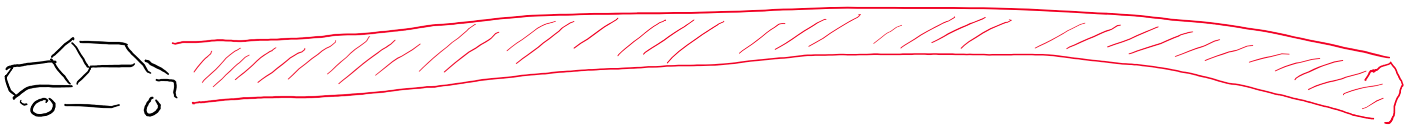
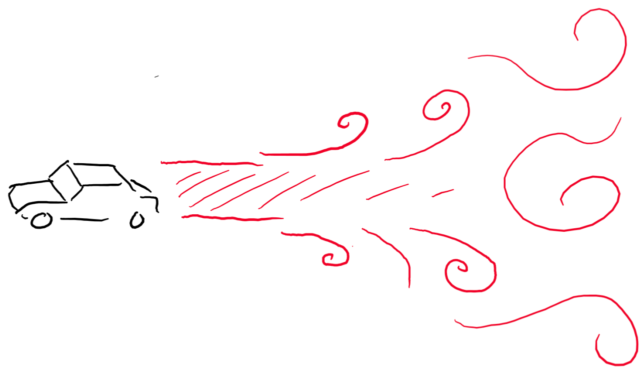
Let's consider where the energy goes when a car is driven down the highway.

One place where the energy ends up is in the wind driven by the car.



The wind right behind the car must be going at the same speed as the car itself. You can imagine that the car is followed by a long "tube" of air that is going at the same speed as the car.

Obviously that is not the case. In reality, the air behind the car has very complicated motion, as the rapidly moving air transfers its energy to the air around it. There is swirling turbulence, vortex shedding, and the details are quite complicated. *Richard Feynman described turbulence as the most important unsolved problem in physics.* Fortunately, since energy is conserved as the flow transitions from a tidy wind trail to a turbulent mess, we can get a reasonable approximation with a coarse-grain model in which we have a clean tube of wind.



1. Estimate the dimensions of a car
2. Estimate the volume of the "wind trail" that a car makes while driving from Corvallis to Portland. (Imagine a clean tube of wind all moving at the same speed as the car.)
3. Use the physics concept $K.E. = \frac{1}{2}mv^2$ to find the energy that went into making the wind trail. Assume that $v = 70\frac{\text{miles}}{\text{hour}}$.

Émilie du Châtelet I'd encourage you to read the Wikipedia article on Émilie du Chaâtelet, who first recognized that total energy (with kinetic energy proportional to v^2) is a conserved quantity. She originally developed this experimentally, and her work was built upon by Euler and Lagrange, resulting ultimately in the Lagrangian mechanics taught in Theoretical Mechanics.