



Green AI-Driven Data Centers?



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Introduction

- ❖ Rise in AI → our world perception alters → unclear future
- ❖ AI technologies developed by highly-specialized facilities called data centers where energy is used to store, process, & manage data
- ❖ AI expansion → high energy use → high heat & emissions → global climate crisis intensifies → loss of life, displacement, & poverty
- ❖ Research Question: What are data centers now doing to decrease energy usage & environmental impacts? Can they go fully green?

Methods

- ❖ Analyzing primary & secondary sources
 - Studies & collaborative journals by global experts in computer/electrical engineering, information technology, computer science
 - Considering perspective of data center companies around world

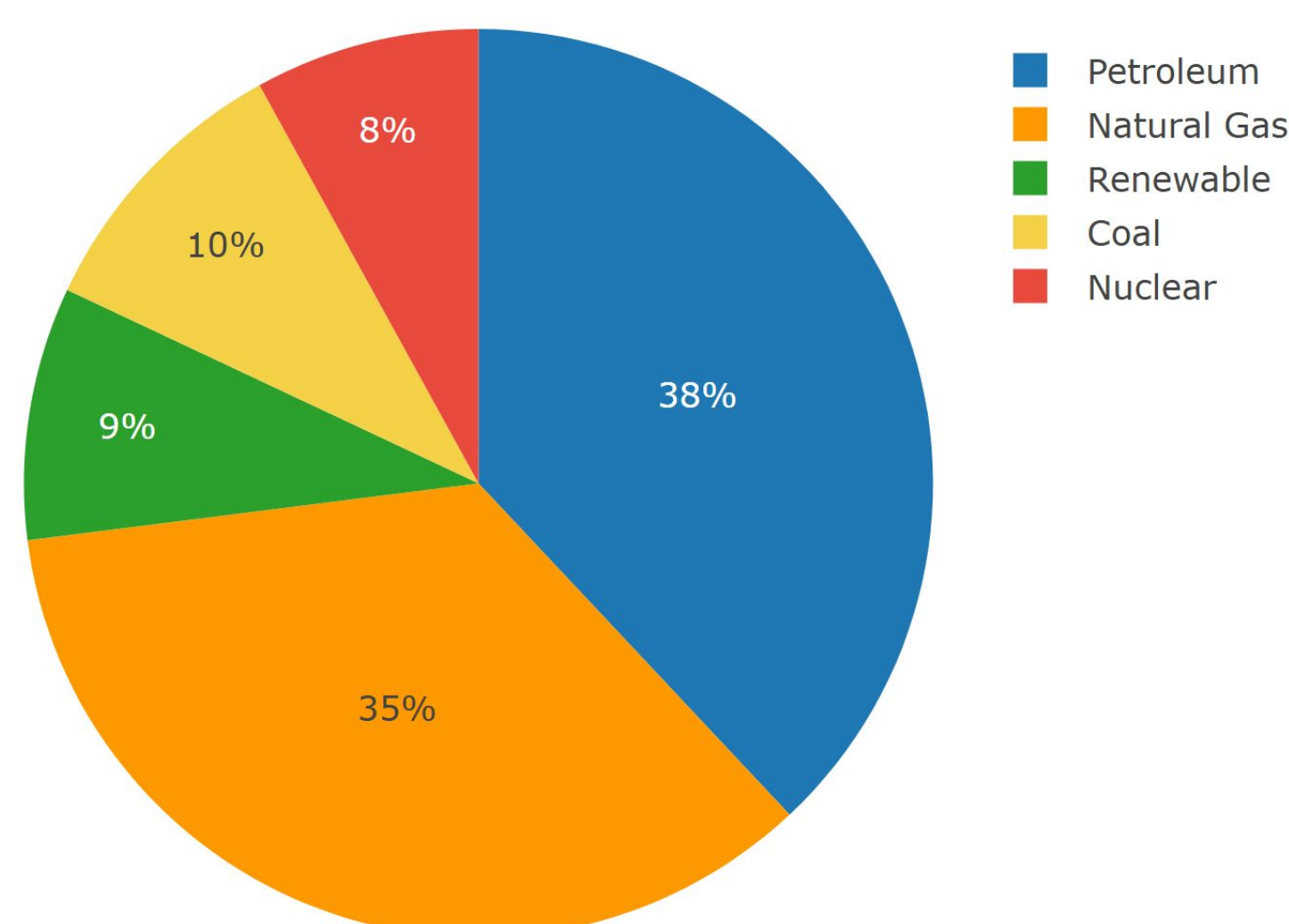
Findings

- “Green” data centers exist globally
 - Focus on sustainable practices
 - Run by Intel, Google, Microsoft, etc.
 - New ideas: energy efficient hardware, virtualization, renewable energy integration, liquid immersion cooling
 - Initial investment → low cost, time, resources needed in long run
- ❖ Not all data centers can be fully “green”
 - Difficult with high cost, abundance of fossil fuel energies, lack of govt. support

Discussion

- ❖ No clear, certain path
- ❖ Data centers must consider all factors & angles when considering transitioning to greener practices
- ❖ Potential future work: Becoming involved in developing & implementing sustainable techniques in real world

US Total Energy Consumption (Out of 103.3 Quad)



U. S. Energy Information Administration; 2024 Data
(<https://www.eia.gov/energyexplained/us-energy-facts/data-and-statistics.php>)
Quad = Quadrillion British Thermal Units



TRG Data Centers; a major data center operator, based in Houston
(<https://www.trgdatacenters.com/resource/what-are-data-center-solutions/>)

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