HAZARD/THREAT CATEGORY	SUB-CATEGORIES
Industrial technical failure	Technical failure of electricity network
Hazard and threat description including scale:	**RISK REFERENCE NO:**
Total shutdown of the electricity supply over whole mainland UK, occurring during working hours and lasting 24 hours	H41
DATE OF REVISION	**NEXT REVIEW DATE**
November 2007	November 2008
Version	2
Author	Utility through TVP

1. Overview of hazard or threat

Whilst this is technically possible in any electricity network, this has never occurred in mainland UK.

The recovery from the complete failure of the electricity network is called a “Black Start” and, although the risk of failure is very low, the electricity industry has robust, well developed and resilient “Black Start” plans to recover the electricity network from a complete failure. The UK electricity network is effectively self-contained, and is not affected by electrical interconnections to Europe or other networks.

The “Black Start” plans envisage that power will be restored within twenty-four hours although there may be areas where the power cannot be restored within this timescale and their may be a need to instigate rota disconnection if critical parts of the network are affected by the event that caused the power failure. See risk H38 for more information about rota disconnections.

2. Key historical evidence

As this has never happened in the mainland UK, the information below covers known worldwide examples, but it should be noted that the conditions that caused them are not necessarily applicable in the mainland UK system.

2003 USA

On the 16 August 2003, a number of concurrent incidents during a period of high demand caused a power cut that left millions of people without electricity in the US and Canada. The power cut affected New York, Toronto, Detroit and Ottawa. However, although it affected about 50 million customers and 61,800MW of load, which is comparable to the number of customers and demand of the UK, this was not a “Black Start” event as power was restored from other parts of the USA and so supplies could be restored fairly easily from outside the affected area. The power was restored in stages over about twenty four hours.

2003 Italy

At about 03:01 hrs on Sunday 28 September, when a tree fell into a power line between Switzerland and Italy it started a chain of events that resulted in a power cut affecting 50 million of the Italy’s 57 million customers. Power was restored within 24 hours. Italy imports about 17% of its power from its neighbours. Again, this was not a Black Start event as the recovery was expedited by the connection to other electricity networks.

2003 Sweden and Denmark

At about 12:40 hrs on Tuesday 23rd September, the Danish capital, Copenhagen, and parts of Sweden were hit by massive power cuts. Around four million homes and businesses lost supplies. Engineers restored most power by late afternoon, but the exact cause of the cuts remained unclear. The problem stretched as far north as the Swedish capital, Stockholm, where the underground railway reportedly

shut down for half an hour. The power cut was blamed on bad weather. Again, this was not a Black Start event and power was restored from outside the affected areas.

Summary:

The UK electricity network has never completely failed. However, the UK has robust, well developed and resilient "Black Start" plans to recover the electricity network from a complete failure.

3. Likelihood

HAZARD	Outcome Description	Likelihood
Power cut affecting the whole of the UK	100% of UK demand	Rare (2)

There has been no increase in the likelihood of a power cut affecting the whole of the UK for twenty-four hours in recent years. The UK system remains well managed, robust and resilient and is operated to minimise the effect of any failure. Changes in ownership and the energy market have had no effect on the likelihood of a power cut affecting the whole of the UK.

The industry remains well regulated and managed.

4. Impact

Summary

HAZARD	Outcome Description	Impact				
		Health	**Social**	**Environ**	**Financial**	**Overall**
Technical failure of electricity network	Total shutdown of the electricity supply over whole mainland UK, occurring during working hours and lasting 24 hours	3	3	3	4	3

The hazards below are ones the civil community may wish to consider:

Details

IMPACTS ASSOCIATED WITH ROTA DISCONNECTIONS
PRIMARY:
Care of the vulnerable
Services will be stretched for those services and businesses without good business continuity plans
If concurrent with cold temperatures, fatalities due to hyperthermia may occur due to the failure of power for: electric space heating; for pumps and boiler controls for gas and oil central heating systems; and making hot drinks and cooking.
Increase in property fires caused by: 1. candles and oil lamps; 2. portable space heaters such as portable gas fires, paraffin heaters; 3. increase in the use of coal fires; 4. householders leaving on cooker rings and electric fires which when the power is restored cause a fire because of their proximity to flammable material.
Crime may increase in unlit streets and houses. Fire alarms may spuriously operate during power cuts which could reduce their effect and encourage burglaries.

Increase in the number of food poisoning cases, if power cuts are for greater than 12 hours, caused by: 1. foodstuffs in refrigerators warning up; 2. inadequate heating of food; 3. food defrosting and refreezing in deep freezers.
Potential for loss of power supplies to telephone exchanges, water and sewage treatment and pumping stations where they do not have alternative power supplies (UPS or generators)
Short-term loss of production due to closure of businesses during power cut
Widespread disruption to the food chain. For example: 1. Frozen food will be difficult to keep frozen unless stores have generators 2. Food production may be affected e.g. bakeries, processed food manufacturers etc 3. Restaurants and bars etc may be unable to open
Widespread disruption to mobile telephone networks during power cuts to sites that do not have backup supplies or inadequate backup supplies.
Potential disruption to entire transport infrastructure including rail and underground services (where stations cannot remain open without power supplies for ticketing, lighting, lifts and escalators, public announcement communications etc), road (loss of traffic management systems) and air (no power at airports and disruption to other transport systems having a knock on effect)
Disruption to financial sector.
SECONDARY:
People trapped in lifts.
If electrical equipment does not have a UPS or generator supply it will fail. For example: 1. Telephone switchboards; 2. Computer systems; 3. Tills and cash machines and credit card authentication systems; 4. Traffic Lights, street lights and other street furniture (and congestion charging); 5. Mobile telephone networks; 6. Emergency Services Communication Networks (including Airwave after six hours); 7. fuel pumps (in petrol stations);
Pollution from sewage pumping stations caused by power cuts.
Failures of UPS and back up generators during power cuts could affect even those who are prepared. Battery capacity diminishes with “age”. Generators are not usually rigorously tested frequently on load. Generators also have to receive regular maintenance if running and regular fuel supplies.
Damage to power cables during rota cuts will not become apparent until the power is restored which could result in injuries to people working near damaged cables.
Overstretch of key resources (equipment and personnel) and agencies especially the emergency services and care and social services.
Public need for information, advice, benefits and emergency payments. For example, for those without secondary means of heating etc
The vulnerable may need special care

5. Vulnerability and resilience

All businesses that do not have good business continuity plans that take into account the failure of power supplies will be vulnerable to the power cut.

Businesses should ensure that their key suppliers have resilient business continuity plans as power cuts at their suppliers’ premises could have knock on effects for their own business. For example, where companies operate on a just-in-time basis if delivery of supplies from a key supplier is affected then the company could be forced to stop production even if they are not directly affected by the power cut.

6. Overall assessment

CATEGORY	SUB-CATEGORY
Industrial technical failure	Technical failure of electricity network

SCALE	IMPACT	LIKELIHOOD	RISK
Whole of UK	**Moderate (3)**	**Rare (2)**	**Medium**

CONTROLS IN PLACE:

- Industry Black Start Plans
- Fuel Security Code
- Electricity Supply Emergency Code
- Department Trade and Industry (DTI) Incident Response Plan
- Royal Berkshire Hospital NHS Trust Business Continuity Plans
- Heatherwood and Wexham Park Hospitals NHS Trust Business Continuity Plans
- Berkshire Primary Care Organisations Business Continuity Plans
- Berkshire Healthcare Trust Business Continuity Plans
- Buckinghamshire Hospitals NHS Trust Business Continuity Plans
- Milton Keynes Hospital NHS Trust Business Continuity Plans
- Buckinghamshire Mental Health Trust Business Continuity Plans
- Buckinghamshire Primary Care Organisations Business Continuity Plans
- Oxford Radcliffe Hospitals NHS Trust Business Continuity Plans
- Oxford Mental Health Trust Business Continuity Plans
- Nuffield Orthopaedic Clinic Business Continuity Plans
- Oxfordshire Primary Care Organisations Business Continuity Plans
- South Central Strategic Health Authority Business Continuity Plans
- Berkshire Integrated Emergency Planning Structure
- West Berkshire Council Emergency Plan
- Buckinghamshire County Council Emergency Plan.
- Aylesbury Vale District Council Emergency Plan.
- Chiltern District Council Emergency Plan.
- South Bucks District Council Emergency Plan.
- Wycombe District Council Emergency Plan.
- Environment Agency Incident Management Plans
- Environment Agency 24/7 incident response
- Environment Agency Memorandum of Understanding with Fire Brigades, Police, Local Authorities, Highways Agency, Health Protection Agency and Health Authority.
- South Central Ambulance Service NHS Trusts Business Continuity Plans
- Milton Keynes Council Major Incident Guide
- Thames Valley Police Emergency Procedures Manual
- ACPO Emergency Procedures Manual
- ACPO Motorway Manual of Guidance
- Oxfordshire County Council Emergency Plan and Business Continuity Plans
- Royal Berkshire Fire & Rescue Service Major Incident Policy
- Oxfordshire Fire & Rescue Service Major Incident Policy

- Buckinghamshire Fire & Rescue Service Major Incident Policy

Additional risk treatment required

Individual agency business continuity plans