Emission inventory and critical assimilative carrying capacity of petroleum refinery in India: EGU24-166 [AS5.10]

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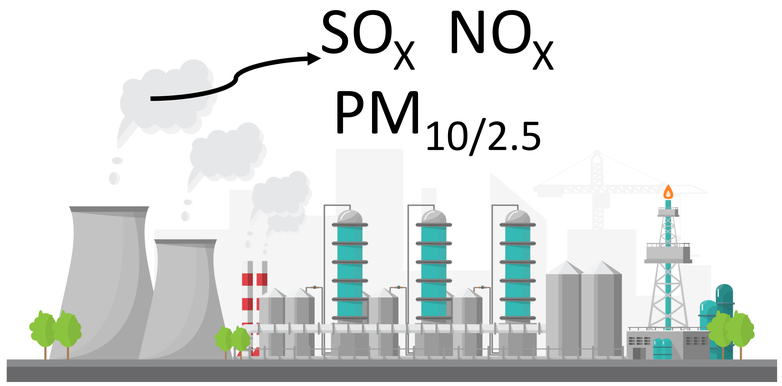
Sharing is encouraged

Objectives

- To calculate the Emission Inventory of stack operations.
- To evaluate carrying capacity using Iterative dispersion modelling simulations

Motivation

- Criteria air pollutants from stack emissions of refineries are understudied.
- To regulate capacity building of industry



Source: https://pngtree.com/

Methodology

- USEPA methodology of emission inventory calculation based on **fuel consumption and composition**
- Dispersion modeling (CALPUFF View) with current emissions, and resulting concentrations are compared with NAAQS-2009
- Model Validation (R2 Value)
  - **0.73** for 8-hour average NO_2
  - **0.63** for 8-hour average SO_2
- Scenarios

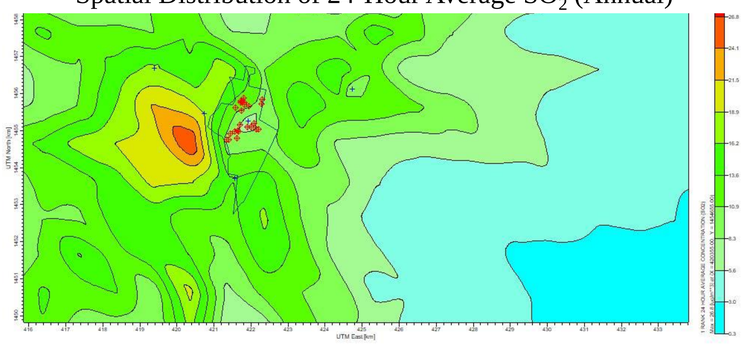
  Current emissions increased in the steps of 30% till 90%

  Extrapolated till NAAQS is achieved

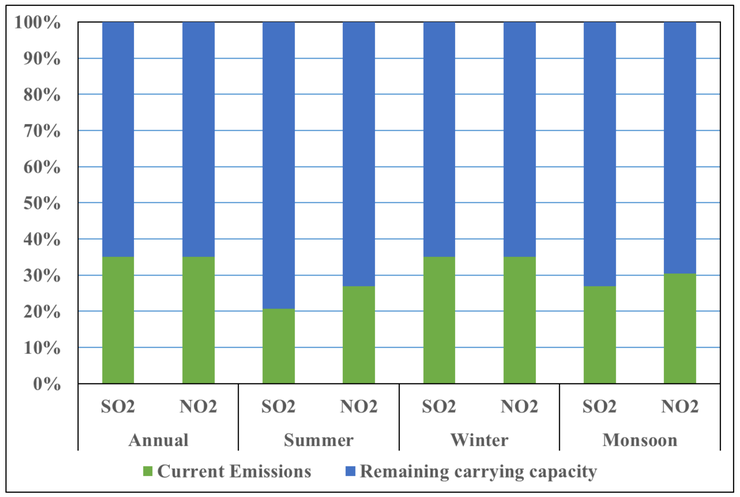
Carrying Capacity = Emissions at which concentration exceeds NAAQS

Remaining Carrying Capacity = Carrying Capacity - Current Emissions

Spatial Distribution of 24-Hour Average SO_2 (Annual)



Results
Carrying Capacity



Conclusions

- Primary Units and Captive processes have the highest emissions
- Seasonal carrying capacity is minimum in winters and maximum in summers

References

- AP 42, Fifth Edition, Volume I Chapter 5: Petroleum Industry
- Panda S. (2017), Dissertation, Indian Institute of Technology, Madras