## Planetary Economics: international dimensions

- Integrating technology and carbon pricing for a 'Club Good'

### **Michael Grubb**

Prof. International Energy and Climate Change Policy, UCL Senior Advisor, Sustainable Energy Policy, Ofgem Editor-in-Chief, *Climate Policy* journal

> Presentation to World Energy Congress European Energy Forum, Paris, 13 March 2015

- Context
- Why a technology lens for international cooperation?
- What are the core problem(s) to be solved?
- The role(s) of carbon pricing
- An international Club of Credibility?

## Can we solve it?

ELEONE TARY

- A mega-problem of risk management under deep uncertainty
  - Not the primary science but the consequences
  - .. And how to value them, act, and coordinate response
- "The biggest market failure in history" (Stern)
- "The perfect moral storm"
- A "Super-Wicked" problem

And we have not been doing very well globally ...

- "Current emission trends are at the high end of levels that had been projected ... growing on average at 2.2%/yr since 2000" [IPCC 2014]
- Energy remains an important development challenge
- Yet to overcome the historical pattern of pollution ...
- Negotiations remain mired in 'blame-and-burdens' mentality

#### Laurence Tubiana's Question

Foundations: Three Domains of decision-making involve different processes which operate at different scales



	DOMAIN	Characteristics	Theoretical foundations	
S O C	Satisficing	Habits, myopia, inattention to incidental / intangible costs; endemic `contractual failures', principal-agent failures, risk aversion to change or investment	Behavioural and organisational economics	T I M E
A L S C	Optimising	Economic optimisation based on relative prices, 'representative agents' with 'rational expectations', stable preferences and tech trends	Neoclassical and welfare economics	H O R I 7
A L E	Transform- ing	Structural, technological, institutional and behavioural change, typically from strategising, innovation, infrastructure investment	Evolutionary and institutional economics	O N

Solutions need to harness corresponding policy pillars, based on the Three Domains, to transform energy systems





## 



- Many international efforts focus on targets or pricing
- Technology has a theoretical appeal in a global context
- .... And a very practical one
- But has a mixed record and a surprising low profile in the international negotiations
  - Major focus has been push by developing countries on technology transfer / cooperation
  - Which makes industrialised countries nervous both about IP and costs



## **Planetary Economics**

# 

### An integrating approach to climate policy





- Nature of the challenge
- Some key observations
- The Three Domains and Three Pillars of Policy
  - Pillar I: Standards and Engagement for Smarter Choices
  - Pillar II: Markets and Pricing for cleaner products and processes
  - Pillar III: Strategic investment for innovation and infrastructure
- Policy Integration
- Strategic implications and conclusions

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

# We are seeking radical innovation in some of the least innovative sectors of our economies



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



Technologies have to traverse a long, expensive and risky chain of innovation to get from idea to market

PLANETARY



Framework Conditions – Macroeconomic Stability, Education & Skills, IP Protection Etc.

m

Fig.9.5 The Innovation Chain



#### Innovation is NOT synonymous with R&D push



- but the track record of State-led development programmes is mixed

- The theoretical basis
  - Classic R&D market failures
  - The impact of liberalisation
- Some classic energy examples:
  - Nuclear fission
  - Coal-based synthetic fuels
  - Nuclear fusion
- Basic problems of:
  - 'picking winners'
  - Cooperation vs competition
  - Policy displacement

\_\_\_\_

Transformation involves not just technologies but sector infrastructure and institutions – is possible, but complex



### Three key "case studies"

- Transport in the Americas
- Electricity in Europe
- Urbanisation in Asia

*The systems themselves also become more integrated* 







- Economic research points two broad aspects for the "Dark Matter" of economic growth:
  - Reducing suboptimal performance of many economic actors and structures
  - Education, infrastructure and innovation
- *ie.* First and Third domain processes are recognised as important for macroeconomic growth. Yet these remain
  - largely absent in global (or national) modelling
  - poorly charted in policy
- Energy is a particularly strong candidate because
  - Pervasive input to numerous production sectors
  - Fossil fuel markets are intrinsically unstable
  - Exceptionally low rates of innovation particularly electricity & construction



# What is missing?



### 



## **Planetary Economics**

# 

### An integrating approach to climate policy



- Nature of the challenge
- Some key observations
- The Three Domains and Three Pillars of Policy
  - Pillar I: Standards and Engagement for Smarter Choices
  - Pillar II: Markets and Pricing
  - Pillar III: Strategic investment
- Policy Integration
- Strategic implications and conclusions

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

## Pillar II (Pricing) observations



# 'Carbon pricing is political suicide'

#### -Stephan Dion,

former Canadian Environment Minister and (briefly) leader of the Liberal Party Comment after losing the General Election to Stephen Harper

- *Economics* of carbon pricing: design and strategic credibility are just as important as present level
- *Politics* of carbon pricing are driven by distributional impacts *and the lack of clearly articulated positive narrative* for either industry or consumers
- Links to the other two domains are central to any tangible positive narrative, drawing on the Bashmakov-Newbery Constant of Energy Expenditure'



### Strategic investment can be costly but the returns can be huge ...

price

Eg. North-Sea oil investments in the 1970s cost UK c.£10bn/yr; full *direct* costs >> \$100/bbl But benefits enormous

Value of low carbon innovation enhanced by a rising carbon reduction value



- We have gained extensive experience of policies to span innovation chain
- Need integration between public and private, & strategic investment and markets
- Infrastructure important as the technologies expand need to overcome lock-in
- Regulatory structures and institutions must evolve along with technologies & systems





IIIII



Figure 10-6: Two kinds of energy future – the carbon divide Source: Upper panel: Gritsevskyi and Nakićenović (2000); lower panel: authors UCL Institute for Sustainable Resources

## **Planetary Economics**

# 

### An integrating approach to climate policy



ar**ni histori** avi Soudirolyn

- Nature of the challenge
- Some key observations
- The Three Domains and Three Pillars of Policy
  - Pillar I: Standards and Engagement for Smarter Choices
  - Pillar II: Markets and Pricing for cleaner products and processes
  - Pillar III: Strategic investment for innovation and infrastructure
- Policy Integration
- Strategic implications and conclusions

http://climatestrategies.org/projects/planetary-economics/ for information and register of related events. Effective mitigation policy needs to understand the complementary economic roles of the different pillars





**Economic Output / Consumption** 

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



Changing course requires a sustained package -

the key is to integrate and synergise across all three pillars



.. A practical answer to Laurence's Question

.. *particularly* when same logic is applied to nature of financial systems!

**UCL** 

Clear alignment between theoretical structure of 'Three Domains' and the empirical basis of *New Climate Economy* 



TIM

- And both suggest multiple routes to 'co-benefits'



Can we build an international club to link 'efficiency, 'price' and 'innovation' – maybe based on a "first among equals?"



### A rising base carbon reduction value could contribute across domains:

1. Attention effects and funding	<ul> <li>rising steadily enables efficiency to keep pace and stop much rise in total bills</li> <li>efficiency programmes to counter regressive concerns?</li> <li>accelerated technology adoption</li> </ul>
2. Rising price differential	<ul> <li>steadily reduce use of coal in power generation without huge asset stranding</li> <li>move low cabon techs from transitional subsidies</li> <li> into expanding mainstream markets</li> </ul>
3. Long term visibility and leverage	<ul> <li>increased investment stability</li> <li>time and leveraged funding for innovation, infrastructure and tech transfer programmes</li> </ul>

- Embedding in international agreement could enhance stability and credibility
- Politically not credible as a *global* deal but could underpin a growing coalition
- Game theory suggests possible advantages to negotiations on a *reduction value*



# Follow-up:



Special Session on TECHNOLOGY INVESTMENT, FINANCE, AND THE ROLES FOR PRICING CARBON: DEFINING THE 'CLUB GOOD'

at *Climate Strategies'* Annual Global Climate Policy Conference New Delhi, 30 April & 1 May, 2015

& session summary presentation at International Science conference, 'Our Common Future under Climate Change', Paris, July 7 – 10 July 2015



## **Planetary Economics:**

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



IIIII

Grubb, Hourcade and Neuhoff (2014)



Kindle: http://www.amazon.co.uk/Planetary-Economics-Sustainable-Development-sustainableebook/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.