



Working Together for Clean Air

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Biodiesel and Environmental Health



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Presentation Highlights

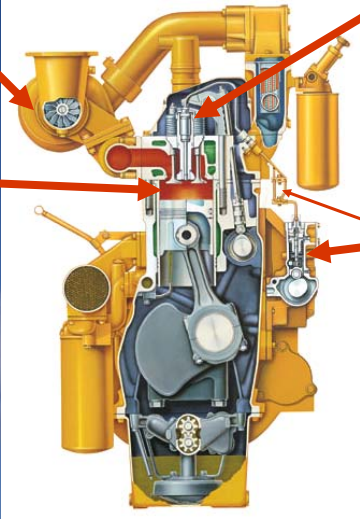


- The diesel engine and health
- Air emission benefits of biodiesel
- Life cycle greenhouse gas emissions benefits of biodiesel
- Lower toxicity benefits of biodiesel



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The Diesel Engine



Turbocharger to increase power, supplies more air

No spark plugs. Heat of compression ignites fuel

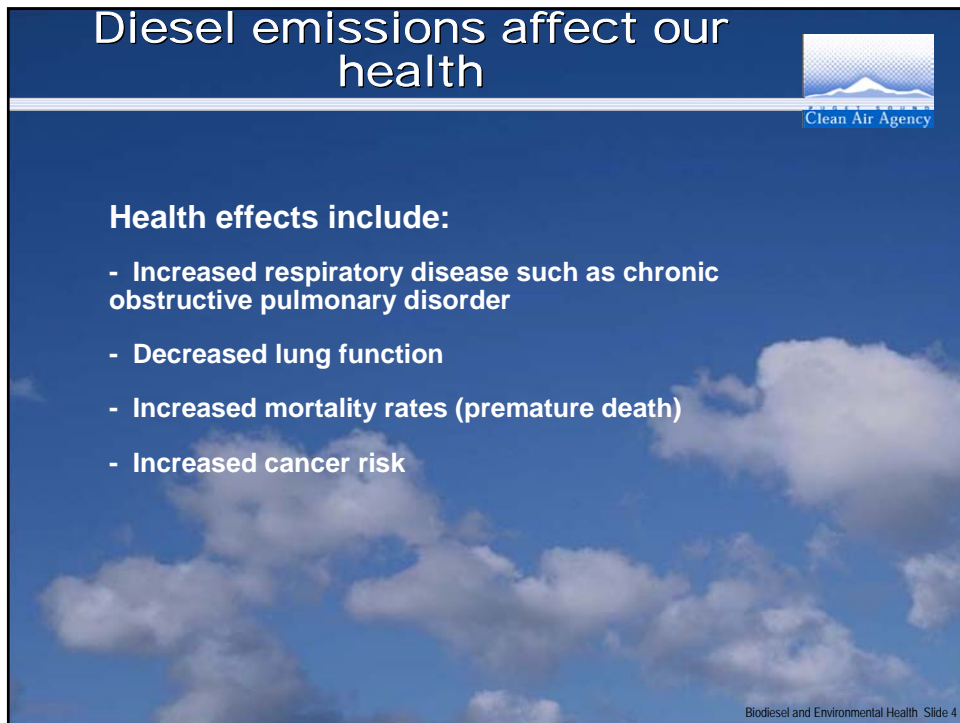
High pressure fuel Injectors inject fuel at 30,000 psi directly into cylinder

Electronic fuel injection system – high pressure pump & controller and injectors

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Diesel emissions affect our health



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Health effects include:

- Increased respiratory disease such as chronic obstructive pulmonary disorder
- Decreased lung function
- Increased mortality rates (premature death)
- Increased cancer risk

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Particles What are they?

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Airborne particles are a complex mixture of extremely small solids and liquid droplets

Human Hair (70 μm diameter)

Hair cross section (70 μm)

PM₁₀ (10 μm)

PM_{2.5} (2.5 μm)

M. Lipsitt, California Office of Environmental Health Hazard Assessment Health Slide 5

Air Toxics in Puget Sound

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Contribution to potential cancer health risk, Seattle 2001

Air Toxic	Contribution (%)
Diesel Particulate Matter	80%
Wood smoke	6%
Chromium	3%
Formaldehyde	3%
Benzene	2%
Carbon Tetrachloride	2%
Arsenic	1%
Chloroform	1%
1,3-Butadiene	1%
Acetaldehyde	1%
Tetrachloroethylene	0%

Diesel particulate matter, wood smoke based on concentrations at Beacon Hill (PMF model)
All other air toxics based on Seattle 6-site averages
Puget Sound Air Toxics Evaluation, October 2003

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Diesel emissions affect our environment




Environmental effects include:

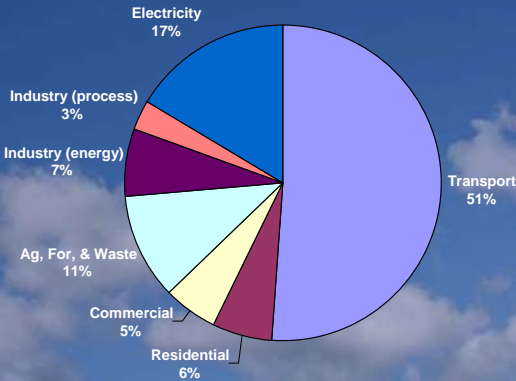
- climate change
- visibility impairment
- plant damage

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Regional greenhouse gas emission sources

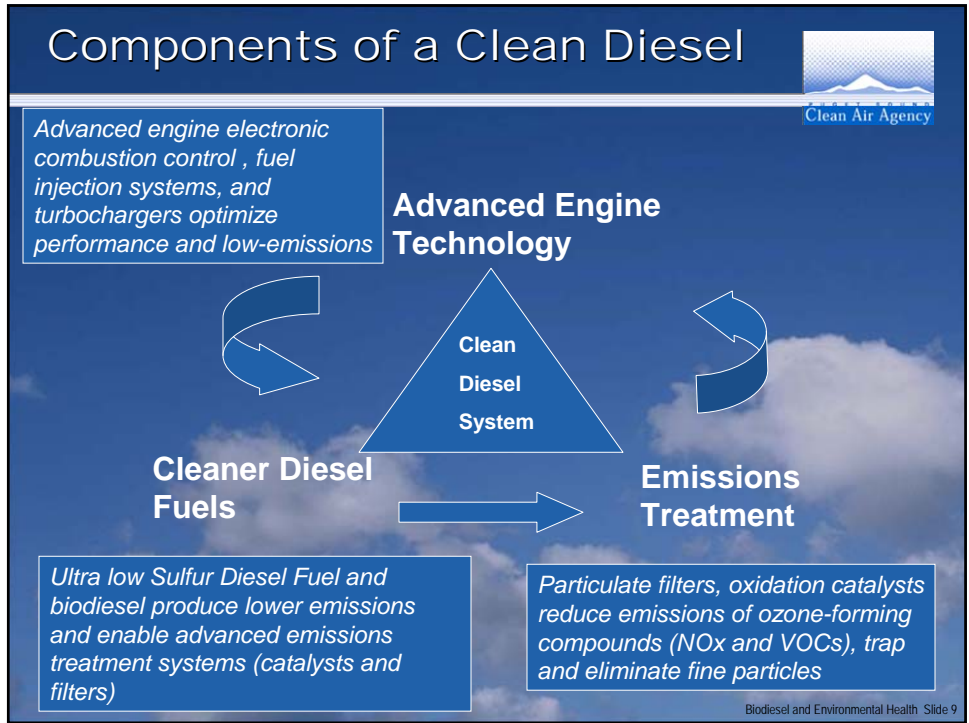


2002 Greenhouse Gas Emissions for the Puget Sound Region



Source	Percentage
Transport	51%
Electricity	17%
Ag, For, & Waste	11%
Residential	6%
Commercial	5%
Industry (energy)	7%
Industry (process)	3%

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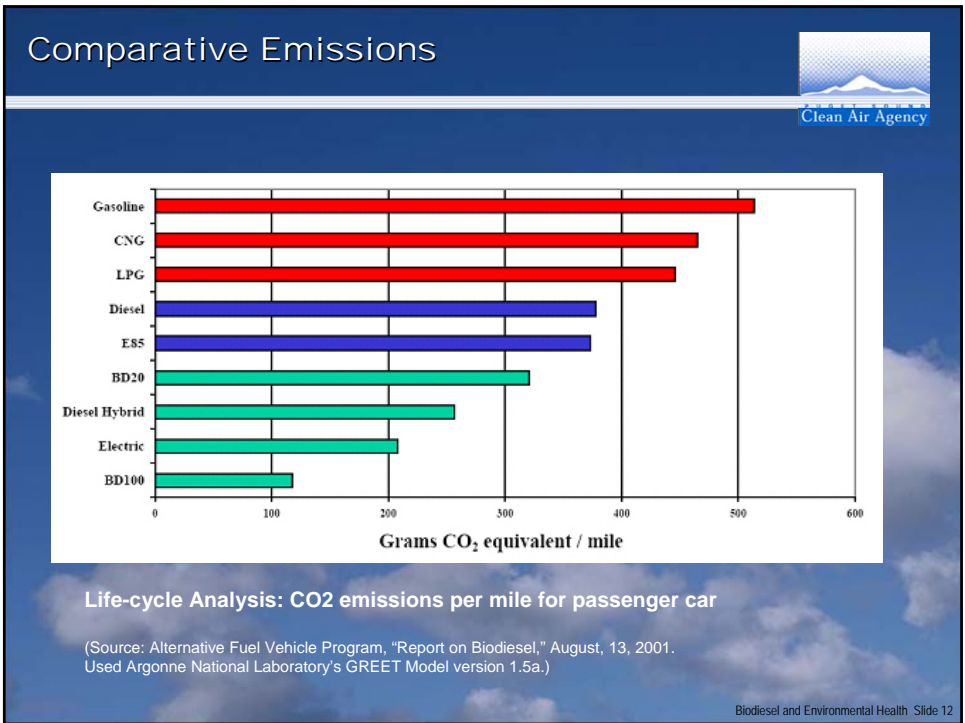
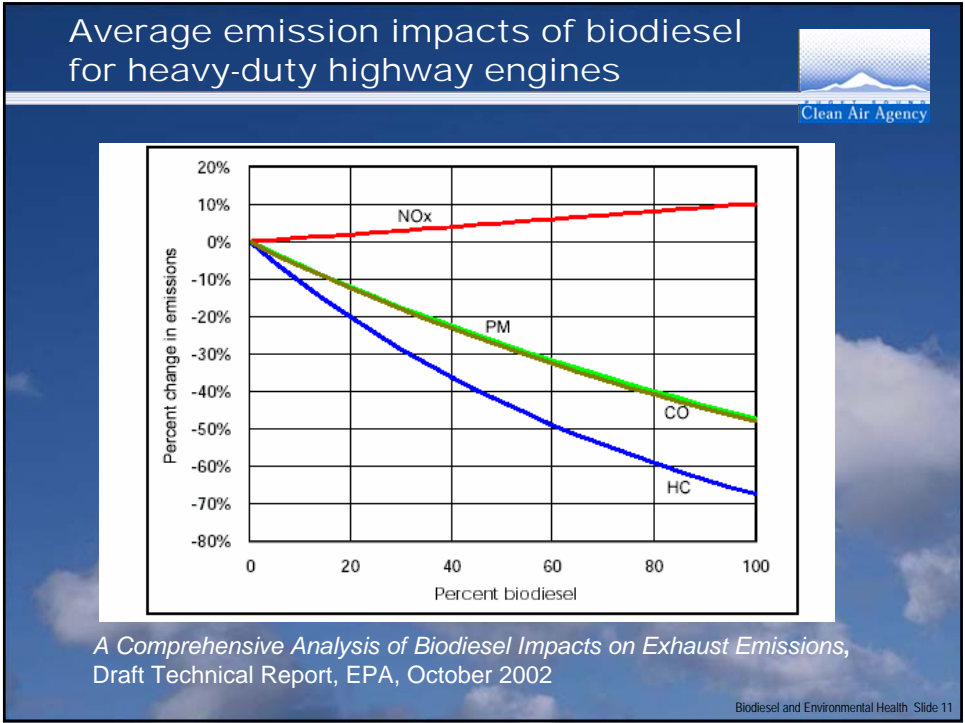


Why Diesel Solutions?

- **Health studies are compelling**
- **Exposure to diesel exhaust is believed to cause cancer**
- **National Air Toxics Assessment and local monitoring show mobile source air toxics for Puget Sound are in the 95th percentile nationally**
- **EPA engine and fuel rules will address only new engines - we want results sooner**

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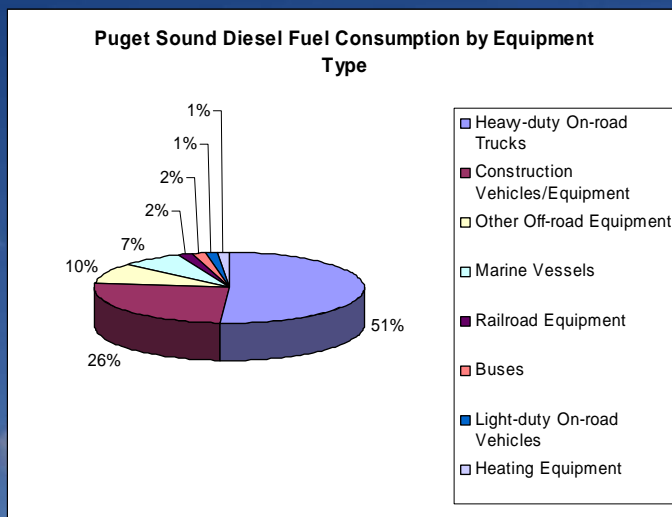
Biodiesel: clean alternative fuel



- **Manufactured by chemically reacting vegetable oils, recycled cooking grease or animal fats with alcohol**
- **Current biodiesel is made from domestic soybean oil**
- **Very low sulfur content**
- **Typically blended with petroleum diesel at 2%, 5%, 20% or more**
- **Advantages: displaces imported oil, reduces air pollution including GHG and supports our farmers, nontoxic**
- **Disadvantages: costs more than petroleum diesel solvent properties can cause fuel filter clogging, can soften or degrade seals and cold weather performance**
- **Federal excise tax credit (effective 1/1/05) could reduce price up to penny per percentage of blending**

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The Market for Biodiesel in Central Puget Sound (561 million gallons per year)



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Some current and potential applications



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Web resources



- <http://www.pscleanair.org/programs/dieselsolutions/fuels/biodiesel.aspx>
- <http://www.biodiesel.org/>
- <http://www.pugetsoundcleancities.org/Biodiesel1.htm>
- <http://www.pugetsoundcleancities.org/Biodiesel2.htm>
- http://www.biodiesel.org/pdf_files/fuelfactsheets/Environment_Safety1.pdf
- http://www.nrel.gov/biomass/proj_biobased_products.html

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