Emission Impacts From Wisconsin Electric Vehicle Adoption Scenarios

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Presentation to the Wisconsin Department of Natural Resources
Air Management Study Group
May 4, 2022

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Acknowledgements

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https://hollowaygroup.org/project/health-benefits-of-clean-energy

What is the influence of 2030 light duty EVs on Wisconsin emissions?

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Examined two EV penetration scenarios

- 13% of miles travelled - based on EPA's analysis for Light- Duty Vehicle GHG Emissions Standards
- 40% of miles travelled – 3X EPA's projection for Light- Duty Vehicle GHG Emissions Standards

Note that the Biden-Harris Electric Vehicle Charging Action Plan target is for 50% of **EV sales** (as opposed to miles travelled) in the U.S. by 2030.

Analysis was conducted with consideration of transportation and electricity sectors.

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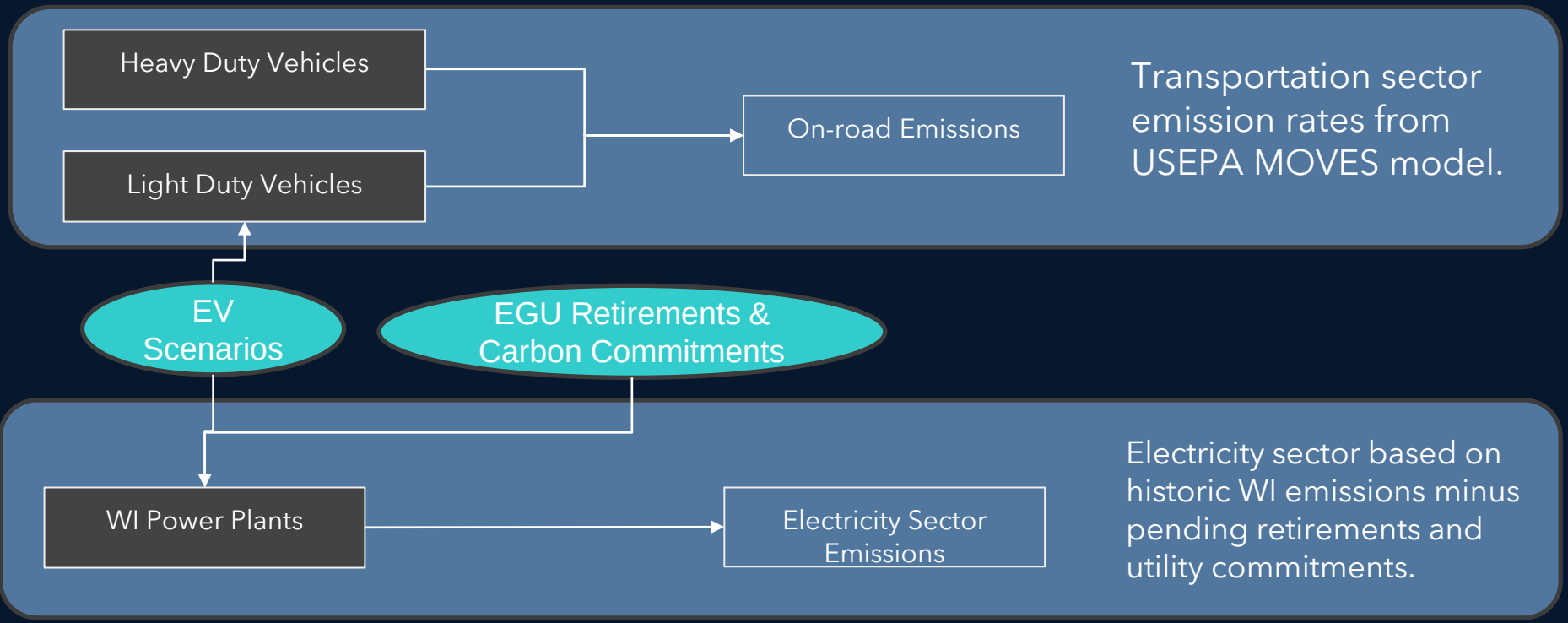

MOVES model forecasts heavy-duty vehicle emissions decline due to improved emission controls and efficiency.

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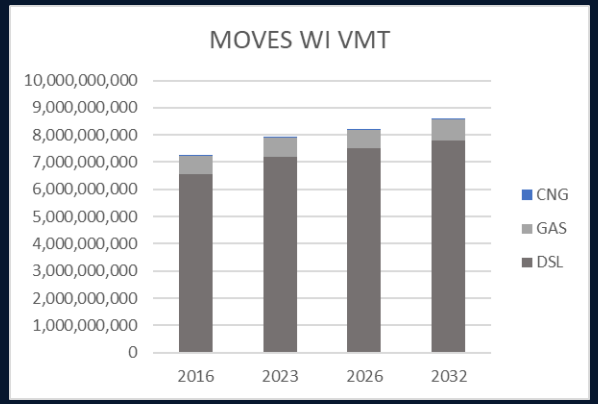
Annual heavy-duty miles travelled increase 18% from 2016 to 2032.

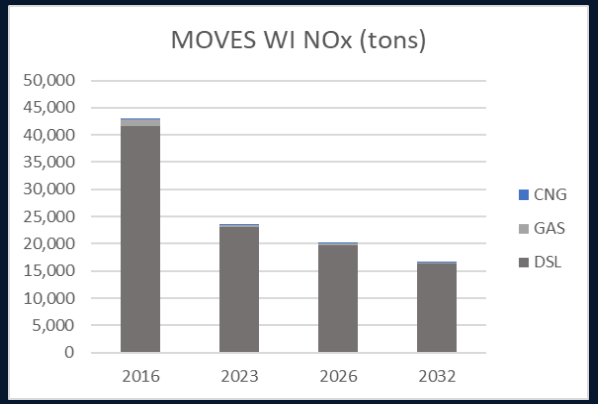
NOx and VOC emissions decline by over 60% over the same period.

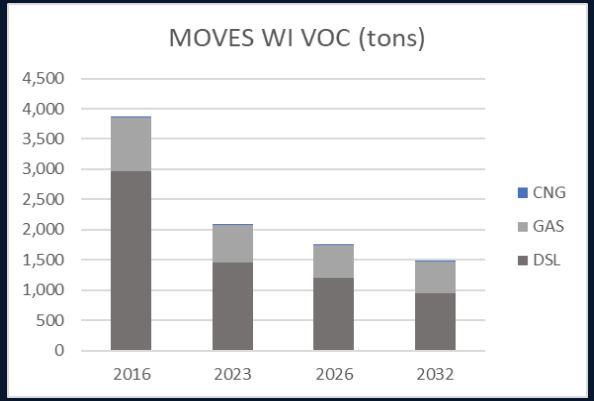
Fuel mix remains constant at 91% diesel, 9% gasoline, and 0.2% CNG.

CO_2 emissions decline 8.9% (2016 to 2032) due to fuel efficiency improvements.

Heavy Duty Vehicles







Even without EVs, light-duty vehicle emissions decline due to improved emission controls and fuel efficiency.

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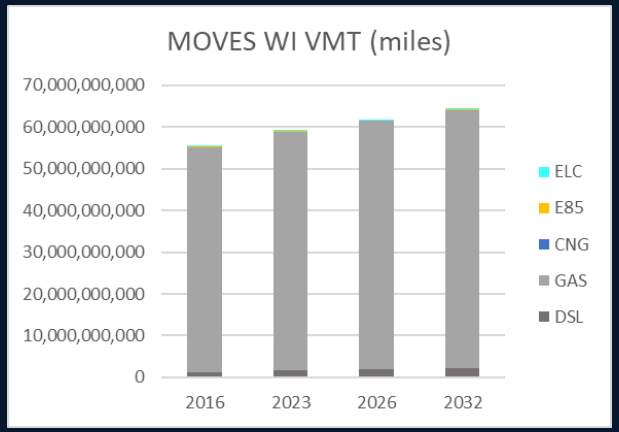
Annual heavy-duty miles travelled increase 16% from 2016 to 2032.

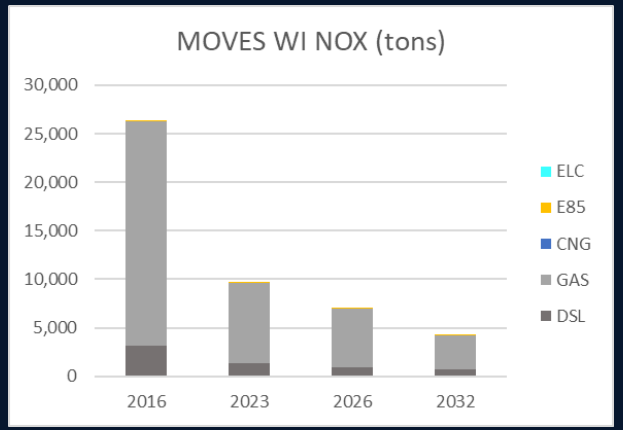
NOx and VOC emissions decline by 84% and 50%, respectively, over the same period.

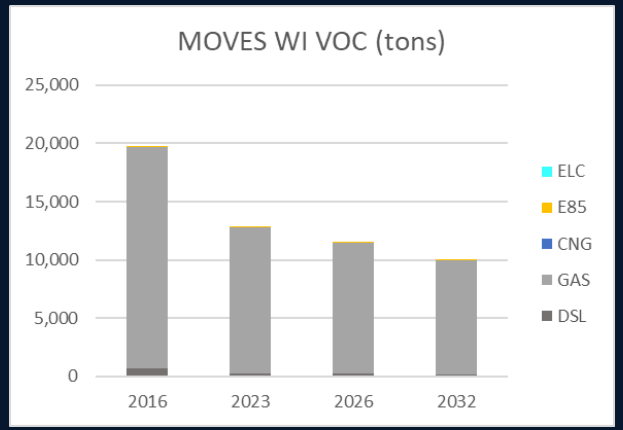
Fuel mix changes from 97.5% gasoline in 2016 to 96.2% gasoline in 2032. EVs represent 0.24% of 2032 VMT.

CO_2 emissions decline 18.7% (2016 to 2032) due to fuel efficiency improvements.

Light Duty Vehicles







How do electricity sector emissions change based on planned retirements and stated commitments?

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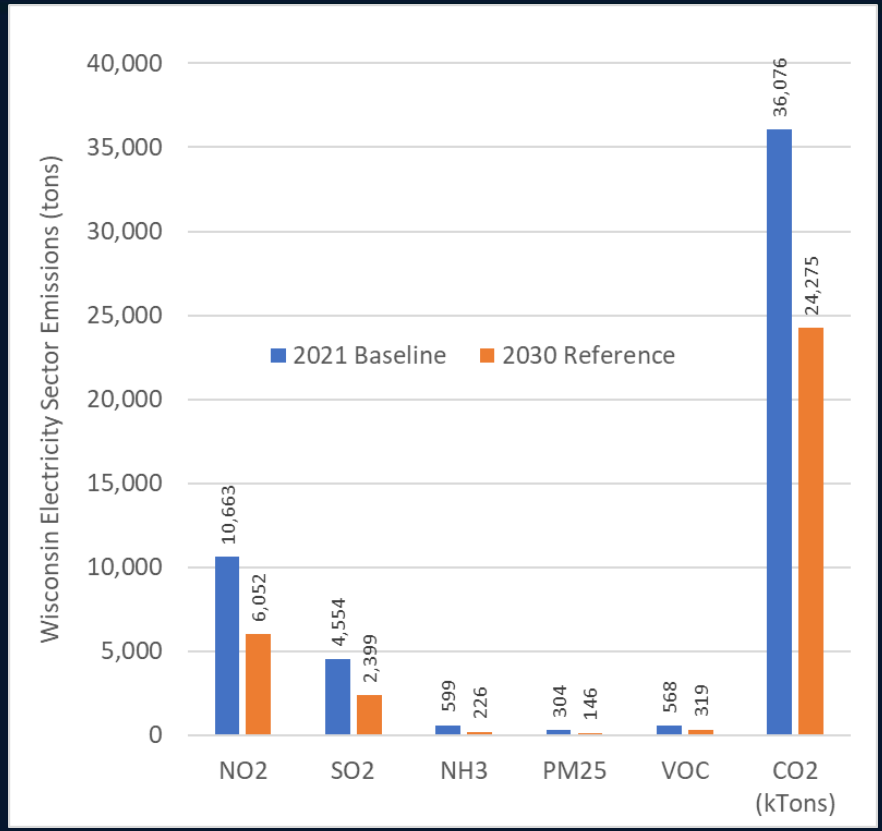
BASELINE 2021 - Planned retirements and commitments through 2021 are removed from the 2019 EPA-reported baseline.

REFERENCE CASE 2030* - Planned retirements through 2030 are removed from the emissions inventory. Emission reductions from retirements exceed commitments.

*2030 emissions are based on an adjustment of historic emissions and not a forecast generated with a power sector model.



EV13 Scenario: 13% Penetration based on EPA Light- Duty Vehicle GHG Emissions Standards

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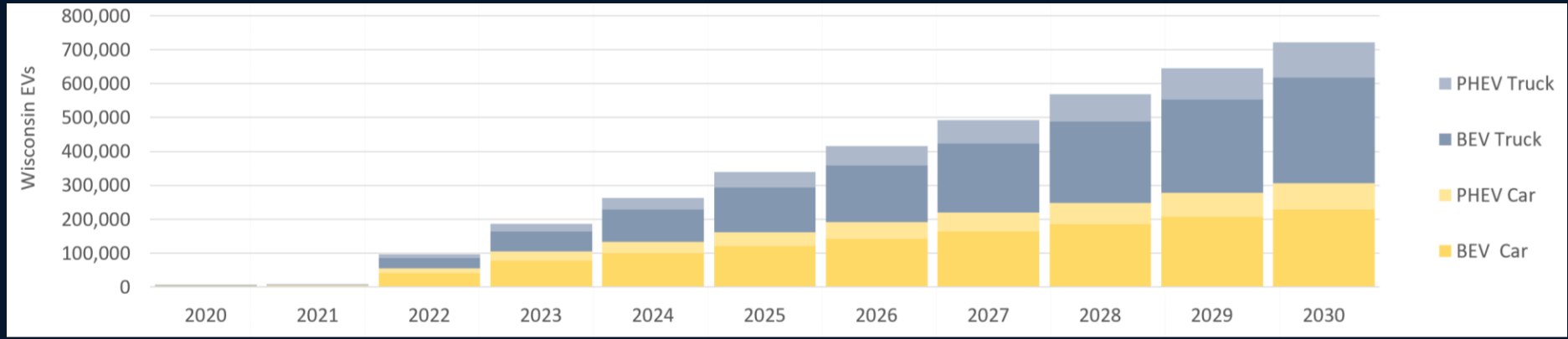

Assumptions

2.5 % per year light duty car fleet penetration

3.1% light duty car fleet penetration

%75/%25 BEV/PHEV split for cars and trucks

13% and 40% EV scenarios (million vehicle miles)

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Any future EV impacts will occur alongside major emission changes for internal combustion engines, as well as a shift toward renewable electricity supply.

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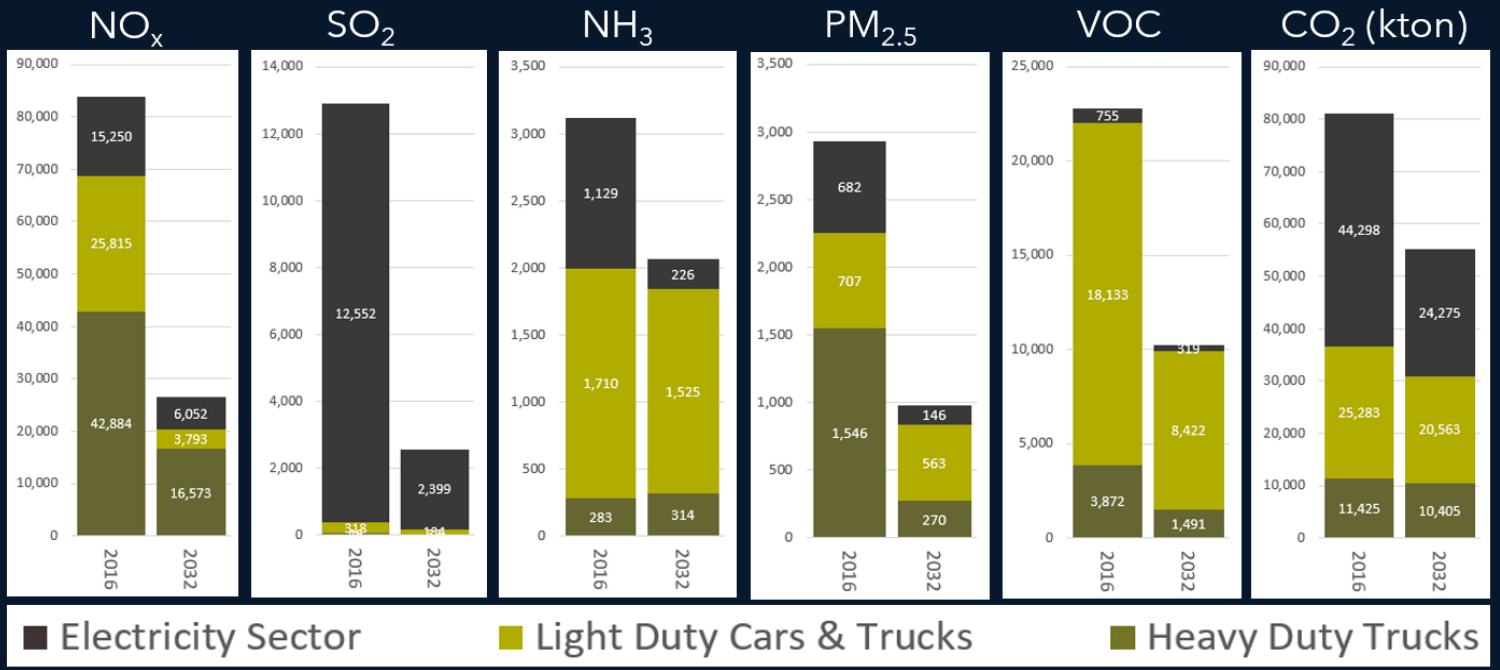
2016 versus 3032 Reference Case emissions (tons)



For light duty vehicles, on-road emission reductions are proportional to the increase in EV-miles travelled.

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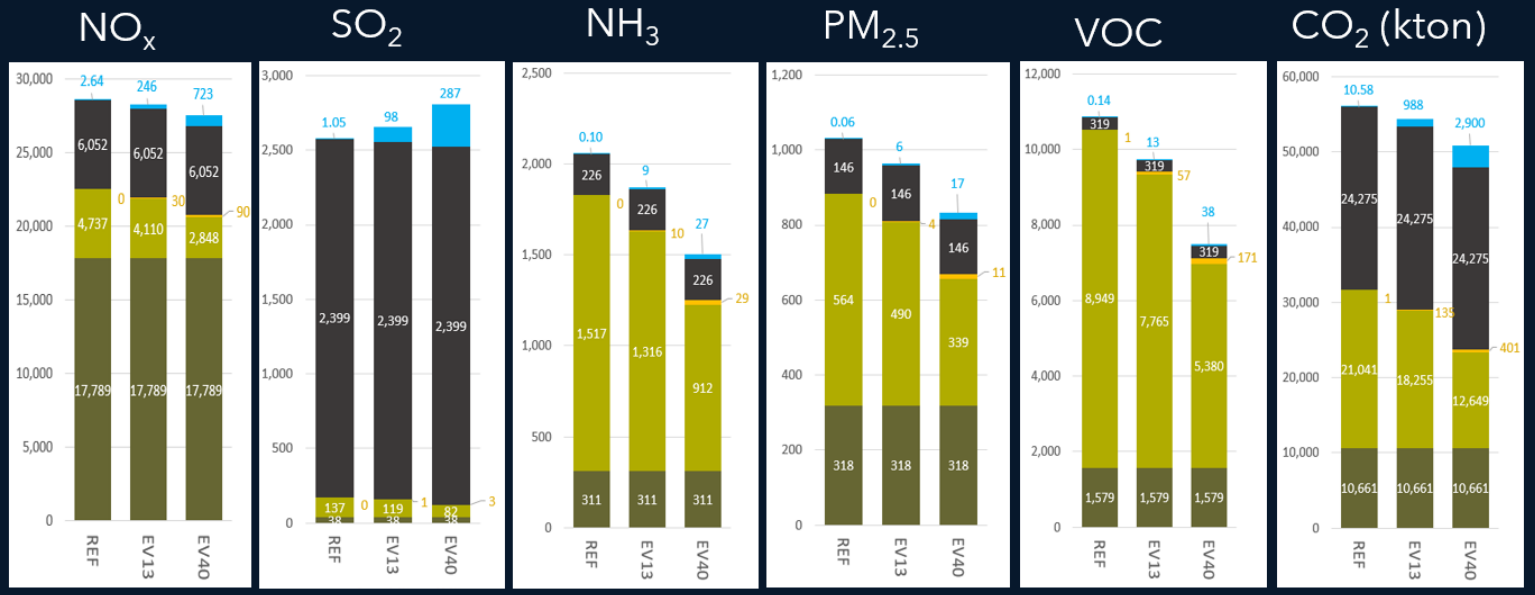
2030 emissions comparison Reference vs EV13 vs EV40 Scenarios (tons)



Electricity provides a cleaner transportation fuel than gasoline, assuming it is supplied from Wisconsin generators, except for SO_2. Electricity demand partially diminishes the vehicle's emissions savings, depending on how the incremental electricity supply is sourced.

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Please direct questions or comments to pmeier@wisc.edu