

**Voluntary Report** – Voluntary - Public Distribution

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**Report Name:** Prolonged Power Outages Raise Serious Concerns about Food Safety

**Country:** South Africa - Republic of

**Post:** Pretoria

**Report Category:** Agriculture in the News, Agricultural Situation

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**Report Highlights:**

South Africa is experiencing significant scheduled power outages, known as loadshedding, to share the limited available energy supply and protect the integrity of the power grid. In 2022 power outages were implemented more than 200 times. Although South African regulations and standards make general provisions for maintaining a cold chain, there are currently no national guidelines to specifically address the challenges of maintaining the cold chain during the energy crisis. Restaurants, food retailers, and consumers are adopting a myriad of techniques to cope with the regular blackouts. However, many businesses and individuals lack the appropriate equipment or knowledge to prevent significant pathogenic growth that can lead to foodborne illnesses.

## **Background**

Electricity is a crucial input for maintaining the cold chain of food and beverage products. Refrigeration requires constant power supply. When it is interrupted, both food quality and food safety are at risk. In 2022, South Africa experienced the highest number of power cuts ever, creating unprecedented challenges in preventing foodborne illnesses.

Loadshedding is a planned rolling out of power based on a rotating schedule during periods of short supply which threaten the integrity of the grid and it ensures that the available energy is shared among all users. South Africa is experiencing loadshedding due to a myriad of factors such as unit breakdown, labor action by utility employees, delayed construction of two power stations due to numerous design flaws, mitigation of deferred maintenance, and old coal fired power stations with deteriorating performance among others. The electricity crisis in South Africa first started in 2007; and since the first quarter of 2008, Eskom introduced loadshedding to prevent total collapse of the national power grid. Over the years, loadshedding in South Africa has become more frequent as the national demand for power far outgrows Eskom's production and supply capacity.

Loadshedding creates numerous challenges for South African society and businesses, especially those in the food sector. The costs associated with production, handling, transporting, and storing food has risen, putting the sector under greater stress during an already inflationary environment. With attention understandably focused on the economic costs of loadshedding, less public attention is being paid to the growing food safety challenges.

### **Time in the Food Safety “Danger Zone”**

Loadshedding is scheduled according to stages; stage 1 may have only one period outage a day with a historical minimum of 2.5 hours whereas higher stages may have about three to four outages a day, ranging from 2.5 hours to 4.5 hours per outage. **Figure 1** highlights a typical loadshedding schedule for a specific area at stage 4 with three power outages planned over three time periods. During stage 6, South Africans have electricity for about 50% of the day. Although the schedule varies by location, stage 5 typically introduces the first outage in excess of four hours (a timeframe notable for jeopardizing consumer food safety), while Stage 6 introduces two outages per day in excess of four hours.

In total, Eskom implemented loadshedding stages about 214 times in 2022. As of January 17, loadshedding has been implemented every day, primarily at stage 4 and above. This represents a significant increase in loadshedding; in 2020 and 2021 loadshedding never surpassed stage 4.

Friday 2022-12-23	
<b>Stage 1</b> 16:00-18:30	<b>Stage 2</b> 08:00-10:30 16:00-18:30
<b>Stage 3</b> 00:00-02:30 08:00-10:30 16:00-18:30	<b>Stage 4</b> 00:00-02:30 08:00-10:30 16:00-18:30
<b>Stage 5</b> 00:00-02:30 08:00-10:30 16:00-20:30	<b>Stage 6</b> 00:00-02:30 08:00-12:30 16:00-20:30
<b>Stage 7</b> 00:00-04:30 08:00-12:30 16:00-20:30	<b>Stage 8</b> 00:00-04:30 08:00-12:30 16:00-20:30

**Figure 1: Loadshedding schedule of Arcadia, Pretoria on December 23, 2022**

Source: Eskom se Push

Refrigerated food at food handling businesses is safe for consumption if kept and maintained at temperatures specified by the Department of Health (see **Table 1**). When temperatures rise above the prescribed temperature due to thawing or lack of refrigeration, bacterial growth increases. Many of the bacteria that present a threat to human health grow most rapidly in the range of temperatures between 4.4 C and 60 C. The longer the time in the “temperature danger zone,” the greater the risk of foodborne illness. Scientists note that many of the bacteria of concern for foodborne illness double in number in as little as 20 minutes when within this temperature range.

### **Food Safety Regulation**

South African regulations and standards make general provisions for maintaining a cold chain. However, there is currently no public communication or guidelines that specifically address the challenges of maintaining the cold chain during the energy crisis. South Africa regulates the safe handling of food as provisioned for in the Foodstuff, Cosmetics and Disinfectants Act, 1972 (Act NO. 54 of 1972). Food premises require a valid certificate of acceptability permitting the handling of food. Among other things, the Act prohibits the sale of food that falls outside of safe temperatures:

- Frozen or chilled products – if the core temperature is higher than the required core or surface temperature of more than 2°C higher than the required temperature

- Heated food - if the core temperature is lower than the required core or surface temperature of more than 2°C lower than the required temperature

A break in the cold chain due to power cuts may cause frozen foods to thaw. The Act states that in the case of frozen foods which has thawed, if the surface temperature does not exceed 5°C, product may be refrozen in accordance with good manufacturing practice. Additionally, frozen food thawed for further processing may be refrozen if; thawing for a short period of time and does not exceed 10 hours, run-off liquid from thawing is drained to prevent cross contamination and chilling commences immediately to comply with the required temperatures.

Chilled products are more likely to be impacted by bacterial growth during an outage because there is a lower temperature differential between the ideal storage temperature and the start of the “temperature danger zone” for bacteria growth. Unfortunately, unlike thawed frozen product, there are little to no visible signs of time/temperature abuse for chilled product. While some products that have experienced significant time/temperature abuse will smell or taste “off,” there is generally no way for consumers to smell or taste bacteria responsible for foodborne illnesses.

**Table 1: Required temperatures in accordance with the Foodstuff, cosmetics and disinfectants Act, 1972 (Act NO. 54 of 1972)**

Category	Type of food	Required core temperature of food products that are stored, transported or displayed for sale
Frozen products	Ice cream and sorbet	≥-18°C
	Any other food which is marketed as a frozen product	≥-12°C
Chilled products	Raw unpreserved fish, mollusks, crustaceans, edible offal, poultry meat and milk	≤+4°C
	Any other perishable food that must be kept chilled to prevent spoilage	≤+5°C
Heated products	Any perishable food not kept frozen or chilled	≥+60°C

Source: South Africa Department of Health (2018)

Maintaining the cold chain and ensuring that foods do not exceed safe temperatures during power outages requires vigilance and integrity to discard compromised product when doing so will impact revenues.

## **Mitigation by Retailers and Food Establishments**

Independently owned small to medium retailers and food establishments are typically more severely impacted by loadshedding than larger and chain competitors. Large generators are very costly, and many small businesses do not have any back up power available. These restaurants and retailers sometimes appear to move perishable refrigerated product to freezer during loadshedding to avoid food spoilage. However, this requires additional freezer space. While diligent employees may manage the transition of cold-chain dependent inventory during business hours, after hours practices create even greater risk. Managers must decide to either keep refrigerated product in the freezer long overnight (and risk significant quality reduction for product that is repeatedly frozen and thawed) or to leave it in non-operational refrigerators during overnight outages. Restaurants without generators generally shut down during loadshedding hours with employees sitting in the dark and turning away customers who request anything other than pre-made food items. This significant downtime severely hampers bottom lines as business owners continue to pay for overhead costs and labor despite significantly operational hours.

The majority of middle and high-end retailers and restaurants appear to have limited generator capacity and are set up to continue operations with reduced electrical pull. Restaurants keep on limited lights and may offer reduced menu items (for example, nothing made in the oven due to heavy electricity pull). Retailers may keep on a few lights, or no lights at all, and generally prioritize power to cash registers and freezers. Some of the major retail chains are franchised, leaving each store to create their own procedures that best suit whatever redundancy

Despite the food safety risks, numerous retailers have been observed without back-up power to keep refrigeration units running. How long an un-powered refrigerator can keep food at a safe temperature is dependent upon a number of factors such as the style of the refrigerator (display style with or without doors), the set temperature prior to the outage, and the ambient temperature.

A Consumer journalist, Wendy Knowler recently interviewed four supermarkets on how they maintain the integrity of their food chains during loadshedding. Responses included monitoring cold chain and frozen foods products and isolating/not selling temperature-compromised food to consumers. However, few retailers appear to have automated temperature tracking. Employees are not frequently seen tracking temperatures, and as 24/7 operations and night shift employees are highly unusual in South Africa, testing and isolating product that gets above acceptable limits, after hours compliance, when loadshedding is often the longest and poses the greatest threat to food safety,

Local media reported that a location of a high-end retailer, Woolworth's, recently experienced a generator failure and was forced to destroy a significant portion of their inventory. While high-end retailers are particularly

concerned about maintaining both safety and quality in order to avoid reputational damage of spoiled food, lower-end retailers, and those without corporate policy to direct appropriate mitigation procedures, may lack the knowledge of how to appropriately handle outages. Others may be unwilling or financially unable to toss inventory due to the substantial losses associated with such a move.

Post contact confirms that loadshedding is changing buying patterns of some retailers, with many stores buying lower volumes however more frequently to avoid stock losses. While this pushes the responsibility of cold chain management higher up the production chain to those who may be better equipped to provide consistent refrigeration, it is not without cost.

### **Mitigation by Consumers**

Loadshedding may result in higher food prices as retailers (and other players along the value chain) transmit to consumers additional cost of compliance and other costs and losses associated with loadshedding. While additional fuel costs will be associated primarily with fresh and chilled product and may drive increased prices on these specific items, store compliance costs may be borne more generally, spreading price increases across product types.

According to U.S. food safety guidance, food in a home refrigerator that remains unopened should stay at a temperature appropriate to keep food safe for about four hours. With outages exceeding this four-hour mark during stage 5 and above, South African consumers are now regularly facing concerns about the safety of their refrigerated food items. It seems that some of these concerns are shifting consumer behavior. Retailers have observed that consumers are also shifting from bulk buying of food to buying smaller quantities with more frequent visit to the store.

However, low-income consumers may not be able to make this shift as smaller quantities are more expensive and are coupled with higher transportation costs to support frequent visits to the grocery stores. Cash-strapped consumers may also be more hesitant to discard food of questionable food safety.

The challenging situation leaves ample opportunity for breakdown in the integrity of the cold-chain and heightens the risk of foodborne illness. Food producers, manufacturers, and retailers should be aware of the threat of reputational damage that could occur should the cold chain be jeopardized even outside of their span of control.

### **Outlook**

Eskom's outlook for 2023 is very dim, with forecasts of continued loadshedding at Stage 4 and above to keep up with the growing demand. Stage 4 forecast is largely due to planned maintenance for 2023, which will remove about 2 300 MW of capacity from the system. In addition, the power utility ran out of money for purchasing

diesel until the next financial year (ends 31 March 2023). Eskom's diesel tanks are currently empty, removing about 2 067 MW from the system used for rapid response.

President Ramaphosa in his closing speech at the 55<sup>th</sup> national conference indicated that work is being done to resolve the energy crisis. The government's objective to resolve the energy crisis is to improve performance of Eskom's existing power stations and to add new generation capacity to the grid. However, this does not ease the level of uncertainty as there are no timelines attached to resolving this crisis which was forewarned as early as 1998.

More businesses are moving towards the alternative, off-grid, sources of power to ensure that among others; the integrity of the cold chain is maintained. A spokesperson for the retail chain Shoprite has said that there are making substantial investments to equip all of their supermarkets with alternative power solutions and that such designs have become standard specification for new stores.

Although Post is not aware of any additional food safety guidance or foodborne illness monitoring projects on the horizon, recent weeks have shown increased attention to the impact of loadshedding on the agriculture sector. Like South African businesses, organizations and Ministries are working to better understand the impact of unprecedented loadshedding and to address the challenges imposed by the prolonged crisis.

**Attachments:**

No Attachments.