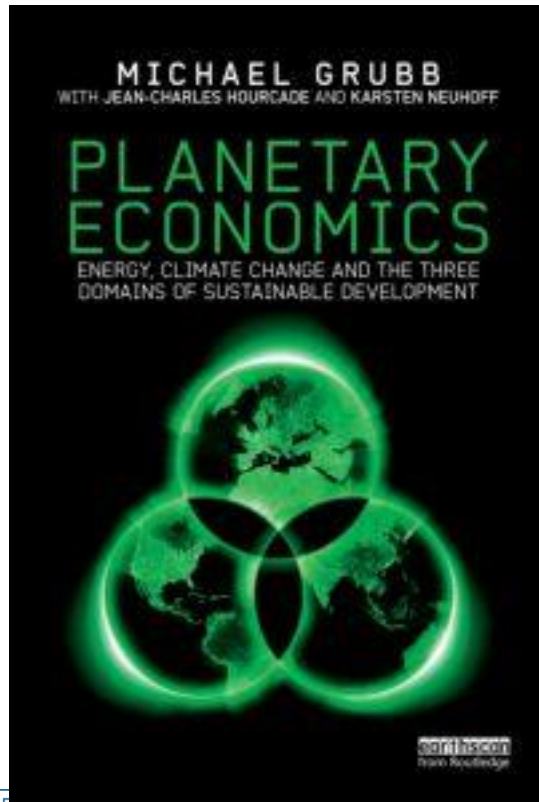


*Some thoughts drawing upon book*

*“Planetary Economics: Energy, Climate Change and the Three Domains of Sustainable Development*



**Remarks to Technical workshop on policy approaches for industrial sector in the climate-energy interface**

**IEA, Paris, 16<sup>th</sup> January 2015**

**Michael Grubb**

Professor of International Energy and Climate Change Policy, UCL

Senior Advisor, Sustainable Energy Policy, Ofgem

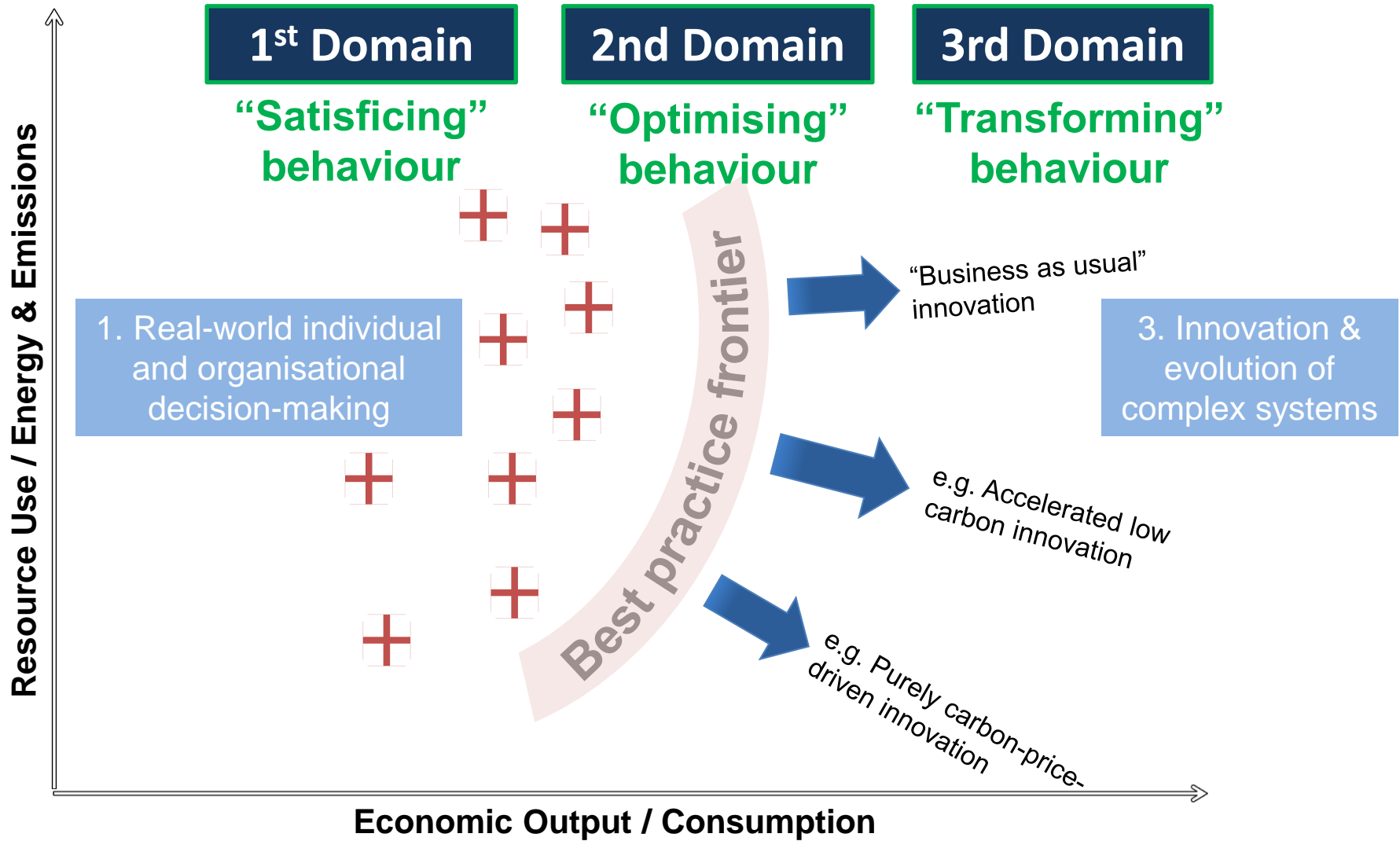
Editor-in-Chief, *Climate Policy* journal

## Differentiation and integration of policy approaches ..

- An introduction to the high-level intellectual framework
  - The Three Domains and Three Pillars of Policy
- Some indicative data on industry?
- Expanding the horizons
- Policy Integration



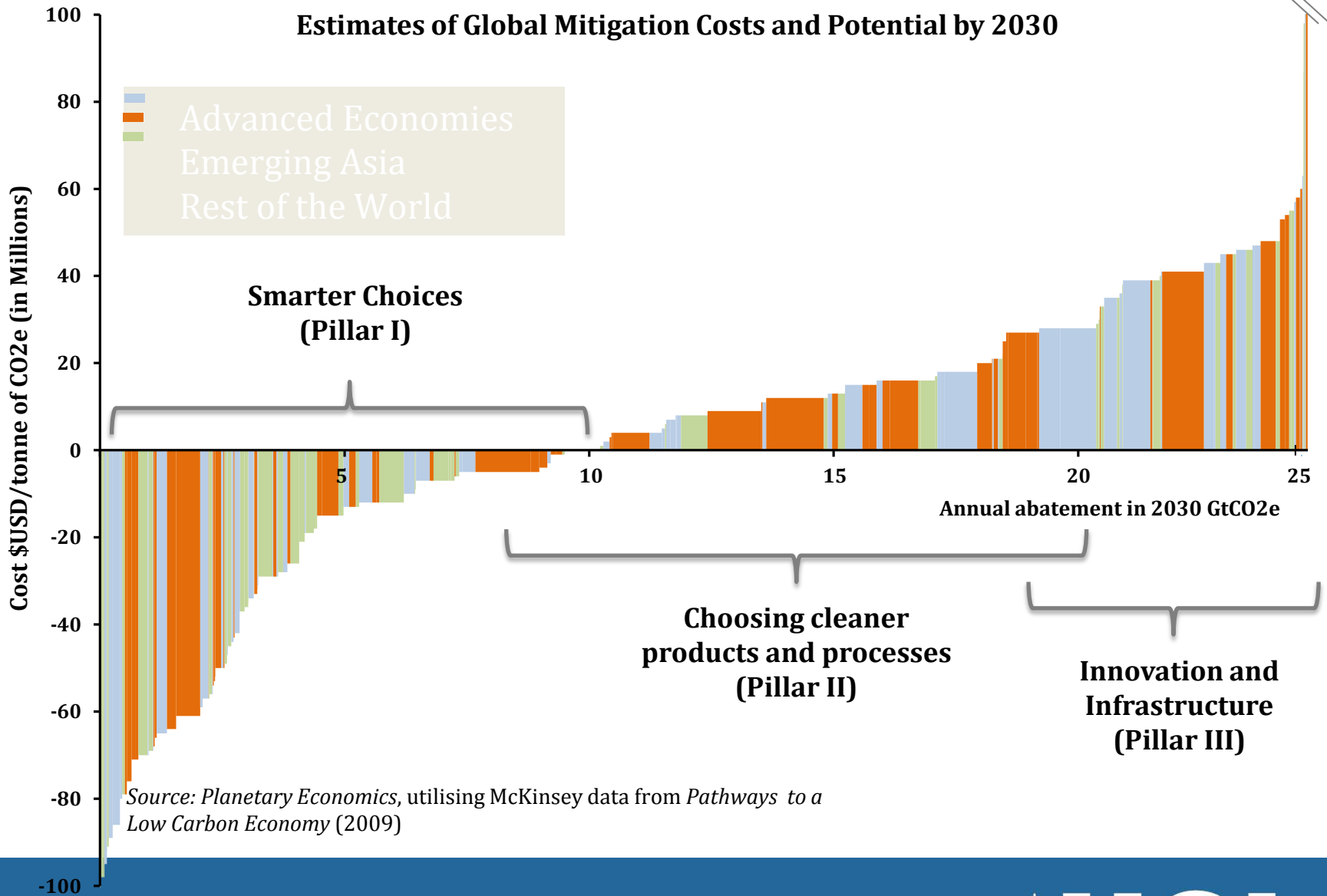
# Three Domains – an Economic Interpretation



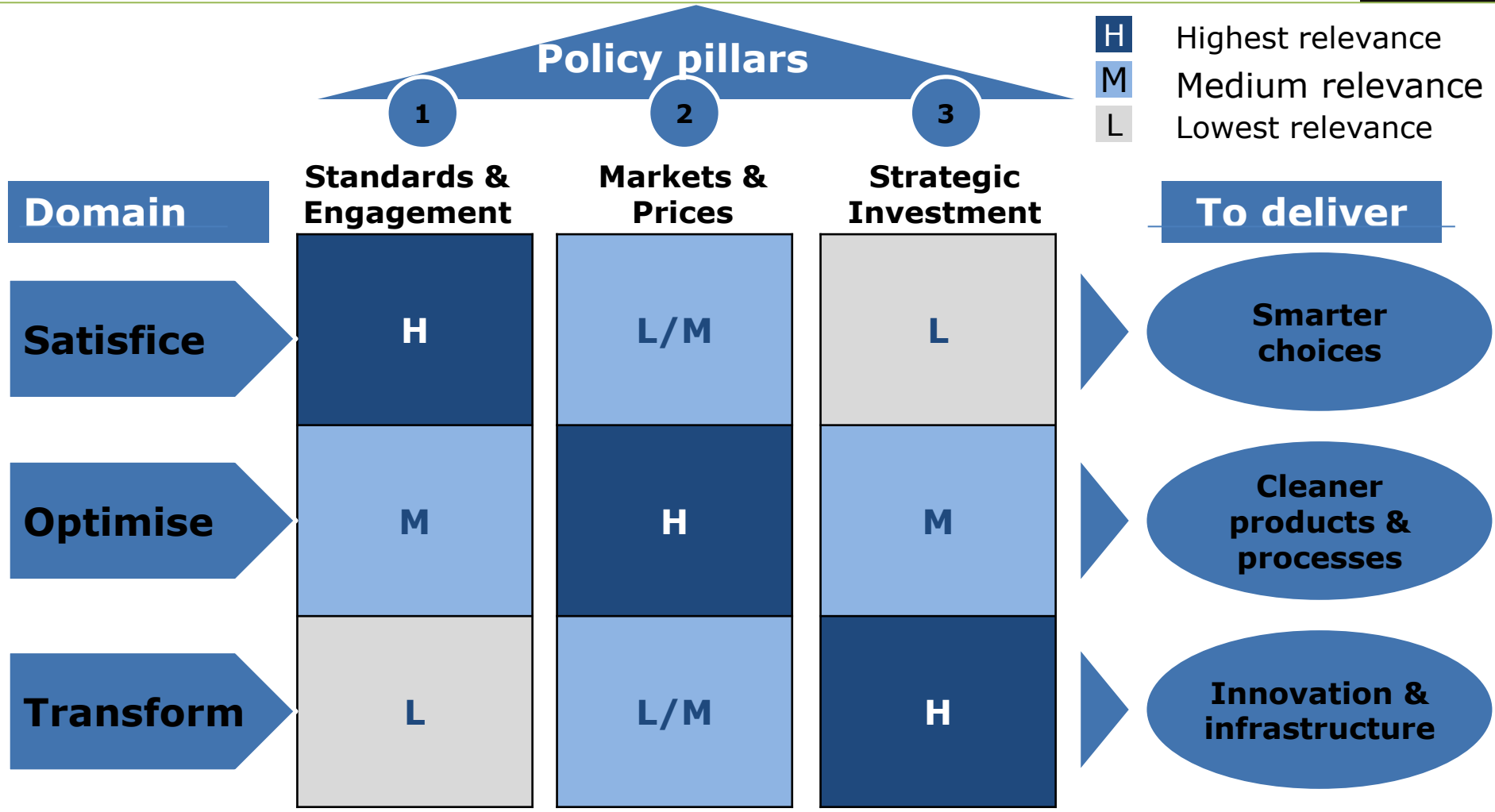
PE Fig. 2 -3 b Resource trade-offs with the other two domains

# Three realms of abatement opportunities

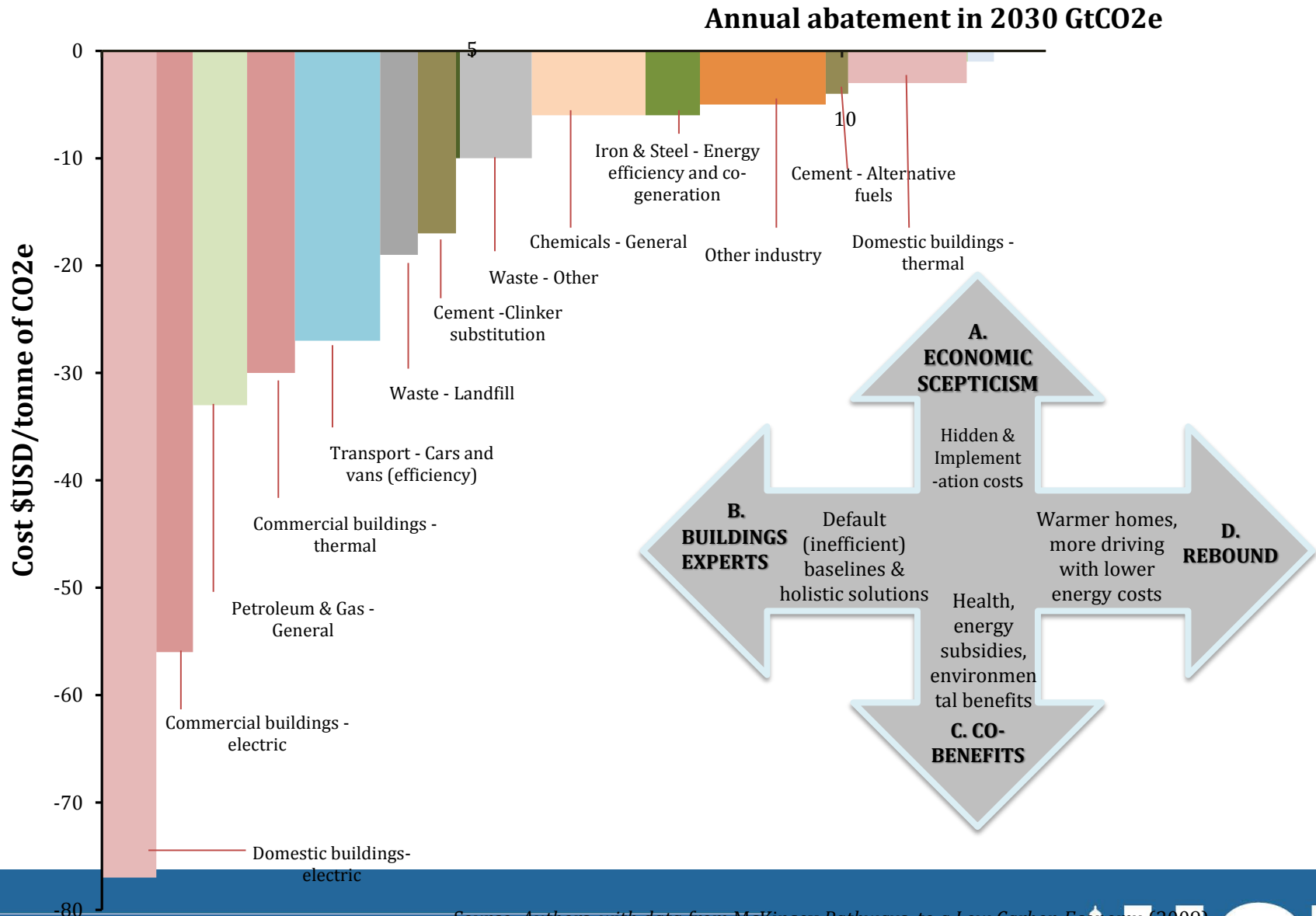
- Where do industry sector opportunities lie? ..



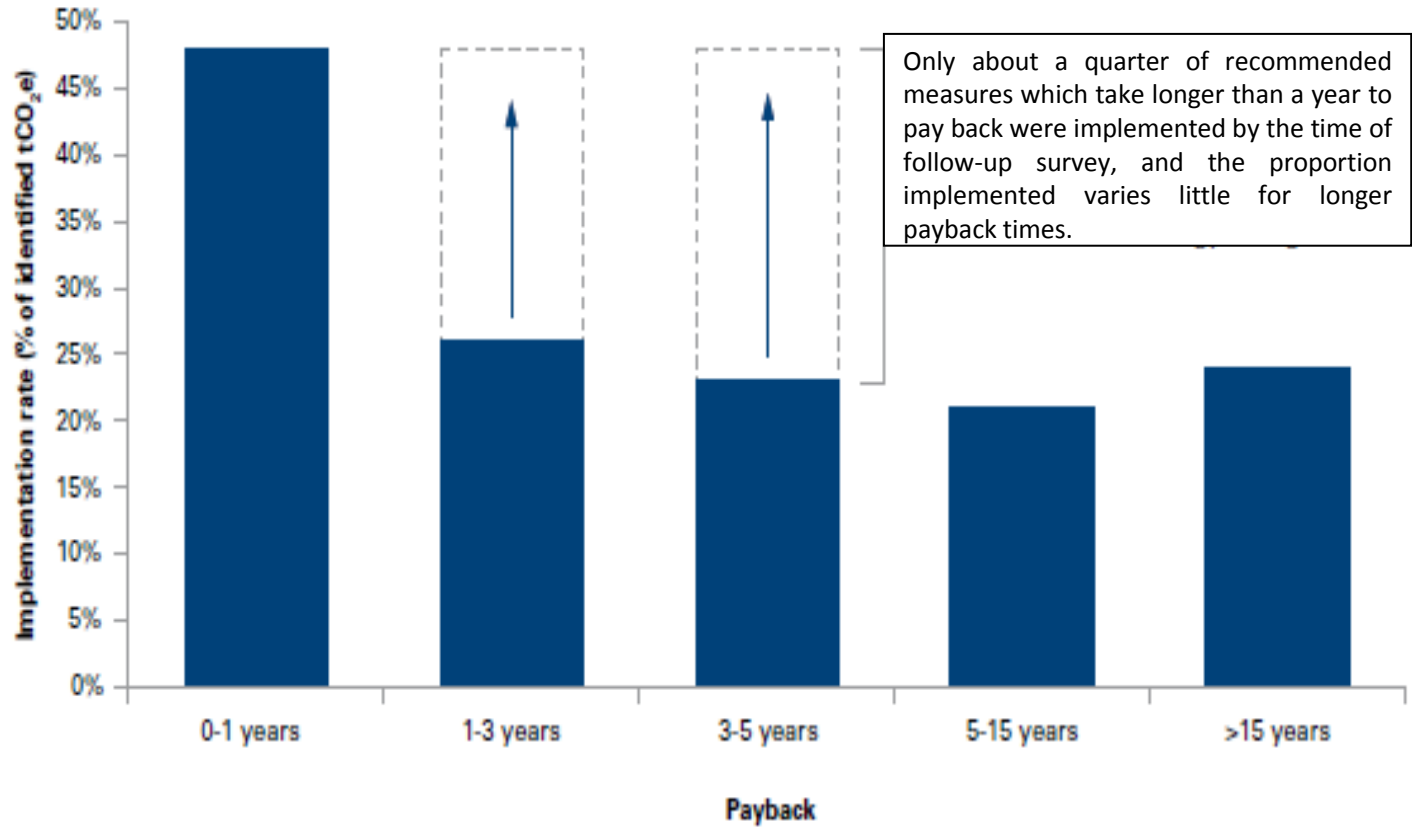
# Solutions need to harness corresponding policy pillars



Significant industrial potential appears to exist at *slightly cost-effective* when measured at a common (low) discount rate ...

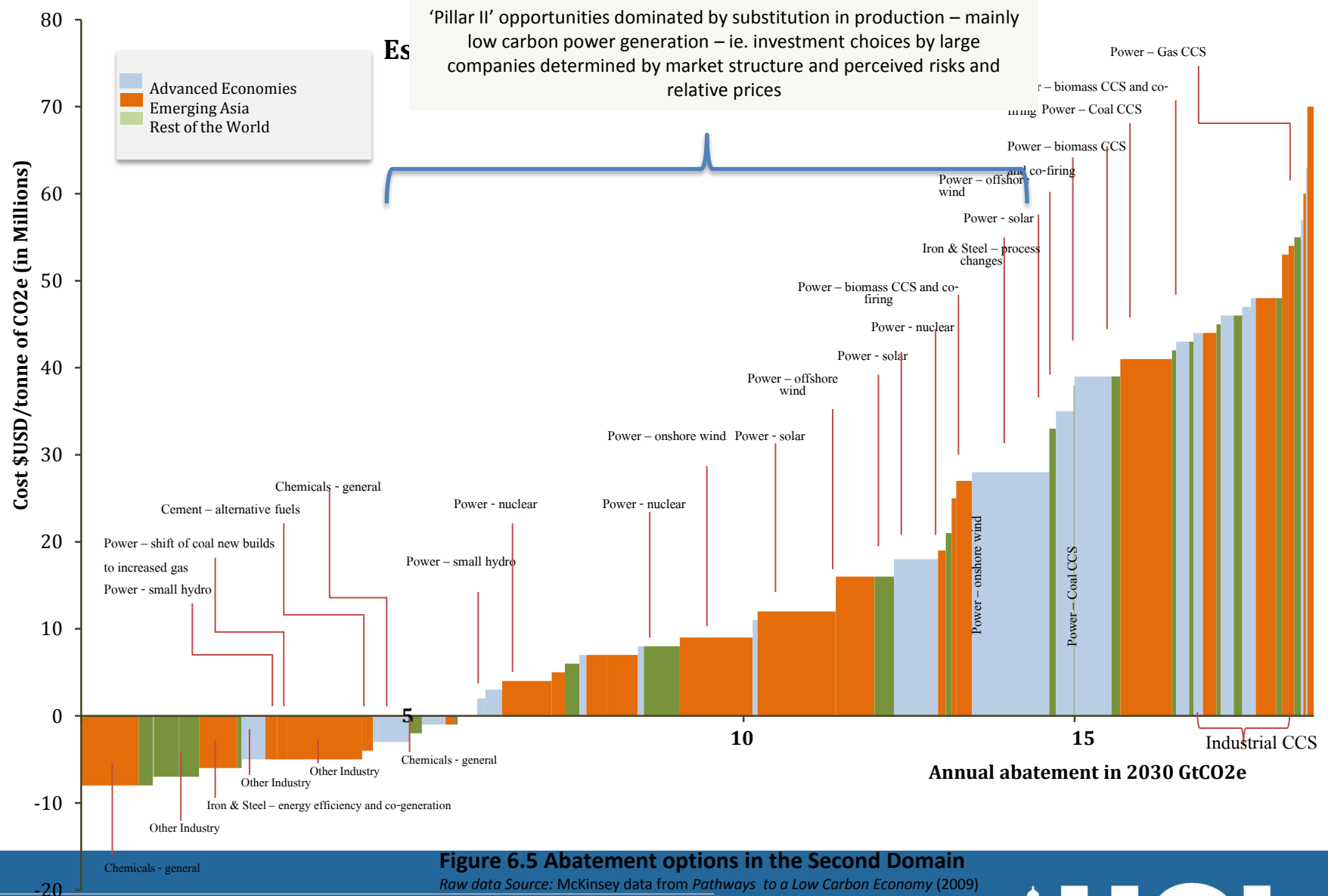


# ... UK Carbon Trust experience indicated continuing potentials particularly but not exclusively in less energy-intensive businesses



**Figure 4-4 Proportion of Carbon Trust recommendations to UK business implemented: dependence on pay-back period**  
 Note: The graph shows combined responses of public, services, retail and chemical sector regarding recommendations identified in 2006-2007.  
 Source: Source: Carbon Trust, based on Carbon Management/Energy Efficiency Advice Close-out database (personal communication)

# Global “modest positive cost” potential dominated by power generation far more than industry or buildings

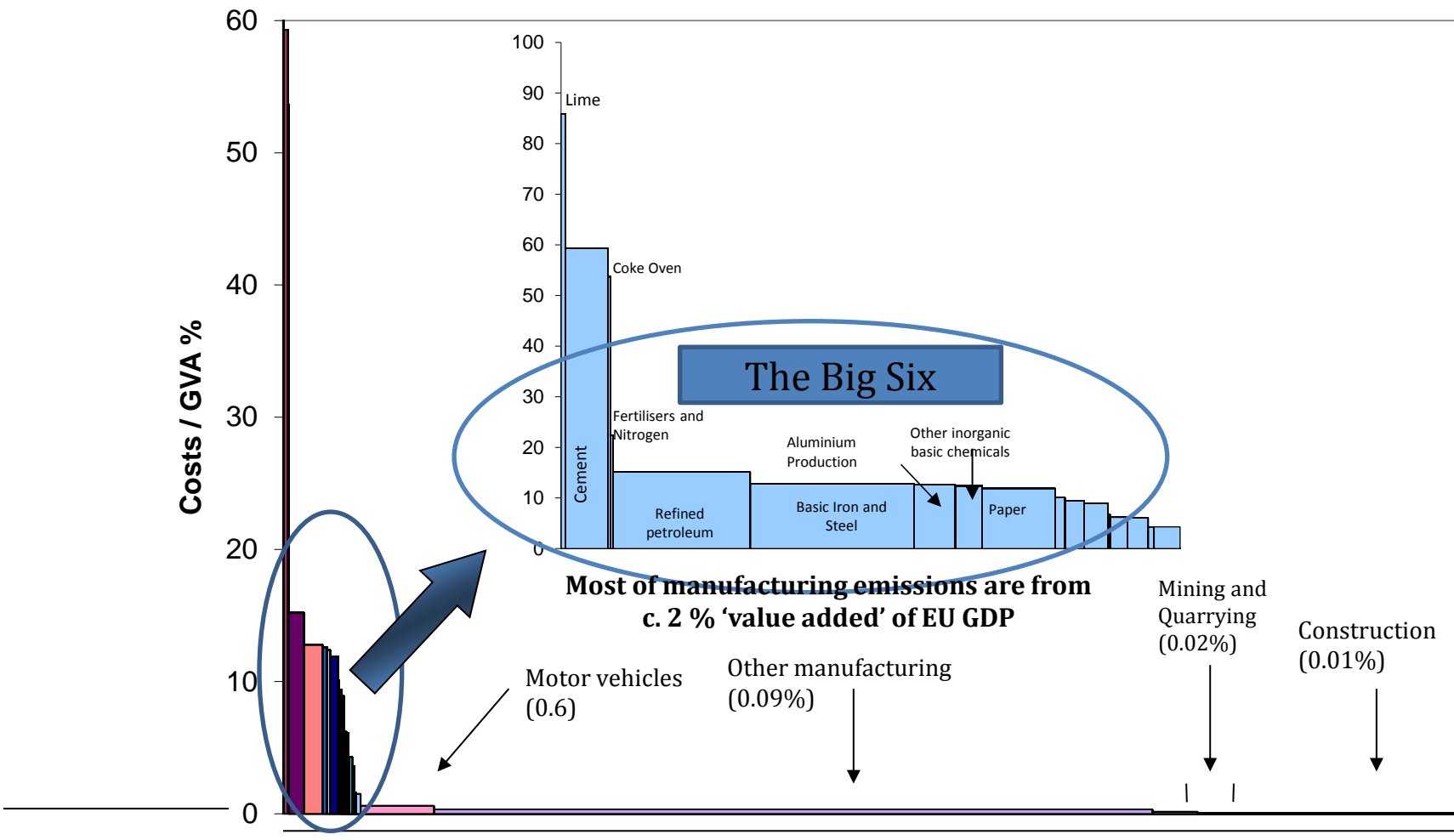


**Figure 6.5 Abatement options in the Second Domain**

Raw data Source: McKinsey data from *Pathways to a Low Carbon Economy* (2009)



# In terms of economic-carbon characteristics, need to distinguish huge differences between energy intensives and others



**Most of manufacturing emissions are from c. 2% 'value added' of EU GDP**

**41% of EU 'value added' (GDP) in manufacturing industry + utilities**

Figure 8-4 Impact of carbon pricing on EU industry sectors and their share of the EU economy

But a word of caution – key opportunities may exist outside of production zone – in recycling, and product characteristics

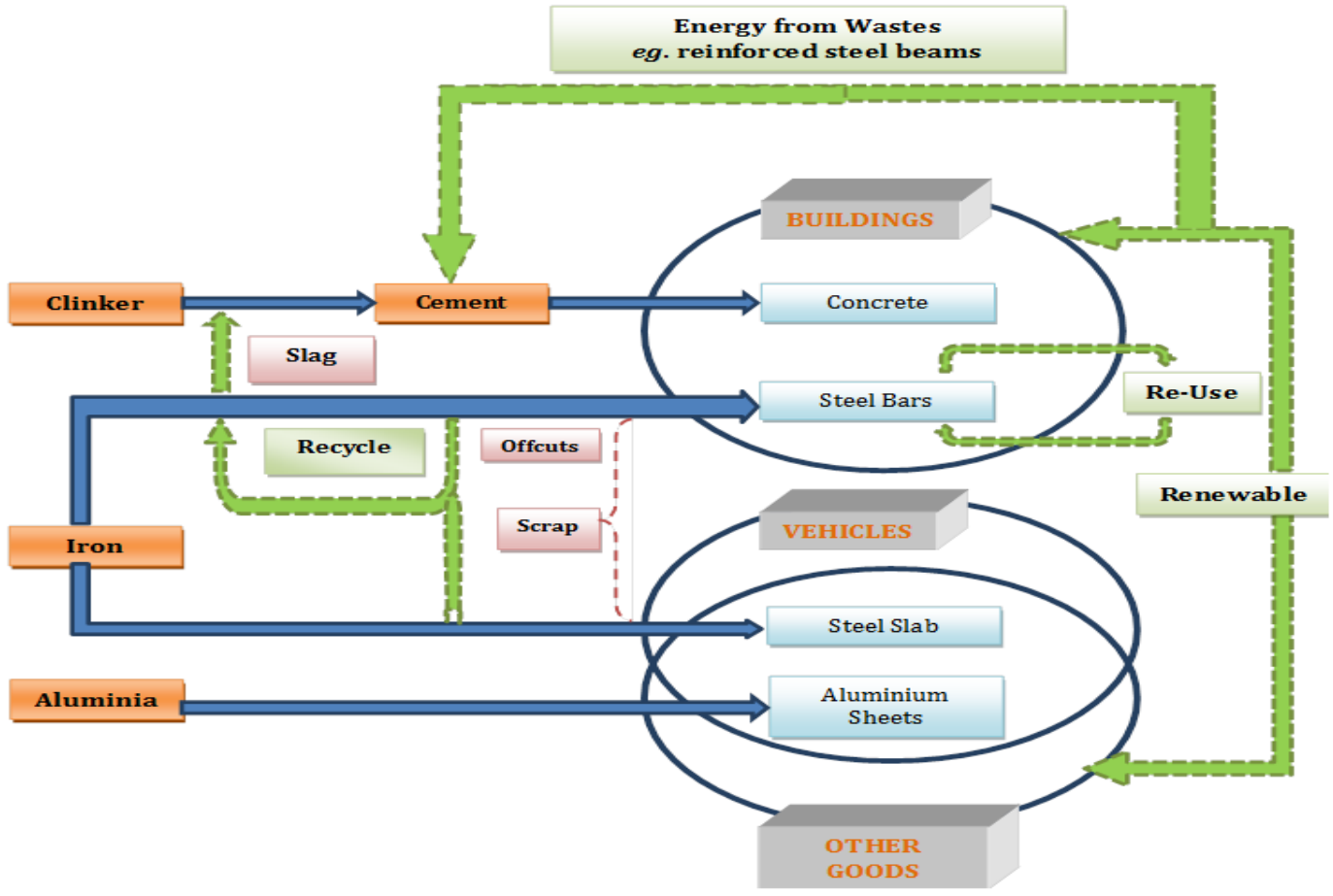


Figure 3-6 Opportunities in energy-intensive supply chains: From primary materials to products.  
 Source: Authors

Eg. in both buildings & vehicles, balance is moving towards embodied energy ... first or second domain ...?

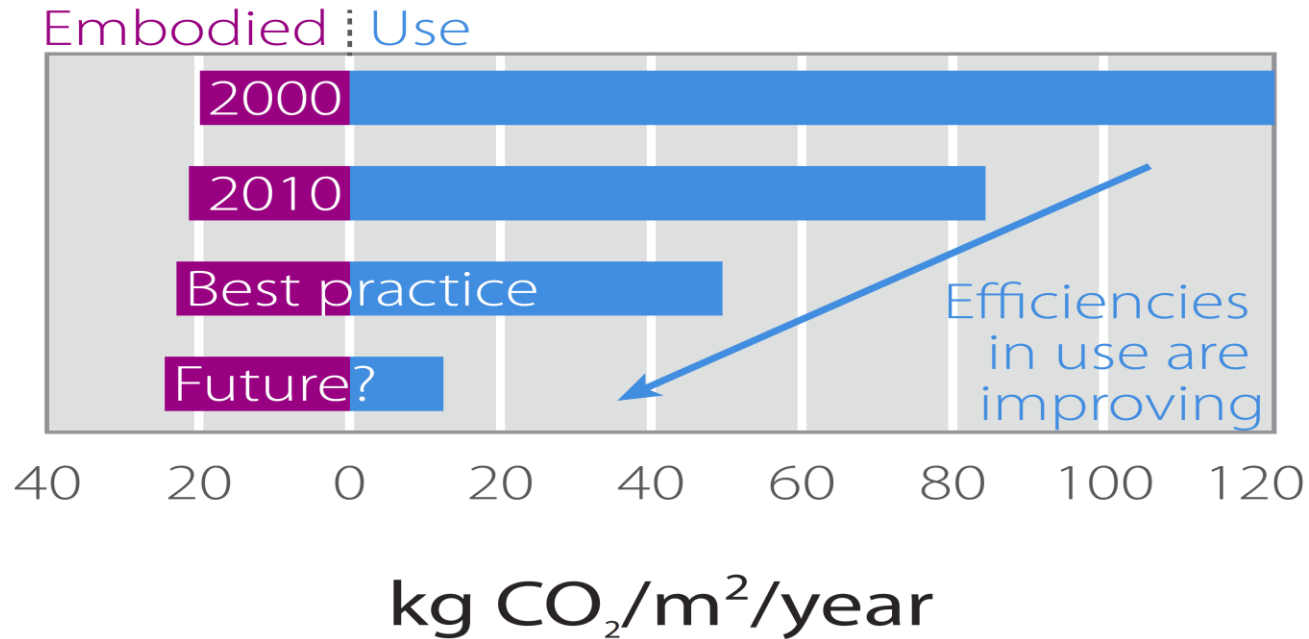


Figure 5-11 Embodied energy in buildings

Source: Allwood and Cullen (2012)

# Taking energy / resource efficiency much further is likely to require digging into dimensions of use and embodied energy



Consumer-driven energy & emissions			
	<u>Efficiency of Stock</u>	<u>Use</u>	<u>Embodied</u>
<b>Buildings</b>	<ul style="list-style-type: none"> <li>•Insulation</li> <li>•Integrated heating and cooling system.</li> <li>•Efficient appliances</li> </ul>	<ul style="list-style-type: none"> <li>•Closing windows while heating or cooling system is operating</li> </ul>	<ul style="list-style-type: none"> <li>•Construction materials</li> <li>•Construction and transport</li> </ul>
<b>Industry</b>	<ul style="list-style-type: none"> <li>•Efficiency of machinery used</li> <li>•Modes of transporting goods</li> </ul>	<ul style="list-style-type: none"> <li>•Efficient use of materials</li> <li>•Heat cascading</li> <li>•Maintenance</li> </ul>	<ul style="list-style-type: none"> <li>•Raw materials used: extraction, transport and processing</li> <li>•Leakage from</li> </ul>
<b>Transport</b>	<ul style="list-style-type: none"> <li>•Vehicle efficiency</li> </ul>	<ul style="list-style-type: none"> <li>•Mode of transport</li> <li>•Tyre pressure</li> <li>•Maintenance.</li> </ul>	<ul style="list-style-type: none"> <li>•Raw materials in vehicle construction</li> <li>•Vehicle disposal</li> </ul>

**Figure 5-10 The scope of consumer-driven emissions**

*Note that these categorisations of the consumers' part are not entirely independent of one another. For example the emissions from the industrial process make up the embodied emissions of consumer goods and services.*

*Source: Authors*

.... Or Third? We are seeking radical innovation in sectors with relatively low innovation intensity ..

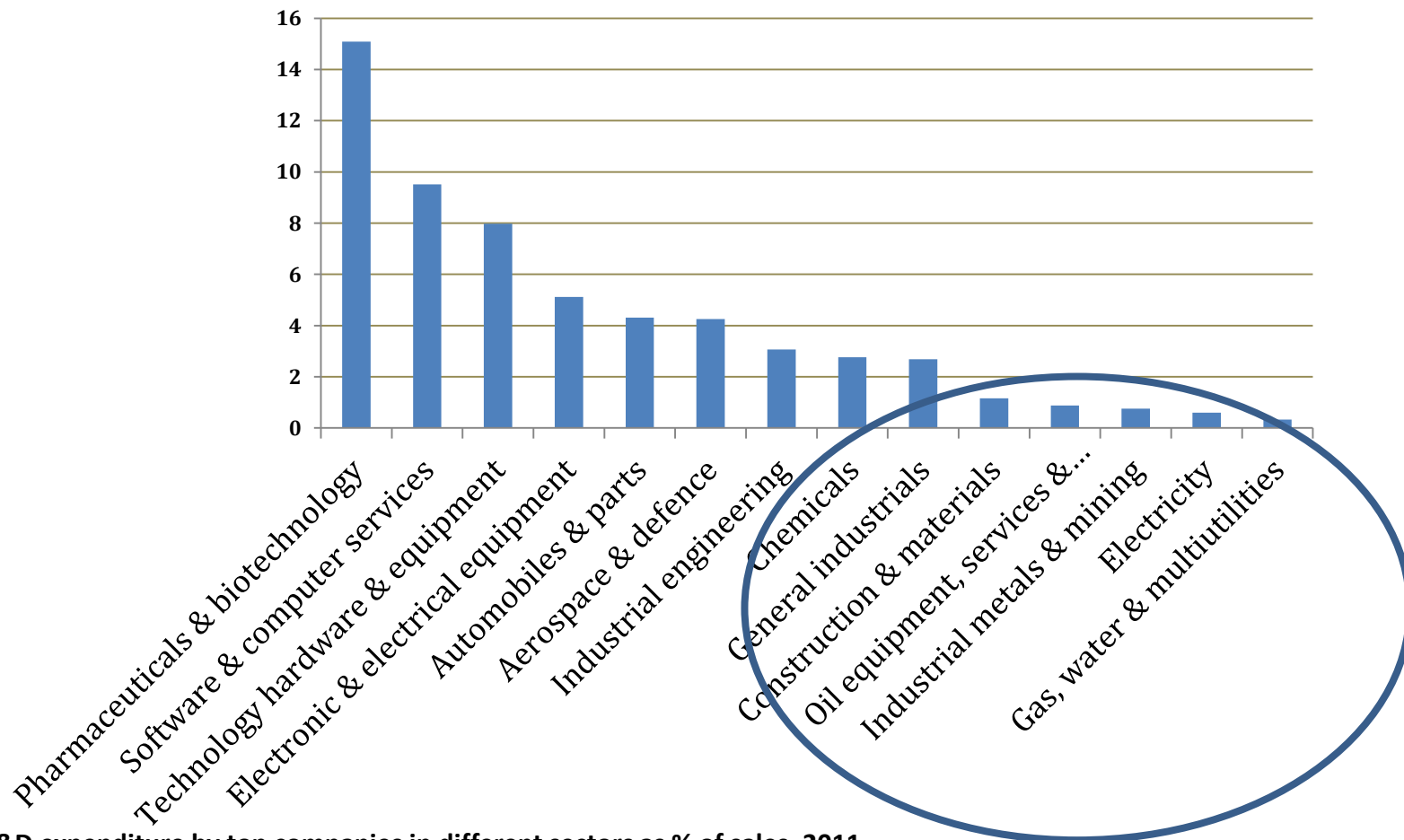
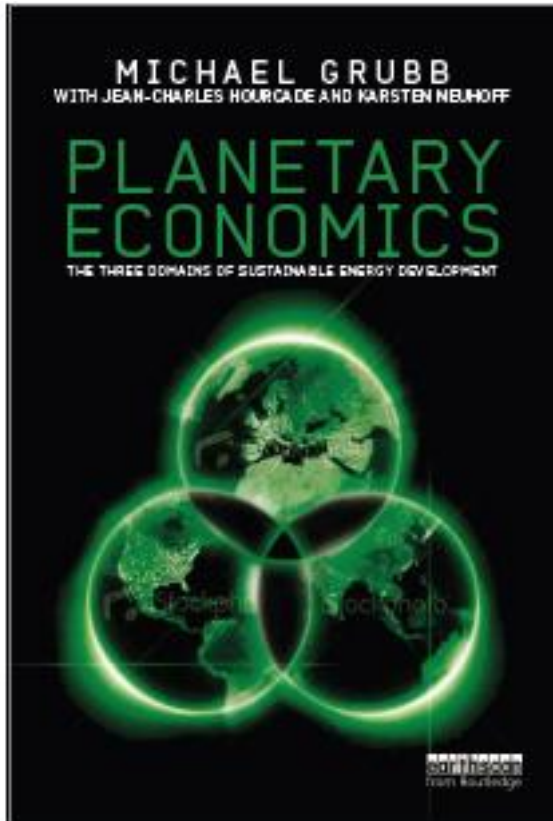


Fig.9.3 R&D expenditure by top companies in different sectors as % of sales, 2011

Data source: EU Joint Research Centre on Industrial Investment and Innovation, R&D Scoreboard 2012, <http://iri.jrc.europa.eu/scoreboard12.html>

## An integrating approach to climate policy



- Nature of the challenge
- The Three Domains and Three Pillars of Policy
- System key components
- Pillar I: Standards and Engagement
- Pillar II: Markets and Pricing
- Pillar III: Strategic investment
- Policy Integration
- Joint Benefits
- The Economics of Changing course

# Need to understand the *complementary* economic roles of the different pillars

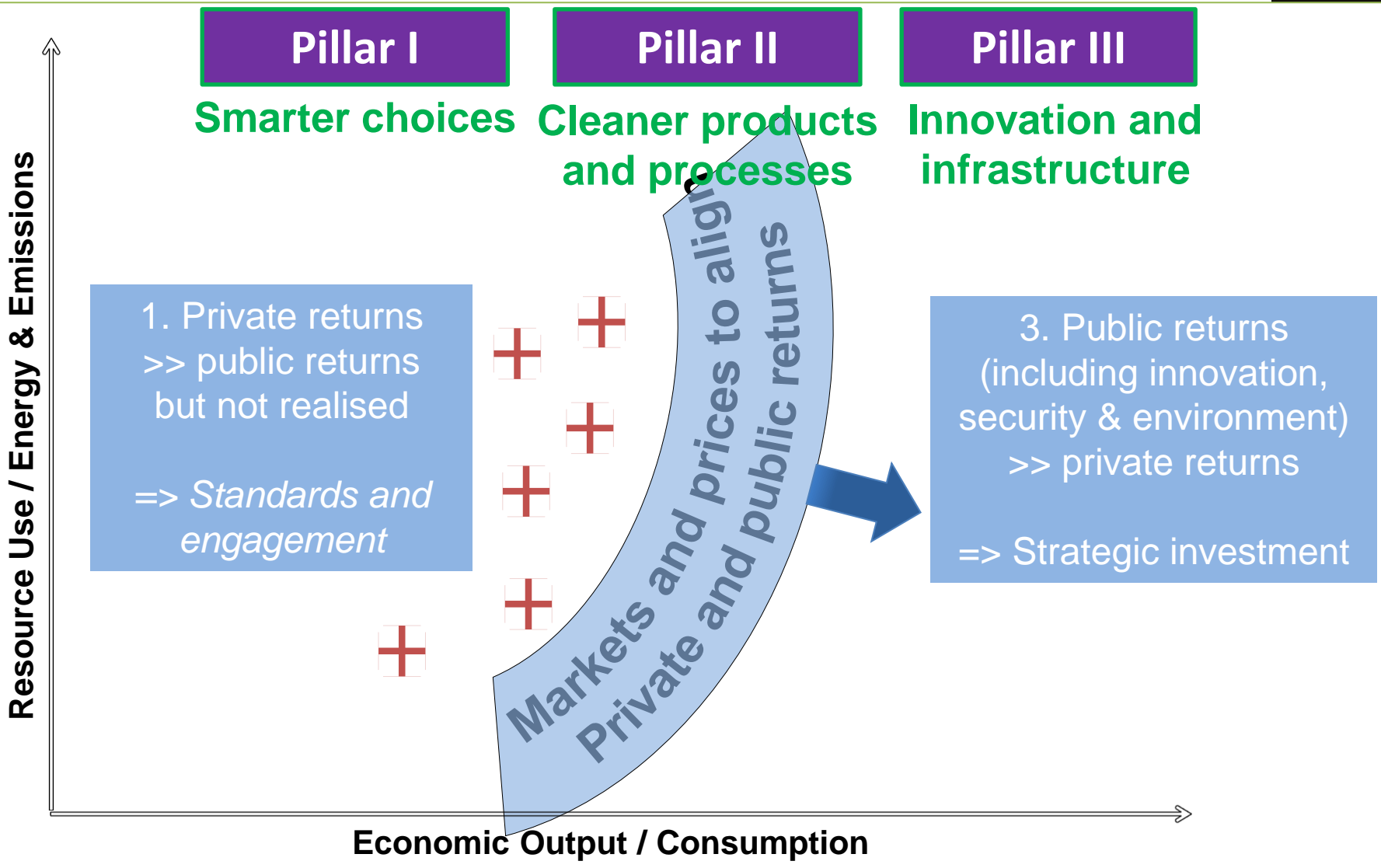


Fig. 12.3 Public and private returns in the 3 domains  
UCL Institute for Sustainable Resources

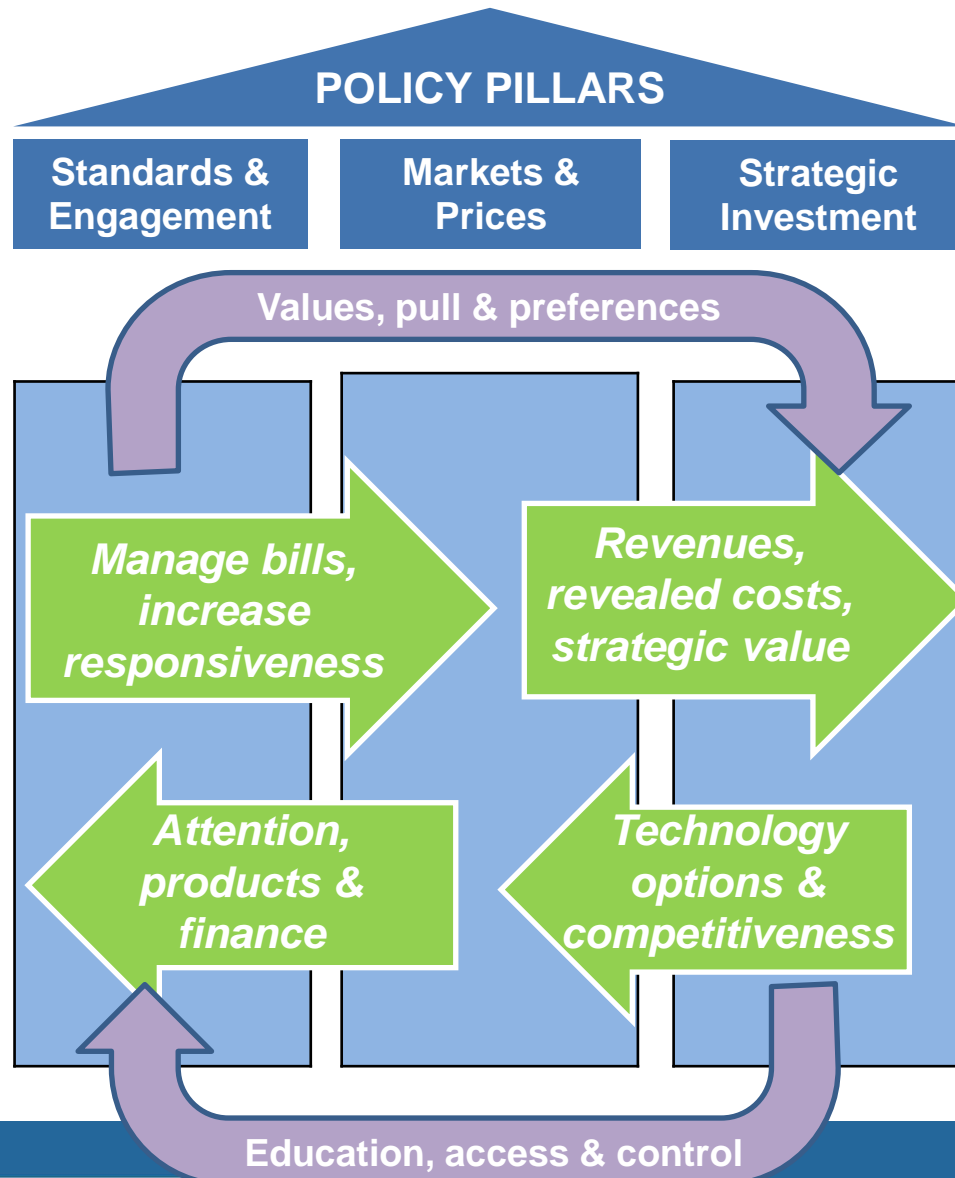
No pillar on its own can credibly solve the problem  
– *nor offers a politically stable basis for policy*



- Energy efficiency policy on its own limited by:
  - Scale of intervention required
  - Growing scale satisficing behaviour
  - .... Leading to large Rebound effects
- Pricing on its own limited by:
  - Blunt nature of impacts First and Third Domain impacts
  - Rising political resistance to rising fuel bills
  - .. and competitiveness concerns
- Innovation on its own limited by:
  - Lack of demand pull incentives
  - Scale & risks of investment costs
  - Political failures in absence of rising market feedbacks



# Changing course requires a sustained package - the key is to integrate and synergise across all three domains



# Planetary Economics:

## Energy, Climate Change and the Three Domains of Sustainable Development



### 1. Introduction: Trapped?

### 2. The Three Domains

#### Pillar 1

- **Standards and engagement *for* smarter choice**
- 3: Energy and Emissions – Technologies and Systems
- 4: Why so wasteful?
- 5: Tried and Tested – Four Decades of Energy Efficiency Policy

#### Pillar II

- **Markets and pricing *for* cleaner products and processes**
- 6: Pricing Pollution – of Truth and Taxes
- 7: Cap-and-trade & offsets: from idea to practice
- 8: Who's hit? Handling the distributional impacts of carbon pricing

#### Pillar III

- **Investment and incentives for innovation and infrastructure**
- 9: Pushing further, pulling deeper
- 10: Transforming systems
- 11: The dark matter of economic growth

### 12. Conclusions: Changing Course

MICHAEL GRUBB  
WITH JEAN-CHARLES HOURCADE AND KARSTEN NEUHOFF

# PLANETARY ECONOMICS

ENERGY, CLIMATE CHANGE AND THE THREE DOMAINS OF SUSTAINABLE DEVELOPMENT



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<http://climatestrategies.org/projects/planetary-economics/>

for information and register of related events.