

Spark Ignited Engine Trends: A Historical Analysis with Future Projections

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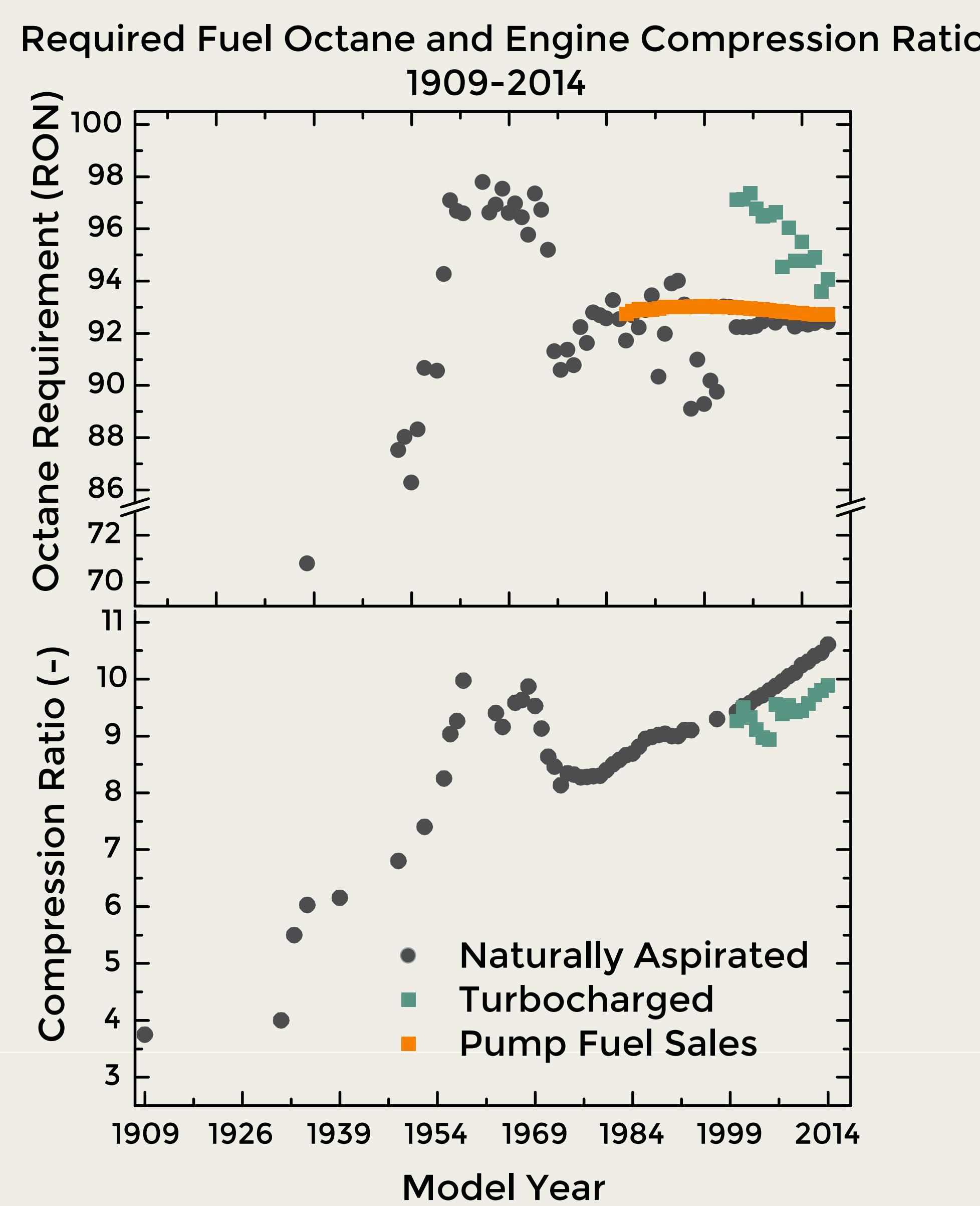
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Introduction

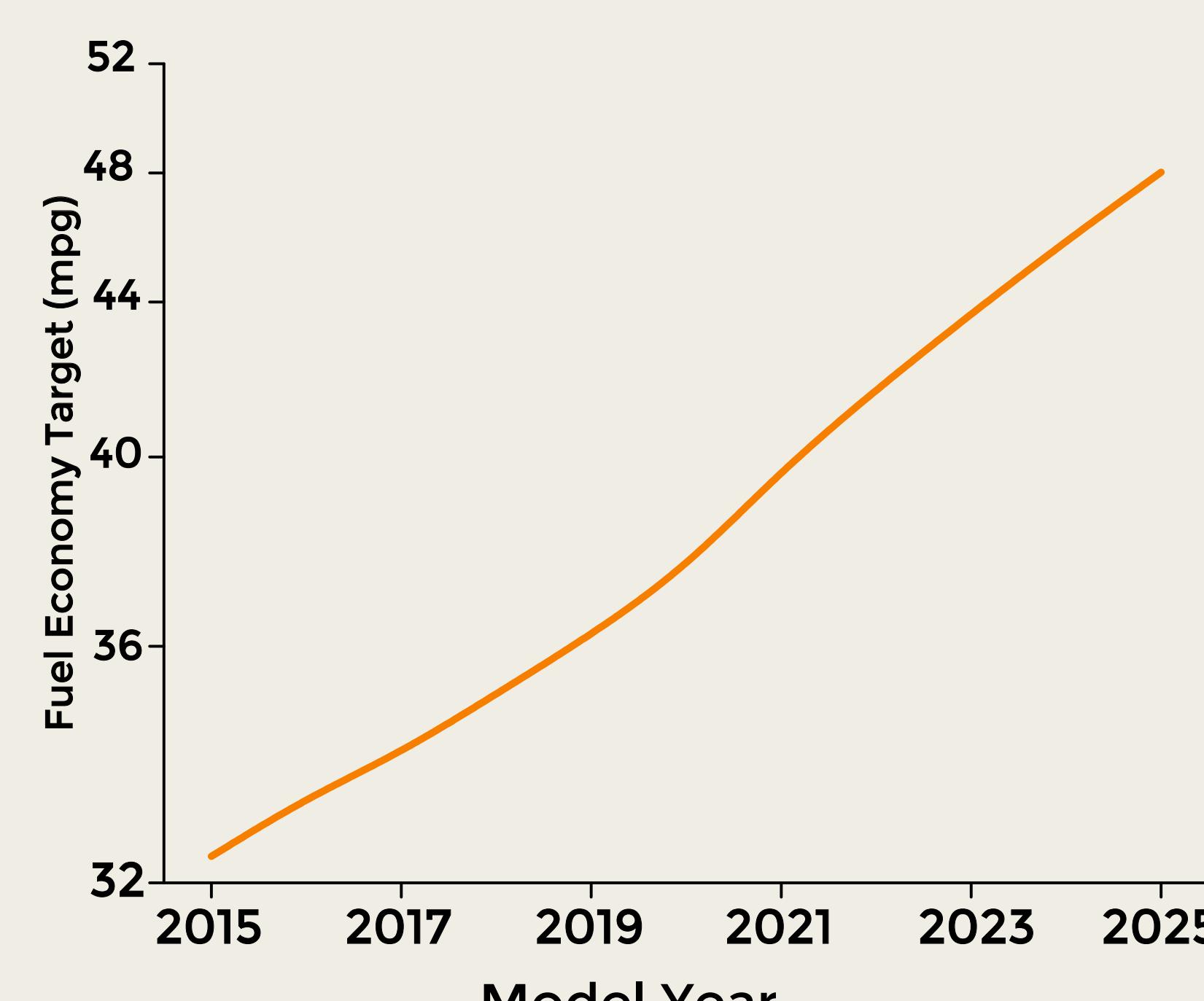
The performance and efficiency of spark ignited engines have been closely coupled to fuel octane number since the beginning

However, over the last 15 years the sales weighted averages of compression ratios, specific output, and fuel economy have increased, while the fuel octane number requirement has remained largely unchanged.

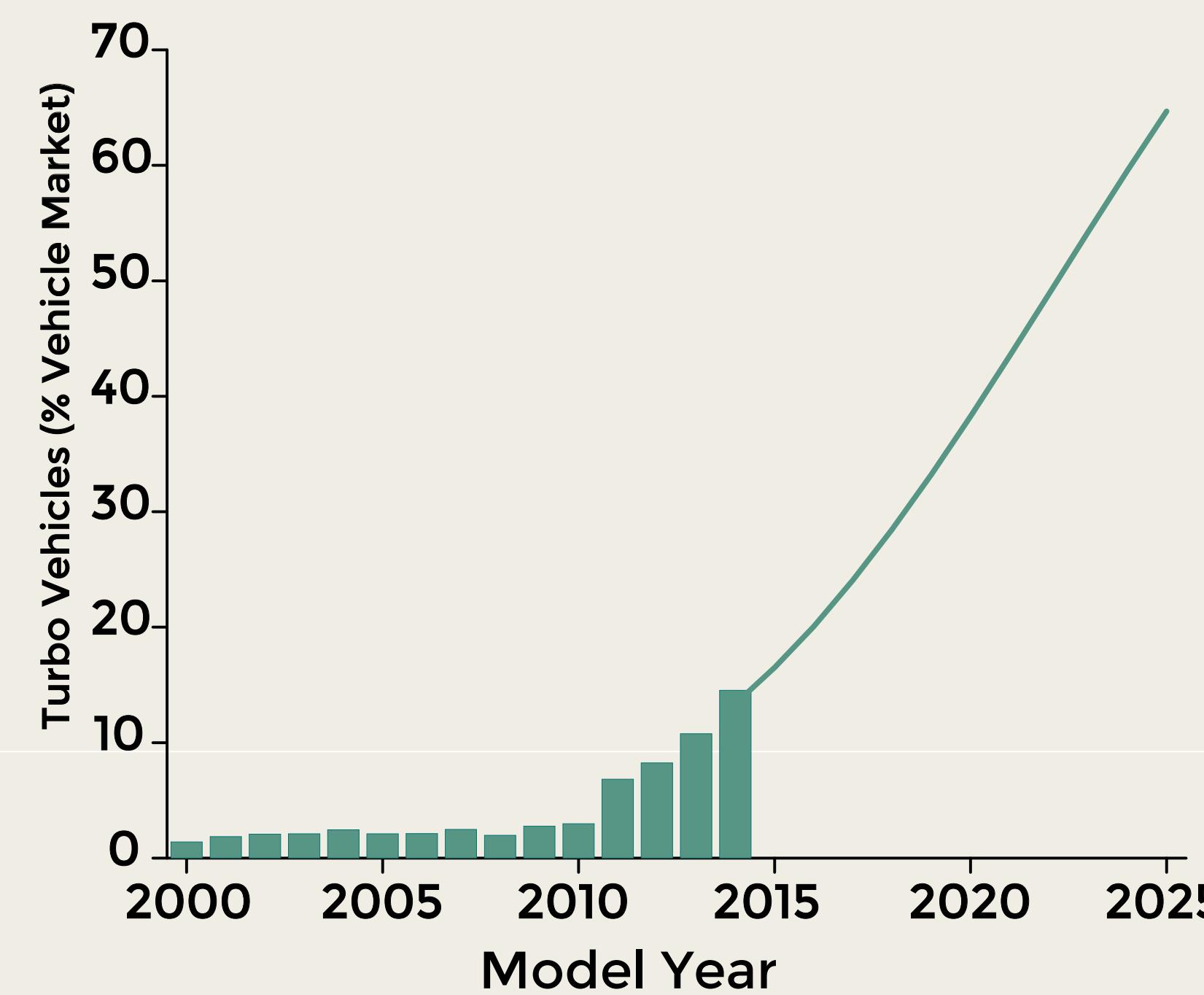


Background

By 2025, the fleet average fuel economy will crest over 50 miles per gallon.

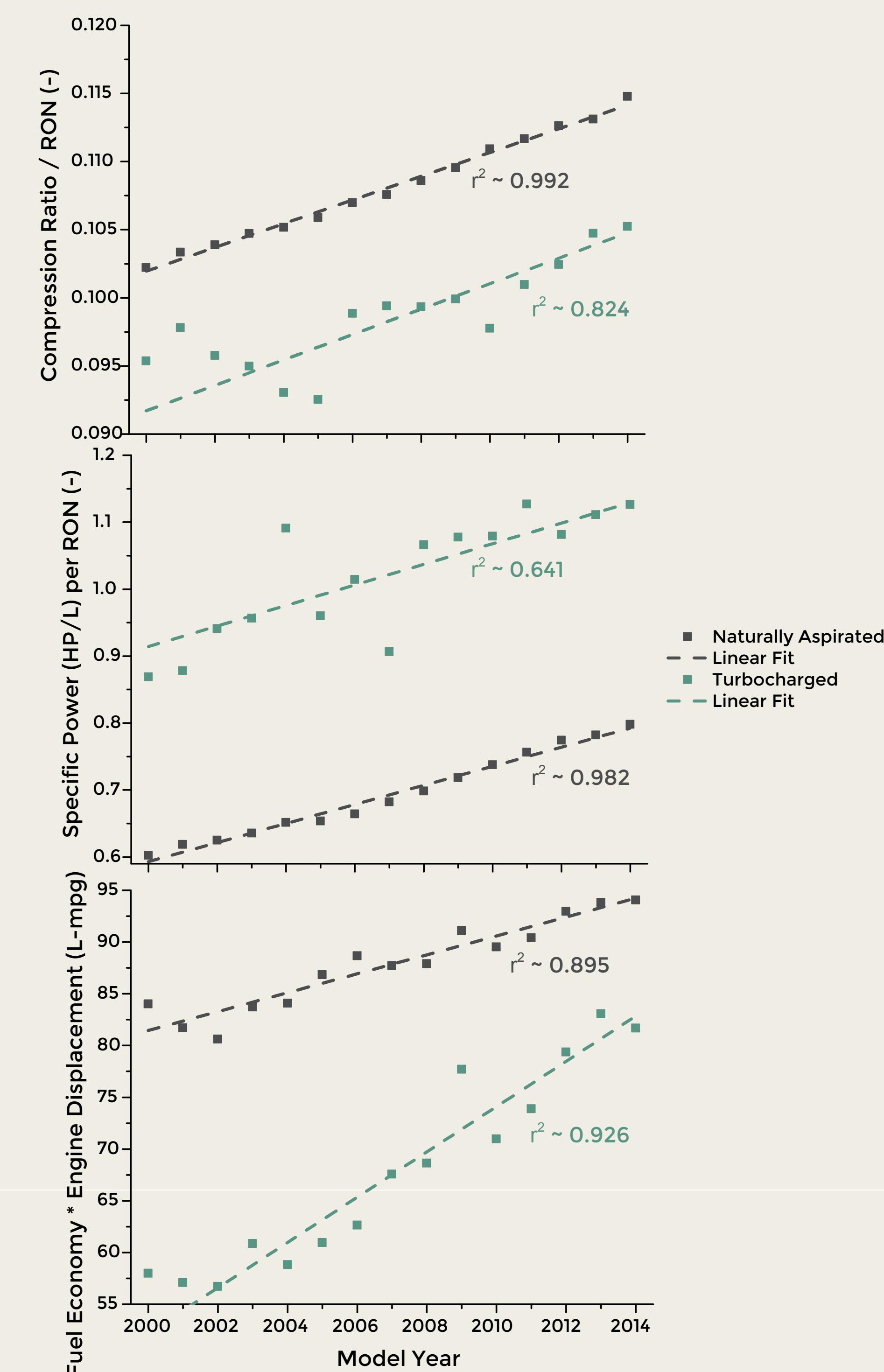


To reach the target, automakers are employing turbocharged gasoline direct injected engines to deliver similar power with small displacement engines, estimated in this study to crest 65% of the market by 2025.



Methods

To estimate the vehicle fleet's ability to meet future targets, trends in compression ratio per unit RON, specific power per unit RON, and fuel economy times displacement were analyzed from Model Years 2000 - 2014 for naturally aspirated and turbocharged engines.



Results

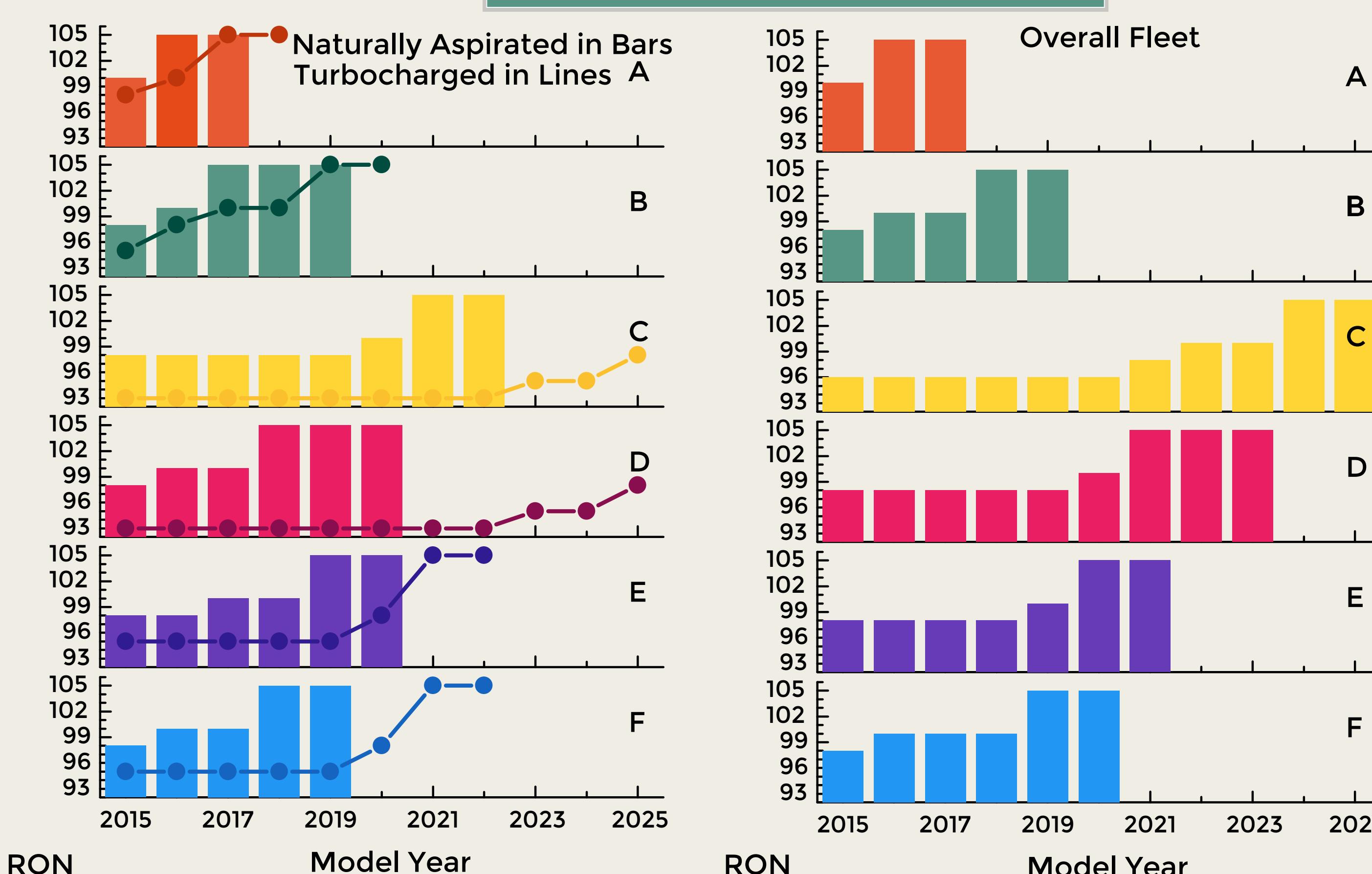
Summary

By 2025, no level of RON studied could help the naturally aspirated portion of the fleet reach the target. The turbocharged fleet portion, however, could reach the target with Scenario C or D using 98 RON fuel.

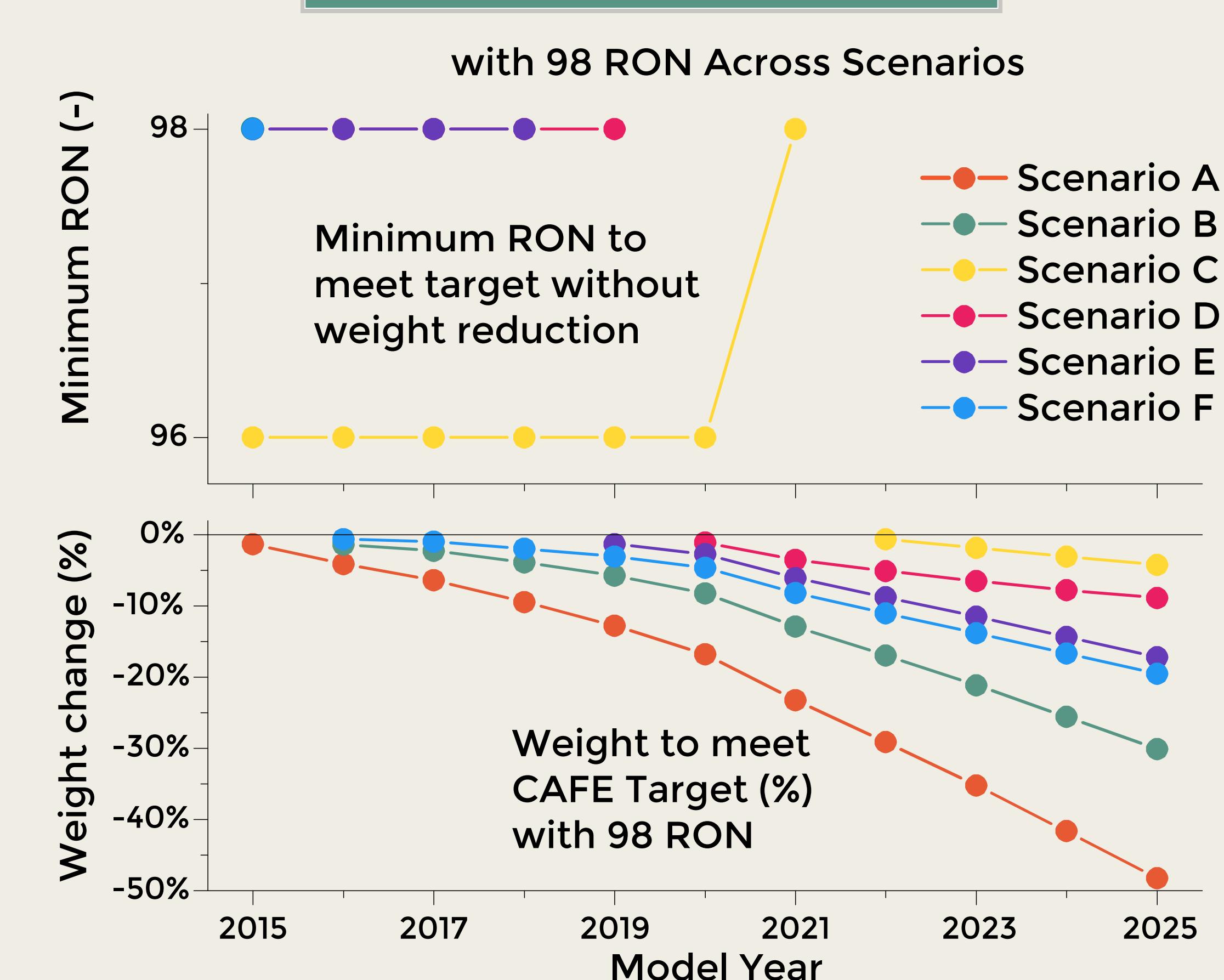
Together, the only scenario for the overall fleet to reach compliance is Scenario C, using 105 RON fuel.

If only 98 RON fuel can be used in the market, estimated weight savings per scenario is calculated assuming the overall mix. Both Scenario C and D can meet the target with only 10% reduction.

Change in RON Only



Weight Reduction



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