Indian EV Market Analysis

Primary Analysis Questions

SQL

Q.1: List the top 3 and bottom 3 makers for the fiscal years 2023 and 2024 in terms of the number of 2-wheelers sold.

```sql
SELECT
    m.maker,
    SUM(m.electric_vehicles_sold) AS Total_EV_Sold
FROM
    sales_by_makers m
JOIN
    dim_date d ON m.date = d.date
WHERE
    d.fiscal_year IN (2023, 2024)
    AND vehicle_category = '2-Wheelers'
GROUP BY
    m.maker
ORDER BY
    Total_EV_Sold DESC
LIMIT 3;
```

```sql
SELECT
    m.maker,
    SUM(m.electric_vehicles_sold) AS Total_EV_Sold
FROM
    sales_by_makers m
JOIN
    dim_date d ON m.date = d.date
WHERE
    d.fiscal_year IN (2023, 2024)
    AND vehicle_category = '2-Wheelers'
GROUP BY
    m.maker
ORDER BY
    Total_EV_Sold ASC
LIMIT 3;
```

Q .2: Identify the top 5 states with the highest penetration rate in 2-wheeler and 4-wheeler EV sales in FY 2024.

```sql
SELECT
    s.state,
    CONCAT(ROUND((SUM(s.electric_vehicles_sold) / SUM(s.total_vehicles_sold)) * 100, 2), " %") AS
Penetration_Rate
FROM
    sales_by_state s
JOIN
    dim_date d ON s.date = d.date
WHERE
    d.fiscal_year = 2024
    AND s.vehicle_category = '2-Wheelers'
GROUP BY
    s.state
ORDER BY
    Penetration_Rate DESC
LIMIT 5;
```

```sql
SELECT
    s.state,
    CONCAT(ROUND((SUM(s.electric_vehicles_sold) / SUM(s.total_vehicles_sold)) * 100, 2), " %") AS
Penetration_Rate
FROM
    sales_by_state s
JOIN
    dim_date d ON s.date = d.date
WHERE
    d.fiscal_year = 2024
    AND s.vehicle_category = '4-Wheelers'
GROUP BY
    s.state
ORDER BY
    Penetration_Rate DESC
LIMIT 5;
```

Q.3: List the states with negative penetration (decline) in EV sales from 2022 to 2024?

```sql
WITH PenetrationRates AS (
    SELECT
        s.state,
        d.fiscal_year as fy_year,
        SUM(s.electric_vehicles_sold) / SUM(s.total_vehicles_sold) AS penetration_rate
    FROM
        sales_by_state s
    JOIN
        dim_date d ON s.date = d.date
    WHERE
        d.fiscal_year IN (2022, 2023, 2024)
    GROUP BY
        s.state, fy_year
),
PenetrationComparison AS (
    SELECT
        state,
        MAX(CASE WHEN fy_year = 2022 THEN penetration_rate END) AS rate_2022,
        MAX(CASE WHEN fy_year = 2024 THEN penetration_rate END) AS rate_2024
    FROM
        PenetrationRates
    GROUP BY
        state
)
SELECT
    state
FROM
    PenetrationComparison
WHERE
    rate_2024 < rate_2022;
```

Q.4: What are the quarterly trends based on sales volume for the top 5 EV makers (4- wheelers) from 2022 to 2024?

```sql
WITH Qty_salses AS (
    SELECT
        quarter,
        maker,
        SUM(electric_vehicles_sold) AS total_ev_sold
    FROM
        sales_by_makers m
    JOIN
        dim_date d ON m.date = d.date
    WHERE
        vehicle_category = '4-Wheelers'
    GROUP BY
        maker,
        quarter
),

makers_rank AS (
    SELECT
        maker,
        SUM(total_ev_sold) AS EV_Sold,
        RANK() OVER (ORDER BY SUM(total_ev_sold) DESC) AS maker_rank
    FROM
        Qty_salses
    GROUP BY
        maker
)

SELECT
    q.quarter,
    q.maker,
    q.total_ev_sold
FROM
    Qty_salses q
JOIN
    makers_rank m ON q.maker = m.maker
WHERE
    m.maker_rank < 6
ORDER BY
    q.quarter ASC,
    q.maker DESC;
```

Q.5: How do the EV sales and penetration rates in Delhi compare to Karnataka for 2024?

```sql
SELECT
    s.state,
    SUM(s.electric_vehicles_sold) AS Total_EV_Sold,
    ROUND((SUM(s.electric_vehicles_sold) / SUM(s.total_vehicles_sold)) * 100, 2) AS PR
FROM
    sales_by_state s
JOIN
    dim_date d ON s.date = d.date
WHERE
    d.fiscal_year = 2024
    AND s.state IN ("Delhi", "Karnataka")
GROUP BY
    s.state
ORDER BY
    Total_EV_Sold DESC;
```

Q.6: List down the compounded annual growth rate (CAGR) in 4-wheeler units for the top 5 makers from 2022 to 2024.

```sql
WITH CTE1 AS (
select
    m.maker,
    sum(case when d.fiscal_year = 2022 then m.electric_vehicles_sold else 0 end) AS Total_EV_Sold_2022,
    sum(case when d.fiscal_year = 2024 then m.electric_vehicles_sold else 0 end) AS Total_EV_Sold_2024
from sales_by_makers m
join dim_date d
    on m.date = d.date
where m.vehicle_category = '4-Wheelers'
group by m.maker ) ,

top_makers AS (
select
maker
from sales_by_makers
where vehicle_category = '4-Wheelers'
group by maker
order by sum(electric_vehicles_sold) desc
limit 5 )

select
c.maker , c.Total_EV_Sold_2022 , c.Total_EV_Sold_2024 ,
case
     when Total_EV_Sold_2022 >0 then
     ROUND ( ( pow(  (Total_EV_Sold_2024 / Total_EV_Sold_2022), (1/2) ) -1 )*100,2 )
     else 0
     end as CAGR
from CTE1 c
join top_makers m
on c.maker = m.maker
order by CAGR desc;
```

Q.7 : List down the top 10 states that had the highest compounded annual growth rate (CAGR) from 2022 to 2024 in total vehicles sold.

```sql
WITH CTE1 AS (
select
    s.state,
    sum(case when d.fiscal_year = 2022 then s.total_vehicles_sold else 0 end) AS
Total_Vehicles_Sold_2022,
    sum(case when d.fiscal_year = 2024 then s.total_vehicles_sold else 0 end) AS Total_Vehicles_Sold_2024
from sales_by_state s
join dim_date d
    on s.date = d.date
group by s.state )

select
state , Total_Vehicles_Sold_2022 , Total_Vehicles_Sold_2024 ,
case
     when Total_Vehicles_Sold_2022 >0 then
     ROUND ( ( pow(  (Total_Vehicles_Sold_2024 / Total_Vehicles_Sold_2022), (1/2) ) -1 )*100,2 )
     else 0
     end as CAGR
from CTE1
order by CAGR desc
limit 10;
```

Q.8: What are the peak and low season months for EV sales based on the data from 2022 to 2024?

```sql
WITH Monthly_EV_Sales AS (
    select
        monthname(STR_TO_DATE(d.date, '%d-%b-%y')) as Month_Name,
        sum(s.electric_vehicles_sold) as Total_EV_Sold
    from sales_by_state s
    join dim_date d
        on s.date = d.date
    where year(STR_TO_DATE(d.date, '%d-%b-%y')) between 2022 and 2024
    group by Month_Name
)
select
    Month_Name,
    Total_EV_Sold
from Monthly_EV_Sales
where Total_EV_Sold = (select max(Total_EV_Sold) from Monthly_EV_Sales)
   or Total_EV_Sold = (select min(Total_EV_Sold) from Monthly_EV_Sales);
```

Q.9: What is the projected number of EV sales (including 2-wheelers and 4-wheelers) for the top 10 states by penetration rate in 2030, based on the Compounded annual growth rate (CAGR) from previous years?

```sql
WITH top_10_PR_States AS (
    SELECT
        s.state,
        ROUND((SUM(s.electric_vehicles_sold) / SUM(s.total_vehicles_sold) * 100), 2) AS PR,
        SUM(CASE WHEN d.fiscal_year = 2022 THEN s.electric_vehicles_sold END) AS fy_2022_ev_sales,
        SUM(CASE WHEN d.fiscal_year = 2024 THEN s.electric_vehicles_sold END) AS fy_2024_ev_sales
    FROM
        sales_by_state s
    JOIN
        dim_date d ON s.date = d.date
    GROUP BY
        s.state
    ORDER BY
        PR DESC
    LIMIT 10
),
CAGR_Cal_for_top_10_PR_States AS (
    SELECT
        state,
        PR,
        fy_2022_ev_sales,
        fy_2024_ev_sales,
        CASE
            WHEN fy_2022_ev_sales > 0 THEN
                ROUND((POW(fy_2024_ev_sales / fy_2022_ev_sales, 0.5) - 1) * 100, 2)
            ELSE
                0
        END AS CAGR
    FROM
        top_10_PR_States
)
SELECT
    state,
    ROUND(fy_2024_ev_sales * POW((1 + CAGR / 100), (2030 - 2024)) / 1000000, 1) AS
Ev_2030_Expected_Sales_in_Mil
FROM
    CAGR_Cal_for_top_10_PR_States
ORDER BY
    Ev_2030_Expected_Sales_in_Mil DESC;
```

Q.10: Estimate the revenue growth rate of 4-wheeler and 2-wheelers EVs in India for 2022 vs 2024 and 2023 vs 2024, assuming an average unit price.

```sql
WITH sales_data AS (
    SELECT
         vehicle_category,
        SUM(CASE WHEN d.fiscal_year = 2022 THEN s.electric_vehicles_sold END) * 85000 AS sales_2022,
        SUM(CASE WHEN d.fiscal_year = 2023 THEN s.electric_vehicles_sold END) * 85000 AS sales_2023,
        SUM(CASE WHEN d.fiscal_year = 2024 THEN s.electric_vehicles_sold END) * 85000 AS sales_2024
    FROM sales_by_state s
    JOIN dim_date d ON s.date = d.date
    WHERE s.vehicle_category = '2-Wheelers'

    UNION ALL

    SELECT
         vehicle_category,
        SUM(CASE WHEN d.fiscal_year = 2022 THEN s.electric_vehicles_sold END) * 1500000 AS sales_2022,
        SUM(CASE WHEN d.fiscal_year = 2023 THEN s.electric_vehicles_sold END) * 1500000 AS sales_2023,
        SUM(CASE WHEN d.fiscal_year = 2024 THEN s.electric_vehicles_sold END) * 1500000 AS sales_2024
    FROM sales_by_state s
    JOIN dim_date d ON s.date = d.date
    WHERE s.vehicle_category = '4-Wheelers'
)

SELECT
    vehicle_category,
    ROUND((sales_2024 / sales_2022) * 100, 2) AS `2022vs2024`,
    ROUND((sales_2024 / sales_2023) * 100, 2) AS `2023vs2024`
FROM sales_data;
```

THANK YOU!