

Energy Efficient Transportation

A discussion of research activities
and opportunities in companies,
national laboratories, and academia

December 3, 2007

Harold H. Kung
Chemical and Biological Engineering
hkung@northwestern.edu



Energy Efficient Transportation

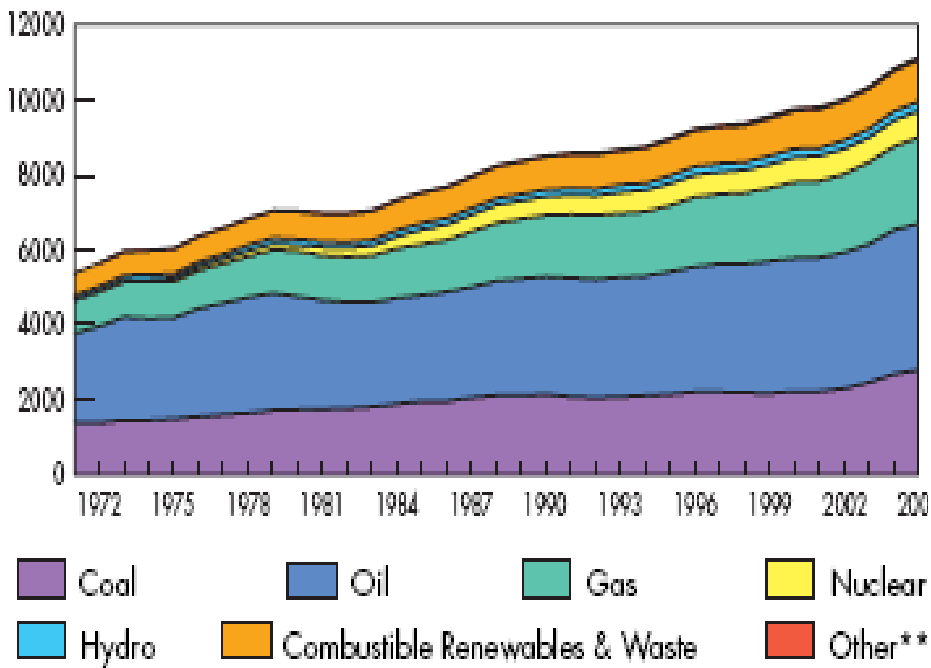


- o High impact on energy consumption
- o Timely; CO₂ level rising, oil price high
- o Timely; advances in materials and nanotechnology
- o Urgent; Congress reached compromise on fuel economy
- o Urgent; adoption of new technology has 10-15 year time lag



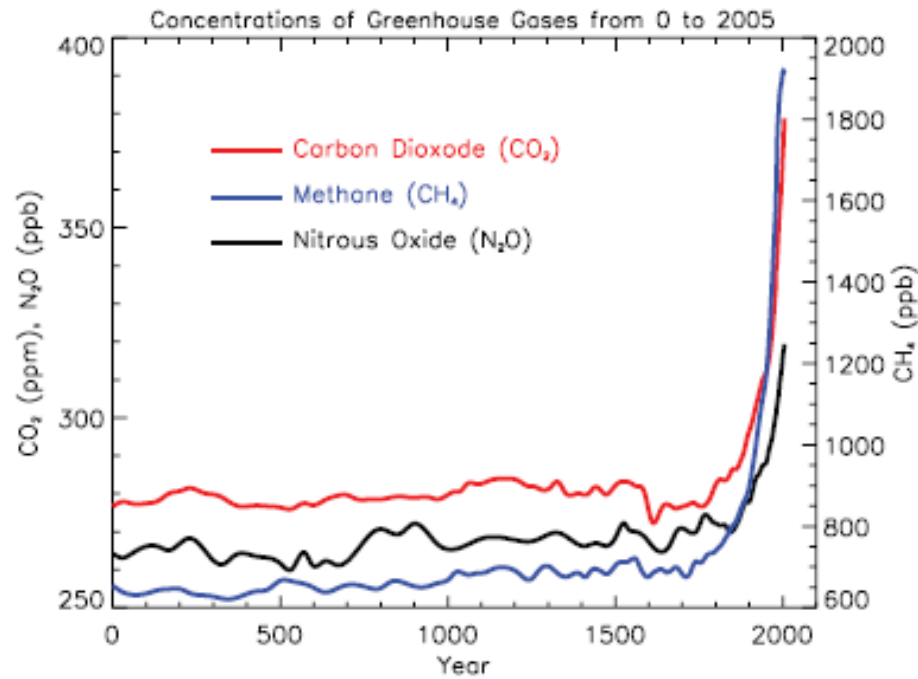
80% of energy derived from fossil fuels that contribute to GHG buildup.

2005 World Primary Energy Supply by Fuel Type (Mtoe)

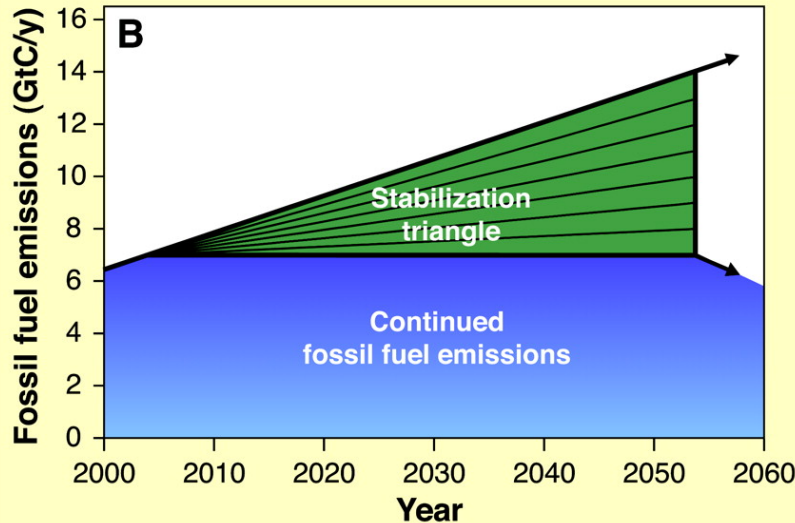
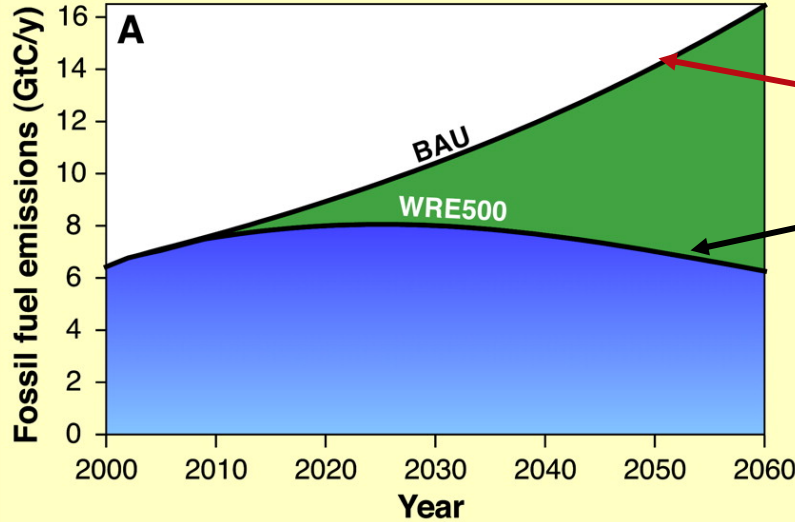


2007 EIA Key Statistics

Concentration of greenhouse gases increasing rapidly



IPCC 4th report technical summary, 2007



Current CO₂ concentration ~350 ppm;
 Projected emission rate if business as usual
 Emission rate for attaining 500 ppm

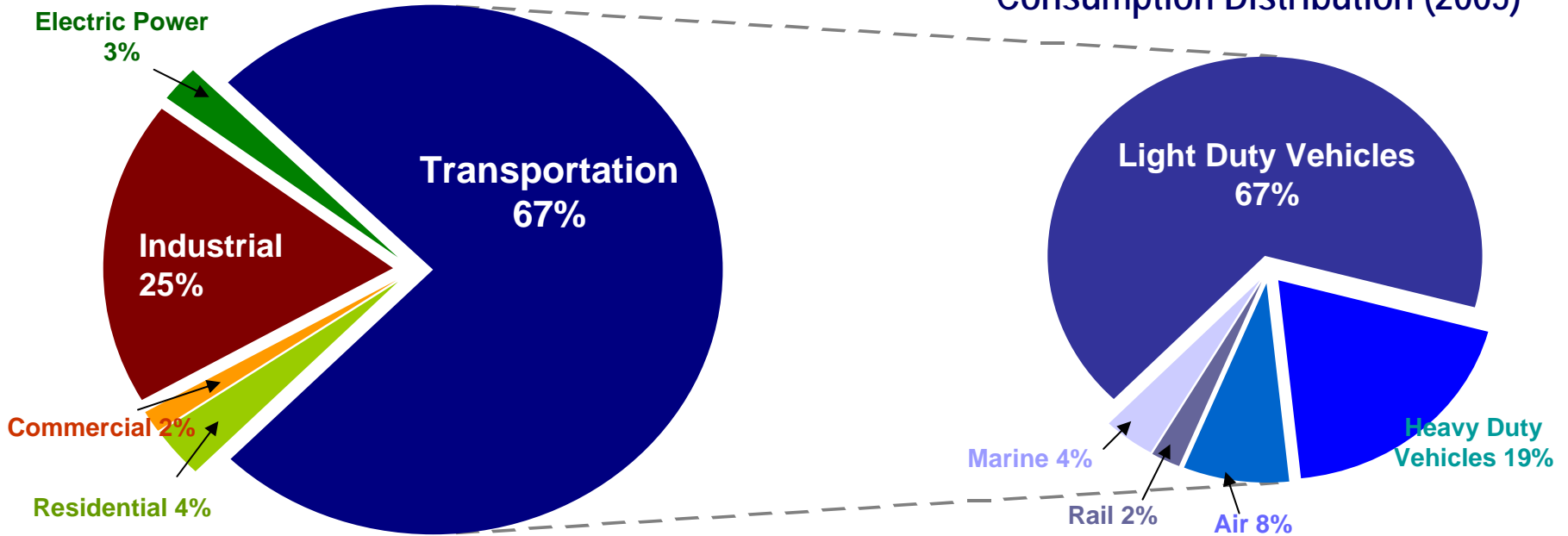
Fig. 1. (A) The top curve is a representative BAU emissions path for global carbon emissions as CO₂ from fossil fuel combustion and cement manufacture: 1.5% per year growth starting from 7.0 GtC/year in 2004

E.g. to reduce 1 GtC/yr:
 -2 billion cars from 30 to 60 mpg.

-2 billion 30 mpg cars travel 5,000 instead of 10,000 miles per year.

- Add 100 times current Brazil or U.S. ethanol production, with use of 1/6 of world cropland.

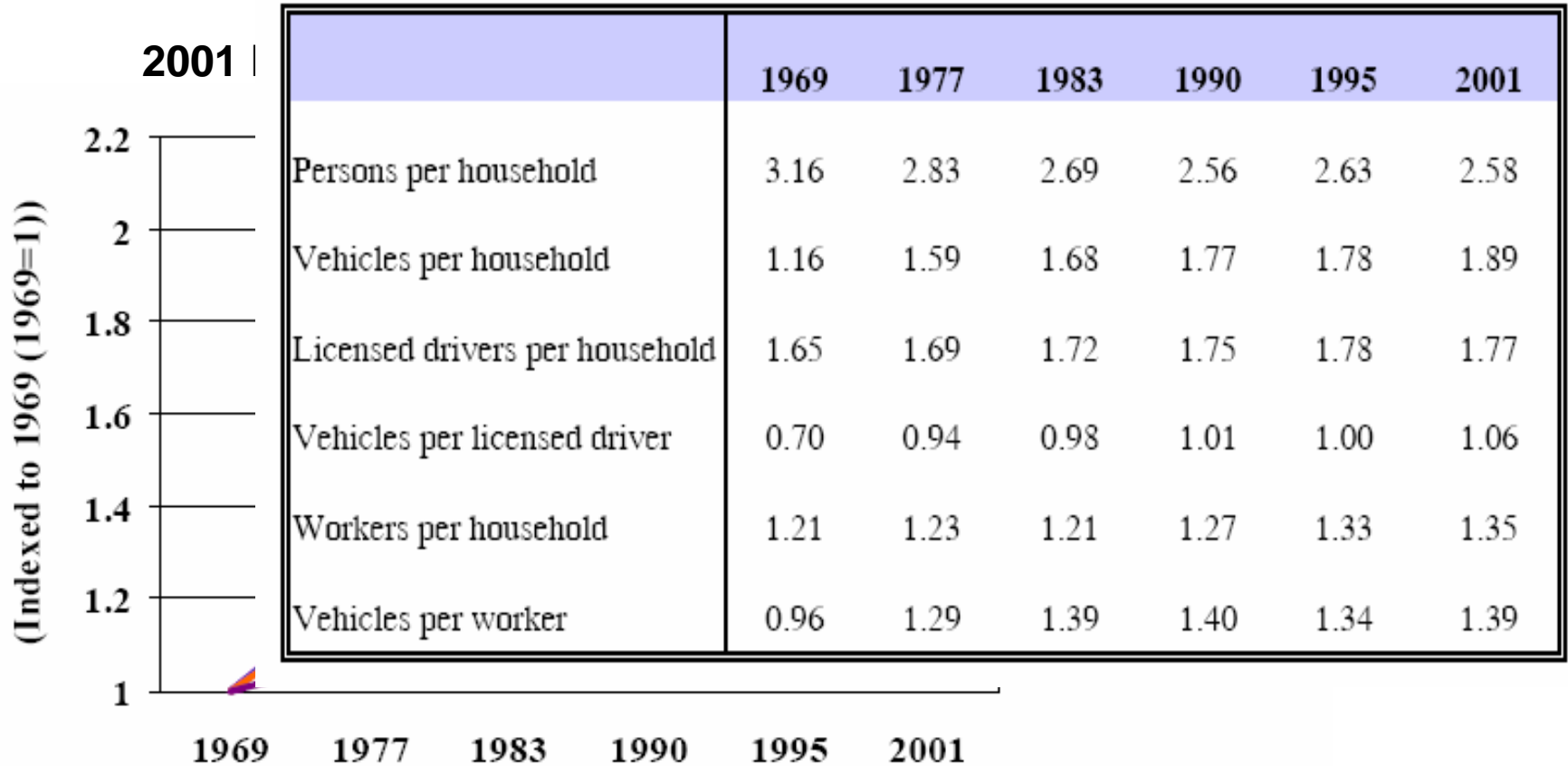
U.S. Transportation Oil Consumption Distribution (2005)



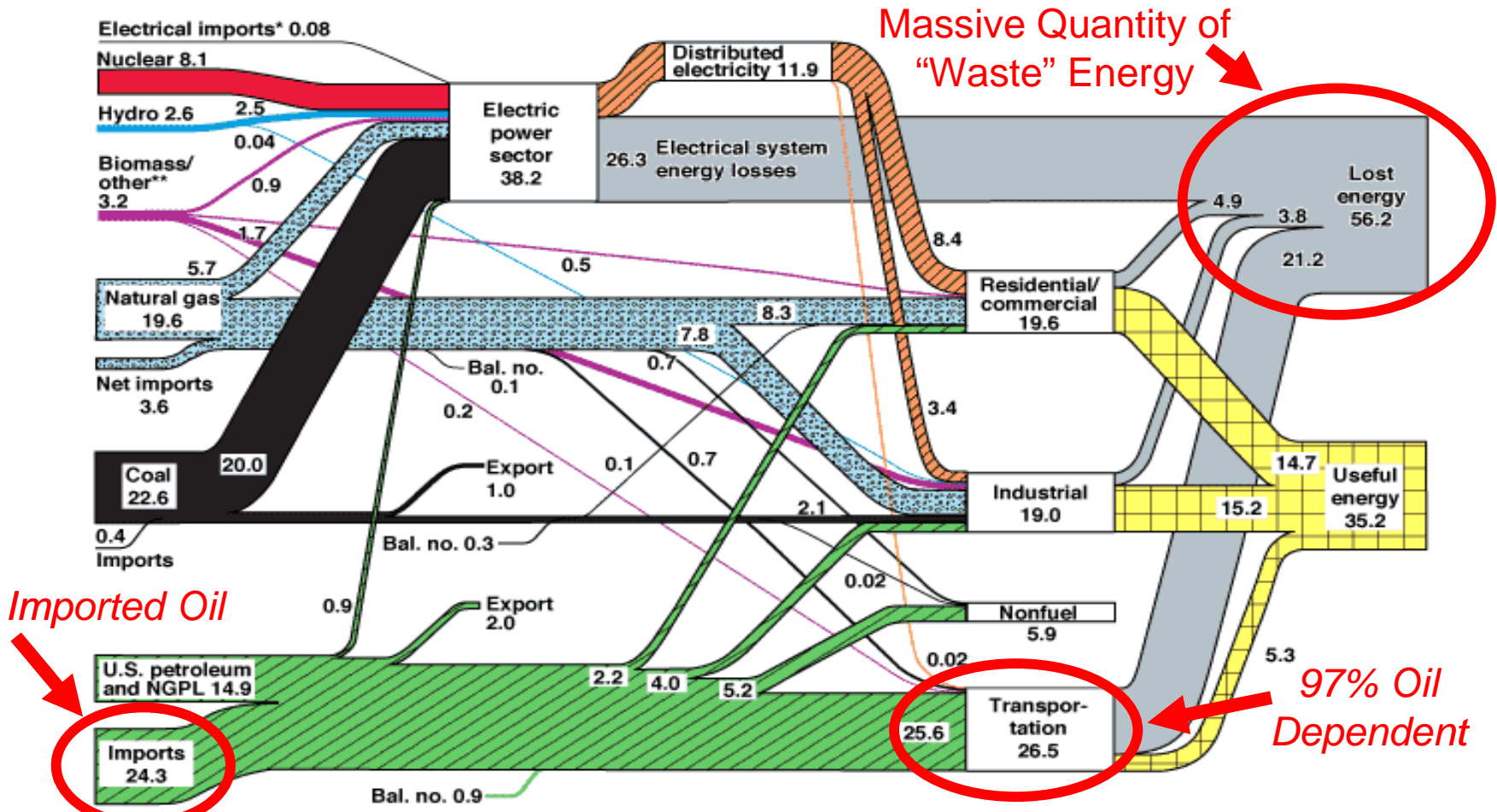
The transportation sector accounts for 67% of the oil use in the United States.

It is the fastest growing petroleum consuming sector.

People like cars!



More than 60% energy consumed are wasted



Source: Production and end-use data from Energy Information Administration, *Annual Energy Review 2002*.

*Net fossil-fuel electrical imports.

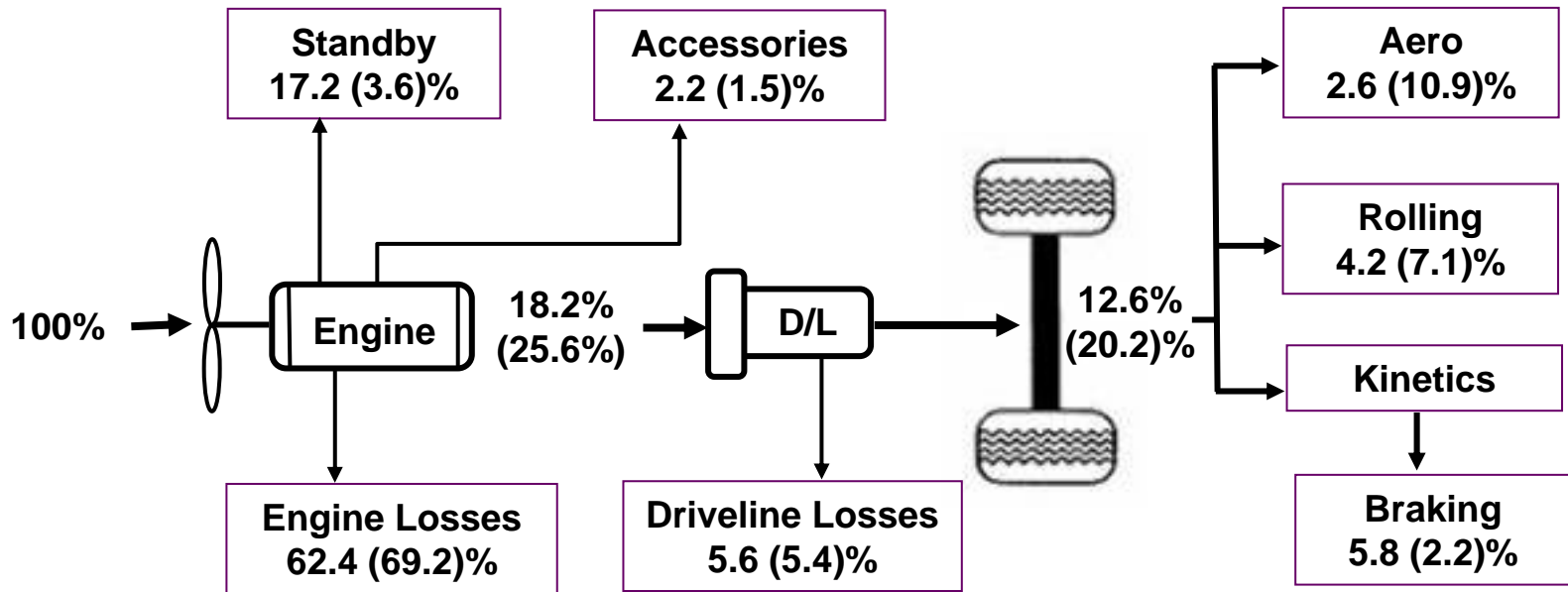
**Biomass/other includes wood, waste, alcohol, geothermal, solar, and wind.



June 2004
Lawrence Livermore
National Laboratory
<http://eed.llnl.gov/flow>

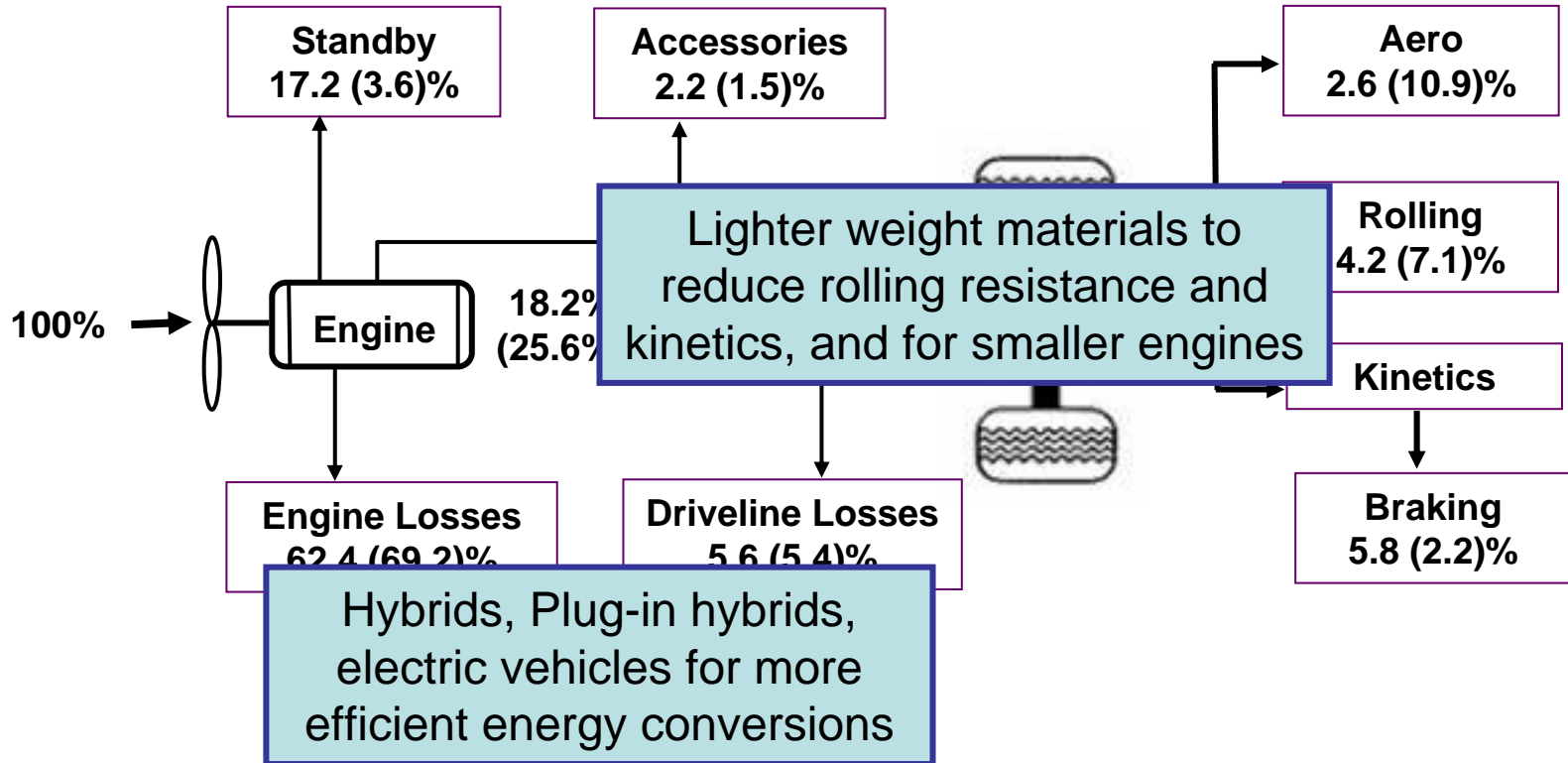
Fate of energy in an internal combustion automobile

Urban (highway)



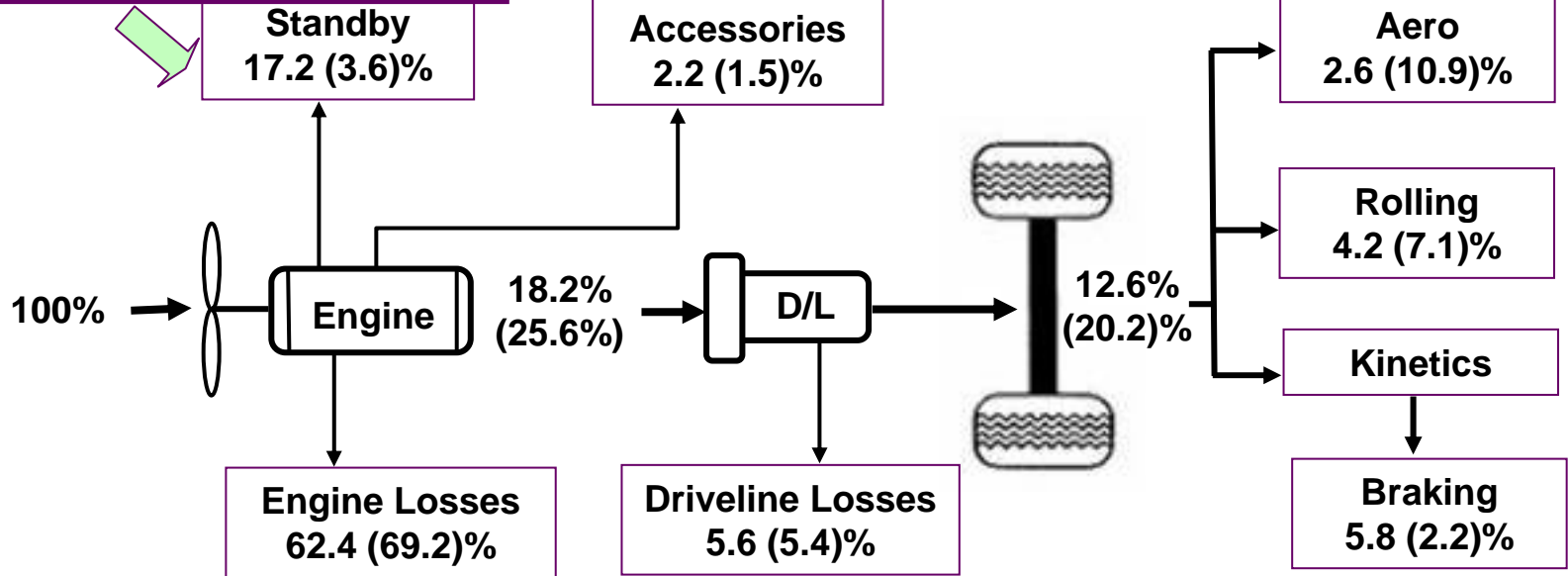
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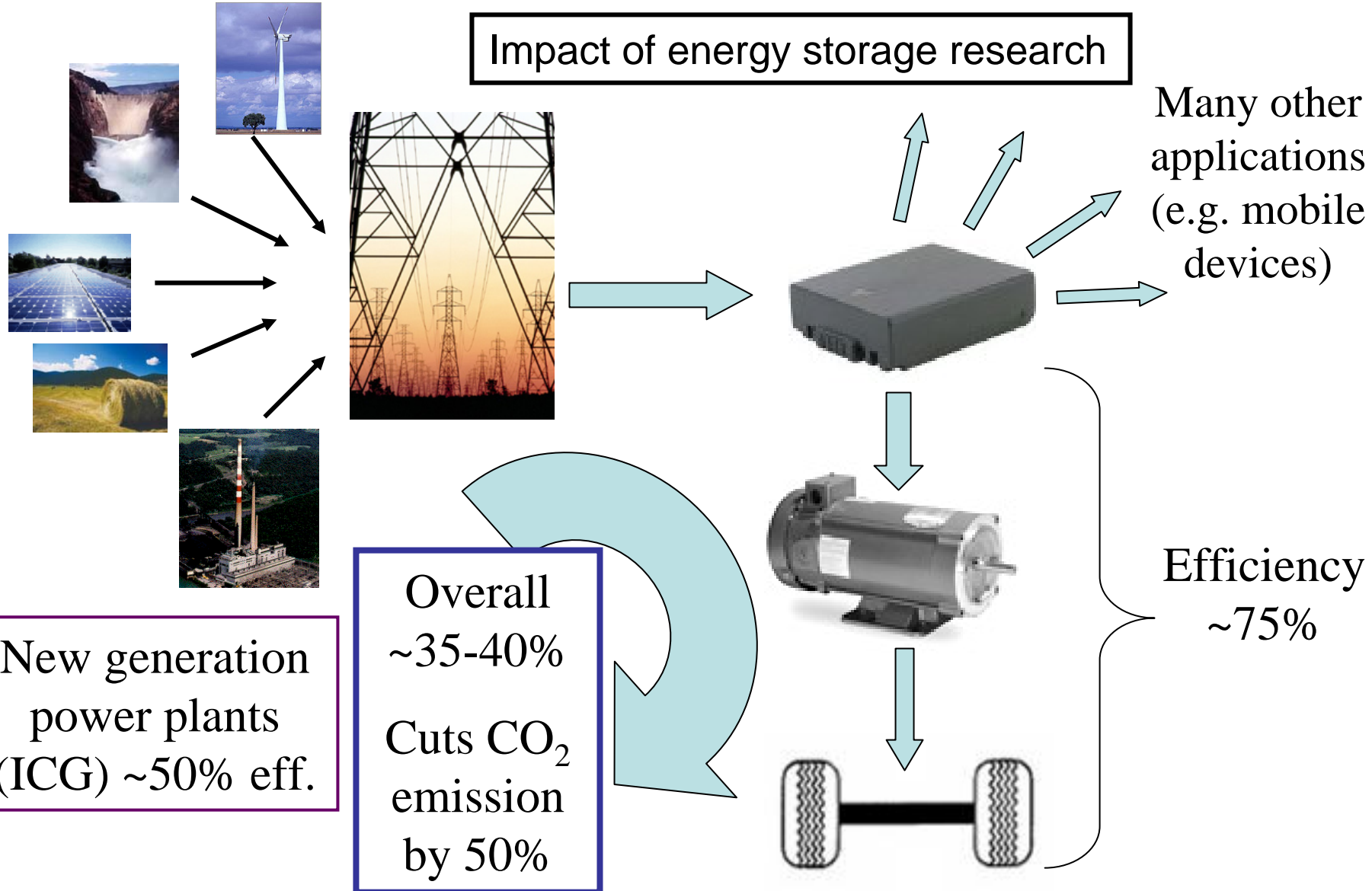
Fate of energy in an internal combustion automobile

Improved traffic pattern and behavior, hybrid, EV



Less friction (Tribology), improved engines, EV

Impact of energy storage research



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▶ *No news currently - please check back later for updated news*

More news

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▶ Domain Dinner & Reception
December 3, 2007
James L. Allen Center

More events

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Transportation, the movement of goods and people over land, water, and air, touches human life everywhere over the world. Today, ninety five percent of transportation is powered by petroleum fuels. It accounts for 27 % of total world energy consumption and 1/3 of total anthropogenic carbon emission. Yet transportation is very inefficient; 80% of the energy in the fuel is wasted.

The Center for Energy Efficient Transportation is driven by the vision that a combination of the latest developments in various disciplines of science and technology, creative minds, and commitments to bring improvements to humanity, will generate innovative solutions to revolutionize transportation technology to significantly improve energy efficiency, without sacrificing safety, and with minimal impact on personal convenience or freedom of choice.



NORTHWESTERN UNIVERSITY

Evanston, IL 60208-3120 | Phone: (847) 491-7492
Fax: (847) 491-3726 | Email: ceet@northwestern.edu
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Provost's Office

Dean Julio Ottino and VPR Brad Moore

Thank you all!

Hope you enjoyed the evening.