

B20 Biodiesel & Cummins

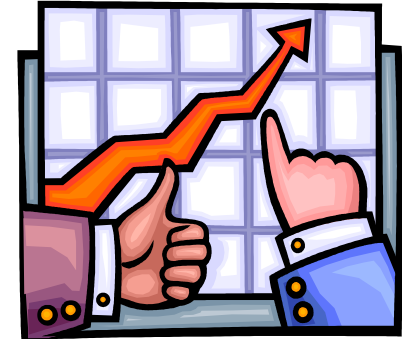
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Biodiesel

Outline

- Trends
- Benefits
- B20 Approval
- 2010 Emissions
- Requirements
- Biodiesel Update
- Summary



Trends

- Production increasing globally
- Incentives & mandates increasing
- Biodiesel included in renewable energy policy / plans
- High instability in crude oil prices
- Shift from small to big players, integration upstream
- Distribution shifting from special handling to mainstream
- OEM's announcing support (most approve B5)
- Shift to higher blends B2→B5→B20
- Industry addressing quality

Benefits

- PM, CO, UHC emissions reduction
- CO2 reduction on a life cycle basis
- Contains no sulfur, aromatics (B100)
- Better lubricity than 500 ppm S fuel
- Renewable energy content
- Local economy, jobs
- Energy security



Biodiesel: Environmental

- Cummins supports the responsible production and use of biodiesel
- We will use biodiesel in our operations where appropriate and produce products that are capable of operating with biodiesel
- Biodiesel must not harm the availability or economics of the global food supply
- Rain forests and water are resources that must be sustained



Biodiesel: Environmental

- Biodiesel offers the environmental benefit of renewable energy
- Can also help to reduce dependency on imported oil
- Provides overall emissions advantage with reduced PM, HC, CO & CO₂
- Cummins is working with industry groups to standardize fuel specifications





B20 Approval

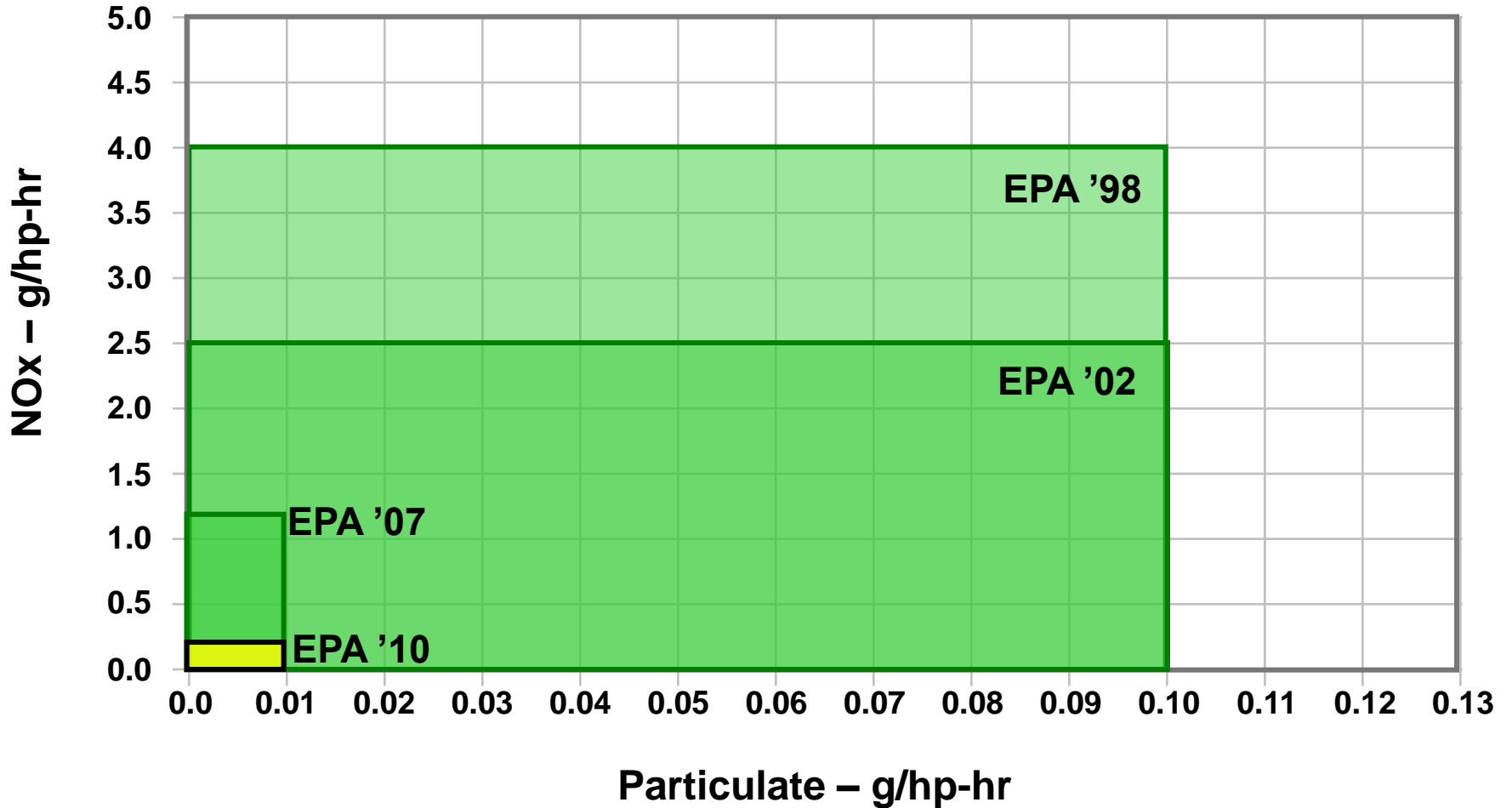
- Requirements specified in [Cummins Service Bulletin 3379001](#)
- Vehicle/equipment OEM's have their own specific requirements

B20 approved engines

- On-Highway: ISX, ISM, ISL, ISC and ISB engines certified to EPA '02 and later emissions standards, ISL, ISC and ISB engines certified to Euro III
- Off-Highway: QSX, QSM, QSL, QSC, QSB6.7 and QSB4.5, QSB3.3 engines certified to Tier 3/Stage IIIA, QSM Marine and QSM G-Drive
- High Horsepower Off-Highway built after January 1, 2008: QSK78, QSK60, QSK50, K2000E, K50, QSK45, QSK38, K1500E, K38, QST30, QSK23, QSK19 and K19. Also Marine QSK60, QSK50, K50 QSK45, QSK38, K38 QSK19, K19.
- All future products will be compatible with biodiesel B20



EPA NA Emission Standards



Doing More to Use Less



Cummins Joined the U.S. Environmental Protection Agency's (EPA) Climate Leaders Program in 2006.

Our pledge is to **reduce** total global Greenhouse Gas (GHG) emissions **by 25 percent** from 2005 to 2010.



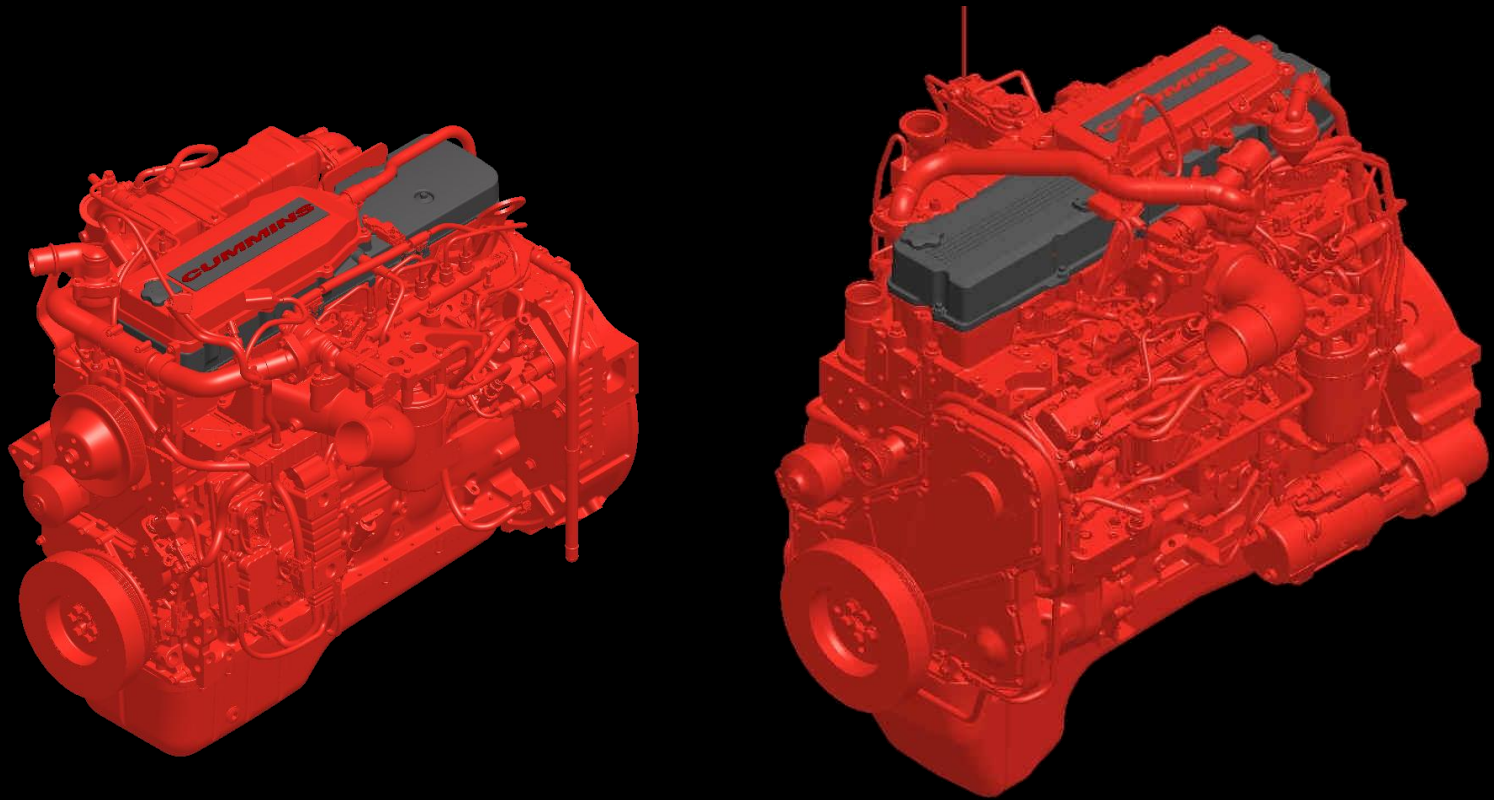
The Right Technology Matters

Cummins will add integrated SCR solution to meet 2010 EPA Emission Standards

- Significant advancements in SCR technology have been achieved by Cummins Emission Solutions as demonstrated by our 2010 MidRange development program.

- SCR solution offers up to **5% improvement** in fuel economy.

Cummins is Ready for 2010!



2010 Engine Platforms & Ratings

ISB6.7

200-325 HP

ISC8.3/ISL9

260-380 HP

ISX11.9

310-425 HP

ISX15

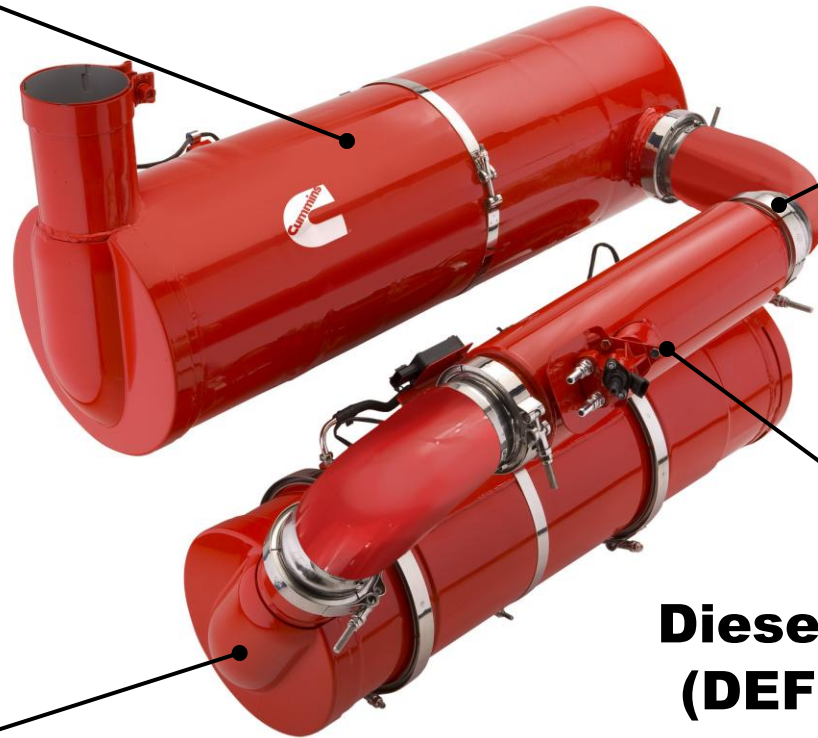
400-600 HP



Cummins Aftertreatment System

**Selective
Catalytic
Reduction
(SCR)
Catalyst**

**Decomposition
Reactor**



**Cummins
Particulate
Filter**

**Diesel Exhaust Fluid
(DEF) Dosing Valve**

Requirements for Using Biodiesel Fuel in Cummins Engines

- Customers choosing to run biodiesel blends **above B5** and up to B20 **must** adhere to the following requirements from Cummins Inc.
 1. B20 ASTM specifications / BQ9000 Suppliers
 2. Oil Sampling
 3. Fuel Water Separation
 4. Biodiesel Fuel Storage
 5. Energy Content
 6. Materials Compatibility
 7. Low Temperature Performance
 8. Microbial Growth
 9. Biodiesel Additives

- It is recommended that customers running biodiesel blends of B5 or below follow these precautions as well.

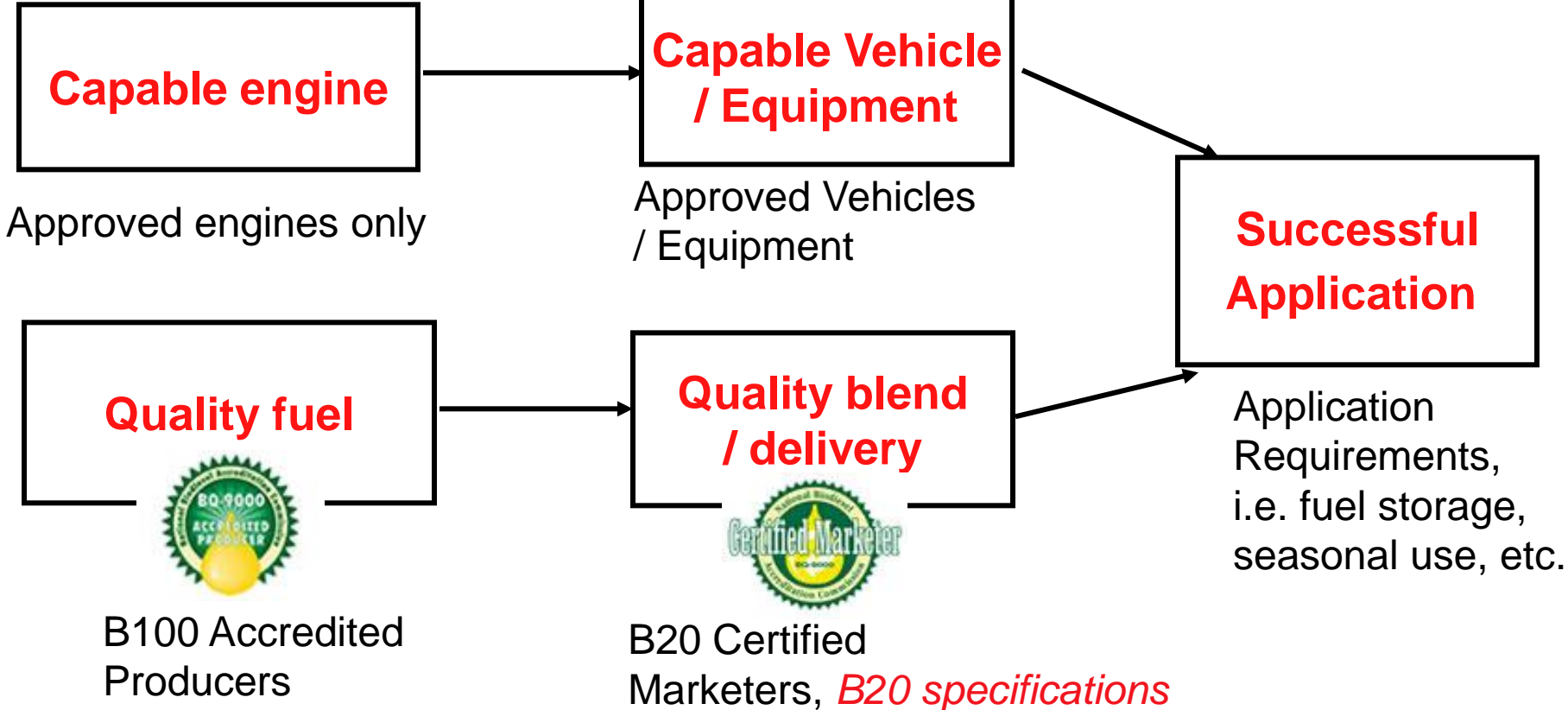


BQ-9000



- In North American Cummins requires biodiesel fuel blend be purchased from a **BQ-9000 Marketer**
- B100 biodiesel fuel used in the blend must be from a **BQ-9000 Producer**
- BQ-9000 Marketers and Producers can be found at the following website: <http://www.bq-9000.org>
 - Over 70% of biodiesel comes from certified producers
 - 33 companies are certified producers
 - Canada, US and Mexico are included in the program
- Outside of North America, consult your local Cummins representative for applicable fuel quality standards

Summary – Key Requirements



Summary

- All Cummins products are approved for use with B5
- Cummins has completed the necessary testing and evaluations and developed guidance to ensure that customers can reliably operate selected equipment with confidence using B20 fuel
- Only use biodiesel that meets ASTM 6751 or EN14214 and ASTM D7467 for biodiesel blends B6-B20. There are no specifications to define blends above B20
- R&E efforts are on-going towards understanding issues relative to use of higher blends