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Carbon Reduction Now!

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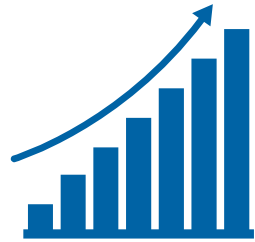
RENEWABLE ENERGY GROUP

Deciding How To Make A Difference

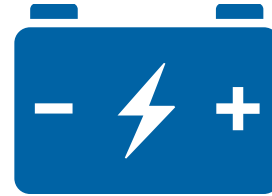
A Simple Step Today For A Better Tomorrow



Transportation is a top contributor to GHG emissions



Emissions accumulate in the atmosphere



Waiting for future technology is doing harm

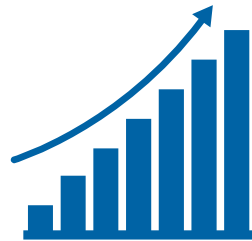


Bio-based diesel: A simple step to reduce GHG emissions today

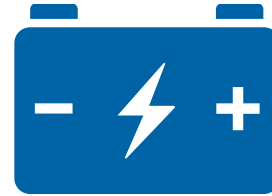
A Simple Step Today For A Better Tomorrow



Transportation is a top contributor to GHG emissions



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Waiting for future technology is doing harm



Bio-based diesel: A simple step to reduce GHG emissions today

While we plan for the long-term, we must also ask: “What can we do now?”

Cumulative Carbon Accounting

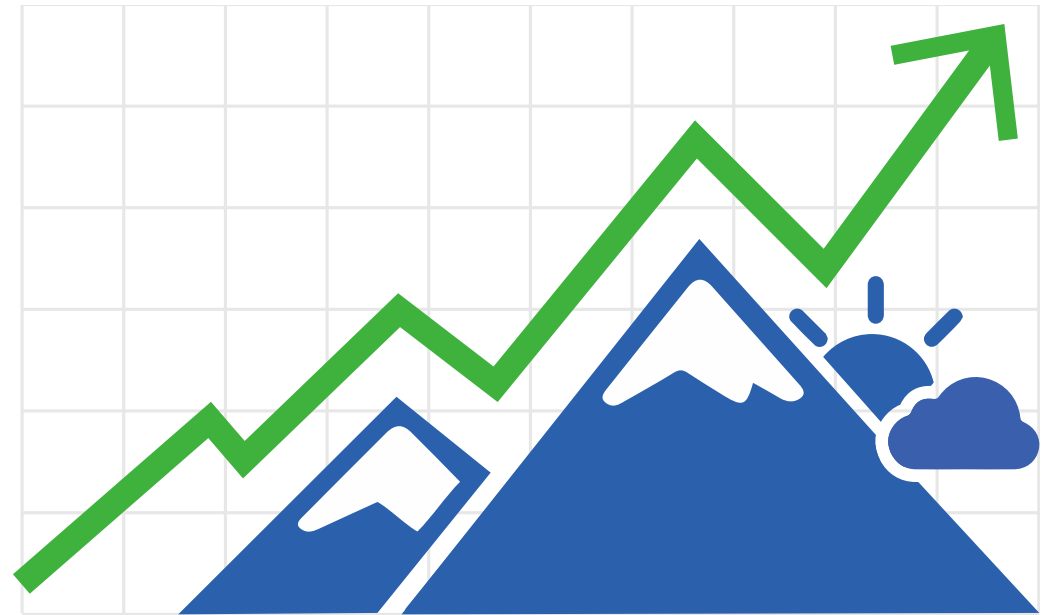
Investing in the Environment – Retirement Analogy

WHEN INVESTING MONEY FOR RETIREMENT:

\$1,000 per year for 10 years
does not = \$10,000 after 10 yrs

5% return → **\$14,200**

10% return → **\$18,500**

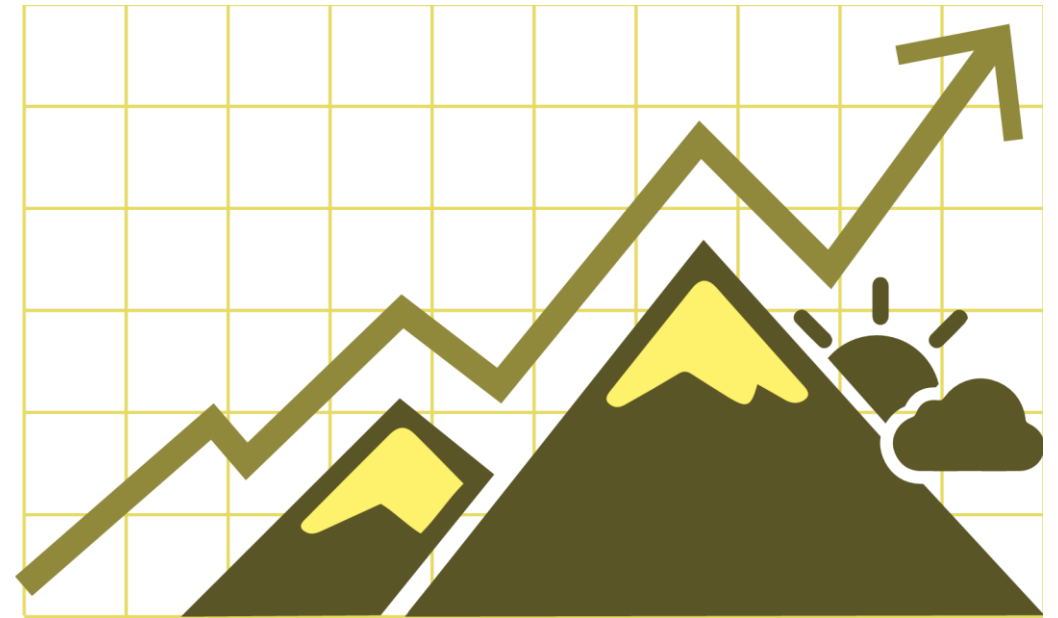


THE BENEFIT OF ANNUAL INVESTMENTS IS COMPOUNDED BY ADDITIONAL IMPACT EVERY YEAR THE \$s ARE IN YOUR ACCOUNT

Investing in the Environment – Cumulative Carbon Impact

1 ton of fossil carbon emissions per year for 10 years **does not** = 10 tons of carbon impact by the end of the decade

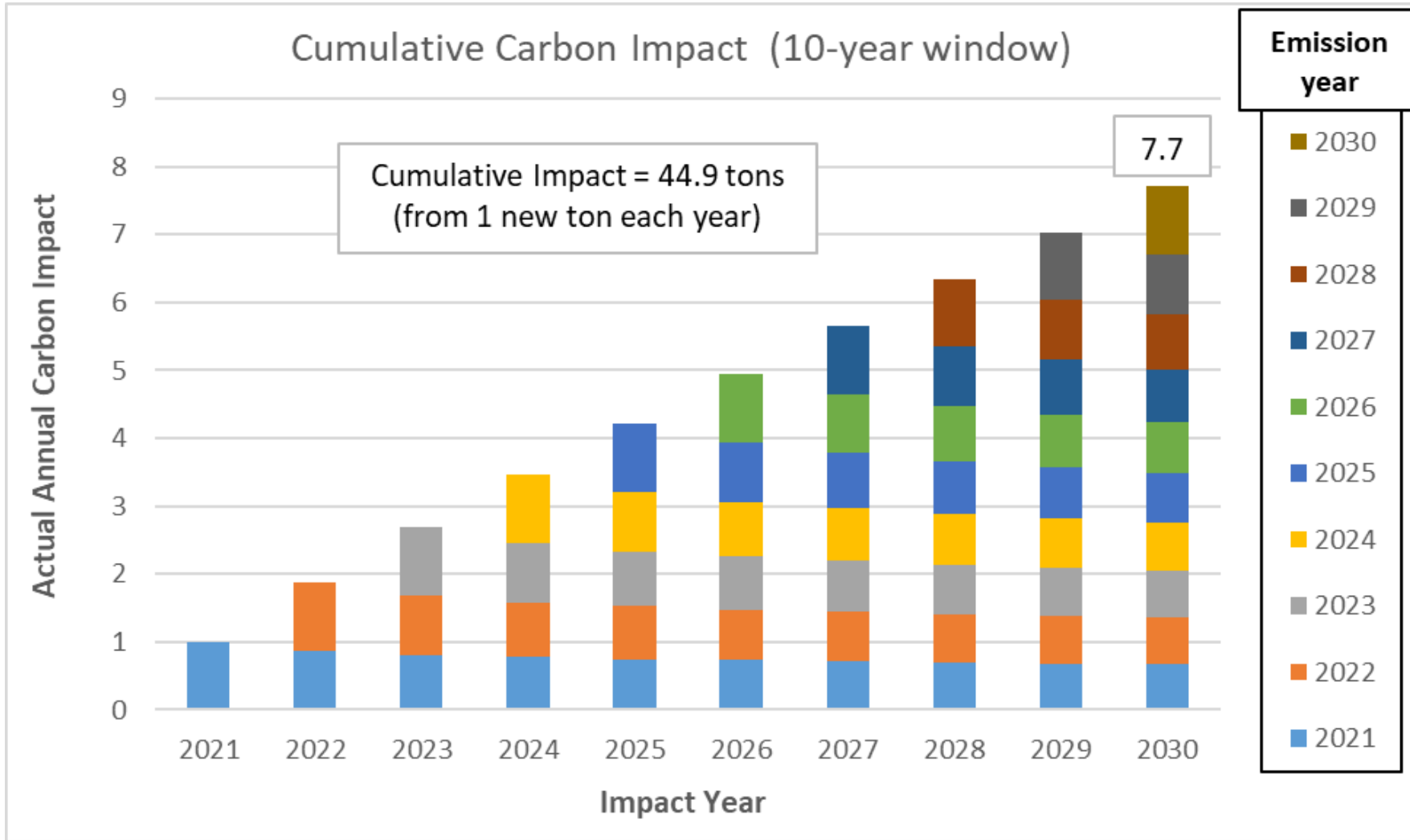
1 ton/year → **44.9 tons of Cumulative Carbon Impact over 10 years***
(7.7 tons of impact in 2030 alone)



THE CUMULATIVE EFFECT OF GHG EMISSIONS IS COMPOUNDED BY ADDITIONAL IMPACT EVERY YEAR THEY ARE IN THE ATMOSPHERE

* Using the Bern Carbon Cycle model provided in Ch. 10 of the 4th Assessment Report of the IPCC (2007) from Joos et al., 2001.

Cumulative Carbon Impact Accounting

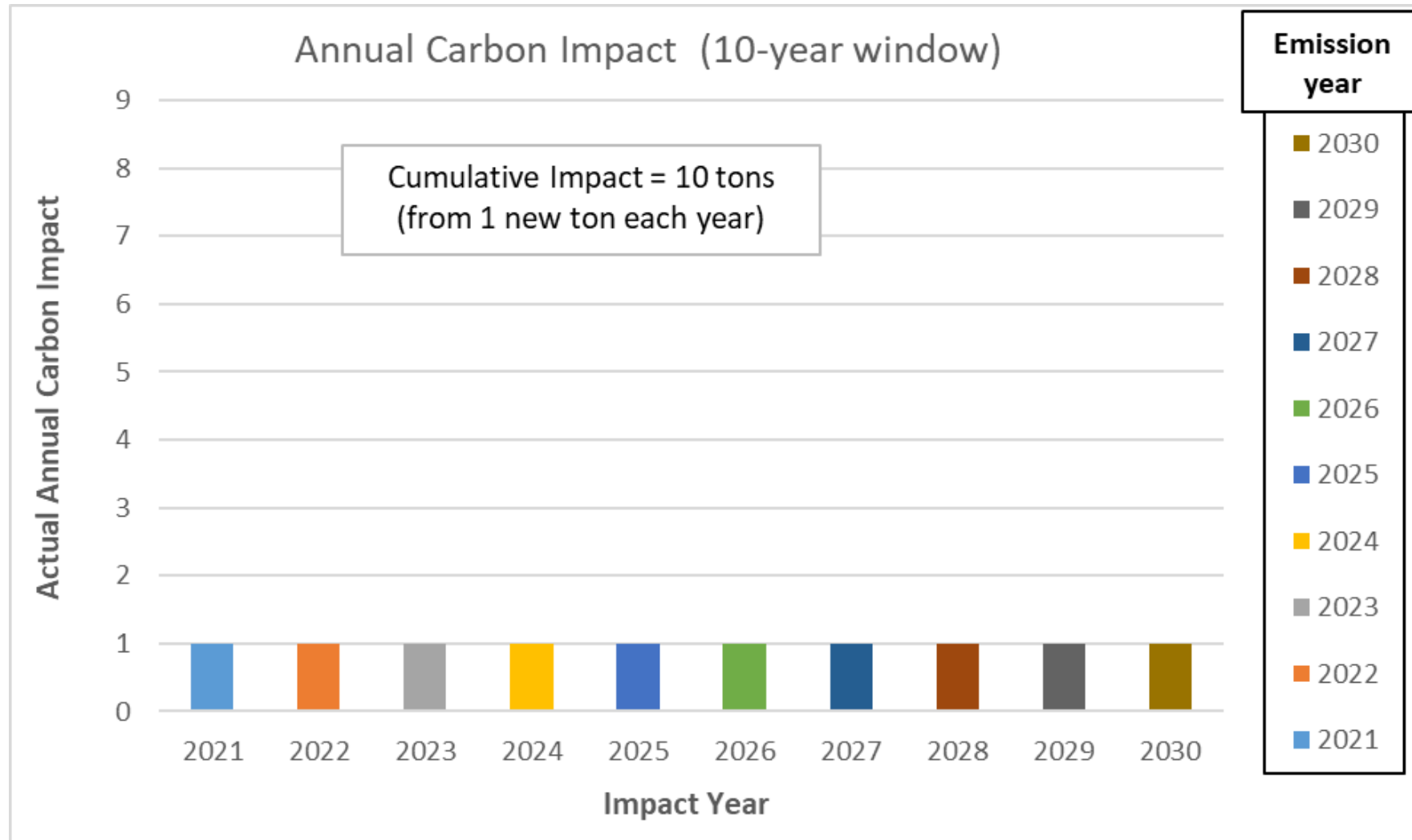


TAKEAWAYS

- New carbon impacts the atmosphere each year for many years (new C = fossil C)
- For Cumulative Carbon Impact accounting, consider only fossil carbon emissions within the window of interest

* Using the Bern Carbon Cycle model provided in Ch. 10 of the 4th Assessment Report of the IPCC (2007) from Joos et al., 2001.

Annual Carbon Accounting Is Insufficient



TAKEAWAYS

- FALSE: New carbon is assumed to affect the atmosphere only in the year it was emitted
- FALSE: Total of annual emissions is assumed to reflect their actual impact on the environment



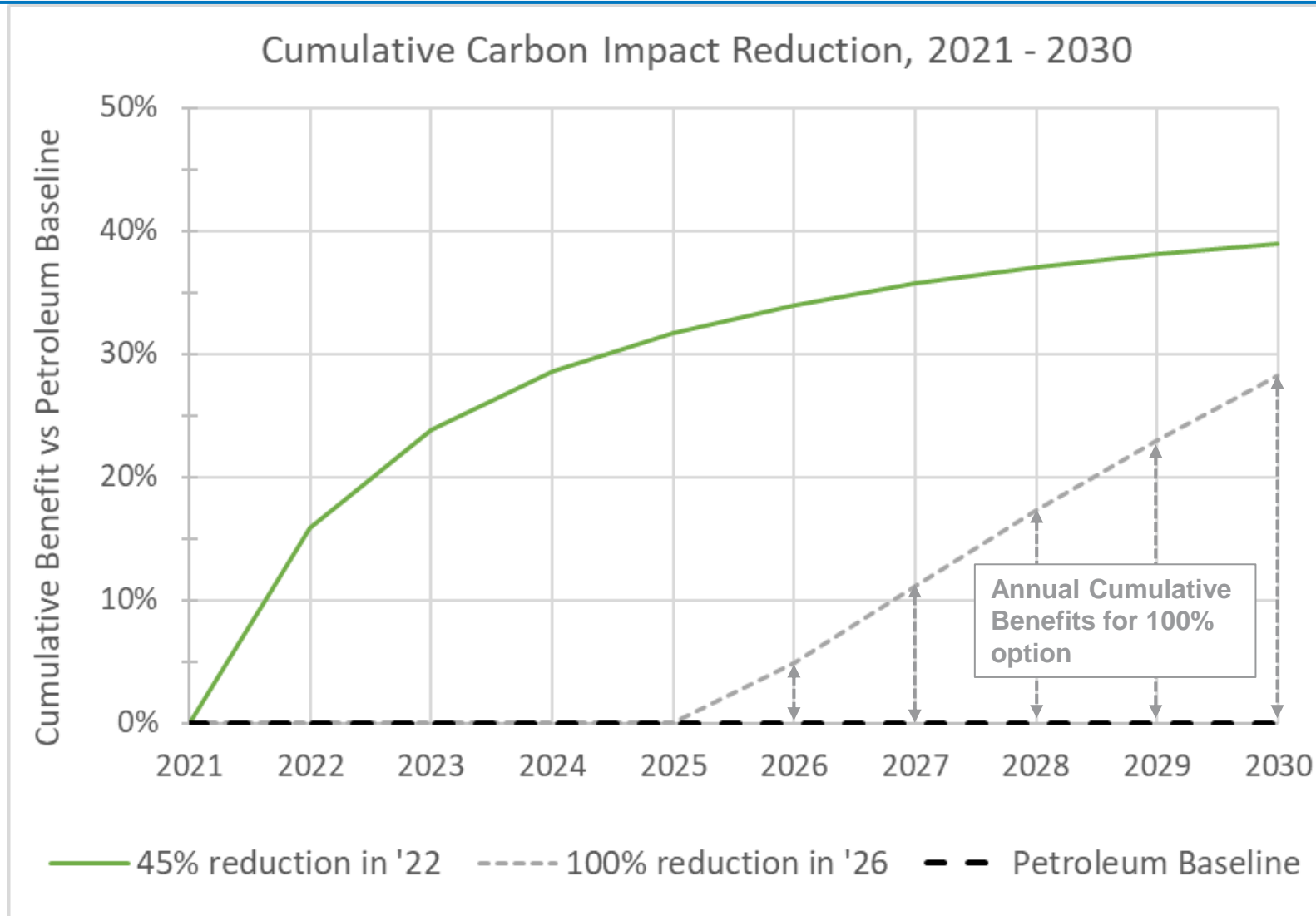
A New Definition of Cumulative Benefit

Unlike simple annual accounting, **cumulative impact accounting** for fossil carbon emissions reflects their actual real-world impact within the time window of interest

- **Cumulative Carbon Impact** = the total of the actual annual carbon impacts within the time window of interest
- **Cumulative Benefit** = the decrease in cumulative impact relative to a baseline case
- Remember, the question to be answered is: “**What can we do now?**”

Comparing Cumulative Benefits

Cumulative Benefit Comparison Example

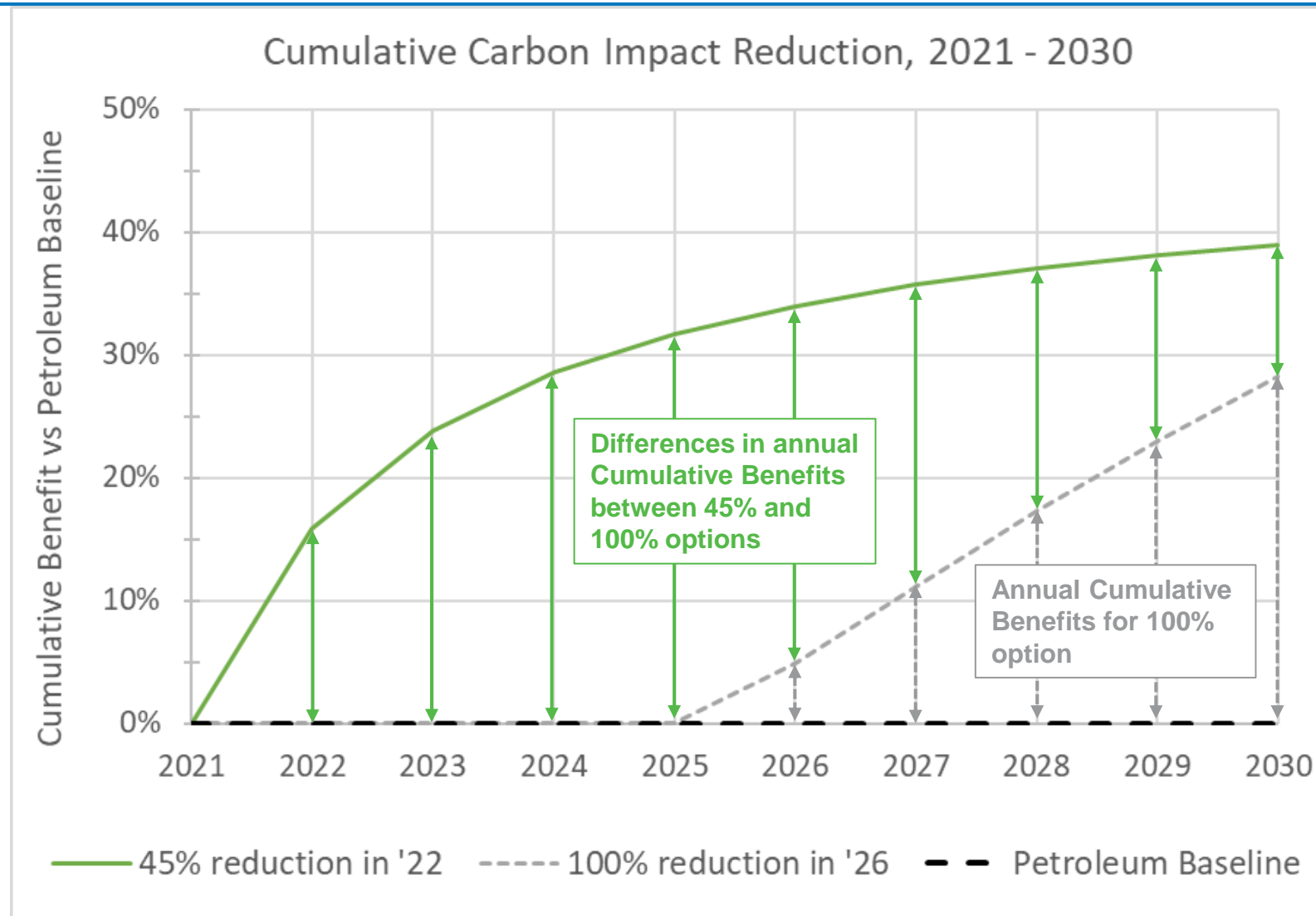


TAKEAWAYS

- Carbon impact occurs every year (not just the emission year)
- Cumulative Benefit can be estimated for each year in the time window



Cumulative Benefit Comparison Example

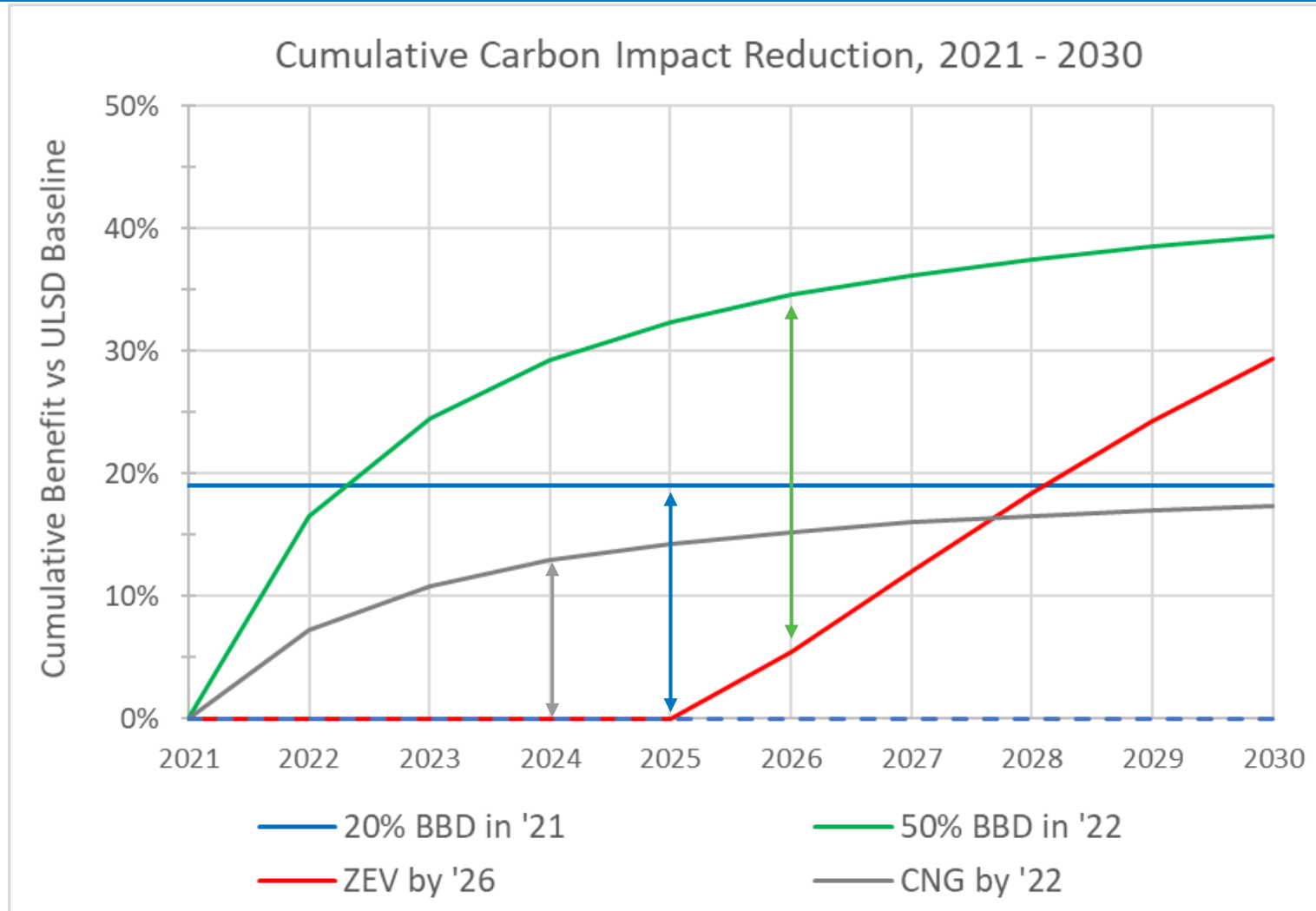


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Cumulative Benefit of Acting Now With BBD



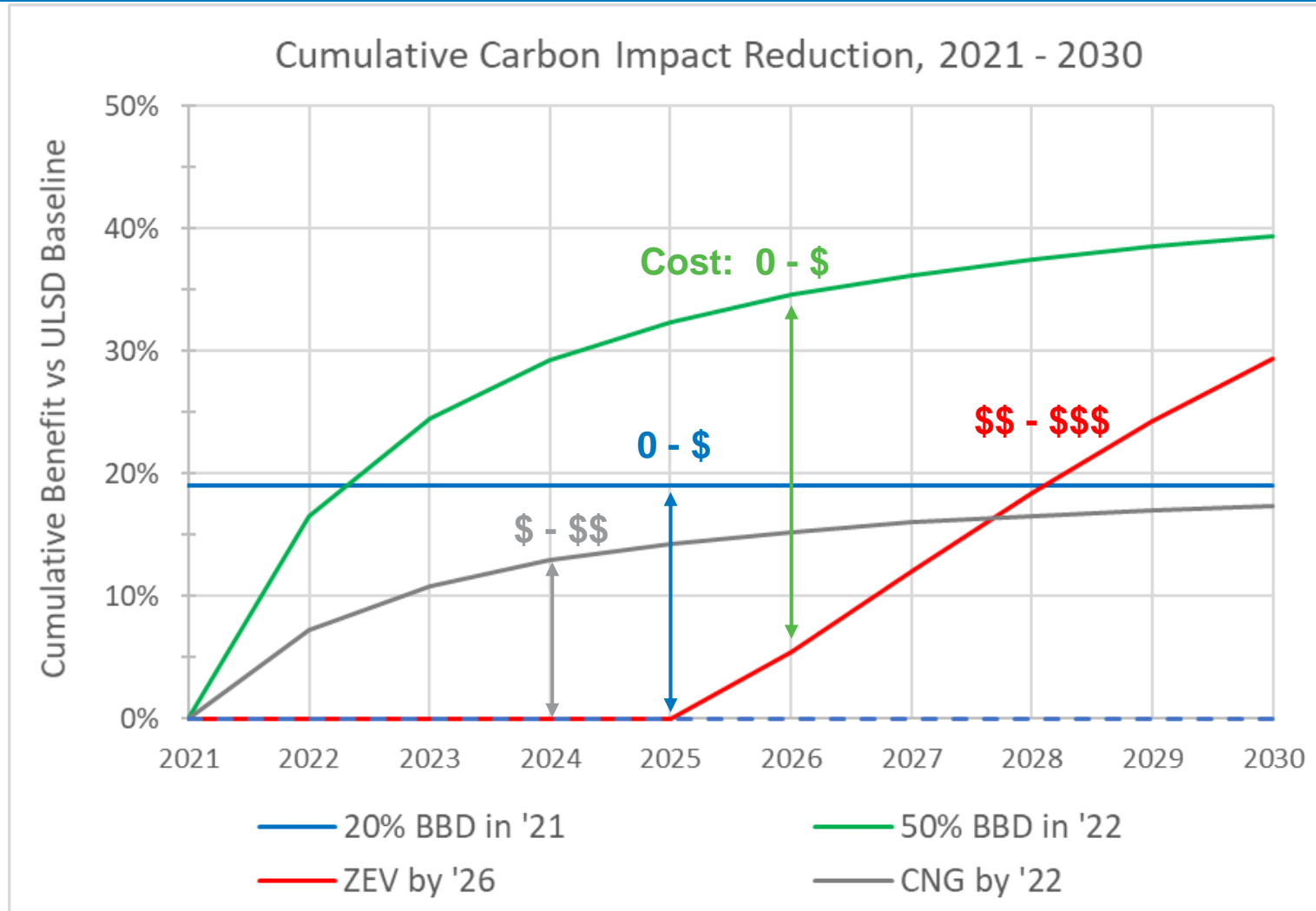
TAKEAWAYS

- BBD can reduce impact the most over the next 10 yrs
- BBD can have the lowest total cost per ton of carbon reduced

Source: Chart assumes 95% Scope 1+2 fossil carbon reduction for BBD, 21% reduction for the CNG vehicle, and 100% reduction for the ZEV



Cumulative Benefit of Acting Now With BBD



TAKEAWAYS

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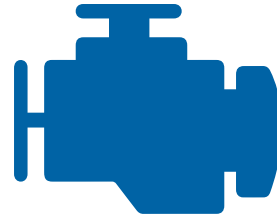
Source: Chart assumes 95% Scope 1+2 fossil carbon reduction for BBD, 21% reduction for the CNG vehicle, and 100% reduction for the ZEV



With Bio-Based Diesel, Fleets Don't Need to Wait



> 94% lower direct fossil carbon emissions than petro diesel *



Drop-in solutions for today's engines



Reduce fossil carbon emissions today with bio-based diesel

* GHG Protocol & EPA Scope 1+2 emissions reduction for biodiesel and renewable diesel; <https://www.epa.gov/climateleadership/scope-1-and-scope-2-inventory-guidance>

Thank You