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

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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

1st Domain
“Satisficing” behaviour

2nd Domain
“Optimising” behaviour

3rd Domain
“Transforming” behaviour

1. Real-world individual and organisational decision-making

“Business as usual” innovation

e.g. Accelerated low carbon innovation

e.g. Purely carbon-price-driven innovation

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

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Three realms of abatement opportunities
- Where do industry sector opportunities lie? ..

Estimates of Global Mitigation Costs and Potential by 2030

- Advanced Economies
- Emerging Asia
- Rest of the World

Smarter Choices (Pillar I)
Choosing cleaner products and processes (Pillar II)
Innovation and Infrastructure (Pillar III)

Solutions need to harness corresponding policy pillars

Policy pillars

1. Standards & Engagement
   - Highest relevance (H)
   - Medium relevance (M)
   - Lowest relevance (L)

2. Markets & Prices
   - H
   - M
   - L/M

3. Strategic Investment
   - M
   - H
   - L

To deliver

- Smarter choices
- Cleaner products & processes
- Innovation & infrastructure

Domain

- Satisfice
- Optimise
- Transform

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

<table>
<thead>
<tr>
<th>Industry/Activity</th>
<th>Annual Abatement in 2030 GtCO2e</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petroleum &amp; Gas - General</td>
<td>10</td>
</tr>
<tr>
<td>Commercial buildings - thermal</td>
<td>10</td>
</tr>
<tr>
<td>Cement - Clinker substitution</td>
<td>5</td>
</tr>
<tr>
<td>Waste - Landfill</td>
<td>5</td>
</tr>
<tr>
<td>Chemicals - General</td>
<td>5</td>
</tr>
<tr>
<td>Cement - Alternative fuels</td>
<td>5</td>
</tr>
<tr>
<td>Domestic buildings - thermal</td>
<td>0</td>
</tr>
<tr>
<td>Transport - Cars and vans (efficiency)</td>
<td>0</td>
</tr>
<tr>
<td>Commercial buildings - electric</td>
<td>0</td>
</tr>
<tr>
<td>Domestic buildings - electric</td>
<td>0</td>
</tr>
</tbody>
</table>

**Source:** Authors, with data from McKinsey Pathways to a Low Carbon Economy (2009)
Only about a quarter of recommended measures which take longer than a year to pay back were implemented by the time of follow-up survey, and the proportion implemented varies little for longer payback times.

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: 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

‘Pillar II’ opportunities dominated by substitution in production – mainly low carbon power generation – ie. investment choices by large companies determined by market structure and perceived risks and relative prices.

Figure 6.5 Abatement options in the Second Domain

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

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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

<table>
<thead>
<tr>
<th>Efficiency of Stock</th>
<th>Use</th>
<th>Embodied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buildings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Insulation</td>
<td>• Closing windows while heating or cooling system is operating</td>
<td>• Construction materials</td>
</tr>
<tr>
<td>• Integrated heating and cooling system.</td>
<td></td>
<td>• Construction and transport</td>
</tr>
<tr>
<td>• Efficient appliances</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Efficiency of machinery used</td>
<td>• Efficient use of materials</td>
<td>• Raw materials used: extraction, transport and processing</td>
</tr>
<tr>
<td>• Modes of transporting goods</td>
<td>• Heat cascading</td>
<td>• Leakage from</td>
</tr>
<tr>
<td>Transport</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Vehicle efficiency</td>
<td>• Mode of transport</td>
<td>• Raw materials in vehicle construction</td>
</tr>
<tr>
<td></td>
<td>• Tyre pressure</td>
<td>• Vehicle disposal</td>
</tr>
<tr>
<td></td>
<td>• Maintenance.</td>
<td></td>
</tr>
</tbody>
</table>

**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

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:

1. **Private returns** >> public returns but not realised
   
   => *Standards and engagement*

2. **Cleaner products and processes**

3. **Public returns** (including innovation, security & environment) >> private returns
   
   => Strategic investment

**Fig. 12.3 Public and private returns in the 3 domains**

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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.

**POLICY PILLARS**

- **Standards & Engagement**
- **Markets & Prices**
- **Strategic Investment**

Values, pull & preferences

- Manage bills, increase responsiveness
- Revenues, revealed costs, strategic value
- Attention, products & finance
- Technology options & competitiveness

Education, access & control
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

Kindle: http://www.amazon.co.uk/Planetary-Economics-Sustainable-Development-sustainable-ebook/dp/B00JQFBWDO/ref=tmm_kin_swatch_0?_encoding=UTF8&sr=8-1&qid=1415625933

http://climatestrategies.org/projects/planetary-economics/ for information and register of related events.