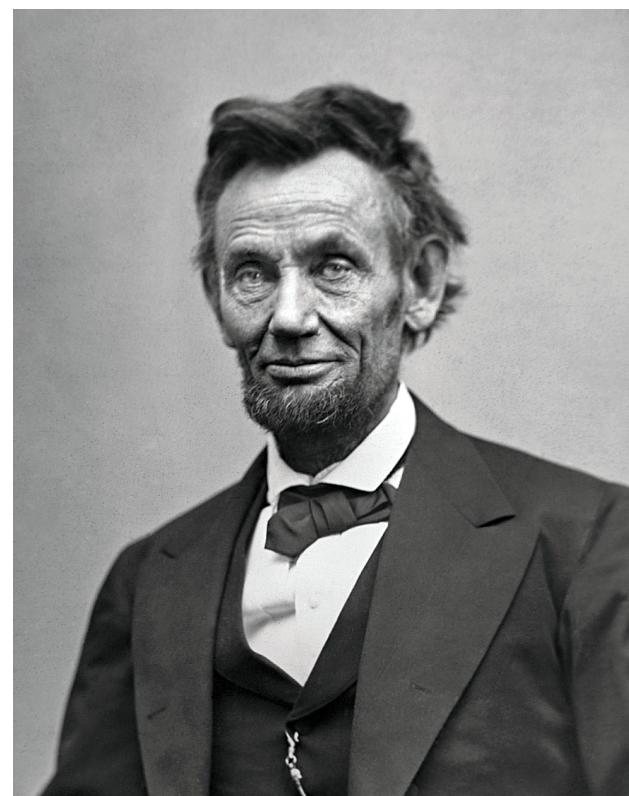


Of all the forces of nature, I should think the wind contains the largest amount of motive power - that is, power to move things. Take any given space of the earth's surface - for instance, Illinois; and all the power exerted by all the men, and beasts, and running-water, and steam, over and upon it, shall not equal the one hundredth part of what is exerted by the blowing of the wind over and upon the same space. And yet it has not, so far in the world's history, become proportionably valuable as a motive power.

Abraham Lincoln



Arizona State University
SES 194

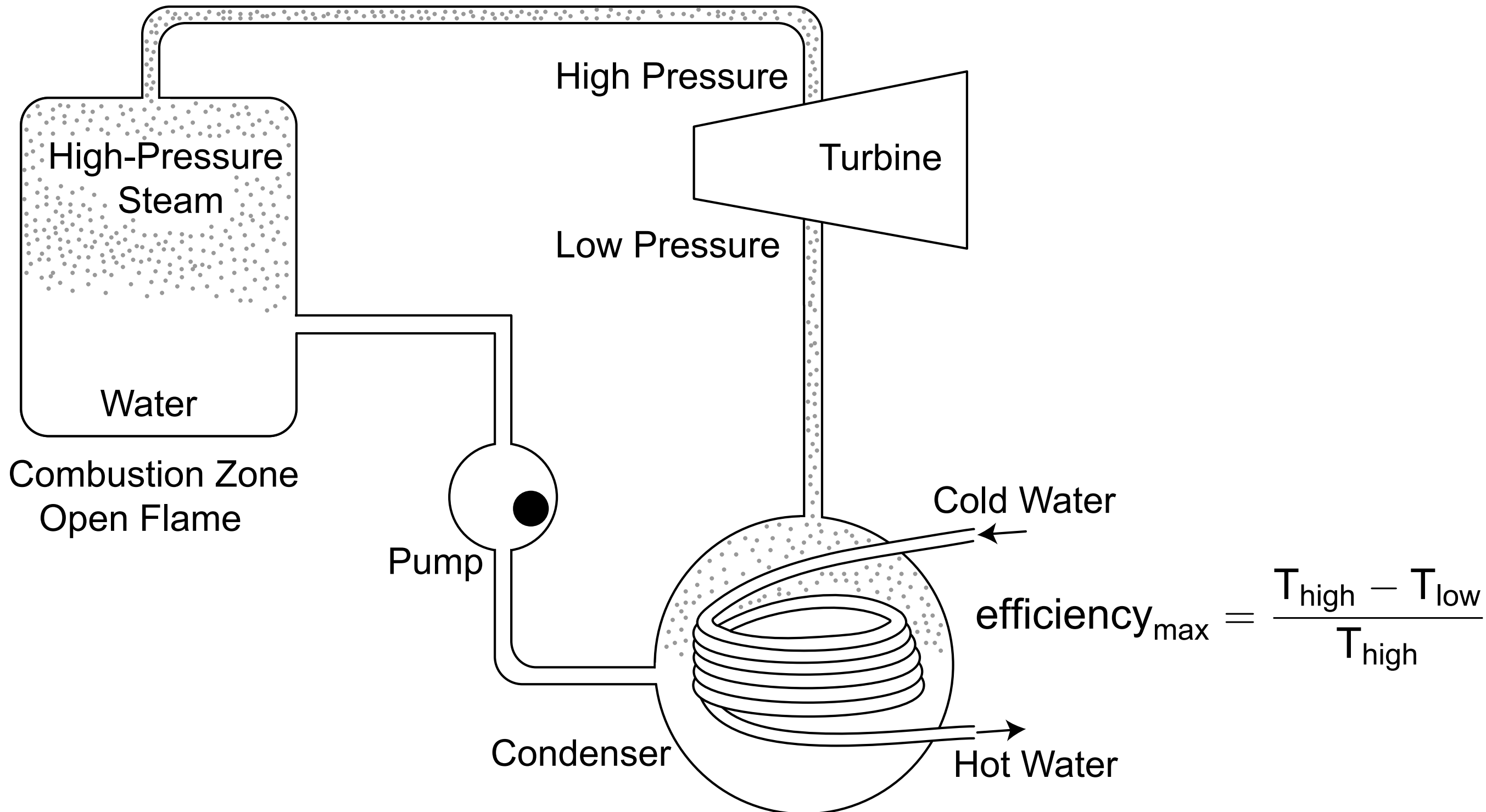
Energy in Everyday Life

Heat Engine Efficiency

Frank Timmes

ftimmes@asu.edu

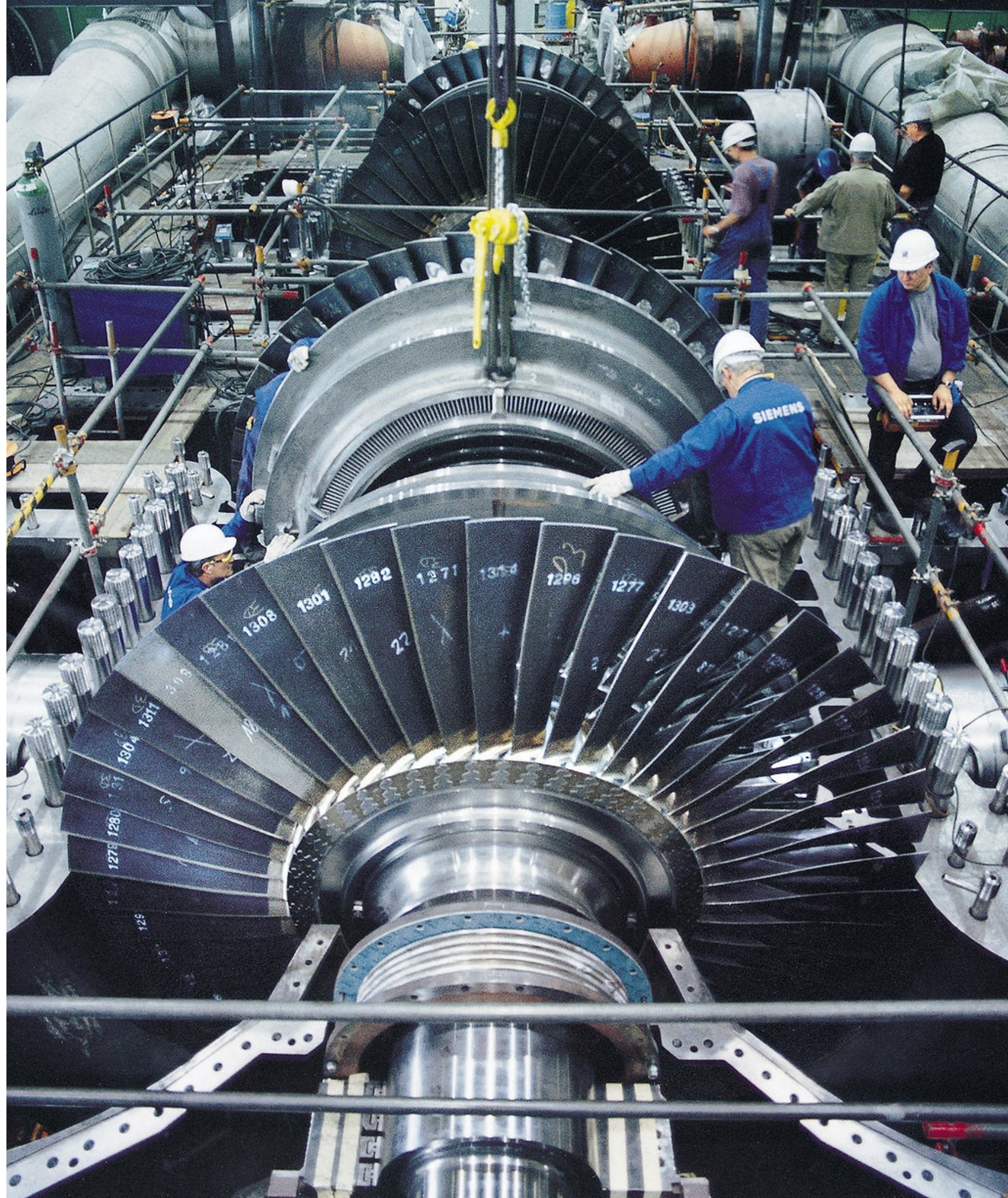
In all heat engines, work is done as material expands (cooled) and then compressed (heated) again.



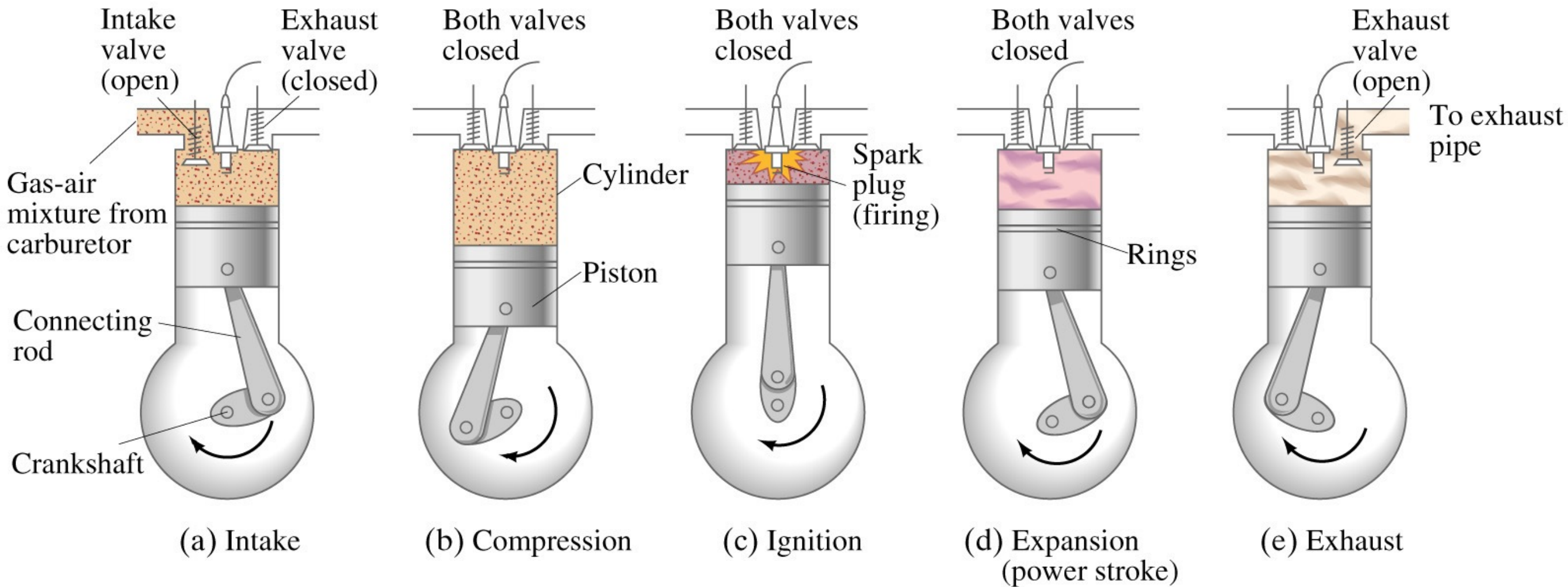
Almost all electrical power on Earth is produced with a turbine of some type.

A windmill is a type of turbine.

The turbine turns a generator to create a flow of charges, a current.

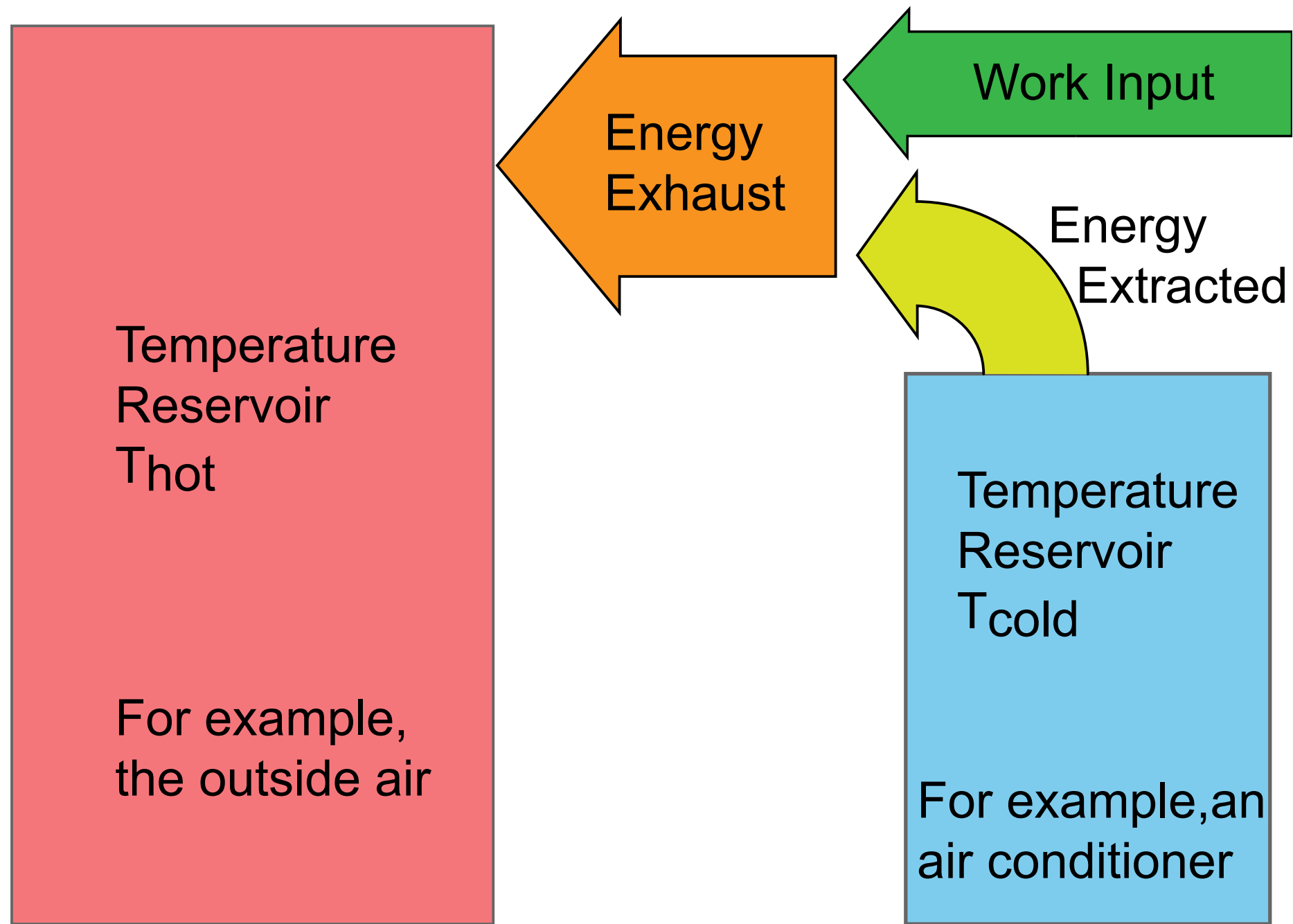


The car engine is also about half of the ideal maximum efficiency.



The high temperature reservoir is in the cylinder and the cooler temperature reservoir is the atmosphere.

If we reverse the heat engine cycle, we have a refrigerator; a process that takes heat from a low temperature reservoir, does work, and exhausts the original heat plus the additional work into the high temperature reservoir.



The greater the temperature difference between two reservoirs, the more work can be done.