Less is a Four-Letter Word

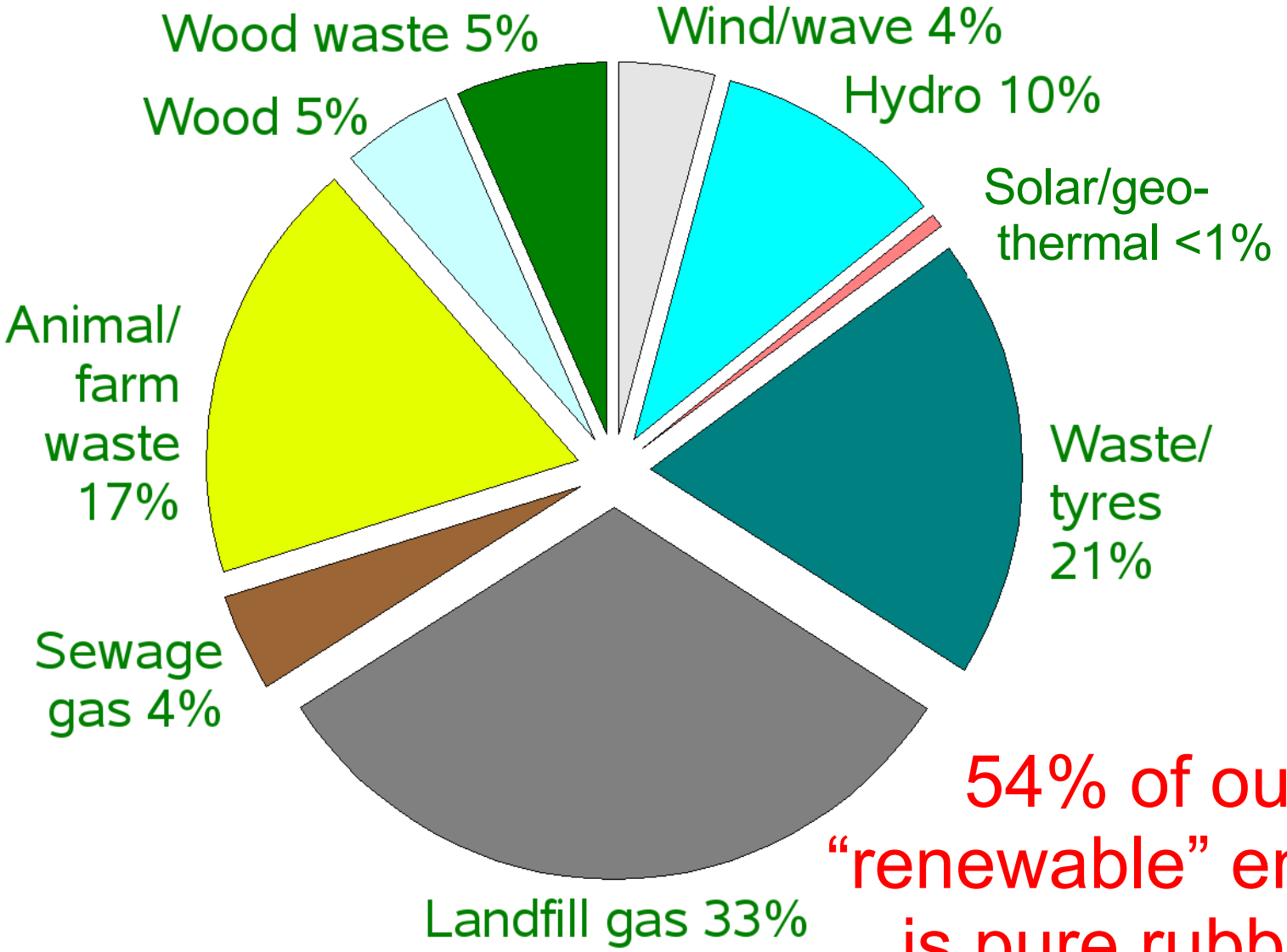
Energy, Climate, and Economic Growth in a Finite World

UK Peak Energy Tour
Spring 2007

The Instant *Energy Beyond Oil*

- The UK uses about 2.3% of worlds traded energy (10¼EJ/yr) but has 1% of the worlds population – consumption is increasing at a little less than 1%/year.
- UK oil production peaked in 1999 and is now falling at 10% to 12% per year.
- UK natural gas production peaked in 2003/4 and is now falling at 6% to 8%, and the rate is increasing.
- For each 1 unit of renewable (wind, solar, etc.) energy produced UK energy consumption increases by 5.
- Globally, oil production is likely to peak around 2010/11 and gas production around 2015-2025.
- **To address energy depletion, the UK has 50 to 60 years to cut energy consumption by 60% to 70%.**

UK “Renewable” Energy, 2005



54% of our “renewable” energy is pure rubbish!

Source:

Digest of UK Energy Statistics 2006, DTI

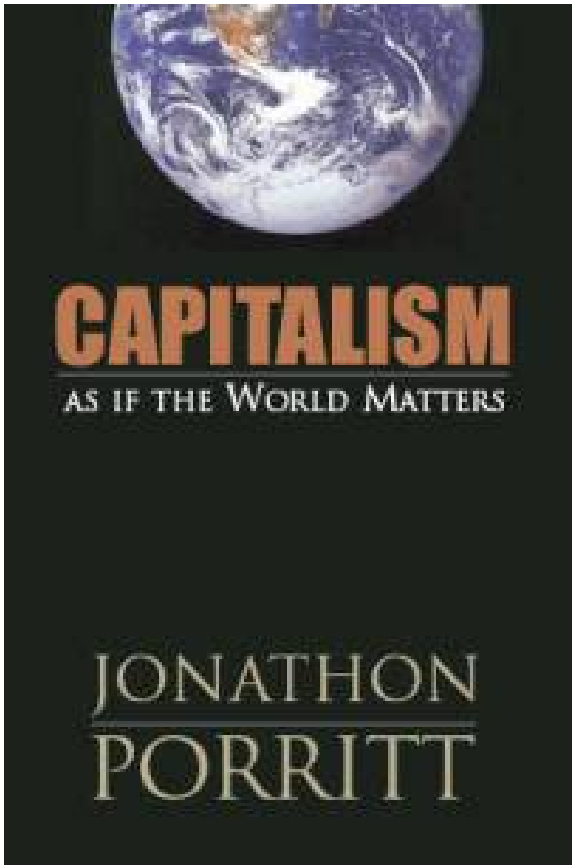
Many thanks to Jonathon Porritt....

...for being the catalyst behind the "Less is a Four-Letter Word" Project, when he said:

"Incremental change is the name of the game, not transformation.

And that, of course, means that the emerging solutions have to be made to work within the embrace of capitalism. Like it or not, capitalism is now the only economic game in town....

For fear, perhaps, of arriving at a different conclusion, there is an unspoken (and largely untested) assumption that there need be no fundamental contradiction between sustainable development and capitalism."



Source:
Page xiv, *Capitalism as if the World Matters*, Jonathon Porritt, 2005

able cook down glut jerk love oily pooh road sold town wary
amen cool drug gods jobs luck oink **poor** rock **soma** trip weak
anti coop dude **good** **junk** lust omen [illegible] roof soon [illegible] **webs**
[illegible] dung gory keep mall oops poxy room sour [illegible] weep
atom **crop** dupe goth kilo math **ooze** prat **ruin** soya ugly well
axed cure **easy** grot kiss **mega** [illegible] play rule stop urea wept
ba[illegible]en
bi[illegible]ld
bi[illegible]**nd**

...many of the other four-letter words are also relevant to the "LESS" argument too!

bock dark [illegible] harm last mojo owns pulp seek tart **vast** wise
body data feed **heat** late mope paid punk **self** **tech** veto wits
boor dead feud help LESS **more** pain **pure** [illegible] test vibe wood
brew **debt** flow high lets move past rail [illegible] thug vino word
burp dirt **food** hoax lied myth **peak** rant sigh tidy visa work
care dogy free home live naff pest rate **size** tiny **void** yeah
cars dole [illegible] howl **load** nano peta rave slag tipi wage yobs
cash doom **fuel** hugs loan nuke phew read slob [illegible] yuck
city dope gain hymn long **obey** pics rent snot toil want zany
coal **dosh** geek icon look obit [illegible] **rich** snub toke **warm** **zero**
coin doss germ **idea** loon ogre pixy riot soft tomb warn zips
cold dour giga info loss oiks **poet** risk soil **tool** wars zits

MORE: The Earth is a “finite system”

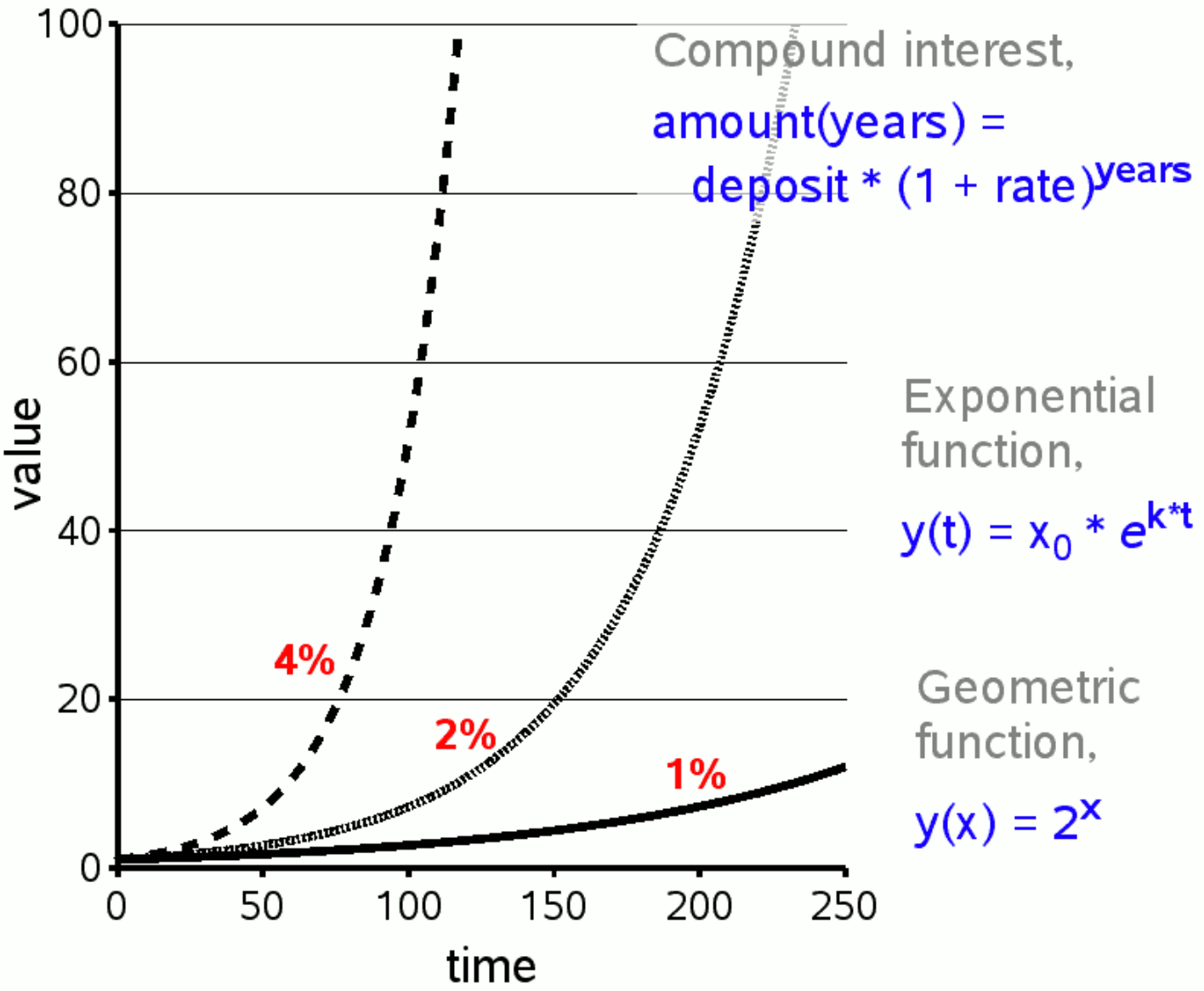
The resources available to humanity are constrained by the capacity of the planet to meet demand.

The First Law of Thermodynamics prohibits any other outcome!

Exponential growth

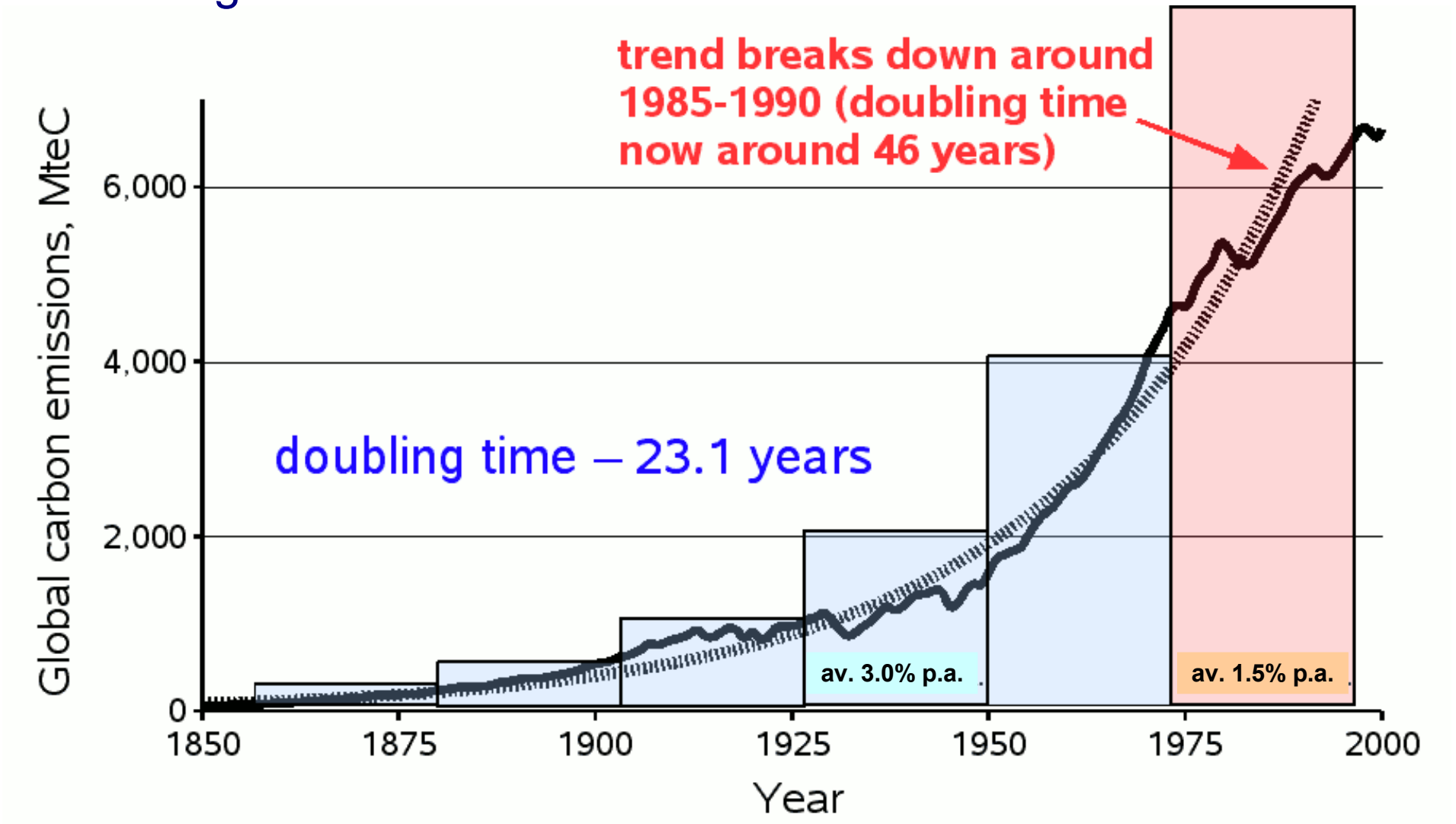
Exponential (or geometric) growth occurs when the growth rate of a function is always proportional to the function's current size.

An everyday example is compound interest.



Doubling time

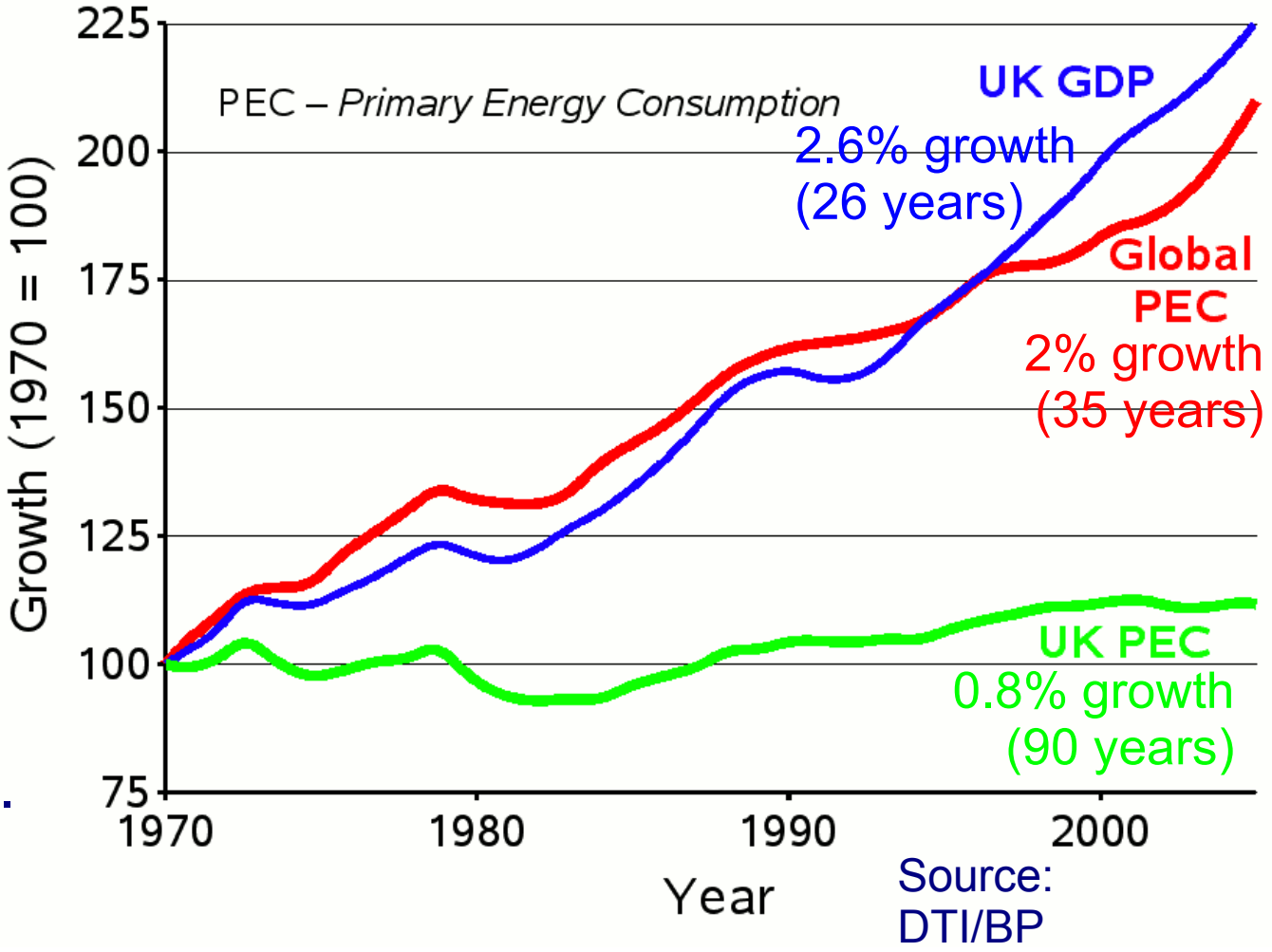
Where growth is exponential, the value will double over a fixed period of time – the "doubling time". This can be estimated by dividing 70 by the rate of growth.



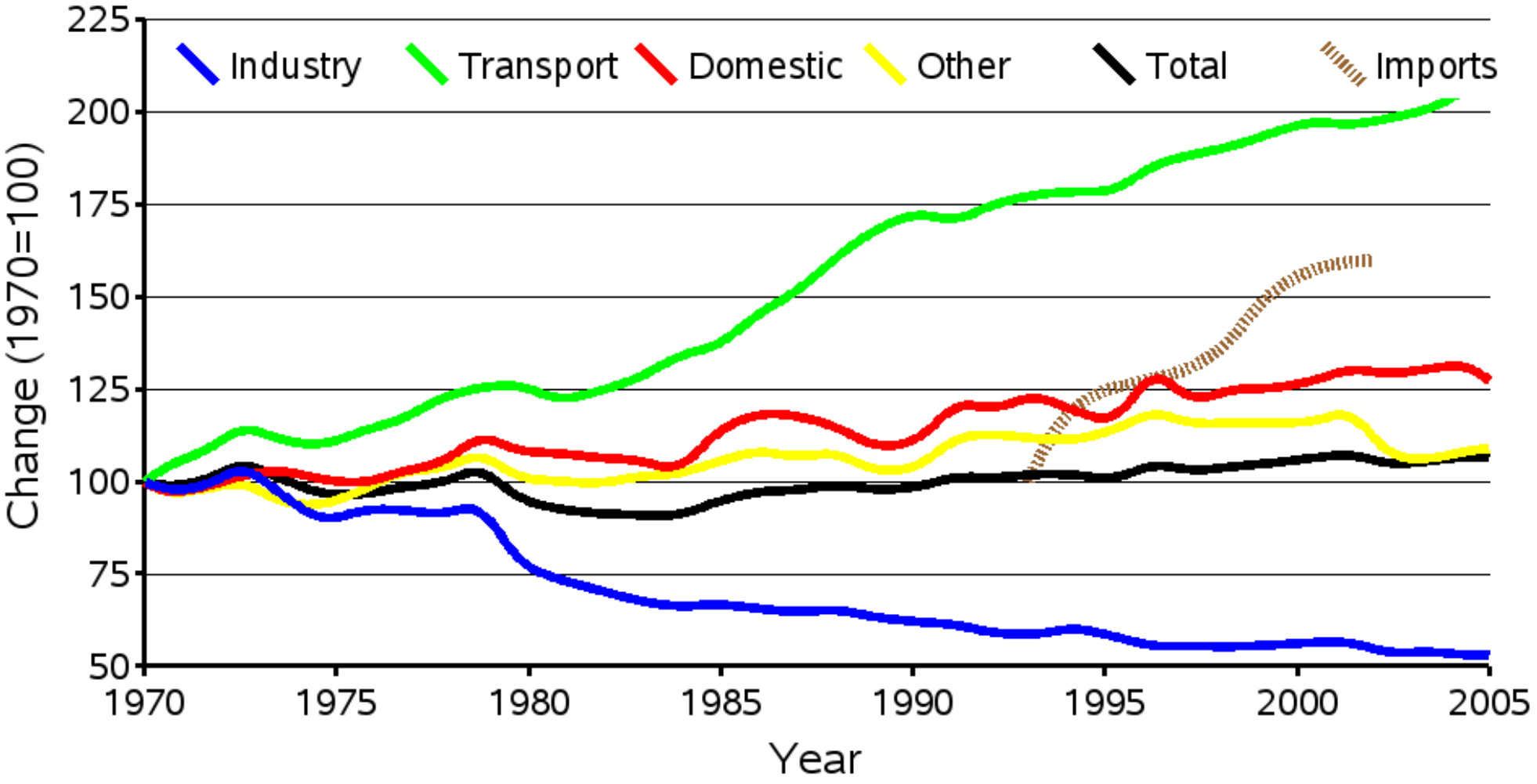
Gross Domestic Product

GDP is used by modern economists and politicians as a measure of economic well-being, but as it values "well-being" in purely economic terms it's use is questionable.

GDP and energy consumption are closely coupled. But in the UK and some other states this links has been broken, primarily by the greater use of (more efficient) natural gas, or by the "off-shoring" of economic production.

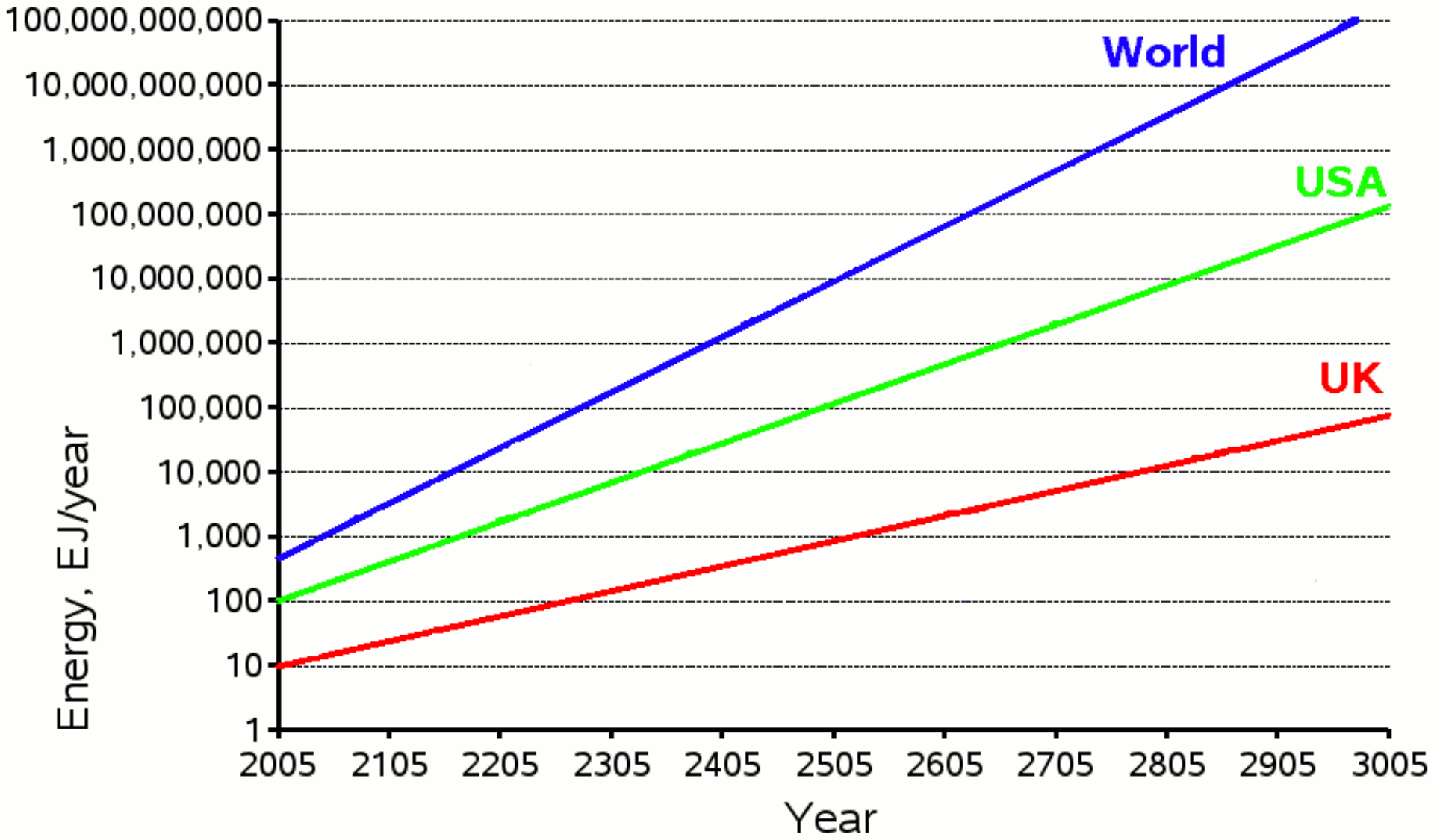


Change in UK Energy Consumption



Source:
Digest of UK Energy Statistics, 2006/National Statistical Office

The (Il)Logical Conclusion of Growth



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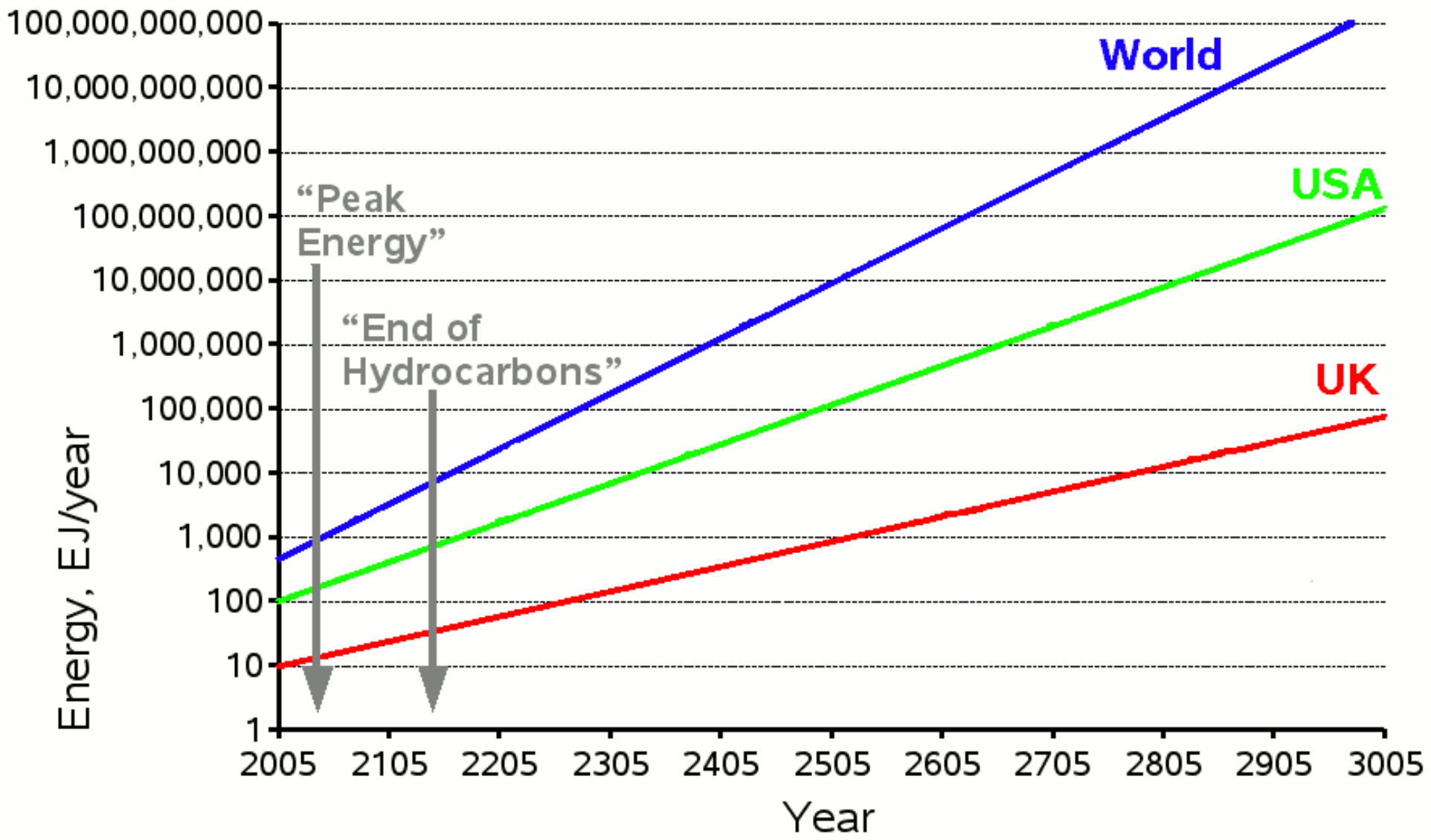

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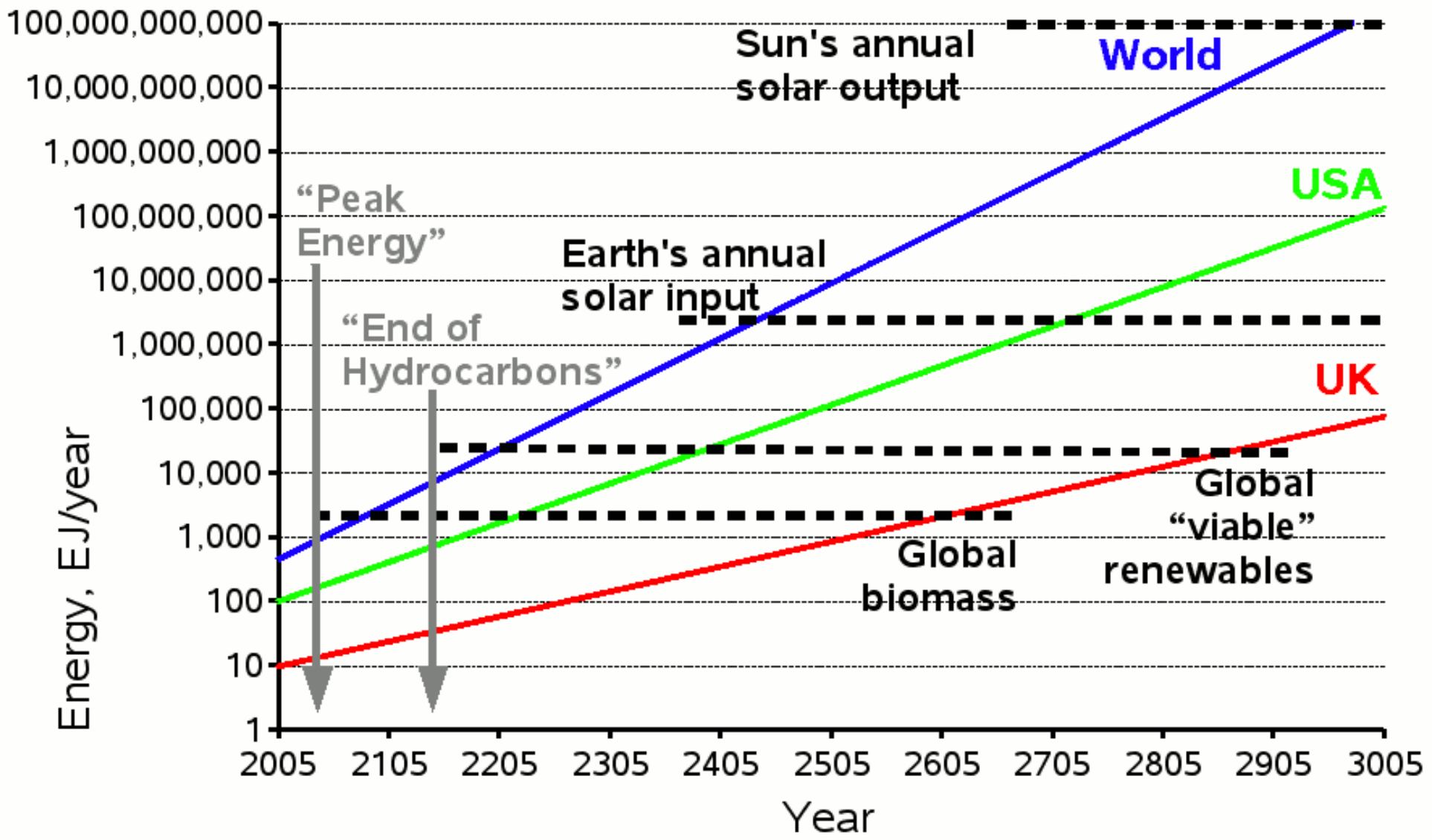
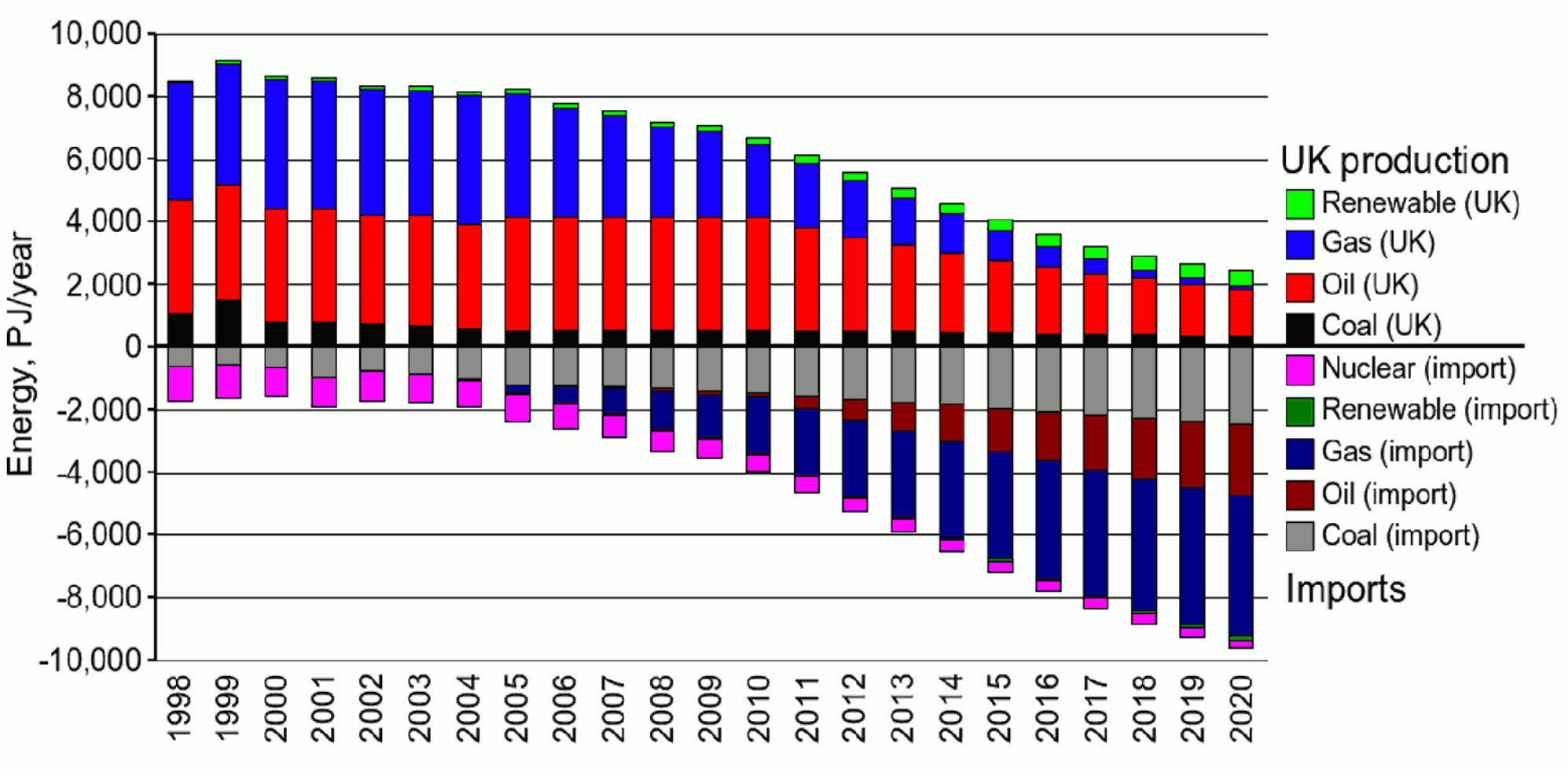


Change in Imports



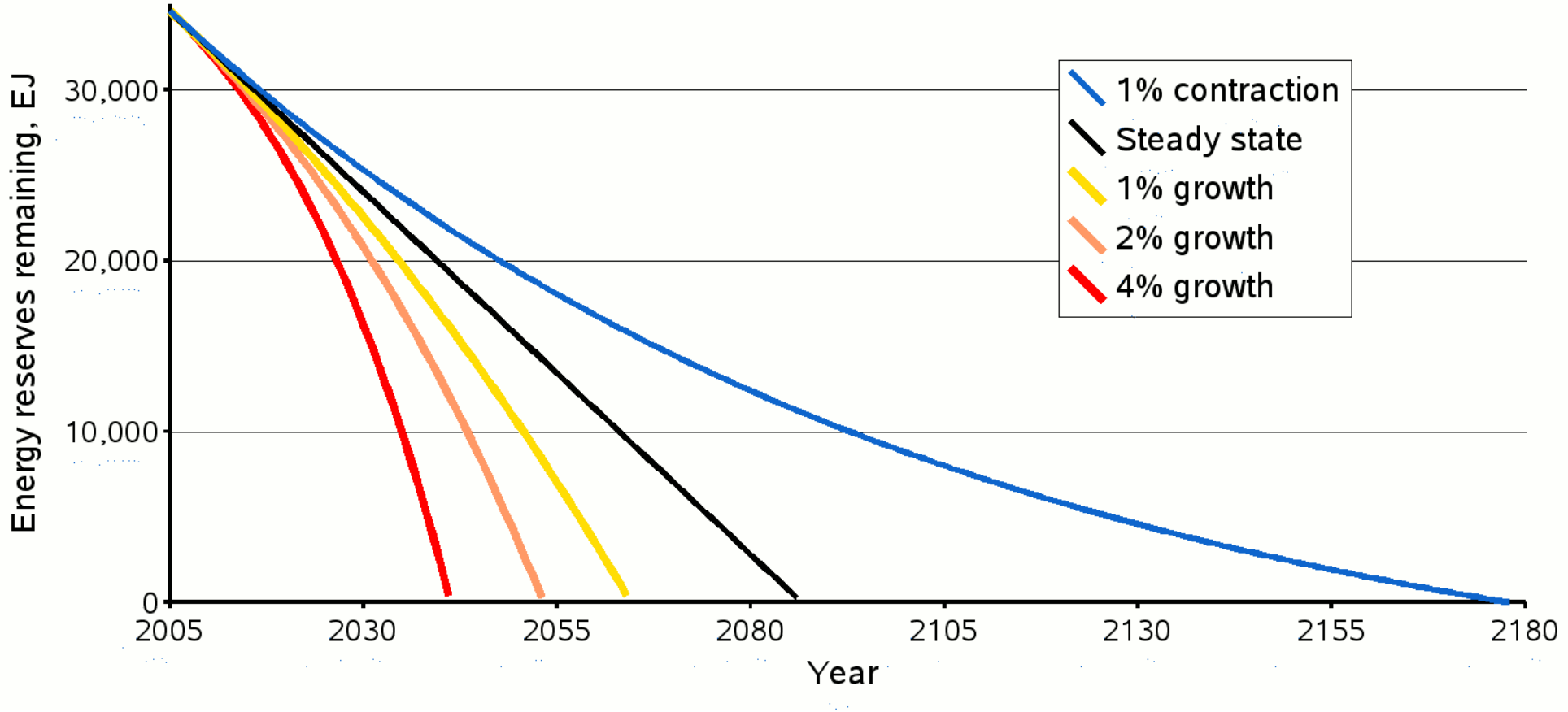
Source:

UK Joint Energy Security of Supply (JESS) Committee

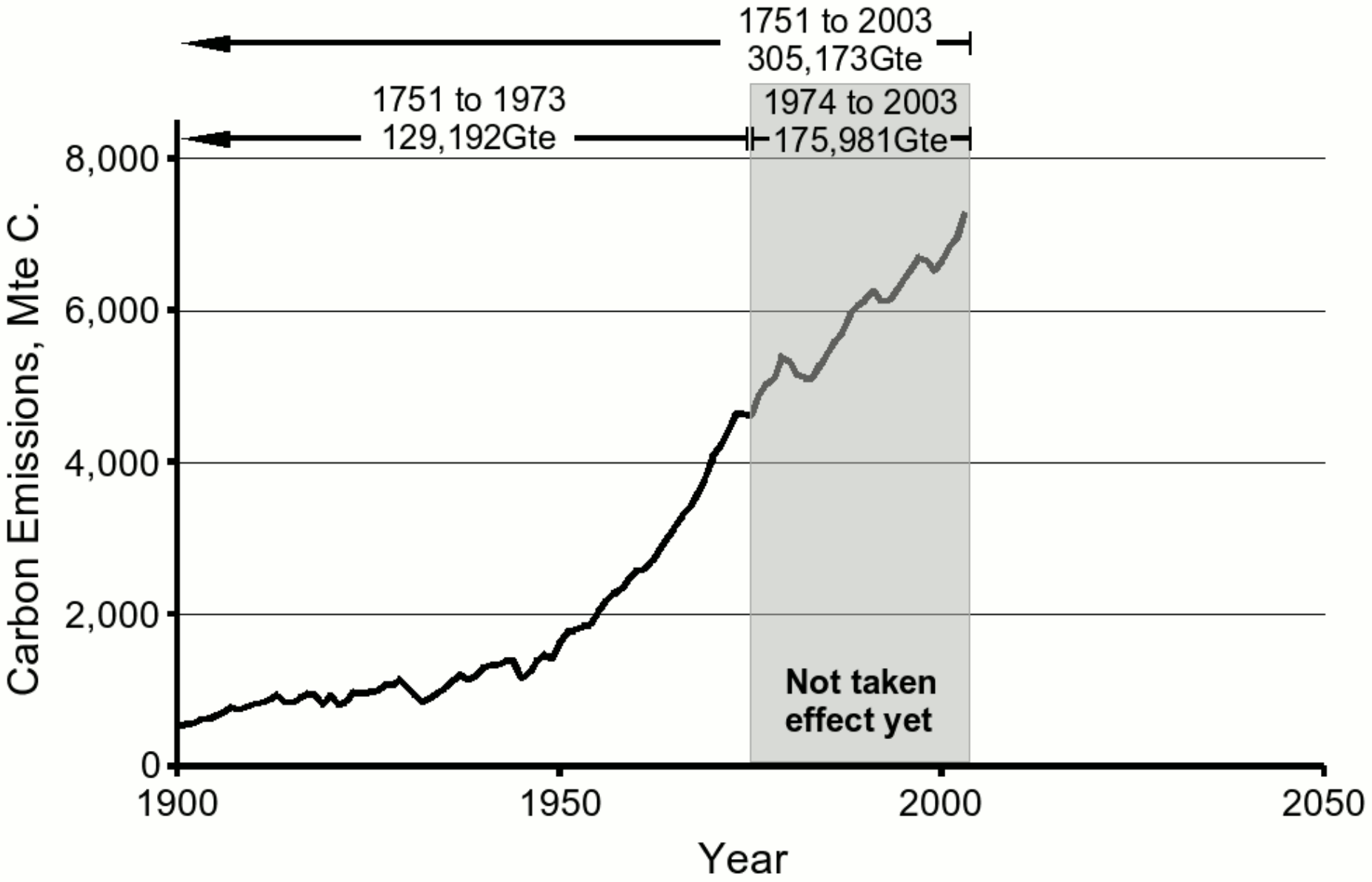
How Long Will It All Last

Source: BP/IEA

Resource	"Proven/ probable" resource	Annual consumption	Equivalent value of resource	Consumption EJ/year (2005)	R/P ratio, years
Oil (conventional)	1,201	30 billion barrels	6,856	172	40
Natural gas	179,850	2,750 billion cu. m.	6,777	104	65
Coal	909,100	5,853 million tonnes	19,370	123	158
Nuclear (uranium)	4,000	64 kilo-tonnes	1,632	26	63
Total (all resources)			34,634	424	82



How Much Carbon?



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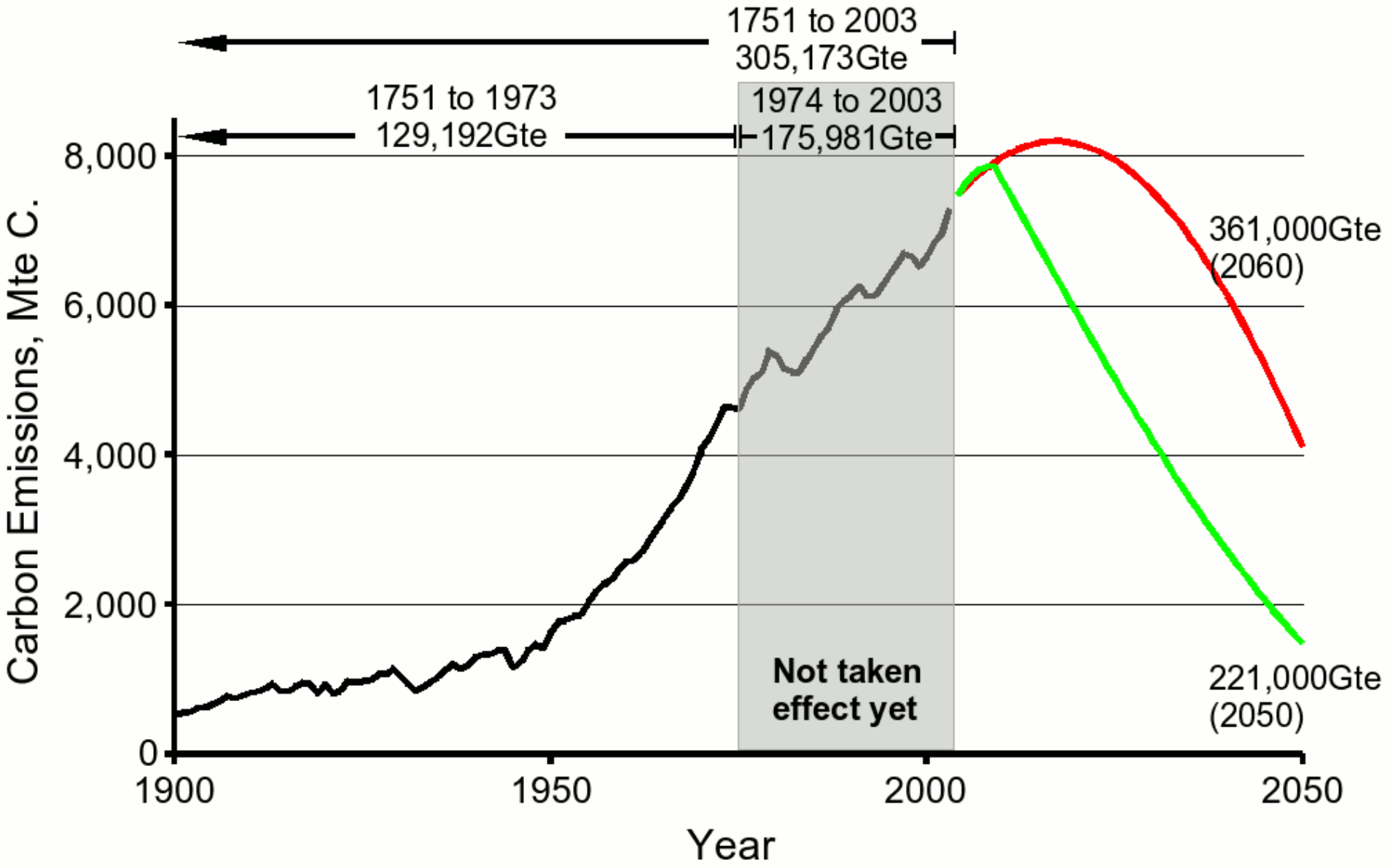

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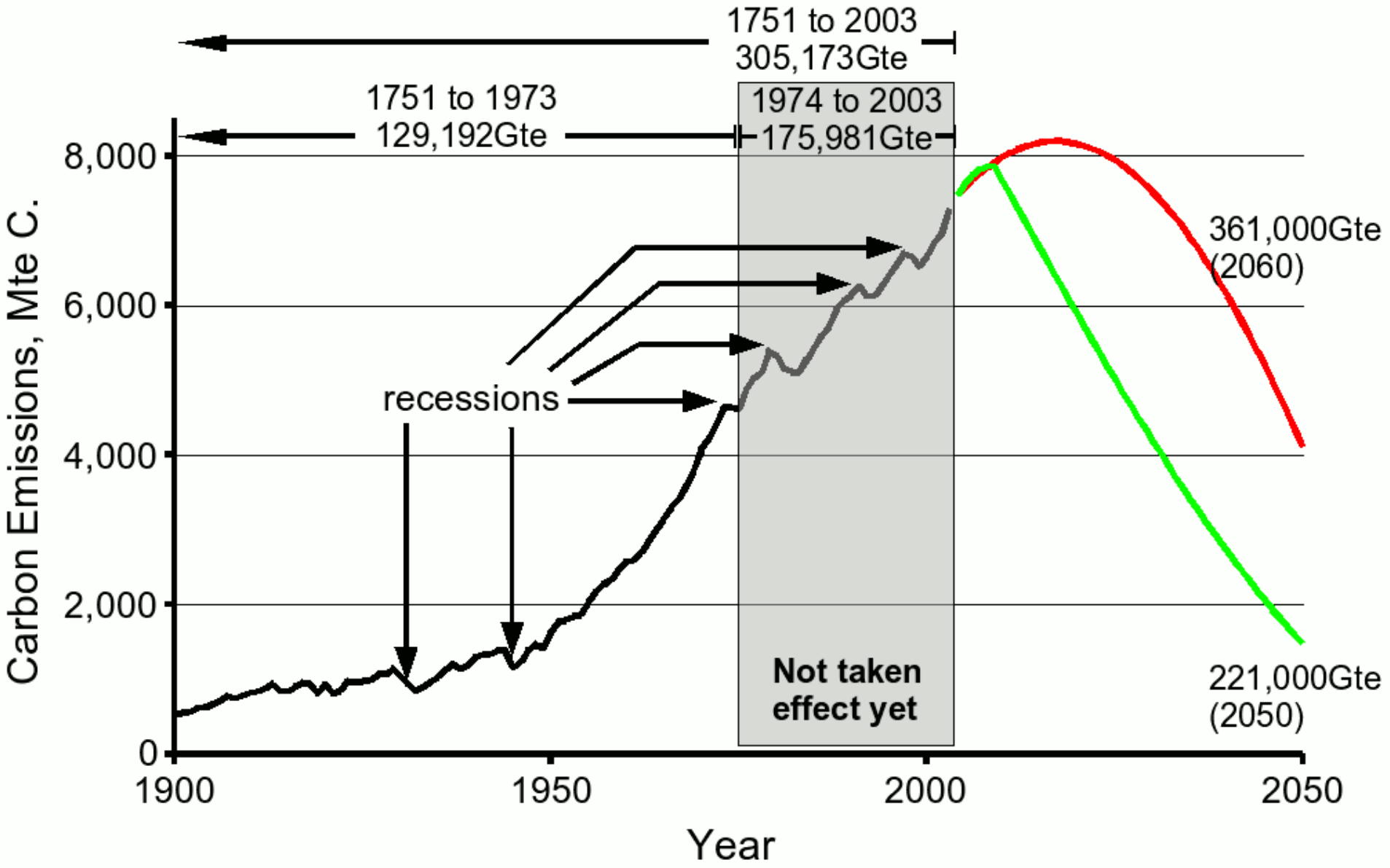
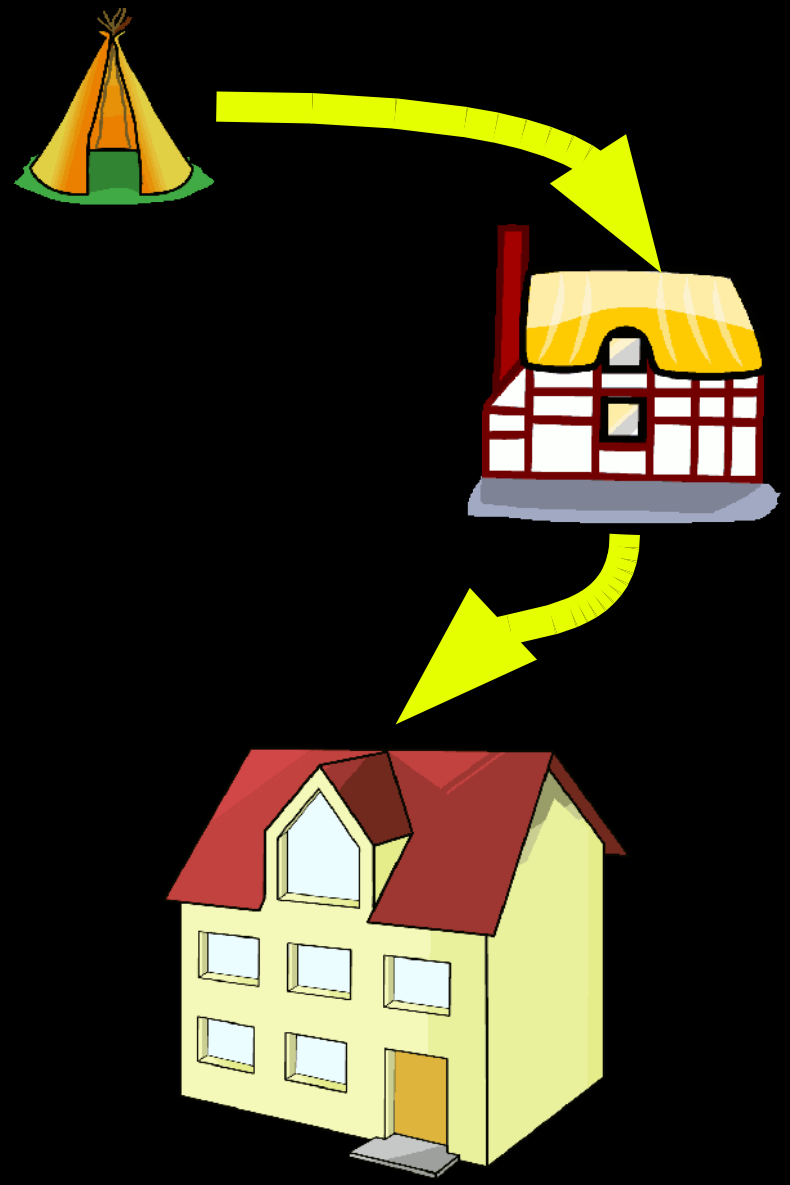


RUSE: The value of "energy efficiency"

The standard solution to resource shortages is greater efficiency – more efficient use makes the remaining resource last longer.

However, *The Second Law of Thermodynamics* limits the extent to which efficiency can restrict consumption. In any case it is often it is the "form" of consumption that is the problem, not its "scale".



The paradox of efficiency

Technology leads to greater efficiency, but those savings can only be used once. Then growth takes over and increases consumption once more.

Very few efficiency advances have led to long-term reductions in consumption – all they tend to do is briefly halt the effects of growth.

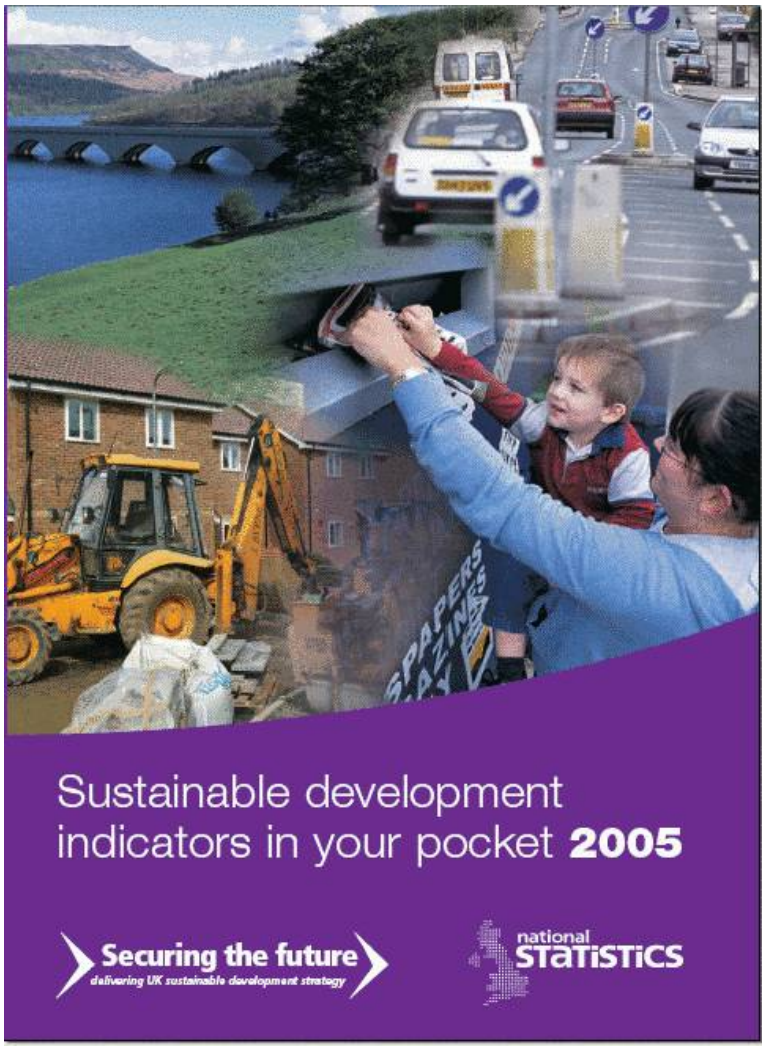
Jeavon's Paradox (1830s)
discovered that more efficient steam engines led to more coal being used in more engines

Rebound Effect (1960s)
discovery that efficiency savings are re-spent buying more "stuff", so re-consuming any savings

Khazzom-Brookes Postulate (1980s)
greater cost/technological efficiency, e.g. ICT, results in cheaper services and so greater use/consumption of services

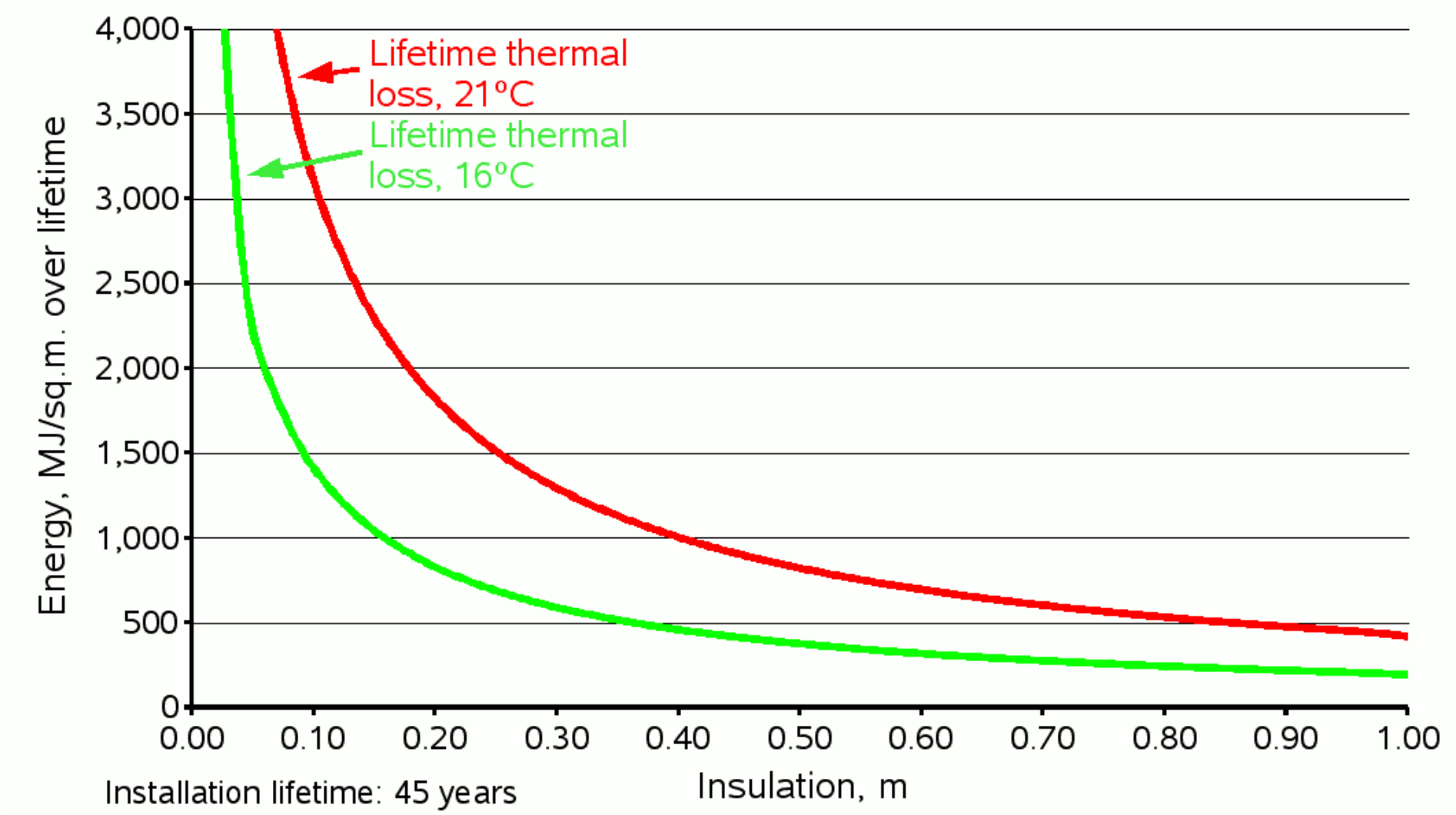
Efficiency vs. Growth

- The UK recycles more than five times the household waste it did 10 years ago, but the amount of household waste going to landfill or incineration has not decreased.
- In 2004 the UK emitted 31% less carbon/£ GDP than in 1990, but as the economy grew 39% over the same period the overall reduction in carbon emissions was just 4%.
- Over the past 30 years improvements in car engine efficiency have saved 400,000 tonnes of oil per year, but increased car usage has raised demand by 900,000 tonnes per year – a net increase of 500,000 t.p.a.



Insulation and Embodied Energy

Lifetime energy losses vs. embodied energy in a roof space, per square metre, using mineral wool insulation



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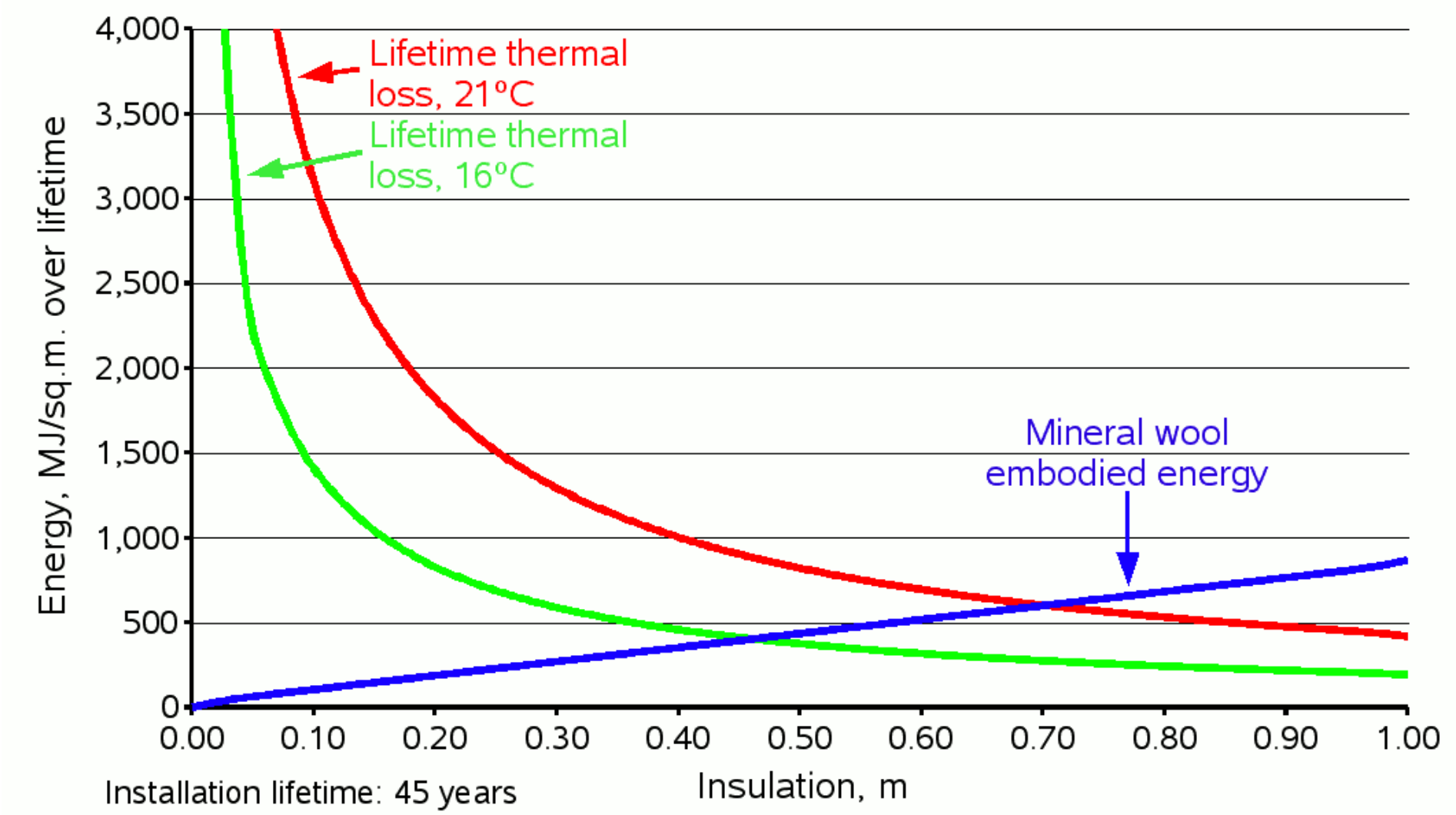

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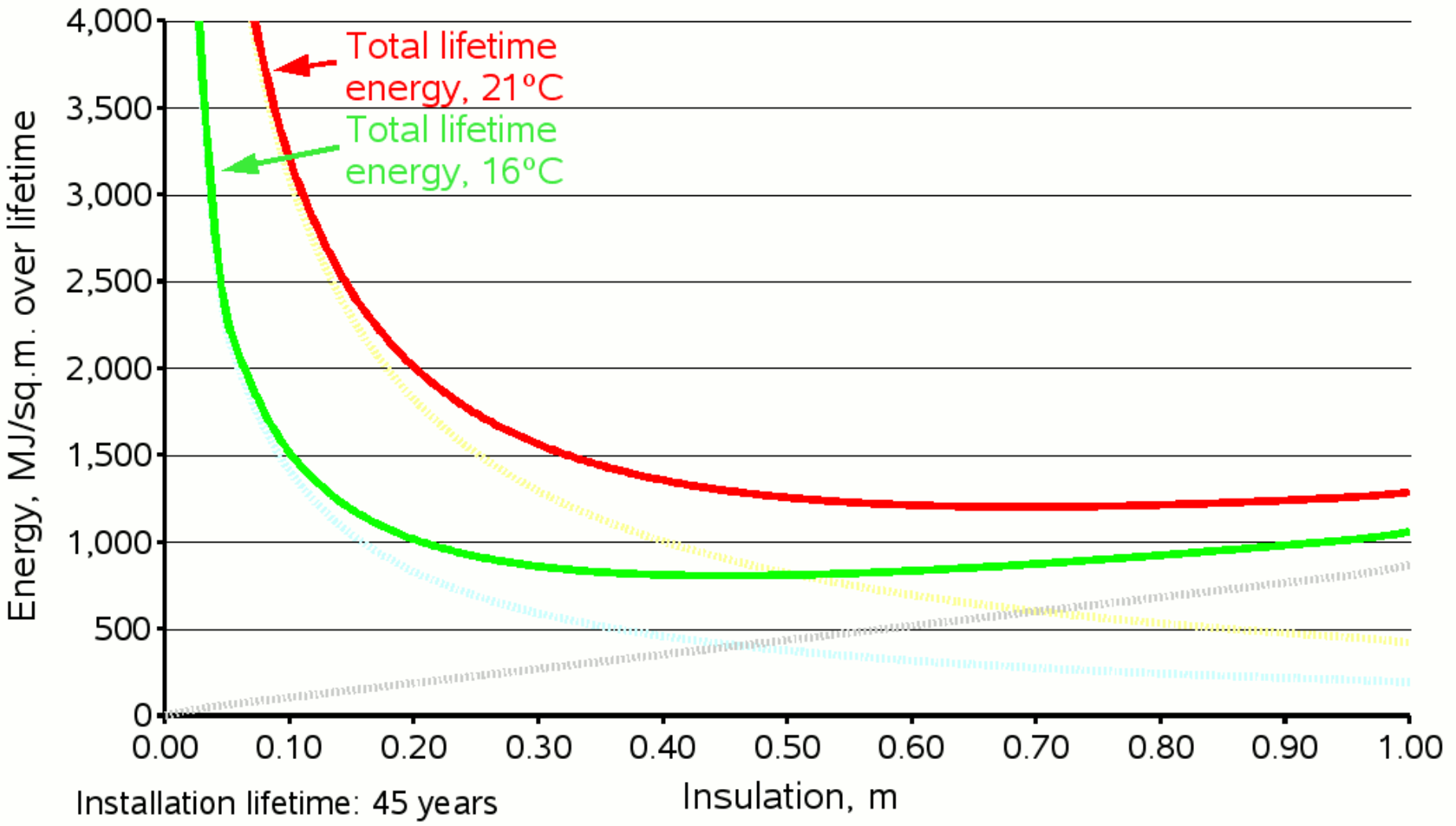

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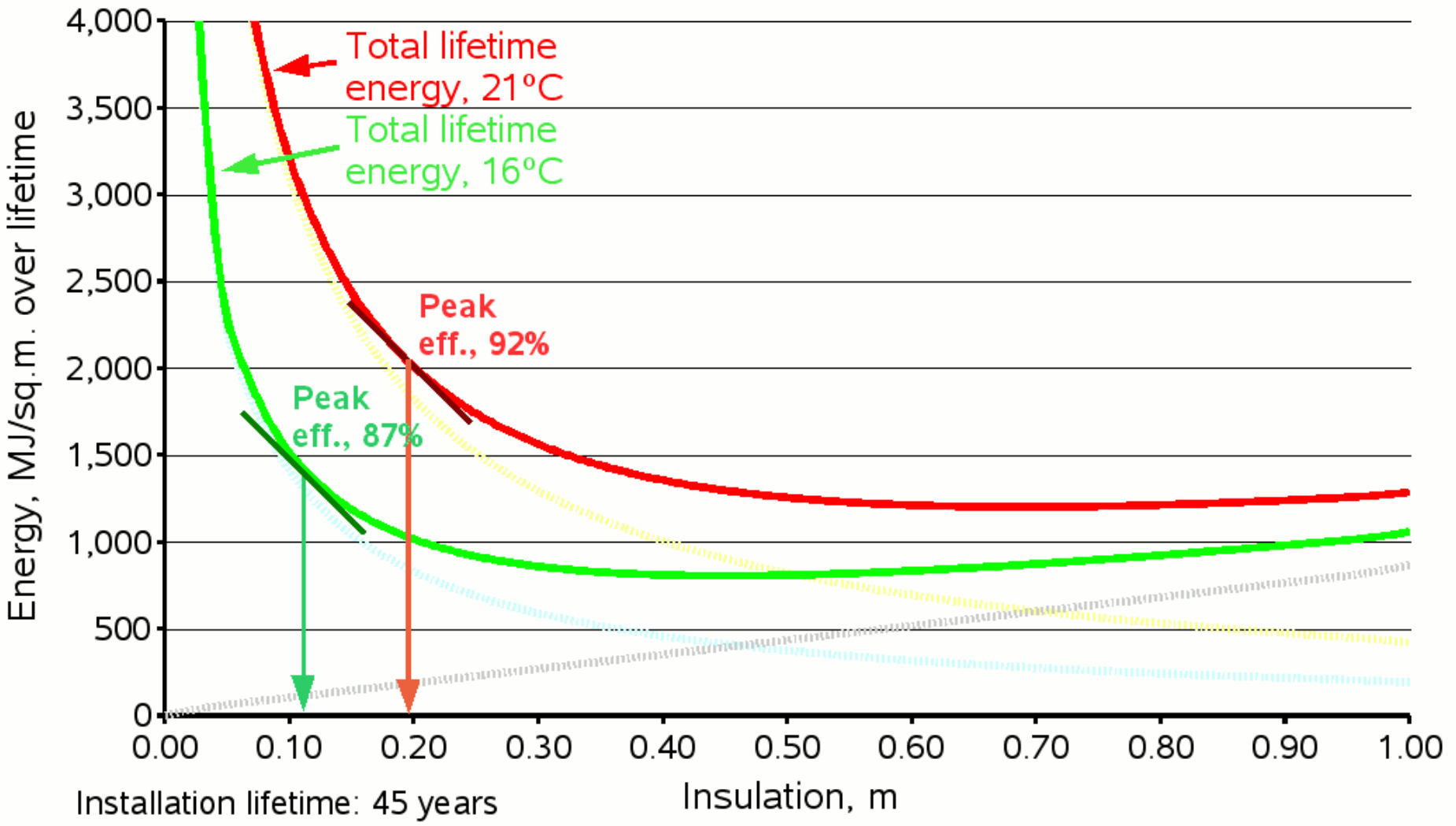

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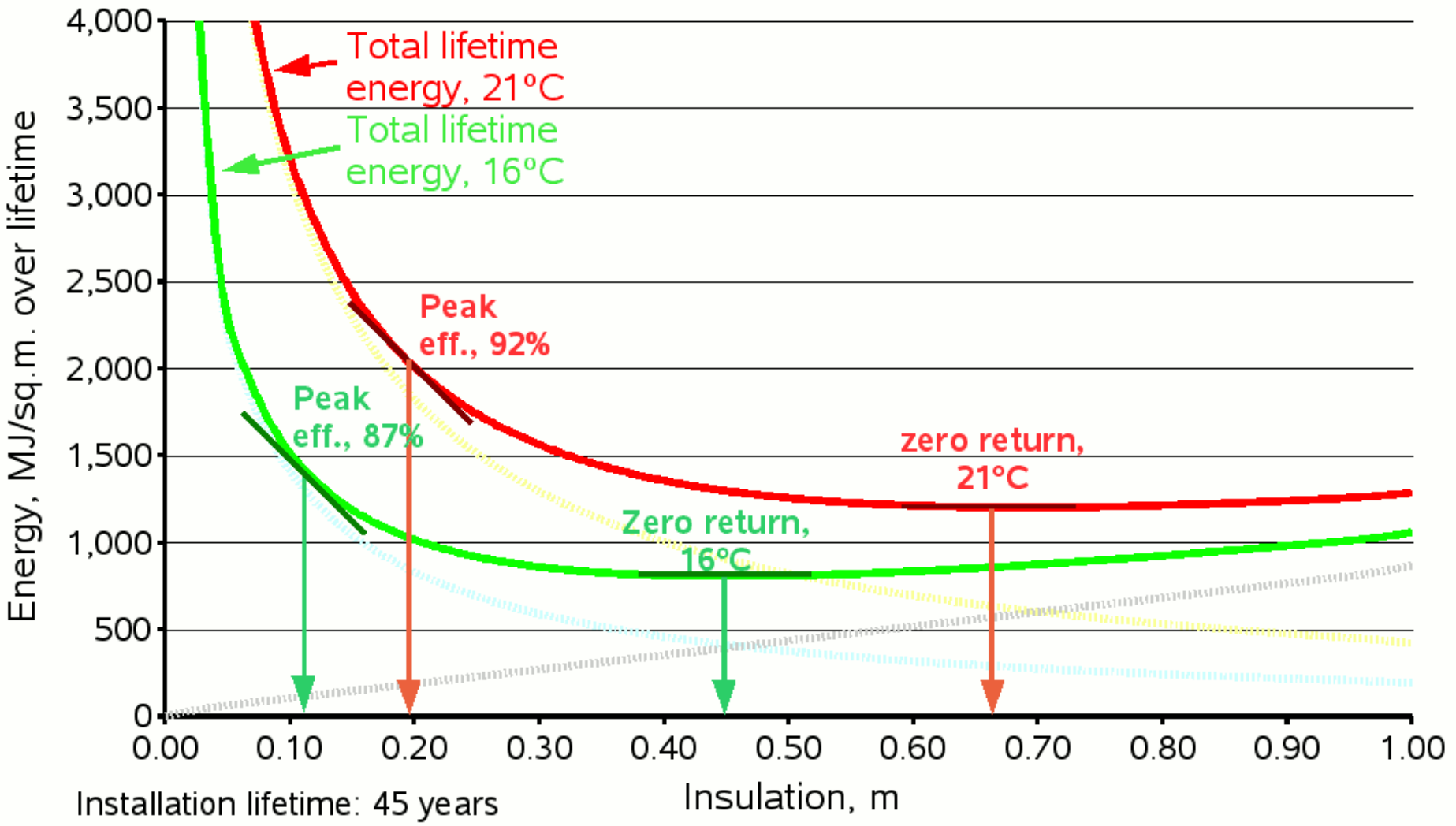
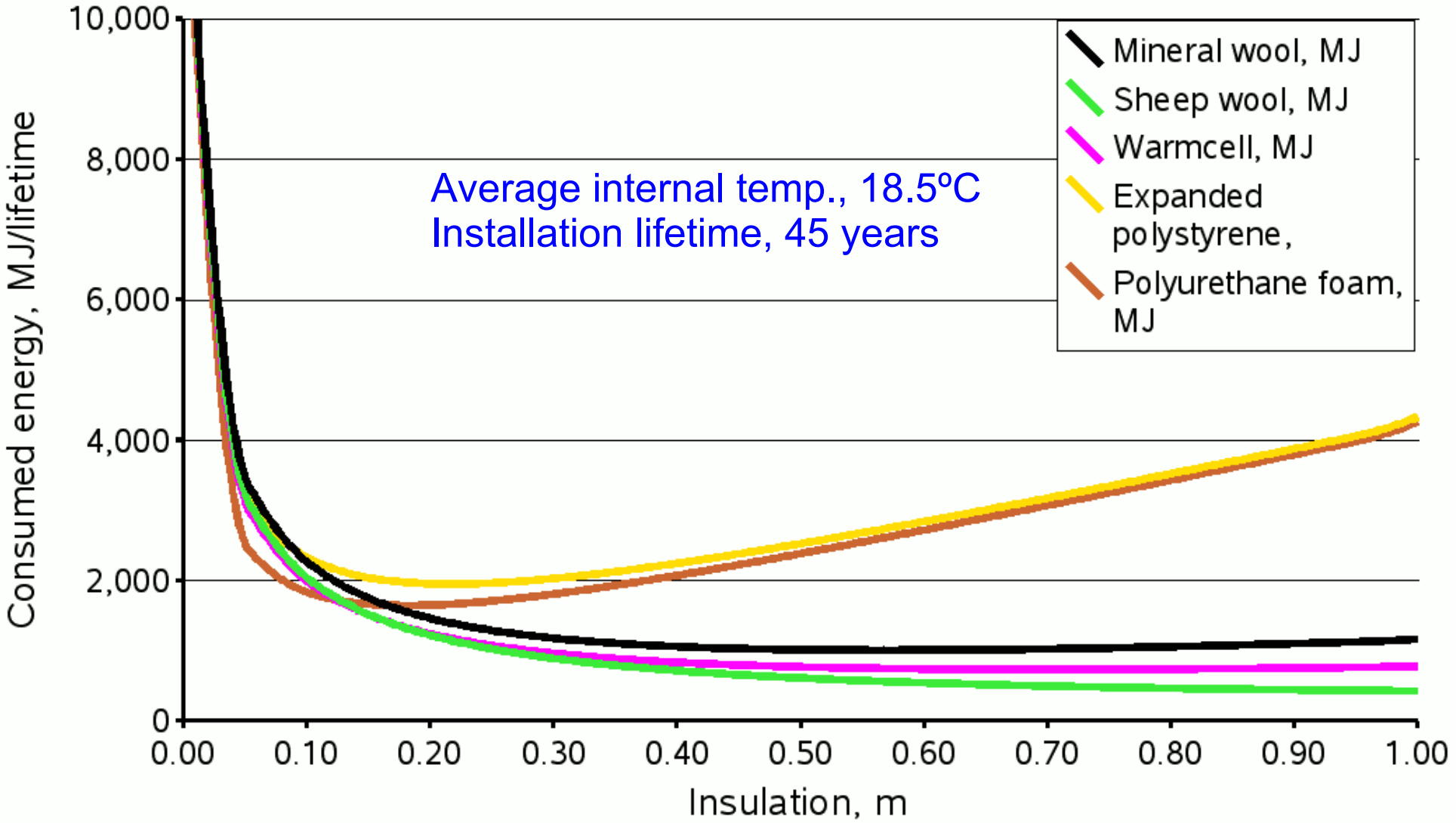


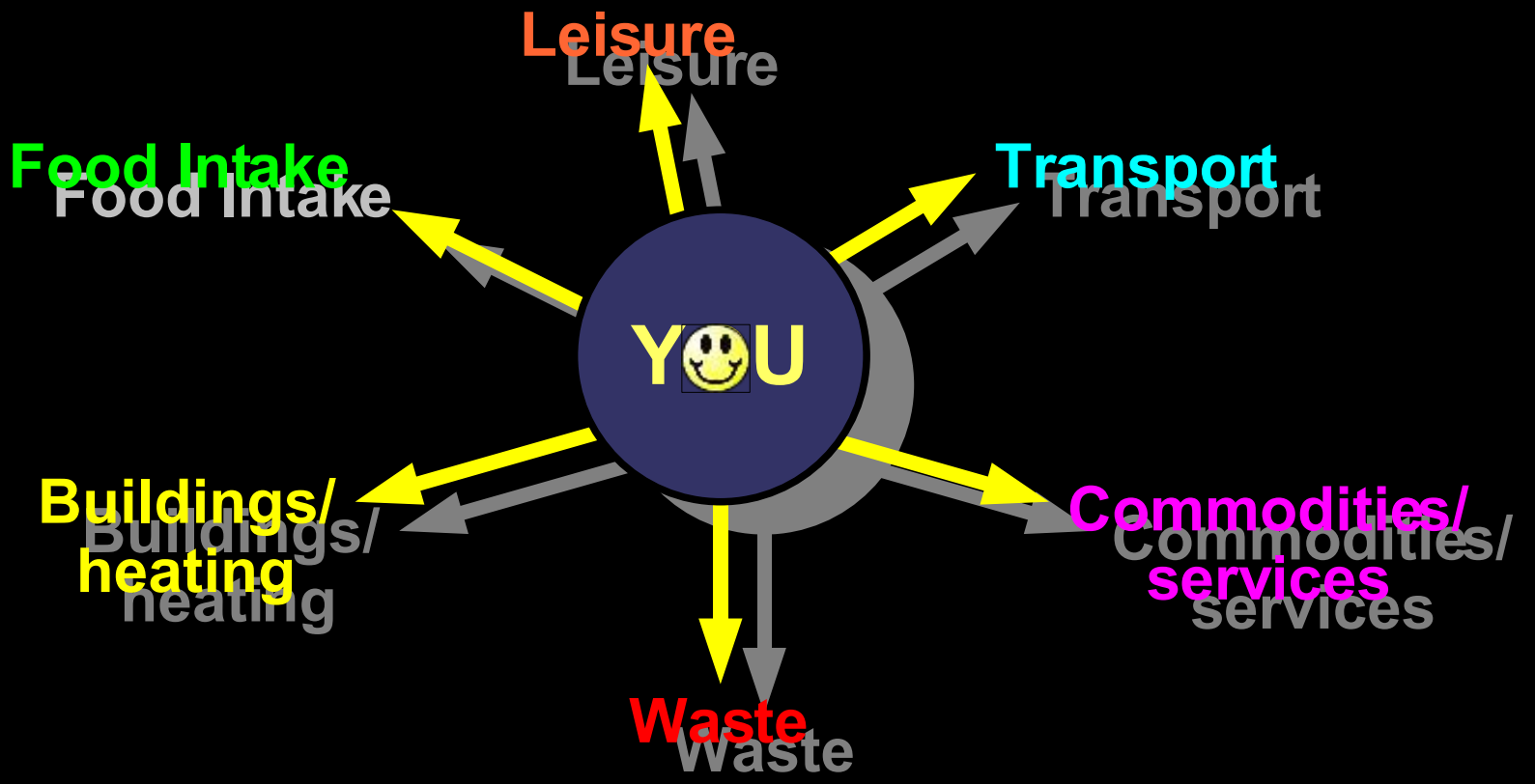
Insulation and Total Energy

Lifetime energy consumption (heat + embodied energy) in a roof space, per sq. m., using a variety of insulation materials



SELF: Energy in the Context of the Individual

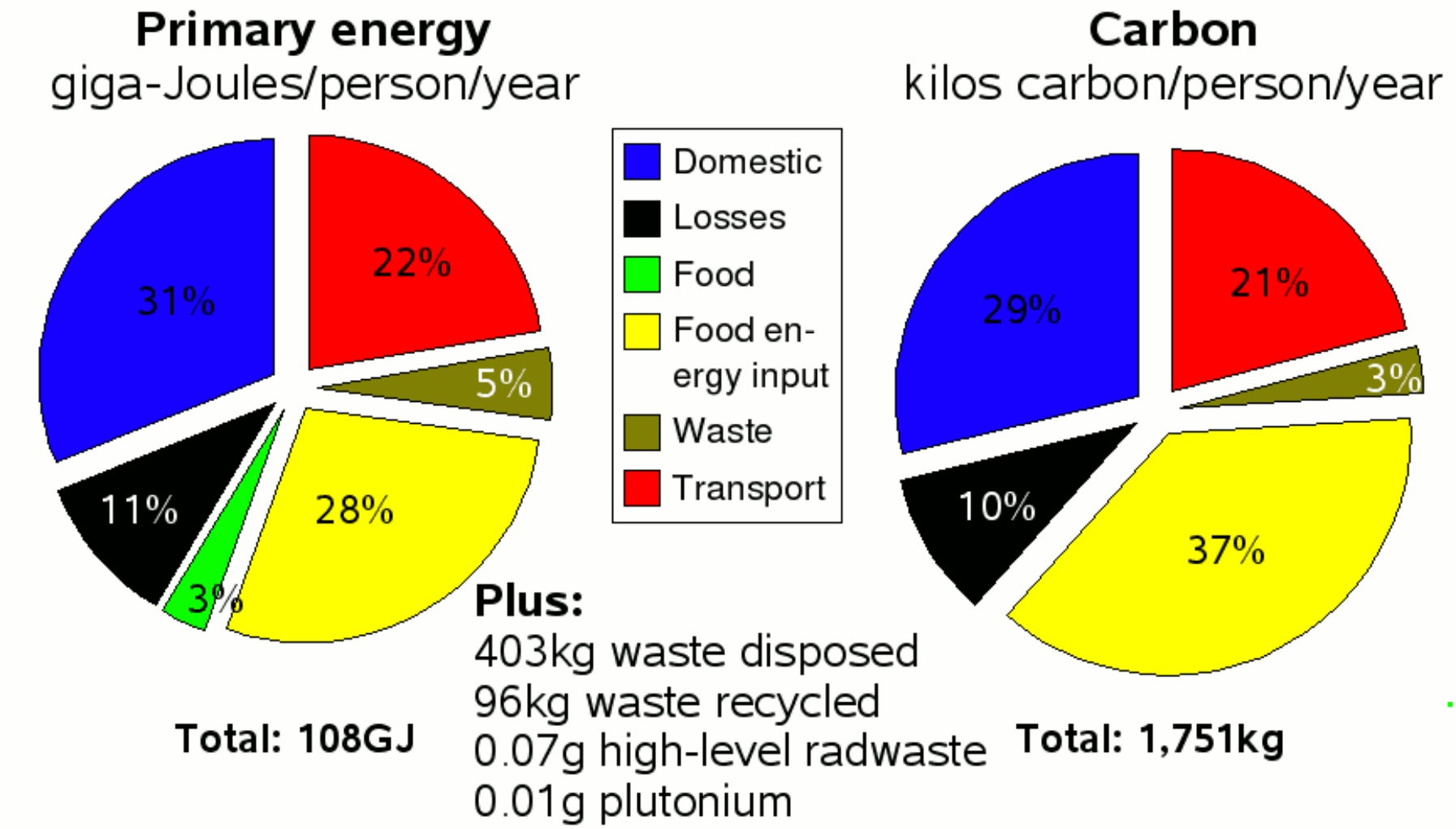
Your existence is defined by very specific energy demands:



Each of these areas comprises a number of direct and indirect 'sinks' of energy and resources, and the emission of waste and pollutants (like CO_2). Most importantly, much of this consumption takes place indirectly, not directly.

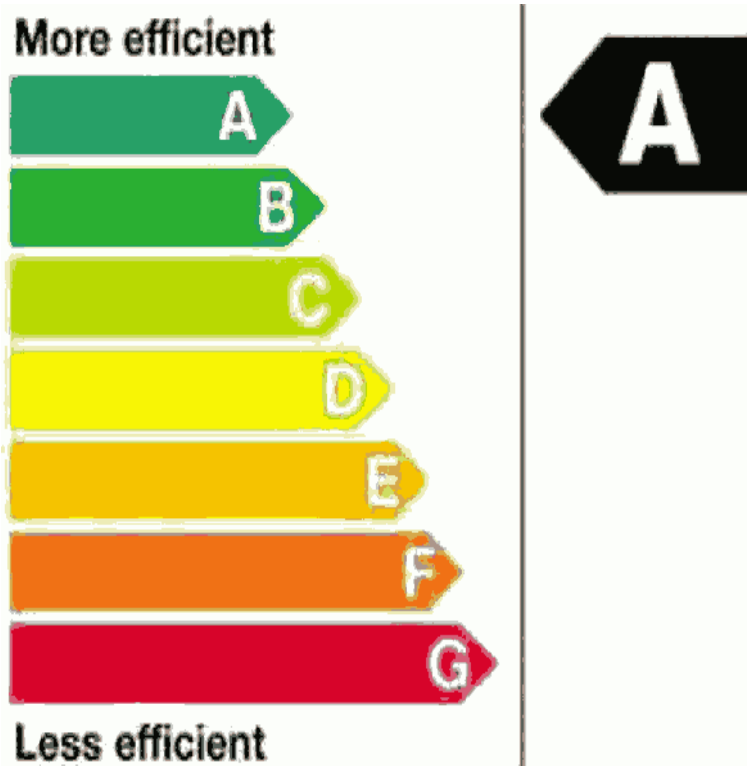
How Much do Individuals Consume?

Energy and carbon levels recalculated for the “average” individual



Efficient Appliances?

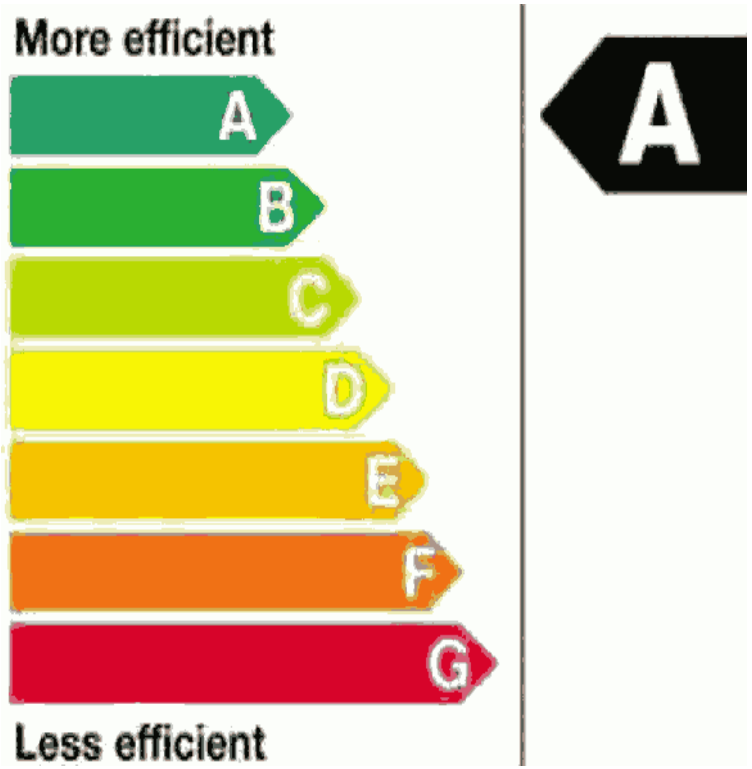
EU Eco-labelling scheme



Miele W3240

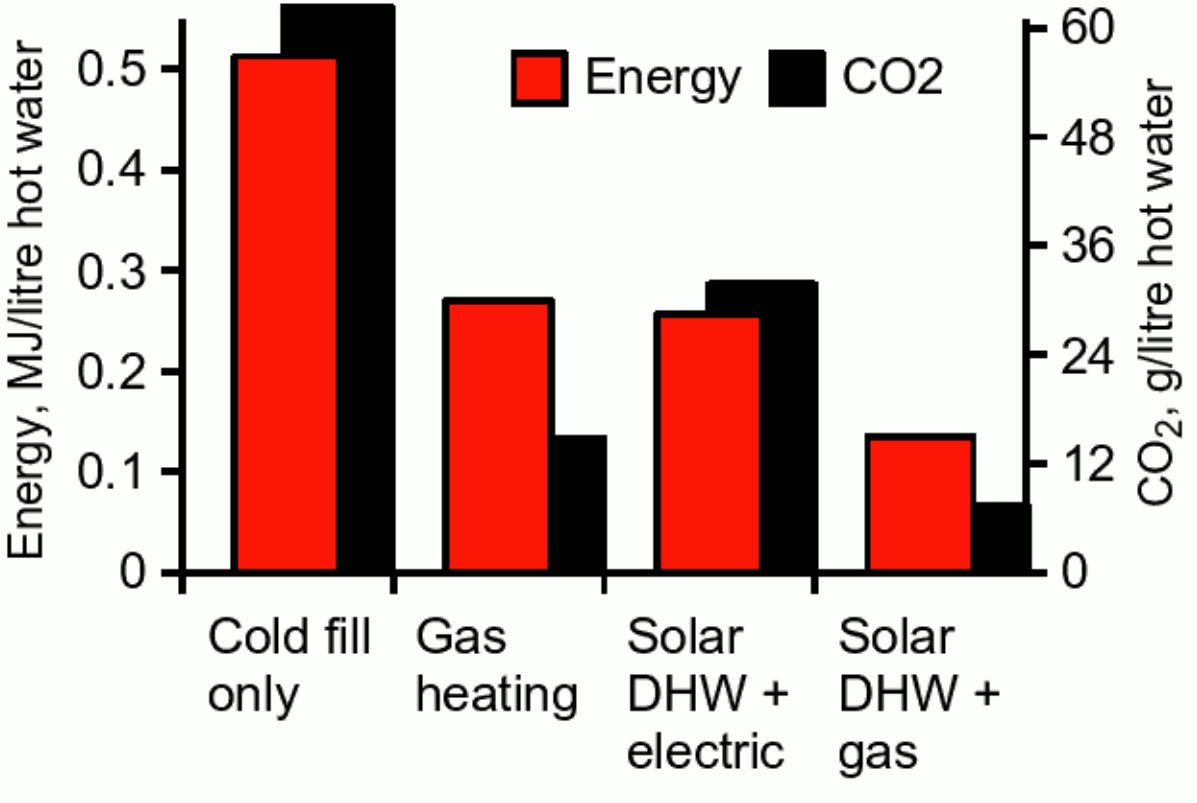
Efficient Appliances?

EU Eco-labelling scheme

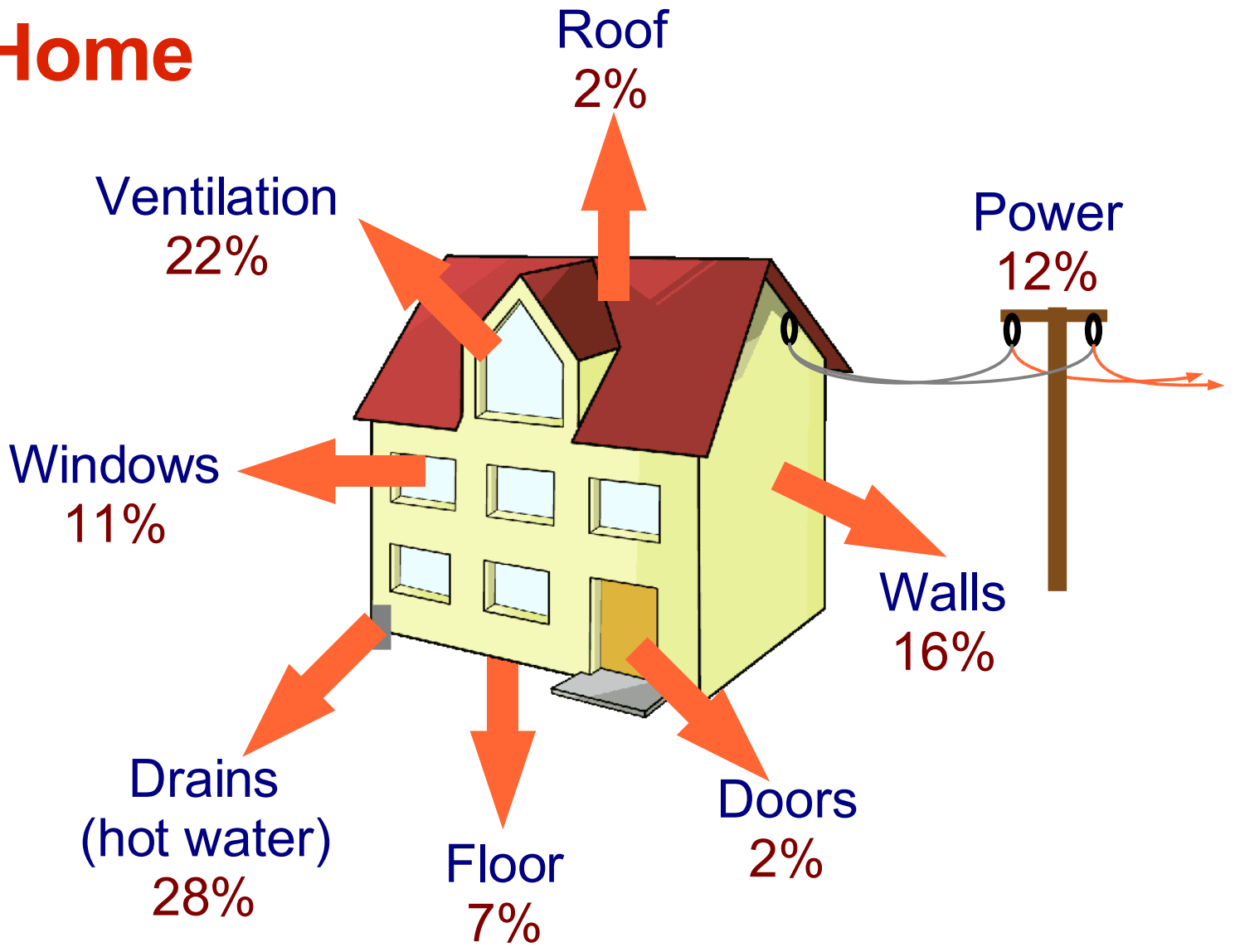


In terms of the “primary” energy consumed, a cold-fill machine uses twice the energy as a (gas-fired) hot fill machine, or four times as much if you have solar water heating*. It's also, respectively, a quarter or an eighth the level of carbon emissions.

**(solar fraction 0.5)*



Your Home

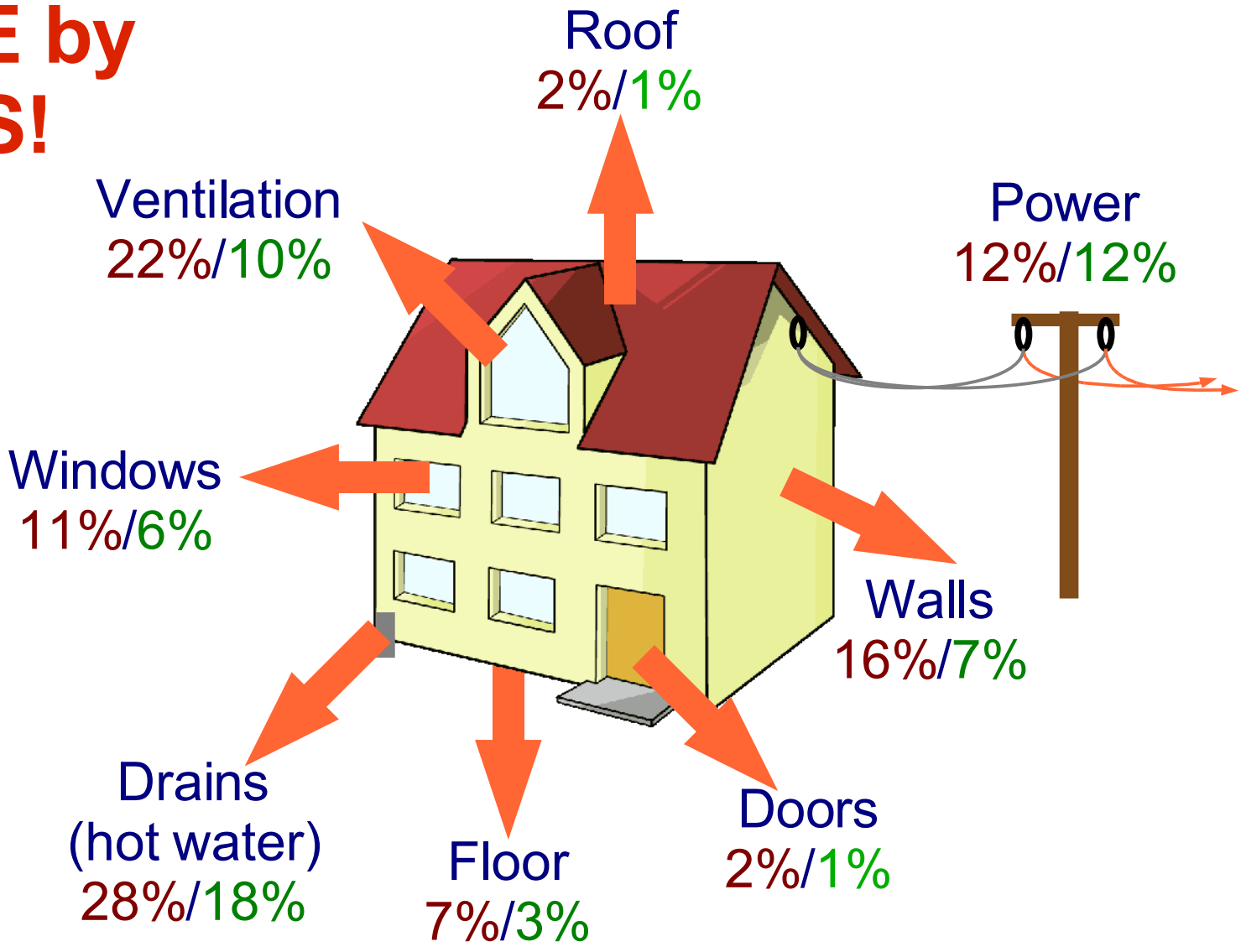


21ºC av. air temp., 70ºC av. water temp. – 125GJ/yr

Save MORE by Using LESS!

Reducing the average temp. by 1ºC saves about 10% of the heating load per year!

Note, in small houses the savings are proportionately less

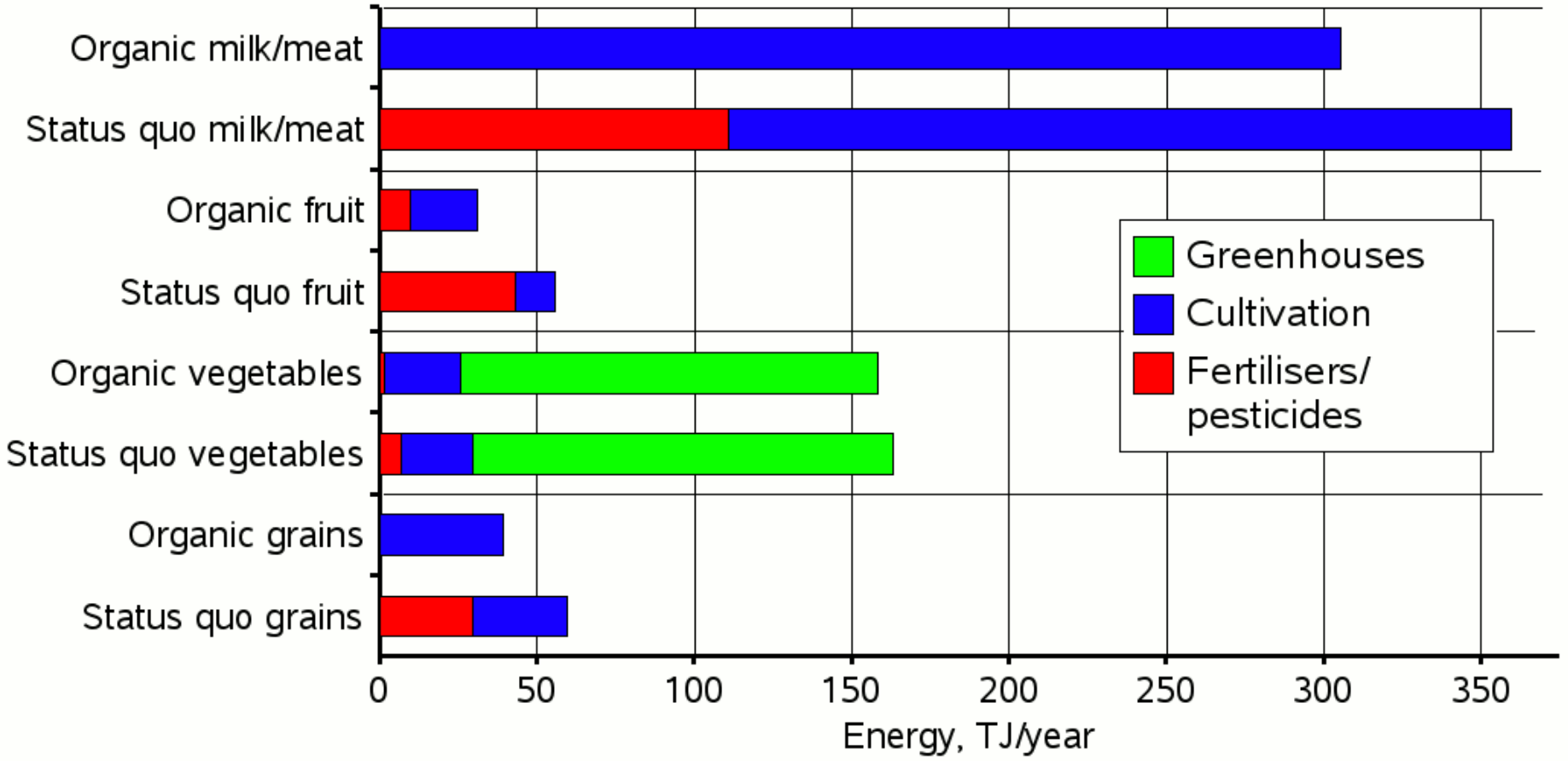


16ºC av. air temp., 55ºC av. water temp. – 76GJ/yr (40% less)

[water <25%, heat <54%]

Intensive vs. Intensive Organic Food

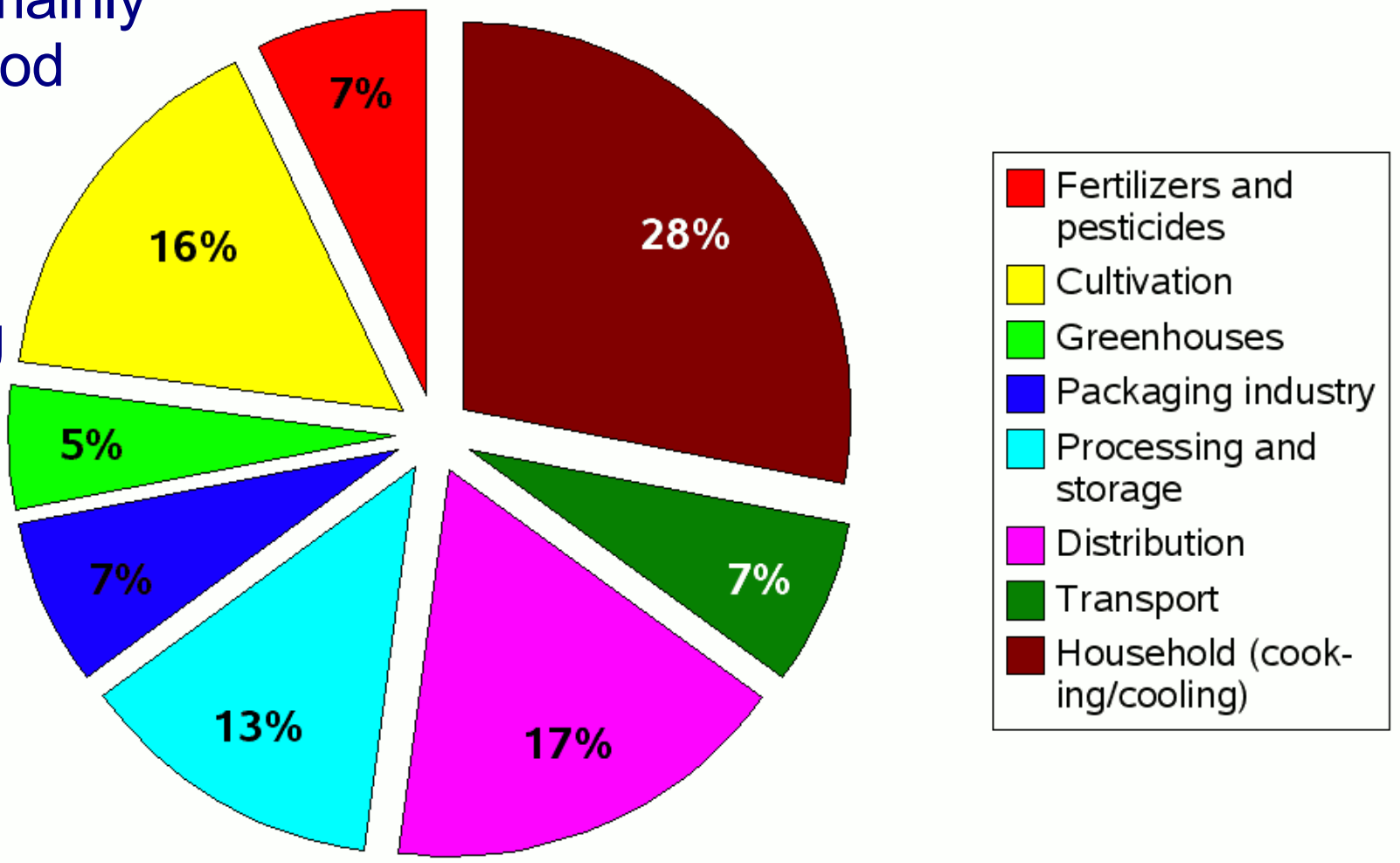
In energy terms, intensive organic is not much better than chemically intensive food production.



Source: The Impact of Household Food Consumption on Resource and Energy Management, Faist et. al., International Journal of Environment and Pollution 15(2), 2001

The Food Chain

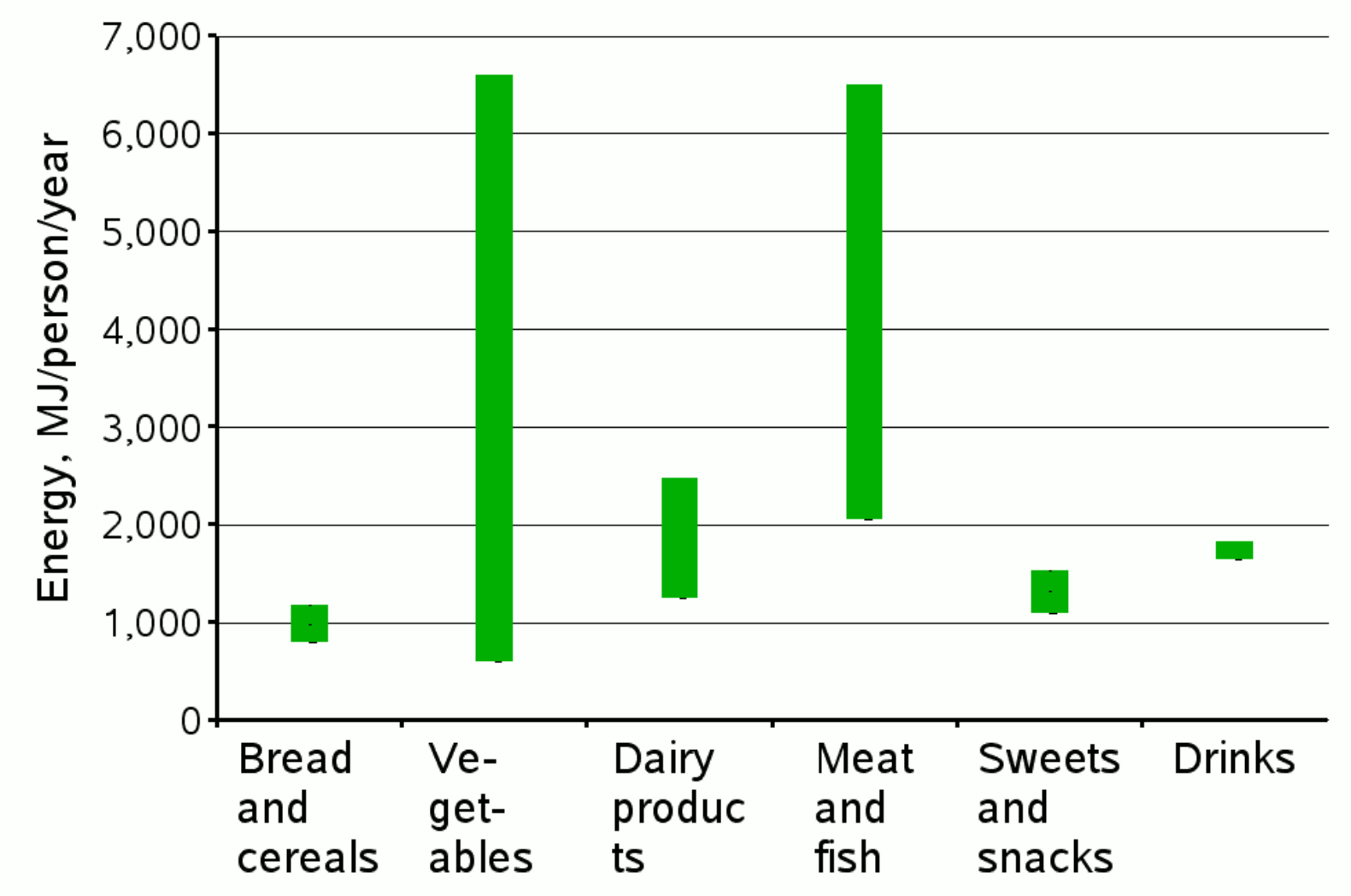
Although the home is significant, the energy savings from food will come mainly from the food chain, not from personal purchasing or use.



Source: The Impact of Household Food Consumption on Resource and Energy Management, Faist et. al., International Journal of Environment and Pollution 15(2), 2001

Variation in Food Energy

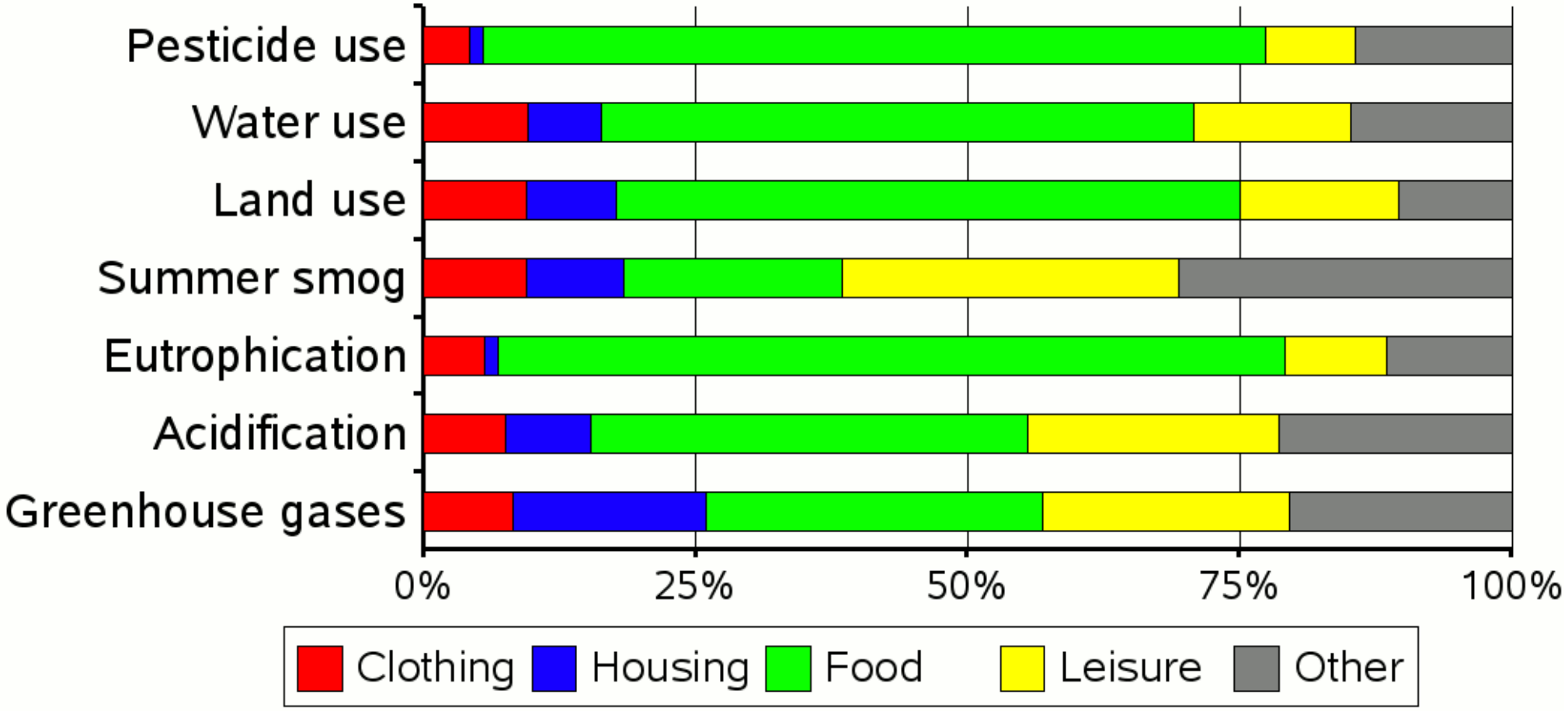
In Sweden, the energy value of people's food intake can vary from 7,500 to 20,000MJ/ year, or 2 to 6 times the calorific value of the food.



Source: Food and Life Cycle Energy Inputs: Consequences of Diet and Ways to Increase Efficiency Carlsson-Kanyama et. al, Ecological Economics 44, 2003

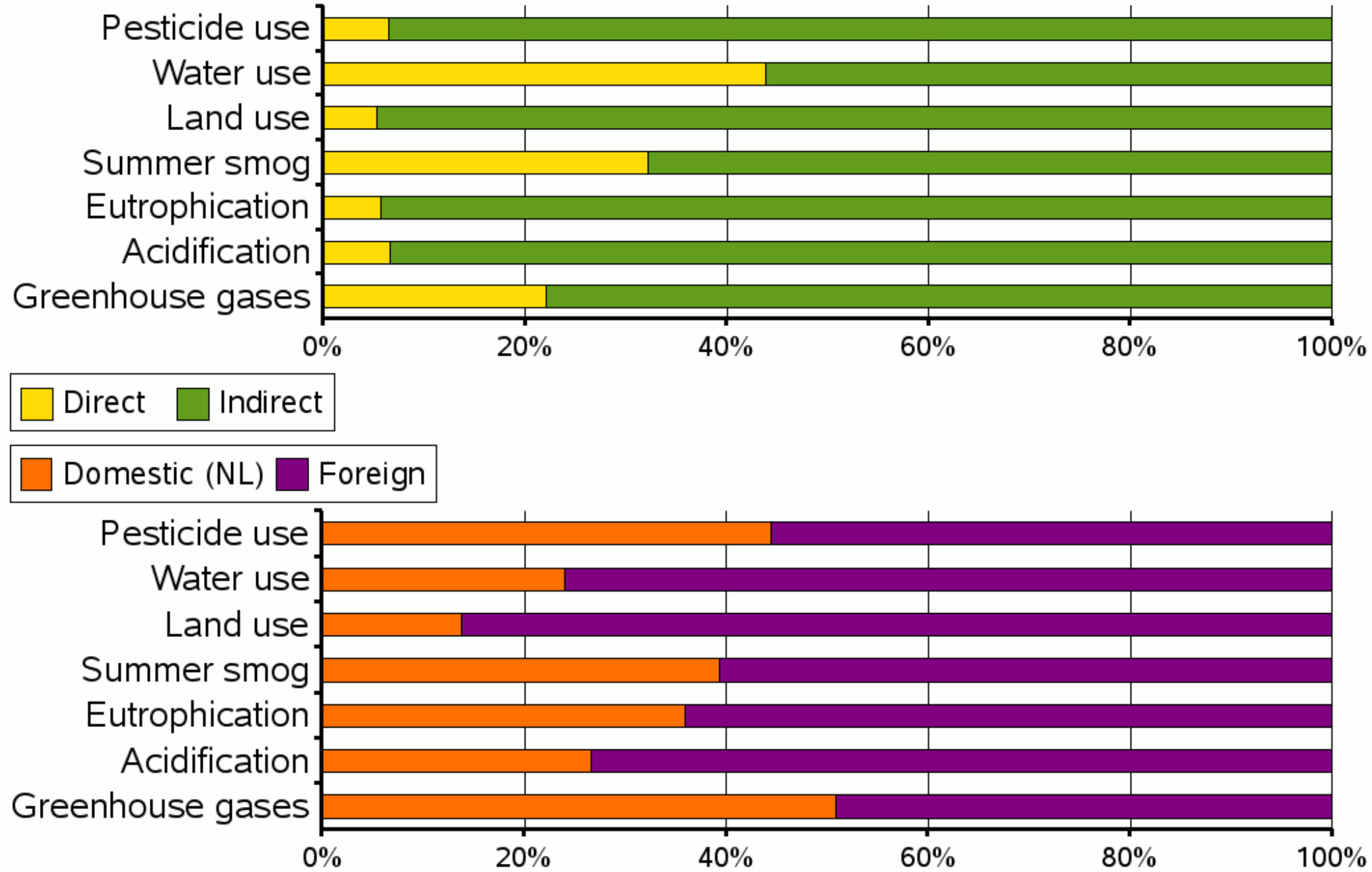
The Impacts of Consumption

Dutch consumption provides a good analogy for the UK:



Source: Share of Consumption Environmental Load from Dutch Private Consumption, Nijdam et. al., Journal of Industrial Ecology 9(1-2), 2005

The Location of Consumption Impacts



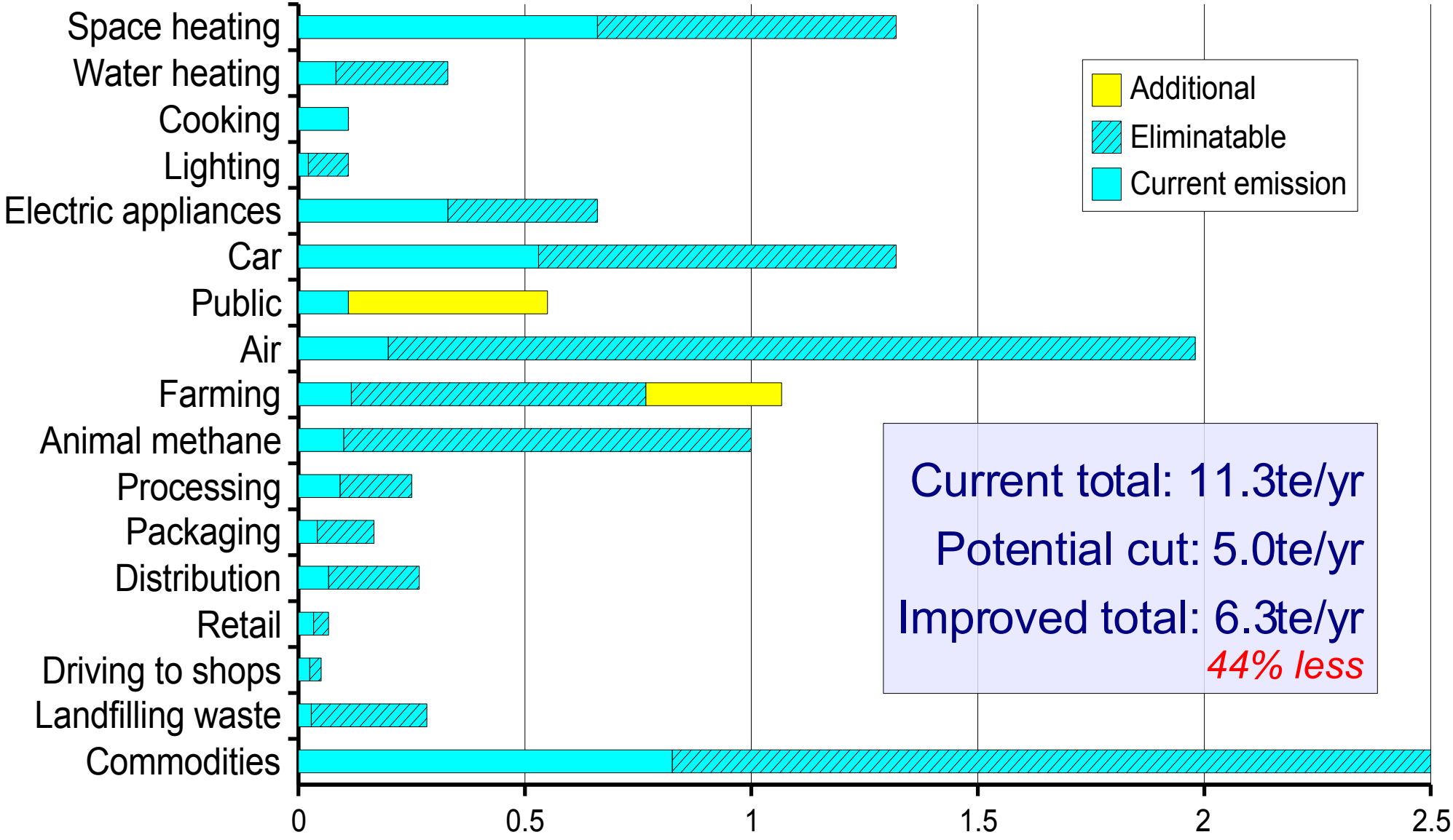
CODA: There is an Elegant Solution...

"Peak Energy", in terms of our current market system, is an unusual situation since it precludes "business as usual" solutions....

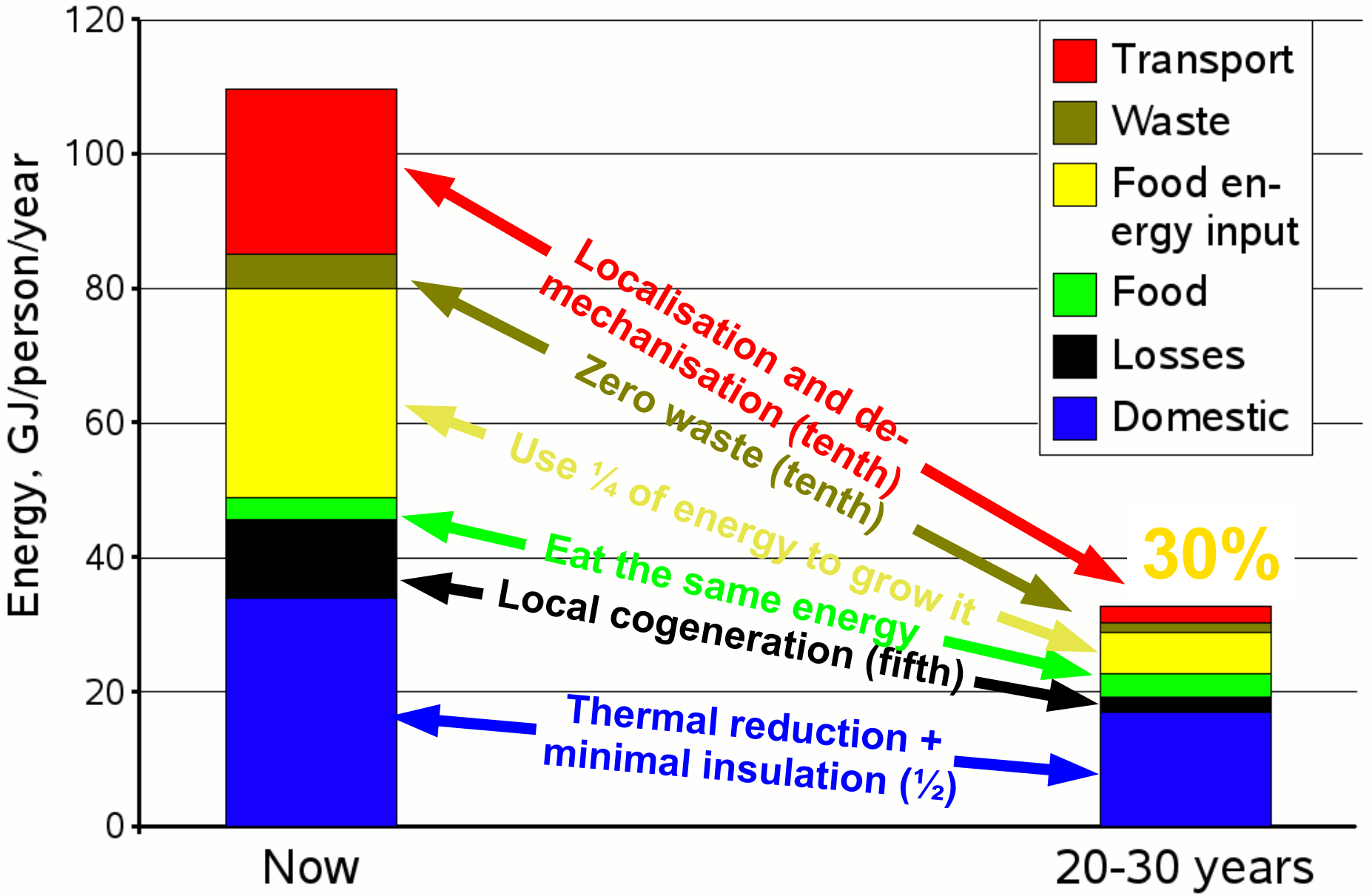
....therefore we should prepare for "business as unusual!"

The solutions are not novel or new – they do not need to be invented... in fact, people have been writing about them for the last 30 years... *it's just that they didn't fit into "the market"*

Mainstream Carbon/Energy Reduction



Potential for Personal Reduction



The immediate priority: POWERDOWN

Network You're going to need help! That begins by re-establishing social networks.

Skills Reducing external energy means that you must put more in yourself – this requires that you re-learn the skills we've lost to the consumer society.

Consume less If you wait until Powerdown is unavoidable you're going to be an unhappy person – *don't wait, start today, and have choice*.

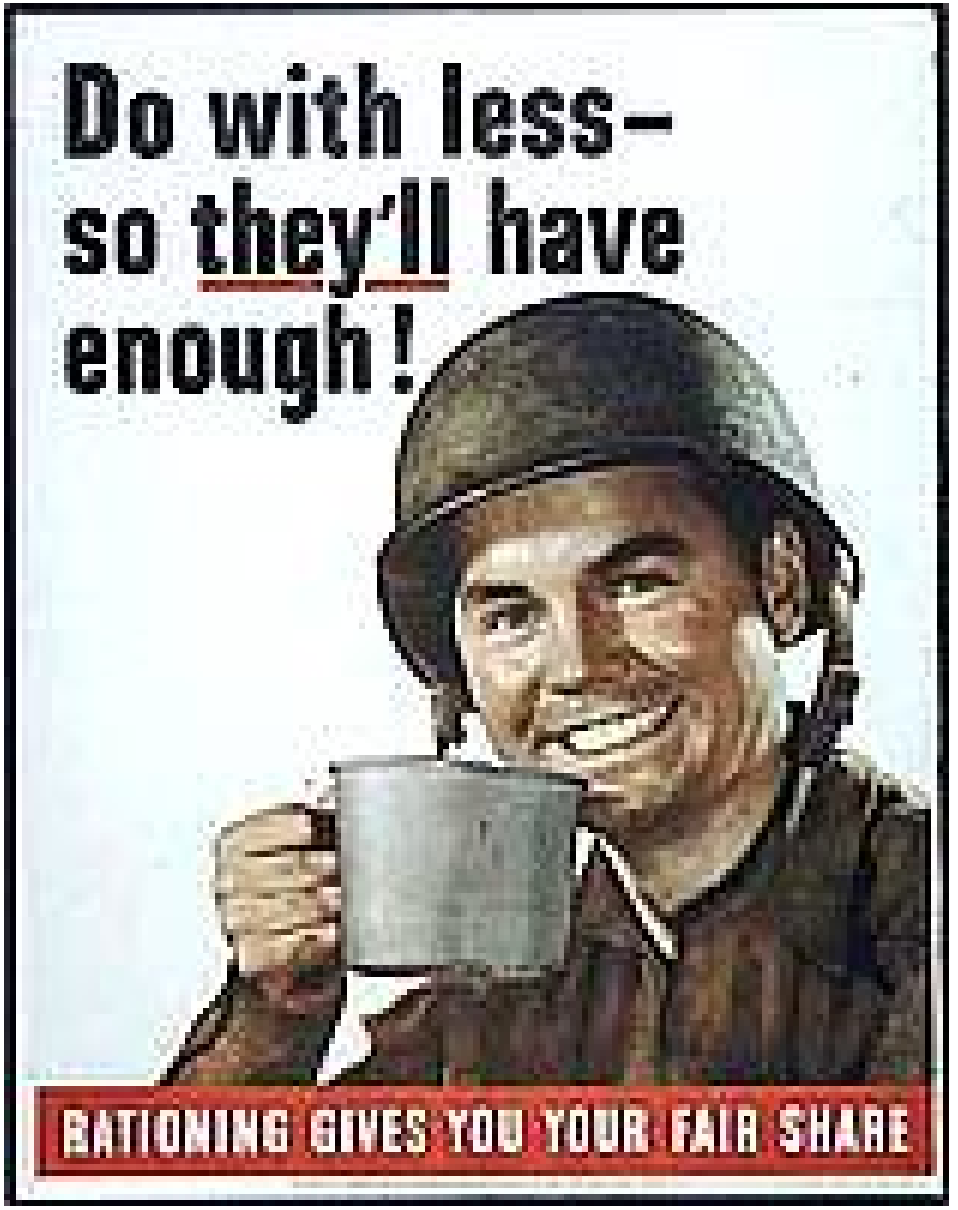
Acclimatise Turn your thermostats down now and put your jumpers on! If you start walking and being physically more active it's going to be uncomfortable, but it gets better after six to eight weeks.

When is Peak Oil?

...when rationing starts!

In reality we're not talking about certain dates, times or processes. Plus or minus 5 years of 2010 is the most likely.

The issue is not that Peak Oil will mean the end of oil, or the end of the motor car (immediately) – what it means is that the certainties of the market place we've known for 50 years will disappear.

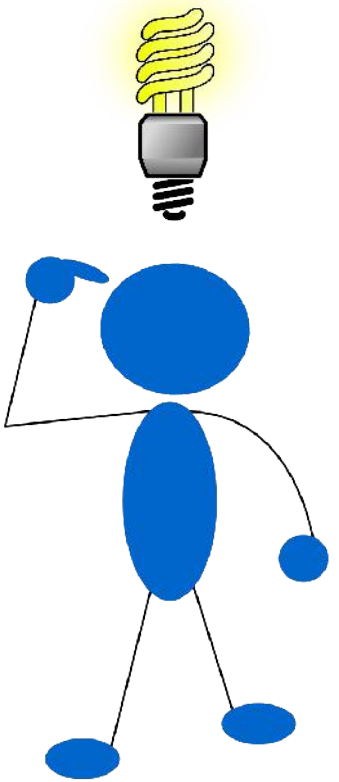


The Free Range "Energy Beyond Oil" Project

web: http://www.fraw.org.uk/ebo/

email: ebo@fraw.org.uk

...but,if you can think of a better idea, we'd like to hear it!



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