

Making Sense of Dual Fuel Engine Options in Heavy- Duty Trucks

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Purpose of today's Discussion



- **Share current dual-fuel (DF) market conditions and fleet feedback**
- **Clarify DF emission certification paths**
- **Discuss relevant US-DOE activities**
- **Seek input from NGVTF attendees**

Dual Fuel Engine Technology

important questions:

- **Why are fleets interested? (UPS)**
- **What are the challenges?**
- **What are the substitution rates and % of time it will use natural gas ?**
- **Why is there so much confusion?**
- **Are there other viable applications besides on-road vehicle transportation?**



Dual Fuel Engine Technology

3 Categories of available regulatory approval

1. (OUL) Outside Useful Life
2. (IUL) Intermediate Useful Life
3. Full Compliance Testing



Dual Fuel Engine Technology

3 Categories of available regulatory approval

Outside Useful Life (OUL):

Applies to engines that are 10 years old or older or having 435,000 miles, or 22,000 hours of operation, whichever first occurs



EPA-Approved Outside of Useful Life (OUL)

- **No stringent engine testing required**
- Approvals based on capability to reduce, or at least not degrade, emissions of original diesel engine
- *Logical Question* - How many people will want to convert a 10-year-old truck with nearly a half million miles?



EPA-Approved Outside of Useful Life (OUL)

Fact check -

- *7 of the 10 Conversion Companies* with EPA approved systems have only gained approval for (OUL) systems, this least-challenging standard



Dual Fuel Engine Technology

Categories of available regulatory approval

Intermediate Useful Life (IUL):

- Applies to engines over two years old
- no mileage restrictions



Only two companies have received EPA approvals for this more stringent IUL standard



EPA-Approved Intermediate Life (IUL)

- Requires exhaust and evaporative emissions testing (much more stringent than OUL) and results in EPA approvals, but still not full certification
- Testing requirements are a step closer to OEM compliance standards



EPA/California Air Resources Board

Full Compliance Testing



- Results in *full certification* - the same testing requirements as new engine manufacturers
- **Only two companies** have achieved full CARB certifications, and only for certain 2010-12 Volvo/Mack engines



Confusion Between EPA Compliance Categories: “Approval vs Certification”

- Difficult for customers to differentiate between “approval” and “certification” - sometimes leaving false impression that kits have been tested to same rigorous testing standards as new OEM offerings
- Many of the listed OUL approvals on the EPA website have not been tested or sold - (the listings often include all engines in a specific engine family regardless of whether they have been individually tested)



Confusion related to EPA Compliance Categories:

- A majority of these conversion approvals have not resulted in a single order.
- This is not a criticism but rather a common misunderstanding of what the EPA listings represent.
- Exuberant sales people may tend to exaggerate or embellish things.



Which Dual Fuel Engine Design is Best?

Good Question! In the end, the things that matter are performance, reliability, environmental compliance and cost effectiveness (highest percentage of diesel displacement by natural gas).



