

“Optimizing conventional engines”

ICEs have been in constant change for maybe 120 yrs – \$10sB, millions of engineering hours, numerous challenges

- Diesel engines: improvements for emissions reductions beginning in the 90s
 - European developments
 - Performance and efficiency also improved – direct injection and turbocharging
- Gasoline engines, cost and power until ~1997), then emissions, power, and cost
 - TWC eliminated emissions issues
 - It is now developing rapidly, and is closing the gap with diesel in performance and efficiency

Since 2000, LD emissions have dropped 97% and fuel consumption 25-30%; performance has improved and costs have been held low

- However, we’re not done. Emissions regulations are tightening 90% and we will need ~20-30% fuel consumption reductions by 2025, and more thereafter
- To meet the challenge, the auto industry is investing heavily in engine technology
- We hear much about EVs, but engines can meet the 2025 GHG regulations, and much more

This panel will look at representative samples of a few recent technologies that are and will play a key role in moving forward

- The auto market is quite risk-averse. For example, it takes 20 years after first models to reach 80% market penetration for a new technology.
- Optimizing the ICE reduces this risk, while delivering meaningful efficiency improvements
- The approaches discussed here are implemented on dozens of vehicles, but still have low market penetration
- The technologies addressed in this panel will be around a while, because they can be used in all emerging engine strategies

You will now hear from two experts about cylinder de-activation, stop-start systems, and way of extracting more energy from the engine called the Atkinson Cycle.

- Jim McCarthy of Eaton will talk about Cylinder de-activation: Most of the time you don’t need that 4th or 6th cylinder. In fact, if you turn one or two cylinders off, much energy can be saved because the remaining cylinders operate much better
- Dean Tomasic will talk about stop-start systems: When coasting down a hill or stopping at a light, about 5% of fuel can be saved by stopping the engine.
- Dean will also talk about the Atkinson Cycle: In a standard engine there is still some pressure or energy left in the cylinder when the exhaust valve opens. This energy is generally wasted. Not in the Atkinson Cycle.