SQL Queries for AEMR Power Outages Analysis

Please see the final execute presentation [here](https://public.tableau.com/views/AEMRPowerOutageAnalysis_16352911227160/Story1?:language=en-US&publish=yes&:display_count=n&:origin=viz_share_link)

# What are the most common outage types and how long do they tend to last?

Question 1.1: In the **AEMR** dataset, write a SQL statement that **COUNTS** the number of **valid (i.e. Status = Approved)** outage events for 2016. This should be grouped by and ordered by the outage **reason**.

SELECT

Count(\*) as Total\_Number\_Outage\_Events

,Status

,Reason

FROM

AEMR

WHERE

Status='Approved'

AND YEAR(Start\_Time)=2016

GROUP BY

Status

,Reason

ORDER BY

Reason

Question 1.2: Write a SQL statement to **COUNT** the number of **valid** (i.e. Status = Approved) outage events **sorted by their reason** (i.e. Forced, Consequential, Scheduled, Opportunistic)\* for 2017.

SELECT

Count(\*) as Total\_Number\_Outage\_Events

,Status

,Reason

FROM

AEMR

WHERE

Status='Approved'

AND YEAR(Start\_Time)=2017

GROUP BY

Status

,Reason

ORDER BY

Reason

Question 1.3: Write a SQL statement that calculates the **average duration in days** rounded to 2 decimal places for each **approved** outage type across both 2016 and 2017. Don't forget to Order this by **Reason** and **Year**.

SELECT

Status

,Reason

,Count(\*) as Total\_Number\_Outage\_Events

,ROUND(AVG((TIMESTAMPDIFF(MINUTE, Start\_Time, End\_Time)/60)/24),2) AS Average\_Outage\_Duration\_Time\_Days

,YEAR(Start\_Time) as Year

FROM

AEMR

WHERE

Status='Approved'

GROUP BY

Status

,Reason

,YEAR(Start\_Time)

ORDER BY

YEAR(Start\_Time)

,Reason

# How frequently do outages occur?

Question 2.1: Write a SQL statement showing the **monthly** **COUNT** of all approved outage types (Forced, Consequential, Scheduled, Opportunistic) that occurred for **2016**. Order by **Reason** and **Month**.

SELECT

Status

,Reason

,Count(\*) as Total\_Number\_Outage\_Events

,Month(Start\_Time) as Month

FROM

AEMR

WHERE

Status='Approved'

AND YEAR(Start\_Time) = 2016

GROUP BY

Status

,Reason

,Month(Start\_Time)

ORDER BY

Reason

,Month

Question 2.2: Write a SQL Statement showing the **monthly COUNT** of all approved outage types (Forced, Consequential, Scheduled, Opportunistic) that occurred during **2017**. Order by **Reason** and **Month**.

SELECT

Status

,Reason

,Count(\*) as Total\_Number\_Outage\_Events

,Month(Start\_Time) as Month

FROM

AEMR

WHERE

Status='Approved'

AND YEAR(Start\_Time) = 2017

GROUP BY

Status

,Reason

,Month(Start\_Time)

ORDER BY

Reason

,Month

Question 2.3: Write a SQL statement showing the total number of all approved outage types (Forced, Consequential, Scheduled, Opportunistic) that occurred for both 2016 and 2017 per month (i.e. 1 – 12). Don't forget to Order this by by **Month** and **Year**.

SELECT

Status

,Count(\*) as Total\_Number\_Outage\_Events

,Month(Start\_Time) as Month

,Year(Start\_Time) as Year

FROM

AEMR

WHERE

Status='Approved'

GROUP BY

Status

,Month(Start\_Time)

,Year(Start\_Time)

ORDER BY

Year(Start\_Time)

,Month(Start\_Time)

# Are there any energy providers that have more outages than their peers which may indicate that these providers are unreliable?

Question 3.1: Write a SQL statement showing the count of all approved outage types (Forced, Consequential, Scheduled, Opportunistic) for all participant codes for 2016 and 2017. Order by **Year** and **Participant\_Code**.

SELECT

Count(\*) as Total\_Number\_Outage\_Events

,(Participant\_Code)

,Status

,Year(Start\_Time) as Year

FROM

AEMR

WHERE

Status='Approved'

GROUP BY

(Participant\_Code)

,Status

,Year(Start\_Time)

ORDER BY

Year(Start\_Time)

,(Participant\_Code)

Question 3.2: Write a SQL statement showing the **average duration** of all approved outage types (Forced, Consequential, Scheduled, Opportunistic) for all participant codes from 2016 to 2017. Don't forget to order the average duration in descending order with the DESC keyword.

SELECT

Participant\_Code

,Status

,Year(Start\_Time) as Year

,ROUND(AVG((TIMESTAMPDIFF(MINUTE, Start\_Time, End\_Time)/60)/24),2) AS Average\_Outage\_Duration\_Time\_Days

FROM

AEMR

WHERE

Status='Approved'

GROUP BY

Participant\_Code

,Status

,Year(Start\_Time)

ORDER BY

Year(Start\_Time)

,CAST(Avg(CAST(TIMESTAMPDIFF(DAY,Start\_Time,End\_Time)AS DECIMAL(18,2))) AS DECIMAL(18,2)) DESC

# What is the energy security risk?

**Question 4.1: Of the outage types in 2016 and 2017, what are the respective percentages composed of Forced Outage(s)?**

SELECT

SUM(CASE WHEN Reason = 'Forced' THEN 1 ELSE 0 END) as Total\_Number\_Forced\_Outage\_Events

,Count(\*) as Total\_Number\_Outage\_Events

,ROUND(((SUM(CASE WHEN Reason = 'Forced' THEN 1 ELSE 0 END)/Count(\*))\*100),2) as Forced\_Outage\_Percentage

,Year(Start\_Time) as Year

FROM

AEMR

WHERE

Status = 'Approved'

GROUP BY

Year(Start\_Time)

Question 4.2: **What was the average duration for a forced outage during both 2016 and 2017? Have we seen an increase in the average duration of forced outages?**

Write a SQL statement to calculate the AVERAGE duration of forced outage events rounded to 2 decimal places, as well as the AVERAGE amount of energy lost (MW) (also rounded to 2 decimal places) for both 2016 and 2017 due to forced outages. Don't forget to order this by YEAR.

SELECT

Status

,Year(Start\_Time) AS Year

,ROUND(AVG(Outage\_MW),2) AS Avg\_Outage\_MW\_Loss

,Cast(ROUND(AVG(Cast(TIMESTAMPDIFF(MINUTE, Start\_Time, End\_Time) AS DECIMAL(18,2))),2) AS DECIMAL(18,2)) AS Average\_Outage\_Duration\_Time\_Minutes

FROM

AEMR

WHERE

Status='Approved'

And Reason='Forced'

GROUP BY

Status

,Year(Start\_Time)

ORDER BY

Year(Start\_Time)

Question 4.3: Write a SQL statement to compare the AVERAGE duration of each **individual outage event** (Forced, Consequential, Planned and Opportunistic) for both 2016 and 2017. Order from **2016** to **2017**.

SELECT

Status

,Reason

,Year(Start\_Time) AS Year

,ROUND(AVG(Outage\_MW),2) AS Avg\_Outage\_MW\_Loss

,Cast(ROUND(AVG(Cast(TIMESTAMPDIFF(MINUTE, Start\_Time, End\_Time) AS DECIMAL(18,2))),2) AS DECIMAL(18,2)) AS Average\_Outage\_Duration\_Time\_Minutes

FROM

AEMR

WHERE

Status='Approved'

GROUP BY

Status

,Reason

,Year(Start\_Time)

ORDER BY

Year(Start\_Time)

,Reason

**Question 4.4: Which energy providers tend to be the most unreliable?**

Write a SQL Statement to calculate the AVERAGE duration and AVERAGE energy lost (MW) for all **approved outages where the reason is equal to Forced** for each participant code, Ordered By AVERAGE energy loss (Avg\_Outage\_MW\_Loss) and Year in descending order.

SELECT

Participant\_Code

,Status

,Year(Start\_Time) AS Year

,ROUND(AVG(Outage\_MW),2) AS Avg\_Outage\_MW\_Loss

,ROUND(AVG((TIMESTAMPDIFF(MINUTE, Start\_Time, End\_Time)/60)/24),2) AS Average\_Outage\_Duration\_Time\_Days

FROM

AEMR

WHERE

Status='Approved'

AND Reason='Forced'

GROUP BY

Participant\_Code

,Status

,Reason

,Year(Start\_Time)

ORDER BY

Year(Start\_Time) ASC

,ROUND(AVG(Outage\_MW),2) DESC

Question 4.5: Write a SQL statement to calculate the Average Outage (MW) Loss and Overall Summed Outage (MW) loss for each participant code where the Status is **Approved** and the Outage Reason is **Forced** across both 2016 and 2017.

SELECT

Participant\_Code

,Facility\_Code

,Status

,Year(Start\_Time) AS Year

,ROUND(AVG(Outage\_MW),2) AS Avg\_Outage\_MW\_Loss

,ROUND(SUM(Outage\_MW),2) AS Summed\_Energy\_Lost

FROM

AEMR

WHERE

Status='Approved'

AND Reason='Forced'

GROUP BY

Participant\_Code

,Facility\_Code

,Status

,Year(Start\_Time)

ORDER BY

Year(Start\_Time) ASC

,ROUND(SUM(Outage\_MW),2) DESC