Which countries have the highest methane emissions over the years?

```
SELECT country, SUM(value) AS total_emissions
FROM gmimethane
GROUP BY country
ORDER BY total_emissions DESC
LIMIT 5;
```

"country"	"total_emissions"
"China"	327443.46248031646
"Russia"	199788.70827109984
"United States"	173702.38796504846
"India"	137440.3059051077
"Brazil"	91736.9433811997

What are the major sources of emissions in the top methane producing countries with methane emissions greater than the average emission value?

```
WITH average_emissions AS (
   SELECT AVG(value) AS avg_value
   FROM gmimethane
)
SELECT country, epa_report_source, AVG(value) AS avg_emission
FROM gmimethane
WHERE country IN ('China', 'Russia', 'United States', 'India', 'Brazil')
GROUP BY country, epa_report_source
HAVING AVG(value) > (SELECT avg_value FROM average_emissions)
ORDER BY country,avg_emission;
```

"country"	"epa_report_source"	"avg_emission"
"Brazil"	"OtherAg"	3.242213114754093
"Brazil"	"Combustion"	4.636231315502728
"Brazil"	"Rice"	10.153503903131151
"Brazil"	"Wastewater"	13.532418217147546
"Brazil"	"Landfills"	18.823843012090162
"Brazil"	"Livestock"	138.72891602540986
"China"	"NGO"	6.4117797793155775
"China"	"Combustion"	15.4798938114317
"China"	"Wastewater"	40.682317788278695
"China"	"Landfills"	71.58178496368855
"China"	"Livestock"	179.5793955071311
"China"	"Rice"	194.45831023606556
"China"	"Coal"	245.87464815101646

"India" "OtherAg" 5.459307377049173
"India" "NGO" 8.272299119036886
"India" "Landfills" 10.085972874532784
"India" "Coal" 12.745633426221312
"India" "Combustion" 14.389262707038247
"India" "Wastewater" 23.868260334278677
"India" "Rice" 88.20032121524592
"India" "Livestock" 149.92127227245908
"Russia" "Wastewater" 12.115854947557379
"Russia" "Coal" 28.968781992278686
"Russia" "Livestock" 30.624155896098365
"Russia" "Landfills" 41.64017559647541
"Russia" "NGO" 146.76409634303675
"United States" "Combustion" 4.699837776852459
"United States" "OtherEnergy" 6.353717213114757
"United States" "Wastewater" 8.093303537508193
"United States" "Rice" 14.517860699016392
"United States" "Coal" 30.597954928180314
"United States" "NGO" 56.980807776532735
"United States" "Landfills" 67.63917799844262
"United States" "Livestock" 117.06164834336069

Which regions(continent) have the highest methane emissions over the past years?

```
SELECT region, SUM(value) AS total_emissions
FROM gmimethane
GROUP BY region
ORDER BY total_emissions DESC
LIMIT 5;
```

"region" "total_emissions"
"Asia" 895260.2101735942
"Americas" 445144.1076091431
"Europe" 350916.1709103647
"Africa" 278744.43825164216
"Oceania" 38313.86393905978

Asia,America and Europe are leading contributors of methane

How have methane emissions trends changed over decades for different regions in the world?

```
WITH Emissions_With_Decade AS (
   SELECT
      region,
      CASE
         WHEN year BETWEEN 1990 AND 1999 THEN '1990s'
```

```
        WHEN year BETWEEN 2000 AND 2009 THEN '2000s'
        WHEN year BETWEEN 2010 AND 2019 THEN '2010s'
             WHEN year BETWEEN 2020 AND 2030 THEN '2020s'
        ELSE 'Other'
      END AS Decade,
      SUM(value) AS Total_Emissions
   FROM gmimethane
   GROUP BY region,
         CASE
           WHEN year BETWEEN 1990 AND 1999 THEN '1990s'
           WHEN year BETWEEN 2000 AND 2009 THEN '2000s'
           WHEN year BETWEEN 2010 AND 2019 THEN '2010s'
                WHEN year BETWEEN 2020 AND 2030 THEN '2020s'
           ELSE 'Other'
         END
)
SELECT
   region,
   Decade,
   SUM(Total_Emissions) AS Total_Decade_Emissions
FROM Emissions_With_Decade
WHERE Decade != 'Other'
GROUP BY region, Decade
ORDER BY region,decade,Total_Decade_Emissions;
```

"region "	"decade"	"total_decade_emissions"
"Africa"	"1990s"	30625.148953824035
"Africa"	"2000s"	37052.39319919198
"Africa"	"2010s"	42800.94029412795
"Africa"	"2020s"	52951.07091248403
"Americas"	"1990s"	65892.90434783598
"Americas"	"2000s"	68301.03646164392
"Americas"	"2010s"	70602.92720247975
"Americas"	"2020s"	82095.59098299556
"Asia"	"1990s"	104201.55067038028
"Asia"	"2000s"	122309.63279613225
"Asia"	"2010s"	144351.62944086394
"Asia"	"2020s"	173306.64712092432
"Europe"	"1990s"	62622.61941411189
"Europe"	"2000s"	56899.76259172074
"Europe"	"2010s"	56452.21586621065
"Europe"	"2020s"	61402.360846305346
"Oceania"	"1990s"	6261.623834552001
"Oceania"	"2000s"	6061.543096439996
"Oceania"	"2010s"	5978.549522659989
"Oceania"	"2020s"	6851.549629919988

Asia= Increased
America= Increased
Europe= Significant drop after 1990 but consistent ever since
Africa= Increased
Oceania= Increased

How do emission reduction trends compare between developed and developing countries over the past decades?

```
WITH country_classification AS (
   SELECT country, CASE
                    WHEN country IN ('USA', 'Canada', 'Germany', 'France', 'UK') THEN 'Developed'
                    ELSE 'Developing'
                   END AS country_class
   FROM gmimethane
   GROUP BY country
),
emissions_by_class AS (
   SELECT m.year, c.country_class, SUM(m.value) AS total_emissions
   FROM gmimethane m
   JOIN country_classification c ON m.country = c.country
   GROUP BY m.year, c.country_class
),
emissions_by_decade AS (
   SELECT
      CASE
         WHEN year BETWEEN 1990 AND 1999 THEN '1990s'
         WHEN year BETWEEN 2000 AND 2009 THEN '2000s'
         WHEN year BETWEEN 2010 AND 2019 THEN '2010s'
         WHEN year BETWEEN 2020 AND 2030 THEN '2020s'
         ELSE 'Other'
      END AS decade,
      country_class,
      SUM(total_emissions) AS total_emissions
   FROM emissions_by_class
   GROUP BY
      CASE
         WHEN year BETWEEN 1990 AND 1999 THEN '1990s'
         WHEN year BETWEEN 2000 AND 2009 THEN '2000s'
         WHEN year BETWEEN 2010 AND 2019 THEN '2010s'
         WHEN year BETWEEN 2020 AND 2030 THEN '2020s'
```

```
        ELSE 'Other'
    END,
    country_class
)
SELECT *
FROM emissions_by_decade
WHERE decade != 'Other'
ORDER BY country_class, decade;
```

"decade"	"country_class"	"total_emissions"
"1990s"	"Developed"	11209.215561515997
"1990s"	"Developing"	258394.63165918784
"2000s"	"Developed"	9757.74059828
"2000s"	"Developing"	280866.6275468485
"2010s"	"Developed"	8371.595861060001
"2010s"	"Developing"	311814.66646528273
"2020s"	"Developed"	9154.251394891999
"2020s"	"Developing"	367452.9680977373

Developing countries contribute more to methane emissions

What is the average emissions value of the top producers of methane?

```
SELECT country, avg(value) AS Average_emissionValue
from gmimethane
group by country
order by Average_emissionValue DESC
limit 5;
```

"country"	"average_emissionvalue"
"China"	67.09907018039273
"Russia"	40.94030907194663
"United States"	35.59475163218207
"India"	28.16399711170244
"Brazil"	18.79855397155733

For which years is the percentage change in emissions maximum?

```
WITH Yearly_Emissions AS (
    SELECT
        year,
        SUM(value) AS Total_Emissions
    FROM gmimethane
    GROUP BY year
),
Yearly_Emissions_Lag AS (
    SELECT
        year,
        Total_Emissions,
        LAG(Total_Emissions) OVER (ORDER BY year) AS Prev_Year_Emissions
    FROM Yearly_Emissions
)
SELECT
    year,
    Total_Emissions,
    Prev_Year_Emissions,
    ((Total_Emissions - Prev_Year_Emissions) / Prev_Year_Emissions) * 100 AS
YoY_Change_Percentage
FROM Yearly_Emissions_Lag
WHERE Prev_Year_Emissions IS NOT NULL
ORDER BY YoY_Change_Percentage DESC
LIMIT 10;
```

"year"	"total_emissions"	"prev_year_emissions"	"yoy_change_percentage"
2003	28563.847613807146	28007.833211029953	1.9852103466476847
2006	29715.915714744	29274.57599086402	1.5075870749339289
2001	27665.892228961042	27275.40614219198	1.431641694841802
2008	30491.196856398798	30066.03987294399	1.4140770957913853
2010	31029.977992605985	30604.76012772356	1.3893847333155198
2004	28958.900386463956	28563.847613807146	1.3830516742634167
2002	28007.833211029953	27665.892228961042	1.23596585730556
2007	30066.03987294399	29715.915714744	1.1782378223204932
2005	29274.57599086402	28958.900386463956	1.0900814609232152
1994	27019.420392052805	26752.154119228846	0.9990458025653132

Predicting Future Methane Emissions(Next Decade)

1.**Which countries are expected to emit maximum emissions in the next decade?**

```
SELECT country,SUM(value) AS total_emissions
FROM gmimethane
WHERE year=2030
GROUP BY country
ORDER BY total_emissions DESC
LIMIT 10;
```

"country"	"total_emissions"
"China"	6117.1910002800005
"Russia"	3421.1581982880007
"United States"	2811.7642581119994
"India"	2412.589762928
"Brazil"	1632.0048550279996
"Indonesia"	1089.2255823760001
"Iran"	706.478003476
"Pakistan"	688.650036504
"Nigeria"	644.4433918240001
"Mexico"	595.85543156

2.Which sector are expected to emit maximum emissions in the next decade?

```
SELECT epa_report_sector,SUM(value) AS total_emissions
FROM gmimethane
WHERE year=2030
GROUP BY epa_report_sector
ORDER BY total_emissions DESC
LIMIT 10;
```

"epa_report_sector"	"total_emissions"
"Agriculture"	15009.627793440006
"Energy"	13142.843831533217
"Waste"	6995.8455280079925
"Industrial Processes"	36.774579956000025

3.Which sources are expected to emit maximum emissions in the next decade?

```
SELECT epa_report_source,SUM(value) AS total_emissions
FROM gmimethane
WHERE year=2030
GROUP BY epa_report_source
ORDER BY total_emissions DESC
LIMIT 5;
```

"epa_report_source"	"total_emissions"
"Livestock"	12108.561554055997
"NGO"	7135.0937815040015

"Landfills" 4765.330265487994
"Coal" 3646.030349824
"Rice" 2469.5108886279995

4.**Which sub-sources are expected to emit maximum emissions in the next decade?**

```
SELECT epa_report_subsource,SUM(value) AS total_emissions
FROM gmimethane
WHERE year=2030
GROUP BY epa_report_subsource
ORDER BY total_emissions DESC
LIMIT 4;
```

"epa_report_subsource" "total_emissions"
"Enteric" 10780.198006495999
"Oil Product" 4703.51269382
"Under" 3588.4905754560004
"MSW" 3409.4206160080007

5.**Which regions are expected to emit maximum emissions in the next decade?**

```
SELECT region,SUM(value) AS total_emissions
FROM gmimethane
WHERE year=2030
GROUP BY region
ORDER BY total_emissions DESC
LIMIT 5;
```

"region" "total_emissions"
"Asia" 16304.355667532012
"Americas" 7630.597799496
"Europe" 5548.407555961199
"Africa" 5067.379799315998
"Oceania" 634.3509106320005

KPI's

1.What is the average emission value?

```
SELECT avg(value) AS Average_emissionValue
from gmimethane;
```

"average_emissionvalue"
2.110528363686166

2.What is the maximum emission value?

```
select max(value)
from gmimethane
```

"max"
662.6366206