🌍🏭 ***Industry Carbon Emission Analysis***

(SQL | MySQL)

📌 Project Overview

This project explores **carbon emissions across industries and countries** to evaluate environmental efficiency and economic decoupling. Using SQL, the analysis uncovers emission trends, identifies inefficient industries, and highlights high-risk regions to support sustainability-driven decision-making.

🎯 Business Objectives

- ★ Understand global and industry-level emission patterns
- ★ Measure emission efficiency using GDP-adjusted metrics
- ★ Identify persistently inefficient industries
- ★ Detect country–industry emission hotspots
- ★ Support data-driven sustainability and policy strategies

📂 Dataset Description

Table Name	Description
`countries`	Country metadata
`industries`	Industry classification
`emissions`	Annual emissions ($MTCO_2$) by country & industry
`industry_gdp`	GDP contribution by industry & country

🔄 Analysis Workflow

🔎 Step 1. Data Understanding & Sanity Checks

- ❖ Null checks
- ❖ Find Duplicates
- ❖ Date validation

🌎 Step 2. Global Emission Overview

- ❖ Total emissions by country and industry
- ❖ High-level emission concentration analysis

🏭 Step 3. Industry-Level Trends & Efficiency

- ❖ Emission intensity (emissions per GDP unit)
- ❖ Industry comparison using relative benchmarks

🗺️ Step 4. Country-Level Efficiency Comparison

- ❖ Cross-country emission efficiency
- ❖ GDP vs emission imbalance detection

🚨 Step 5. Industry–Country Risk Hotspots

- ❖ Identification of high-risk combinations
- ❖ Multi-year emission persistence

📊 Step 6. Advanced Insights & Decoupling Analysis

- ❖ Persistent inefficiency detection
- ❖ Structural decoupling evaluation

🧠 SQL Concepts Used

- ★ JOINs (multi-table joins)
- ★ Aggregations (`SUM`, `AVG`, `COUNT`)
- ★ Window functions
- ★ Subqueries
- ★ Conditional logic (`CASE WHEN`)
- ★ HAVING & GROUP BY

★ Time-based trend analysis

🛠️ Tools Used

★ MySQL / MySQL Workbench
★ SQL
★ Python (for CSV generation)
★ GitHub
★ Google Colab

🧑‍💻 Skills Demonstrated

★ SQL Analytics
★ ESG & Sustainability Analysis
★ Data Modeling
★ Business Insight Generation
★ Environmental Impact Assessment

🧑 Author

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