Oregon Solutions
Emission Free Truckstops

Why Idle?

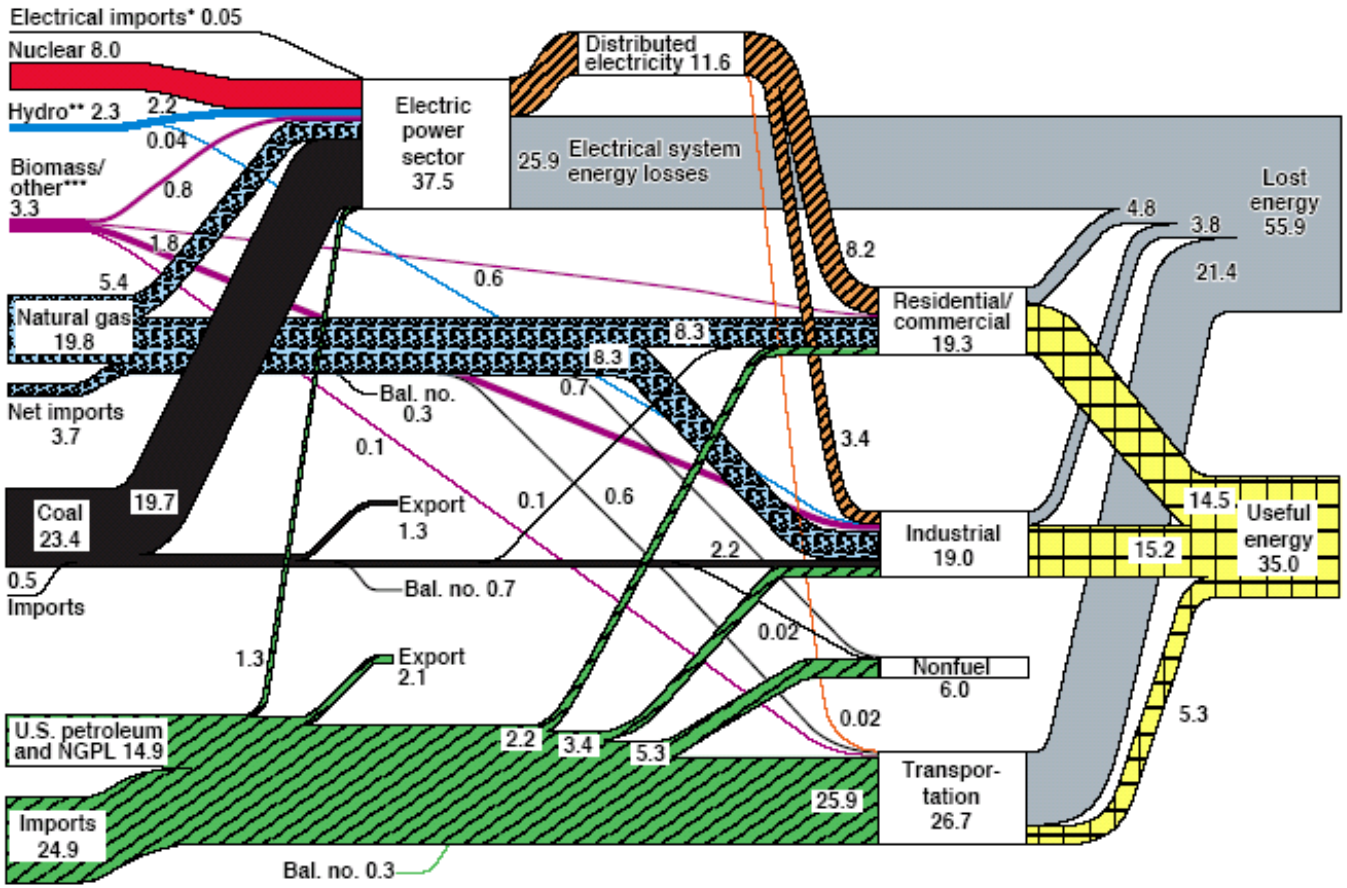
- Occurs in long duration and short duration settings
  - Habit, past practice
  - Mask noise and because other drivers do it
  - Personal comfort – heating and cooling
  - Operate onboard appliances
  - Ensure engine block, fuel and oil remain warm in cold weather

What is the Problem with Idling?

- Consumes energy and uses fuel inefficiently
- Diesel exhaust has adverse public health and environmental impacts

U.S. Energy Flow - 2002

Quadrillion BTUs



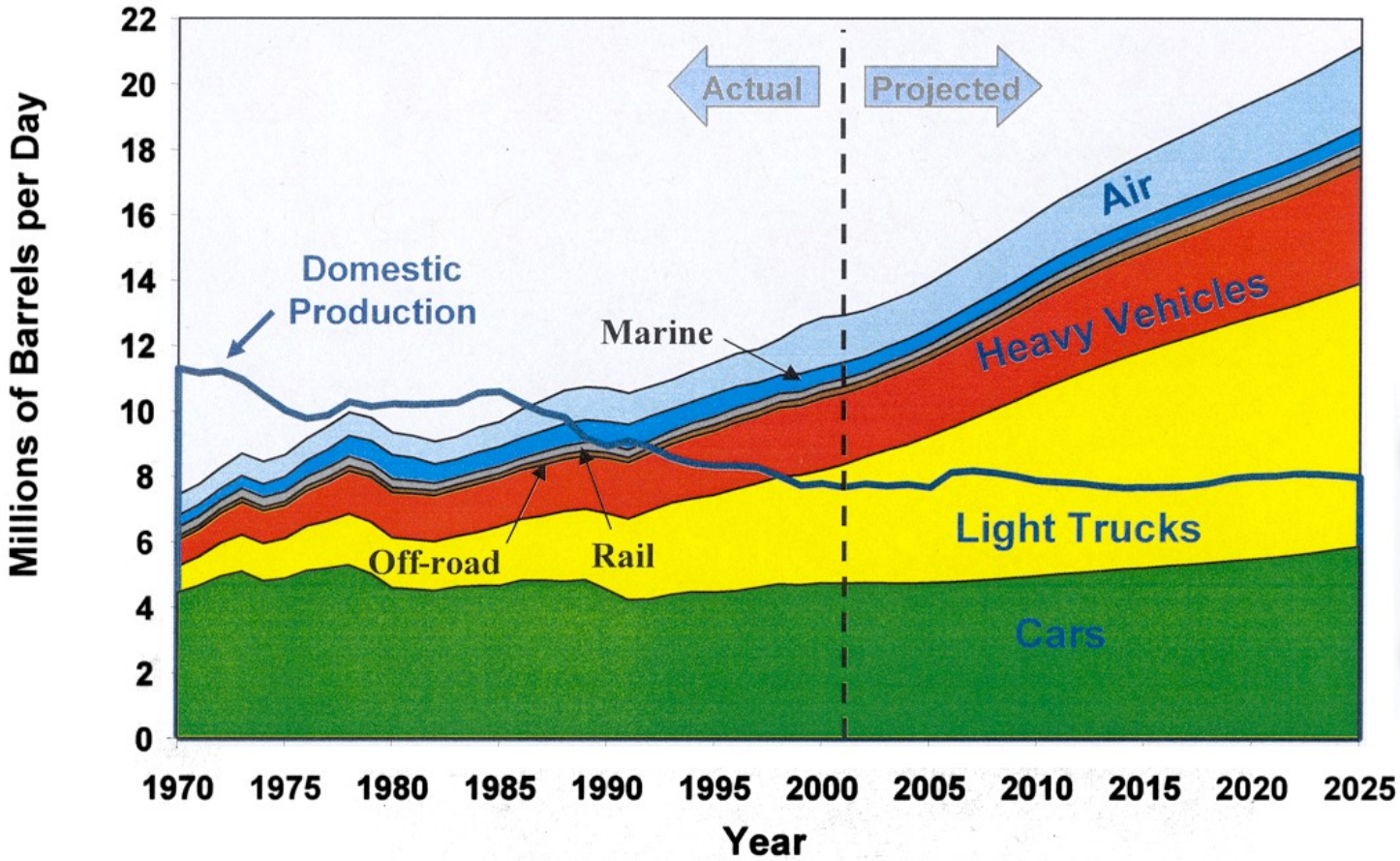
Source: Production and end-use data from Energy Information Administration, *Annual Energy Review 2001*
*Net fossil-fuel electrical imports
**Includes 0.2 quads of imported hydro
***Biomass/other includes wood, waste, alcohol, geothermal, solar, and wind.

August 2003
Lawrence Livermore National Laboratory
http://eed.llnl.gov/flow

U.S. Petroleum Usage

Oil Facts

- 53% imported
- 2/3 used in transportation
- 17% used by heavy trucks

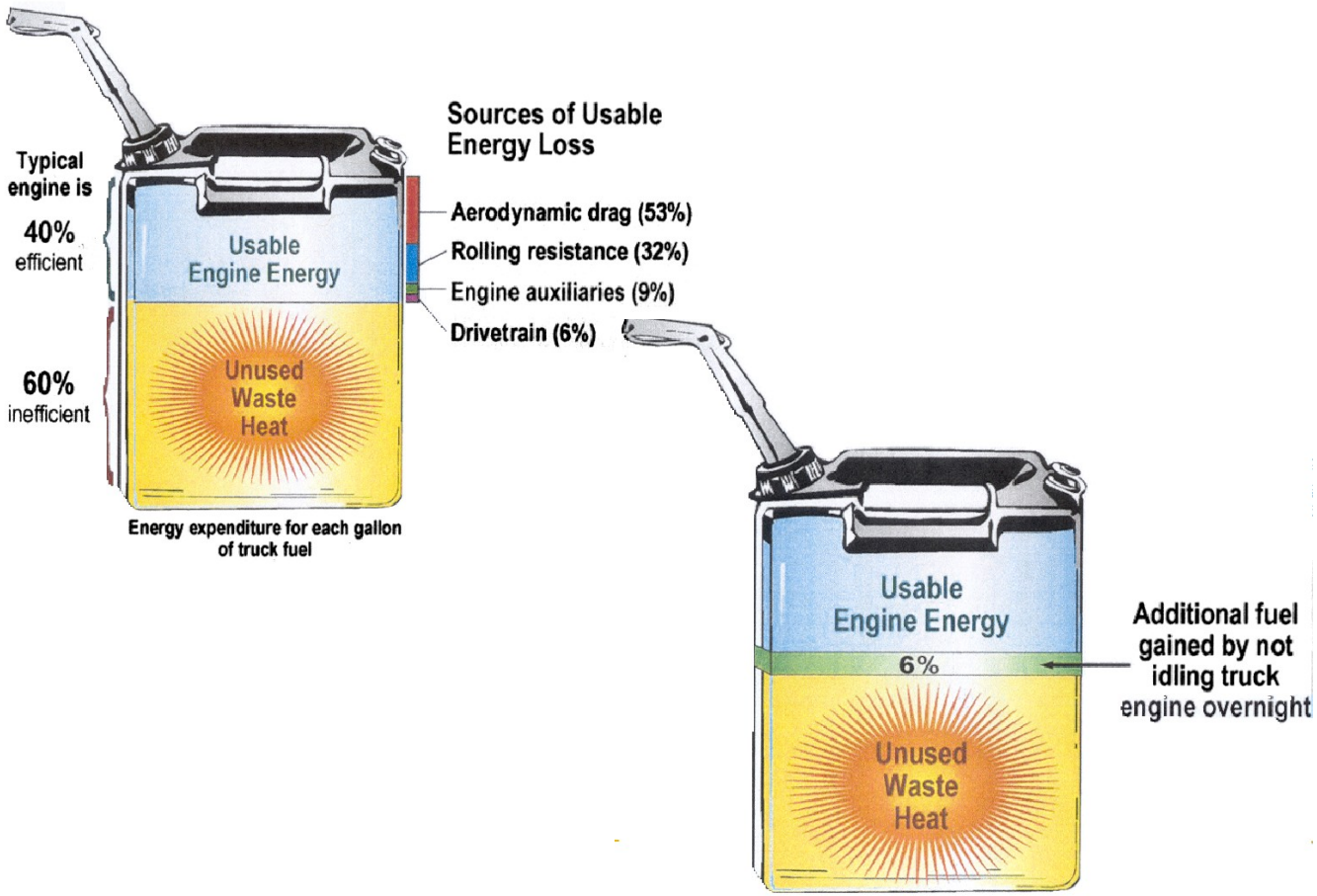


Source: Transportation Energy Data Book: Edition 22, September 2002, and EIA Annual Energy Outlook 2003, January 2003

Truck Idling

- Nationally, 500,000 long haul trucks
- May idle between 6-8 hours per day
- Consume 838 million gallons idling
- $1.3 billion in fuel and maintenance costs

Idling is Inefficient



Idling Causes Emissions

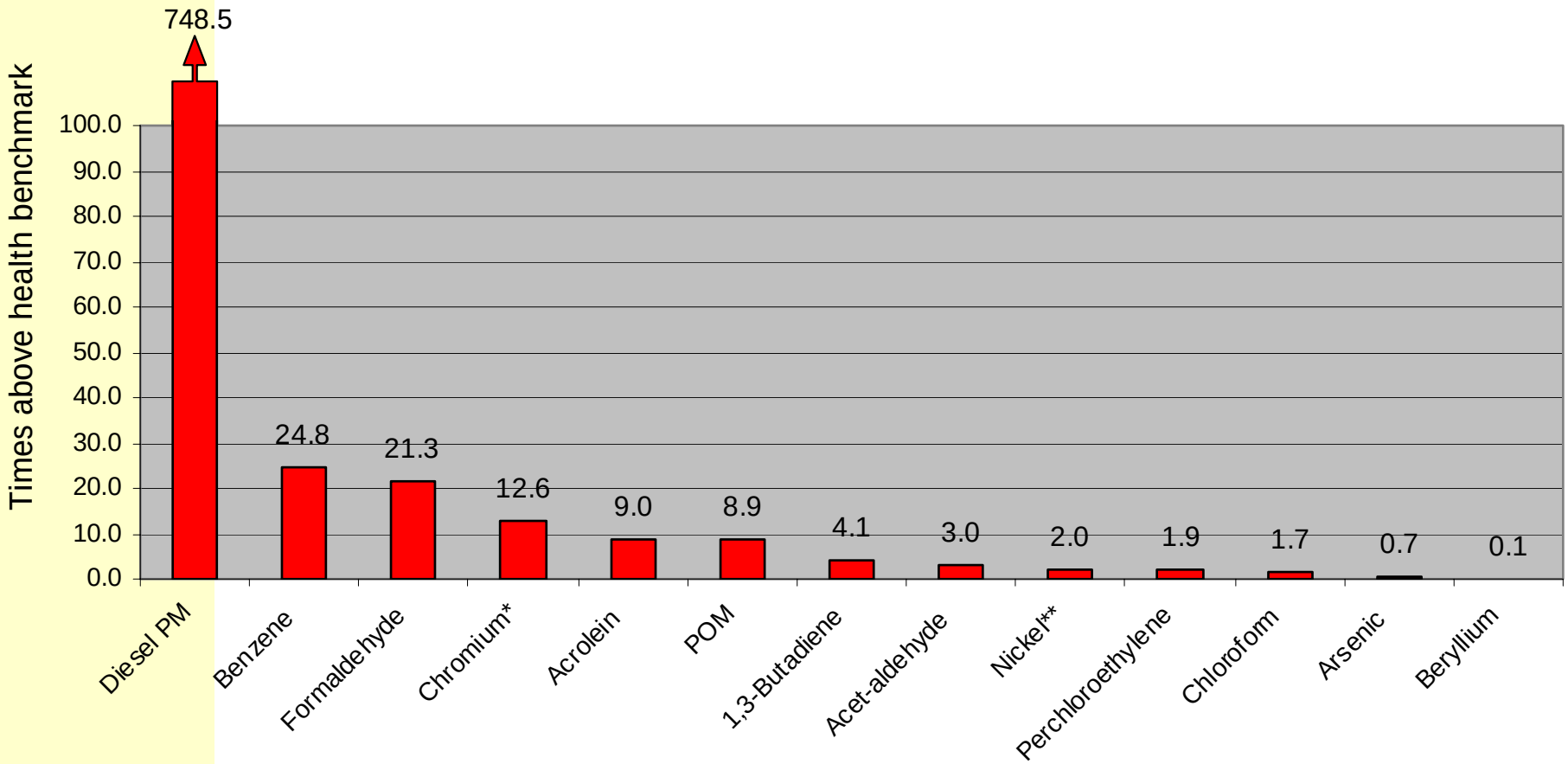
Nationally,

- CO_2 11 million tons
- NOx 180,000 tons
- PM 5,000 tons

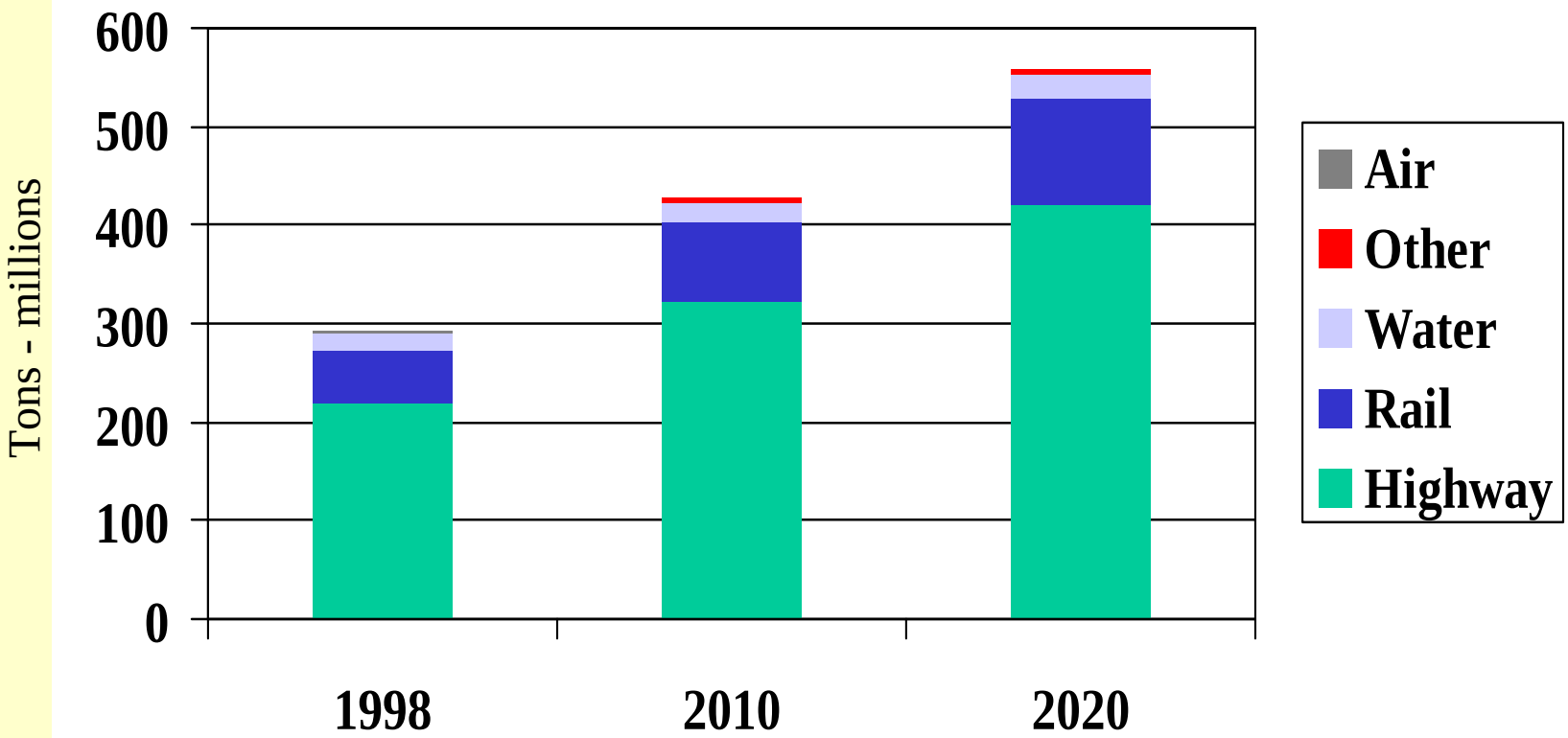
In Oregon,

- CO_2 250,000 tons
- NOx 4,500 tons
- PM 122 tons

Statewide Hazard For All Pollutants

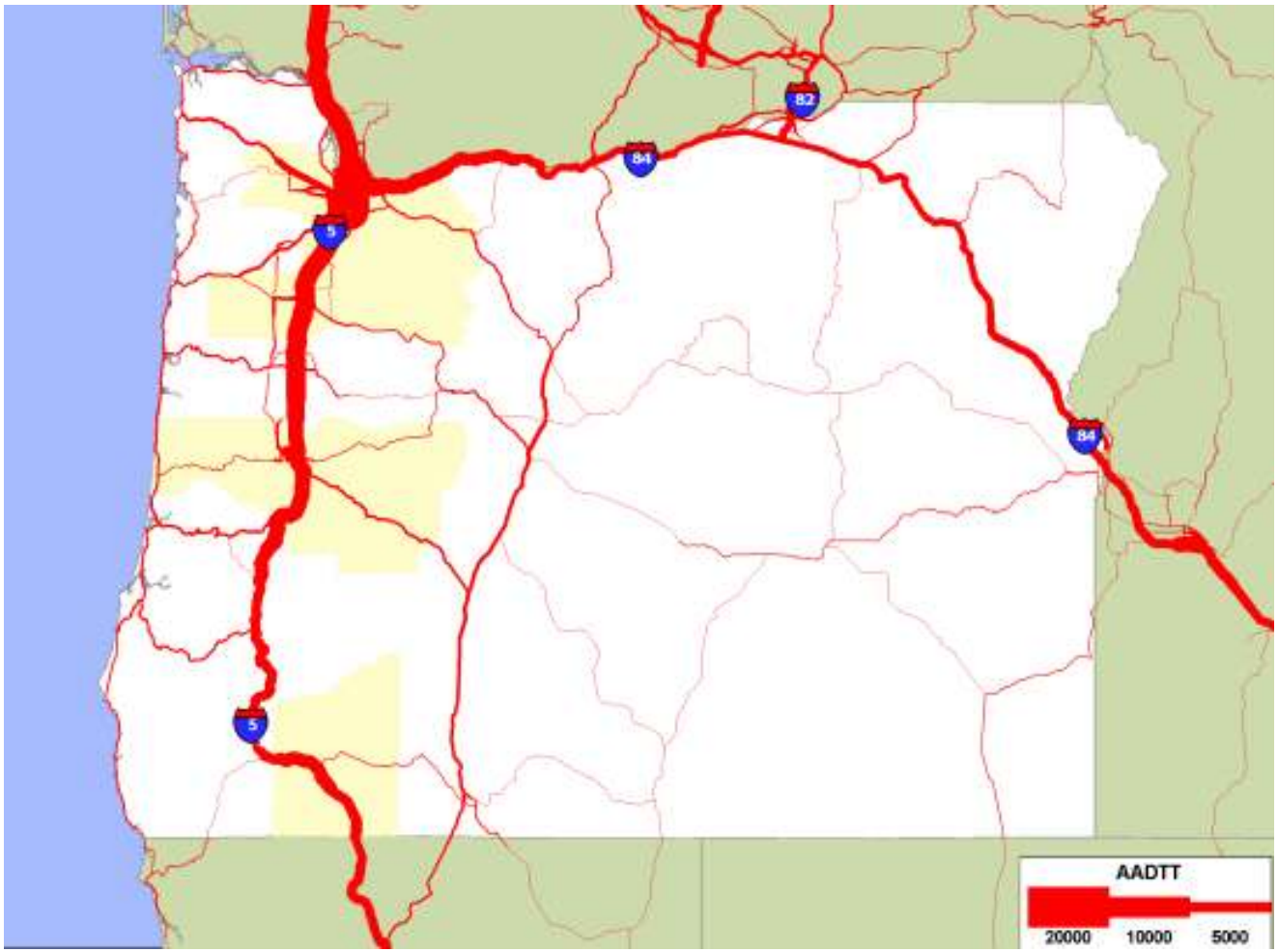


Freight Shipments To, From, and Within Oregon



from FHWA State Freight Profiles

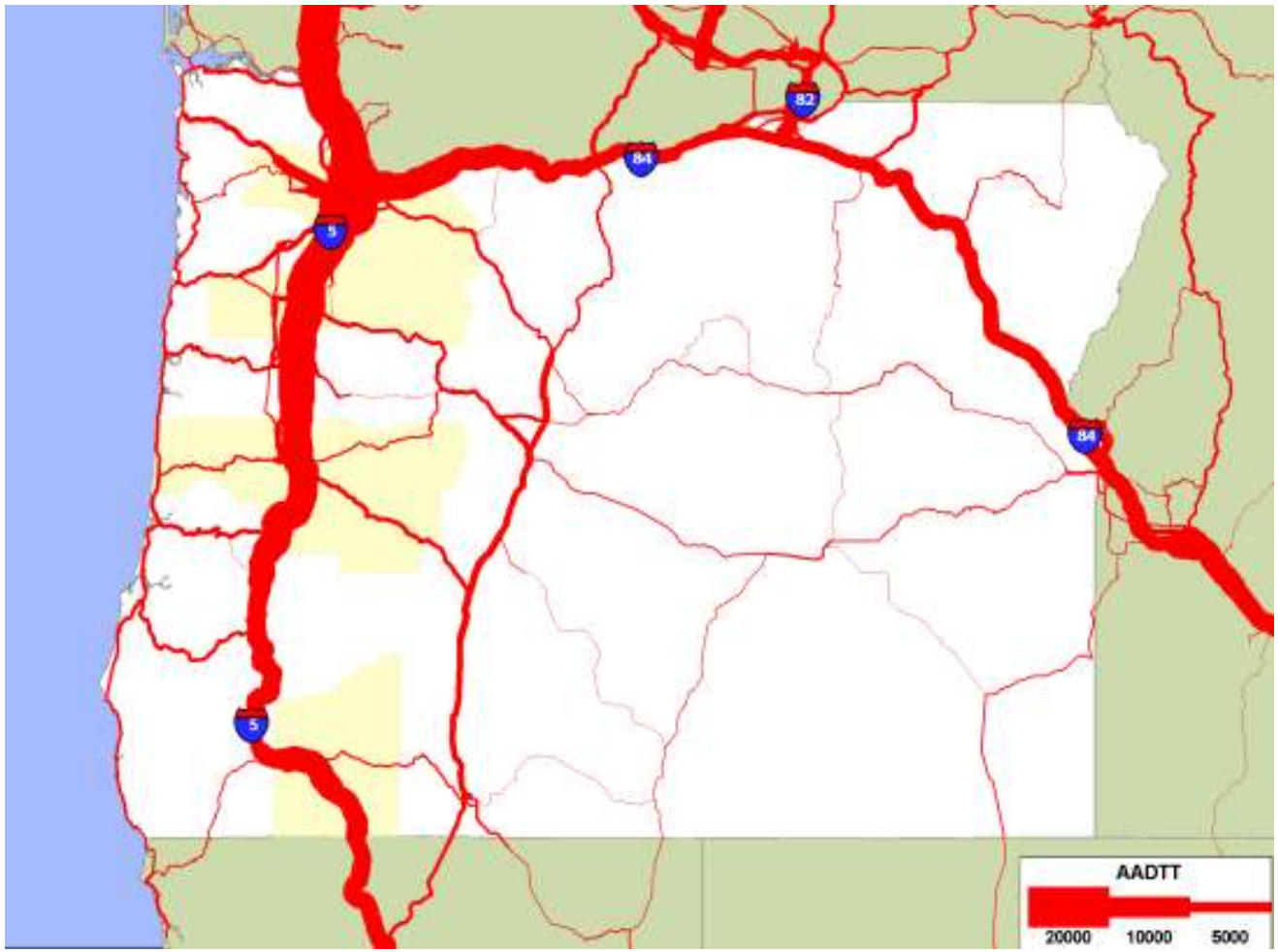
Estimated Average Annual Daily Truck Traffic: 1998



Source:

Federal Highway Administration
November 2002

Estimated Average Annual Daily Truck Traffic: 2020



Source:

Federal Highway Administration
November 2002

Truck Freight Movement in Oregon

Idling Controls

- Regulation by state and local jurisdiction
  - No specific anti-idling laws in Oregon but ORS 811.585 could apply in some cases
- Behavioral controls
  - Financial incentives
- Technological approaches
  - On board
  - Off board

Auxiliary Devices

Auxiliary Power Units

- Uses a small off-road diesel engine and on-board fuel
- Equipped with a generator/alternator to provide electrical power
- Heating, cooling, engine warming and electrical power for battery charging and on-board appliances
- Can be used anywhere
- Drawbacks: Heavy, needs maintenance, high initial cost

Auxiliary Devices

Direct Fired Heater

- Provides heat to cab/sleeper or engine or both
- Compact and high heating efficiency
- Uses on-board fuel and truck batteries for power
- Can be used anywhere
- Drawbacks: No cooling, and may drain batteries

Idle Limiting Devices

Idle Shutdown Timer

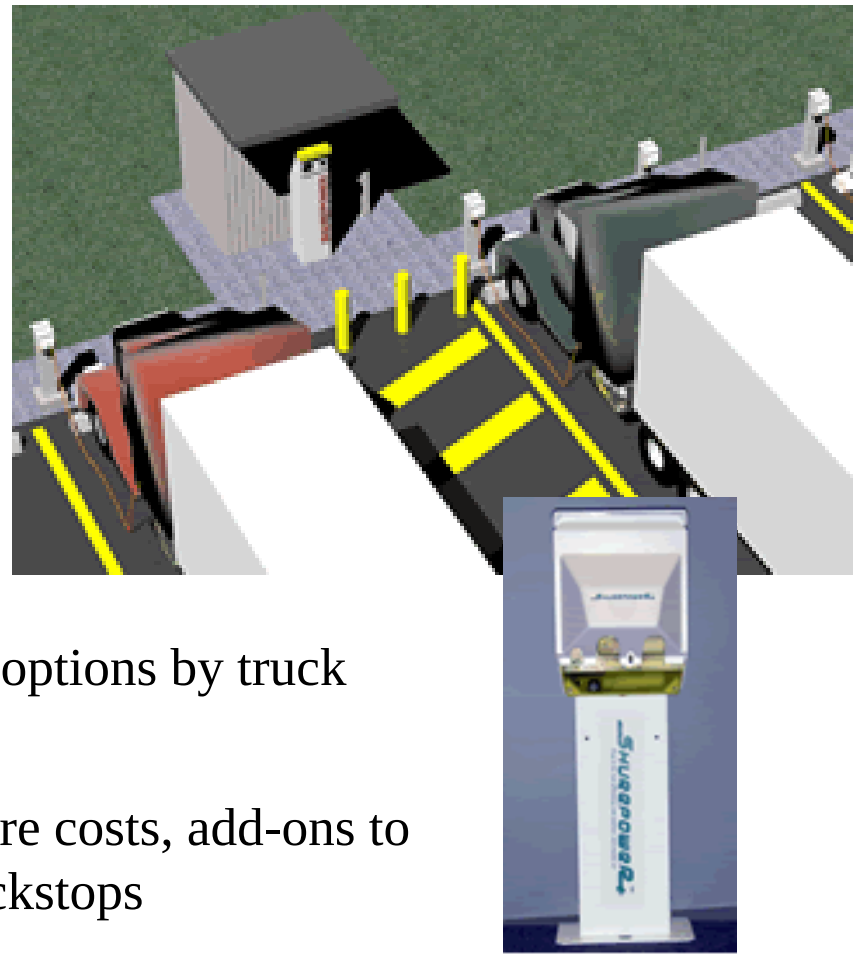
- Shuts off the engine after a set time
- Available in all electronic engines

Automatic Start/Stop Systems

- Automatically stops and restarts the engine based on battery voltage and engine and/or cab/sleeper thermostat settings
- Available as option with DDC, Cummins, Caterpillar and Mack engines
- Drawback: Start/stop can be sleep disruptive

Truckstop Electrification

- Electrical power for heating, cooling and for battery charging and on-board appliances
- Requires electrical outlets at parking spaces and inverters/chargers and electrical connections on trucks



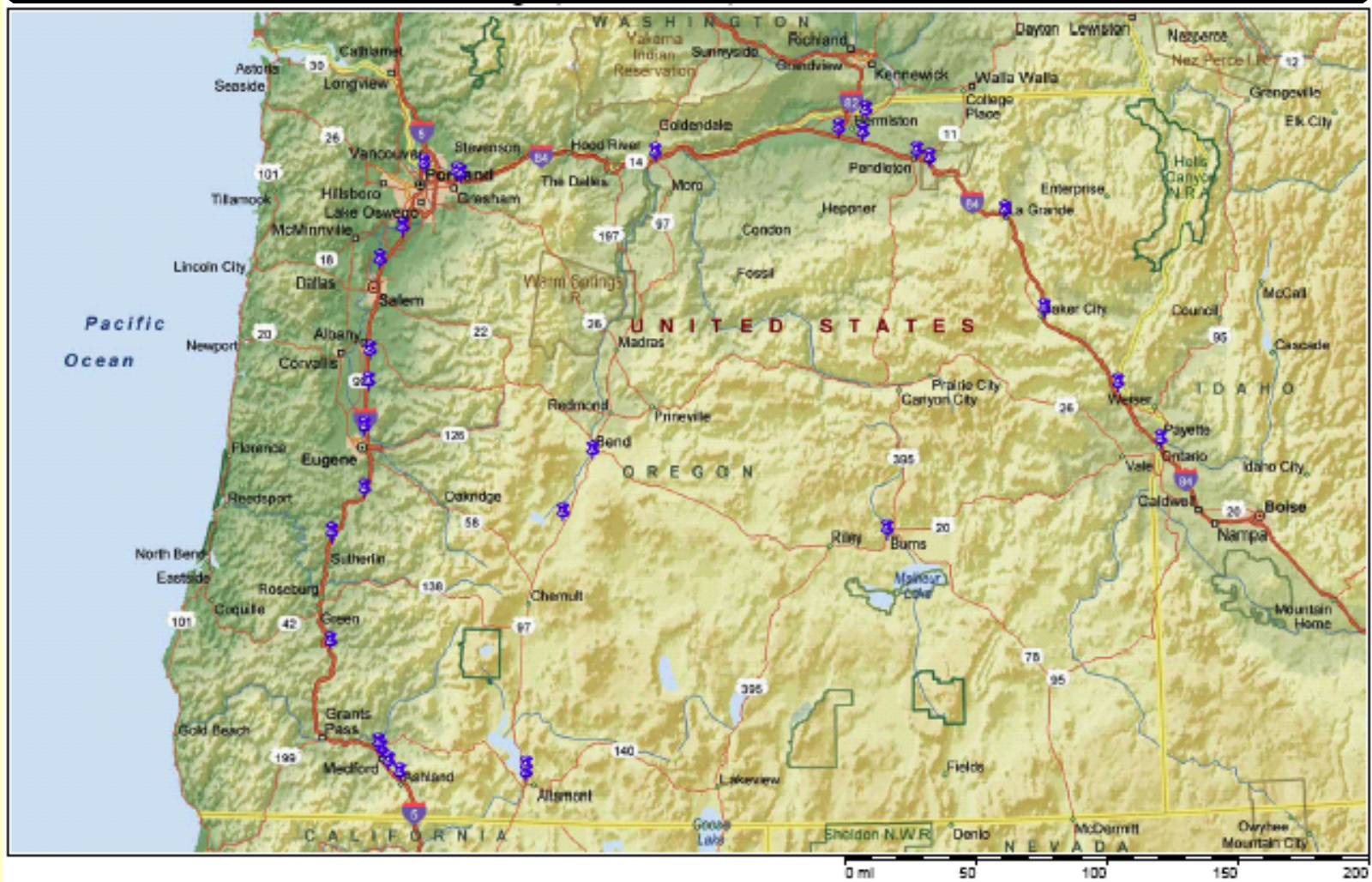
- Inverters/chargers offered as options by truck manufacturers
- Drawbacks: high infrastructure costs, add-ons to truck and available only at truckstops

Advanced Truckstop Electrification

- Truck modifications not needed
- Independent HVAC units for each truck installed above each parking space
- Electrical power for on-board appliances
- Telephone, internet and television services

- Drawbacks: High infrastructure costs and available only at truckstops

Truckstops in Oregon



Why TSE?

- Governor's West Coast Climate Change Initiative
- EPA National Transportation Idle Free Corridor project
- Surplus of commercial truck parking spaces
- Targeted expenditure of resources

Ton-Miles of Truck Shipments