PUGET SOUND
Clean Air Agency

Working Together for Clean Air

www.pscleanair.org

Cleaning Up Diesel Exhaust

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Puget Sound Clean Air Agency

Diesel Exhaust Is A Significant Environmental And Health Problem

- Key Air Quality Problems With Diesel Exhaust
  - Ultra-Fine Particles (PM 2.5 Or Soot)
  - Toxic Emissions And Cancer Risk
  - Regional Visibility

Diesel Exhaust Is A Key Source Of Fine Particles

- Diesel Exhaust Contains Ultra-Fine Particles Bound Up With Toxic Substances
- Result Of Incomplete Combustion
- Act Like A Gas Rather Than A Solid
- Are Invisible And Bypass Lung Defenses

Health Effects From Ultra-Fine Particles

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- Excess Deaths
- Increased Incidences Of Asthma
- Increased Hospital Admissions And Emergency Room Visits
- Significant Increases In Lost Work Days
- Lung, Eye And Throat Irritation

Diesel Exhaust And Cancer Risk

- An Increasing Number Of Studies Link Diesel Exhaust To Lung Cancer Risk
- The Los Angeles Air District Identified Diesel Exhaust As Responsible For 70 % Of The Cancer Risk From Breathing Ambient Air
- The Los Angeles Study Showed Cancer Risk Levels As High As 1400 In A Million Attributable To Diesel Exhaust
- EPA, California And Others Have Identified Diesel Exhaust As A Probable Human Carcinogen

Urban Air Toxics

- A Number Of Washington Cities And Counties Have High Modeled Toxics Levels Attributable To Diesel And Fuel Combustion
- We Are At Some Of The Highest Levels Nationally
- Air Monitoring Verifies High Toxic Levels In The Puget Sound Region

1996 Estimated County Median Ambient Concentrations Benzene - WASHINGTON Counties

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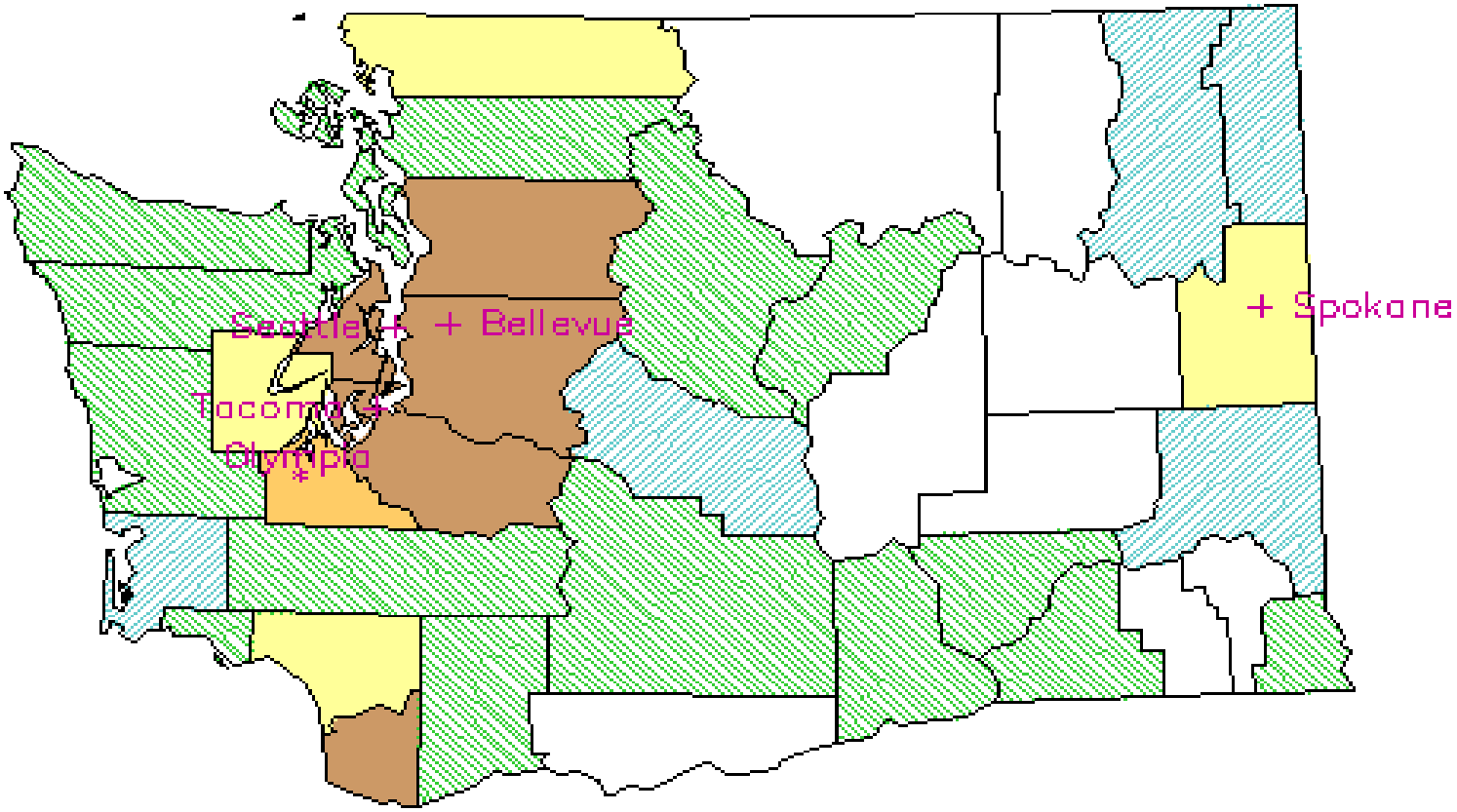

Distribution of U.S. Ambient Concentrations

Percentile	County Median Ambient Pollutant Concentration (micrograms / cubic meter)
Highest in U.S.	4.75
95	1.43
90	1.14
75	0.81
50	0.65
25	0.57
Lowest in U.S.	0.48

Source: U.S. EPA / OAQPS
NATA National–Scale Air Toxics Assessmen

Visibility Is Seriously Impacted By Diesel And Other Fuel Burning

- NOx Emissions Generate A Yellow Haze
- Soot From Exhaust Reflects And Scatters Light And Reduces Mountain Views
- Sulfates From Fuel Combustion Impact Visibility And Contribute To Acid Rain

Why Should We Act Now?

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- The Health And Environmental Benefits Are Substantial
- EPA Estimates That Cleaning Up Diesel Vehicles Will Ultimately:
  - Eliminate 8,300 Early Deaths Per Year
  - Prevent 5,500 Cases Of Chronic Bronchitis And 17,600 Cases Of Acute Bronchitis In Children Per Year
  - Will Avoid 360,000 Asthma Attacks And 386,000 Cases Of Respiratory Symptoms In Asthmatic Children
  - Will Prevent 1.5 Million Lost Work Days, 7,100 Hospital Admissions And 2,400 Emergency Room Visits For Asthma Annually
- The Net Economic Benefit Is Estimated To Be $20 Billion In 2030 - Benefits Outweigh Costs By 16 To 1

So, What Can We Do About It?

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- EPA Has New Standards For Diesel Fuels & Engines
  - Ultra-Low Sulfur Diesel Fuels In 2006
  - New Diesel Engine Standards In 2007
- But, These Programs Will Only Help Us Well Beyond 2010
- To Have A Real Impact Over The Next 20 Years Requires We Reduce Emissions From Vehicles On The Road Now

Diesel Solutions Program

- A voluntary diesel retrofit program in collaboration with EPA's Voluntary Retrofit Program
- Introducing ultra-low sulfur diesel & retrofit kits into the central Puget Sound area
- Focused on government & large private fleets
- Without the fuel & EPA support there would not be a program

Diesel Solutions
Cleaner air for tomorrow, today

A Partnership

Puget Sound Clean Air Agency

United States Environmental Protection Agency

King County Metro

The City of Seattle

The Boeing Company

Everett Public Schools & Durham Transportation

Pacific Rim Enterprise Center & Emerald City Disposal

Washington State Department of Transportation

Port of Seattle

Tosco Refining

Washington State Department of Ecology

The Diesel Technology Forum

MECA (Manufacturers of Emission Controls Association)

Cummins

Detroit Diesel

Johnson Matthey

A Partnership with many - but EPA, Phillips Petroleum (formerly Tosco), King County and Seattle are critical

An Equipment & Fuel Approach

- **Retrofit Devices Are Available For Existing Vehicles.**
  - **Particulate Traps (More On Newer Diesels)**
  - **Oxidation Catalysts (More On Older Diesels)**
- **With Ultra Low Sulfur Fuel of less than 30 ppm sulfur:**
  - **Particulate Traps Can Reduce Particulate Emissions 90% or more**
  - **Oxidation Catalysts Can Reduce Emissions 30% or more**
  - **Particulate Traps Can Reduce Toxics 90 % or More**

Diesel Solutions
Cleaner air for tomorrow, today

Program Goals

Puget Sound Clean Air Agency

- Reach 50% Of Governmental Fleets and 30% Of Large Private Fleets In The Next 5 Years
- If We Are Successful:
  - 14-25% Reduction Of Total Regional Fine Particle Emissions
  - 30-63 Fewer Early Deaths Annually
  - 68-126 Fewer Chronic Bronchitis Cases Annually
  - 1500 - 2,765 Fewer Cases Of Respiratory Symptoms In Asthmatic Children
  - 5,805 - 10,665 Fewer Lost Work Days Annually

Additional Benefits

- Improved Regional Visibility
- Reduced Cancer Risk
- Continued Ability To Meet National Ambient Air Quality Standards For Particulates
- Improved Quality Of Life

King County Metro commitments

- Switch to Ultra-low sulfur fuel for all 1,100 buses between 2001 And 2003
- Equip 800 buses with retrofit hardware over the next 2-1/2 years
- Identify fleet vehicles for retrofit over the next two years
- Meet the 2007 EPA standards for new bus purchases
- Help recruit others in the public and private sectors

City Of Seattle commitments

- Use Ultra-low sulfur fuel throughout its diesel fleet
- Begin retrofitting heavy duty diesel fleet in 2001 with the goal of retrofitting 400 vehicles by end of 2003
- Make Ultra-low sulfur diesel fuel available at city refueling stations for other agencies

Boeing Company Commitments

- Begin fueling entire Puget Sound heavy-duty diesel fleet with ultra-low sulfur diesel fuel this Fall
- Retrofit 70 heavy-duty diesel vehicles in the next several months
- Take a leadership role in demonstrating the viability of retrofit hardware and fuel to the private sector

Commitments from other partners

- Everett School District & Durham Transportation will retrofit 20 school buses by the end of December
- Emerald City Disposal will pilot retrofits this Fall and are interested in retrofitting all 400 refuse vehicles
- The Washington State Department Of Transportation will develop a pilot retrofit project this Fall
- The Port Of Seattle will develop a project to install retrofit hardware on diesels associated with construction of a new third runway at Sea-Tac Airport

Next steps

- Implement the projects by initial partners and distribute funding
- Solicit additional partners and funding
  - School bus fleets
  - Grocery fleets
  - Package distribution fleets
- Continue to work on fuel supply and pricing issues
- Work on incentives with Legislature
- Meet program goals of fuel and retrofits for 50% of governmental and 30% of private fleets

Key Challenges

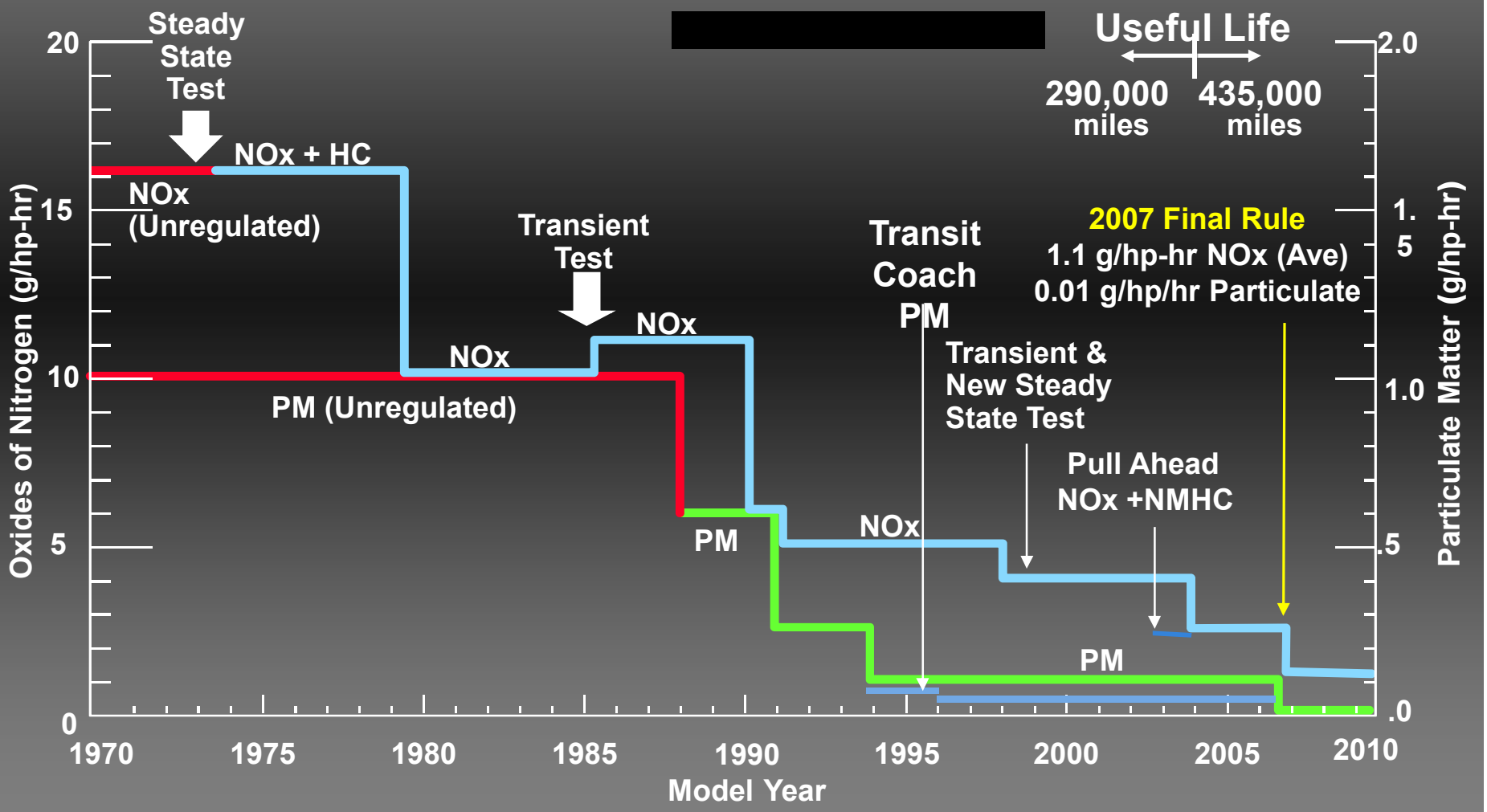
- Fuel Pricing and Distribution
- Cost of Retrofits
- Fear of New Technology

Conclusion

- We have an opportunity for:
  - Health & Air Quality Improvements
    - Toxics Reductions
    - Fine Particle Reductions
    - Reduced Cancer Risk
    - Visibility Improvement
    - Reduced Acid Rain Components
  - Avoiding additional regulations
  - Successful collaboration between government and the private sector

For More Information, See Our Web Site At:
WWW.PSCLEANAIR.ORG And Click On "Diesel Solutions"

EPA Heavy-Duty
Engine Emission Standards



US ON-HIGHWAY EMISSION REQUIREMENTS

Yr	TRUCK NOx	TRUCK PM	URBAN BUS NOx	URBAN BUS PM	CALIFORNIA URBAN BUS NOx	CALIFORNIA URBAN BUS PM
2001	4.0	0.1	4.0	0.05	4.0	0.05
2002	2.5	0.1	2.5	0.05	2.5	0.01
2003	2.5	0.1	2.5	0.05	2.5	0.01
2004	2.5	0.1	2.5	0.05	0.5	0.01
2005	2.5	0.1	2.5	0.05	0.5	0.01
2006	2.5	0.1	2.5	0.05	0.5	0.01
2007	1.1 (Ave)	0.01	1.1 (Ave)	0.01	0.2	0.01
2008	1.1 (Ave)	0.01	1.1 (Ave)	0.01	0.2	0.01
2009	1.1 (Ave)	0.01	1.1 (Ave)	0.01	0.2	0.01
2010	0.2	0.01	0.2	0.01	0.2	0.01

All emissions in g/hp-hr