**help us understand patterns and trends around outages, quantify their impact on our communities, and identify possible weak points in the grid.**

# **Recommended Analysis**

1. Are there any trends in power outages over time?
2. Which event types are the most significant?
3. Are there any special events that skew the data?
4. What is the most common amount of downtime for a power outage?

### **0. Outage Risk Index (ORI):**

* Assesses the risk of outages in specific areas or regions based on historical data.
* **Formula**: (Number of Events in Region \* Average Duration \* Customers Affected) / Total Events
* **Critical for**: Identifying high-risk regions that may need infrastructure upgrades or improved monitoring.

### **1. Mean Time to Restoration (MTTR):**

* Measures the average time it takes to restore services after an event occurs.
* **Formula**: Average of the time difference between "Date/Time of Restoration" and "Date/Time Event Began."

### **2. Event Severity Index (ESI):**

* This KPI could be created to weigh events based on both their **duration** and the **number of customers affected**. It provides a measure of how impactful each event is.
* **Formula**: ESI = (Duration in hours \* Customers Affected) / Total Customers Affected

### **3. Energy Loss per Event:**

* Calculates how much energy (MW) was lost on average per event.
* **Formula**: Total Demand Loss (MW) / Total Number of Events

### **4. Failure Rate per Region:**

* Tracks the number of events per region to identify which areas are more prone to failures.
* **Formula**: Number of Events in Region / Total Number of Events

### **5. Customer Impact per Event Type:**

* Measures how different types of events (e.g., vandalism, operational malfunction) affect customers.
* **Formula**: Sum(Customers Affected) by Event Type / Total Customers Affected

### **6. Event Recovery Efficiency:**

* Evaluates how quickly teams respond to different types of incidents.
* **Formula**: Average Restoration Time by Event Type / Average Event Duration

### **7. Customer Downtime:**

* This measures the total downtime experienced by customers based on the event duration and number of customers affected.
* **Formula**: Sum(Duration in Hours \* Customers Affected)

### **8. Event Frequency Over Time:**

* Tracks the number of events over a time period (e.g., monthly, quarterly) to identify trends in incident occurrence.

### **9. Energy Loss Efficiency:**

* A measure of how much energy (MW) is lost relative to the number of events and their severity.
* **Formula**: Total MW Lost / (Total Events \* Average Event Severity)

### **10. Restoration Time Efficiency:**

* This KPI tracks how efficiently teams restore services relative to the severity of the event.
* **Formula**: Total Duration of Event / Total Restoration Time
* **Critical for**: Identifying how quickly the system can bounce back after a failure and determining team performance.

### **11. Mean Time Between Failures (MTBF):**

* Tracks the average time between incidents or failures in the system.
* **Formula**: Total Operating Time / Number of Failures
* **Critical for**: Predicting the reliability of the system and planning preventive maintenance.

Track system **efficiency** in managing disruptions.

### **Potential Top KPIs:**

1. **Total Customers Affected**: Sum of customers affected across all events.
2. **Average Event Duration**: Mean duration of events.
3. **Total Demand Loss (MW)**: Total megawatts lost due to events.
4. **Number of Events by Type**: Count of events categorized by type (e.g., vandalism, operational malfunction).
5. **Event Frequency by Area**: Number of events that occurred in specific regions.