

# Sustainable Construction

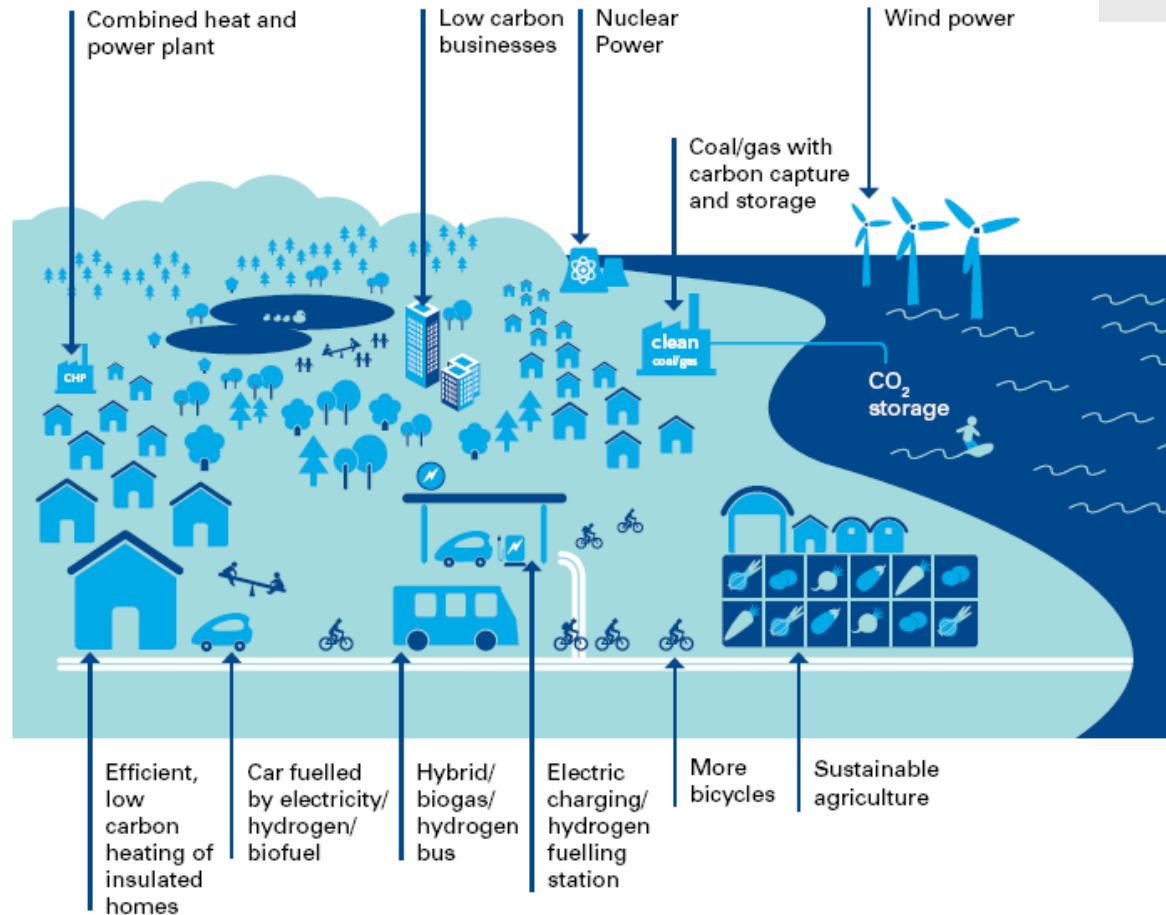
Key Drivers & Barriers

Simon Smith

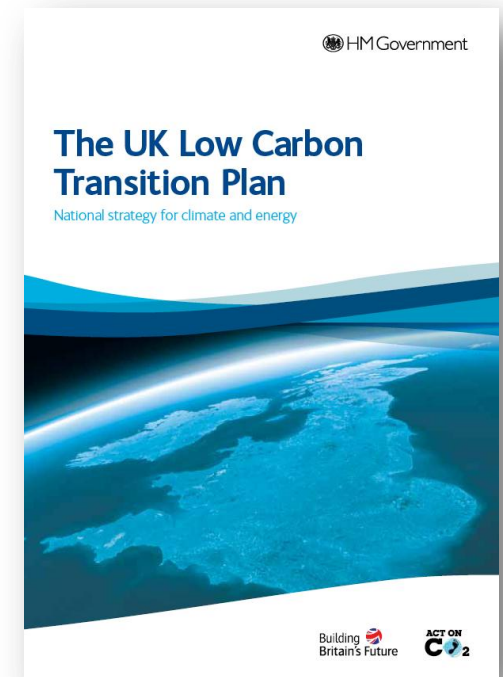
# Drivers – Legislation

Figure 3

Our energy system in 2050 could look substantially different



UK Climate Change Act 2008  
80% reduction in CO<sub>2</sub>  
emissions by 2050



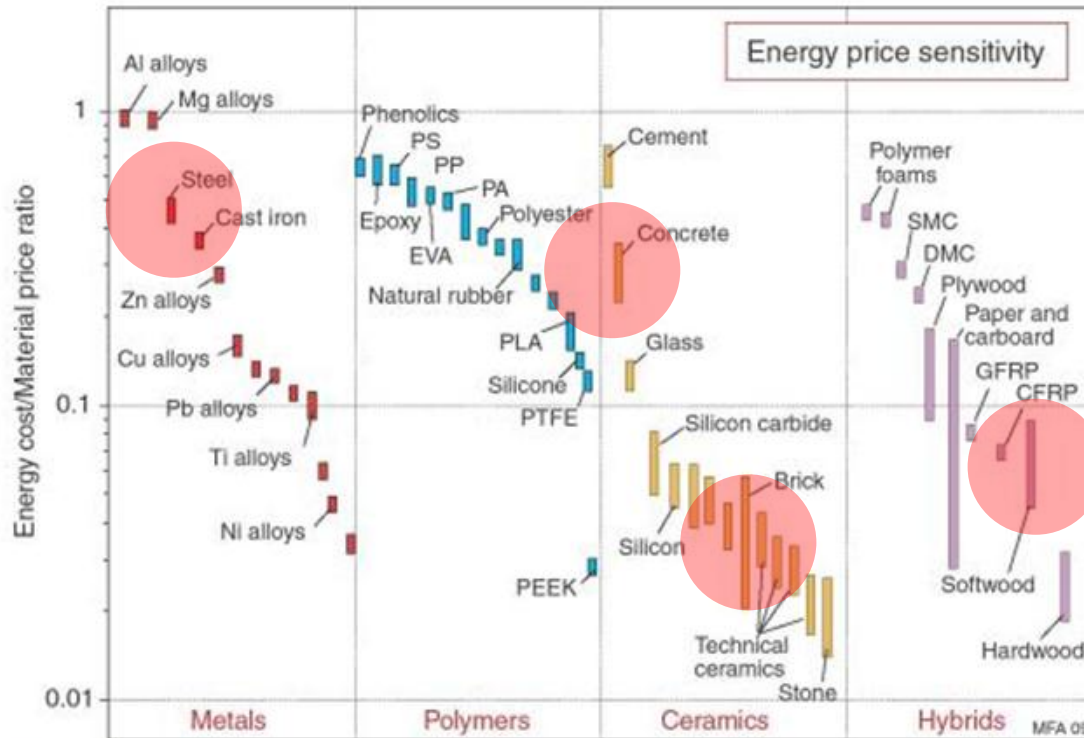
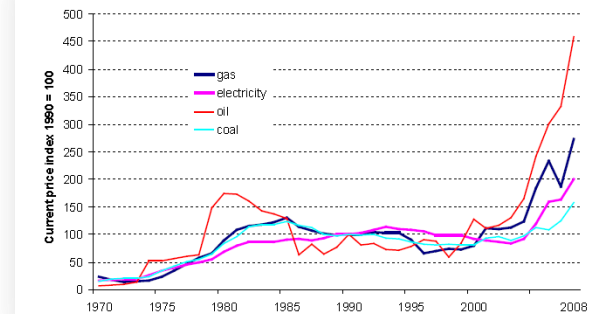
# Drivers – Self Legislation

- Annual CSR reporting
- BREEAM
- Waste Reduction (WRAP)
- Responsible Sourcing (BES 6001)
- Environmental Management Systems (ISO 14001)
- Life Cycle Assessment (CEN/TC 350, ISO 14040, PAS 2050, Envest etc)
- Construction Products Regulation will be introduced July 2013
  - *CE marking will include a new component 'Sustainable use of natural resources'*
  - *Introduction of CEN/TC 350 – Environmental Product Declaration (EPD)*



# Drivers – Energy Costs

Chart 8.6: UK coal, gas and electricity prices compared to oil



Energy cost  
represents 100% of  
material cost

Energy cost  
represents 10% of  
material cost

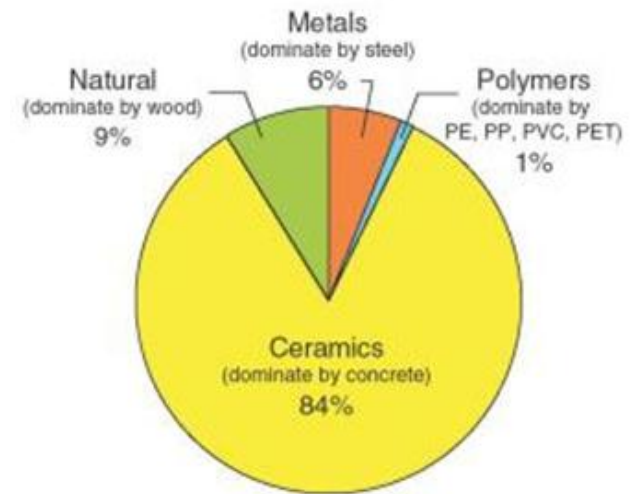
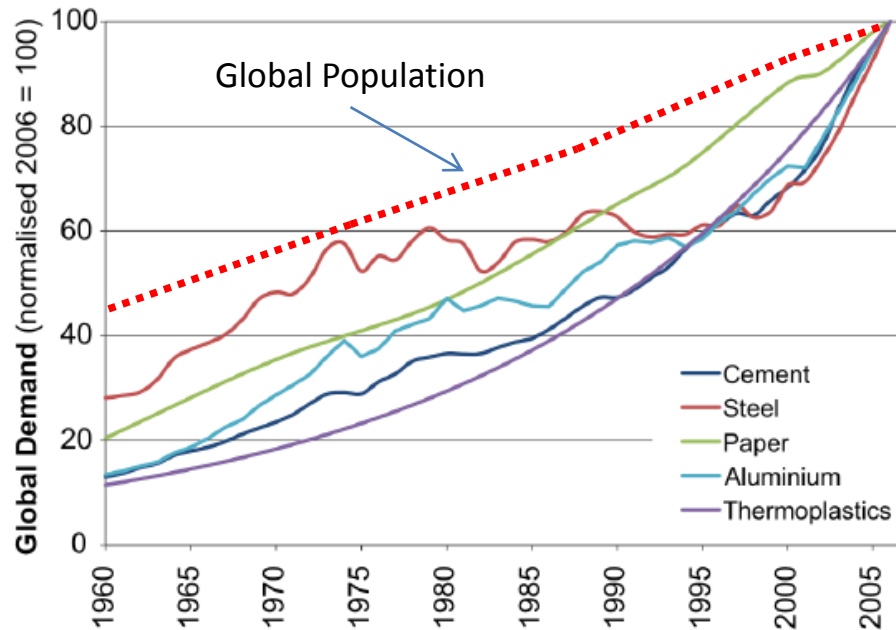
Energy cost  
represents 1% of  
material cost

Ref: 'Materials and the Environment' Mike Ashby

# Drivers – Resource Efficiency

## Are we being efficient with the materials we have?

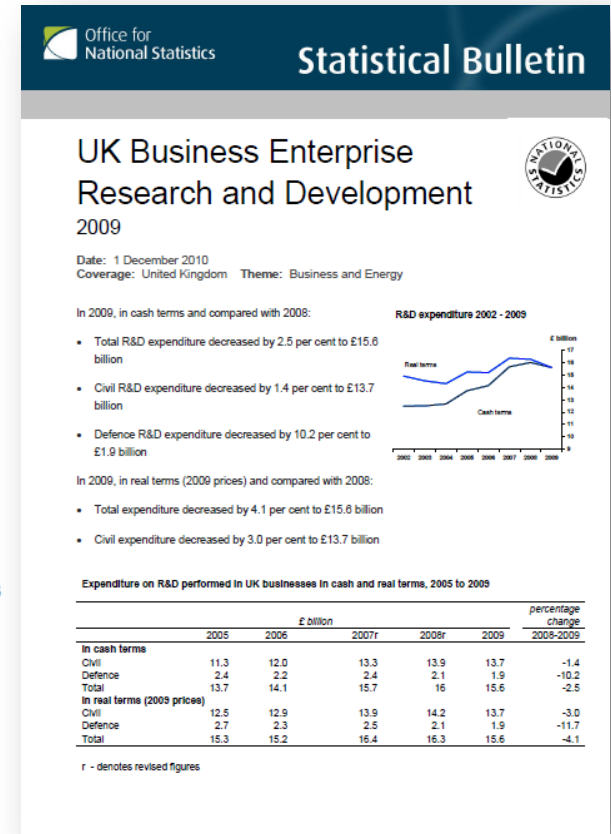
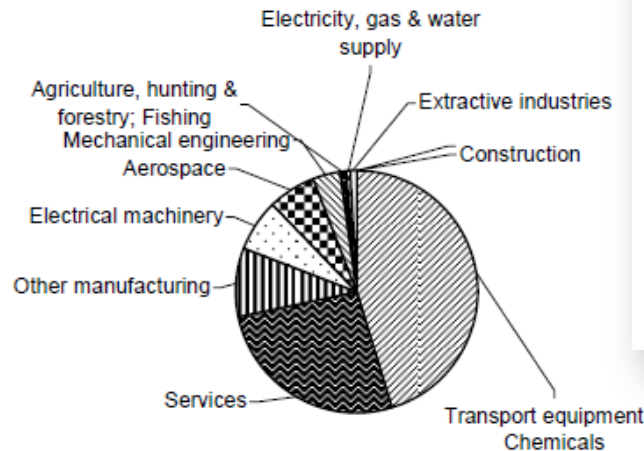
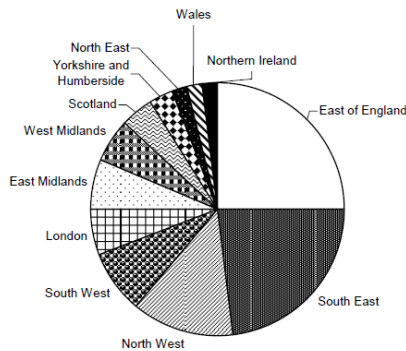
- 10 billion tonnes pa of engineering materials used globally
- 1.5t person pa, main components are concrete, wood, steel, asphalt, glass, brick
- Concrete is by far the dominant engineering material (factor 10) and responsible for some 5% of global CO2 emissions
- 10 billion tonnes pa of oil and coal used globally



Ref: 'Materials and the Environment' Mike Ashby

# Barriers – R&D Track Record

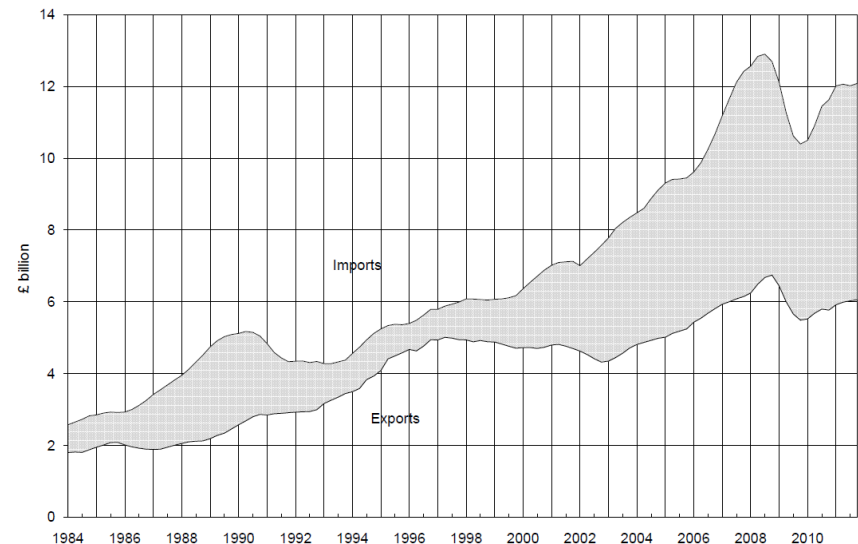
- 2009 investment in R&D
  - £4400m pharmaceutical
  - £1100m automotive
  - £140m agriculture
  - £18m construction



# Barriers – Import Reliance

- **UK 400mt construction materials used annually (2008)**
  - *1.5mt steel*
  - *100mt concrete*
  - *7.5mt timber*
- **UK has a trade deficit in construction materials/products (2011)**
  - *UK construction products market is £40bn annually*
  - *We import £12bn of construction products annually*
  - *We import £3.5bn from Germany and China*
  - *We export £1.5bn to Ireland and Germany*
  - *We import £650m of steel and export £475m*
  - *We import £110m of cement and export £45m*
  - *We import £135m of rebar and export £50m*
  - *We import £625m of timber*

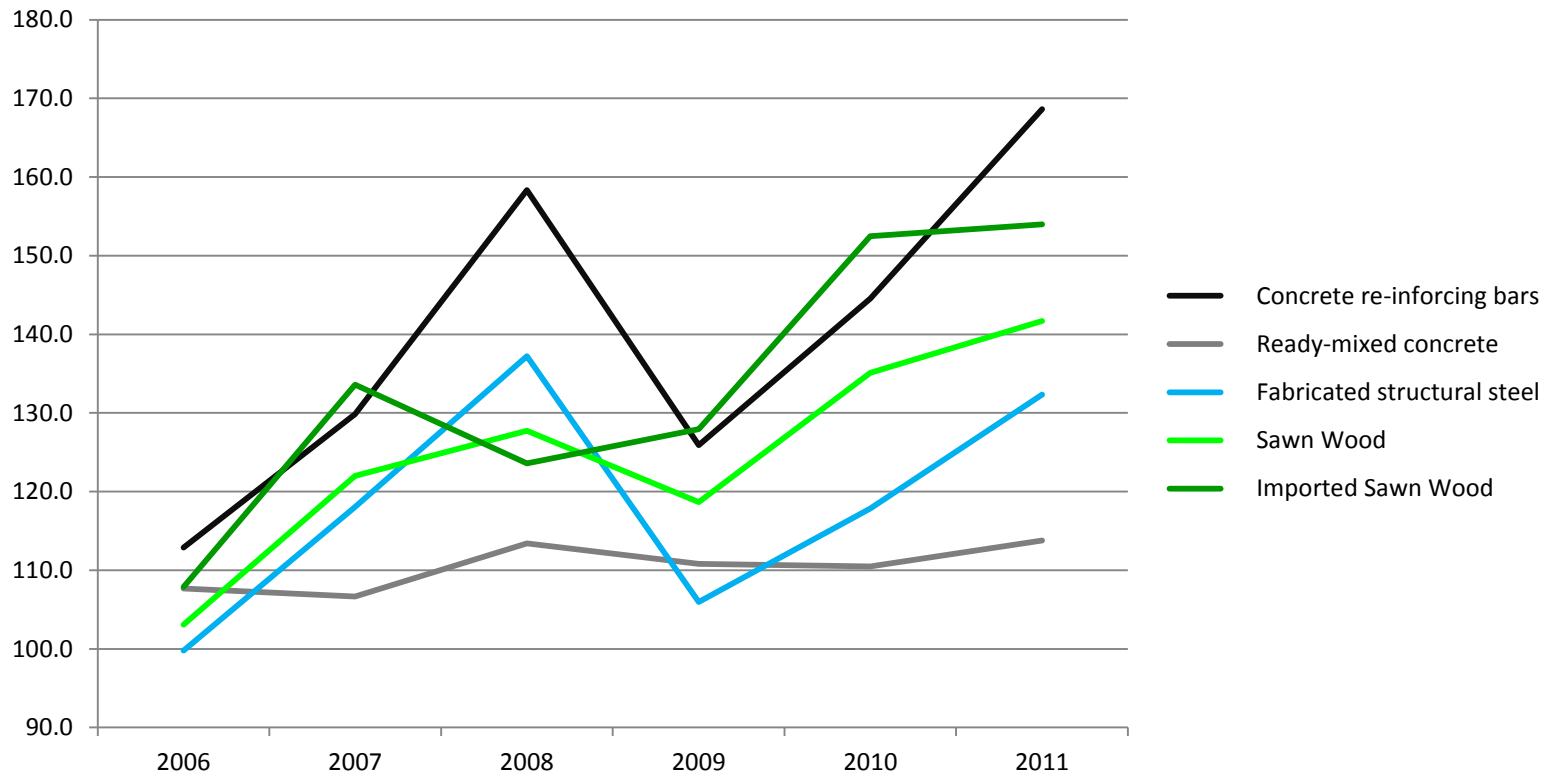
Comparison of Imports & Exports  
4-quarter moving totals



# Barriers – Global Markets

## Price indices history

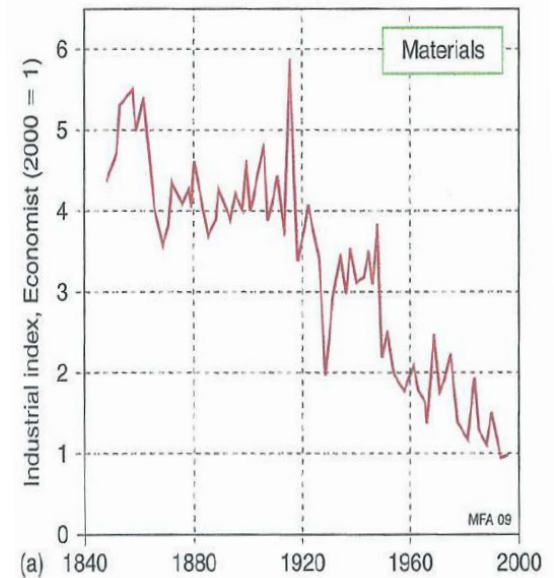
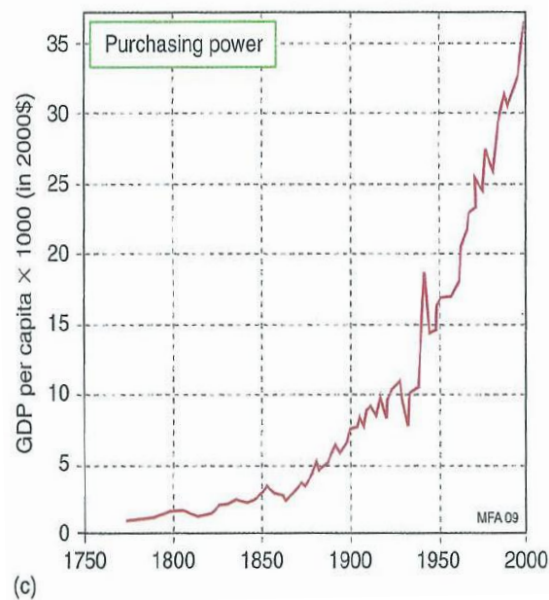
- [www.bis.gov.uk/analysis/statistics/construction-statistics/building-materials](http://www.bis.gov.uk/analysis/statistics/construction-statistics/building-materials)





# Barriers – Costs

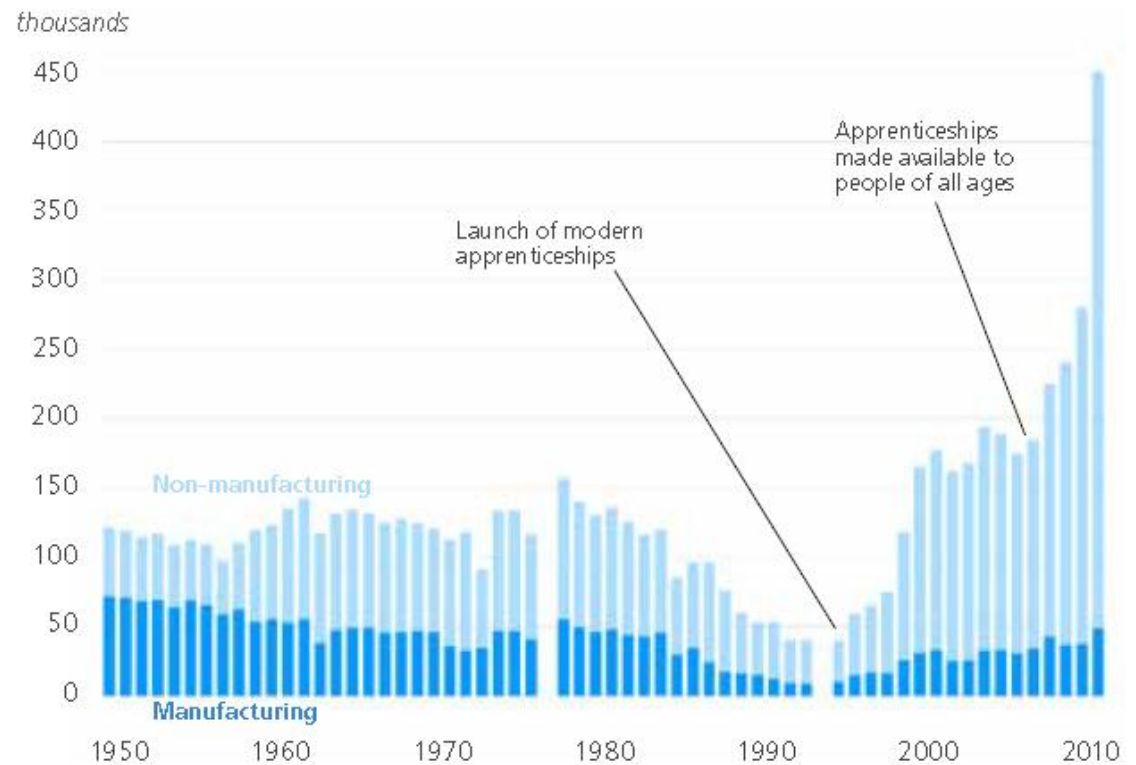
- Increasing cost of thought encourages inefficient design
- Falling cost of materials discourages lean design



Ref: 'Materials and the Environment' Mike Ashby

# Barriers – Skills

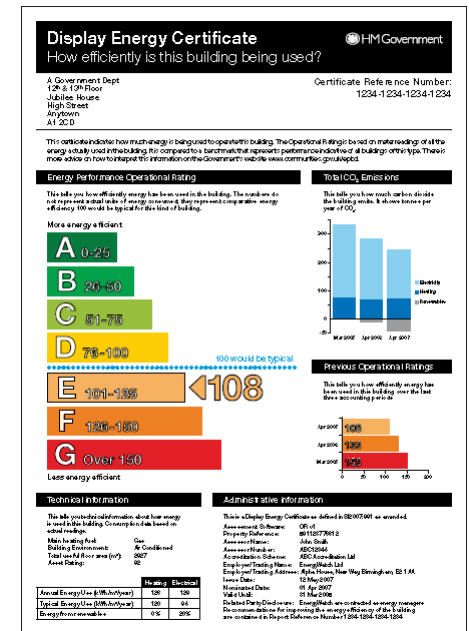
- **Higher Education**
  - *Option of first choice*
  - *Government 50% target*
- **Vocational Education**
  - *Seen as second choice*
  - *Shift to non-craft skills*



Ref: 'Olympic Britain' House of Commons

**smithandwallwork**  
engineers

- *EPC's and DEC's*
- *Post Occupancy Evaluation (POE)*
- *Occupier Education*
- *Occupier Behaviour*
- *Monitoring*
- *Maintenance*
- *Building MOT....*



# Options – Materials

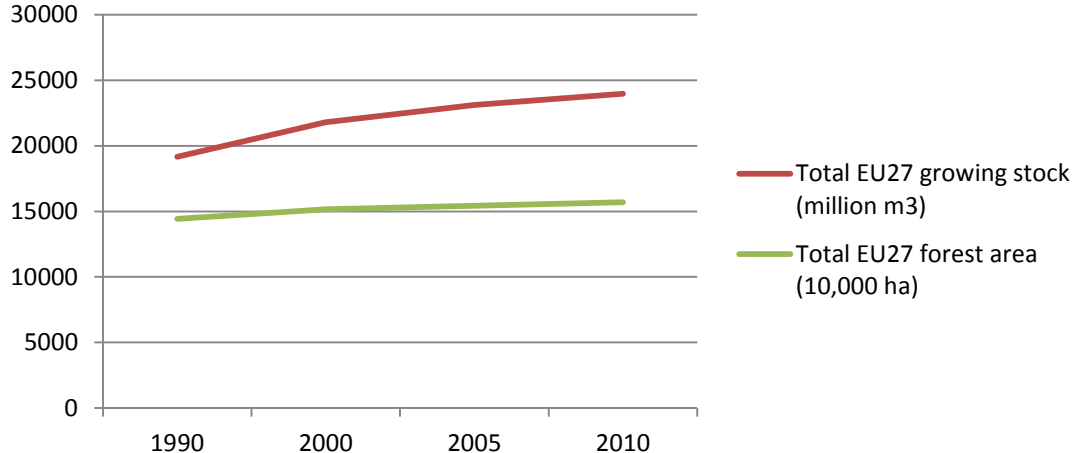


“The best friend of man is the tree. When we use the tree respectfully and economically, we have one of the greatest resources on the earth”

*Ref: Frank Lloyd Wright*

# Options – Materials

- **EU27 forests are growing year on year**
  - *More than 100 million m<sup>3</sup> of growth not harvested*
- **What could we do with 100 million m<sup>3</sup> of wood each year?**
  - *Build 3 million new homes?*
  - *Build 250 million m<sup>2</sup> of commercial buildings?*



# Options - Summary

- **Credibility**
  - *Industry has to deliver and maintain sustainable buildings that are proven to work.*
  - *Industry has to create a 'new professionalism' – for society to respect the skill and craft involved in construction.*
- **R&D**
  - *Deeper understanding of construction and the true impact of the materials and products used....not just CO2....water, ecology, skills, communities etc.*
  - *Deeper understanding of how buildings are used and perform.*
- **Skills**
  - *Invest in vocational education and apprenticeships.*
  - *Re-introduce guilds*

# References

## Forests and Timber

- *'Combating Climate Change - a role for UK forests'* published by UK Forestry Commission
- *'State of the World's Forests 2011'* published by Food and Agriculture Organisation
- *'Independent Panel on Forestry'* published by DEFRA

## Embodied Carbon in Construction

- *'Embodied Carbon – The Inventory of Carbon and Energy'* published by BSRIA
- *'A short guide to embodied carbon in building structures'* published by IStructE
- *'A guide to understanding the embodied impacts of construction products'* published by the CPA
- *'Methodology to calculate the embodied carbon of materials'* published by RICS

