

# Changing Minds and Policy: An Equitable Approach to Clean Transportation

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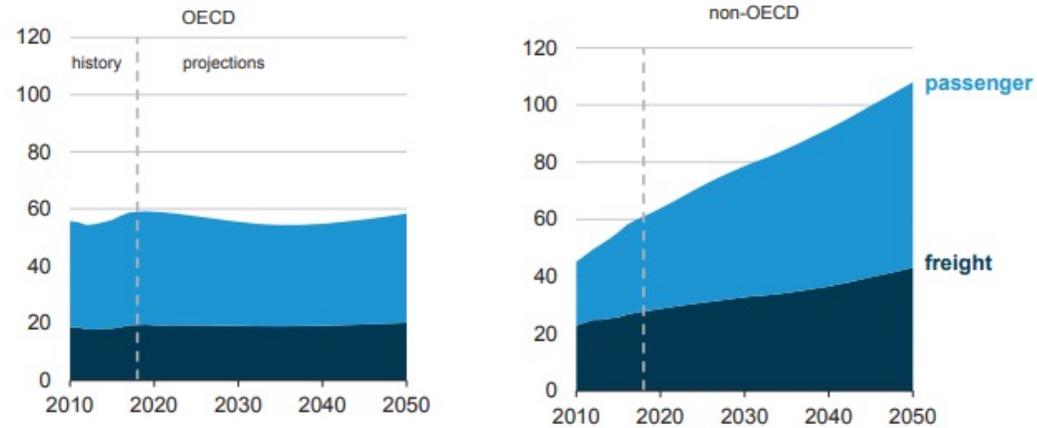
# Environmental Justice and Life Cycle Analysis

- ▶ **Environmental justice** is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. This goal will be achieved when everyone enjoys:
  - ▶ The same degree of protection from environmental and health hazards, and
  - ▶ Equal access to the decision-making process to have a healthy environment in which to live, learn, and work.
- ▶ <https://www.epa.gov/environmentaljustice>
- ▶ **Life Cycle Analysis (LCA)** is a comprehensive form of analysis that utilizes the principles of Life Cycle Assessment, Life Cycle Cost Analysis, and various other methods to evaluate the environmental, economic, and social attributes of energy systems ranging from the extraction of raw materials from the ground to the use of the energy carrier to perform work (commonly referred to as the “life cycle” of a product).
  - ▶ <https://www.netl.doe.gov/LCA>

# Solving a global challenge

Energy use for passenger travel accounts for most of the growth in transportation energy consumption—

Transportation sector energy consumption  
quadrillion British thermal units

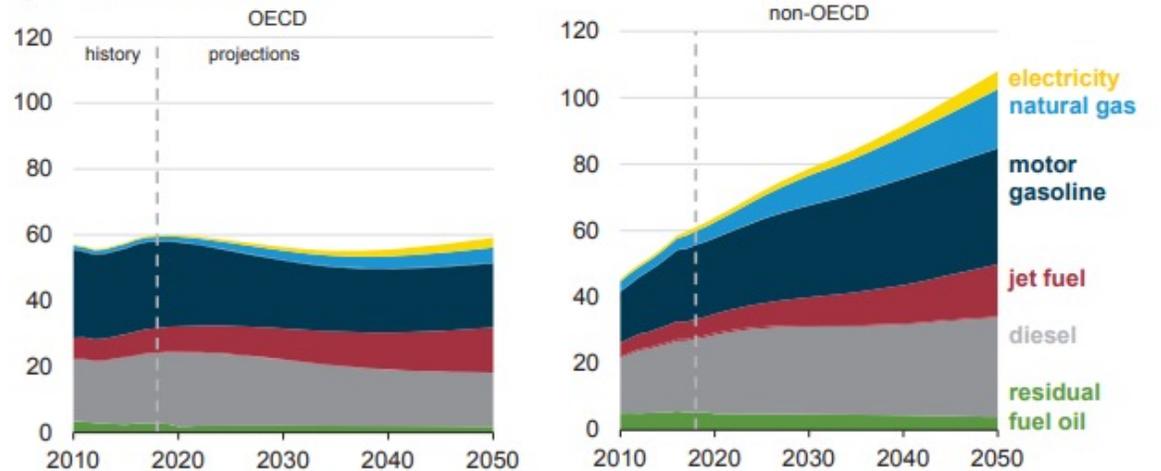


Nearly ALL growth in transportation energy use is in non-Organization for Economic Co-operation and Development countries.

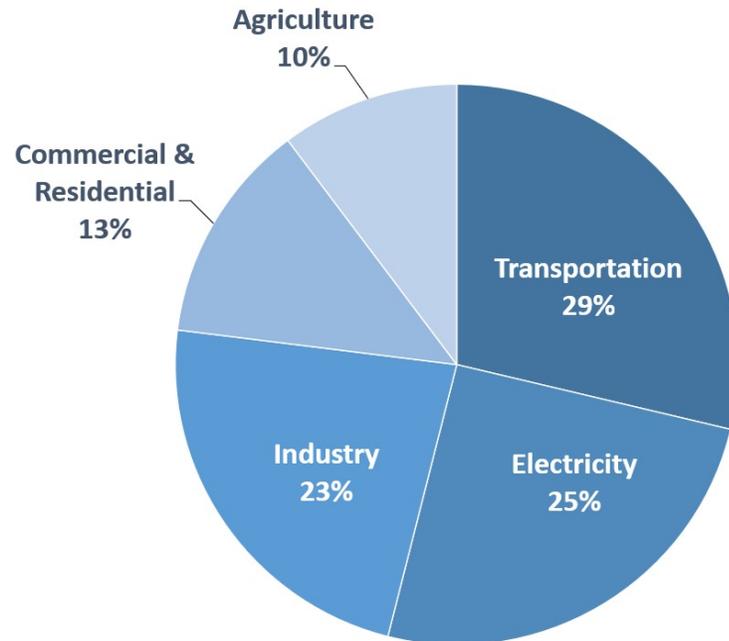
Diesel, gasoline, & natural gas use continue to growth through 2050

In the Reference case, the share of transportation fuel from alternative energy sources increases through 2050—

Transportation energy consumption  
quadrillion British thermal units



## Total U.S. Greenhouse Gas Emissions by Economic Sector in 2019

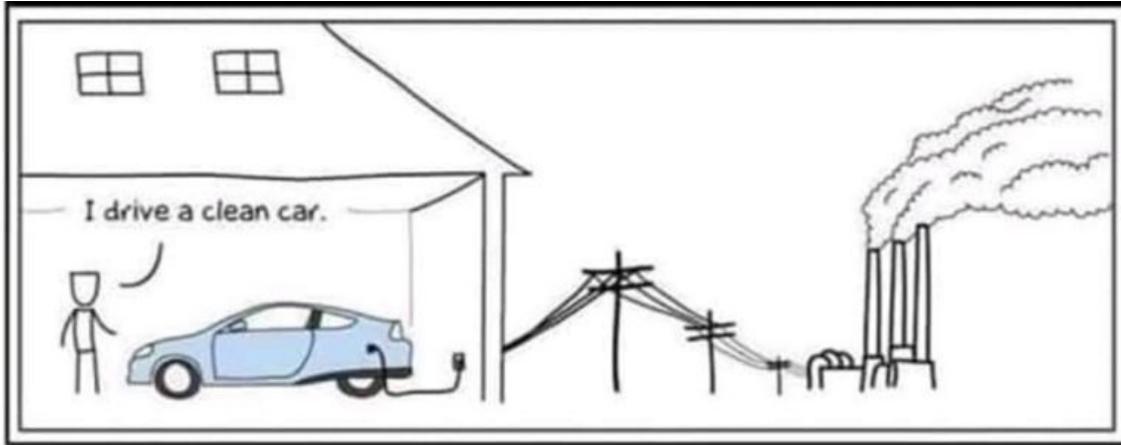


U.S. Environmental Protection Agency (2021). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2019

- ▶ Total Emissions in 2019 = 6,558 [Million Metric Tons of CO2 equivalent](#). Percentages may not add up to 100% due to independent rounding.
- ▶ <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions#electricity>

# Why We Need to Look At Life Cycle Analysis

# I drive a clean car...



## ***Biden Administration Plans Wind Farms Along Nearly the Entire U.S. Coastline***

Interior Secretary Deb Haaland announced that her agency will formally begin the process of identifying federal waters to lease to wind developers by 2025.

America's race to zero emissions

## **'They aren't used to losing': wealthy New York enclave battles over offshore windfarm**

Wainscott, a hamlet in the Hamptons, offers a new obstacle in Biden's renewable energy plans as 'Nimbys' fight back with petitions, lobbyists and lawsuits

by [Oliver Milman](#)

**S**hould Joe Biden's plans for a huge expansion of renewable energy across the US survive the gamut of congressional bickering, a very different obstacle threatens progress - wealthy homeowners who enjoy sweeping scenic views.

Wainscott, a hamlet in the wealthy **New York** enclave of the Hamptons, is the unlikely setting for a rancorous battle over what would be the state's first offshore wind farm. A flurry of angry letters to the local newspaper has escalated to petitions, the hiring of high-powered lobbyists and now lawsuits, in what could presage similar quarrels elsewhere as the Biden administration seeks to support a national boom in new wind turbines at sea and on land.

<https://www.theguardian.com/us-news/2021/mar/17/wainscott-new-york-hamptons-offshore-windfarm>

# Significant Impact on POC Communities

- ▶ According to a 2017 study by the University of Washington, nationally, people of color were exposed to about 40% more air pollution than white people<sup>1</sup>
- ▶ “Racial minorities and low-income households are disproportionately likely to live near a major road [e.g., 27% of racial minorities vs. 19% of the total population lived near high traffic volume roads in the United States in 2010 (based on an analysis of national census and traffic data; Rowangould 2013)], where transportation-related air pollution (TRAP) concentrations are typically highest (e.g., nitrogen dioxide concentrations were on average 2.9 times higher near major roads than urban background levels Karner et al. 2010)].”<sup>1</sup>
- ▶ A 2019 study published in the [Proceedings of the National Academy of Sciences \(PNAS\)](#) found that White people experience an average of 17 percent less pollution than the production of their goods and services emit. In contrast, Black people experience 56 percent more pollution than their consumption generates.<sup>2</sup>
- ▶ A 2018 EPA study found that Black people are exposed to 1.54 times more fine particulate matter than white people. Those below the poverty line were only exposed to 1.35 times more fine particulate than those above the poverty line, making race the most accurate predictor of fine particulate matter exposure.<sup>2</sup>
- ▶ NAACP's 2012 ["Coal-Blooded"](#) study, 53% of people who live within three miles of the most heavily-polluting coal-fired power plants are Black.<sup>2</sup>
- ▶ 68% of African Americans live within 30 miles of a coal-fired power plant – the distance within which the maximum effects of the smokestack plume are expected to occur. By comparison, about 56% of the white population live within 30 miles of a coal-fired power plant.<sup>3</sup>

<sup>1</sup> [Changes in Transportation-Related Air Pollution Exposures by Race-Ethnicity and Socioeconomic Status: Outdoor Nitrogen Dioxide in the United States in 2000 and 2010](#)

<sup>2</sup> <https://www.sustained.kitchen/latest/2020/6/6/fast-facts-on-environmental-racism>

<sup>3</sup> [http://www.energyjustice.net/files/coal/Air\\_of\\_Injustice.pdf](http://www.energyjustice.net/files/coal/Air_of_Injustice.pdf)

# Expand Beyond CO2

UK passenger cars	Sales share, August 2021 YTD	Average real-world tailpipe CO <sub>2</sub> emissions (g/km)	Annual saved CO <sub>2</sub> compared to gasoline ICE benchmark (tonnes)	Average real-world tailpipe NO <sub>x</sub> emissions (g/km)	Average real-world tailpipe and tyre wear emissions (mg/km)
Diesel ICE	9.7%	165	29,057	43	33
Gasoline ICE	47.9%	182	0	10	33
Diesel MHEV*	6.7%	155	31,876	43	33
Gasoline MHEV*	12.0%	171	23,259	10	33
FHEV	8.7%	127	84,316	13	33
PHEV	6.6%	115	77,919	3	34
BEV	8.4%	0	269,387	0	38
Overall diesel	16.4%	161	60,933	43	33
Overall ICE	57.6%	179	29,057	16	33
Overall hybrids	34.0%	146	217,371	16	33
Overall BEV	8.4%	0	269,387	0	38

\* Mild hybrid electric vehicles (MHEVs) typically have a battery around 0.5 kWh.

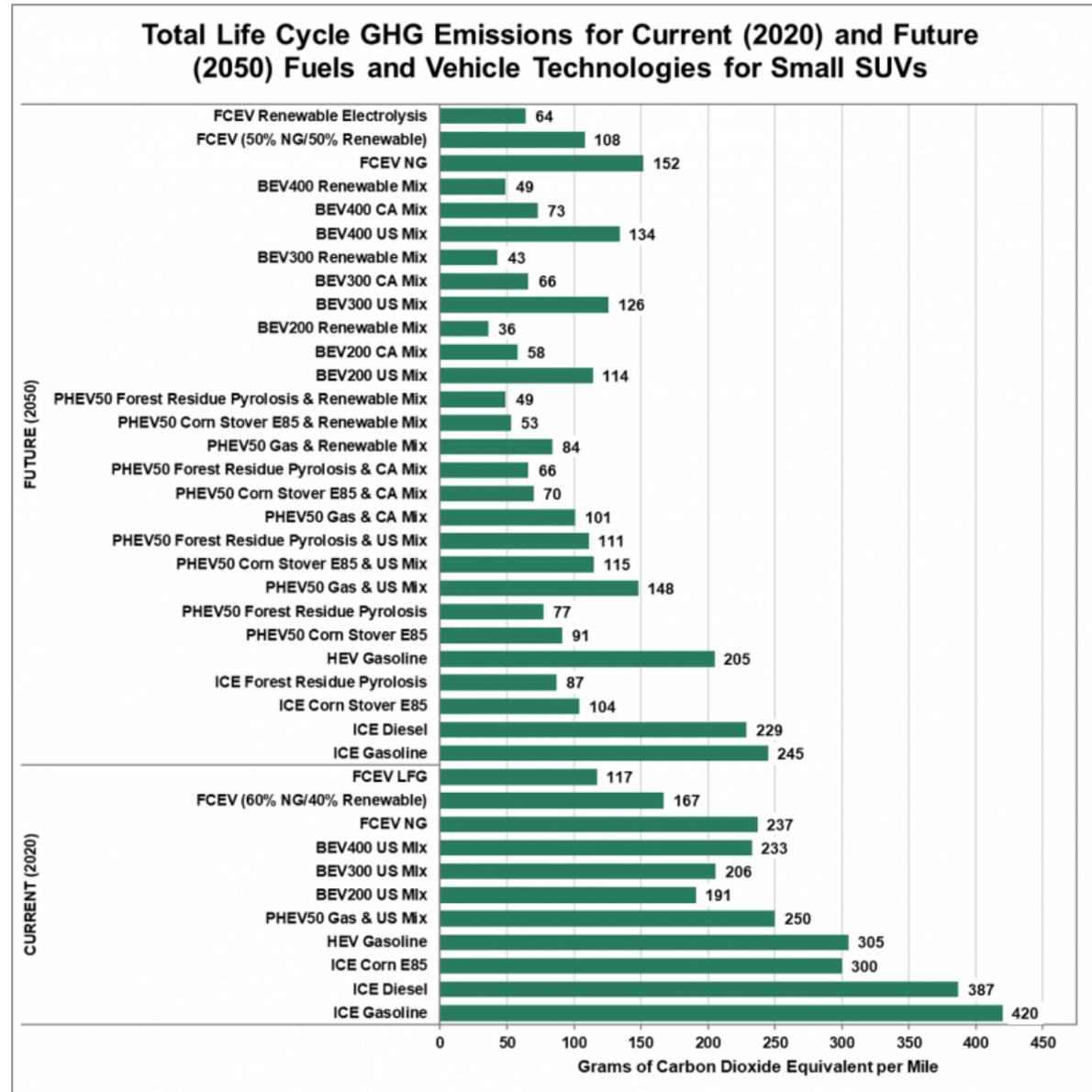
Emissions Analytics: The Inevitability of Hybridisation

<https://www.emissionsanalytics.com/news/the-inevitability-of-hybridisation>

In contrast, tyre emissions from ICEs are around 32 mg/km over a lifetime, whereas the BEV tyre wear rate – other things being equal – are 21% higher at 38 mg/km. Adding exhaust and non-exhaust emissions together, BEVs are slightly higher emitting than ICEs and full hybrid electric vehicles (FHEVs).

# No Single Solution Will Meet the Need of the Market

*The future of power requires a multi-faceted strategy. ...power solutions must be reliable, efficient, flexible and sustainable...They also must comply with stringent emission regulations, help address climate change and be part of the solution for the energy and environmental challenges facing the planet.*  
 Dr. Wayne Eckerle, Vice President, Global Research and Technology, Cummins Inc.



<https://www.energy.gov/eere/vehicles/articles/fotw-1208-oct-18-2021-life-cycle-greenhouse-gas-emissions-2020-electric>

# The Need to Look at Life Cycle Analysis?

**New Economy:** America and its manufacturing sector will be seeking major transformation over the next 15 years to reduce energy consumption and carbon footprint.

**Supply Chain:** The economic opportunity for countries – and companies – that can advance a sustainable supply chain is massive.

**New Regulations:** Regulatory changes are expected to dramatically alter the way manufactures operate and hire and train workers.

**National Security:** Our military must address climate change and understand how to respond to our energy supply as an issue for our security.

**Global Pressures:** Other nations are expecting manufacturers account for their environmental footprint. The cost of employing different LCA models can be difficult, costly, and create uncertainty.

**Transportation and Fuels:** Advance a technology neutral approach to address climate and environmental concerns including how to manage LCFS, propulsion systems, etc.

# Implementation - what we are doing now

- ▶ Advocate for sound, fair, and comprehensive carbon reduction policy via:
  - ▶ Congressional outreach
  - ▶ NGO engagement
  - ▶ Industry cooperation
  - ▶ Research organizational collaboration
  - ▶ Public education
- ▶ Assess and analyze the carbon impact of contract / project action
  - ▶ US Department of Defense
  - ▶ Federal and state municipalities
  - ▶ Public and Private corporations



# Life Cycle Analysis... what's not happening... *and what we hope to accomplish*



- ▶ **Acceptance and Integration of LCA Modeling:** LCA is not readily defined by government agencies and is not making its way into top-level policy and influencer discussions.
- ▶ **Policy Considerations:** LCA is not a core consideration in the multiple policy areas that should be aware of its impact on costs, jobs and supply chains.
- ▶ **Impact on Manufacturers:** There needs to be more coordinated planning around LCA as new regulations force manufacturers to reshape their industries.
- ▶ **The LCA Policy Council will serve as a forum to:**
  - ▶ Develop a more functional approach to the use and thinking of LCA as a tool for industry to coalesce around and support.
  - ▶ Establish a network of expertise for the application of LCA into critical policy areas.
  - ▶ Be the hub for broad implementation of LCA policy.

# LCA is Gaining More Interest

Union Calendar No. 361  
116TH CONGRESS  
2D SESSION  
**H. R. 7613**  
[Report No. 116-449]

The Committee supports existing work to develop a lifecycle model that fully evaluates energy and emission impacts of advanced and new transportation fuels, the fuel cycle from well to wheel, and the vehicle cycle through material recovery and vehicle disposal. The Committee encourages further research to develop standardized modeling that establishes a tool that can be used for future lifecycle analysis reporting and accounting.

President Biden's January 25, 2021, Executive Order, in which he stressed the need for standards to account for all GHG emissions.

*Sec. 5. Accounting for the Benefits of Reducing Climate Pollution. (a) It is essential that agencies capture the full costs of greenhouse gas emissions as accurately as possible, including by taking global damages into account. Doing so facilitates sound decision making, recognizes the breadth of climate impacts, and supports the international leadership of the United States on climate issues*

# The goal of environmental policy is clean air and the elimination of pollutants

- ▶ Develop government-wide program to shrink our federal carbon footprint - working on programs with the Department of Defense
- ▶ Partner with industry to make carbon reduction an immediate priority
- ▶ A collaborative regulatory framework that incentivizes development and accelerates adoption of advanced carbon control technologies across all energy platforms.





## CLIMATE CHANGE IS A NATIONAL SECURITY PRIORITY

### A CALL TO ACTION

Climate change impacts the world and the way the US Military operates in it, both abroad and at home. Climate change:

- threatens critical infrastructure;
- increases global instability;
- devalues U.S. leadership;
- serves as a significant threat multiplier.

Climate effects impact our military readiness and climate change is currently threatening more than two-thirds of our critical operation infrastructure.[1]

These effects are seen in how the Department of Defense handles many aspects of operation from training, supply chains, construction, equipment and deployments. The effects of climate change impact operations when the military confronts changing sea routes in the Arctic, natural disasters such as floods, droughts and wildfires, increasing refugee movement and political instability due to climate change.

*"Climate change is impacting stability in areas of the world where our troops are operating today. It is appropriate for the Combatant Commands to incorporate drivers of instability that impact the security environment in their areas into their planning."*

**Secretary of Defense, James Mattis, March 14, 2017**

<https://www.comprehensivecarbon.com/s/CCI-Climate-Change-is-a-National-Security-Priority.pdf>

# Vehicle Technologies Primer

Climate change and resulting regulatory changes pose a risk to the Department of Defense and the Army mission requirements. The Army needs to be prepared to deal with industry's move to greener technologies, address the need for use of these greener technologies within the military unique environment, and plan for climate related regulatory changes to minimize the impacts to the mission.

## Department of Defense - Vehicle Technologies Primer (VTP)

(CCI) shall deliver a draft (initial) VTP...the contractor shall establish the VTP framework to address the following: TRL, TRL justification, suitability of the technology from a mission perspective, suitability from a performance perspective, regulatory and policy implications, and life-cycle environmental footprint.

# Closing

- ▶ It is essential to incorporate lifecycle analysis (LCA), and account for all upstream emissions, for all vehicle technologies and the fuels that power them in future emission standards. LCA is a necessary element of the U.S.'s efforts to transform the transportation system into one that is significantly less carbon intensive and is more equitable.
- ▶ This transformation is already in process with significant investments in renewable sources of energy, renewable and lower carbon fuels, more sustainable forms of generation to power the electrical grid and expanded supply chains to provide the resources necessary to support production of greener fleets.
- ▶ Adoption of LCA would better prepare industry for the impact of expiring multiplier credits and the accounting of upstream, embedded, and end-of-life carbon emissions which influence the technology investments being made today by OEMs and suppliers.
- ▶ LCA's role in evaluating the environmental, economic, and social attributes of our systems intersects with the EPA (and others) goal of providing the same degree of protection for all people regardless of race, color, national origin, or income, from environmental hazards



# Thank you

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