Loss Prevention Standards – Asset Classes

Power Outage

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With the increased risk of power outages globally, understanding the impact to business is critical. Determining your organisations energy resilience and asking the right questions has never been more important to ensure your business is as prepared as it can be.

Power Outage

Introduction

In a world where there is uncertainty in the resilience and reliability of electrical power and energy supplies, there is the real possibility that sudden and unplanned and/or planned power outages occur. While it is understood that this already occurs in some territories globally or following events like high winds, heavy snow or flooding, it is now a possibility within areas where historically this provision has been stable and outside of other factors.

While power outages are normally unlikely and/or only for prescribed periods or relatively short duration, the exposures a power outage creates need to be understood and all eventualities need to be planned for. Therefore, having a robust approach to Risk Management, paired with a rigorous Management of Change process should enable any organisation to be prepared for any such eventualities.

Whether this event occurs on the coldest darkest days or nights of winter, during a heavy rain downpour or on a warm summers day, unless a facility or building is considered 'protected' by Government, it should be prepared. This includes employees, specific items of equipment, infrastructure, construction projects, buildings through to fully integrated processing assets.

In such periods, there could be enhanced risks to the following:

- Life safety
- Fire
- Security
- Natural hazard perils
    - Flooding and inundation
    - Freezing
- Product quality control
- Deterioration of stored stock
- Supply chain and logistics
- Business impact

With the increased risk of power outages globally, understanding the impact to any building and business is critical. Determining an organisations energy resilience and asking the right questions has never been more important to ensure a business is as prepared as it can be.

As part of any energy resilience plans, businesses should understand who their electricity network operator is, not their energy supplier, and who can provide the latest information on power outages. In the UK to find out who the distributor is for any local area either:

- Call 105 Or
- Search by postcode on the Energy Networks Association's website.

Businesses should also understand whether or not they fall under the 'Protected Sites' status. The criteria to be part of the Protected Sites List (PSL) includes the need for businesses to have their electricity supply maintained because of a national or regional critical need, public health and safety issues or the potential for catastrophic damage to high value plant.

For full details of the criteria for receiving Protected Sites status, please refer to the document prepared by the UK Government Electricity Supply Emergency Code (ESEC).

Electricity Supply Emergency Code (ESEC)

In addition to the Protected Site criteria, also within this document, Annex 1 and Annex 2 can be used to provide guidance on when planned power outages could occur and to what extent/impact these could have:

- Annex 1: Variable Rota Disconnection Plan – Order of Disconnection for Load Blocks A to U
- Annex 2: Rota Plans

Firstly, there is a need to understand what 'load block' any given location is classed as: Load Block A to U - this can be found in a black square on an electricity statement.

Using this information Annex 2 can then be used to identify the day of the week there is a planned power outage.

Once this is known Annex 1, can then be used to establish what times of the day are impacted and the impact level.

The are 18 levels of impact, increasing in severity of power outage, ranging from level 1 disconnections (occasional three hour blocks), through to level 18 disconnections (total blackout).

The Future

Looking to the future and understanding energy resilience and one's own energy needs is becoming increasingly important. Some organisations have already installed or are considering the installation of battery energy storage systems or photovoltaic solar panels to support their own energy demands. While this helps to address one exposure, each of these technologies, comes with its own inherent risks, which also need to be managed and form part of any robust Change Management process.

How to respond and prepare for the future will be different for every business, but the planning needs to be sooner rather than later. Based on Aviva's experience, our advice is for an organisation to proactively plan and prepare for the likely impacts of a future event in advance of them occurring.

However mature a business's risk management is to be able to respond to threats such as this, Aviva Risk Management Solutions can support. All of our Risk Management content and guidance can be found on our free to access Risk Solutions website and in particular to support a business if power supply disruption were to occur, within our Building Your Business Resilience section.

Checklist

A generic Power Outage Checklist is presented in Appendix 1 which can be tailored to your own organisation. This contains a series of thought provoking questions and guidance on what measures could or should be taken during this period of change. This is not an exhaustive list and will vary based on every situation, business and building.

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Aviva Risk Management Solutions can offer access to a wide range of risk management products and services at preferential rates via our network of Specialist Partners.

- Electrical Inspections & Thermographic Imaging - Bureau Veritas
- Business Continuity - Horizonscan

For more information please visit:
Aviva Risk Management Solutions – Specialist Partners

Additional Information

Relevant Loss Prevention Standards include:

- Ammonia Refrigeration Systems
- Arson
- Business Continuity
- Business Continuity Plan - Testing & Maintenance
- Business Impact Analysis
- Electrical Installations - Inspection and Testing
- Emergency Response Teams
- Escape of Water
- Heat and Smoke Venting Systems
- Hot Work
- Maintenance Regimes
- Managing Change – Liability
- Managing Change – Property
- Managing Contractors

To find out more, please visit Aviva Risk Management Solutions or speak to one of our advisors.

Email us at riskadvice@aviva.com or call 0345 366 6666.*

*The cost of calls to 03 prefixed numbers are charged at national call rates (charges may vary dependent on your network provider) and are usually included in inclusive minute plans from landlines and mobiles. For our joint protection telephone calls may be recorded and/or monitored.

Appendix 1 – Power Outage Checklist

Location	
Date	
Completed by (name and signature)	

	Risk Assessment & Pre-Planning	Y/N	Comments
1.	Risk Assessments. Where applicable, do existing risk assessments include hazards and risks for power outages? If not, these should be reviewed and revised. These could include: • Workplace Activities • Safety Critical Equipment • Fire • Dangerous substances • Process hazard control • Flood or other natural hazard exposure • Escape of water/water mitigation		
2.	Improved Power Resilience. Following Business Impact or Risk Assessments, is there a need to improve the power supply provision or resilience? • Uninterruptable power supplies? • Emergency generators? • Emergency connections installed for leased emergency to be introduced? • Contracts for emergency generator provision established?		

3.	Pre-Outage Inspection & Site Lockdown. Ahead of any power outage will there be:
	• Formal inspections of all areas that will not be occupied to ensure:
	  ○ Everything is shut down safely.
	  ▪ Where required a formal Lock Out/Tag Out management system is used to isolated certain items and/or circuits?
	  ○ Housekeeping is clean and tidy and waste is moved out of the building?
	  ○ All combustible materials and waste is as far away from the building as possible?		

	• Areas are locked and secured for the period of the power outage. • Based on risk assessment(s), are any vents required to be manually closed to prevent cold air or any contaminants etc. from coming into the isolated ventilation systems?		
4.	Normal Business Hours. Based on 'normal hours of business', are plans in place if a power outage occurs during this period? • What are the implications? What are the implications if this occurs outside of normal operating hours?		
5.	Work Planning. Ahead of a power outage: • Can any work be completed in advance of the planned power outage(s)? • Can any work be transferred to any other site(s) that is unaffected by the planned power outage(s)?		
6.	Housekeeping & Waste Management. Ahead of any planned power outage(s) is the standard of housekeeping inspected? Is this maintained to the highest standards possible? Is all waste minimised and removed from site? If stored externally, is all waste moved as far away from any buildings or yard storage as possible, and ideally greater than 10m? Has management considered the potential for increased malicious risk activities and arson?		

7.	Supply Chain. Based on the likely impact of a power outage being to a region, and not a whole country, has the impact to the following been considered, who may be from 'unaffected' regions:
	• Suppliers
	• Customers
	• Logistics
	  ○ Deliveries to site
	  ○ Shipments from site
	  ○ Will these be prohibited during the power outage?		

	People	Y/N	Comments

8.	Employees & Contractors. In preparation of a power outage, has the impact on all employees, contractors and members of the management team been assessed?
	
	Has the following been considered:
	
	• Identify who will be able to work from home?
	• Identify who will need to go home?
	• Identify who will need to be on site?
	• Management of contractors?
	  ○ Security staff?
	  ○ Cleaners?
	  ○ Waste handlers?
	  ○ Maintenance? etc.		

9.	Personnel on Site. Ahead of any power outage, have all personnel on site been informed of the arrangements that will need to be put in place? • Understand any changes and be appropriately trained? • Safe access and egress for both internal and external areas? • Raising fire, security, process etc. 'alarm'? • Emergency escalation procedures & response? • Following any lone worker procedures? • If known in advance, have the timings of any power outages, been clearly communicated to all employees, contractors and visitors (with a reminder of the action that is required of them)?		
10.	Organisational Behaviour. Is the perceived impact or will the actual pressure on employees unable to complete tasks, operations or deliveries be addressed before the known power outage time? • To help prevent 'rushing' a task that could lead to injury or losses? • Can safe loading/unloading be undertaken in this period? • Can the movement of vehicles be undertaken in this period?		

	Activities & Processes	Y/N	Comments
11.	Prioritisation of Activities. Are all critical activities that must be completed, identified and prioritised?		
12.	Non Essential Power Usage. Ahead of any planned power outage(s), are all non-essential lighting and/or other equipment identified and turned off? • Are these electrically isolated? • Are these isolated using a Lock Out/Tag Out management system?		
13.	Prohibited Activities. On days where potential power outages are planned, will the following be prohibited: • Planned impairments to fire, security or other protection, safety or control systems? • Hot work tasks? • Non-critical planned electrical infrastructure tasks?		
14.	Cooking Ranges. Are there any cooking ranges in place and being used? If so, these should be shut down and allowed to cool for at least 1 hour prior to the planned power outage time. Is the full daily cleaning regime in place and up to date?		
15.	Temporary Heating. If a power outage does occur, is the use of gas, solid or liquid fuel fired temporary heaters or heating devices strictly prohibited? Unless unavoidable, is the philosophy to 'heat the person' versus 'heat the building' enacted during such outages?		
16.	Torches & Lamps. In preparation for any power outage, are rechargeable or battery powered torches or lamps available? Are: • Enough devices available? • Enough batteries/spare batteries provided? ○ Batteries restocked? • Rechargeable devices fully charged? The devices confirmed as being in good working order?		
17.	Candles. If a power outage does occur is the use of candles or other naked flame devices strictly prohibited?		

18.	Mobile Devices. To ensure continued communications during a power outage, is there a procedure in place to ensure all mobile phones and other such devices are fully charged? • Are mobile phone numbers for key officials shared and cascaded with appropriate personnel? • Have employees been advised that they may not be able to communicate using mobiles if the mobile networks go down? • Has the possibility of mobile telephone infrastructure failure been considered? E.g. mobile phone mast battery failure.		
19.	Portable Devices. Only where it is safe to do so and supported by appropriate Risk Assessments and Method Statements, to help ensure the continued use of portable appliances during a power outage: • Is there a procedure in place to ensure all rechargeable batteries for such items are fully charged? • Are these checked ahead of time? If the safety of personnel involved cannot be assured then any task should be postponed and rescheduled until the power has been restored.		
20.	Portable Battery Packs. To help maintain the use of portable devices and appliances during a power outage, are portable battery packs and appropriate leads available? • Are these items fully charged?		

	Machinery, Equipment & Stock	Y/N	Comments

21.	Production, Process Flow & Equipment. In the event of a power outage, are there any potential impacts to the continued operation and/or safe shut down of:
	• Production activities?
	• Gas or liquid flows or transfers?
	• Dust or particle flow or transfers?
	• Volatile organic compound and low flash point fluids or gases?
	• Extraction systems for safe removal of vapours or gases that can accumulate to cause explosion or other hazards?
	• Materials in process that if they stop cause plugging or blockages?
	• Materials in process that if they stop, spoil or cause the operation to be off specification?
	• Equipment that cannot be shut down quickly?
	  ○ Or that require a phased or progressive cool down for shut down?
	• Equipment that can seize or lock up upon power failure?
	• Processes or tanks that require trace heating or heating coils?
	  ○ What are the implications to the contents and their transfer?
	• Hot water or steam boilers or hot oil heaters that require power for their control and safety systems?
	• A stirred process where upon power failure the viscosity can increase, to a point that when power returns the viscosity is too great for stirrer rating?
	
	Are all items inspected, tested and maintained in accordance with the appropriate guidance and applicable standards?		

22.	Building Management Systems. Upon loss of power, how will the building management system perform? • Lighting? • Heating, temperature control? • Ventilation and air conditioning systems? • Humidity and atmospheric control equipment? Are all items inspected, tested and maintained in accordance with the appropriate guidance and applicable standards?		

23.	Electrical Systems. In the event of a power outage what electrical systems will need to be prioritised? • Are existing electrical arrangements arranged to support this? • Are switches, circuits breakers and other electrical safety devices inspected, tested and maintained as required?		
24.	Sensitive Electrical Equipment. Ahead of any planned power outage, will 'sensitive equipment' be powered down safely to prevent a sudden hard stop and damage to sensitive electrical boards and components?		
25.	Existing Battery Back Up Capacity. Is the size of any existing battery back-up systems known? Are these appropriately sized to meet the demands if there was a power outage?		
26.	Existing Back Up Power & Maintenance. Are all back up power supplies inspected, tested and maintained in accordance with the Equipment Manufacturers guidelines?		
27.	Existing Back Up Power Supplies. Are existing installed back up power supplies: • Introduced on a phased basis with an Uninterruptable Power Supply system? • Automatic or manually started? • Synchronised? • Emergency Lighting has been discharge tested within the last twelve months? • Any units replaced if required?		
28.	Fuel Supplies - Back Up Generator or Fire Pump. Is an adequate supply of fuel stored on site? To ensure re-order frequencies and logistics are accurate, is the volume of this fuel supply and usage rate known? Is this fuel supply securely stored?		
29.	Safety & Critical Equipment. Are all 'safety' related equipment and/or controls or critical equipment, identified? Is the impact of a power outage fully understood and clearly documented? Are all items inspected, tested and maintained in accordance with the appropriate guidance and applicable standards? Is critical I.T. data fully backed-up and verified?		

30.	Critical Equipment & UPS. Are all identified safety and critical equipment items required to be connected to a UPS system, actually connected to a UPS? • Has this been tested? • Is this UPS sized correctly for the expected power outage?		
31.	Water/Fluid Movement. In the event of a power outage are there any potential impacts to: • Water/fluid movement pumps? • Waste or surface water movement pumps? • Water ingress or flood mitigation pumps? For example in basements or high rise buildings; cooling towers; process involving water or other fluids that can freeze; cistern or storage tanks. Does a power outage during a prolonged rain or a downpour have any impact on flood or inundation mitigation measures or sump pumps?		

32.	Freeze. In the event of a power outage during a period of sub-zero temperatures, would there be any exposure to 'vulnerable' items freezing?
	• External equipment especially those pumping fluids including heating, ventilation, refrigeration/cooling systems?
	  ○ Fan coil units are particularly vulnerable.
	• Equipment on the roof?
	• Equipment in highly ventilated plant rooms?
	• Explosion relief systems where the vent is normally in a space warmed from below?
	  ○ This could freeze shut or have a frozen static load on it preventing it from operating if needed.		

33.	Deterioration of Stock. Are there any items in process or in storage that require a temperature or atmosphere controlled environment that could be impacted by a power outage? • How long can the controlled environment be held without power? • For food items - Does the Hazard Analysis Critical Control Point (HACCP) include for power outages? • Have the HACCP requirements been communicated to employees? • What controls and contingency plans are in place? • What quality assurance measures are in place to ensure the materials being controlled are within tolerance?		

34.	Electrical Ignition Flares. Are there any 'off gas', flare or safety systems that burn off waste or excess process gases that require electrical ignition pilot lighter? If so, what are the implications of a power outage?		

	Protection Systems	Y/N	Comments

35.	Fire. Upon a power outage, how will the exposure from fire be managed?
	
	• Emergency lighting?
	• Sounders and beacons?
	• Automatic and manual fire detection systems?
	• Are any reserve battery back-up systems for fire alarm panels sized correctly for the expected downtime?
	  ○ Are these batteries within their usable life expectancy with no performance issues?
	  ○ Have these batteries been replaced in accordance with the recommended OEM guidance?
	• Fire doors, shutters etc. – do they fail open, closed, or 'safe'?
	• Fire doors, shutters etc. - not being able to operate?
	  ○ In which case, should these be manually closed prior to the power outage?
	• Heat & smoke ventilation systems?
	
	Are all items inspected, tested and maintained in accordance with the appropriate guidance and applicable standards?
	
	Based on a risk assessment, in the event of a power outage, are additional fire watch patrols proposed to be used to mitigate any enhanced exposures?
	
	• The recommended patrol frequency should be based on the exposures but no less frequent than every hour.
	• How will a fire alarm be raised?
	• To where?
	• What will the expected response be?		

36.	Automatic Sprinklers. Does the site have automatic water-based fire protection systems such as automatic sprinklers or wet risers? If yes, with a power outage is the performance of following understood so it does not cause an enhanced risk: • Trace heating? • Water motor gongs – have these been verified as working?		

	• Water flow or drop in pressure alarms – will these operate without power?
	• Dry pipe systems
	  ○ Air compressor – if there is a leak on the system that normally is addressed by the compressor this could now trip the system.
	• Preaction systems
	  ○ Are these solenoid powered to be closed?
	  ○ Are they designed to trip upon power failure?
	• Deluge systems
	  ○ Need to ensure the actuation mechanism is not compromised by loss of power
	• Wet pipe systems – are they exposed to freezing temperatures?
	• Immersion heaters for water tanks – in the power outage period will this be an issue?
	• Pump room heating – ahead of power outage ensure room temperature is in excess of 10C.
	• Understand any electric motor jockey pump will not work. Therefore, if a diesel engine pump in place there may be a situation where this starts on pressure drop/fluctuation.
	• Unless there is an emergency generator connected to the fire pump, an electric motor driven fire pump will not work.
	• Diesel engine driven fire pumps – has the charge on the battery sets been checked ahead of the outage and loss of the charger?
	• Any powered fire pump room ventilation/extraction may not work, so in an emergency there may be a need to open the fire pump house doors to provide fresh air to the diesel engine motor.
	
	Are all items inspected, tested and maintained in accordance with the appropriate guidance and applicable standards?		

37.	Gaseous or Special Extinguishing Systems. Has the impact of a power outage been considered on any other forms of fire suppression system? Regardless of the type of system – is the protection system provided with a back-up power supply? If multiple different protection systems are provided are all systems covered by a back-up power supply? Is the signal to actuate any fire extinguishant provided with a power failure back-up? Is the failure mode of the actuating solenoid known? • Oxygen Reduction: ○ May not operate, unless connected to an emergency power source		

	○ Monitoring of the oxygen concentration may not work ○ Air concentration management system may not work • Gaseous, Dry Powder, Wet Chemical or other Extinguishing Systems • Watermist System: ○ Is this pumped or cylinder fed? • Carbon Monoxide & Hazardous Gas Monitoring ○ Is the system provided with a back-up power supply? • Spark Detection & Suppression		
38.	Interlocks & Safety Devices. Is it understood what interlocks are provided on equipment? Is the impact of a power outage in relation to interlocks understood? Is the impact of a power outage in relation to 'failing safe' understood where a condition could be created that causes an increased risk or hazard? Are all items inspected, tested and maintained in accordance with the appropriate guidance and applicable standards?		
39.	Power Surge Protection. Have all items that could be potentially damaged by power surge been identified? Are these items protected against such an event, if created by the returning power supply being switched back on?		
40.	Escape of Water Protection Systems. Does the site have any automatic escape of water safety shut off systems? If yes, how will this exposure be managed with a power outage? Are all items inspected, tested and maintained in accordance with the appropriate guidance and applicable standards?		

	Security Systems	Y/N	Comments
41.	Security. Upon loss of power, how will the integrity of the building and/or site perimeter be maintained from a security perspective? How will any of the following be impacted: • Security lighting? • Building and/or fence/perimeter alarm systems? • Closed Circuit TV systems? • Access control systems? • Door securing systems? • Smart locks? • Safes? Are any reserve battery back-up systems sized correctly for the expected downtime? • Are these batteries within their usable life expectancy with no performance issues? • Have these batteries been replaced in accordance with the recommended OEM guidance? Are all items inspected, tested and maintained in accordance with the appropriate guidance and applicable standards? Based on a risk assessment, if a power outage is planned or does occur, are additional security guards proposed to be used to mitigate any security exposures? The recommend patrol frequency both internally and externally should be based on the exposures but no less frequent than every hour. • How will a security incident be raised? • To where? • What will the expected response be?		

	Emergency Response / Business Continuity Plans	Y/N	Comments
42.	Sudden Power Loss. Based on risk assessments, is it fully understood what would happen if systems powered down suddenly or unexpectedly?		
43.	Emergency Response Plans. Have emergency response plans been reviewed, revised and tested for a power outage? Does this identify and consider the length of time of the outage? Has this plan considered what would happen if there was an emergency incident in the period when there is no power? Such as: • Personal injury/accident? • Operational Impact? • Fire? • Security event? • Malicious damage? Does this specifically include an appropriate list of contractors and utility companies with contacts and phone numbers? If there is an outage if the mobile network tower batteries run out of power how will you communicate to internal and external stakeholders		
44.	Business Impact. Have power outages been considered on: • Business Impact Assessments? • Within Business Continuity Plans?		
45.	Business Continuity Plans. Based on a loss of power scenario has testing been completed of the Business Continuity Plans? If not, is this planned?		
46.	Employee Education & Training. Have all employees been trained in what to do in the event of a power outage?		

47.	Return to Normal. Following a power outage, once power resumes, is it understood:
	• How to return to 'normal' in a safe way?
	  ○ What manual resets are required?
	  ○ What interlocks require resetting?
	  ○ Phased return to 'normal'?
	  ○ What order items need to be started or restarted?
	• How long it would take to return to 'normal'?
	• That the use of systems such as Lock Out/Tag Out may be needed on some systems, equipment or circuits to maintain a		

	basis of safety and/or safe system of work when the power is returned? • If dusts capable of forming an explosive atmosphere have settled and suddenly become airborne again? • If gases or vapours capable of forming an explosive atmosphere have accumulated and suddenly are moved or extracted again? • Fire doors, shutter and dampers – need manual reset? • Extract vents – need manual reset?		

Additional comments:

Please Note

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