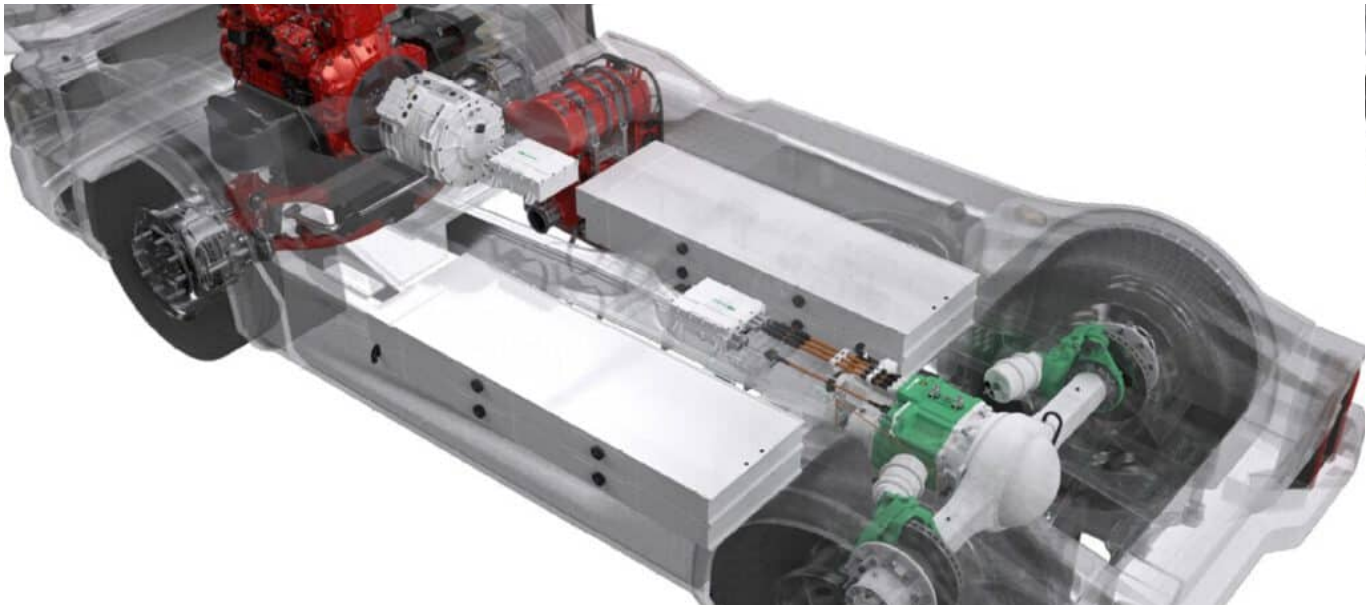

ICE and Hybrid Powertrains: Complementary Technologies for the Future

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Picture: Cummins

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Cummins Leads with Integrated Diesel Hybrid

Cummins has unveiled a groundbreaking integrated diesel-hybrid powertrain

concept, combining an internal combustion engine (ICE) with an electric hybrid module. This development represents a practical and scalable solution for hybrid propulsion in commercial vehicles, showcasing how legacy technologies and electrification can work hand in hand.

New SAE Research on Hybrid Configurations

Several recent SAE technical papers provide valuable insights into hybrid system optimization:

- One study examines how different ICE configurations impact performance, efficiency, and system layout in parallel hybrid architectures.
- Another paper demonstrates that hybrid vehicles can achieve **fuel savings of 18–32%** compared to conventional ICE-only vehicles.
- In light-duty Class 3 commercial vehicles, a **P3 hybrid architecture** with engine downsizing and active thermal control achieved **up to 60% CO_2 reduction** under WLTC and FTP75 drive cycles. However, the same study noted **elevated NO_x peaks** during intermittent ICE operation, which would require advanced exhaust aftertreatment solutions.

Summary Table

Study / Source	Key Findings
Cummins	Diesel-hybrid prototype with integrated electric module
Parallel Hybrid Study	Analysis of fuel economy, power output, and ICE influence
General HEV Research	Fuel savings of 18–32% versus ICE-only vehicles
Class 3 Light Commercials	Up to 60% CO_2 reduction; NO_x peaks during ICE operation

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Conclusion: ICE and Hybrid Are a Smart Pairing

1. **Hybrid Systems Are Becoming Practical:** Studies of parallel and P3 architectures highlight the efficiency of real-world applications.
2. **Fuel Efficiency:** Hybrid powertrains can reduce fuel consumption by up to 30% depending on the use case.
3. **Emission Reductions:** For commercial use, up to 60% CO_2 savings are

feasible- though NO_x emissions need to be managed with smart thermal and aftertreatment strategies.

4. **Industrial Relevance:** Cummins' diesel-hybrid integration shows how OEMs are incorporating hybrid technology into mainstream offerings.

Reference SAE: Hybrid powertrains in the product mix