

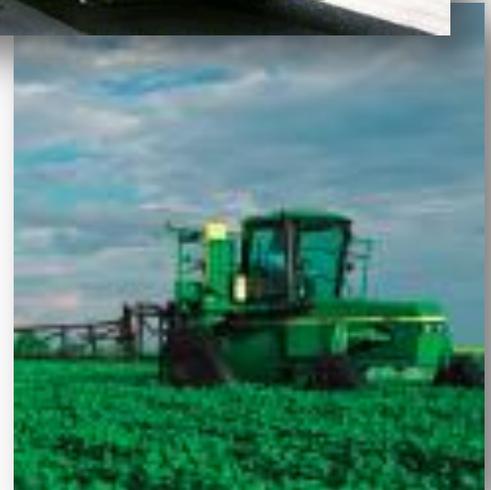
# The Tragedy of the Commons



Rational decisions by individuals acting independently will deplete a shared resource



# Oregon Clean Diesel Initiative



# Oregon Clean Diesel Initiative



# Diesel Engines and Air Quality



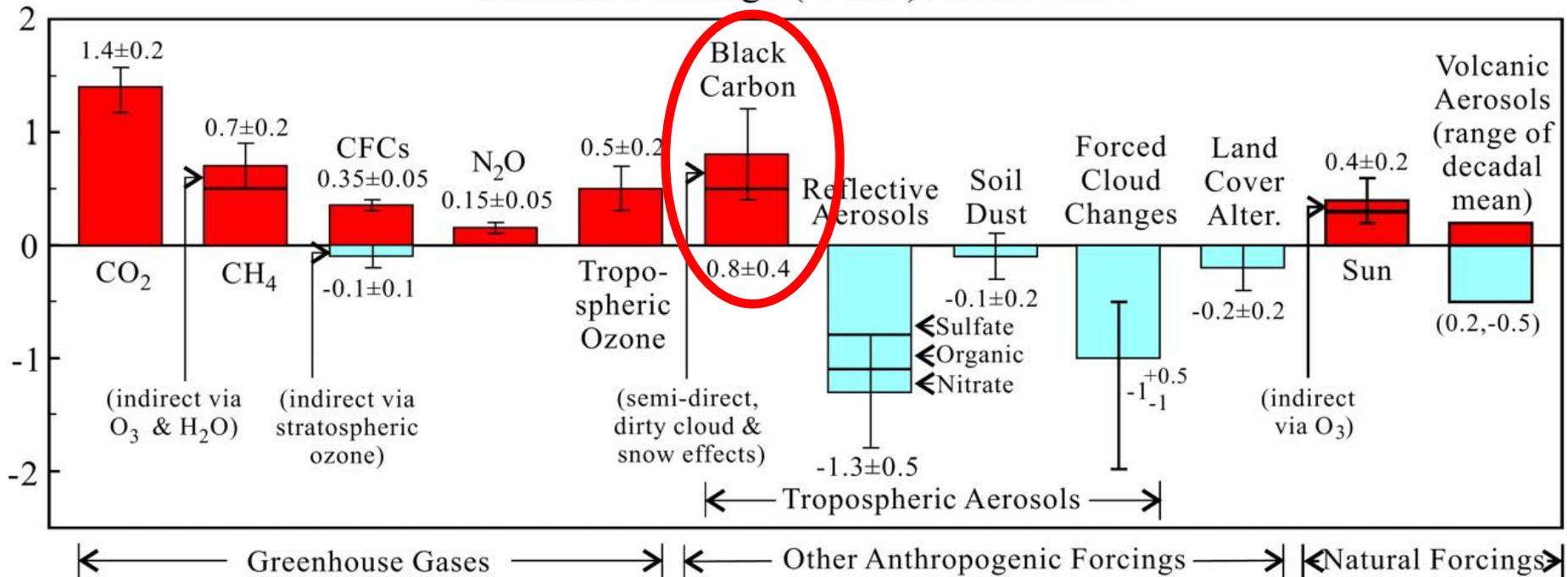
- Diesel exhaust is a complex mixture of gases and fine particles
- Engines have historically contributed significant amounts of NO<sub>x</sub>, particulate matter to air pollution



# Climate Change Agents



Climate Forcings ( $\text{W/m}^2$ ): 1850-2000





## ARTICLE

doi:10.1038/nature12540

# The projected timing of climate departure from recent variability

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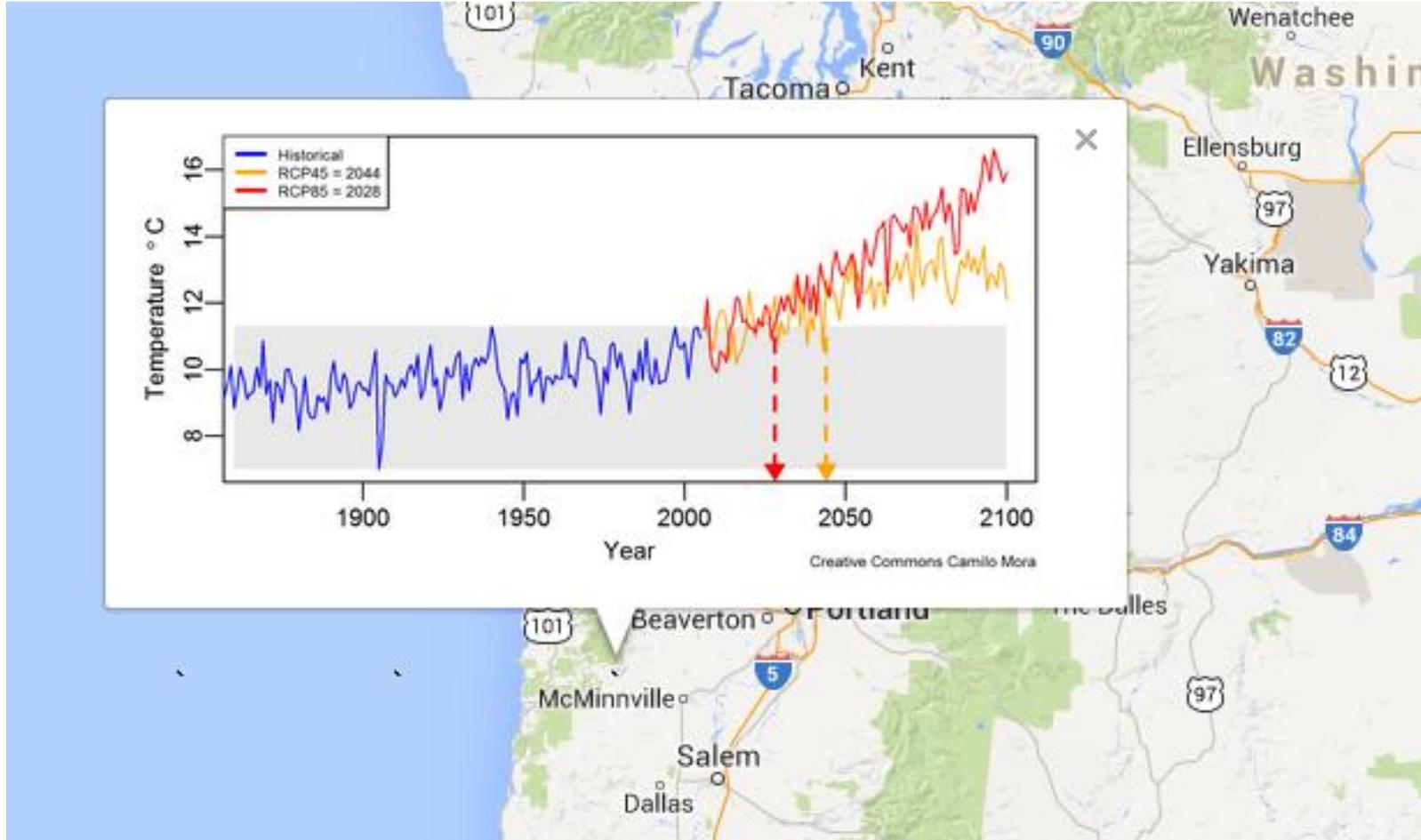
...and societal disruptions by modern climate change are critically determined by the time frame over which ... Here we present a new index of the year when the projected mean climate of ... historical variability under alternative greenhouse gas ... (+18 years s.d.) for

or ...when will the coldest temperatures in the future be hotter than the warmest temperatures than anyone has seen since your great, great grandparents were alive? ”

structure<sup>3</sup> and disrupt ecosystems. Changing climates could also affect the following: human welfare, through changes in the supply of food<sup>13</sup> and water<sup>14,15</sup>; human health<sup>16</sup>, through wider spread of infectious vector-borne diseases<sup>17,18</sup>, through heat stress<sup>19</sup> and through mental illness<sup>20</sup>; the economy, through changes in goods and services<sup>21,22</sup>; and national security as a result of population shifts, heightened competition for natural resources, violent conflict and geopolitical instability<sup>23</sup>. Although most ecological and ... to adapt to a changing climate, the ...

the Representative ... (RCP85), which included the period from 2006 to 2100 ... ways or scenarios represent contrasting mitigation efforts between a concerted rapid CO<sub>2</sub> mitigation and a 'business-as-usual' scenario (CO<sub>2</sub> concentrations could increase to 538 and 936 p.p.m. by 2100, according to RCP45 and RCP85, respectively<sup>27,28</sup>). A more aggressive mitigation scenario (RCP 2.6) was not analysed, because it was not consistently used among models, and the implicit mitigation effort is ... possible<sup>29</sup>.

# Climate Change



# Dirty vs. Clean Diesel



CONVENTIONAL

RETROFITTED

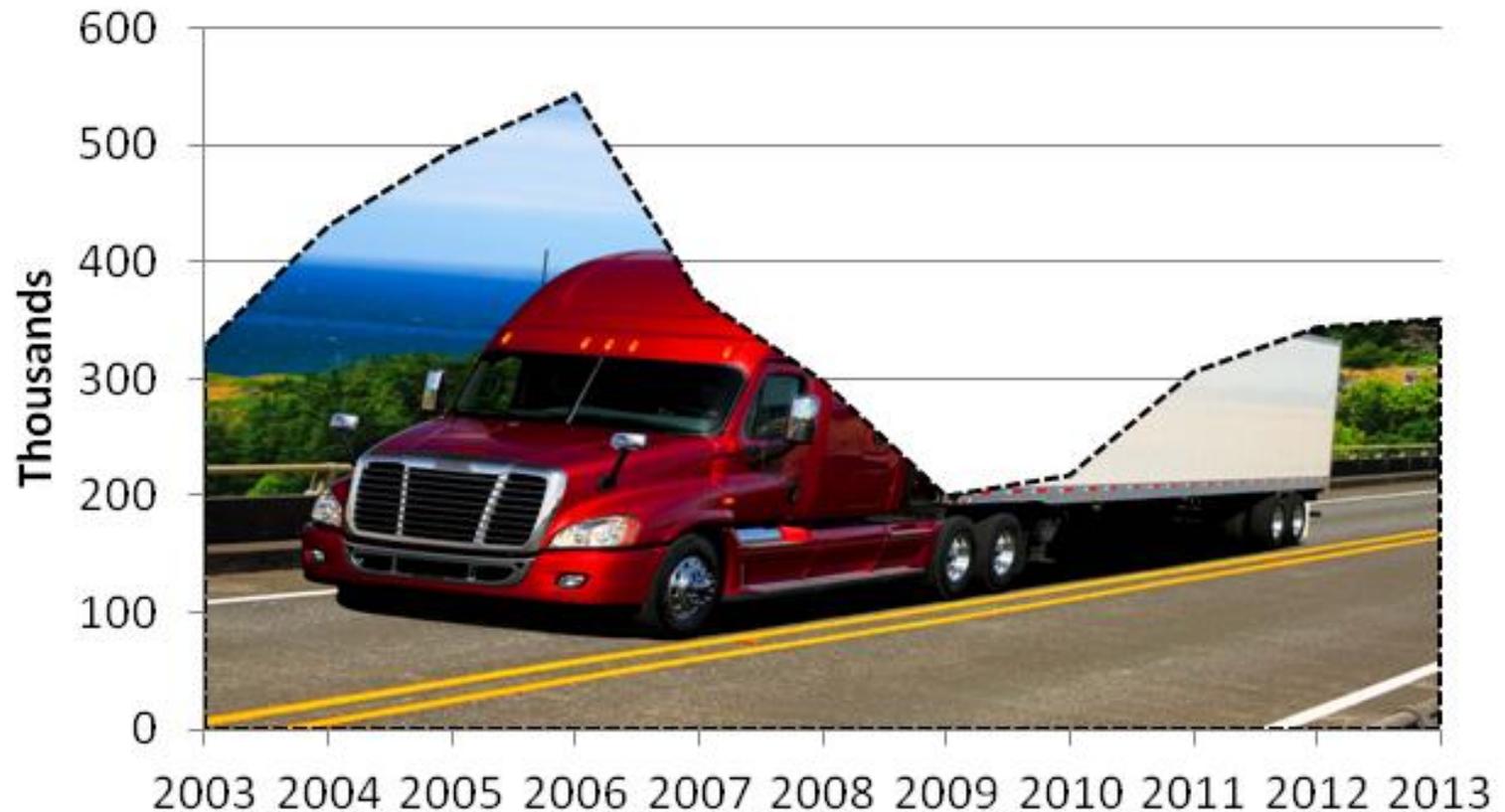
Real time measurements of particulate matter pollution inside a car “chasing” a diesel refuse truck before and after retrofitting.

Courtesy of Clean Air Task Force

# On Road Diesel Engine Emission Standards



## US HD Truck Sales



# Economics of Diesel



\$ 410 billion

Diesel contribution to American economy



\$ 296 billion

Health/environmental impacts associated with highway, nonroad, marine and locomotive diesel vehicles

# Economics of Clean Diesel



Per vehicle:

Filter costs  
– \$16,000

Environmental/

Public health costs

@ 1500 hr/yr = \$ 52,000

Social Return on Investment:

Environmental/Public health breakeven

- less than 5 months



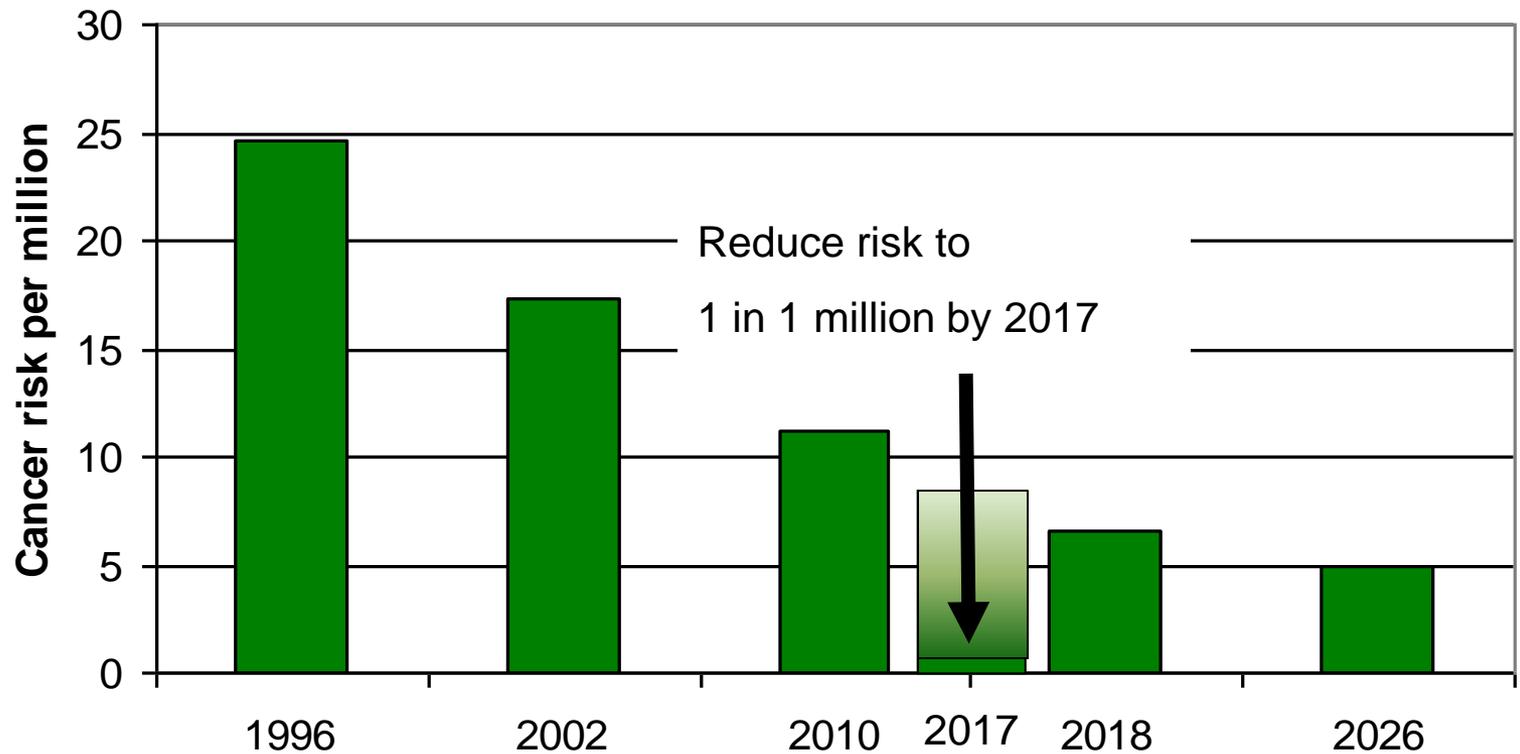
# Clean Diesel Projects



# Progress to date



# Projected Diesel PM Risk in Oregon



# Oregon Clean Diesel Initiative



- Benefits are disbursed and in the future
- Solutions come at a cost
- Can require substantial effort
- Legacy problem
- Voluntary vs. regulatory



# Oregon Clean Diesel Initiative



- Addresses a serious need
- Solution readily available
- Cost effective
- Substantial gains in protecting public health and the environment



# Oregon Clean Diesel Initiative



Is exposure to diesel exhaust a public health concern?

Is this an issue that you can contribute a resolution to?

What can you do to help?