

Pathways towards a One Planet Economy – complexity in action

**ESRC workshop on complexity economics for
sustainable resource management**

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23-06-09



Pathways towards a One Planet Economy – complexity in action

METHODS & TOOLS

- Intro...
- Supply chain & wider impacts
- Value chain & wider economy
- Complexity & 'relational economy'
- Why do policies succeed or fail?
- Pathways to a One Planet Economy

APPLICATIONS:

- Cities & buildings
- Food & trade...etc
- Environmental finance
- Examples
- Towards a general method & toolkit
- The case of Leeds ...

Introduction



Latest climate change projections

Positive proof of global warming.



Latest climate change projections

Positive proof of systemic failure



Well Mr Darling
says we weren't
borrowing and
spending enough,
so he's going to do
it for us...



Well Mr Darling
says we weren't
borrowing and
spending enough,
so he's going to do
it for us...

2000 quid a
head no less



Well Mr Darling says we weren't borrowing and spending enough, so he's going to do it for us...

2000 quid a head no less

So we can all rush out and spend on a consumer christmas



Well Mr Darling says we weren't borrowing and spending enough, so he's going to do it for us...

2000 quid a head no less

So we can all rush out and spend on a consumer christmas

Yeah.. Shop until you drop.. for Britain!!



Well Mr Darling says we weren't borrowing and spending enough, so he's going to do it for us...

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So we can all rush out and spend on a consumer christmas

Yeah.. Shop until you drop.. for Britain!!

Question is .. Will this new plasma wide screen really make us all happier ??? And where does all this stuff come from???



Well Mr Darling says we weren't borrowing and spending enough, so he's going to do it for us...

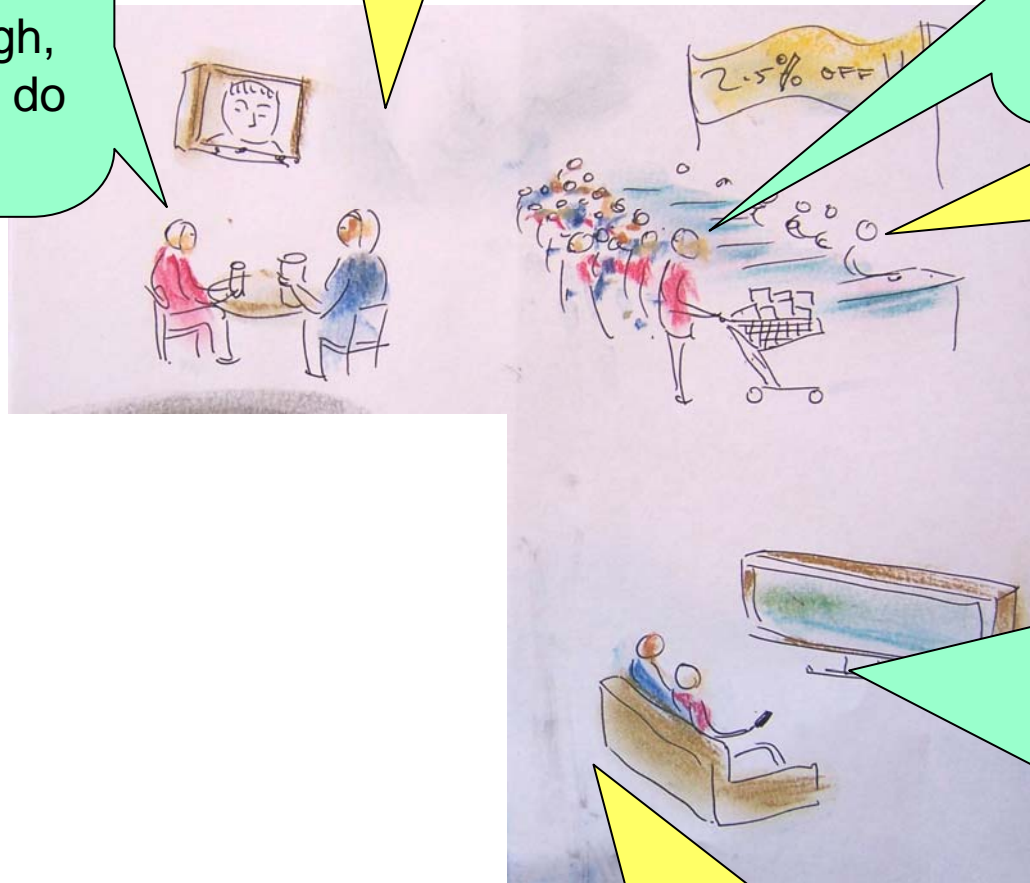
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So we can all rush out and spend on a consumer christmas

Yeah.. Shop until you drop.. for Britain!!

Question is .. Will this new plasma wide screen really make us all happier ??? And where does all this stuff come from???

C'mon how can you say that at a time like this

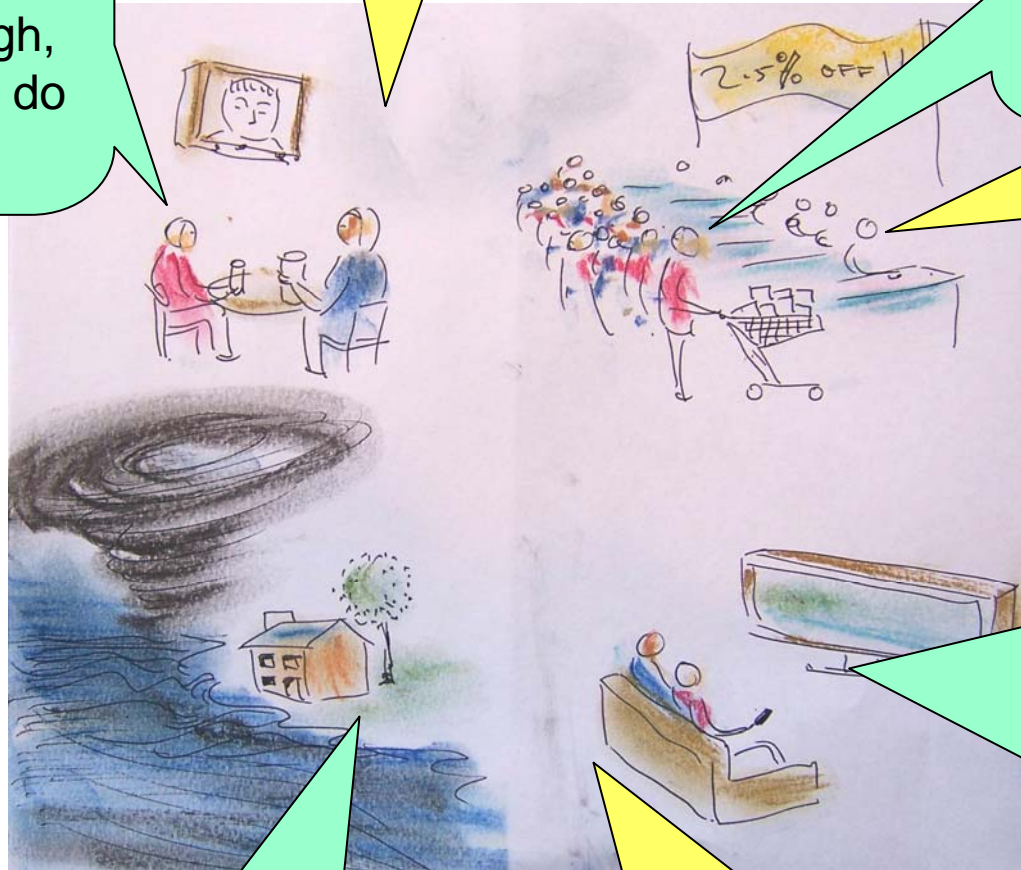


Well Mr Darling says we weren't borrowing and spending enough, so he's going to do it for us...

2000 quid a head no less

So we can all rush out and spend on a consumer christmas

Yeah.. Shop until you drop.. for Britain!!



Ok if that's what it takes ... let's go shopping

C'mon how can you say that at a time like this

Question is .. Will this new plasma wide screen really make us all happier ??? And where does all this stuff come from???

Well Mr Darling says we weren't borrowing and spending enough, so he's going to do it for us...

2000 quid a head no less

So we can all rush out and spend on a consumer heaven

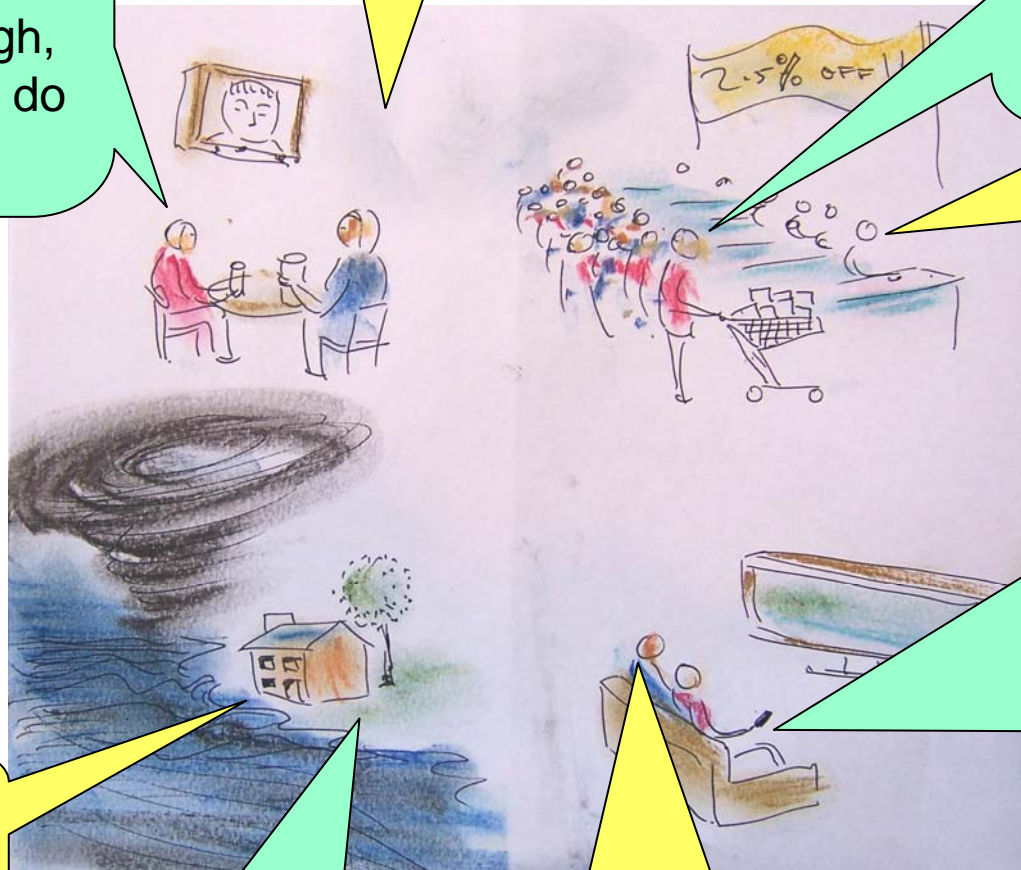
Yeah.. Shop until you drop.. for Britain!!

Question is .. Will this new plasma wide screen really make me happier ??? And where does all this stuff come from anyway???

Hey !!! ... look out the window !!!#''!!!

Ok if that's what it takes ... let's go shopping

C'mon how can you say that at a time like this

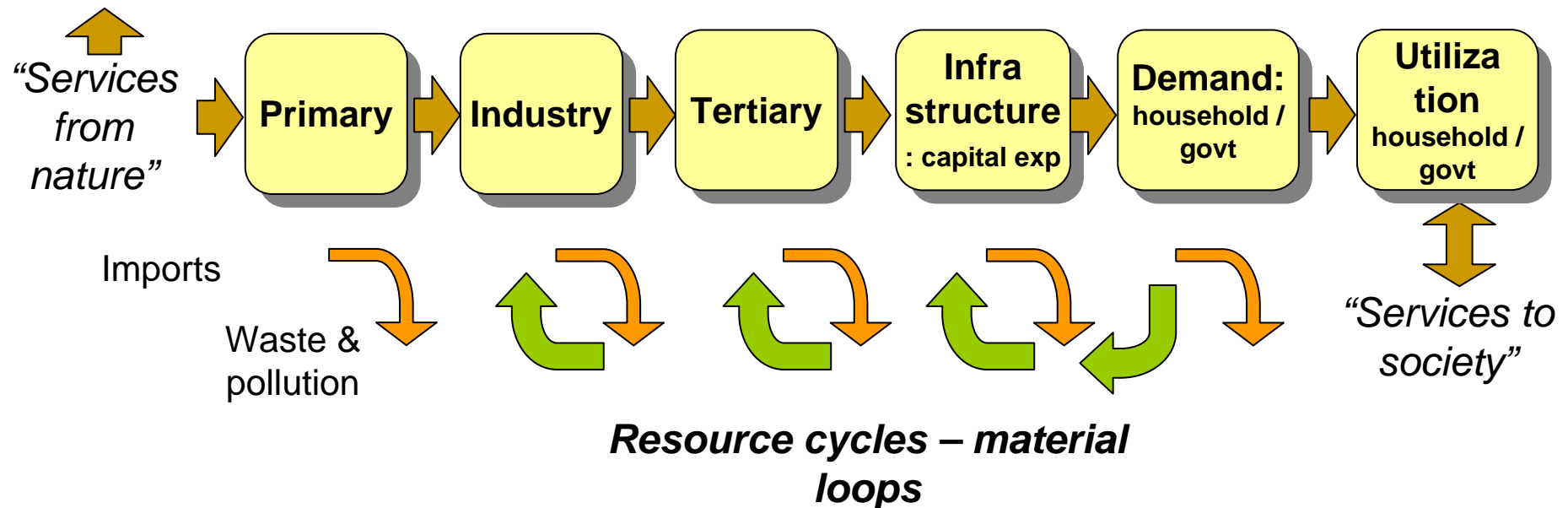


Supply chain & wider impacts



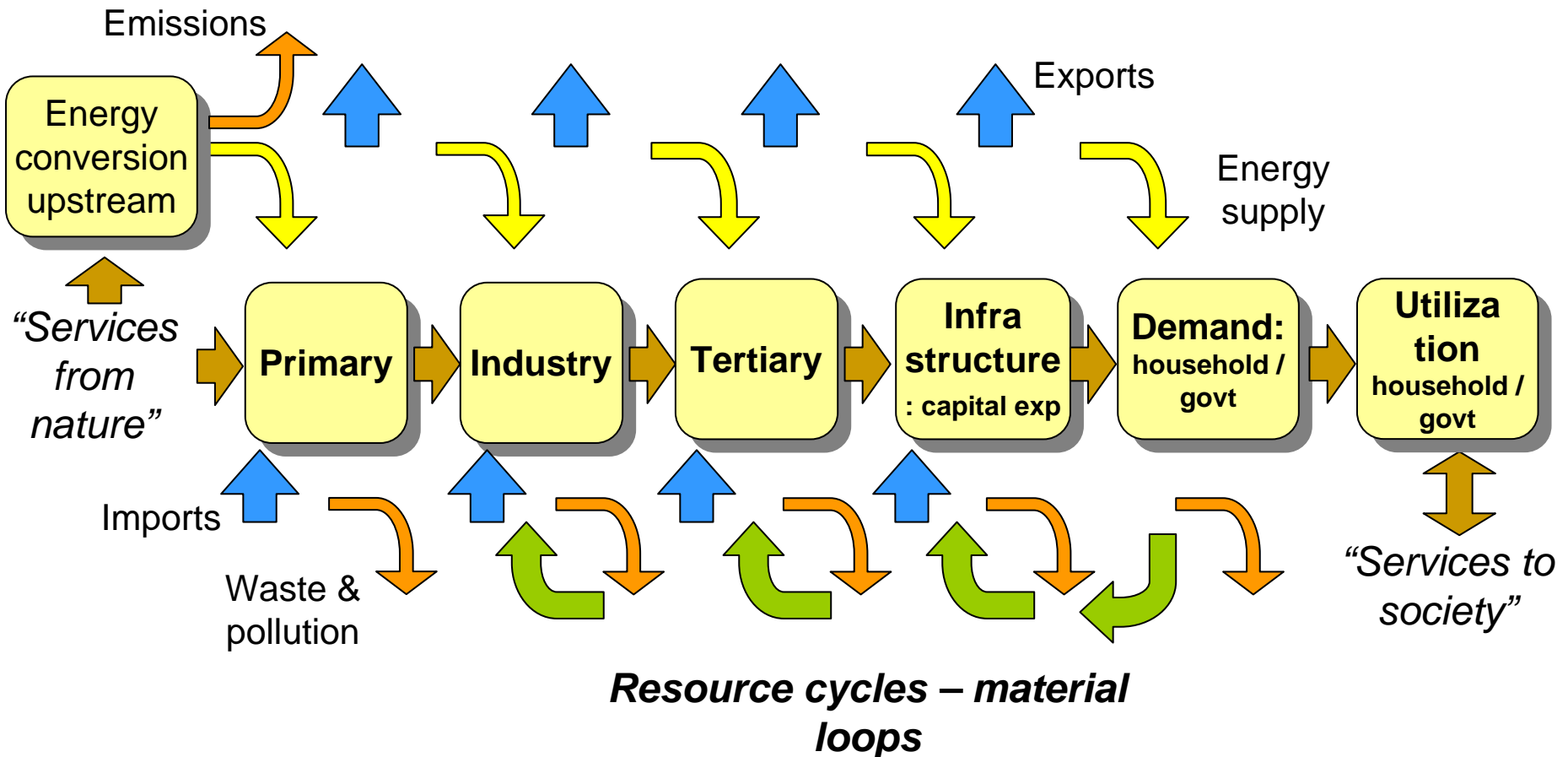
Physical resource 'supply chain' & 'resource cycle'

Resource flows in the physical supply chain: including services to & from "nature" and "society".



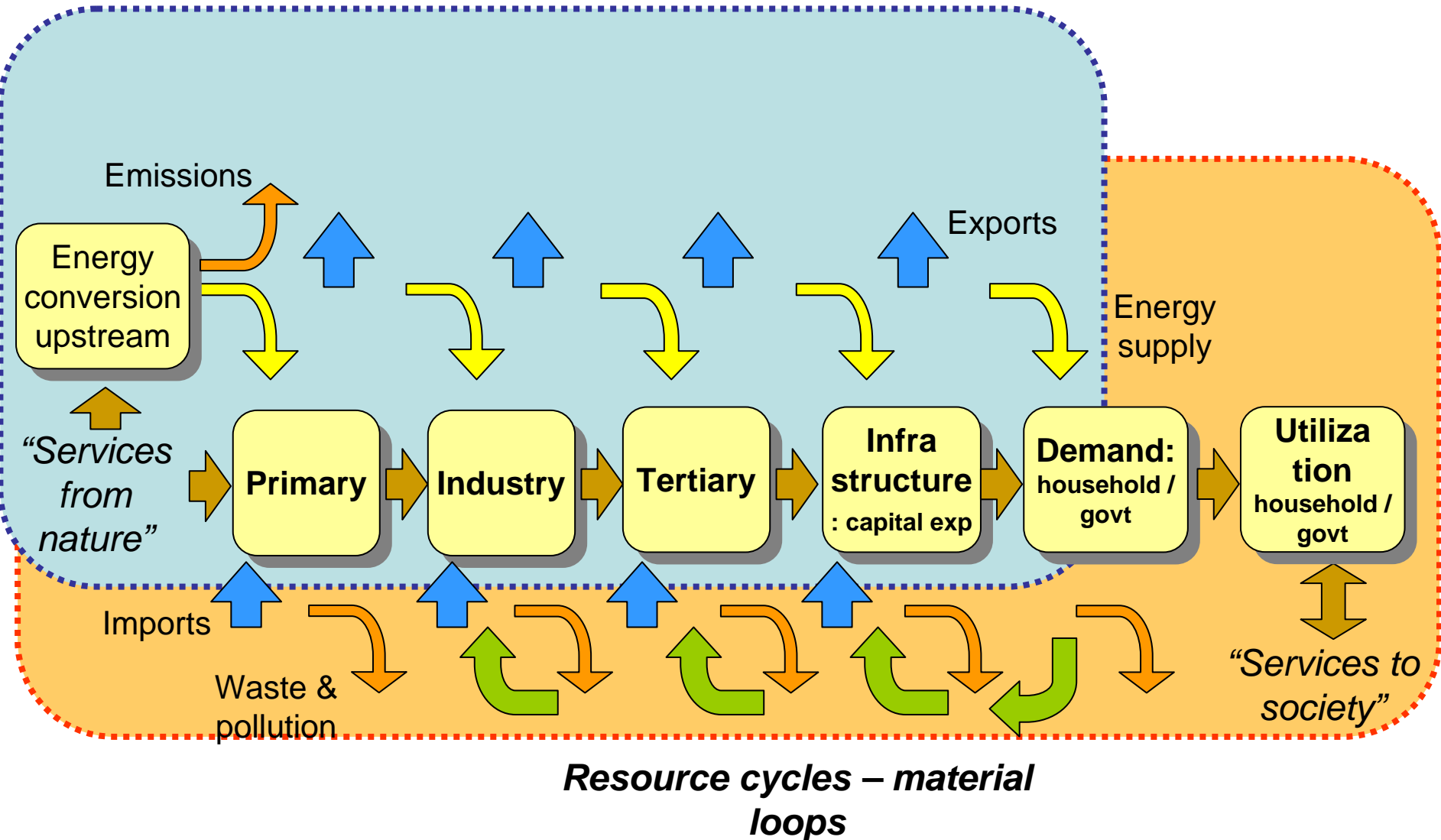
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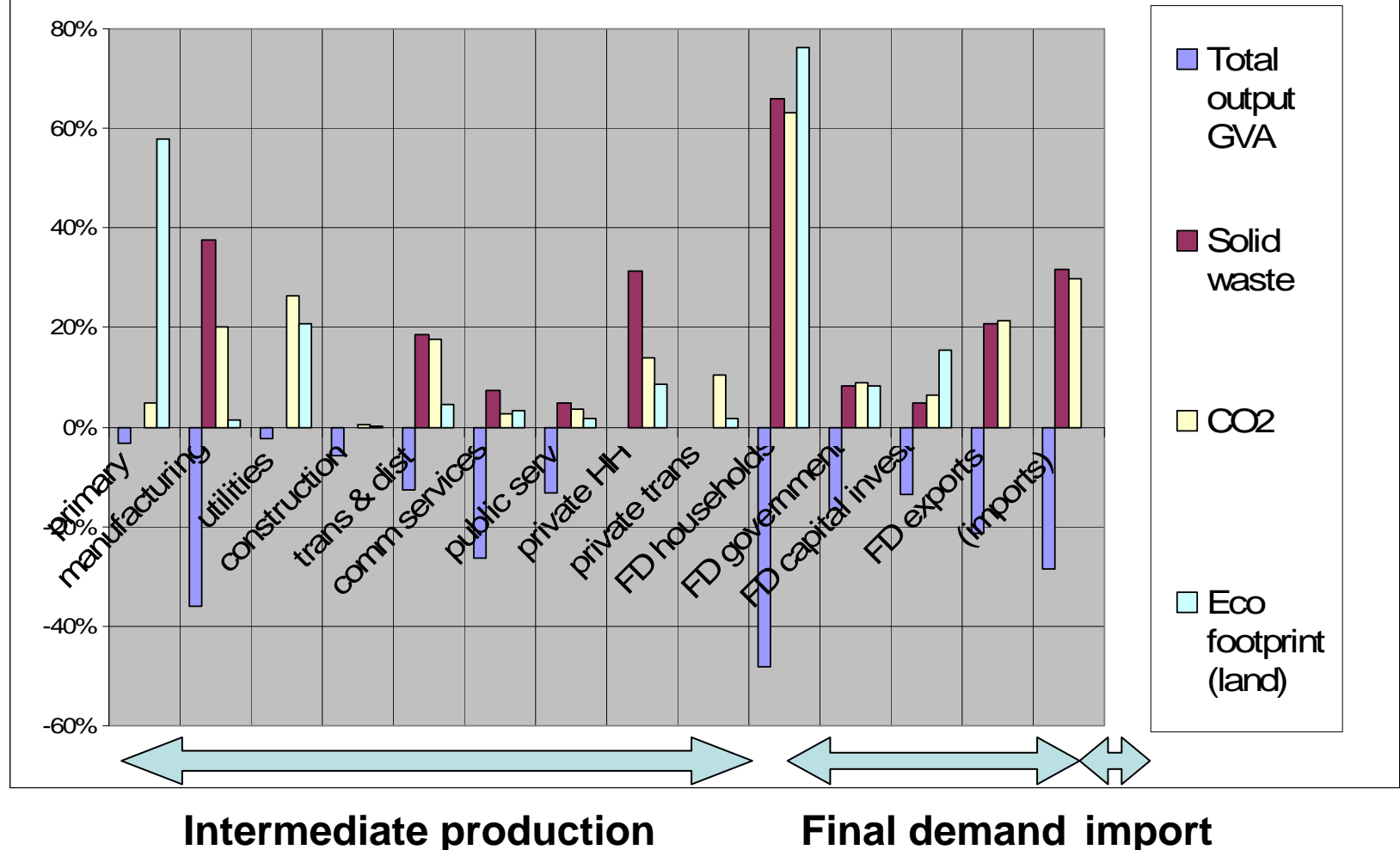
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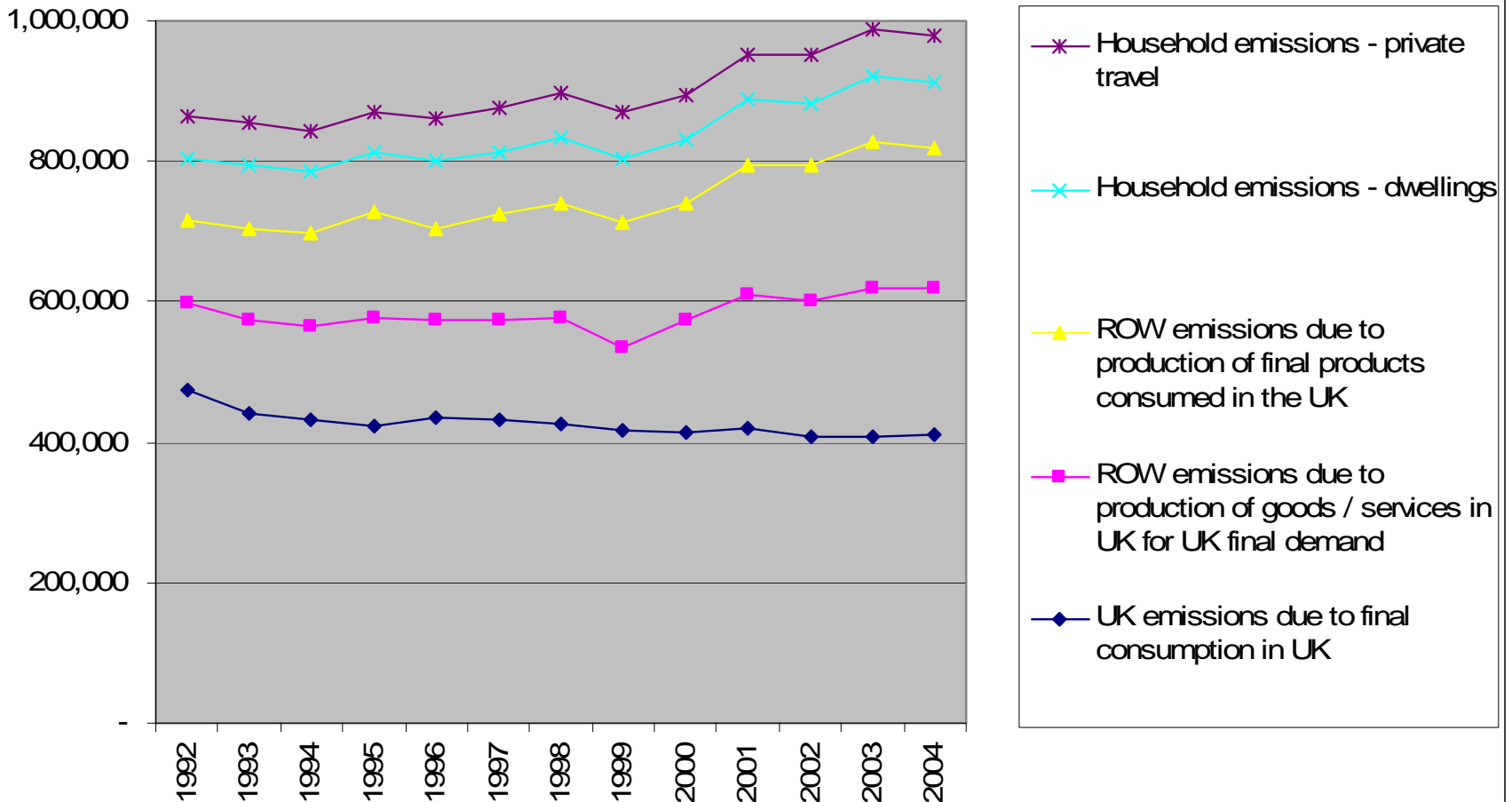
UK total resource chain profile

Based on ONS economic & environmental data as of 2003, grouped into broad sectors: includes both intermediate production and final demand categories: eco-footprint (land) shows the non-fossil fuel components: all data normalized to % of UK totals in each category



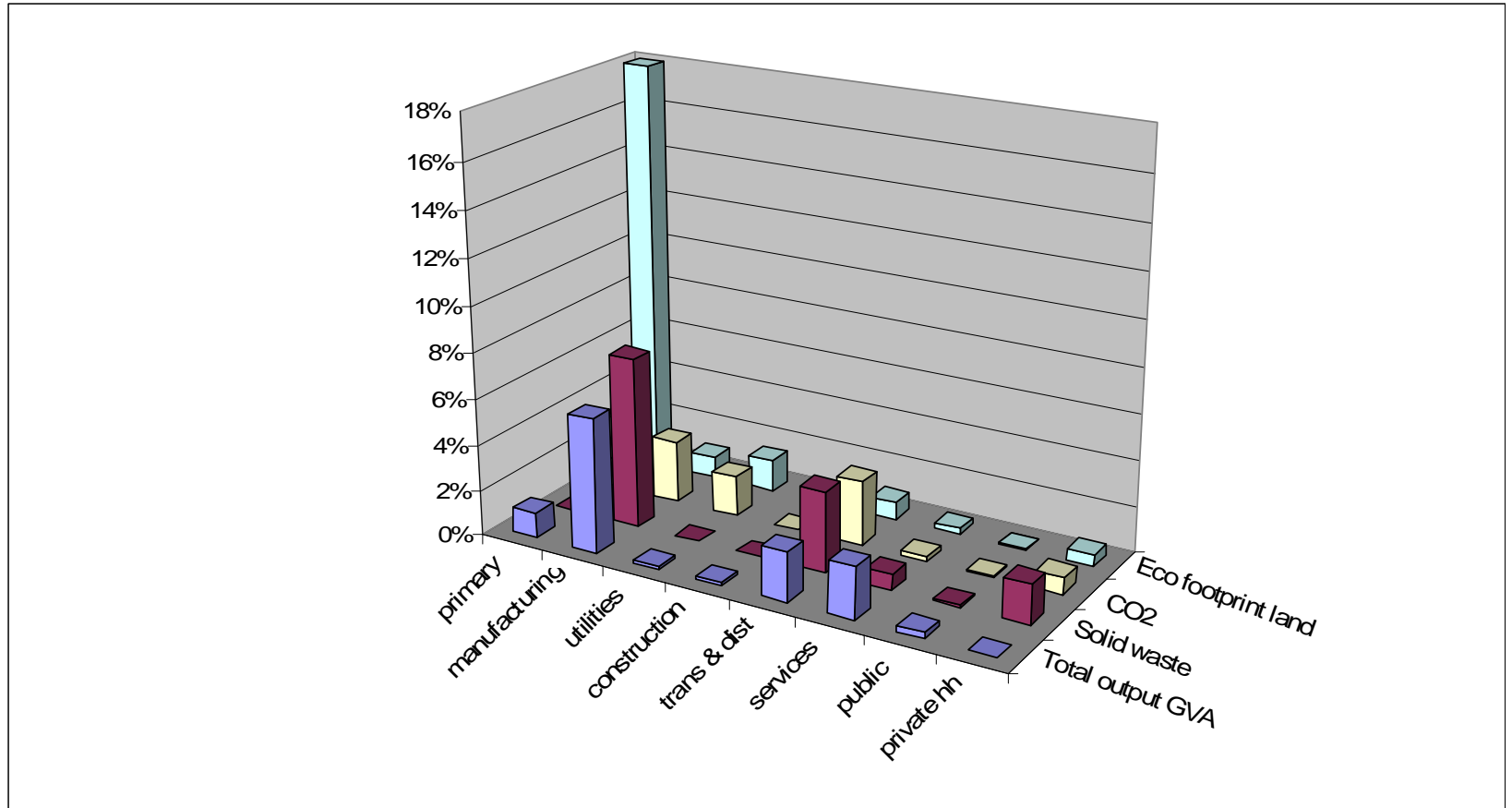
'Measuring wider impacts'

Activity sectors in the physical supply chain: based on 'cradle to grave' concept.



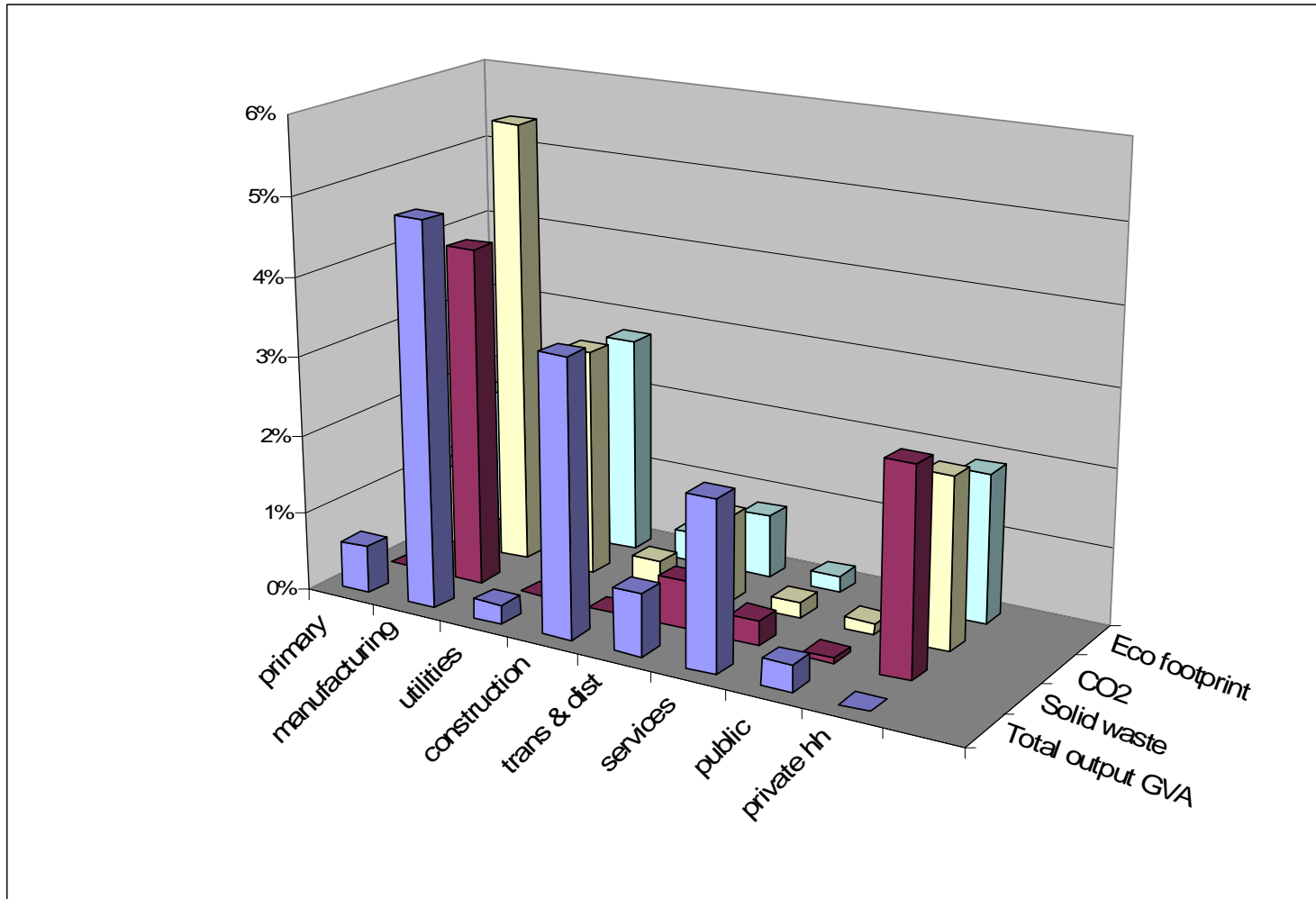
Supply chain profile – food

Based on ONS economic & environmental data 2003: grouped into broad sectors: shown as % of UK totals in each category



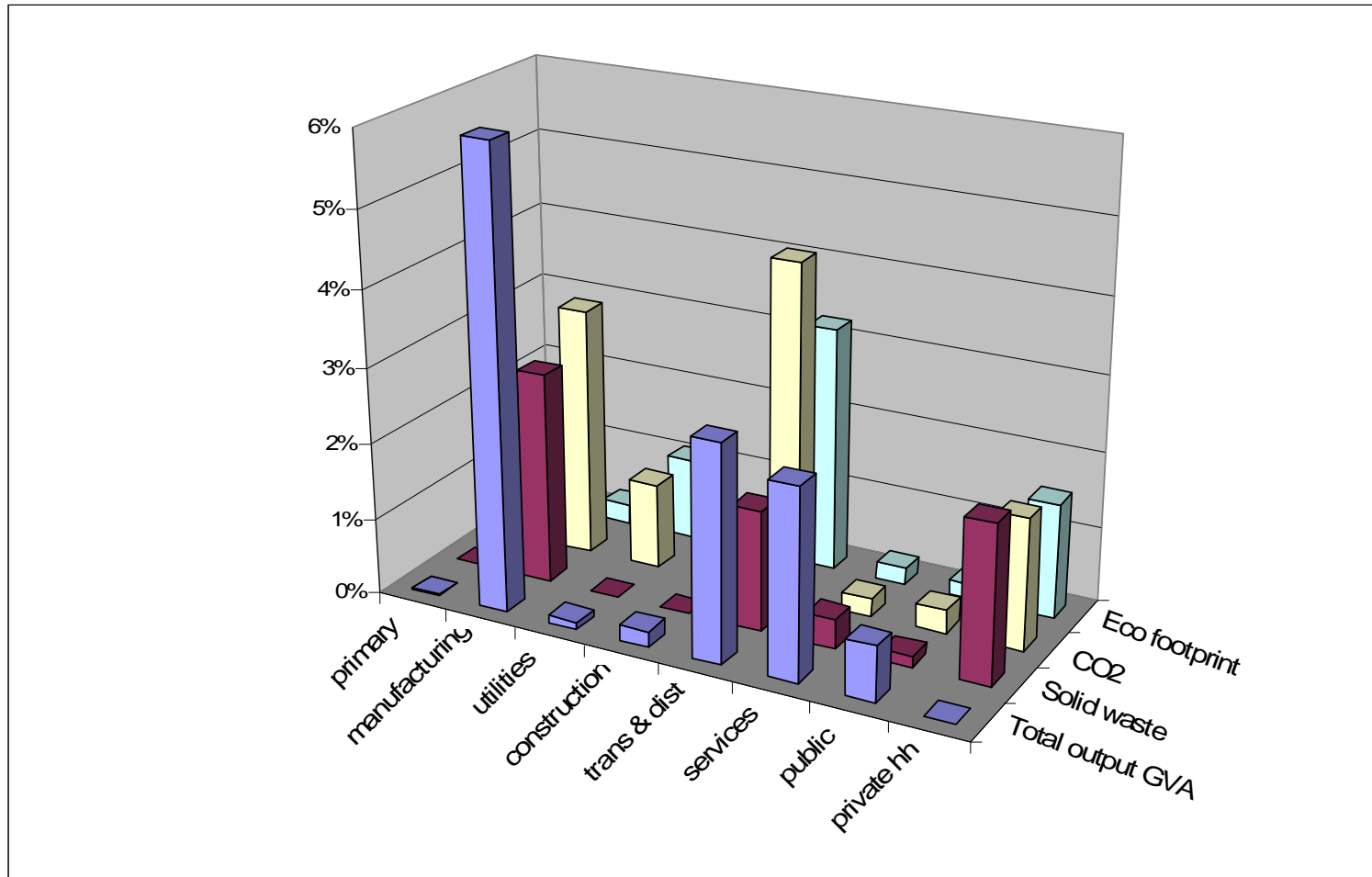
Supply chain profile – buildings

Based on ONS economic & environmental data 2003: grouped into broad sectors: shown as % of UK totals in each category

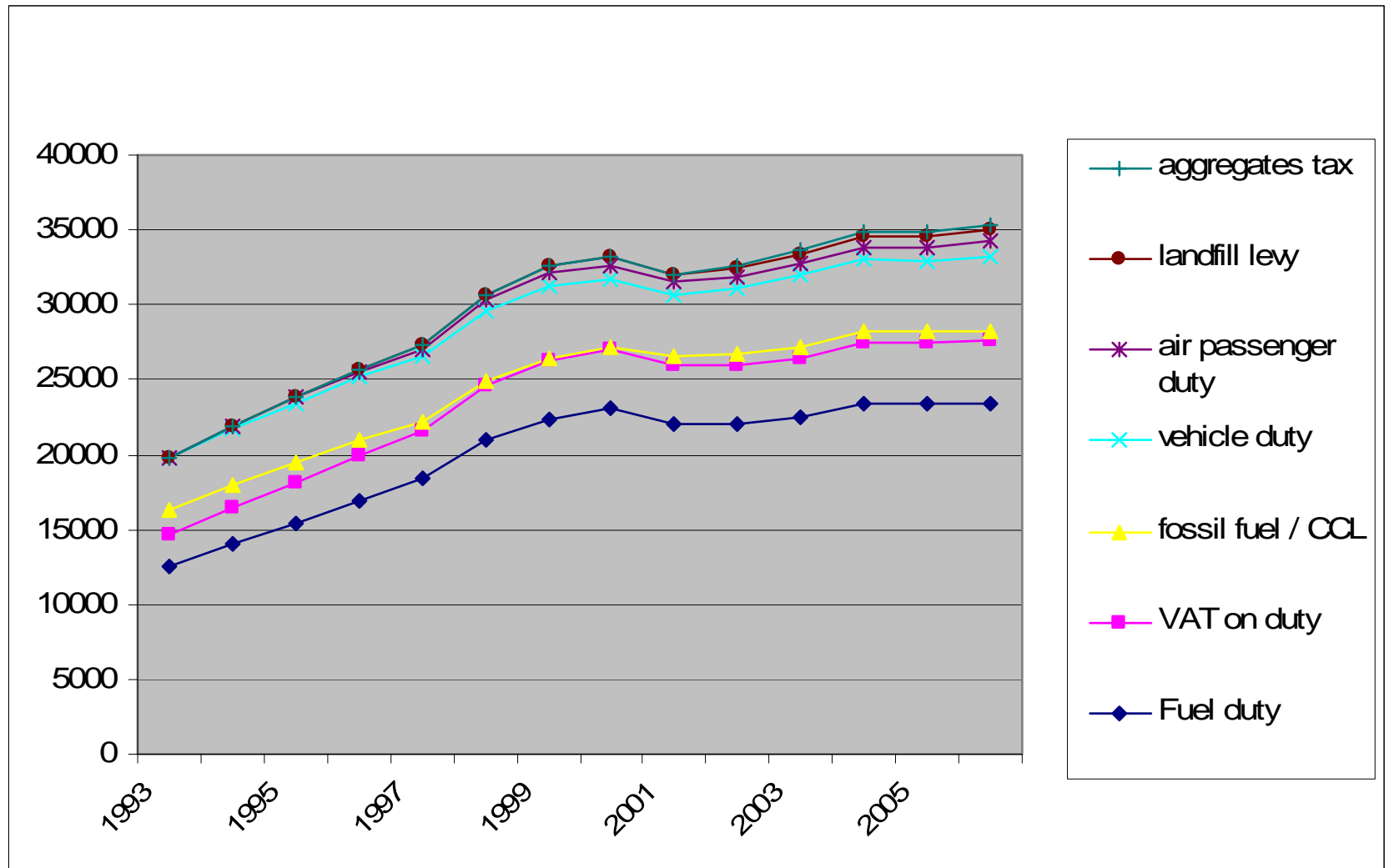


Supply chain profile – transport

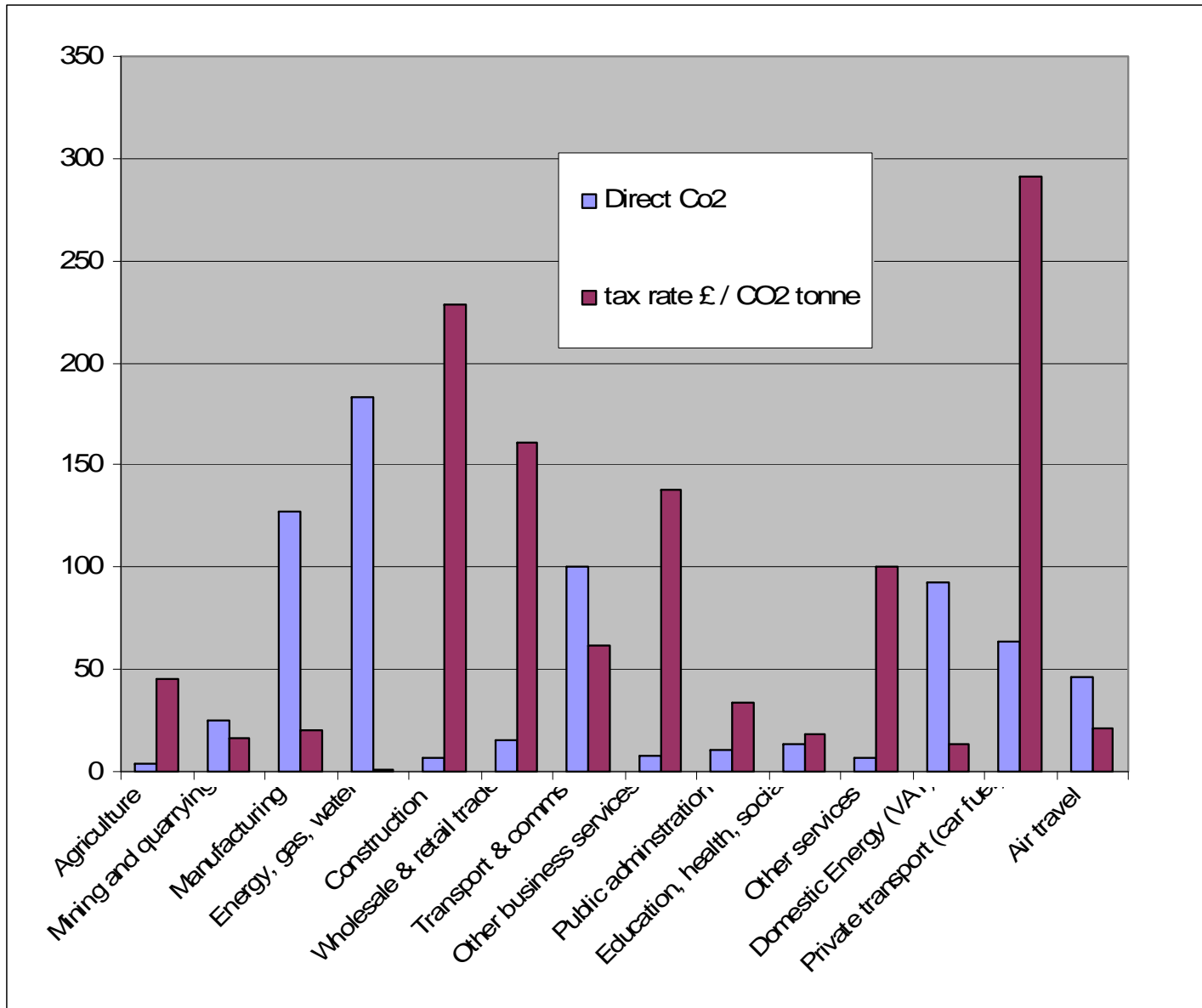
Based on ONS economic & environmental data 2003: grouped into broad sectors: shown as % of UK totals in each category



Recent history of environmental taxation

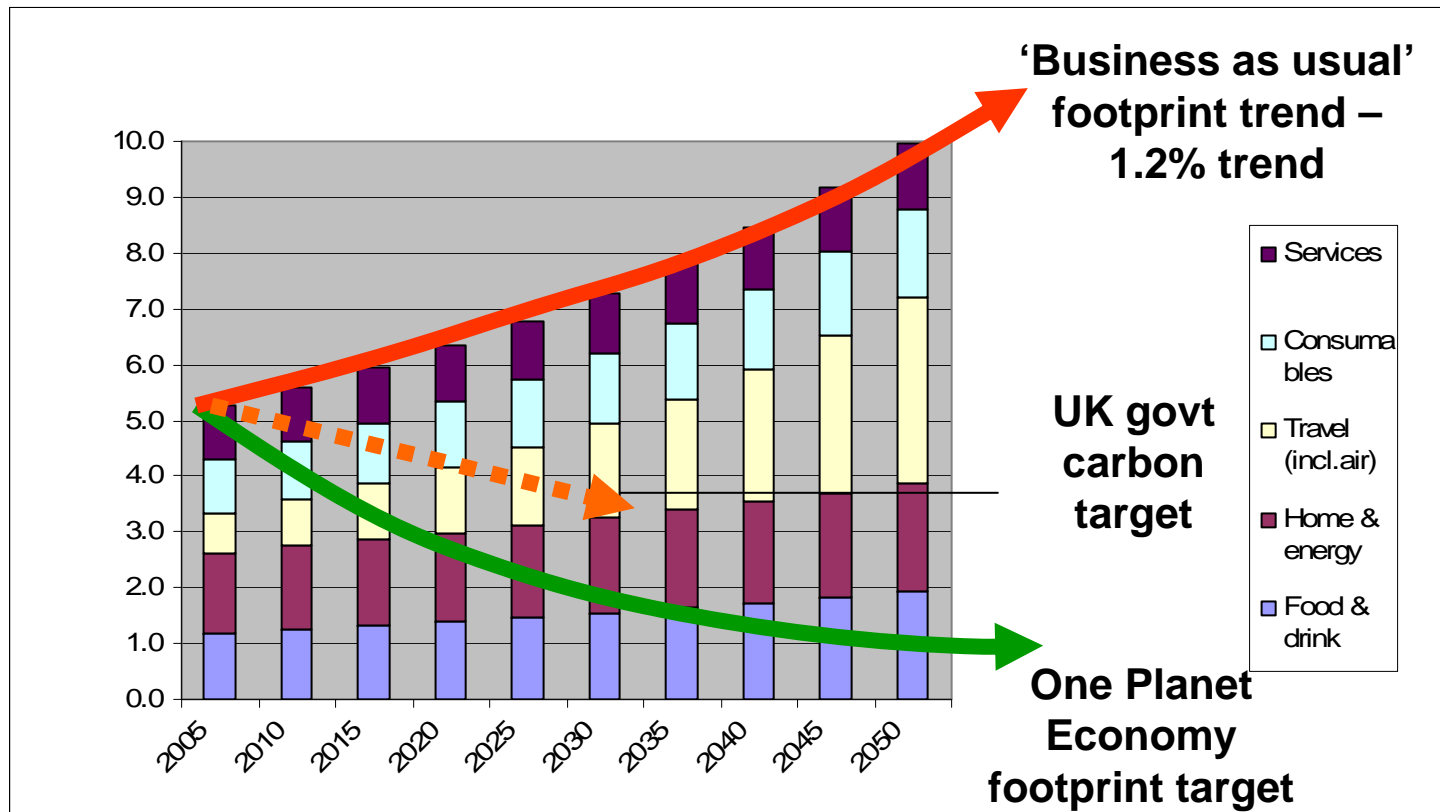


Carbon tax analysis by sector



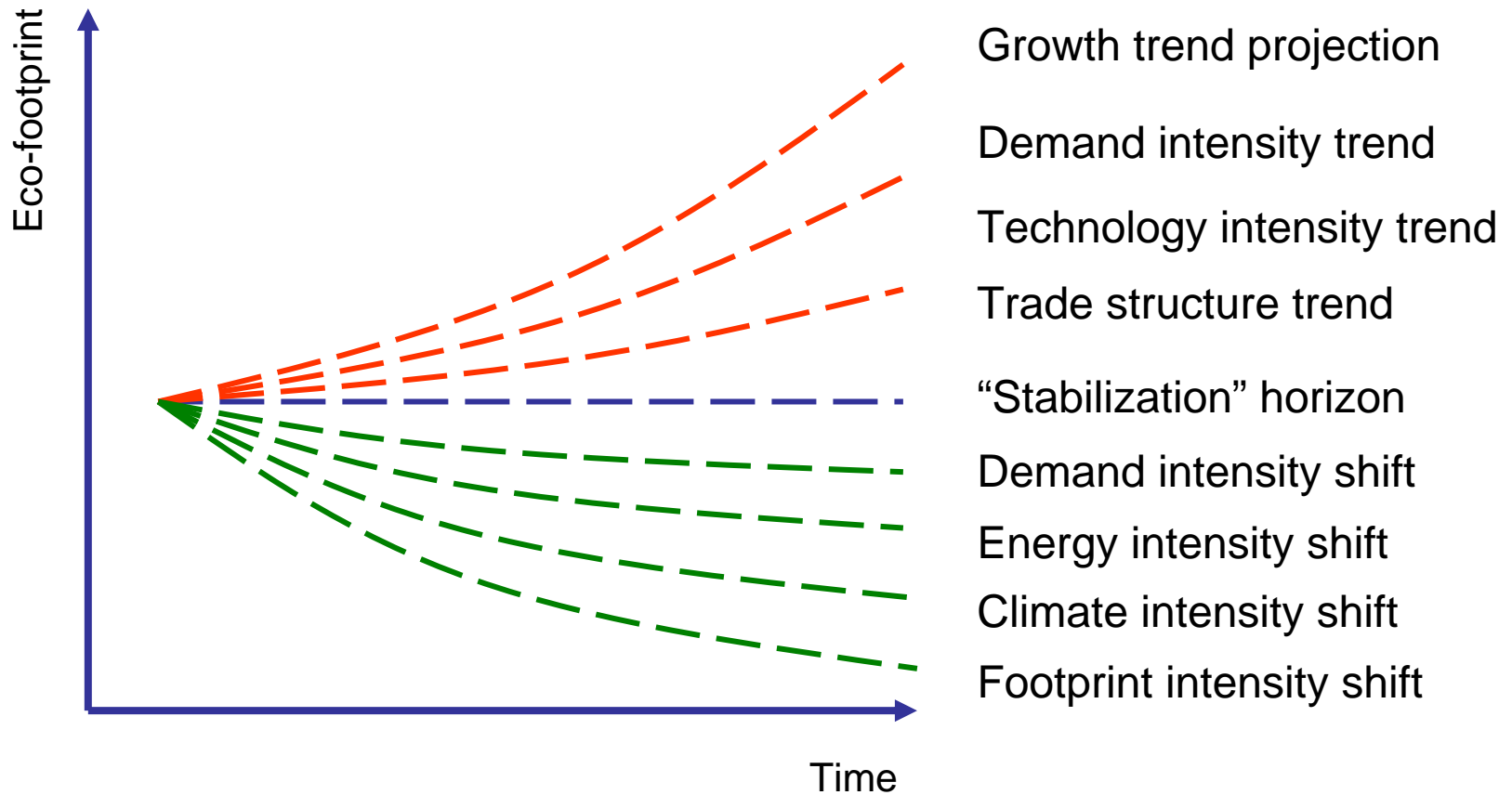
Footprint trends & targets:

Comparing eco-footprint trends and targets, with carbon targets: calculations based on Energy White Paper 2007 with positive assumptions.



Factors of growth and change in wider impacts

Decomposition of resource trends and footprint targets

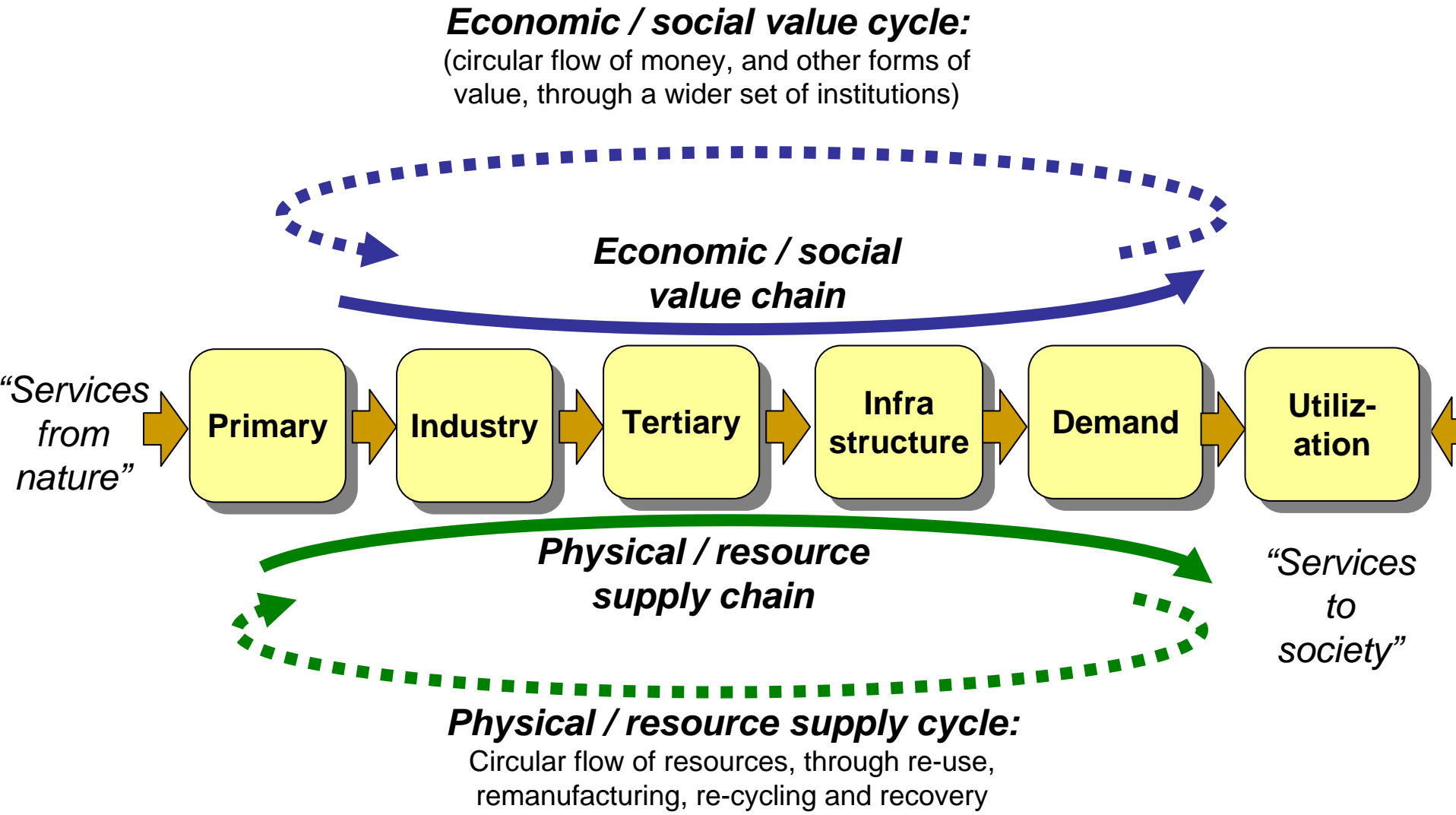


Value chain & wider economy



Resources and values: from chains to cycles

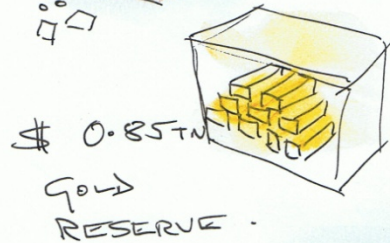
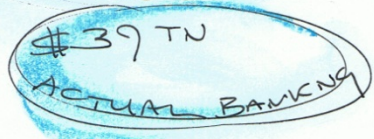
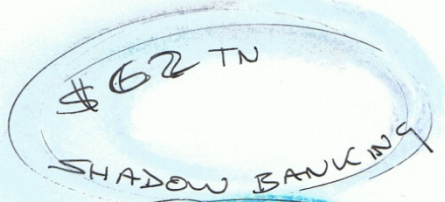
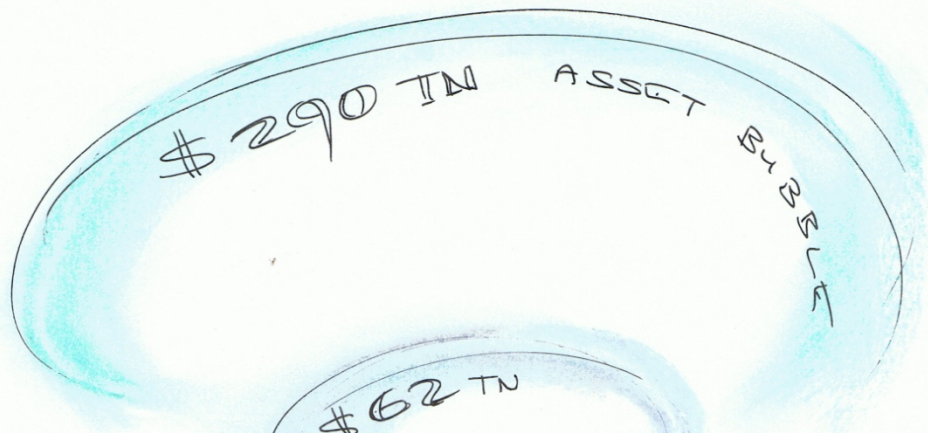
Showing a generalized supply chain with the shift: from linear chains to physical resource cycles: and from linear value chains to economic / social value cycles.



Social value chains & loops

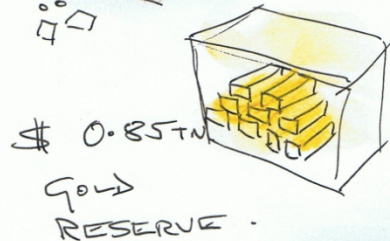
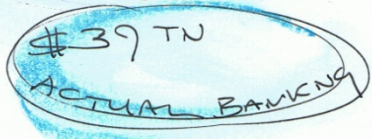
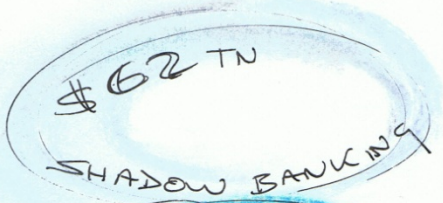
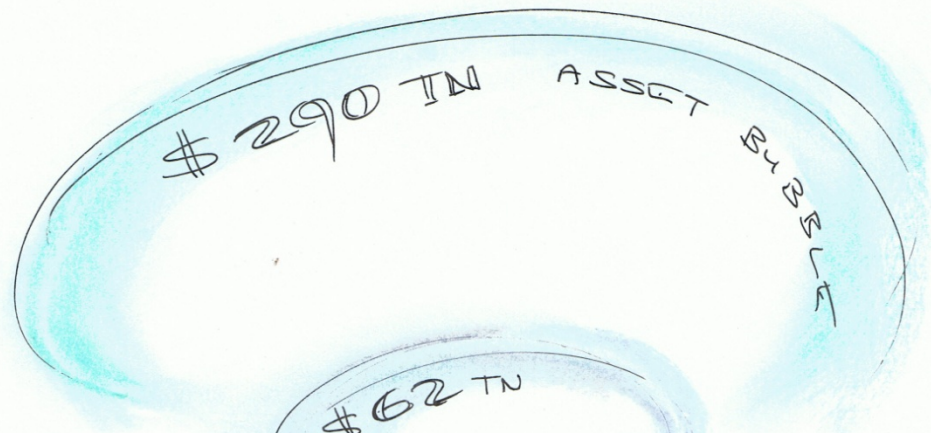
- Needs hierarchy & functions based approach to value... (Maslow, Max-Neef)
- ‘Capitals’ based approach – Porritt etc
- ‘relational’ or ‘flow’ approach
- Cognitive-cultural approach to value – ideology, hegemony, expropriation
- ‘marginal utility’ & ‘consumer sovereignty’





MONEY?
IT'S JUST
A LOAD OF
PROMISES





MONEY?
IT'S JUST
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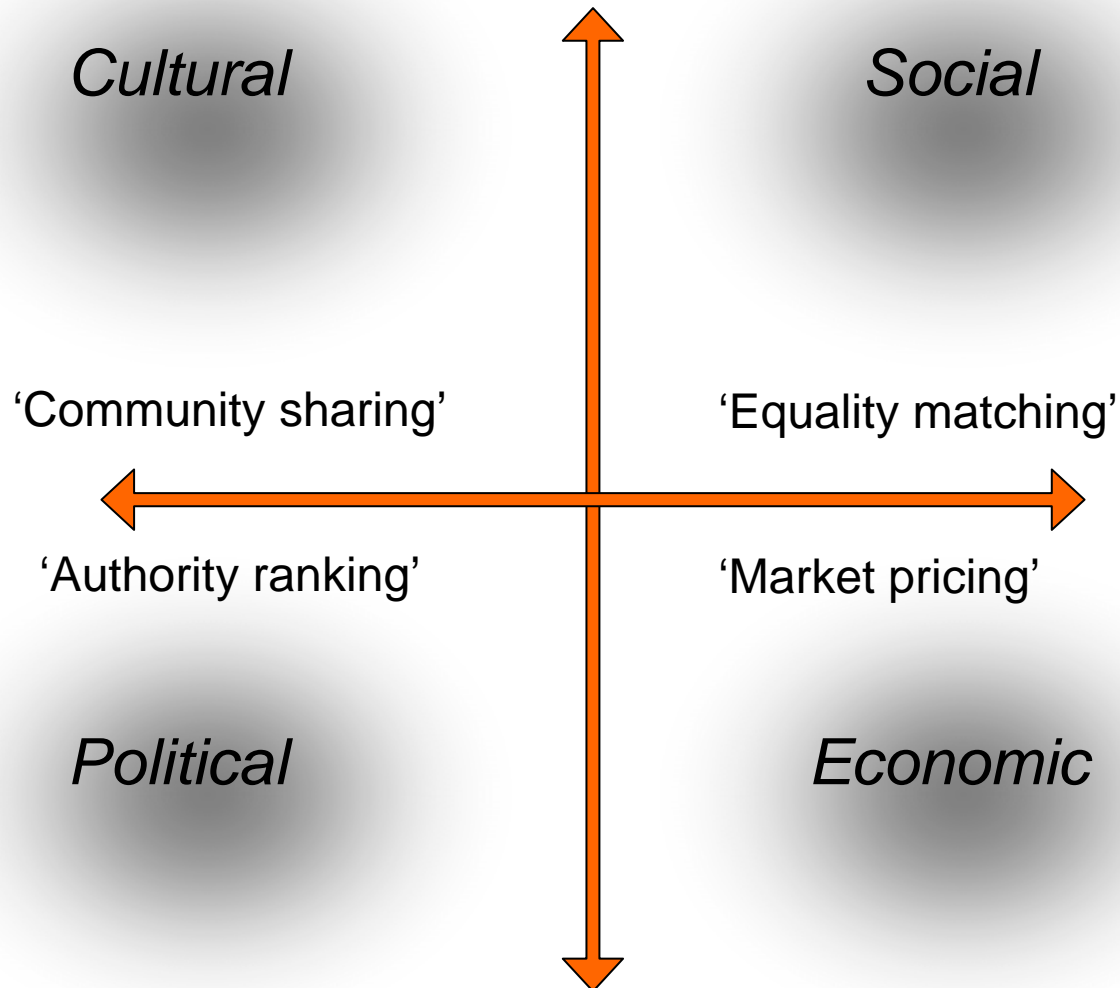


I'll give you a million pounds if you go fishing today

No thanks, I don't really need it

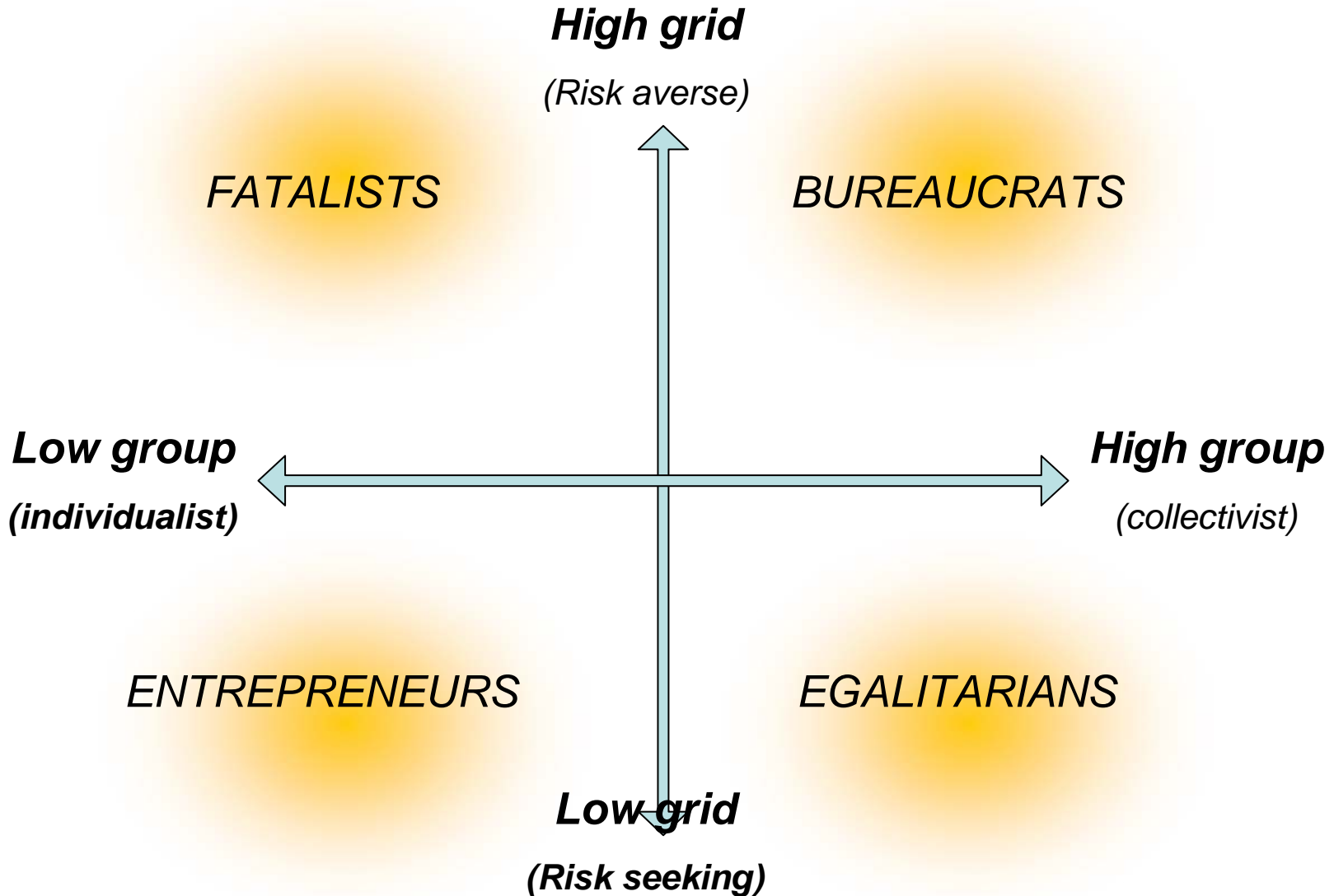
Relational models theory

(Allen Fisk)



Cultural theory

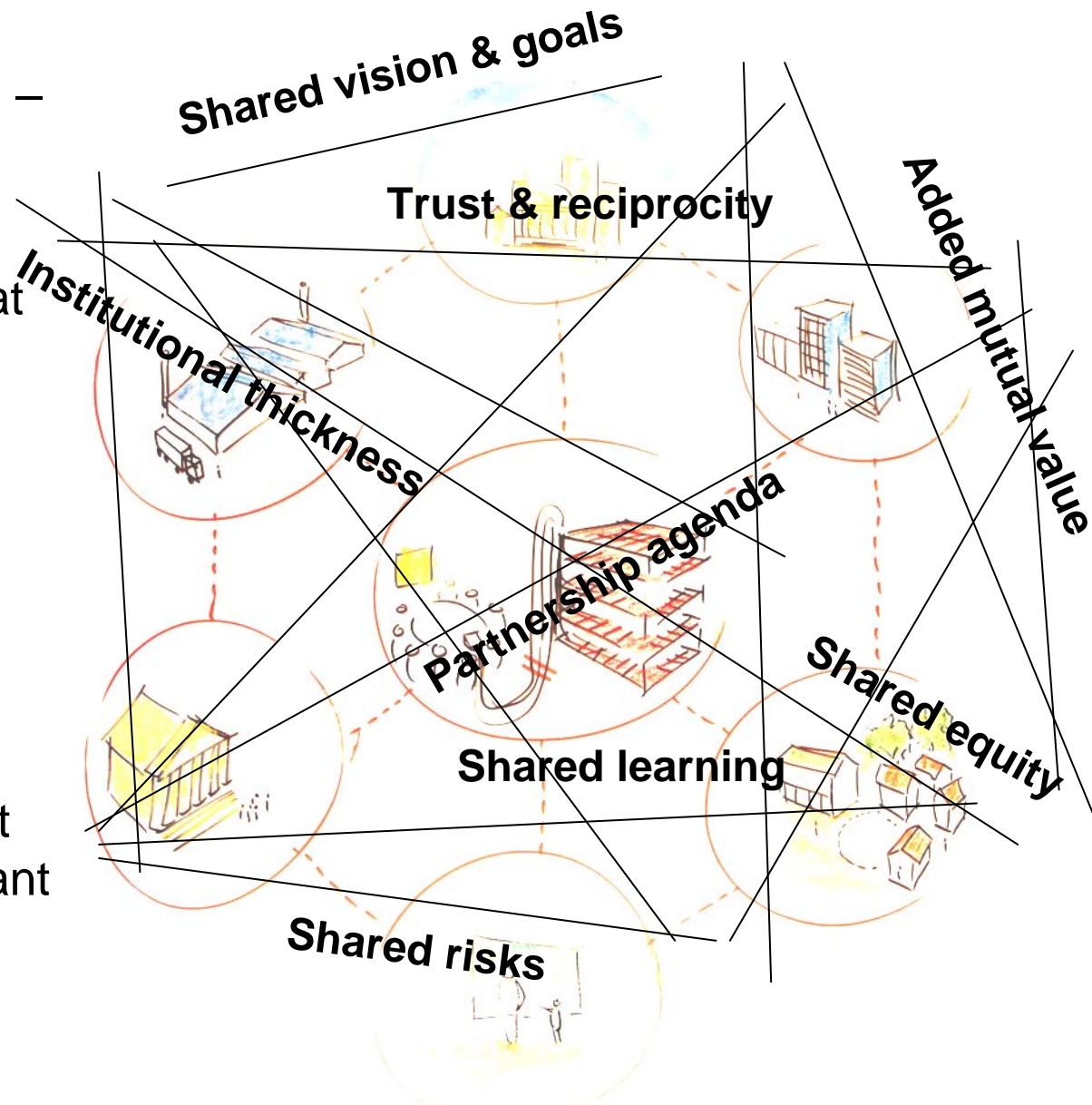
(Douglas, Wildavsky, Thompson)



Innovation systems, co-learning, shared value

Investment & return & cost-benefit – results based on market rules & boundaries – i.e. political & institutional questions

- Complexity studies looks at emergent properties
- Combining many other capitals with economic capitals
- ‘Utility’ & ‘sovereignty’ – towards behavioural economics approach – simple equilibrium may not be tractable or even relevant
- As demonstrated by technology & innovation policy challenges



Complexity & the relational economy



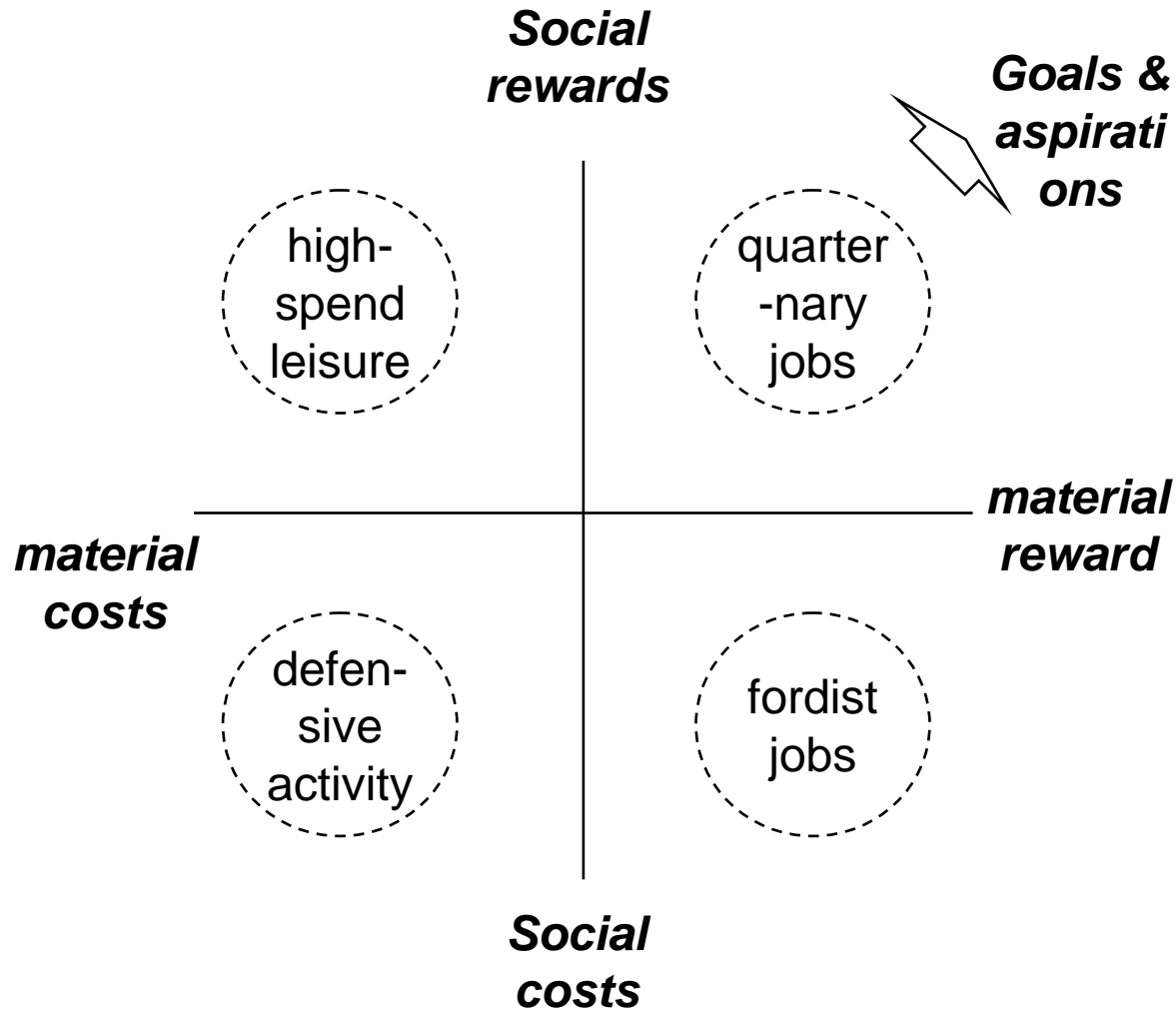
Relational economy themes

1. Economic flows & incentives & signals - focus on the material exchange dimension
2. BUT there are other dimensions – political, social, cultural...
3. To “re-socialize” the economy we need links between ... both in theory and in practice, & at micro and macro scale;
4. First - revisit key assumptions & paradigms which overlap, merge, emerge

ASSUMPTIONS & PARADIGMS

- **Production & consumption –**
- **Government & market –**
- **Benefit & cost –**
- **Ownership / stakeholding –**
- **Efficiency & efficacy -**
- **Local v global**

e.g. production & consumption



Changing balance of quantity of material reward and quality experience in work and leisure in post-industrial societies.

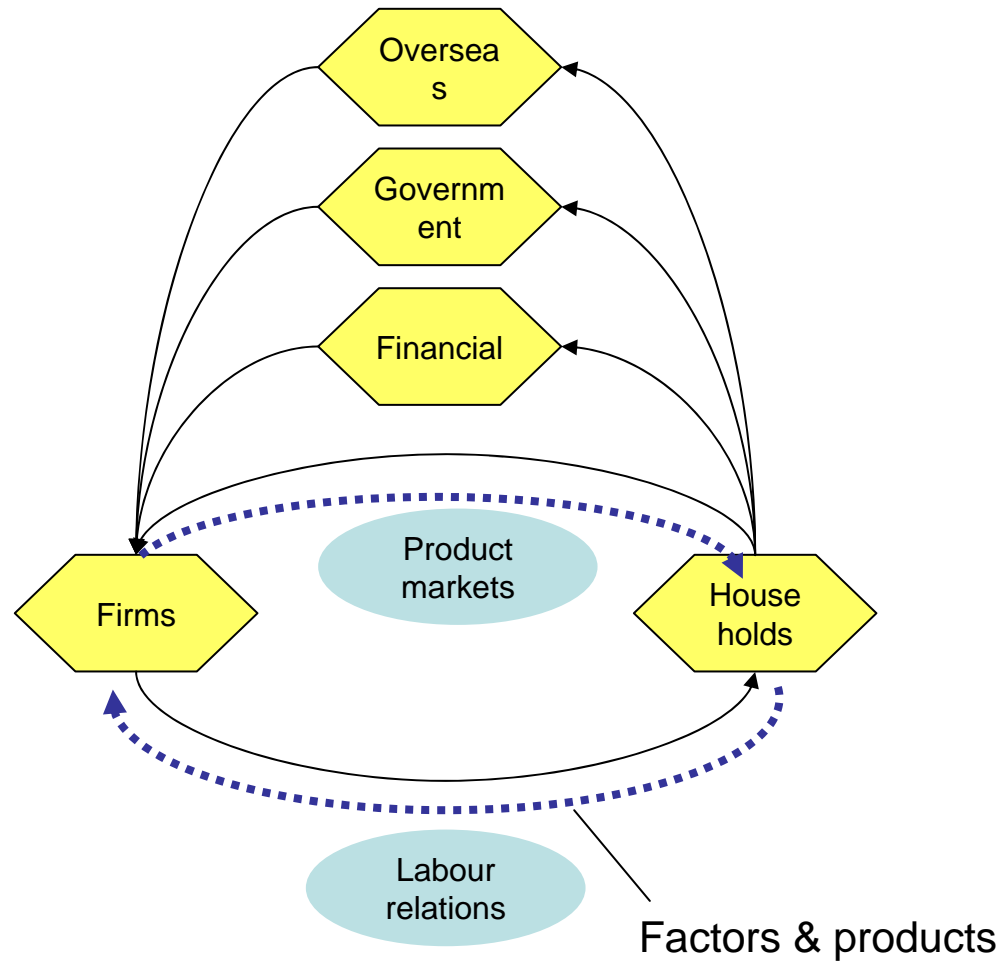
Source: adapted from Handy 1995: Rifkin 1994

Complex relational economy themes

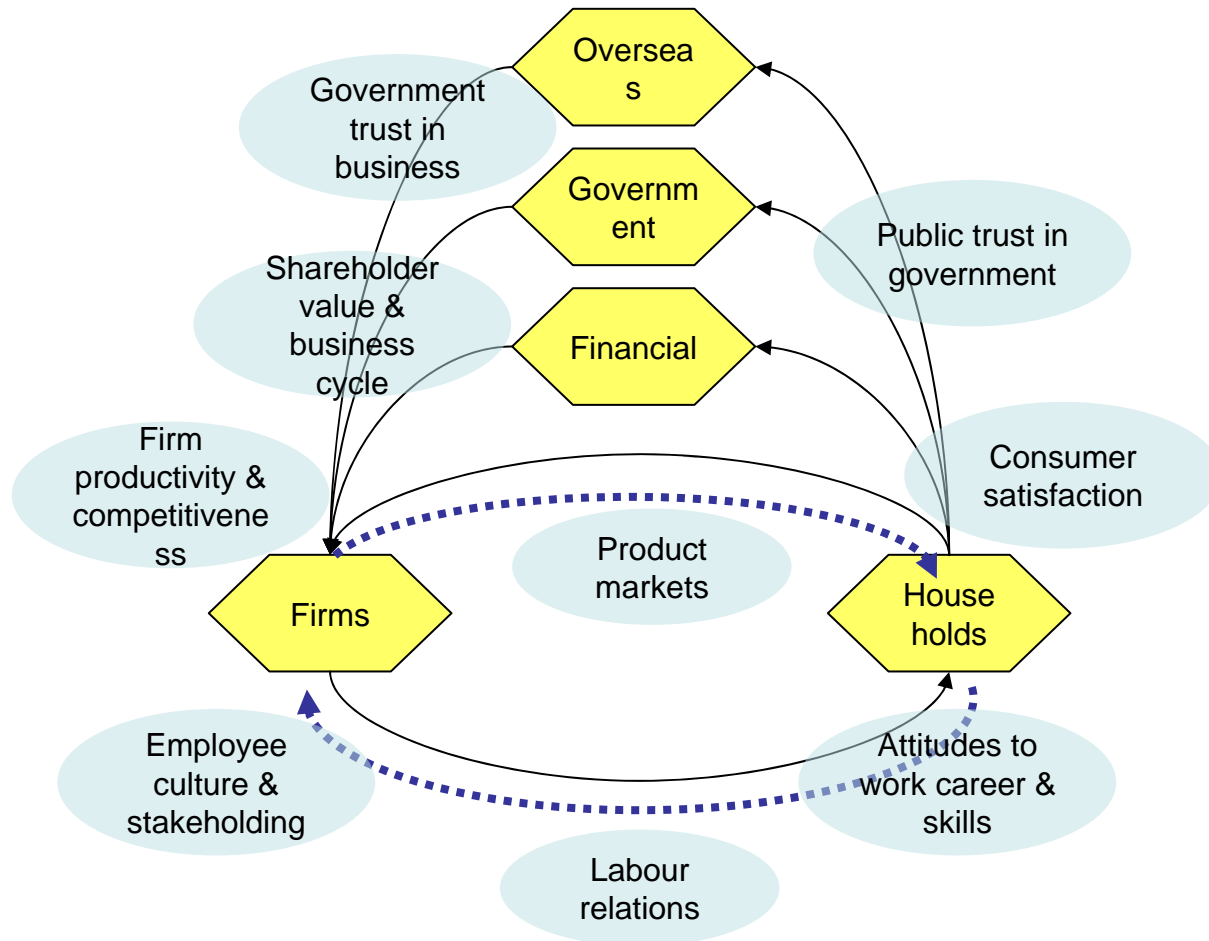
- Complexity occurs both in quantitative & qualitative dimensions of relationships...
- Emergence Where higher order systems emerge from lower order sub-systems
- Resilience & self-organization

- Cognitive polyphasia”
- Freakonomics & Homo economicus
- e.g...blood donations
- ...marriage...
-schoolkids... etc
- Unifying theories or frameworks?????

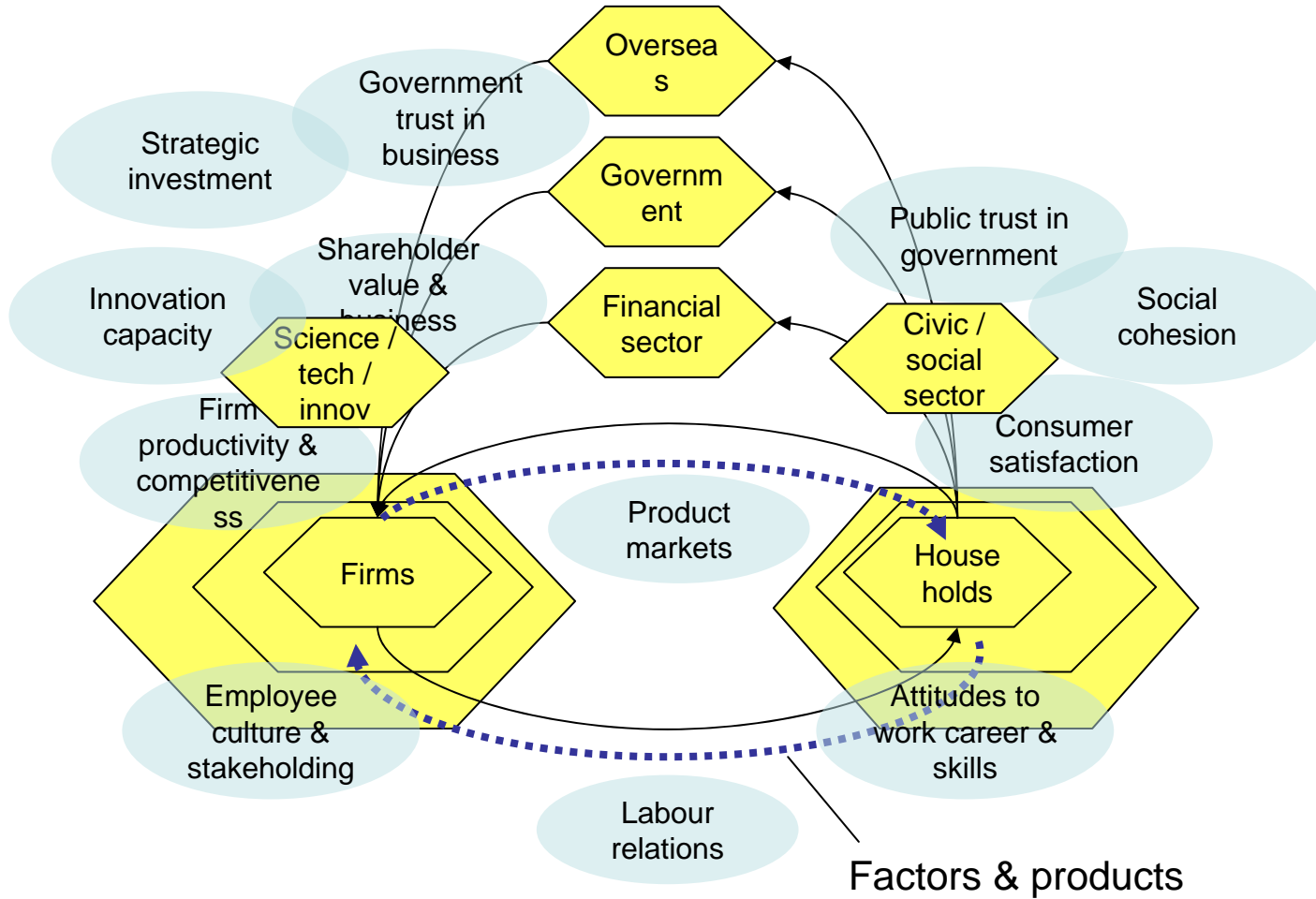
Text book circular flow of money



Circular flow + institutional agendas

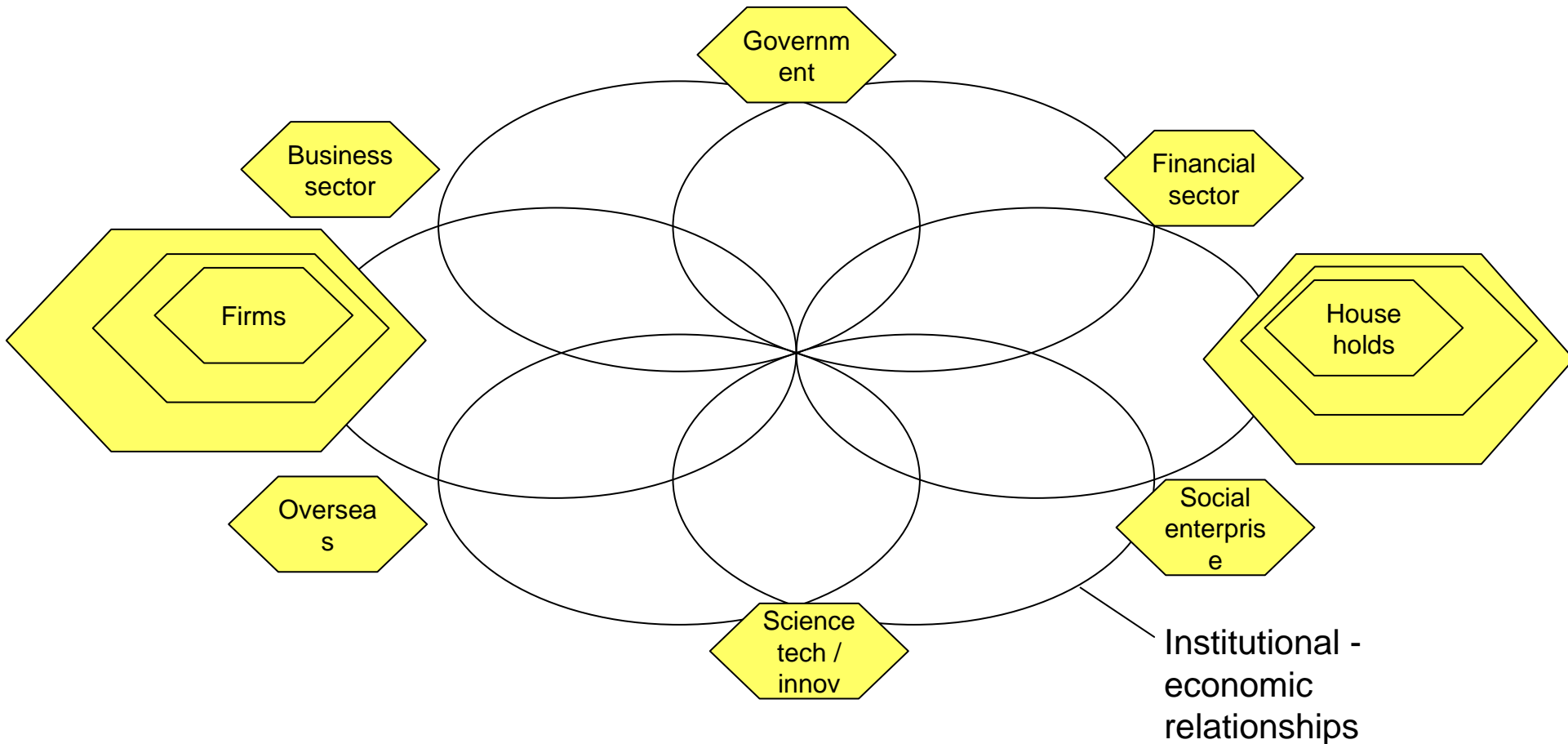


Circular flow + more institutional agendas



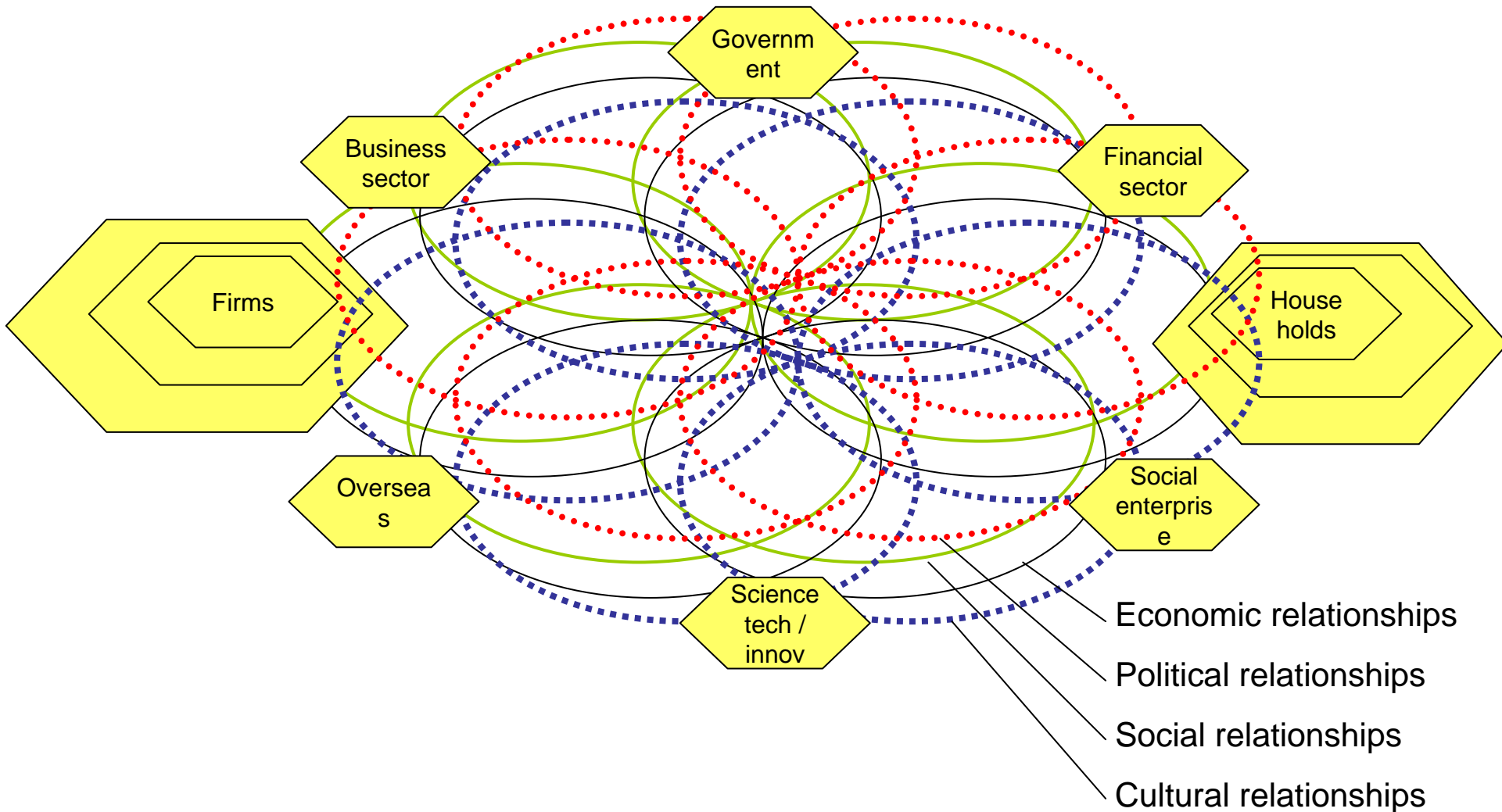
Institutional economy systems

(Turning the circular flow of money into a circle of institutional relationships)



Institutional economy systems

(risk of unmanageable complexity)

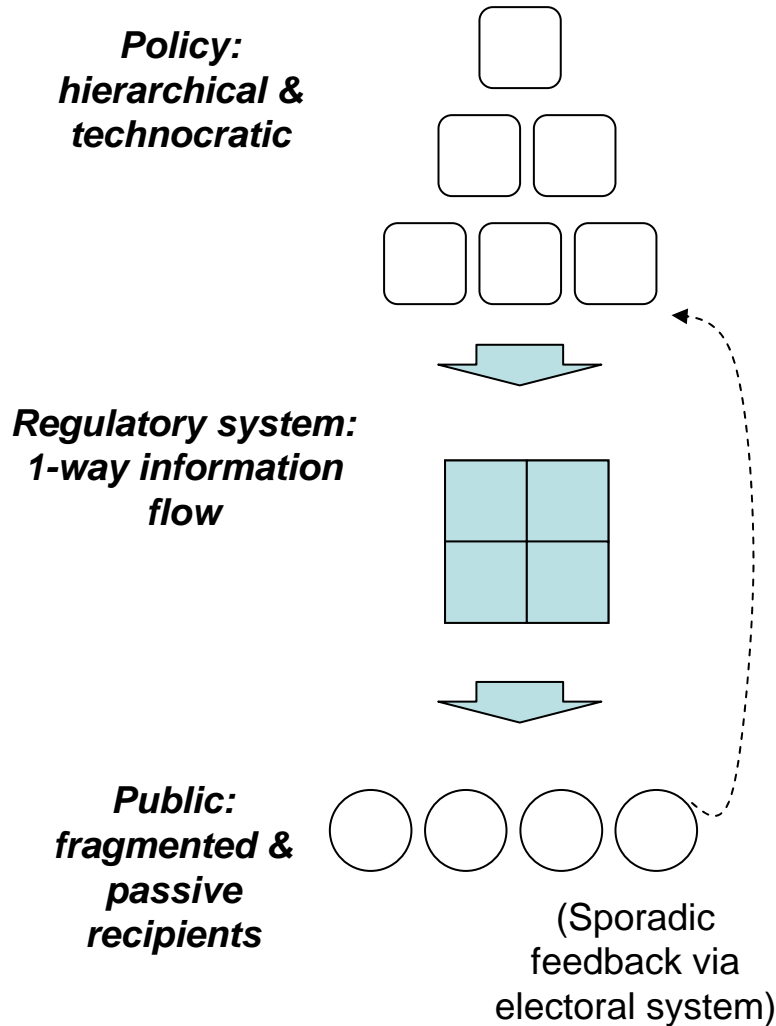


Relational governance – (current trends facilitated by ICT)

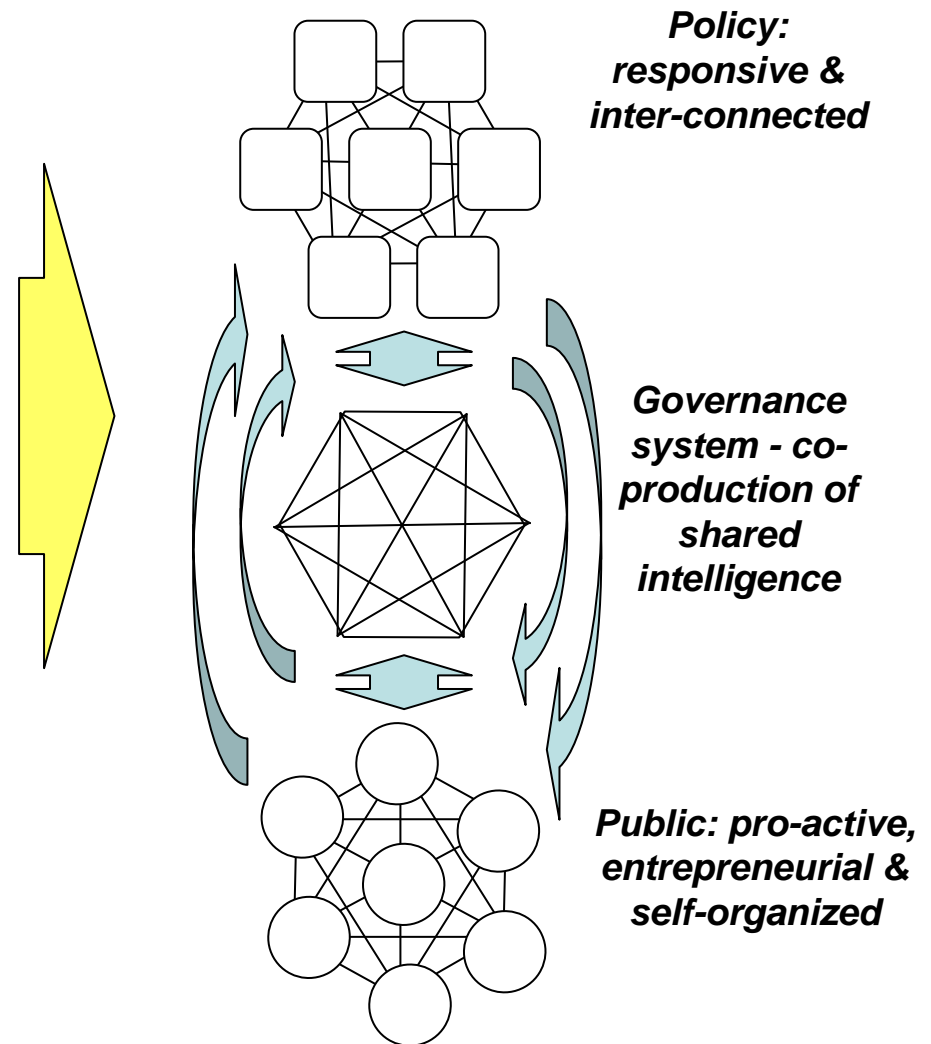


Relational governance - paradigm shift

"INDUSTRIAL DEMOCRACY"



"ECOLOGICAL DEMOCRACY"



Why do policies succeed or fail?



Example – congestion charge

“Congestion charging: FAQs”

“How do you feel about a plan to introduce congestion charging in Greater Manchester? The controversial scheme could bring in almost £3 billion of improvements to public transport. But critics say it's unfair. What's your view?”



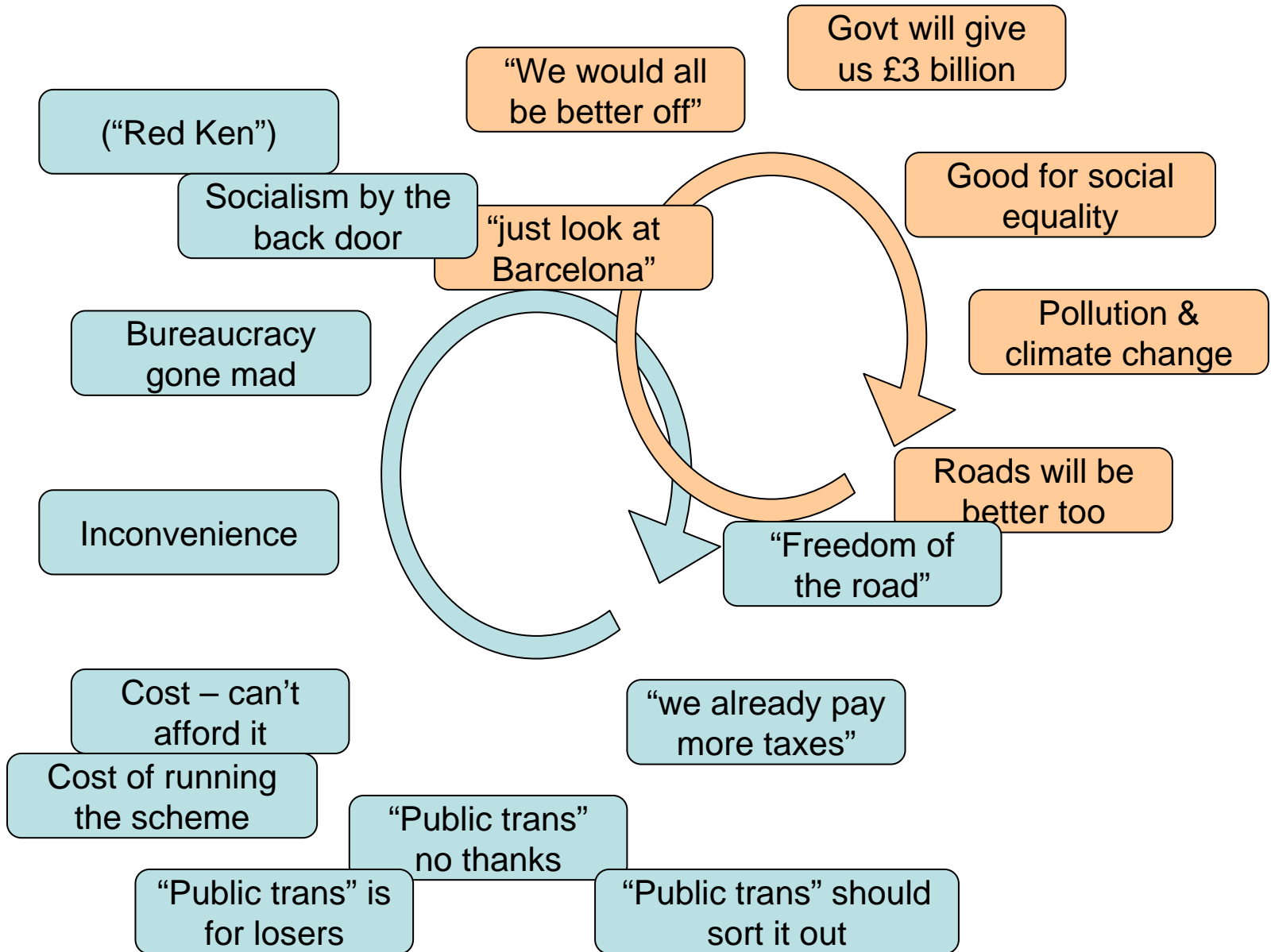
Comments - before

- “we can be called to travel across the city at anytime most often during the planned peak congestion charging hours. Public travel is not an option in the job we do! So will this be taken into consideration?”
- “We tried to work how much it will cost me to get to work and it will be approx £150 per month.”
- “I am disgusted by this hair brained idea that some jumped up prats in offices who have nothing better to do then work out ways to nail us road users for even more tax than we are already paying....”
- “my job is to travel around companys in stockport and manchester, I live by the M60, this means I will cross the cordon approx 6 to 10 times a day.”

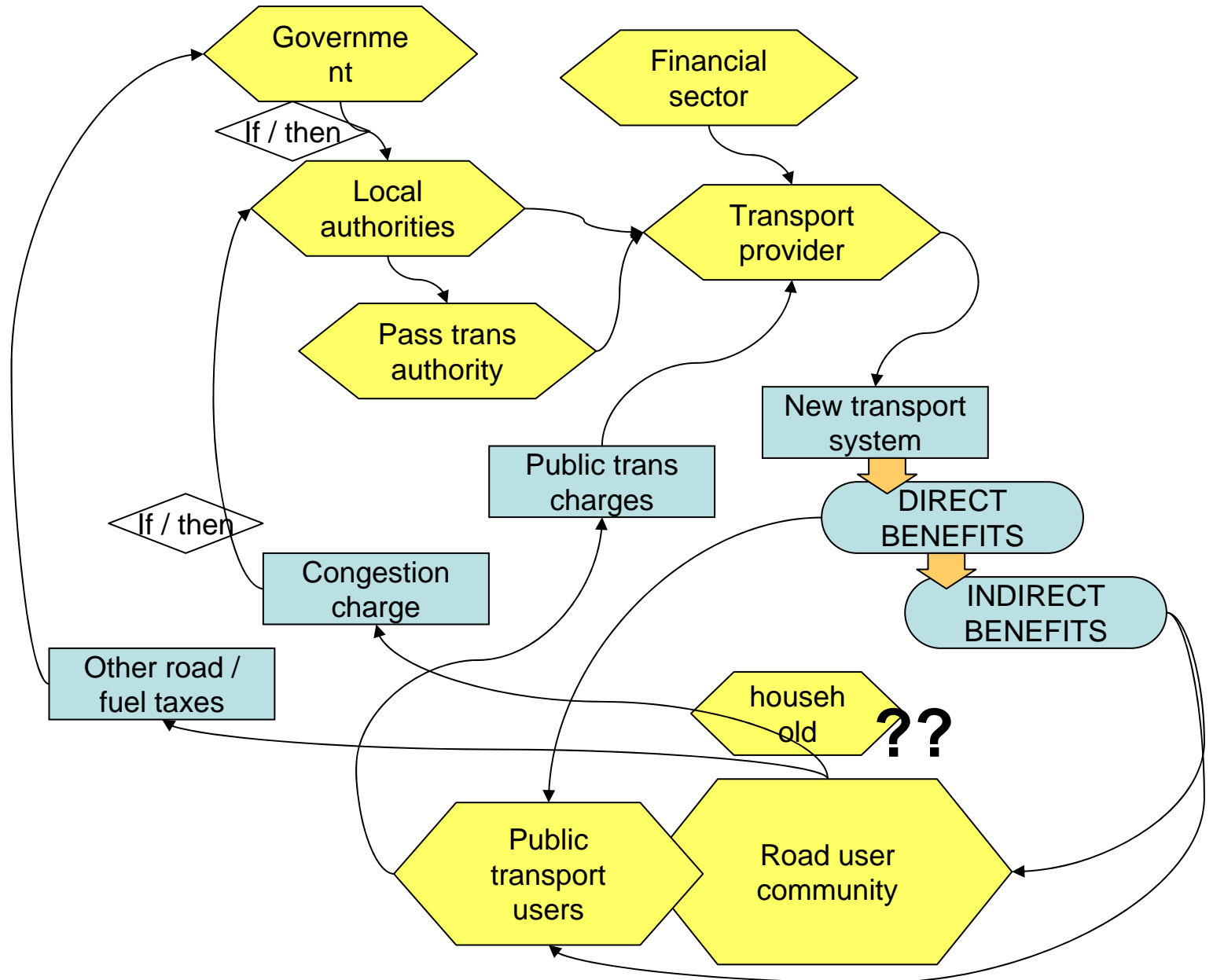
Comments - after

- **“We Won! No Congestion Charge in Manchester!**
- **“We** gave Gordon Brown the finger!
- “Well done all the people of Manchester who voted a resounding "NO" to Labour's stealth tax congestion charge! We hope this site has helped!
- “The Socialist City of Manchester wants to introduce congestion charging to the city. The model will be similar to the scheme Red Ken Livingstone introduced in London (but covering a much larger area).
- “This is where Manchester people get their **one and only opportunity** to stop this crazy proposed highway robbery.

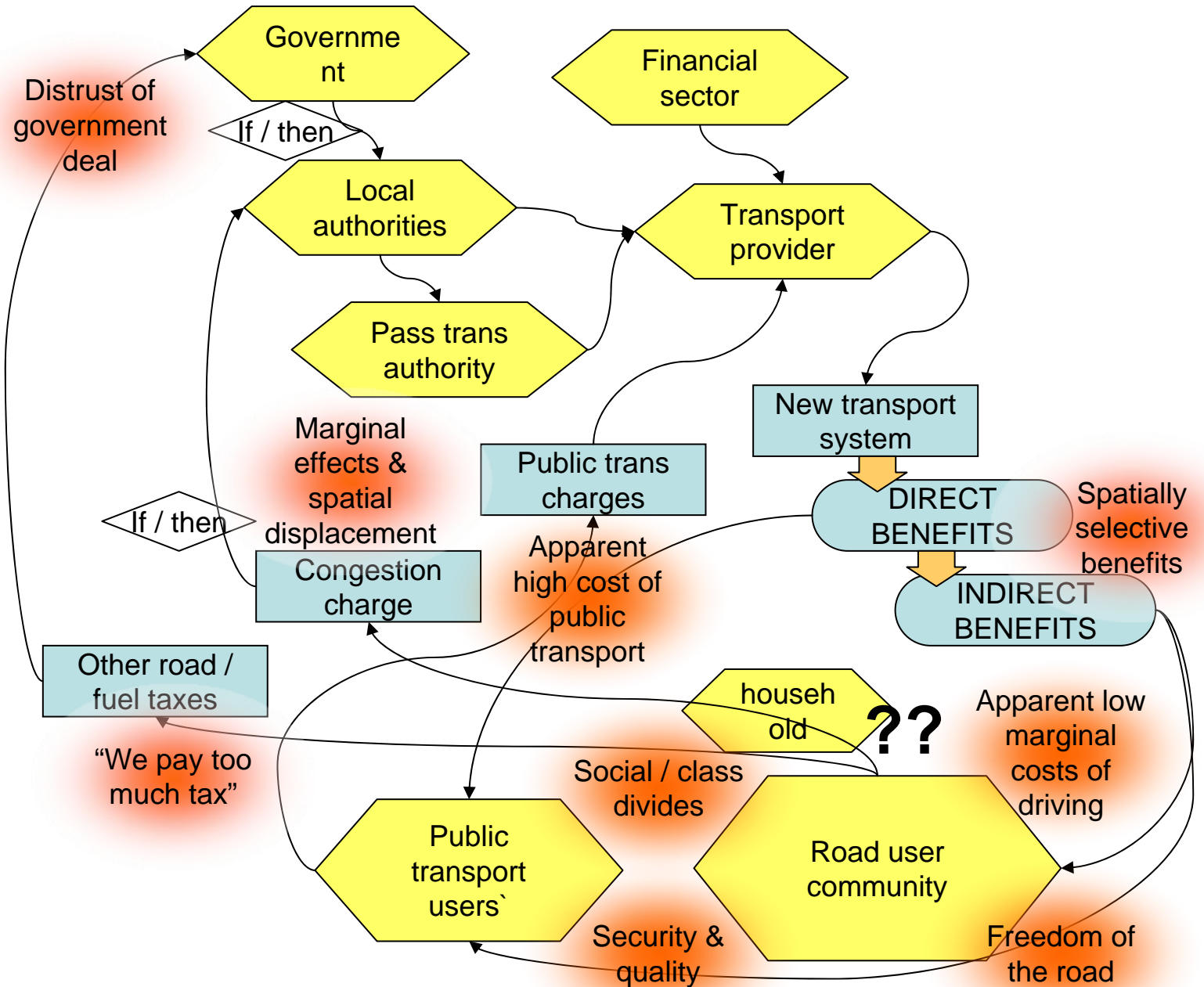
Competing discourses



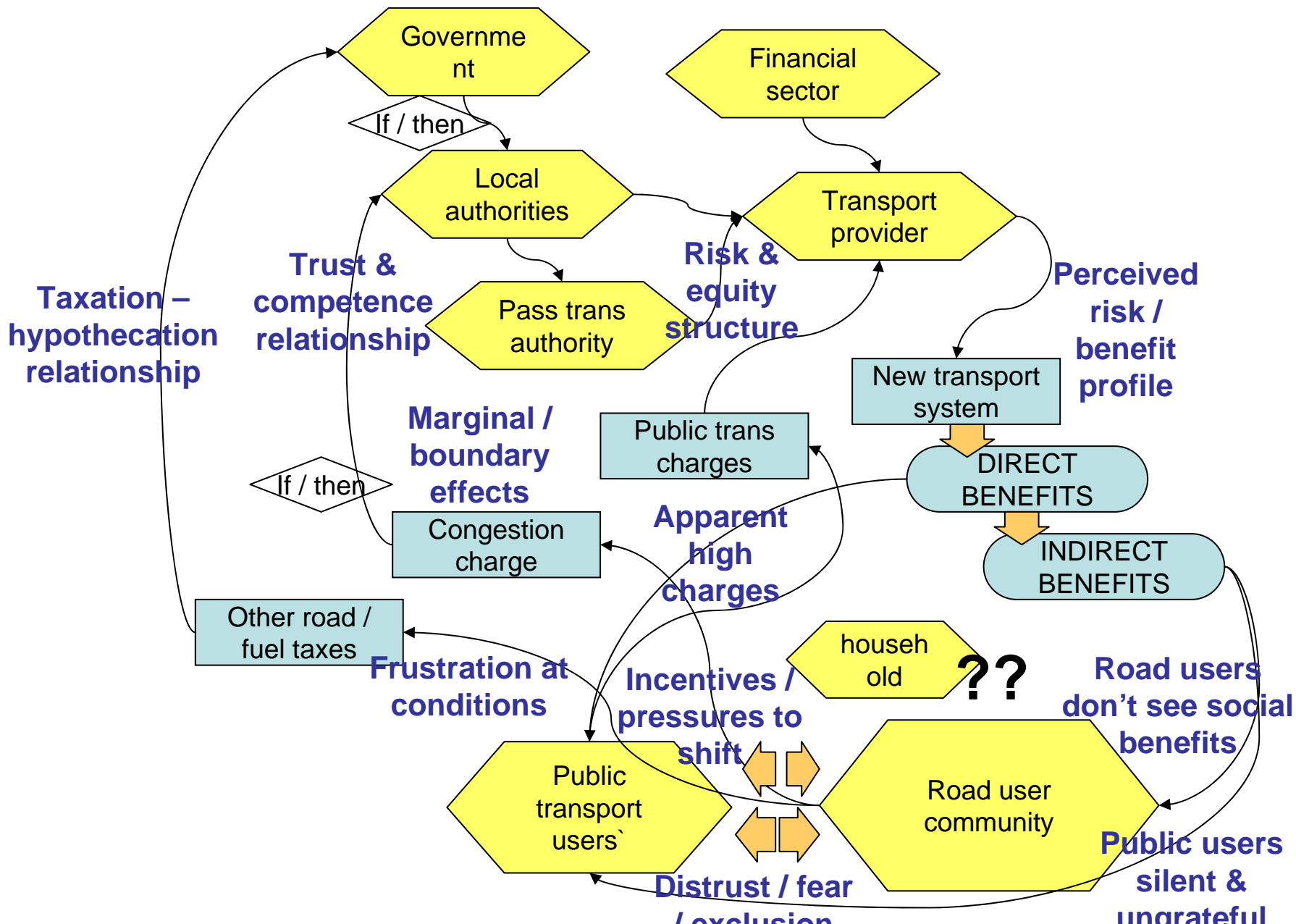
Economic relationships in the proposal



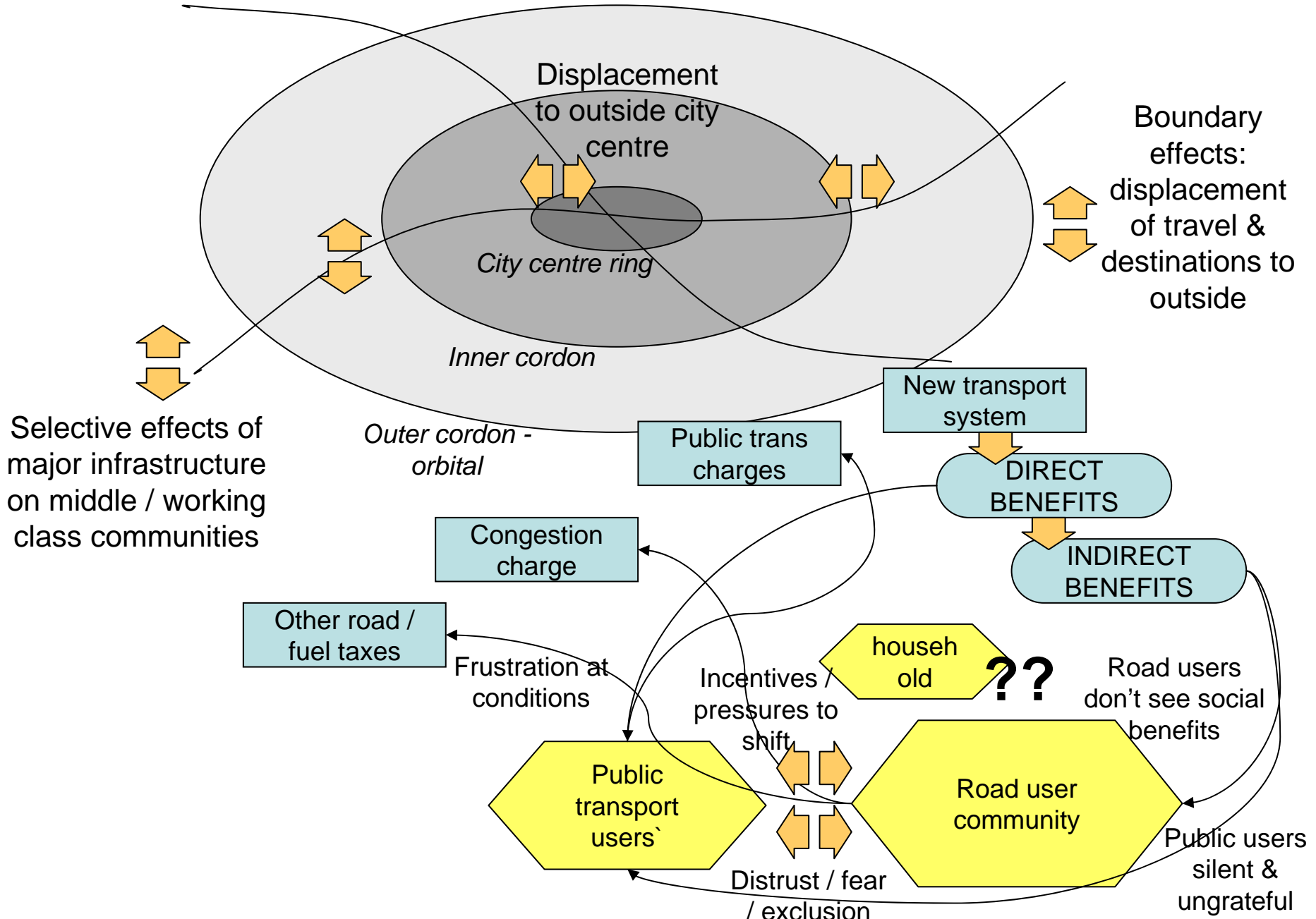
Contested discourses - less explicit in the proposal



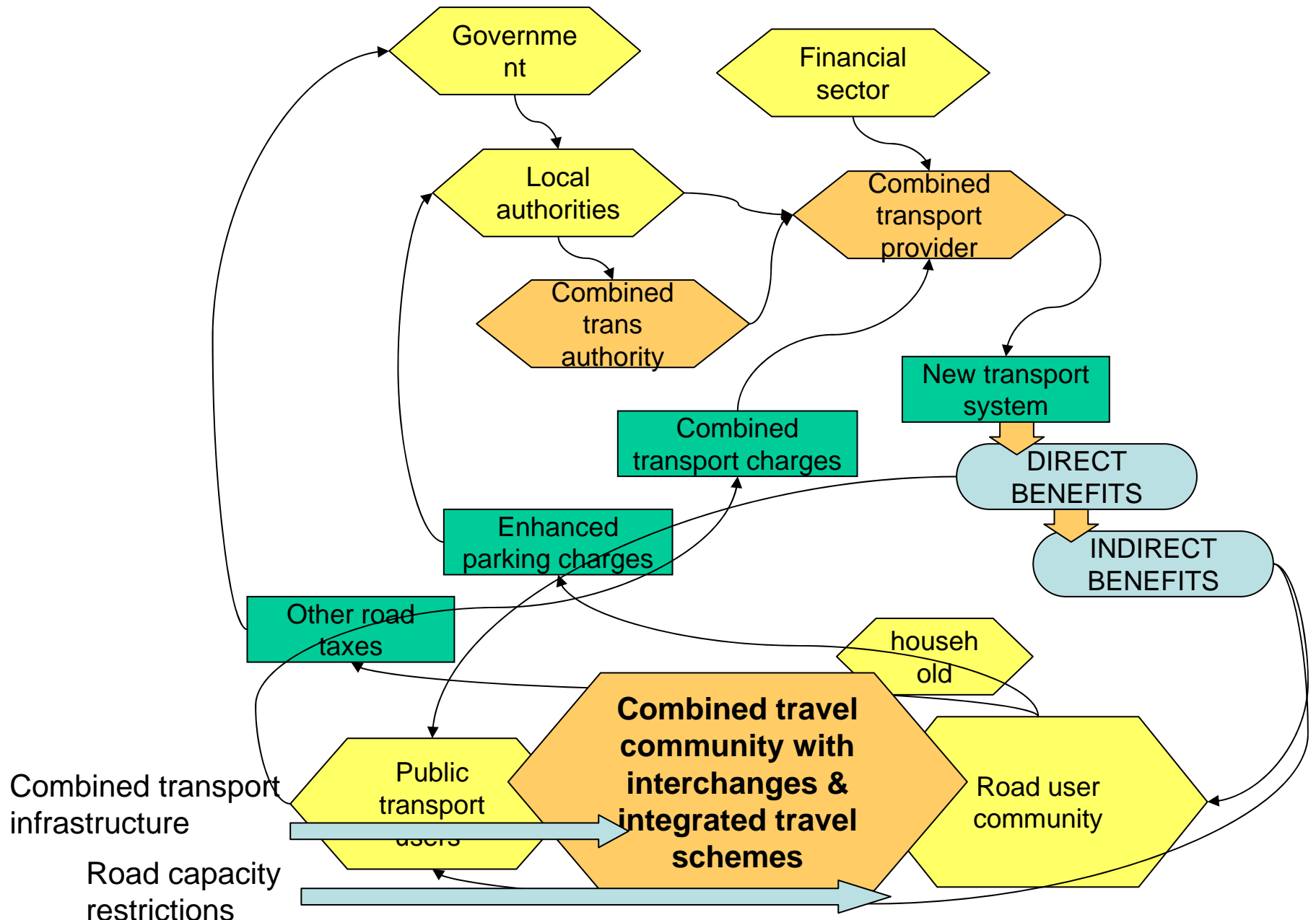
Political – cultural relationships



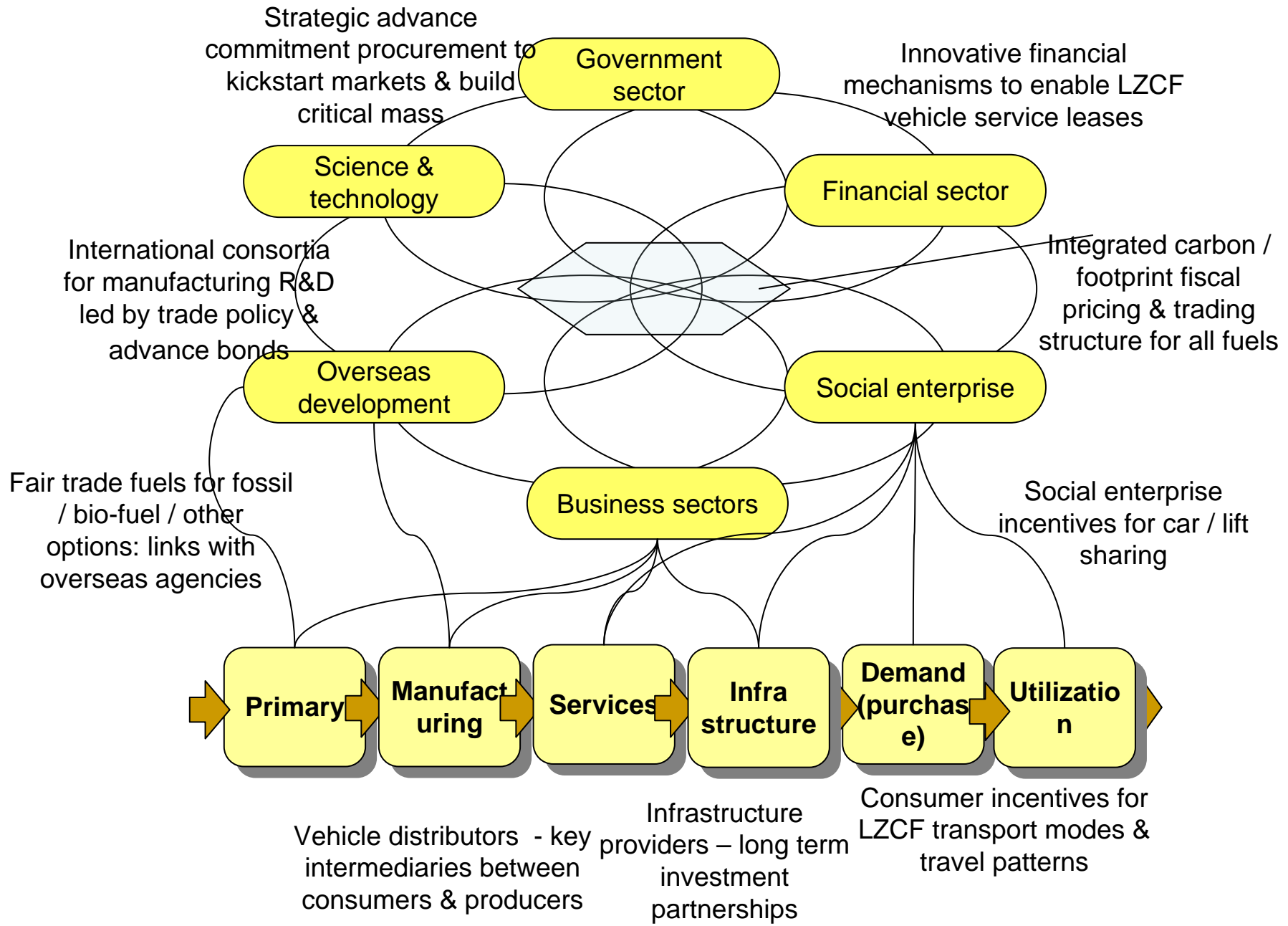
Spatial effects & boundary questions



So what would work better?



Context – One Planet Transport



Pathways – designing policies that work



Pathways

- Stewardship / procurement: stability & strategy through government & public sector:
- Stakeholder finance: re-engaging capital with communities, employees & environment:
- Innovation / enterprise: opportunity seeking in the wider innovation 'system':
- Service chain: advance investment & leasing models along the supply chain:
- Social enterprise: mobilizing the energy & commitment of citizens & communities:
- Fair trade: engaging with overseas development & global strategy.

- Public
- Financial
- STI sectors
- Business
- Social & civic
- Overseas

Pathways design

GENERALLY CONTAIN

- Economic flows & incentives
- Political benefits
- Ideological commitment
- Social rewards...
- all woven together in a self-organizing value chain / loop

EACH PATHWAY -

- Based on a 'paradigm' or 'agenda'
- Points towards financial instruments
- Fiscal policy
- Institutional design
- Social & cultural links

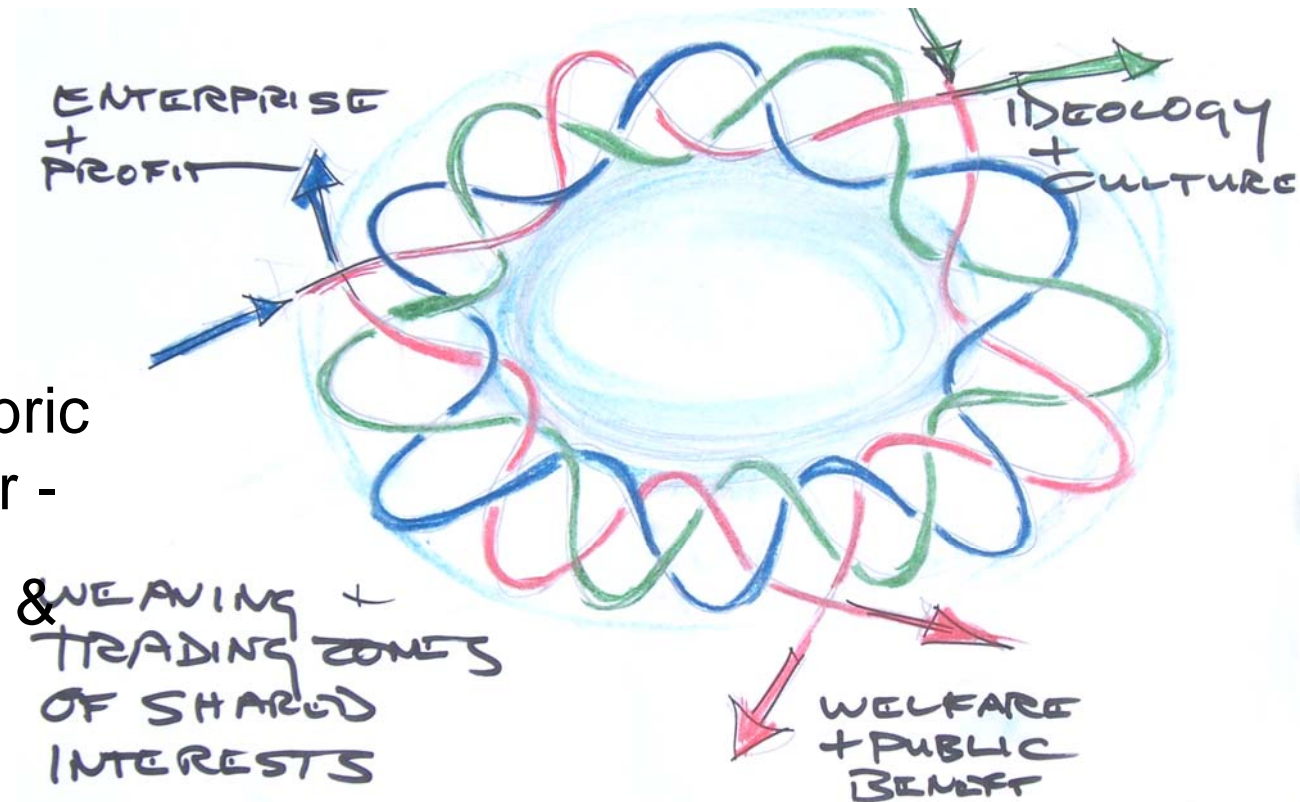
Weaving a self-organizing web of relationships

Mobilization of stakeholder interests:

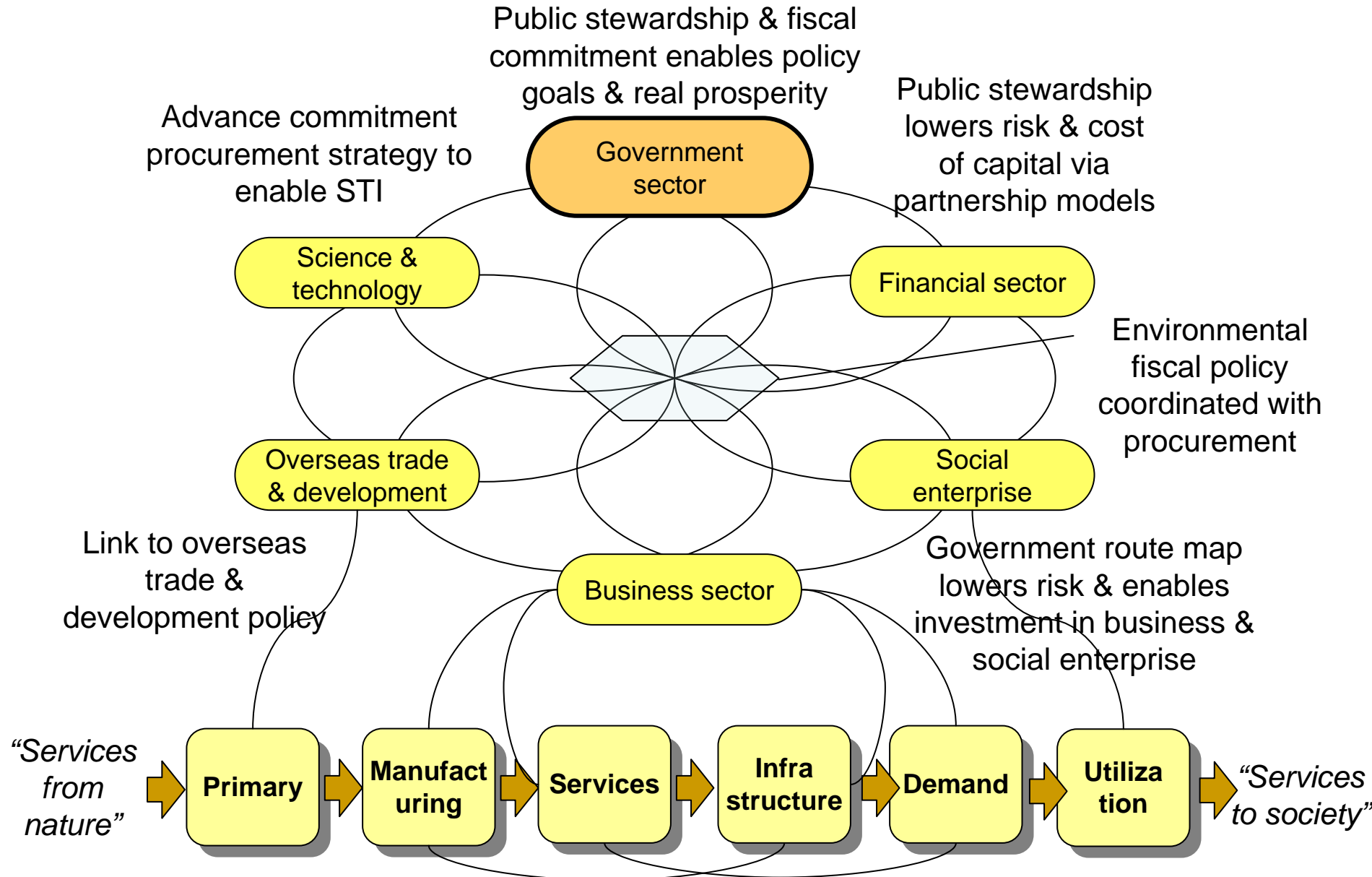
- enterprise / economic
- ideology / cultural
- power / political
- emotional / social

Weaving a social fabric which holds together -

trading of resources & motives for shared intelligence



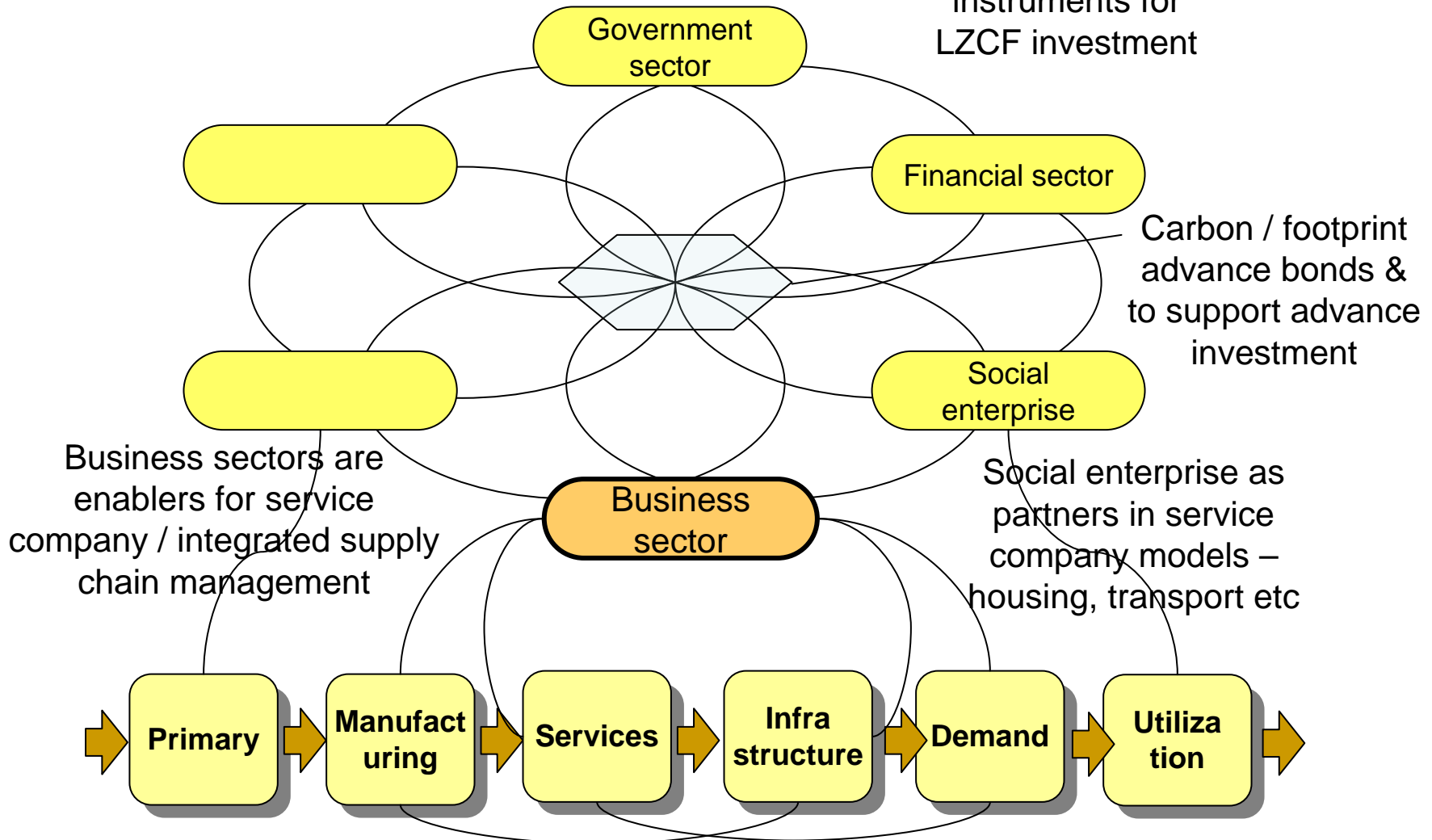
Pathway 1 - Stewardship / procurement



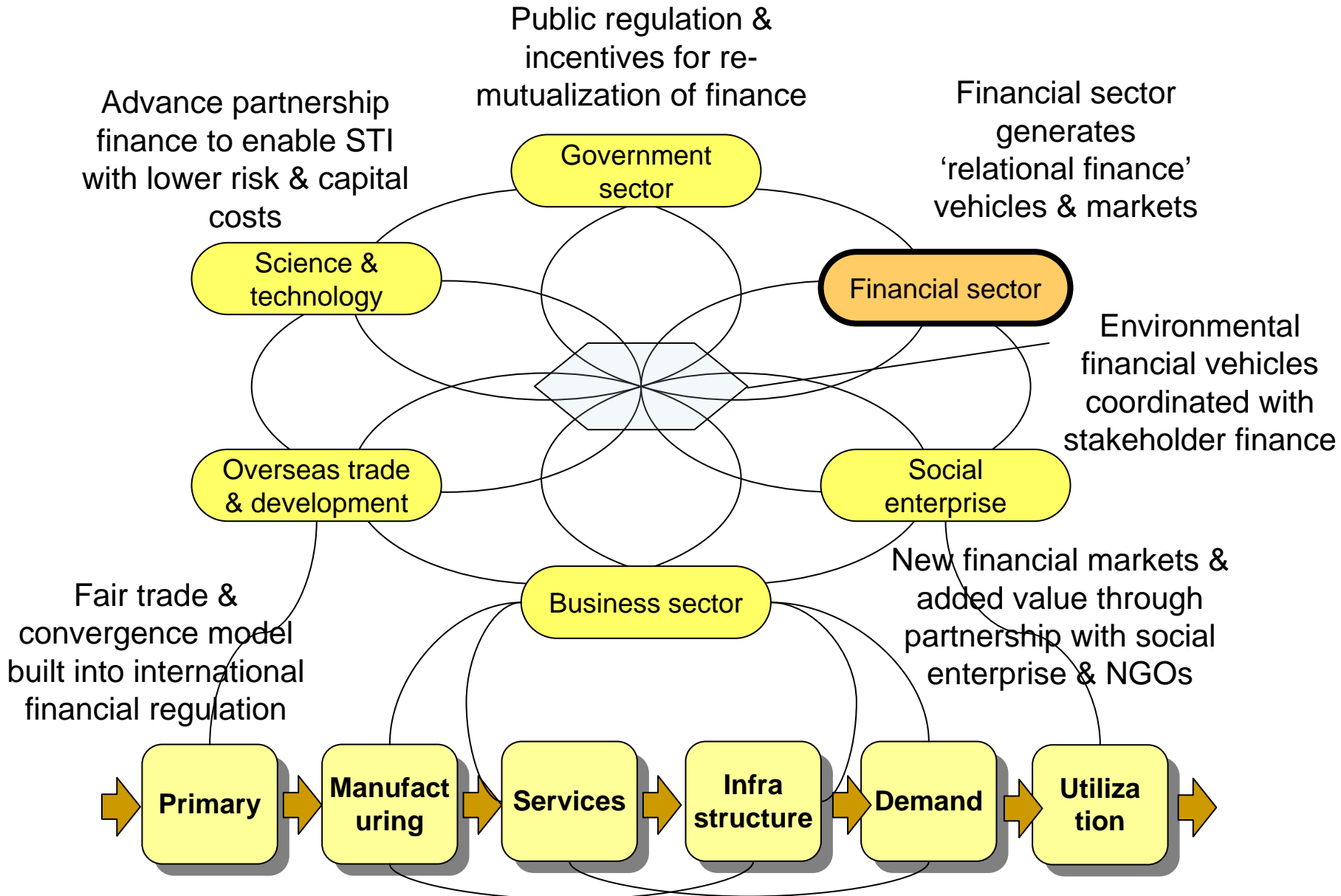
Pathway 2 – service value chain

Service value chain model
linked into sector route maps to
lower risk & raise commitment

Financial
instruments for
LZCF investment

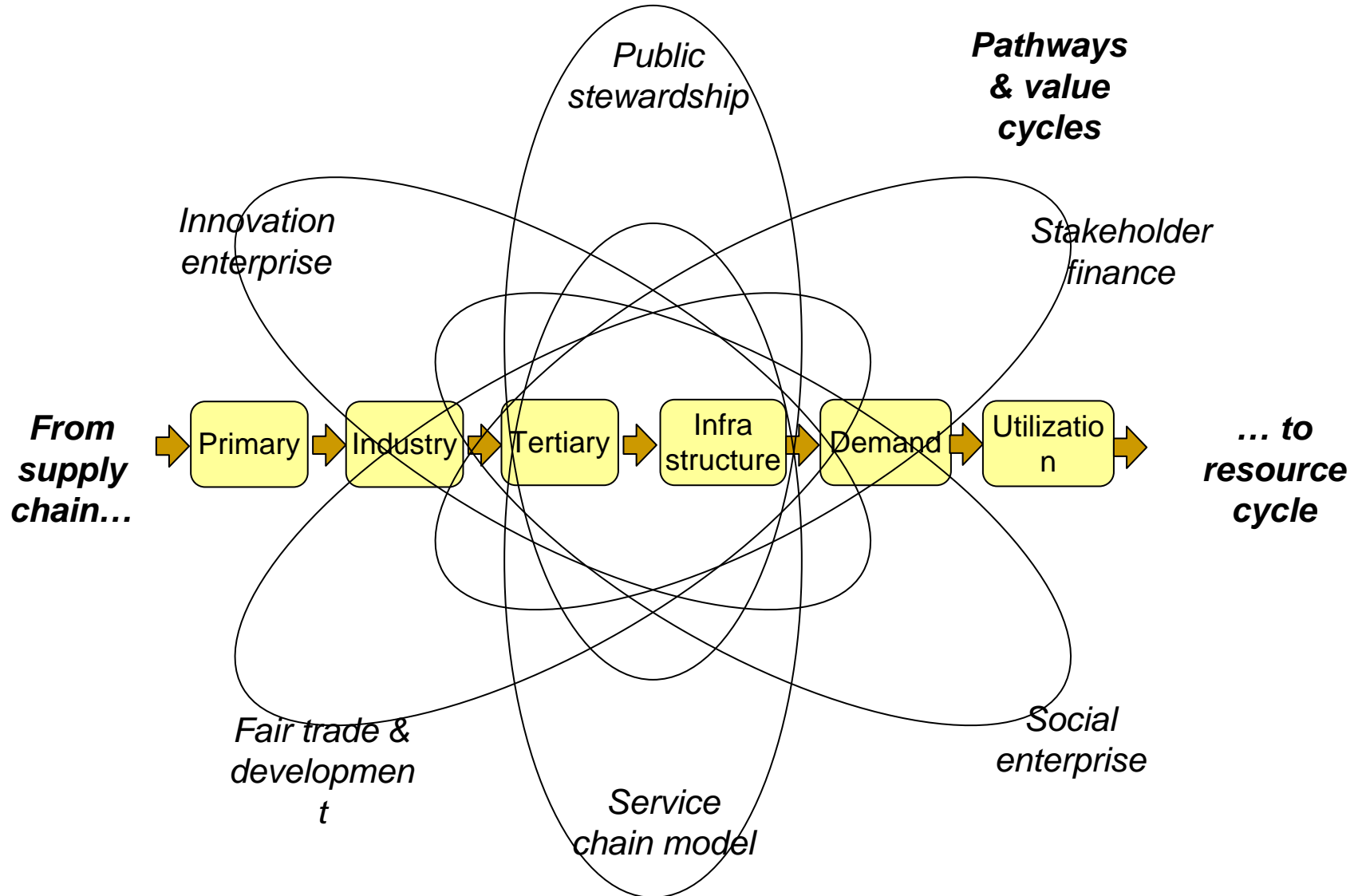


Pathway 3 – stakeholder finance..... etc



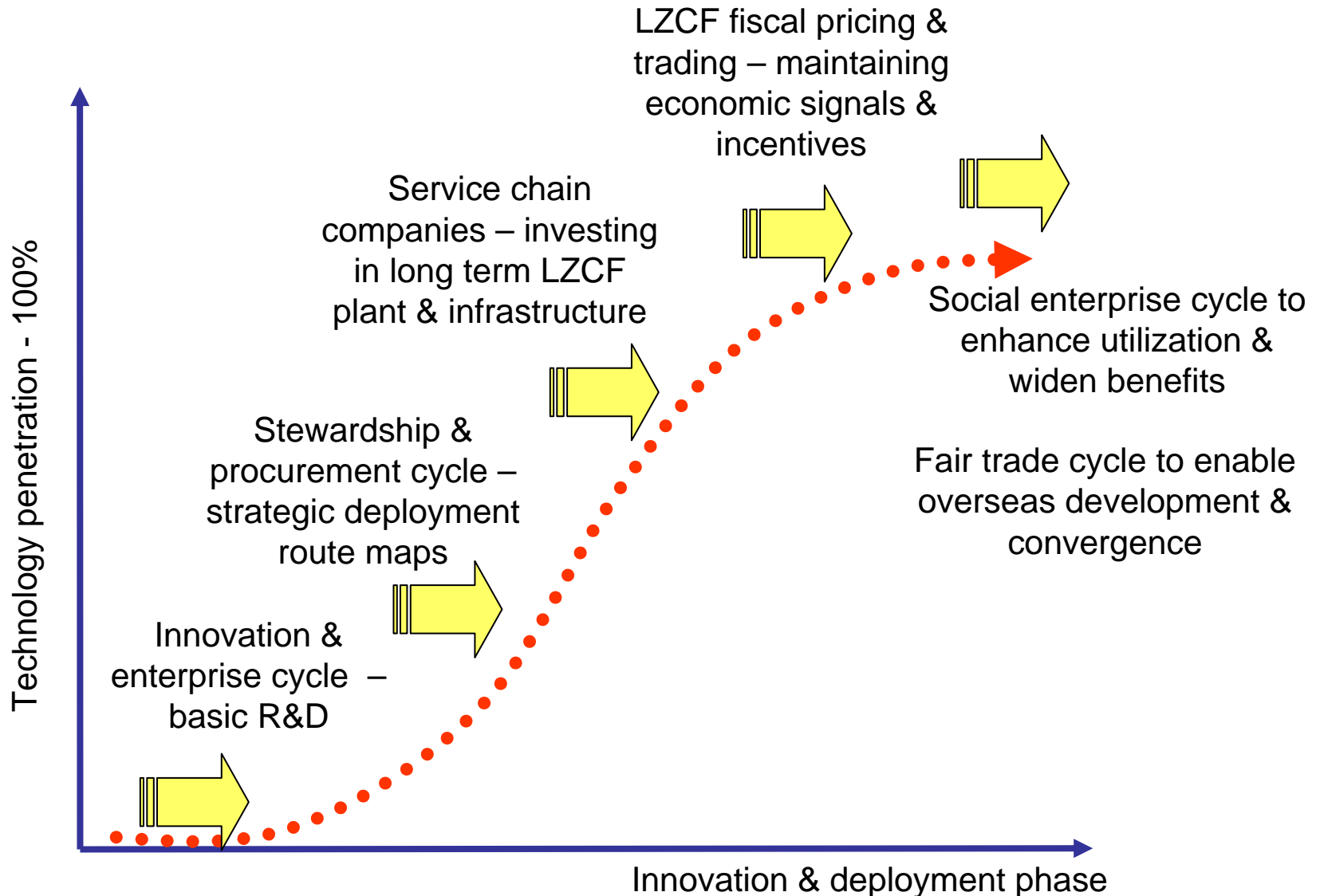
Pathway	Value cycle	Economic models	Financial instruments	Typical themes & wedges	Lead sector	Paradigm shift & debate
Stewardship	Public procurement cycle	Partnership collateral	Public green bonds	Public transport: Waste & resources	Public sector	Market vs state
Stakeholder finance	Responsible investment	Securitization	Performance bonds	Energy & water: Transport:	Finance sector	Ownership v stakeholding
Innovation enterprise	Technology advance cycle:	Futures markets	Advance commitment bonds	Products: Services	STI sectors	Strategy v opportunity
Re-socialization	Social trading / investment cycle:	LETS & social markets	Social reinvestment bonds	Food: Tourism	Social sector	Production v consumption
Service chain	Service company / resource chain	Integrated chain management	Upstream / downstream credits	Buildings: Cars: Appliances	Business sector	Efficiency v efficacy
Convergence	Fair trade cycle:	Fair trade & ecosystem markets	Ecosystem credits	Food: Construction Minerals	Overseas sectors	Local v global

Putting the pathways together...



Innovation & technology curve

Typical applications of the OPEN pathways to the technology innovation & deployment curve



Applications – eco-fiscal markets



Macro-economic issues

QUESTIONS

- From 'green new deal' to 'new kind of deal'?
- Stimulus – centred on more of the same growth?
- When & how much peak oil effect?
- How can environmental capital be embedded in national accounts
- How much global convergence?

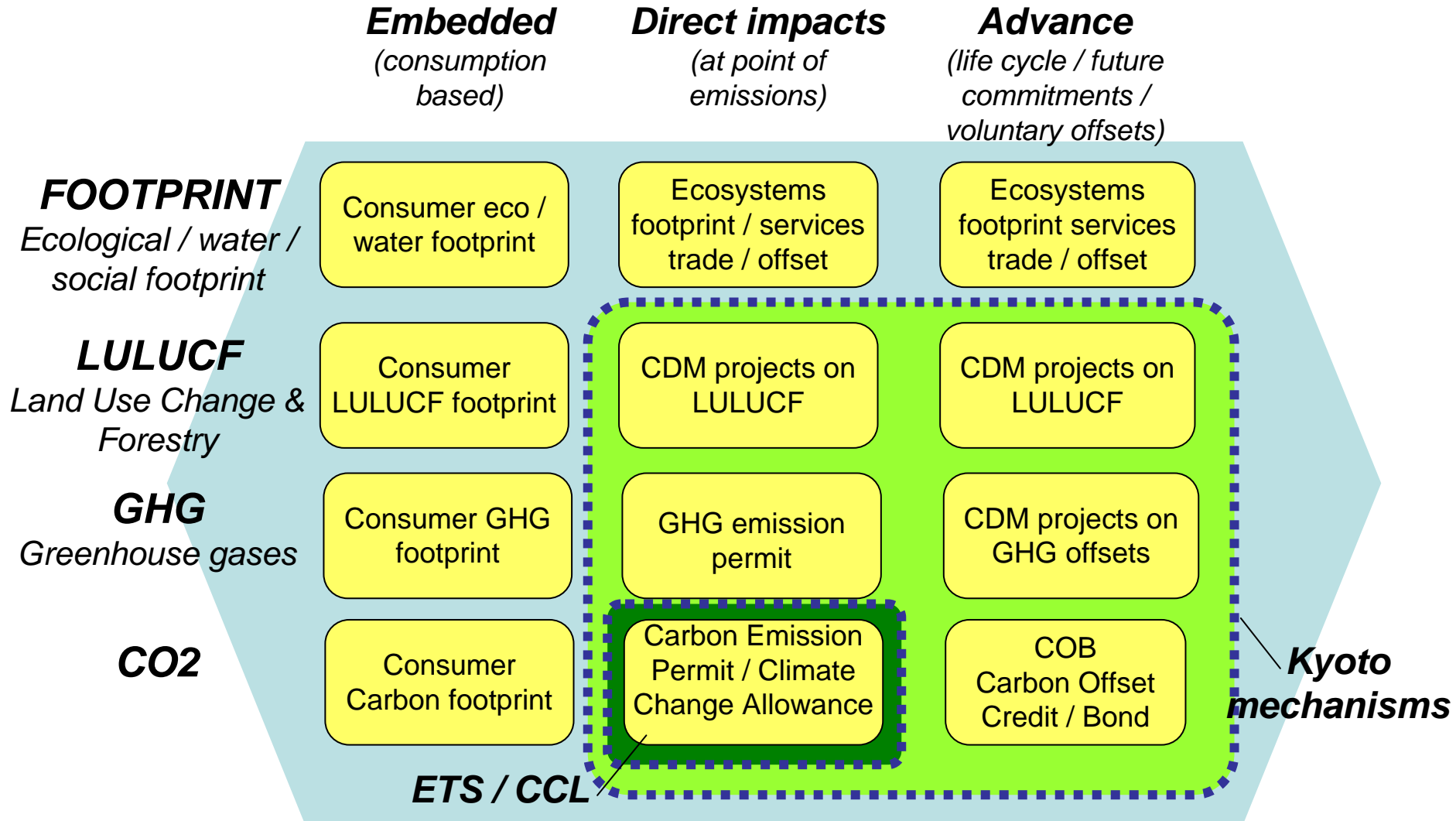
MACRO SCALE EFFECTS

- Securitization of macro scale energy price
- Deeming of upfront carbon offsets
- Resource scarcity & price effects
- Transfer activity to social enterprise sector
- Stakeholder finance – mutualization effects.

Environmental markets & fiscal policies

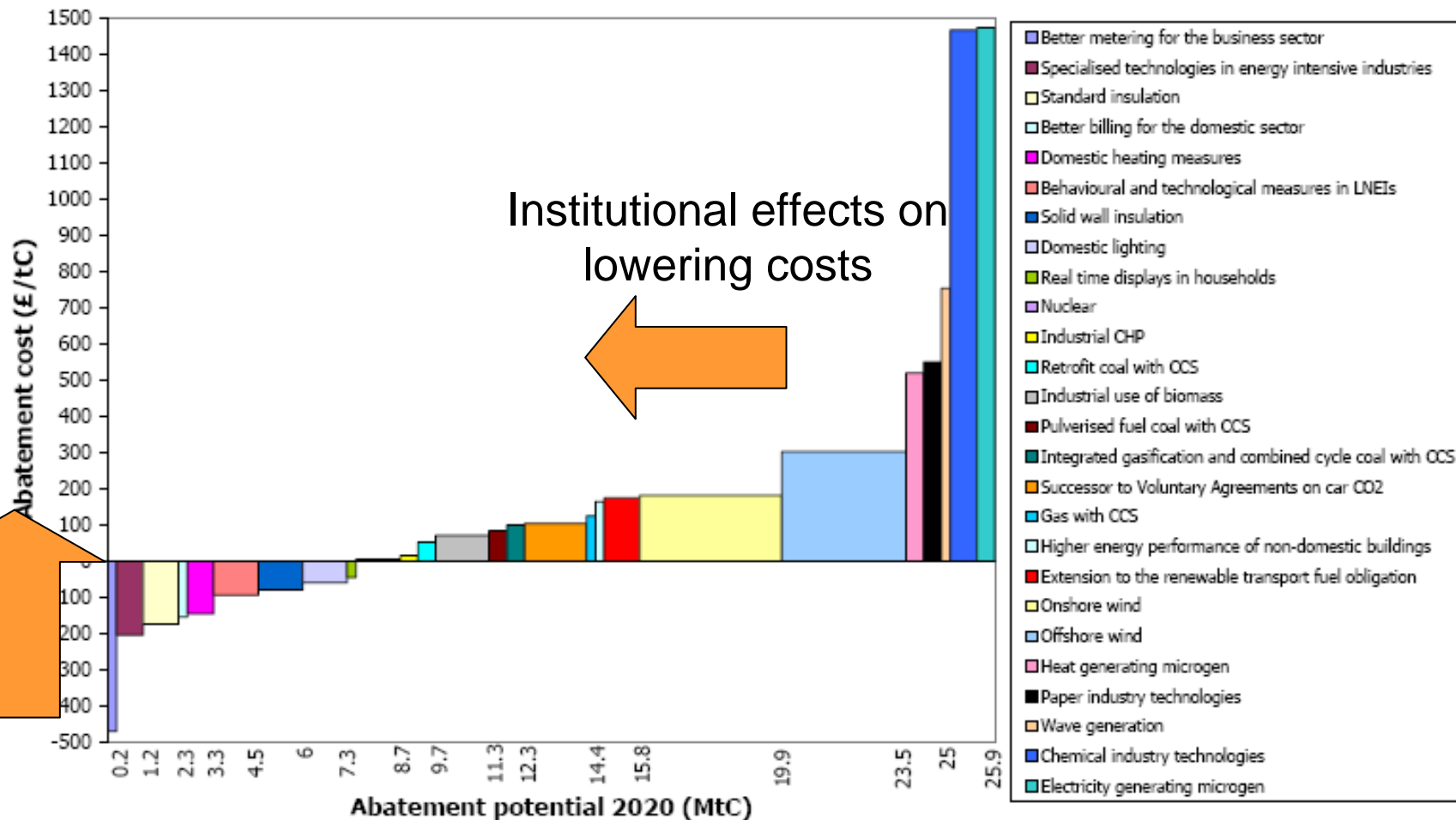
Integrated system covering wider impacts both upstream / downstream:

'Footprint' refers to a range of specific indicators, not already included in the climate change basket: ecology (i.e. bio-productive land use), water, minerals, various social indicators.



Carbon abatement marginal cost curve

Estimates as at 2020: based on McKinsey Global Institute, 2007: CBI, 2007

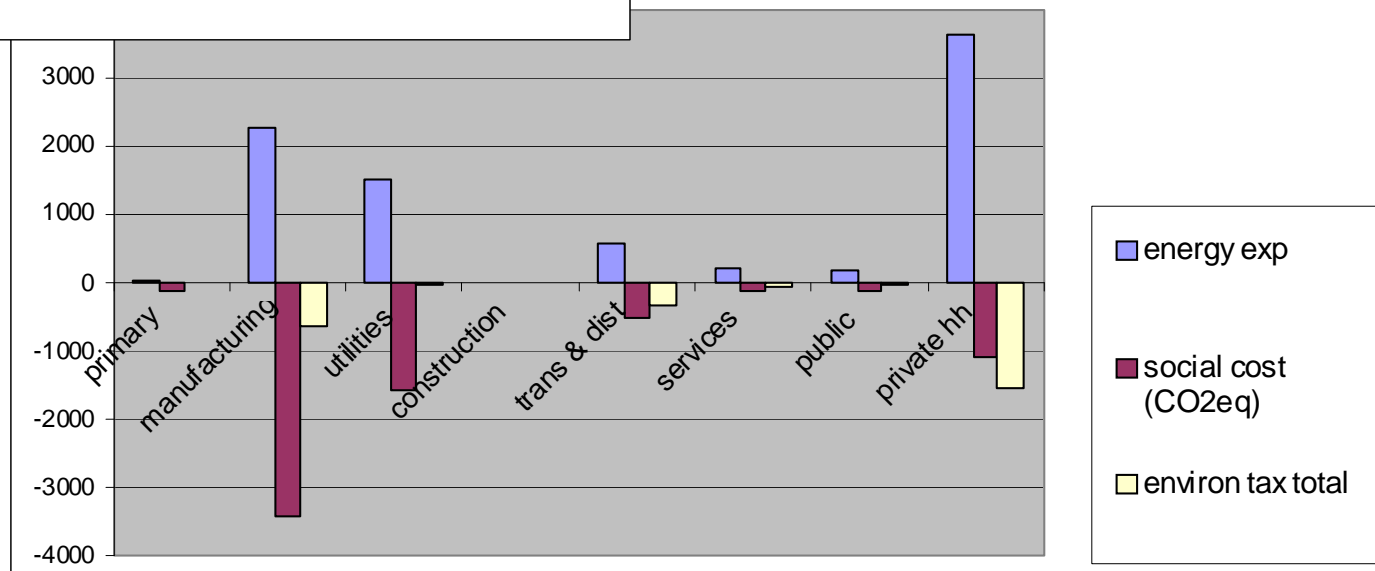
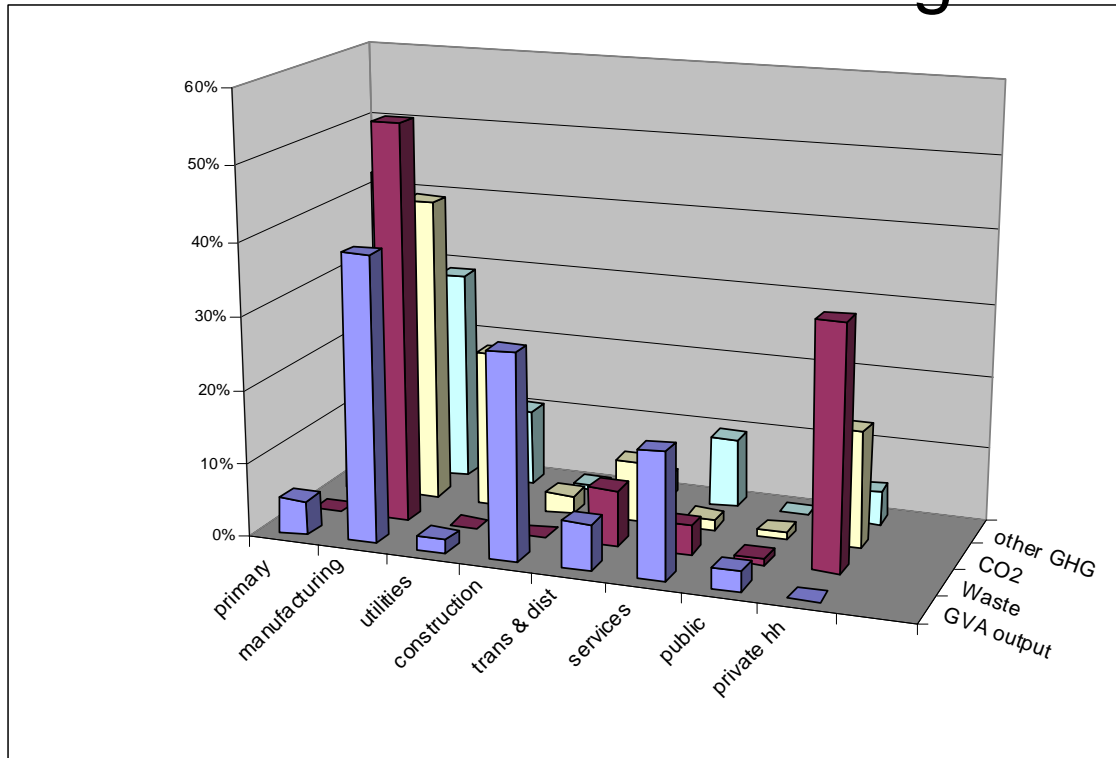


Rising oil price effect on changing baseline

Applications – cities & buildings



Supply chain analysis for a One Planet housing stock



Pathway applications & modelling approach

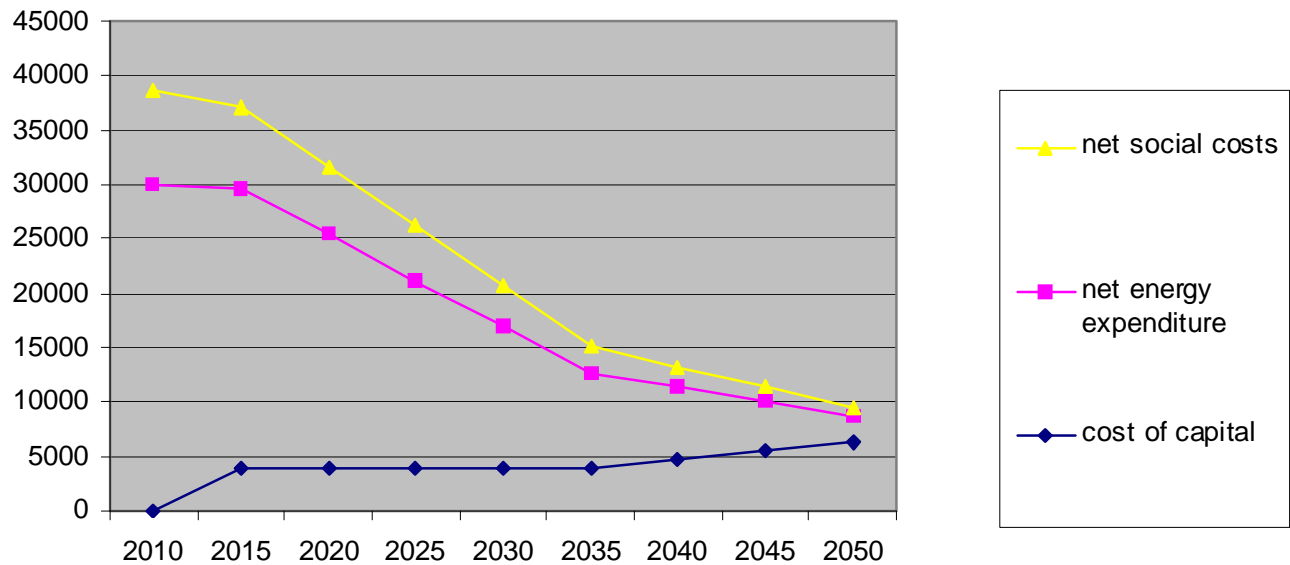
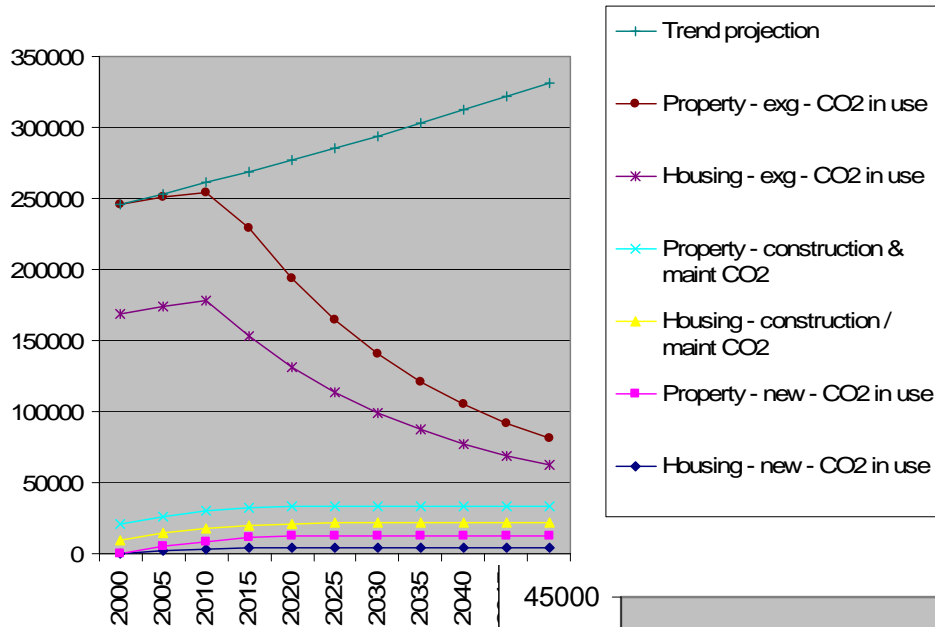
Service chain pathway (ESCO):

- MAC curve ~~~ hurdle rate ~~~ cost of capital
- Rate of penetration & deployment in existing stock
- Assumptions on behaviour in household energy demand
- Sensitivity to: oil price, cost of capital, scheme overheads, scale effects

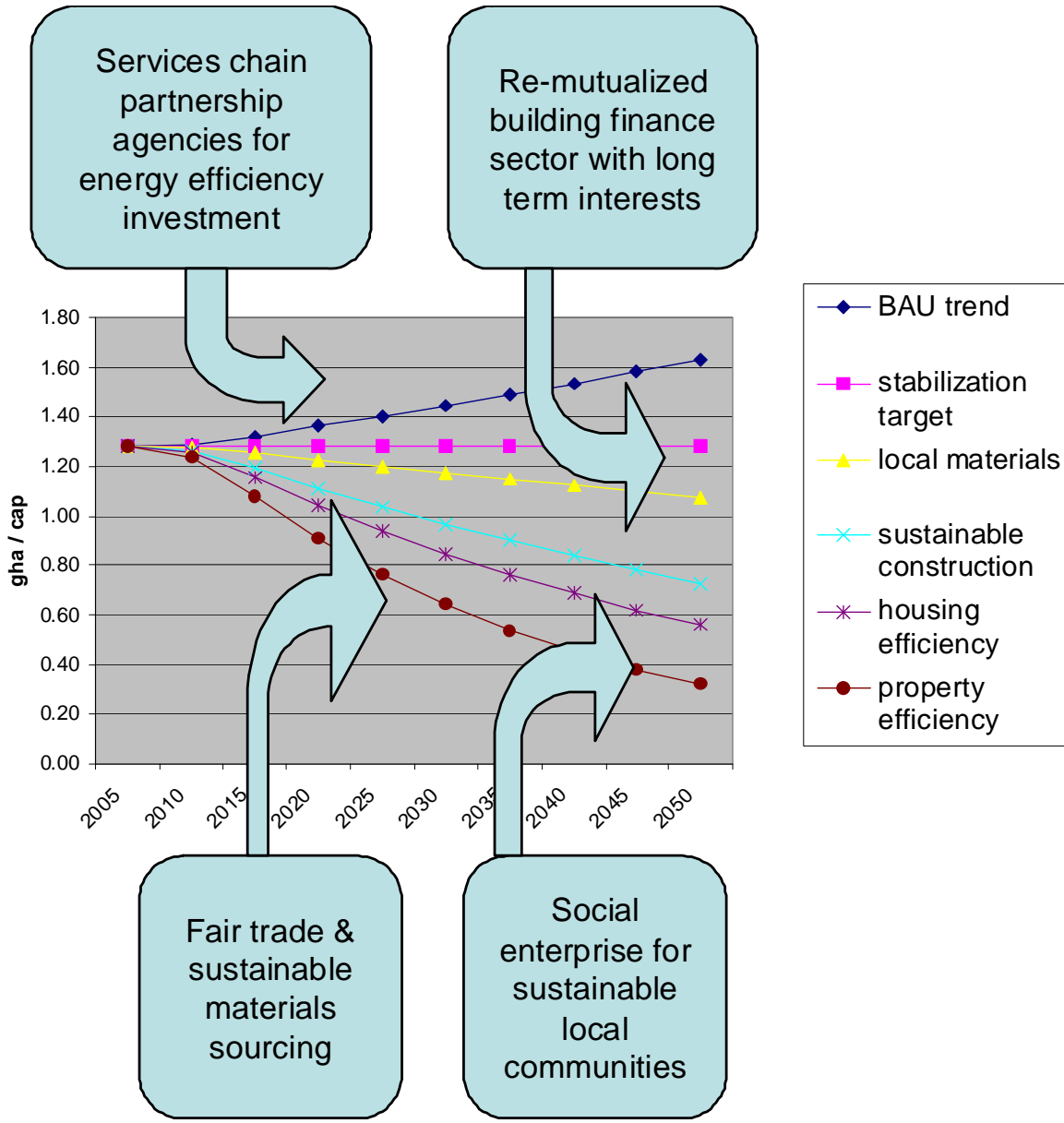
Stewardship & procurement pathway:

- Public & social housing stock as demonstration & procurement market:
- LZCF Construction & materials innovation / skills programme
- Construction & materials re-cycling programme:
- Sensitivity to: recovery rates, design innovation, industry uptake

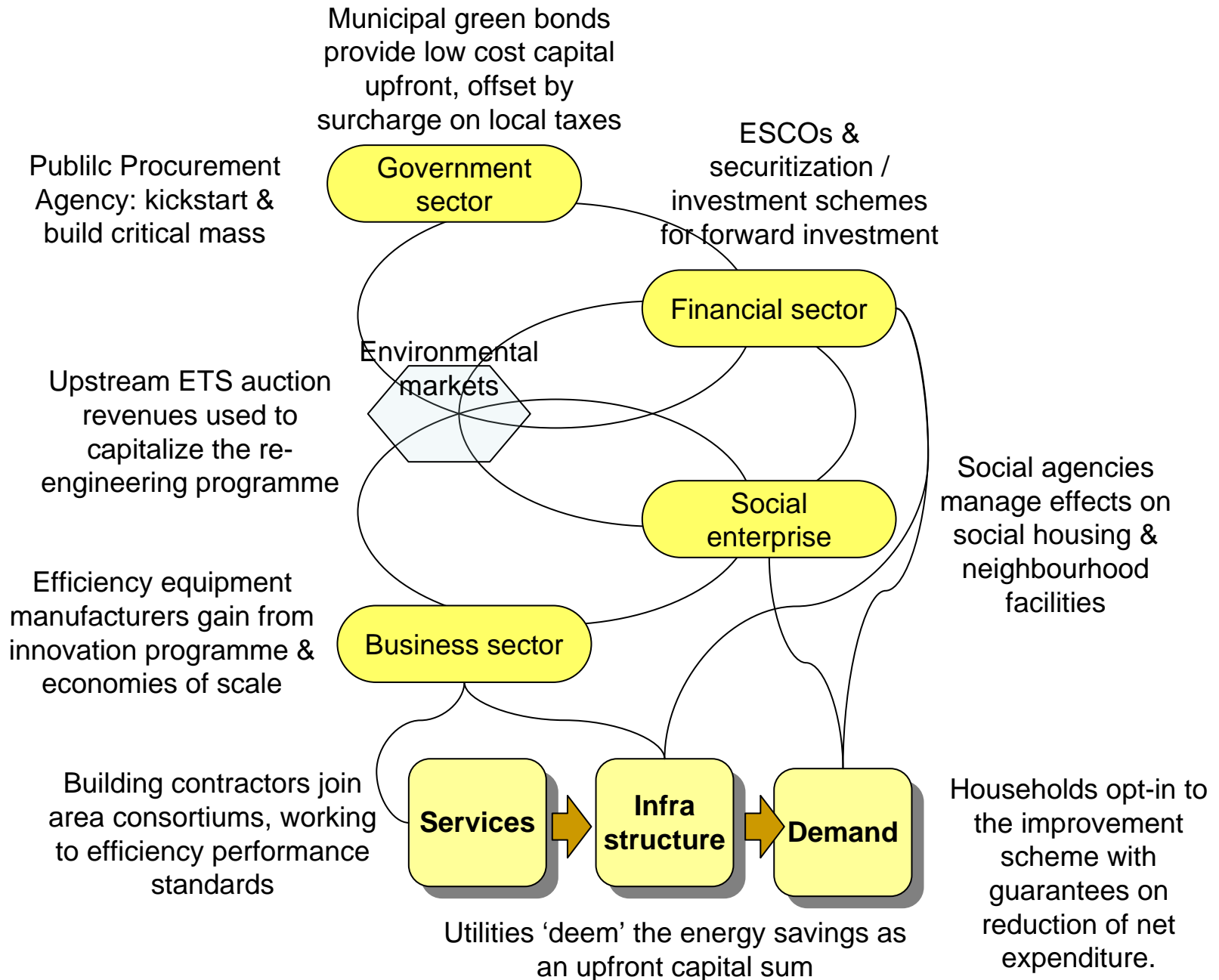
Sector wedge & cost benefit analysis

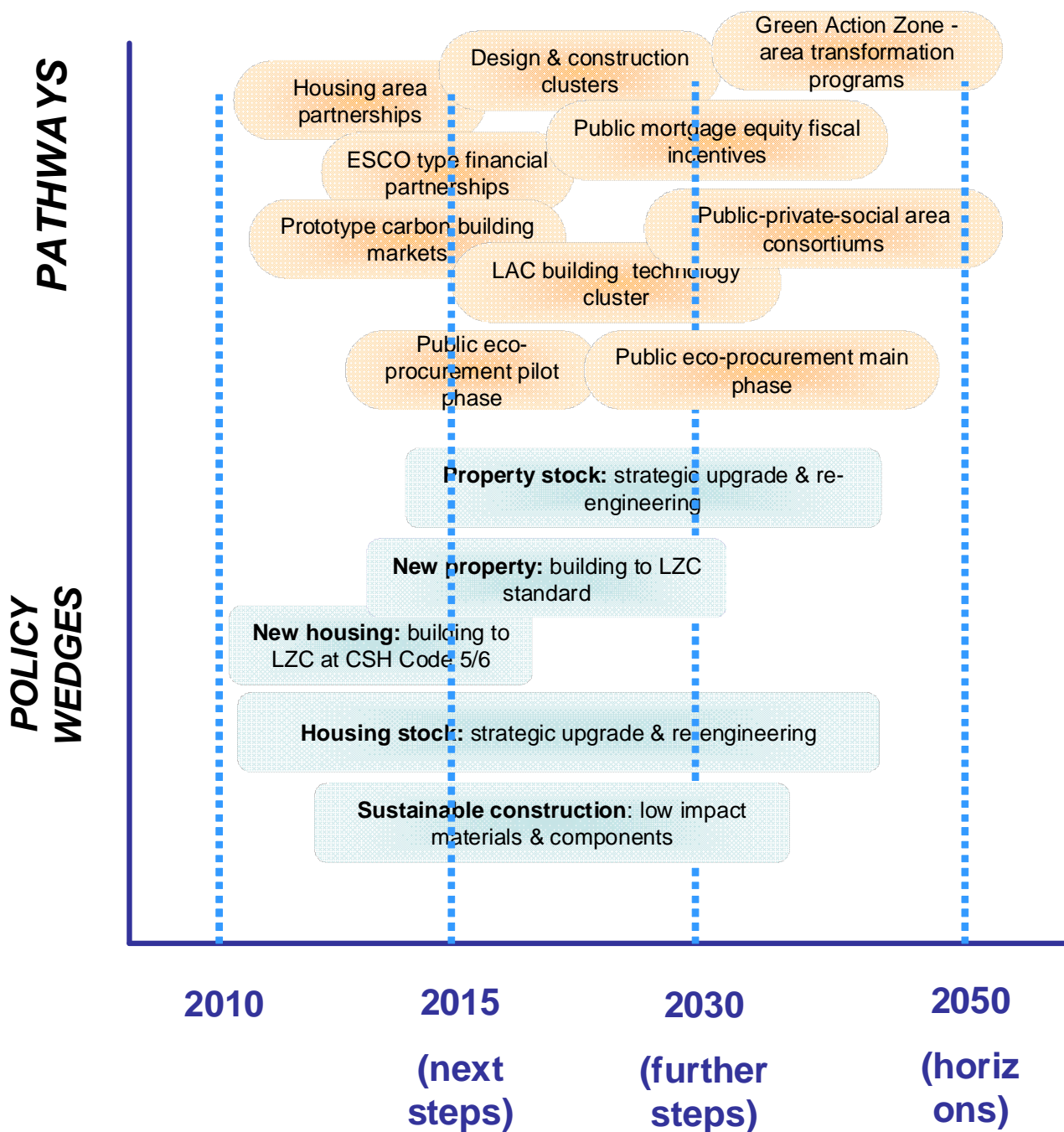


Policy wedge analysis



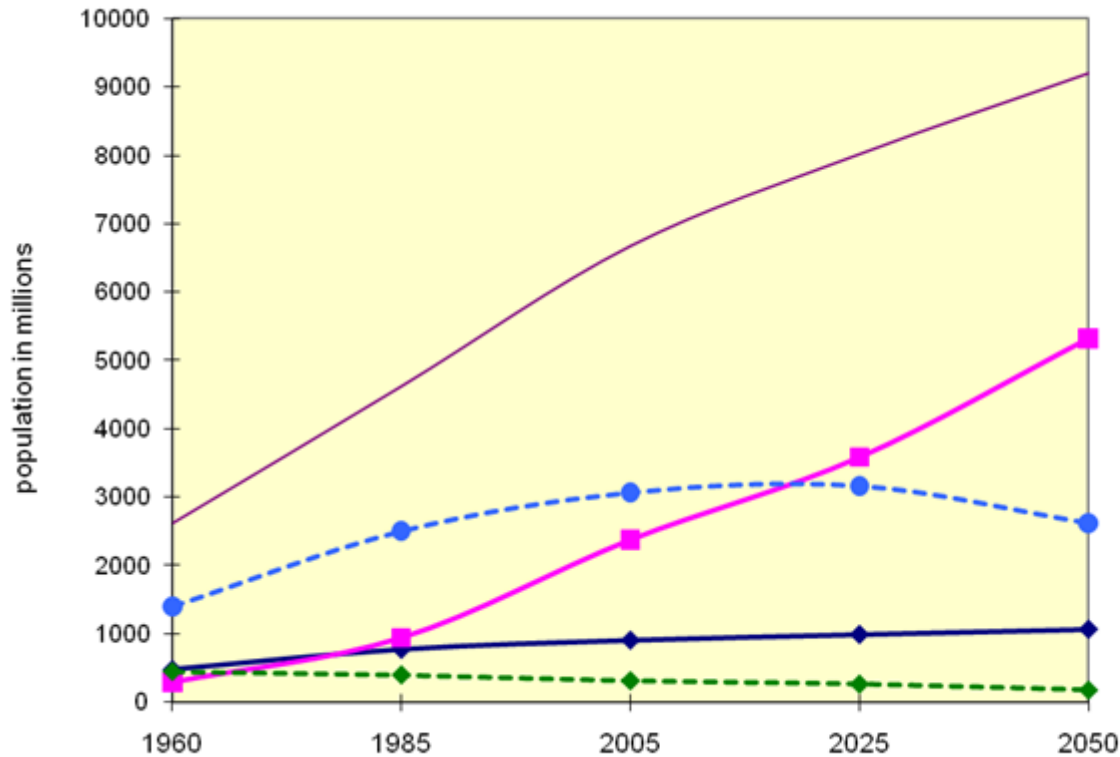
Policy options for a One Planet housing stock





World Urbanization Prospects

Source: UN Department of Economic and Social Affairs, 2007



TOTAL population projection

URBAN - less developed

RURAL - less developed

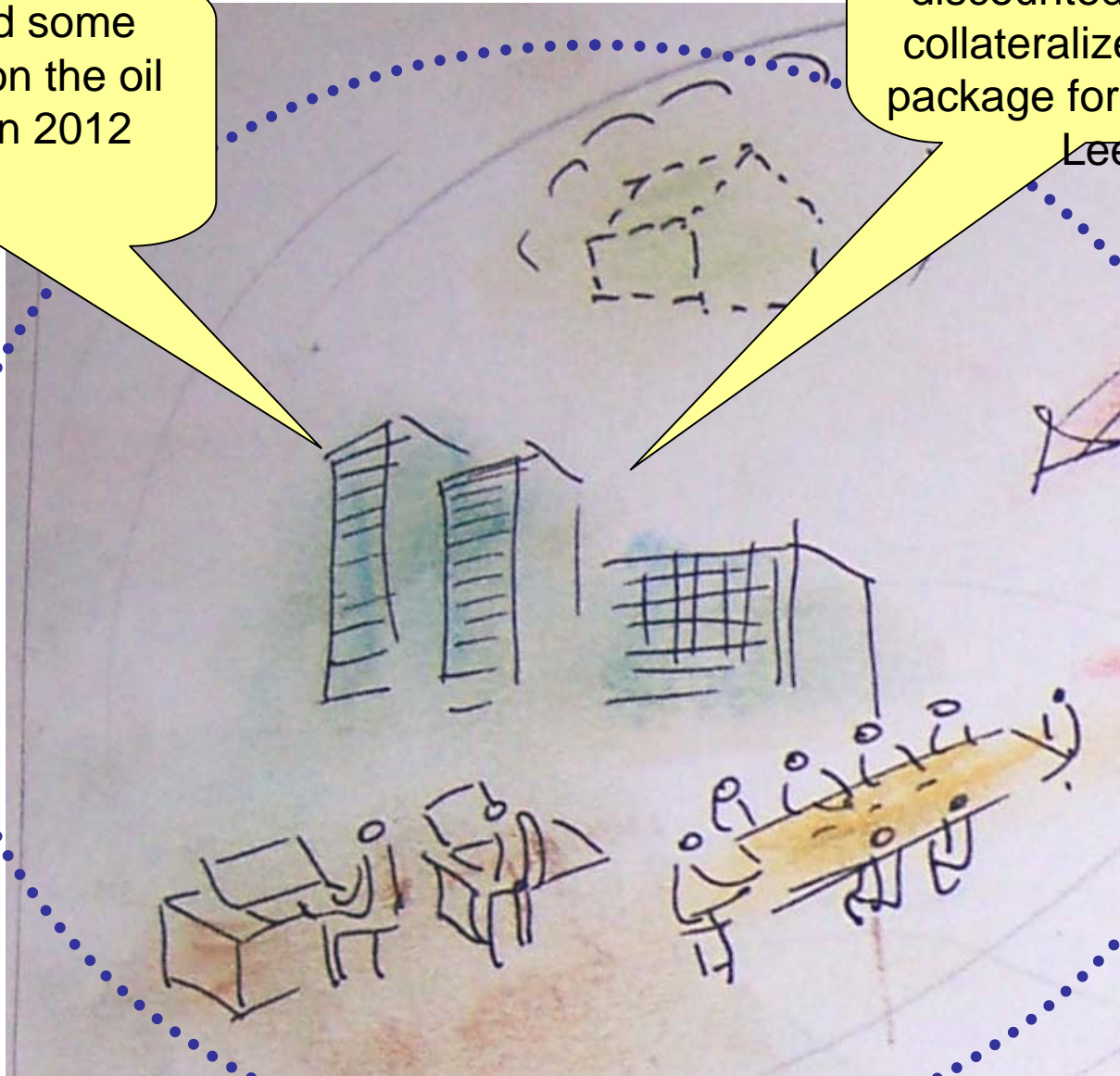
URBAN - more developed

RURAL - more developed

Capital investment sector

Ok we need some short punts on the oil spot price in 2012

Yeah residential carbon is our business..., we can do you a complete discounted risk-shared collateralized obligation package for... How about Leeds?



Capital investment sector

Ok we need some short punts on the oil spot price in 2012

Thing is with neo-regulated "relational" markets, how are we gonna have any fun

Yeah residential carbon is our business..., we can do you a complete discounted risk-shared collateralized obligation package for... How about Leeds?

Would you believe it, the future of this great corporation is now in the hands of a bunch of unelected self-styled "climate change experts" – i say we need a Plan B

Hear hear!!!

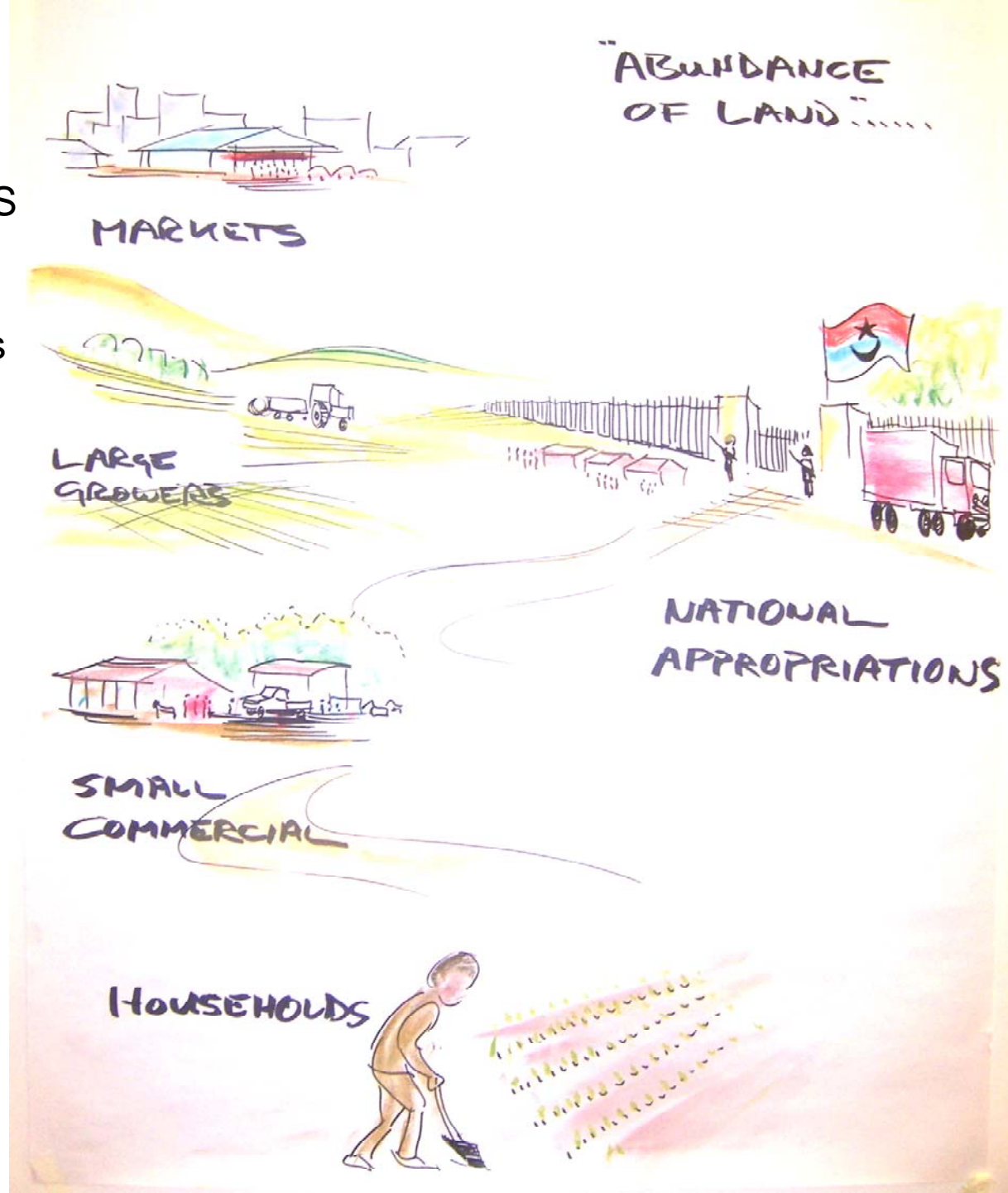


Applications – food & trade

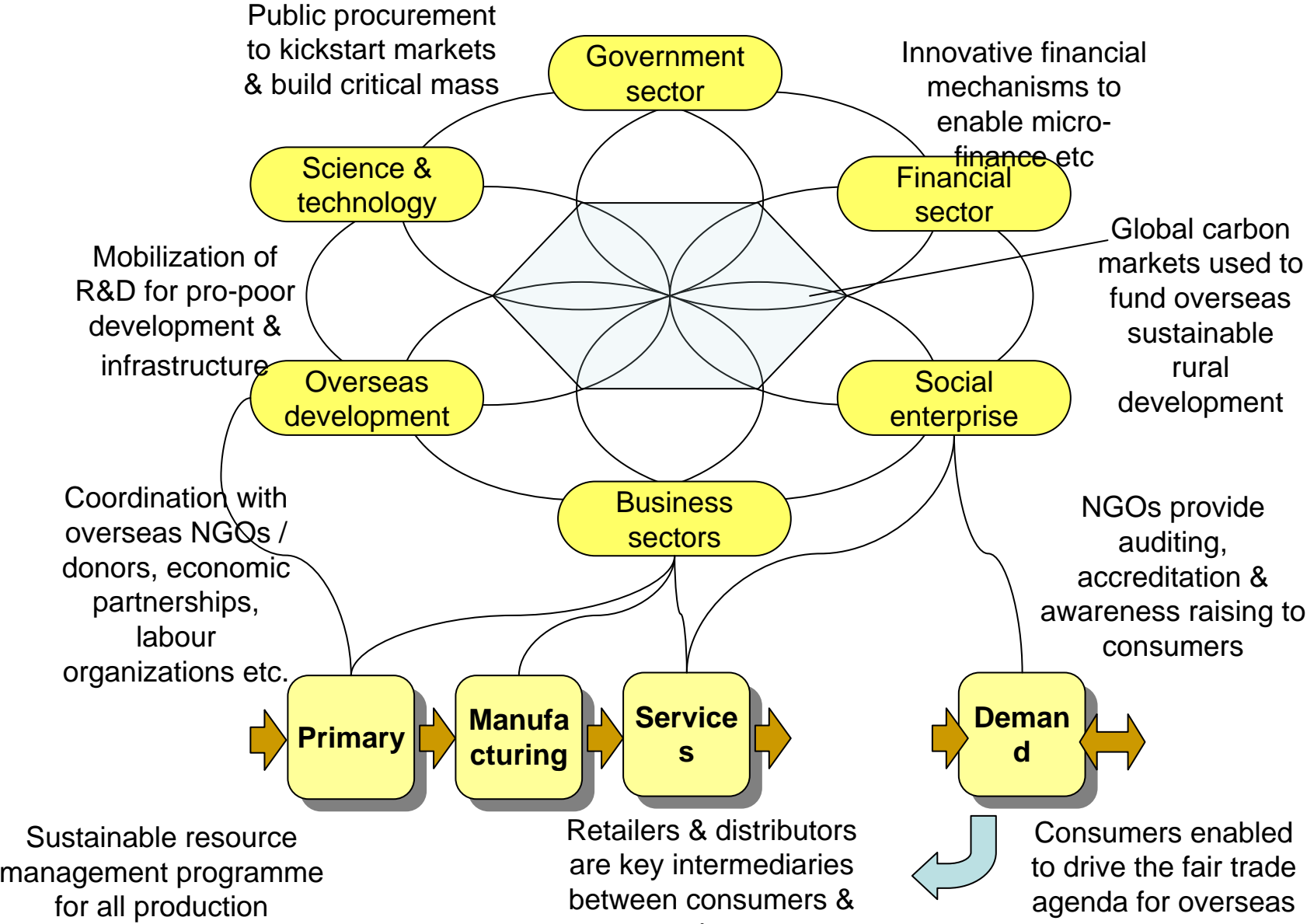


MULTI-LEVEL CHAINS & ECONOMIC RELATIONSHIPS

-
Connecting the village farmers with the urban markets –
but what about the large scale national land appropriations ?



Institutional policy options for 'Fair trade' food



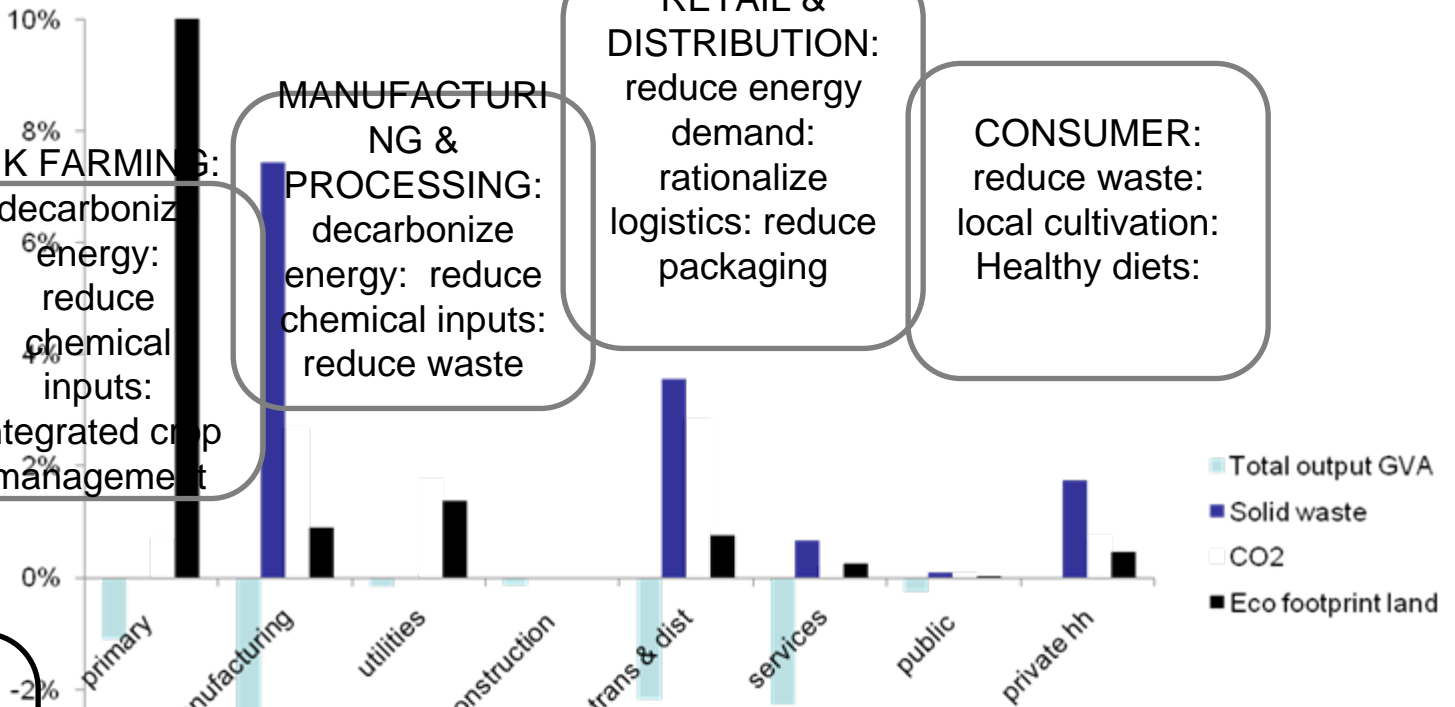
IMPORTS:
reduce
embedded CO2:
eco / water
footprint: rural
development

UK FARMING:
decarbonize
energy:
reduce
chemical
inputs:
integrated crop
management

MANUFACTURING & PROCESSING:
decarbonize
energy: reduce
chemical inputs:
reduce waste

RETAIL & DISTRIBUTION:
reduce energy
demand:
rationalize
logistics: reduce
packaging

CONSUMER:
reduce waste:
local cultivation:
Healthy diets:



IMPORTS: fair
trade networks:
sustainable
rural
partnerships

UK FARMING:
stewardship
schemes:
energy tariffs:

MANUFACTURING & PROCESSING:
energy tariffs:
carbon tax/trade:
innovation
programme:

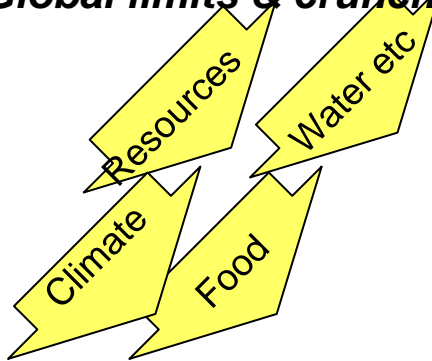
RETAIL & DISTRIBUTION:
mutual
stakeowner
enterprise: fair
trade gateway:
social market
enabler

CONSUMER:
reduce waste:
local cultivation:
fair trade
shopping:
healthy diets:

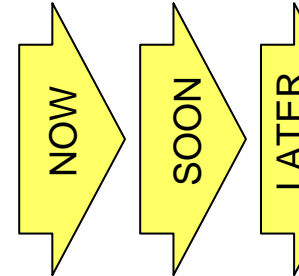
Trade & development – global agendas & pathways

Concept map of the scope & boundaries of the agenda

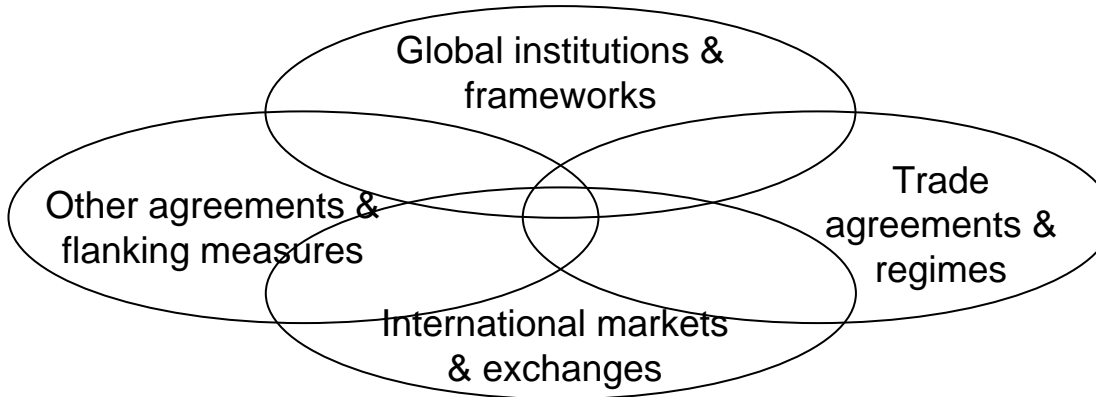
Global limits & crunches



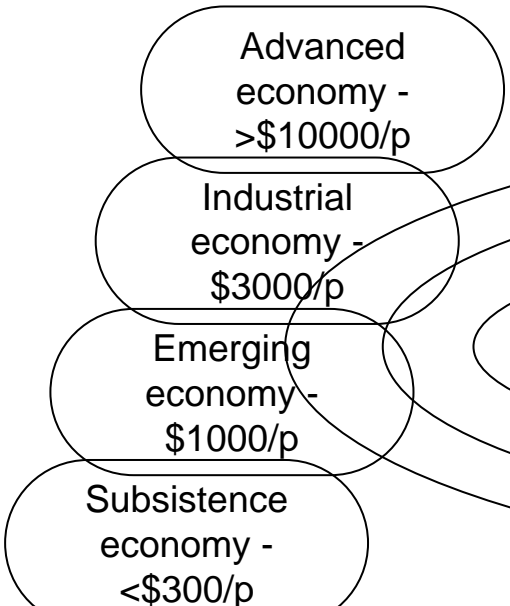
Time horizons aspirations



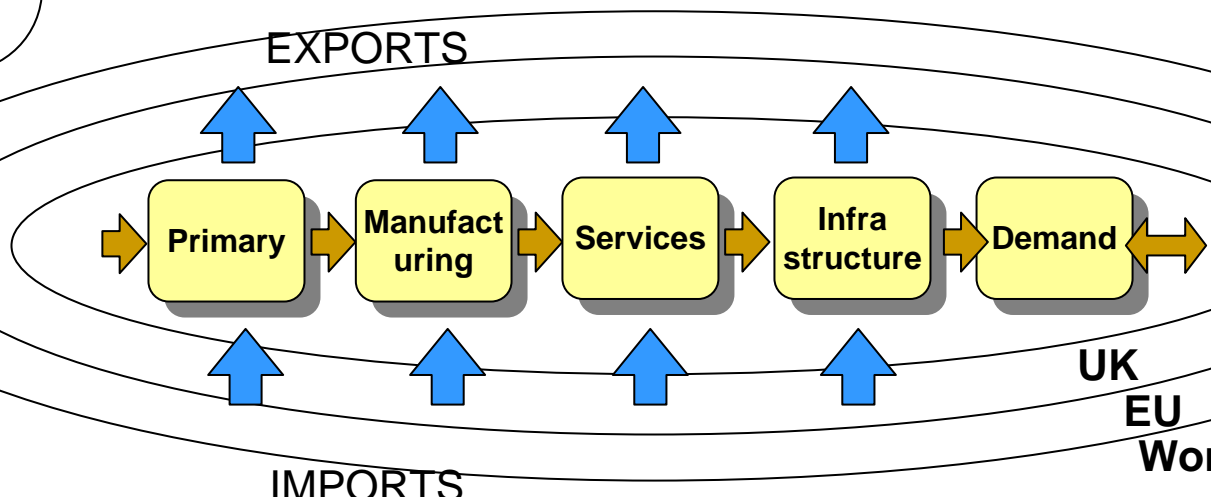
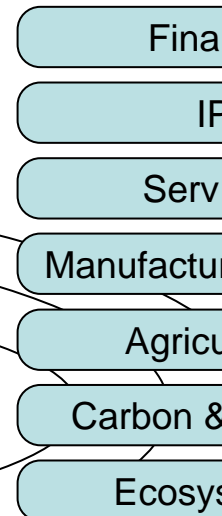
Institutional agenda



Economic development agenda



Trade agreement agenda



Examples

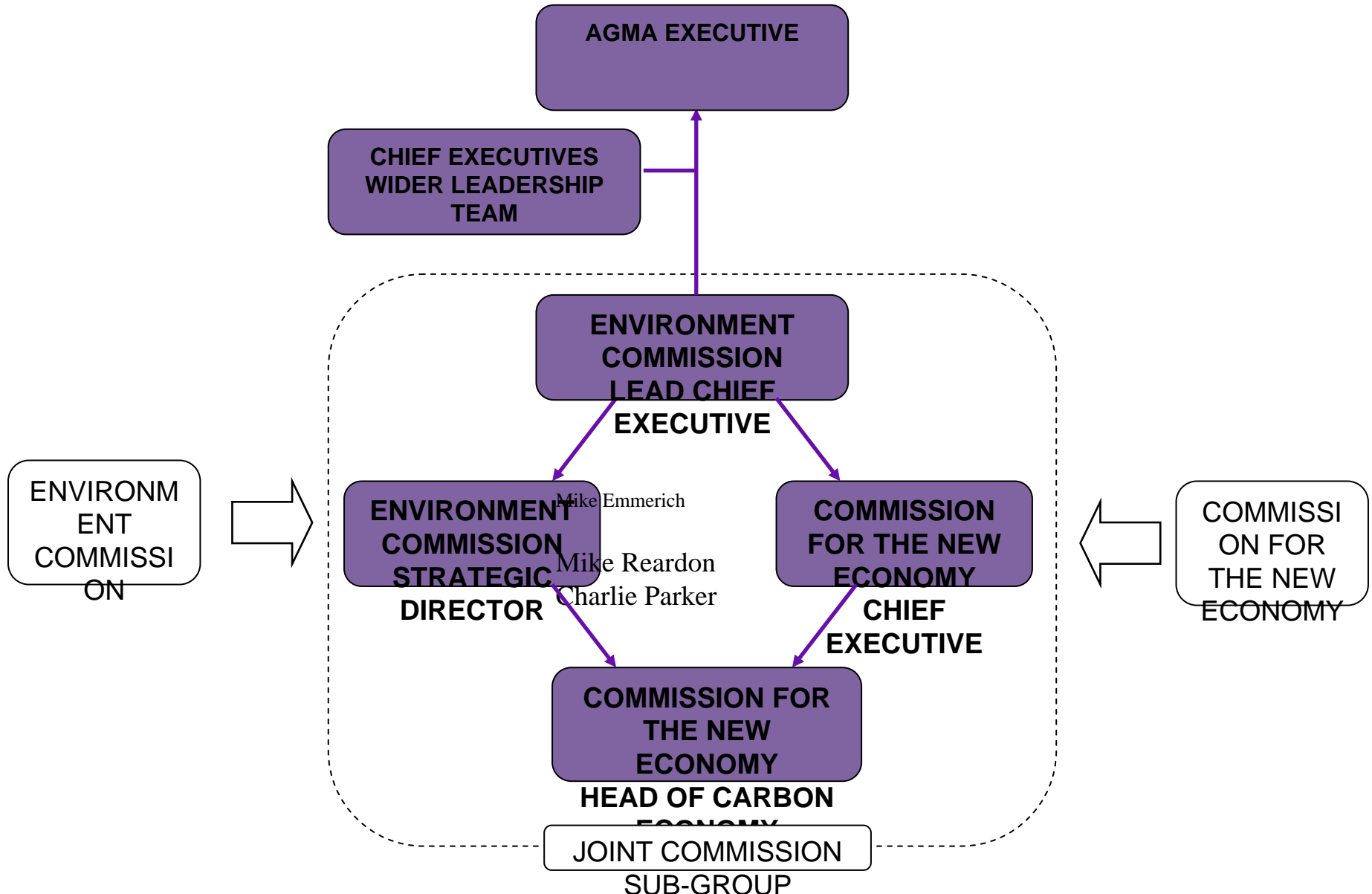


Manchester experience

- an imbalance in demand and supply in localised areas, leading to unexpected power outages
- new developments and regeneration schemes paying extremely high grid connection and upgrade charges,
- some developments having to be abandoned due to abnormally high utility access charges
- a mismatch between the spatial aspirations of the city region and the long term investment plans of utility companies
- a lack of local energy generation assets, making us vulnerable to external influences, and affecting our security of supply
- an inability to adapt to and adopt new technologies and ways of meeting energy needs, such as combined heat and power, decentralised energy supply, and shared use of small scale generation between public, private, domestic and commercial users

Manchester schemes

Research	Activity mapping and gap analysis of current energy planning related activity in Greater Manchester
	Report of current / anticipated EU, UK, NW and GM policies, strategies and plans relating to energy planning
	Report on GM / MCC / OMBC current energy situation arrangements
	Report on GM / MCC / OMBC current, planned and potential climate change mitigation activity
Scenario Development	Stakeholder Engagement Sessions x3 – led by Tyndall
	Vision-led Citizen Engagement Sessions x3 – led by Tyndall
	Environmental Impact Assessment of BaU, low, medium and high level additional interventions
Action Planning	Draft report with recommendations on GM / MCC / OMBC BaU / low / medium / high scenario actions and targets
	Report on wider stakeholder and citizen consultation
	Final report with recommendations for AGMA, MCC and OMBC



Low Carbon Innovation Zones	Establishment of low carbon innovation zones linking public and private sector property through new district heating networks and incorporating renewable energy solutions and behavioral change programmes. A pilot bid in Oldham town centre has already been submitted to the EU.
Green Roof and Living Wall Programme	Work is underway to establish the basis for this programme, including 5 feasibility studies and a design guide. The programme would seek to ensure a wider implementation programme in both existing and new developments
Decarbonising the Manchester Airport Supply Chains	Current work is looking at the carbon footprint and value of key supply chains and the opportunities to de-carbonise these. Further work would involve technological interventions to reduce this footprint and bring wider local economic benefits.
Greater Manchester Smart Meter Club	Establishment of the first UK smart metered business district, incorporating a 'business club' approach that gives additional benefits to members including access to funds for energy efficiency measures and installation of renewables.
The Greater Manchester ESCo	Development of an Energy Service Company (ESCo) framework with supporting development work to assist establishment of ESCOs in the public and private sectors.

Low Carbon Industrial Analysis	<p>Study into the existing and potential market value of the low carbon industrial sector in GM. It would identify a substantial range of interventions in the emerging low carbon industrial sector that: support the establishment of new businesses, support the growth of existing businesses, offer support for existing businesses with transferable skills to re-align themselves to this sector, support Foreign Direct Investment.</p>
Carbon Labelling Standard	<p>Development of a consistent carbon labeling and footprint standard for public, private and third sector organizations to help them meet the requirements of the new carbon reduction commitment.</p>
Ultra Low Carbon Vehicles	<p>Purchase of ultra low vehicles as part of upcoming Government Scheme for cities. Vehicles could be purchased for public sector vehicle fleets as well as private hire companies such as whizz-go</p>
Greater Manchester Top Green 100	<p>Establishment of a high level club of businesses across GM that are critical towards economic prosperity but have developed and exhibited strong environmental commitments. Such a club would help drive investment, promote, influence and lobby.</p>
Low Carbon Development Framework	<p>Development of a low carbon framework to be used at all stages within large physical regeneration and development programmes. Such work is being piloted in Sportcity, and could be the basis for undertaking similar work across the city region to ensure that all major developments are reaching exacting standards for achieving low carbon targets. This would support the outcomes of the AGMA Decentralised Energy Study</p>

Towards a general method & toolkit



Working with real world complexity

- Ecological thinking ... an approach to looking at whole systems not just the parts
 - Relational analysis – look for systems of relations & values.... on economic / political / social / cultural / spatial levels.
 - Design & innovate with algorithms – stepwise processes – which lead towards self-organizing value chains & loops
- Embed the algorithms as self-learning loops in the institutions which are running the system –
 - Work with the economy as a subset of society & culture...
 - “Market barriers” should be institutional opportunities.

Sunrise business parks with global connections use advanced ICT for low-impact connectivity, green travel etc

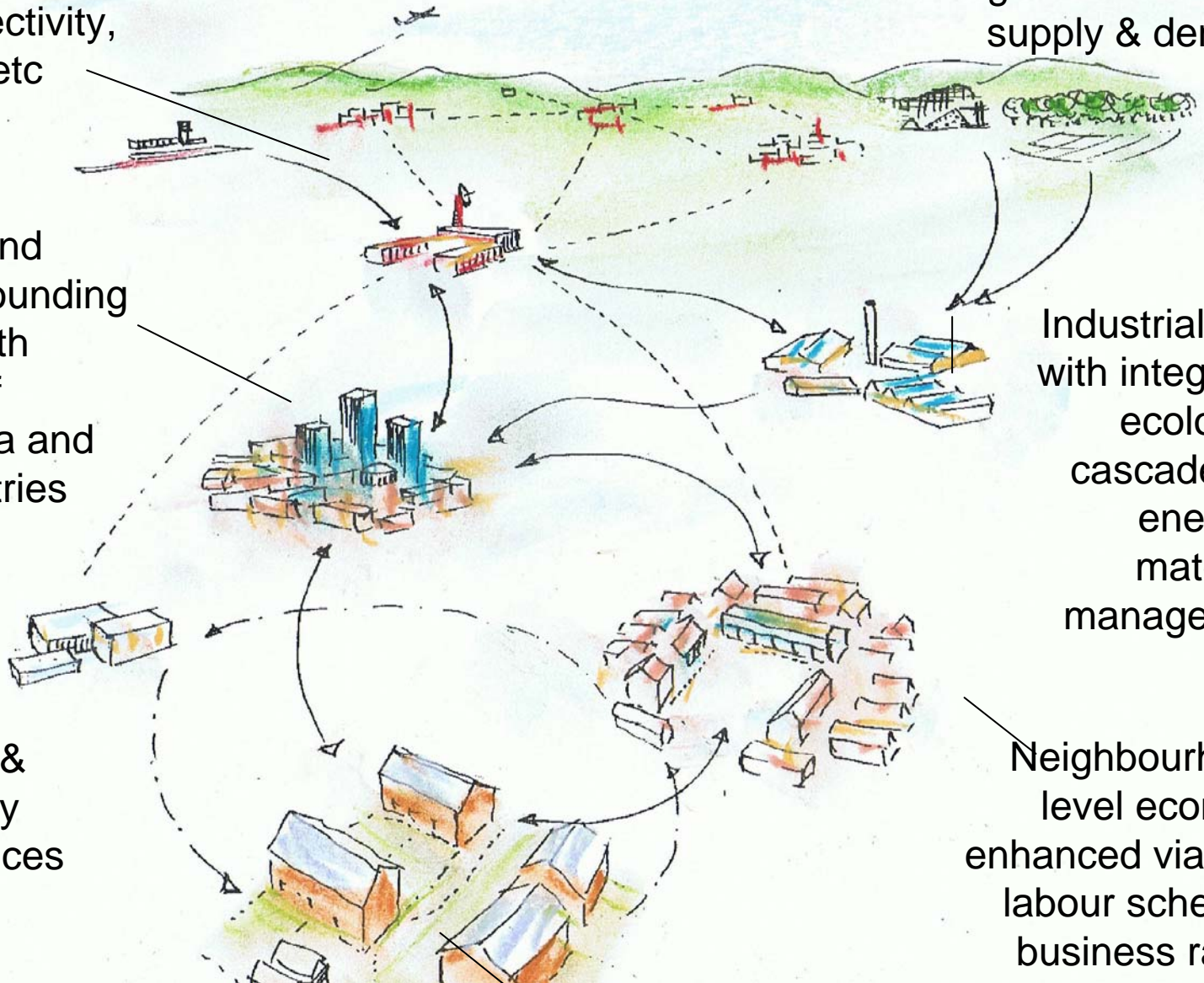
Renewable and mineral primary resources managed in long term balance of supply & demand

City-centres rejuvenated and linked to surrounding inner cities with diverse mix of finance, media and cultural industries

Industrial sites with integrated ecological cascades for energy & materials management

Intermediate labour market & social economy for public services & community facilities

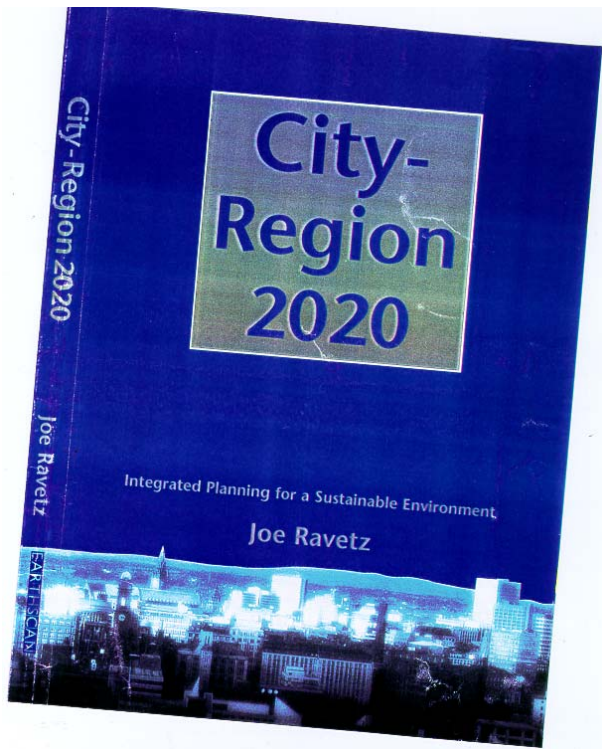
Neighbourhood-level economy enhanced via local labour schemes, business rating,



Commercial break



Joined up thinking... (in progress)



“World’s largest feasibility study” – linking spatial, economy, environment, society, governance.



“Environment and the City” - critical perspectives on the urban environment around the world



“World’s largest business strategy” – shared intelligence for the relational economy

The case of Leeds



Scenario 4 'New Urban Neighbourhoods' (for the 21st Century)

- ① North Leeds
- ② East Leeds
- ③ Aire Valley
- ④ South Leeds / M62 Corridor
- ⑤ Outer West Leeds
- ⑥ City Centre Rim

Airport
 Leeds / Bradford Corridor
 Rim
 Area Action Plan Areas / Regeneration Areas
 Built Up Area
 Railways
 Motorways
 A Roads
 BRT / Rapid Transit

