has to be produced at the same time when it is need, the storage is very limited (physical/technical related).

In case of a shut down of power plant the electrical grid can be threatened. In a timeframe of seconds the network has to be stabilized otherwise we are facing a domino effect of a power cut.

1.2 Basic assumptions (2)

If that domino effect occurs, a part of the power network will collapse.

“The larger and more widespread the damage, the more difficult it is to restart the delicate balance of electricity generat

(Green Paper)

1.3 Effects of a power cut

Generally the effects of a longer lasting power cut are nowadays serious and complex.

There are massive consequences for all critical infrastructures. The effectsof a power cut influence:

- ICT
- Traffic, transport (fuel service)
- Manufacturing
- Health service, emergency service
- Communication to the people/inhibitants

1.3 Effects of a power cut (2)

In case of a power cut the information and commination to/with the public becomes one of most challenging tasks.

The complexity of a power cut in a modern technology-base society can be pointed out as a cascade effect. Almost all critical infrastructures are based on a reliable power supply.

2 Preparations for a power cut in Frankfurt

2 Preparations for a power cut in Frankfurt

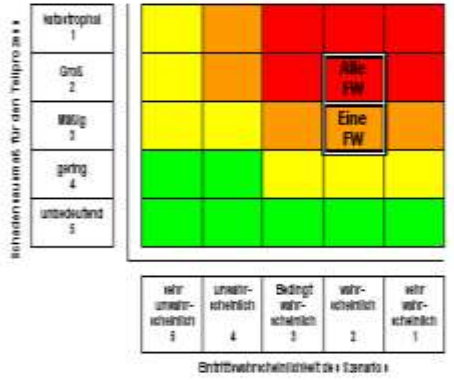
Assumptions

- widespread power outage in the city of Frankfurt am Main
- timeline > 3 days
- cold weather conditions

2.1 Risk analysis

Processes in a fire and rescue service:

- Communication / alarm calls
- Buildings / infrastructure
- Running the fire service fleet
- Supply / Disposal
- Staff



2.1 Risk analysis (2)

Critical processes within the Fire & Rescue Service Frankfurt/Main:

- **Communication / alarm calls**
- Buildings / infrastructure
- **Running the fire service fleet (fuel supply)**
- Supply / Disposal
- **Staff**

2.1 Risk analysis (3)

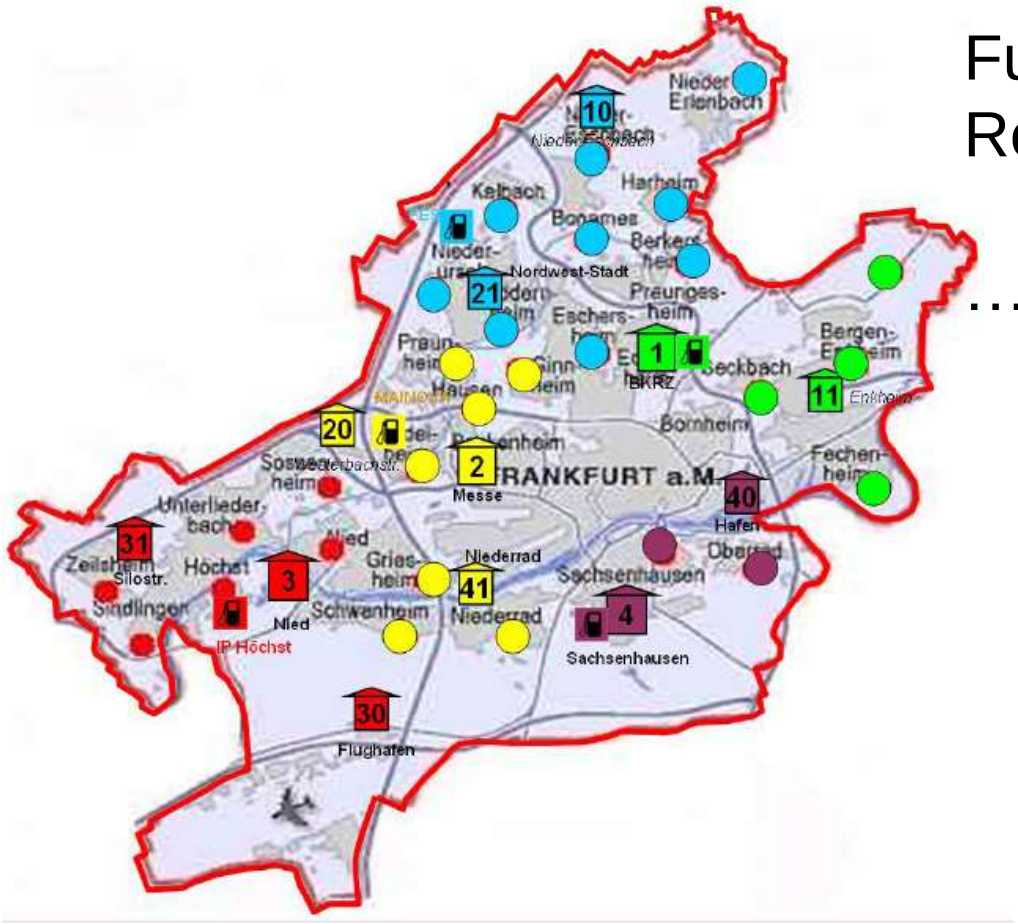
- Fuel supply
- Assessment of the emergency power supply of all fire stations
- Emergency power generators of the voluntary fire service
- Exchange of liaison officers
- Action plan “Power cut”

2.1 Risk analysis - Fuel supply

The amount of fuel witch the Fire & Rescue Service Frankfurt needs for 24 h is approximately 10.000 liters of Diesel.

- no own fuel station
- no fuel station in town with an emergency power supply

2.2 Strategic planning



Fuel supply for the Fire & Rescue Service Frankfurt

…Public Private Partnership

2.2 Strategic planning (2)

Einsatz- und Maßnahmenplan kritische Infrastrukturen Stromausfall			
Kategorie 2			
Modul 2 Kritische Infrastrukturen Intern			
Arbeitshilfe			
Seite:	2 von 16	A	A 2.1 Feuerwachen
Stand:	November 2011		
Druck:	06.02.2012		
Version:	1.0		
Verfasser:	37.G - Zilu	Seite:	1 von 1

feuerwehr frankfurt am main

Nr.	Arbeitshilfe
A. 2.1	

Feuerwachen Berufsfeuerwehr

		Zeitraum						Notstromsystem				Tank					
		Laufzeit ganz						Anz.	Ges. L.	Für Fzg. Zugänglich	Ext. Einsp.	Anz.	Ges. V.	Inhalt (Haupttank)	Halbe Tankfüllung	Laufzeit halb	Laufzeit ganz
Bereich	Objekt	0 - 6 h	6 - 16 h	16 - 24 h	24 - 60 h	60 - 72 h	72 - 84 h		[kVA]				[L/h]	[L]	[L]	[h]	[h]
B1	BLW 1 BKPZ							1	250	ja	ja	1	63	1.000	500	8,0	16,0
	BW 10 Niede r-Eschbach							0	20	nein	geplant	0	0	0	0	0,0	0,0
	BW 11 Enkheim							1	60	ja	nein	2	13	1.000	500	37,5	75,0
B2	BLW 2 Gallusviertel							0	18	nein	ja für TEL	0	0	0	0	0,0	0,0
	BW 20 Flughafen							0	-	nein	nein	0	0	0	0	0,0	0,0
	BW 21 Nordweststadt							1	135	ja	nein	1	42	250	125	3,0	6,0
B3	BLW 3 Nied	befindet sich im Umbau						1		nein	nein					36,0	72,0
	BW 30 Sossenheim							1	125	nein	nein	3	28	3.000	1.500	36,0	72,0
	BW 31 Zeilsheim							1	85	nein	nein	2	14	1.000	650	36,0	72,0
B4	BLW 4 Sachsenhausen							1	60	ja	nein	1	14	1.000	500	36,0	72,0
	BW 40 Hafen							1	200	ja	nein	1	13	1.000	500	40,0	80,0
	BW 41 Niede rrad							1	85	nein	nein	2	22	1.600	800	36,0	72,0

	kein Handlungsbedarf
	Geringer Handlungsbedarf
	Kritischer Handlungsbedarf

Notstromversorgte Einrichtungen in den Feuerwachen:

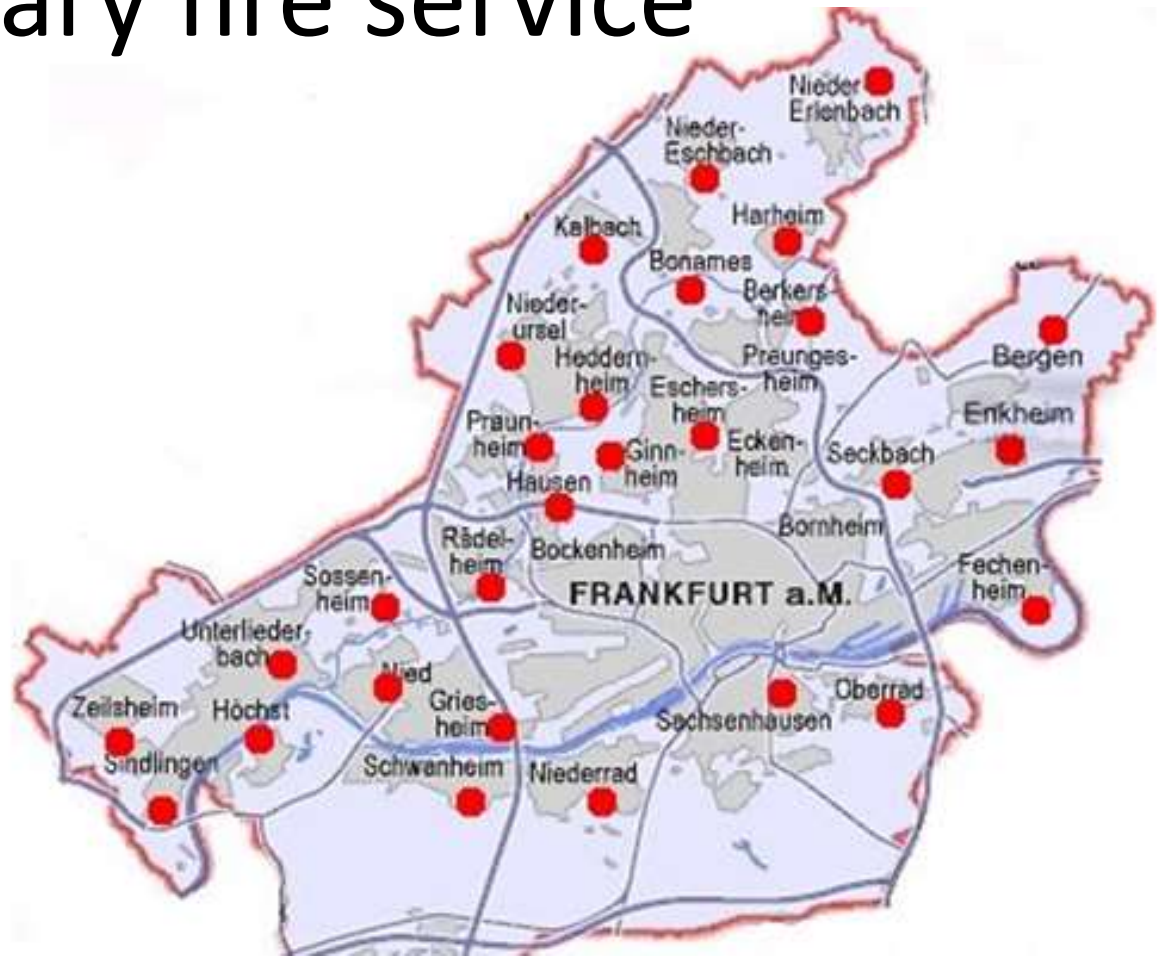
		Versorgte Verbraucher									
Bereich	Objekt	Funkgerät	EDV	ELA	Alarmdrucker	Wachdurchsage	Telefon	Beleuchtung	Rolltore	Küche	Heizung
B1	BLW 1 BKPZ	x	1 PC betriebsfähig		x		x	nur teilweise	x		
	BW 10 Niede r-Eschbach										
	BW 11 Enkheim	x	x	x	x	x	x	x	x		x
B2	BLW 2 Gallusviertel	für TEL			für TEL		für TEL	x			
	BW 20 Flughafen										
	BW 21 Nordweststadt	x	x		Fax	x	x	x	x	Kühlschrank	
B3	BLW 3 Nied	x	x	x	x		x	x	x	x	
	BW 30 Sossenheim	x	x	x	x		x	x	x	x	
	BW 31 Zeilsheim	x	x	x	x	x	x	x	x	x	
B4	BLW 4 Sachsenhausen	x	x	x	x		x	x	x	x	
	BW 40 Hafen	x	x	x	x	x	x	x	x	x	x
	BW 41 Niede rrad	x	x	x	x		x	x	x	Küchengeräte	

2.2 Strategic planning (3)

Goals of the strategic planning

- Increase the capability of the voluntary fire service in case of a power cut
- Information point for the public
- **Reachable** (by feet/witout ICT) **point for alarm calls**

Information points voluntary fire service



Timeframe ICT

Generelles Zeitschema zum Ausfall der Kommunikations- und Datennetzwerke

Stunden	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	>24
BOS-Funk analog																									
BOS-Funk digital																									
Städt. Datennetz																									
Städt. Telefonnetz																									
Richtfunkstrecke	0,5h																								
Telefonnetz Telekom																									
analog																									
ISDN																									
Mobilfunknetz																									
Brandmeldeanlagen																									
Personenrufanlage																									

USV oder Batterie
ext. Einspeisung möglich
Notstromversorgung (stationäres Aggregat)
Steht nicht mehr zu Verfügung

2.3 Plan of action

Who is doing?

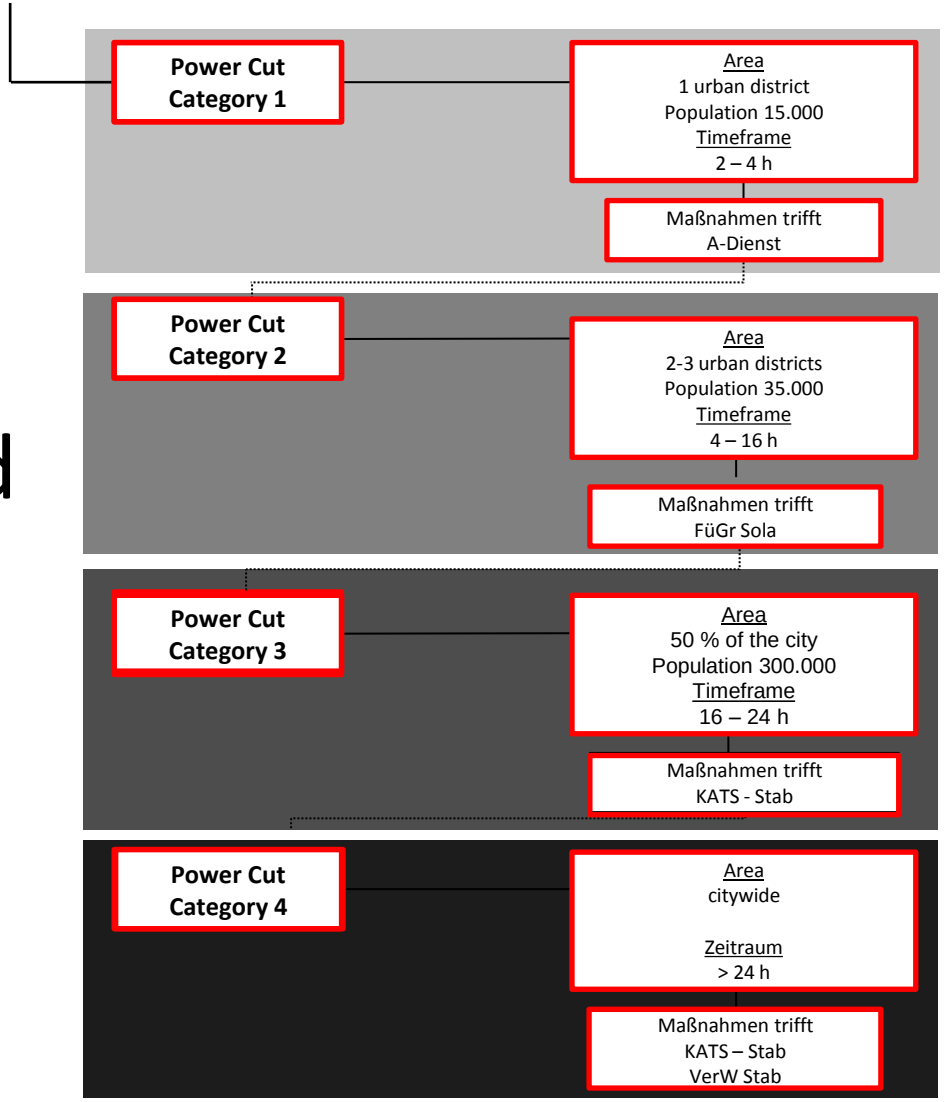
What?

Where?

When?

2.3 Plan of action (2)

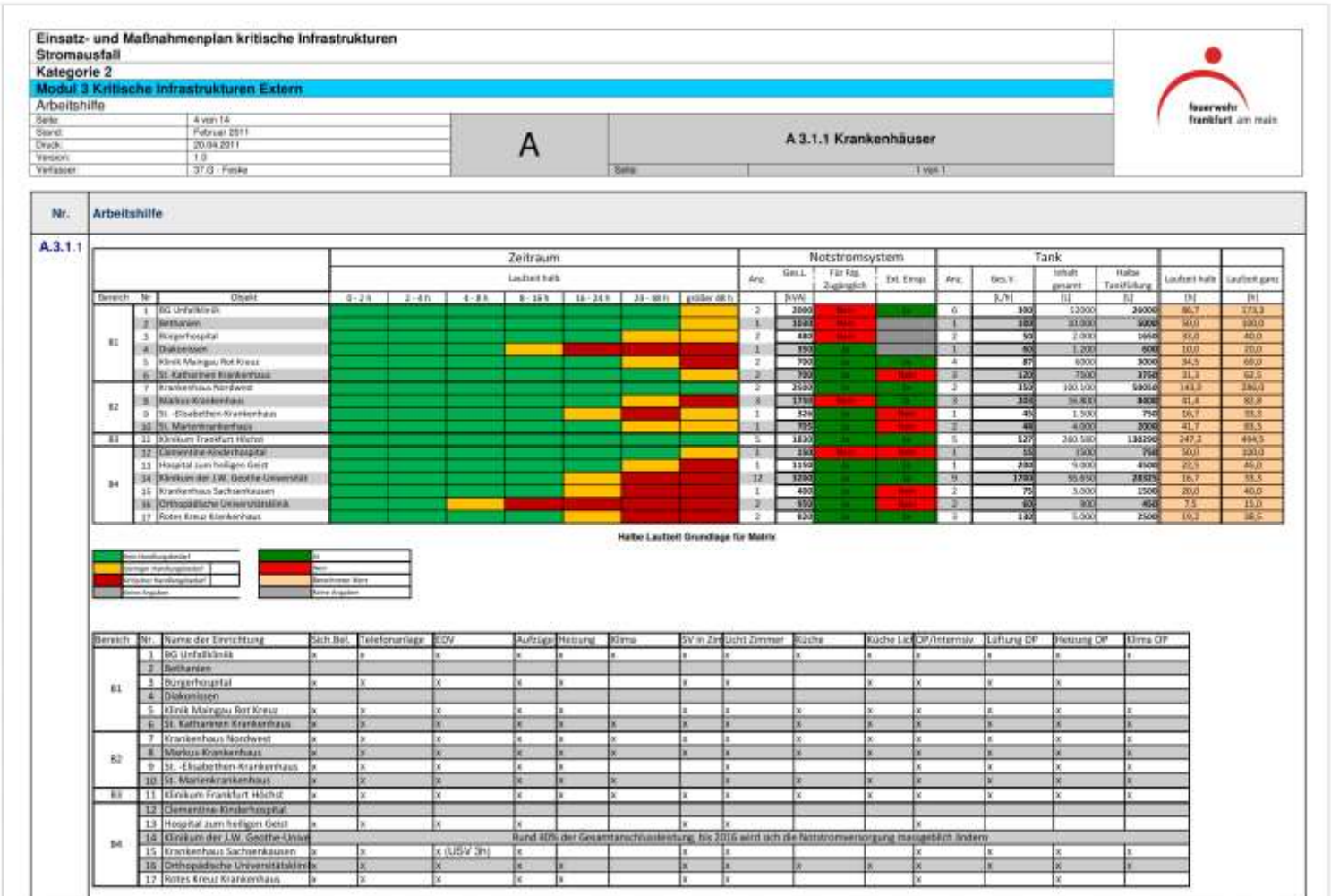
- Categorising a power cut by spread and time
- Level of command
- Chain of command
- Flow chart



2.3 Plan of action (3)

Power Cut
Category 3

Working in modules
- tasks
- checklists
- references



Einsatz- und Maßnahmenplan kritische Infrastrukturen
Stromausfall
Kategorie 2
Modul 3 Kritische Infrastrukturen Extern
Arbeitshilfe

A

A 3.1.1 Krankenhäuser

Nr. A.3.1.1 Arbeitshilfe

Zeitraum (Lauzeit halb): 0 - 2 h | 2 - 4 h | 4 - 8 h | 8 - 16 h | 16 - 24 h | 24 - 48 h | größer 48 h

Bereich	Nr.	Objekt	Notstromsystem Anz.	Ges.L. [kVA]	Für Fzg. Zugänglich	Ext. Einsp.	Tank Anz.	Ges.V. [L/h]	Inhalt gesamt [L]	Halbe Tankfüllung [L]	Laufzeit halb [h]	Laufzeit ganz [h]
B1	1	BG Unfallklinik	2	2000	Nein	Ja	6	330	52000	26000	86,7	173,3
	2	Bethanien	1	1040	Nein		1	100	10.000	5000	50,0	100,0
	3	Bürgerhospital	2	480	Nein		2	50	2.000	1000	40,0	80,0
	4	Diakonissen	1	350	Ja		1	60	1.200	600	10,0	20,0
	5	Klinik Maingau Rot Kreuz	2	700	Ja	Ja	4	87	6000	3000	34,5	69,0
	6	St. Katharinen Krankenhaus	2	700	Ja	Nein	3	120	7500	3750	31,3	62,5
B2	7	Krankenhaus Nordwest	2	2000	Ja	Ja	2	350	100.000	50000	143,0	286,0
	8	Markus-Krankenhaus	1	1700	Nein	Ja	8	320	59.800	29900	93,4	186,9
	9	St. -Elisabethen-Krankenhaus	1	520	Ja	Nein	1	45	1.500	750	16,7	33,3
	10	St. Marienkrankenhaus	1	700	Ja	Nein	2	48	4.000	2000	41,7	83,3
B3	11	Klinikum Frankfurt Höchst	5	1830	Ja	Ja	5	127	260.580	130290	247,2	494,5
B4	12	Clementine-Kinderhospital	1	360	Nein	Nein	1	55	1500	750	30,0	120,0
	13	Hospital zum heiligen Geist	1	1150	Ja	Ja	1	200	9.000	4500	22,5	45,0
	14	Klinikum der J.W. Goethe-Universität	12	3280	Ja	Ja	9	1700	55.650	28525	16,7	33,5
	15	Krankenhaus Sachsenhausen	1	480	Ja	Nein	2	75	3.000	1500	20,0	40,0
	16	Orthopädische Universitätsklinik	2	550	Ja	Nein	2	60	900	450	7,5	15,0
	17	Rotes Kreuz Krankenhaus	2	820	Ja	Ja	3	130	5.000	2500	19,2	38,5

Halbe Laufzeit Grundlage für Matrix

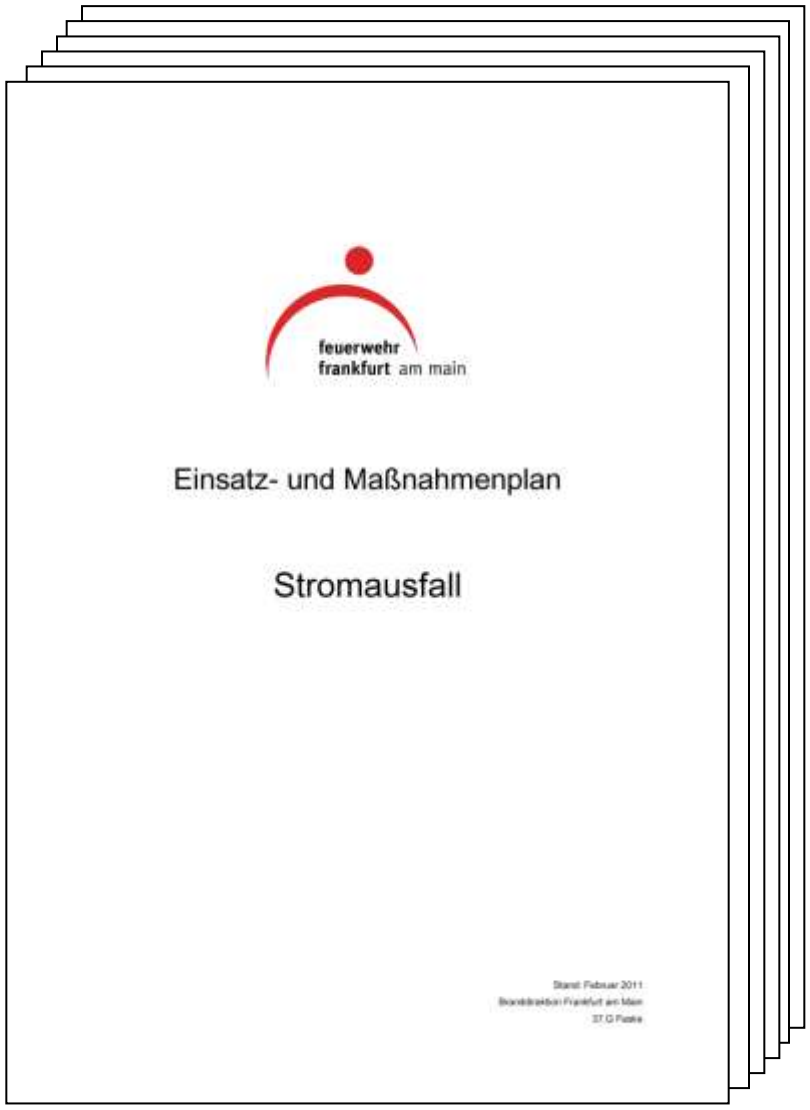
Bereich	Nr.	Name der Einrichtung	Sich.Bel.	Telefonanlage	EDV	Aufzüge	Heizung	Klima	SV in Zi	Licht Zimmer	Küche	Küche Licht	OP/Intensiv	Lüftung OP	Heizung OP	Klima OP
B1	1	BG Unfallklinik	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	2	Bethanien														
	3	Bürgerhospital	x	x	x	x	x		x	x		x	x	x	x	
	4	Diakonissen														
	5	Klinik Maingau Rot Kreuz	x	x	x	x	x		x	x	x	x	x	x	x	x
	6	St. Katharinen Krankenhaus	x	x	x	x	x	x	x	x	x	x	x	x	x	x
B2	7	Krankenhaus Nordwest	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	8	Markus-Krankenhaus	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	9	St. -Elisabethen-Krankenhaus	x	x	x	x	x			x			x	x	x	x
	10	St. Marienkrankenhaus	x	x	x	x	x	x		x	x	x	x	x	x	x
B3	11	Klinikum Frankfurt Höchst	x	x	x	x	x	x	x	x	x	x	x	x	x	x
B4	12	Clementine-Kinderhospital														
	13	Hospital zum heiligen Geist	x	x	x	x			x	x			x			
	14	Klinikum der J.W. Goethe-Univer	Rund 40% der Gesamtanschlussleistung, bis 2016 wird sich die Notstromversorgung maßgeblich ändern													
	15	Krankenhaus Sachsenhausen	x	x	x (USV 3h)	x			x	x			x	x	x	x
	16	Orthopädische Universitätsklinik	x	x	x	x	x		x	x	x		x	x	x	x
	17	Rotes Kreuz Krankenhaus	x	x	x	x	x		x	x			x		x	

ection

Modul 9
Ext.-com.

3 Conclusion

- Fast and reliable reference
- Easier planning needs/resources
- Probability between Category 2 and 3
- Training and exercises is needed
- periodic survey is fundamental as well as the extension/addition



List of reference

Green Paper of the Forum on the Future of public safety and security in Germany

Project “KRITS” Fire & Rescue Service Frankfurt

Michael Brückmann / Leonhard Feske

Thank you very much
for your attention!

Questions?