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Pollution in the Air

Reducing levels of health-damaging pollution in the air represents a foremost societal challenge to attain well-being & sustainability

- Estimated 5.5 million annual deaths world-wide from air pollution
- Major strides have been taken in the U.S. and California
 - However, many frequencies of Total Deaths from Air Rollytics in 2018 rds



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Cause of Air Pollution

The cause of ambient air pollution is the combustion of fossil fuels for societal energy needs

• Results in the generation of gaseous and particulate pollutants



Complete Consideration of System Emissions

Integrating intermittent renewables can impact generator dispatch/dynamics – potentially increasing emissions locally

- Increased start/stops, part-load, ramping, cycling
- Could yield localized emission consequences impacting regional AQ





Air Quality Assessment



Renewable Resources and Electrification

AQ impacts include both the reduced emissions from electrified technologies and increased emissions from electricity generators

AQ Impacts of Electrifying Residential and Commercial Buildings





Full Consideration of System Interrelationships

The complex interdependencies of energy systems yield farreaching impacts and effects from strategy deployment



Pursue Reductions From Challenging Sources



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Ensure Environmental Justice

CalEnviroscreen 3.0 Identifies communities disproportionately burdened by pollution

Impacts of electrifying heavy duty port trucks









Conclusion

Conclusions

- Electrification generally translates to improvements in ozone and PM_{2.5}
 - Impacts vary markedly by pollutant, sector, horizon year, season, and location
- Increased electricity demand and altered grid dynamics can result in localized worsening at sites of emitting utility-scale power generators
- Holistic strategies needed to achieve maximum AQ and GHG co-benefits
 - Should be interpreted via population exposure and economic justice





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