Energy Consumption Monitoring and Analysis

Group-20

MileStone-3

Implementation of ROLAP

Team Members-

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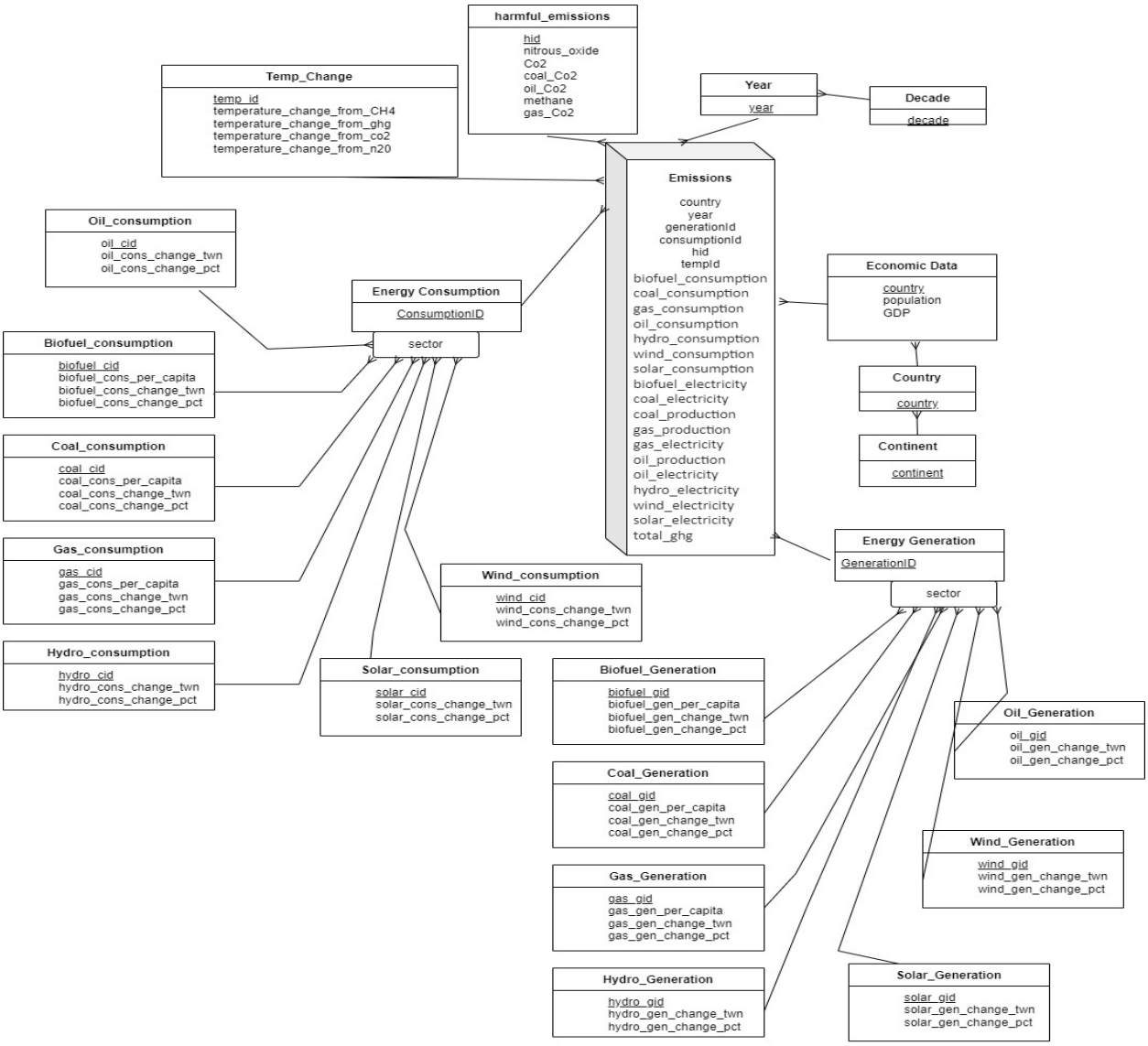
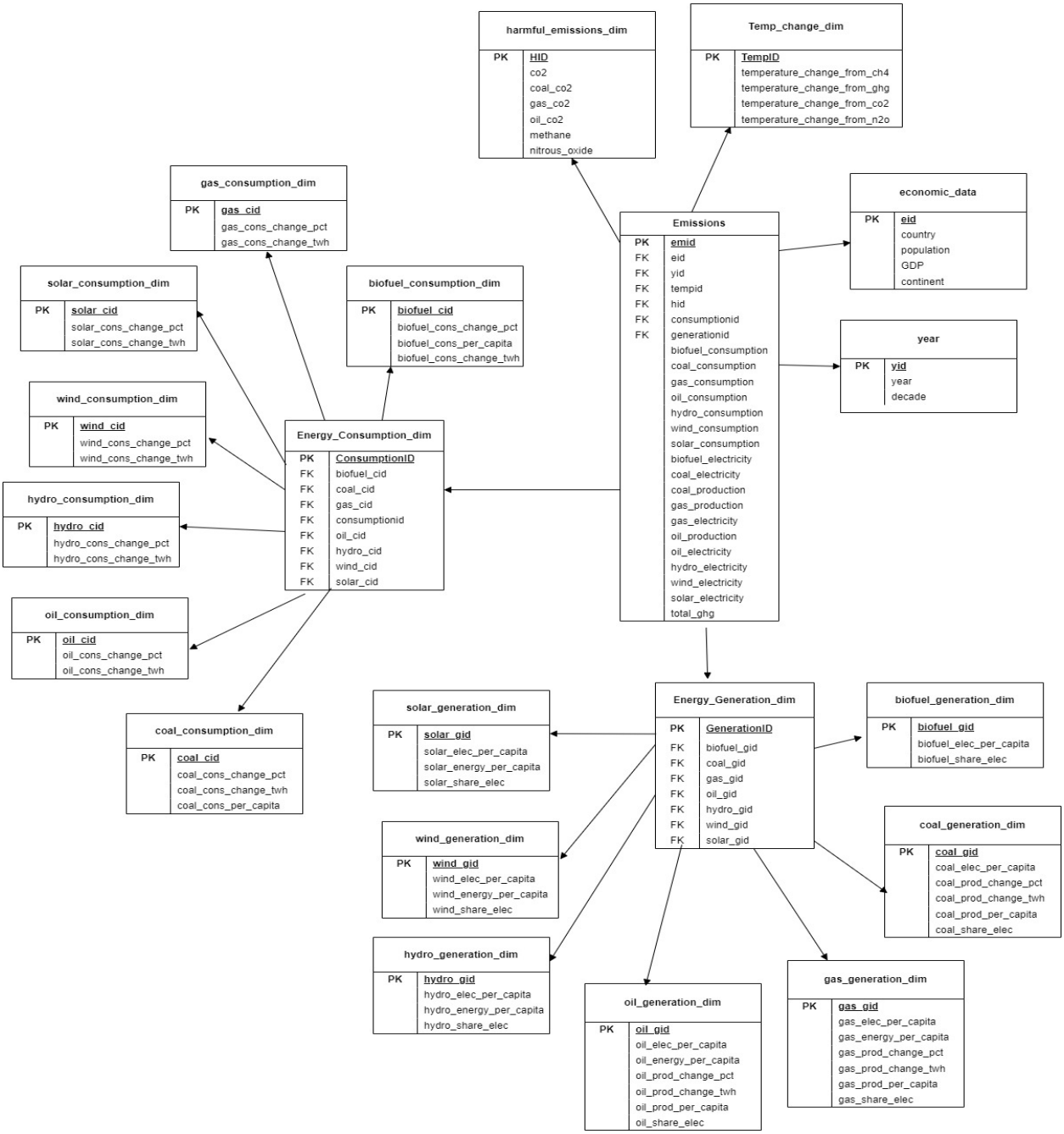
Conceptual Data Warehouse Model-

The data warehouse of this project consists of one fact table (Emissions) and dimensions tables(temp_change, harmful_emissions, economic_data, energy_consumption, energy_generation etc)

We also have 2 separate hierarchies country->continent, year->decade



Logical Model-



In the year 2017, for India, the amount of energy produced from coal was 3329.753 TWh, from gas was 276.993 TWh, from oil was 470.285.

The amount of electricity India generated using biofuel was 11.247 TWh, using coal was 1115.24 TWh, using gas was 74.99 TWh, from hydroelectricity was 135.82 TWh, using oil was 6.365 TWh, from solar was 21.54 TWh and from wind was 52.63 TWh. While, the amount of energy consumed

using biofuel was 15.231 TWh, using coal was 4737.157 TWh, using gas was 535.999 TWh, using hydro was 361.465 TWh, using oil was 2571.897 TWh, using solar was 57.336 and using wind was 140.062 TWh. Consequently, the total amount of greenhouse gases emitted while generation of energy from these different sources was 3215.07 million tonnes.

OLAP Queries-

1)Which Country generated maximum biofuel electricity by year?

Result1 <- ROLLUP*(Emissions, Economic Data-> country, Year->year, SUM(biofuel_electricity))

Result2 <- MAX(Result1, biofuel_electricity,1)

2) Total ghg emission by each country, list top3.

Result1<-ROLLUP*(Emissions,Economic Data ->country, SUM(total_ghg))

Result2<- MAX(Result1, total_ghg,3)

3)Top 10 percent countries in generating hydro-electric power?

Result1<-ROLLUP*(Emissions,EconomicData>country,SUM(hydro_electricity))

Result2->TOPPERCENT(Result1, country,10) ORDER BY hydro_ electricity DESC

4)Which country consumes least amount of coal?

Result1<-ROLLUP*(Emissions, Economic Data->country, SUM(coal_consumption))

Result2<-MIN(Result1, coal_concumption,1) ORDER BY coal_concumption DESC

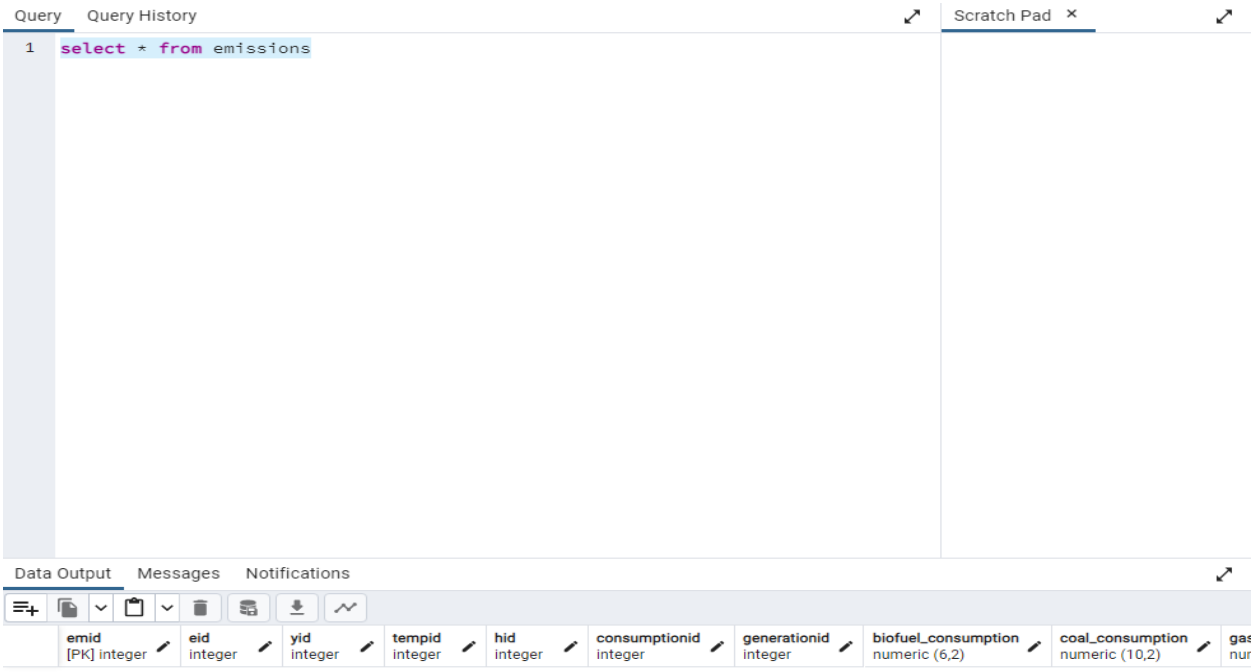
5)Number of countries that produce hydroelectricity by continent?

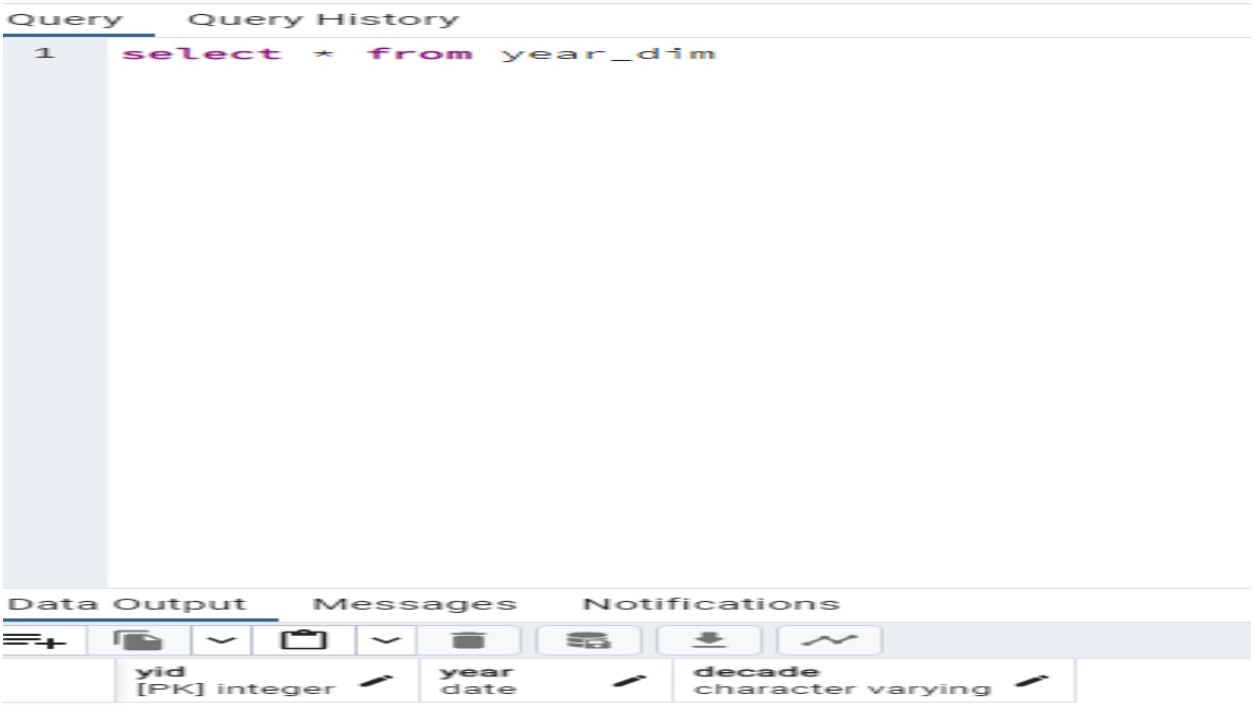
Result1<-ROLLUP*(Emissions, Economic Data->continent, COUNT(DISTINCT country) AS No.ofCountries))

6)Total biofuel consumption by country by country per year?

Result1<- ROLLUP*(Emissions, Economic Data-> country, year->year, sum(biofuel_consumption))

Data Warehouse Implementation in Postgres-





Query | Query History | Scratch Pad

```
1  select * from temp_change_dim
```

Data Output | Messages | Notifications

tempid [PK] integer	temperature_change_from_ch4 numeric (30,2)	temperature_change_from_ghg numeric (30,2)	temperature_change_from_co2 numeric (30,2)	temperature_change_from_n2o numeric (30,2)

Query | Query History | Scratch Pad

```
1  select * from harmful_emissions_dim
```

Data Output | Messages | Notifications

hid [PK] integer	co2 numeric (30,2)	coal_co2 numeric (30,2)	gas_co2 numeric (30,2)	oil_co2 numeric (30,2)	methane numeric (30,2)	nitrous_oxide numeric (30,2)

Query | Query History | Scratch Pad

```
1  select * from energy_consumption_dim
```

Data Output | Messages | Notifications

consumptionid [PK] integer	biofuel_cid integer	coal_cid integer	gas_cid integer	oil_cid integer	hydro_cid integer	wind_cid integer	solar_cid integer

Query | Query History | Scr

```
1  select * from energy_generation_dim
```

Data Output | Messages | Notifications

generationid [PK] integer	biofuel_gid integer	coal_gid integer	gas_gid integer	oil_gid integer	hydro_gid integer	wind_gid integer	solar_gid integer

Query | Query History

```
1  select * from biofuel_consumption_dim
```

Data Output | Messages | Notifications

	biofuel_cid [PK] integer	biofuel_cons_change_pct numeric (6,2)	biofuel_cons_change_twh numeric (6,2)	biofuel_cons_per_capita numeric (6,2)

Query | Query History

```
1  select * from coal_consumption_dim
```

Data Output | Messages | Notifications

	coal_cid [PK] integer	coal_cons_change_pct numeric (10,2)	coal_cons_change_twh numeric (10,2)	coal_cons_per_capita numeric (10,2)

Query Query History

```
1  select * from gas_consumption_dim
```

Data Output Messages Notifications

gas_cid [PK] integer	gas_cons_change_pct numeric (10,2)	gas_cons_change_twh numeric (10,2)

Query Query History

```
1  select * from oil_consumption_dim
```

Data Output Messages Notifications

oil_cid [PK] integer	oil_cons_change_pct numeric (10,2)	oil_cons_change_twh numeric (10,2)

Query Query History

```
1  select * from wind_consumption_dim
```

Data Output Messages Notifications

wind_cid [PK] integer	wind_cons_change_pct numeric (10,2)	wind_cons_change_twh numeric (10,2)

Query Query History

```
1  select * from solar_consumption_dim
```

Data Output Messages Notifications

solar_cid [PK] integer	solar_cons_change_pct numeric (10,2)	solar_cons_change_twh numeric (10,2)

Query | Query History | Scratch Pad

```
1  select * from energy_generation_dim
```

Data Output | Messages | Notifications

generationid [PK] integer	biofuel_gid integer	coal_gid integer	gas_gid integer	oil_gid integer	hydro_gid integer	wind_gid integer	solar_gid integer

Query | Query History

```
1  select * from hydro_consumption_dim
```

Data Output | Messages | Notifications

hydro_cid [PK] integer	hydro_cons_change_pct numeric (10,2)	hydro_cons_change_twh numeric (10,2)

Query Query History

```
1  select * from biofuel_generation_dim
```

Data Output Messages Notifications

biofuel_gid [PK] integer	biofuel_elec_per_capita numeric (10,2)	biofuel_share_elec numeric (10,2)

Query Query History Scratch Pad ×

```
1  select * from gas_generation_dim
```

Data Output Messages Notifications

gas_gid [PK] integer	gas_elec_per_capita numeric (30,2)	gas_energy_per_capita numeric (30,2)	gas_prod_change_pct numeric (30,2)	gas_prod_change_twh numeric (30,2)	gas_prod_per_capita numeric (30,2)

Query Query History

```
1  select * from oil_generation_dim
```

Data Output Messages Notifications

	oil_gid [PK] integer	oil_elec_per_capita numeric (10,2)	oil_energy_per_capita numeric (10,2)	oil_prod_change_pct numeric (10,2)	oil_prod_change_twh numeric (10,2)

Query Query History Scratch

```
1  select * from coal_generation_dim
```

Data Output Messages Notifications

	coal_gid [PK] integer	coal_elec_per_capita numeric (10,2)	coal_prod_change_pct numeric (10,2)	coal_prod_change_twh numeric (10,2)	coal_prod_per_capita numeric (10,2)	coal_sh numeri

```
1  select * from wind_generation_dim
```

Data Output | Messages | Notifications

wind_gid [PK] integer	wind_elec_per_capita numeric (10,2)	wind_energy_per_capita numeric (10,2)	wind_share_elec numeric (10,2)

Query | Query History

```
1  select * from hydro_generation_dim
```

Data Output | Messages | Notifications

hydro_gid [PK] integer	hydro_elec_per_capita numeric (10,2)	hydro_energy_per_capita numeric (10,2)	hydro_share_elec numeric (10,2)

```
1  select * from solar_generation_dim
```

Data Output | Messages | Notifications

	solar_gid [PK] integer	solar_elec_per_capita numeric (10,2)	solar_energy_per_capita numeric (10,2)	solar_share_elec numeric (10,2)