Rebound in US Productive Sectors

Presentation to the CEDM Workshop

June 27th and 28th, 2011

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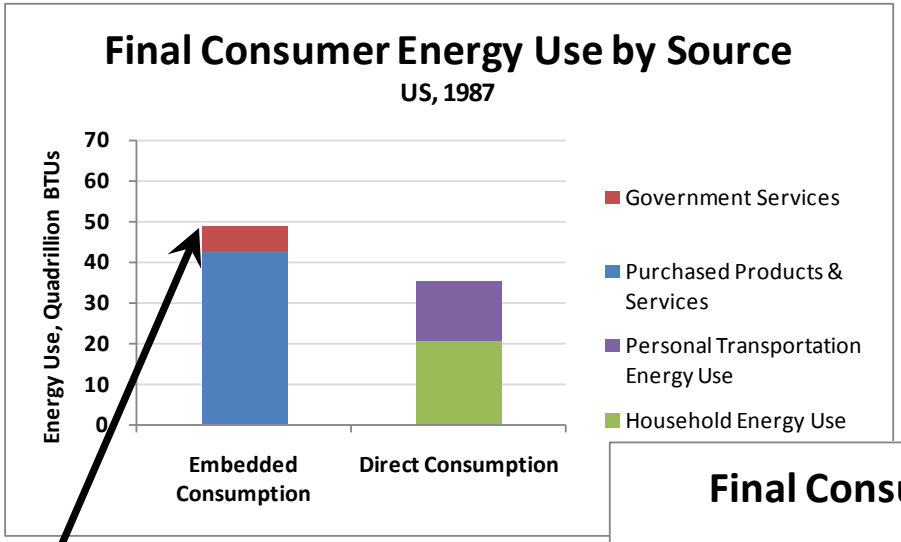
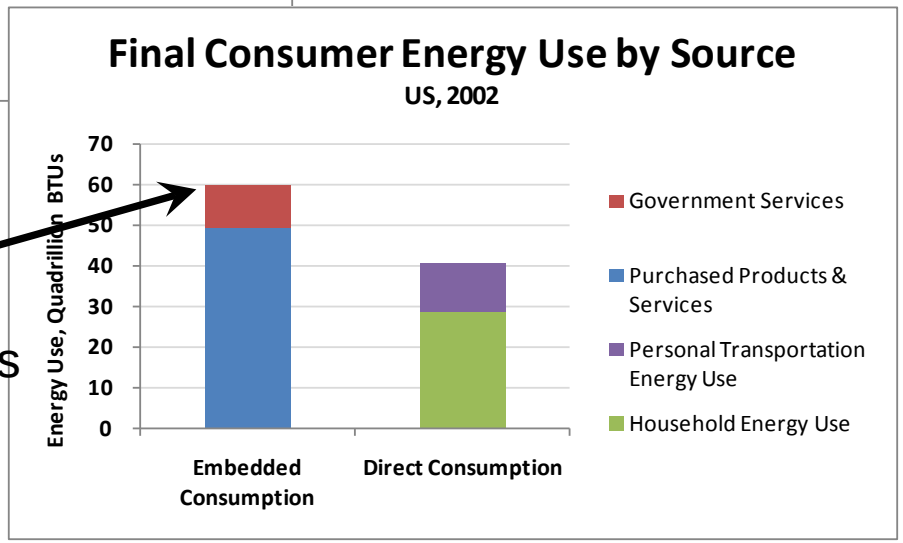
Embedded energy use dominates.

- Globally, about two-thirds of energy is consumed in the production of goods and services.
- End-use energy consumed directly by households and for personal transportation is only about one-third.
- Worrisomely, embedded energy consumption in the US dominates and historically has grown…

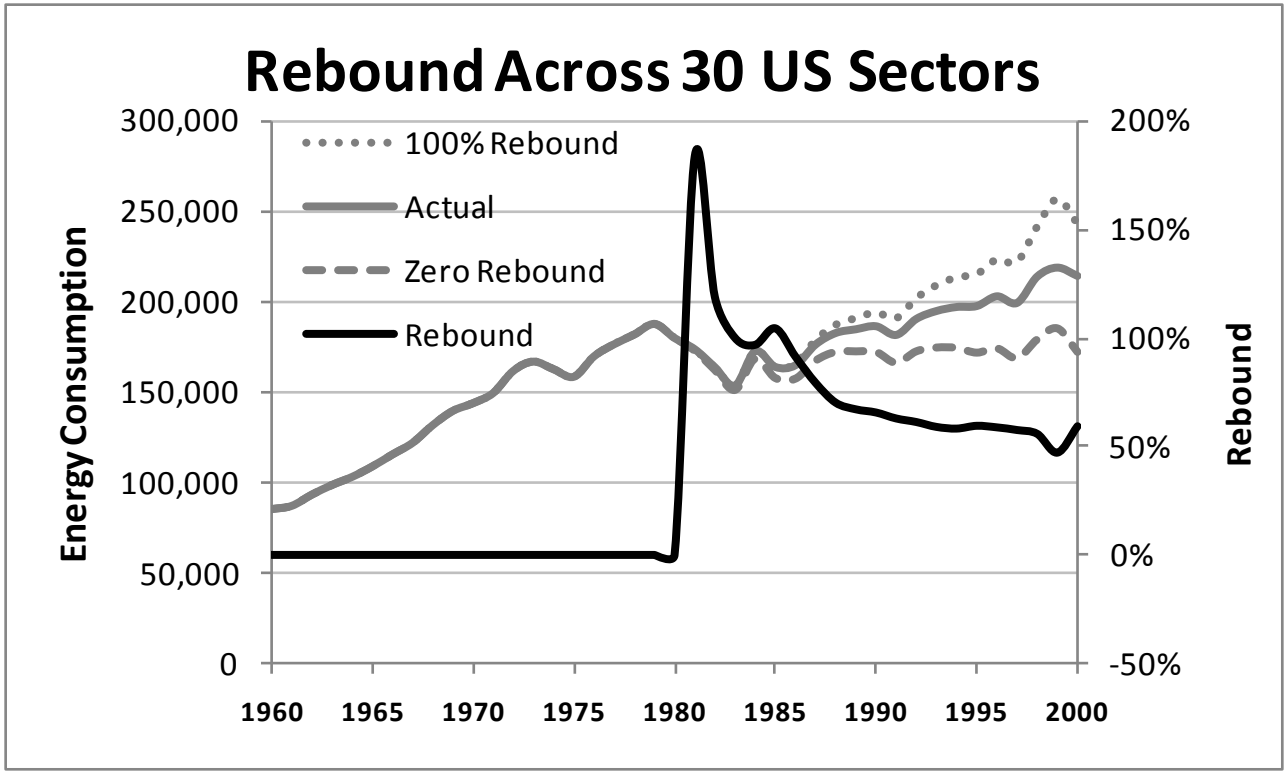
Embedded energy has grown in the US.





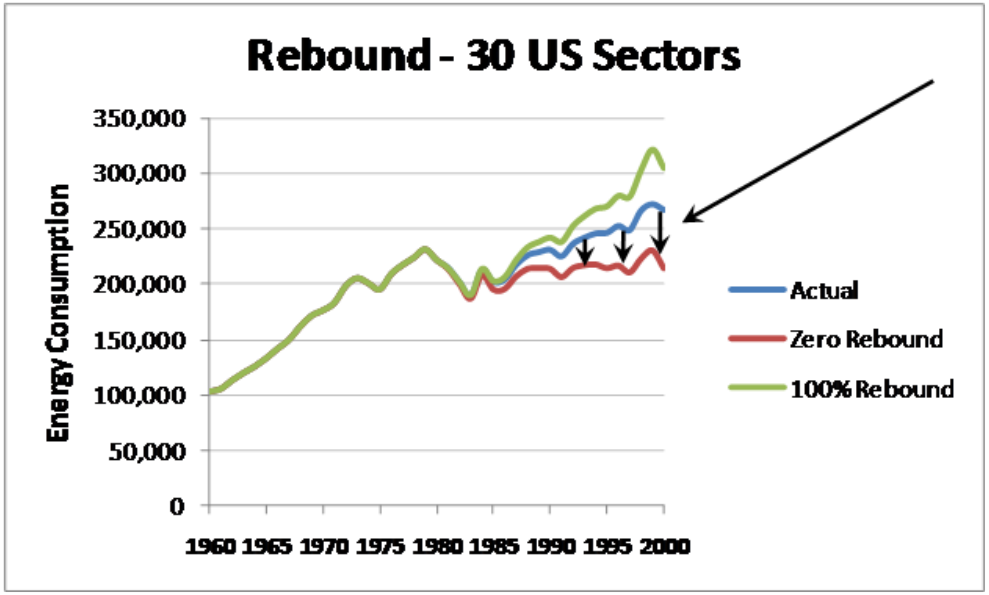
Energy consumption <u>embedded</u> in goods & services grew from 1987 to 2002 (58% to 60% of total)

Historically, rebound has been substantial in the US economy.



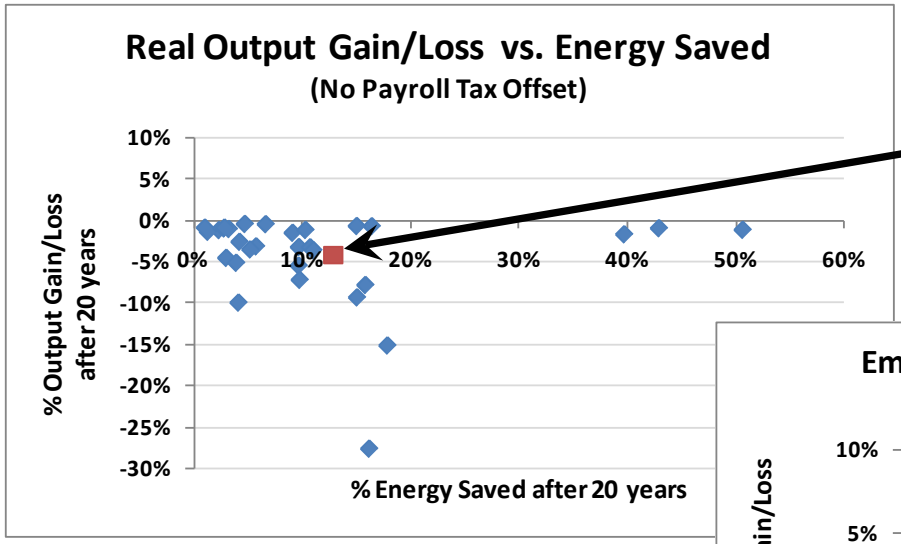
Direct rebound in the productive part of the economy (that part producing the goods and services) was large from 1980 to 2000.

Rebound can be mitigated with a carbon tax.

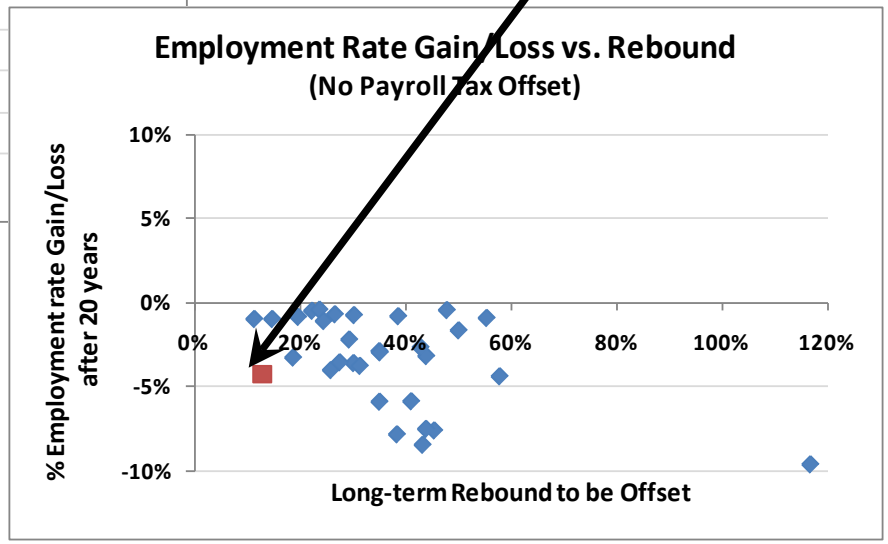


- An energy tax can be found that offsets rebound.
- The tax must be large—roughly equivalent to a carbon tax of \$95/tonne of CO_2.
- The result is *stabilization* of energy use, not a reduction.

Rebound mitigation carries welfare losses.



Weighted average across all sectors



Rebound accelerates climate change.

- Current models used for energy forecasting ignore or improperly treat rebound.
  - IPCC
  - IEA
  - Stern
- This means we have less time than we think to devise climate change remedies.
- Rebound research needs are vast – the topic is shot through with subtlety and complexity.