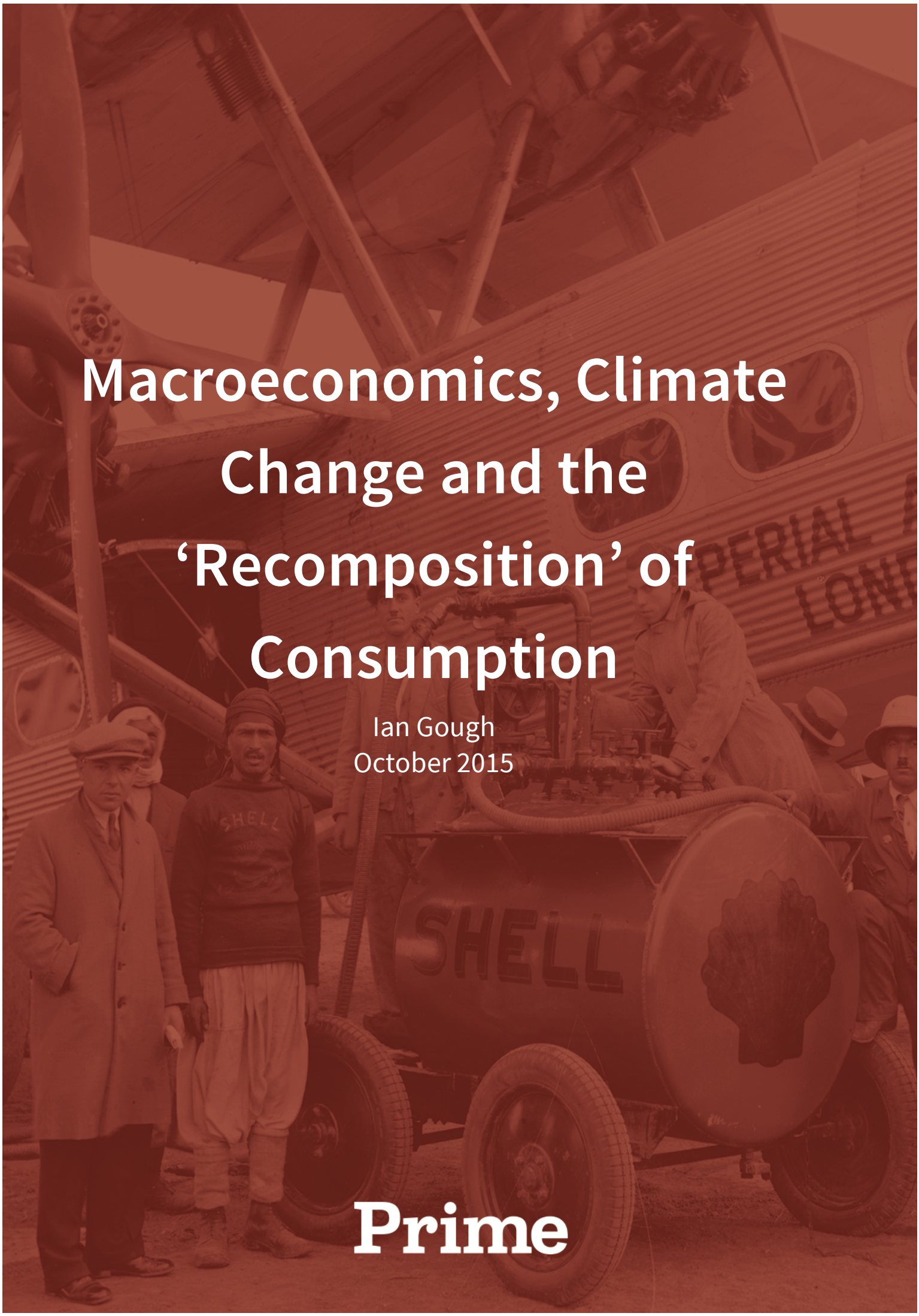

Macroeconomics, Climate Change and the 'Recomposition' of Consumption

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Summary

1. Macro-economic policy should be evaluated and devised according to sustainability criteria alongside economic and social criteria. Economic goals, whether growth of GDP, productivity or competitiveness should not trump equity/justice or sustainability. But nor should environmental goals trump social goals. The urgent challenge addressed in this note is to develop a macroeconomic framework that supports 'eco-social' policies to pursue both goals simultaneously.

2. The overriding challenge of climate change requires fast and transformative improvement in eco-efficiency across a myriad of domains (S1 or 'Sustainability 1' policies). However, because this would continue the widespread 'outsourcing' of emissions from the OECD world and for other reasons, attention must also be paid to consumption policies. The focus of this paper is on policies to 'recompose' consumption (S2 policies).

3. To achieve effective S1 policies will require a rising share of investment and public investment in GDP; and to achieve this more equitably and efficiently will require a rising share of government consumption expenditures in GDP. Finally, for global and national reasons, these in turn will require a falling import surplus (M-X/GDP).

4. Thus the share of personal consumption will be squeezed. How far this would result in an absolute squeeze in average consumption will depend on the growth of GDP, but it would seem prudent to assume a considerably slower rate of growth over the next decades than over the three decades prior to 2008.

5. In a context of current egregious inequality, such a consumption squeeze would be highly regressive. Thus it would need to be accompanied by 'classic' redistribution policies. However there is a possibility that these alone would, *cet par*, increase rather than reduce aggregate emissions. This paper therefore considers alternative 'recomposition' policies (S2).

6. Just and sustainable macroeconomic planning should take into account two further policy dimensions: the *emissions intensity* of different items of consumption, and the *necessitousness* of these items. Ways of measuring both of these are proposed.

7. When personal consumption in the UK is analysed in this way, an awkward policy dilemma immediately appears: almost all necessities are high carbon, while most 'luxuries' emit lower than average GHGs. Transport is also high carbon and comprises both necessary spending given current infrastructure and luxury spending.

8. Thus a radical macro-economic framework needs to endorse and devise new 'eco-social' policies to serve both justice and sustainability goals. Three approaches are suggested: taxing high-carbon luxury consumption, variable pricing of high-carbon necessities, and rationing carbon.

Setting the scene

Almost every discussion of an alternative macroeconomics ignores – inexplicably and recklessly - the environment. Global warming poses a looming threat to habitats, economies and human wellbeing which must be taken into account. And policies to mitigate dangerous climate change in the future – it cannot be totally prevented – pose real challenges to our management of the economy here and now. This note outlines a macroeconomic framework for thinking about some of them.

The global climate/economic challenge has recently been succinctly restated by Lord Stern (2015: 279). To achieve a 50-50 chance of avoiding global warming exceeding 2°C by the end of the century, and taking population growth into account, global emissions must be cut from around 7 tonnes of carbon equivalent (CO2e) per person per year now to no more than 2 tonnes by 2050: a cut of c3.5 times. However, if global output per person continues to grow at its present rate (roughly trebling by 2050), then global emissions *per unit of output* must fall by a factor of c10 times by 2050 – an unprecedented transformation. And this is an underestimate on two counts. A 50-50 chance is very poor odds; yet the decarbonisation required to achieve a higher chance of avoiding dangerous climate change will be more drastic still. And logically the cuts required in rich countries, where average per capita emissions vary between 10 tonnes (EU) and 20+ tonnes (US) are faster still.

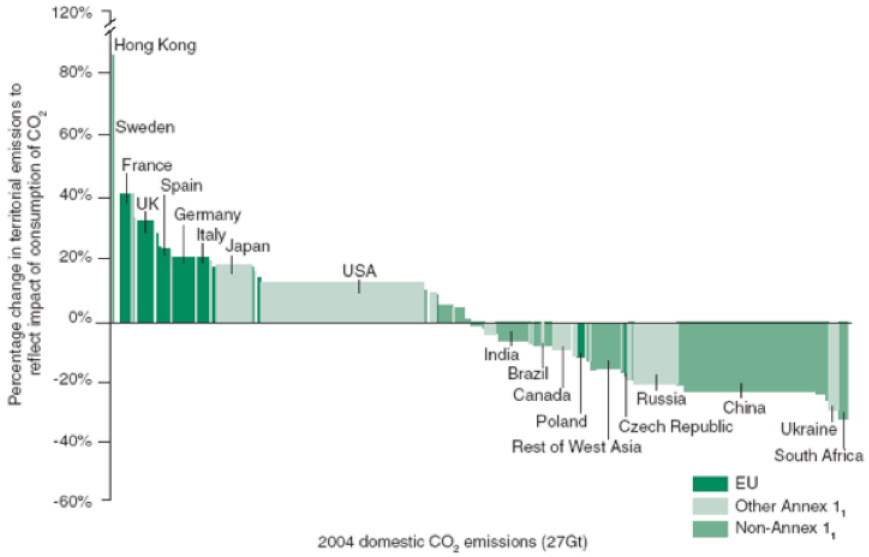
The dominant framework among those economists who do pay attention to climate and environmental economics is 'green growth'. It amounts to a belief that raising the price of carbon, accelerating technological progress, undertaking transformational investment and implementing other incentives to reduce carbon intensities can, and with luck will, achieve such a sustained pace of decarbonisation (Stern 2015; Grubb et al 2014).

One can summarise this approach as a combination of initiatives and programmes to raise global and national *eco-efficiency.* This amounts to improving the ratio of output over emissions to achieve a rapid *absolute* decoupling of incomes from emissions. In the light of the political economic, geo-political, ideological and institutional barriers to such an unprecedented technological transformation (all of which Stern is aware of) this is a daunting challenge, which any reasonable person might think impossible.

But for the rich countries (the subject of this note) it also ignores the *consumption* side. National emissions can be calculated on a production basis – all emissions from a national territory, which is the Kyoto method; or on a consumption basis – all emissions embodied in the consumption of a national population. At the global level these will be identical, but as the Figure below shows, they have become seriously uncoupled as a result of the globalisation and financialisation of the world economy. This is especially the case in countries running large trade deficits such as the UK. For example, while UK territorial emissions of CO2 declined by 19% from 1990-2008, the emissions embodied in UK consumption rose by 20% (Gough 2013).

Calculating emissions on a production basis, as does the Kyoto Protocol, benefits the global North and disadvantages the global South. It will not be possible for the rich world to combat climate change without also addressing its consumption.

Figure 2—the impact of a consumption-based view on emissions by country.[27]



1 Annex 1 to UNFCC.
Note 1: Includes CO_2 emissions from production, process, transport and household sources only (27Gt in 2004): excludes non-CO_2 emissions due to land-use-change.
Note 2: Based on an MRIO (multi-region input/output) model allocating emissions to regions of consumption.
Source: Carbon Trust Analysis; CICERO/SEI/CMU GTAP7 MRIO Model (2004).

Source: The Carbon Trust

Source: House of Commons 2012.

Thus there are three basic ways of mitigating climate change, denoted as follows (S is for Sustainability):
S1. Improve the emissions-efficiency or eco-efficiency of production
S2. Encourage low-emission consumption patterns
S3. Reduce total consumption levels

S1 is the green growth approach; S3 is the argument of 'degrowth' or 'post-growth' advocates. My approach here is to tease out what S2 – encouraging low-emission consumption levels – would entail for a green macroeconomic policy. I do not deny the central importance of S1 but argue that it will not be enough. Nor do I rule out the potential need for S3 degrowth strategies at some stage, but that is another paper.

Equally important, my approach also seeks to combine equity and social justice principles with sustainability. There is no ethical case for meeting the needs of future generations over those of the present poor; nor can profoundly unjust programmes achieve legitimacy and public support (Gough 2015).

Decomposing climate change mitigation

Two Swedish economists, Jonas Nässen and Jörgen Larsson, provide some supporting evidence of the need for S2 policies. Nässen (2014) decomposes the

change in consumption-based emissions in Sweden between 1993 and 2008 as shown in Table 1.

Table 1. Decomposition of emission trends in Sweden 1993-2008

	Impact on annual change in emissions (holding other factors constant)
Population	+0.5%
Consumption per capita (C3)	+1.8%
Change in consumption composition (C2)	-0.4%
Eco-efficiency of production (C1)	-1.4%
Total	+0.5%

Swedish consumption emissions have been boosted by population growth and notably by per capita consumption growth (the potential target of S3 policies) and deflated by rising eco-efficiency of production (S1) and, to a small extent, a shift in the composition of consumption (S2).

Larsson (2014) then builds scenarios to achieve the drastic emission cuts needed by 2050 (Figure 2). If the rate of improvement of eco-efficiency matched that of the past (1.4%pa), Sweden's emissions would almost level out - a considerable achievement given that the 'low hanging fruit' will already have been picked. But even a doubling of this rate would not be enough to achieve the necessary emissions target of 2 tonnes per head by 2050.

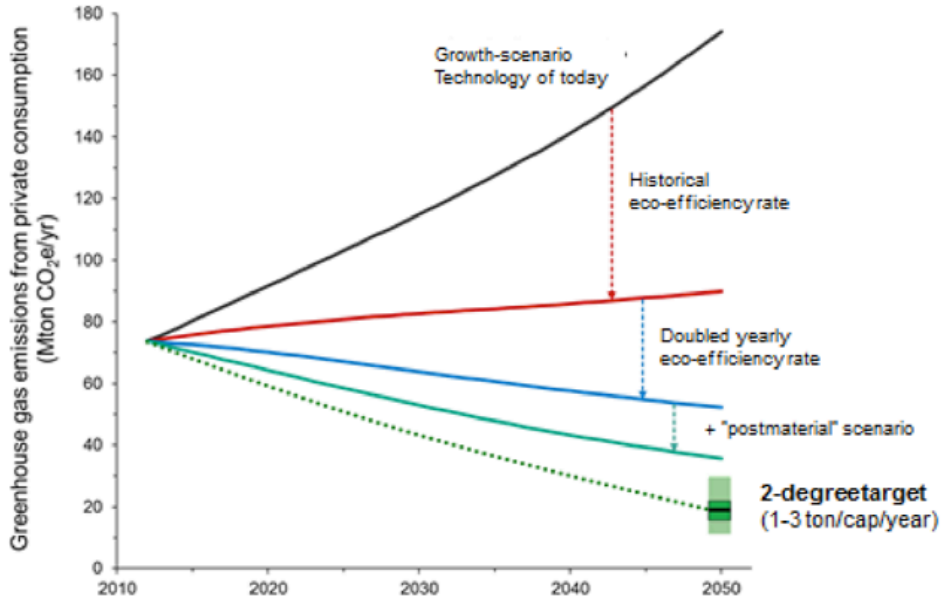


Figure 3. Scenarios for greenhouse gas emission from private consumption in Sweden 2012-2050
Source: Larsson (2014)

Thus, 'post-material' or 'sufficiency' policies will also be needed. According to their model, both S2 and S3 policies will be needed to hit the target. Policies could for example target beef consumption, air travel and expensive second homes. But they would still not be enough. The goal is finally achieved in this model by introducing an S3 policy - a reduction in average hours of work.

I call all S2 policies to alter the composition of consumption *recomposition* policies. These will have several effects – on distribution and equity, economic efficiency and consumer choice and freedom – as well as on emissions and environmental sustainability. The rest of this paper puts forward a framework for comprehending such a strategy and for addressing some of these questions.

Recomposition for a green economy

I start from the common national accounting identity:

$$GDP = C + G + I + (X-M)$$

and distinguish four forms of recomposition for sustainability. These all have the effect of squeezing the share of personal consumption, which is analysed in the following section.

Raise green and social investment (I)

There is an urgent need to invest in renewable energy, energy networks, transport, communications, transformed cities and buildings, retrofitting housing, the preservation and enhancement of natural resources and investment enabling adaptation to climate change. This would need to reverse the decline in investment shares across the OECD over the past three decades and raise the share of green investment for eco-efficiency. An earlier estimate of these extra investment needs for the UK came to about £50 billions a year, or some 3% of GDP (Helm et al 2009).

Raise the share of public investment (Ig)

A growing share of this would need to be public or public-led. One way of stating this case is in terms of 'market failures'. For example, Stern (2015, ch.3) now identifies five market failures in addition to excessive greenhouse gas emissions – the 'greatest market failure of all'. These are: i) inadequate research development, demonstration and deployment of new technologies, ii) imperfections in risk/capital markets, iii) inadequate public networks, iv) inadequate reliable information, and v) inadequate appreciation of co-benefits. Public investment policies will be needed to address some of these. This would amount to reversing both the sell-off of public assets over the past three decades and the corresponding sharp decline in net public wealth to near-zero, as charted by Piketty (2014, ch.3).

There are parallels between the calls to reinstate a coherent public investment strategy to deal with climate change and the 'social investment' approach to social

policy pioneered in Europe over the last two decades. Fostering a 'new green industrial revolution' will call for more investment in R&D, universities etc. at the upper end of education, but there is no doubt that the EU Lisbon programme saw a link between this and earlier years social investment (Morel et al 2012).

Raise the share of public consumption (G)

Public consumption emits notably fewer GHGs than private consumption. In 2008 it accounted for 11% of UK emissions compared with 22% of GDP – roughly half the emissions intensity of the economy as a whole (Wiedmann and Barrett 2011). This may be expected given its services nature. The major emitters are the NHS and defence. This differential holds when comparing services across the private and public sectors. For example, the health care system directly accounts for 8% of emissions in the US, compared with 3% of emissions in the UK (Chung and Meltzer 2009). This is due both to the greater macro-efficiency and lower expenditure shares of the National Health Service in the UK, but also to lower emissions per pound or dollar spent, presumably due to better allocation of resources and procurement practices. Tax-financed social consumption, such as health services, social care and education is also inherently redistributive: allocation according to need, risk or citizenship, not market demand, automatically serves redistributive social goals. Thus a larger share of social consumption can pursue both equity and sustainability goals.

Reduce the trade deficit (M-X) to lower the outsourcing of emissions

There are sound macroeconomic reasons to cut the excessive trade deficits of some OECD countries, such as the UK. But when the outsourcing of emissions is recognised and monitored there are other rationales: ethical, geo-political and equity-based. It would also facilitate policy alignment. For example, energy efficiency and carbon savings in direct emissions (S1) can 'rebound' to cause rising imported emissions. (When respondents in a UK survey were asked how they would spend any savings accruing from lower energy bills, the most common single answer was 'an overseas holiday involving air travel' (Druckman and Jackson 2009: 2068)). This imperative to reduce the trade deficit will also reduce the share of real consumption in the economy.

Towards sustainable and more equitable consumption

If these arguments are correct, then the share of private consumption will be squeezed on all sides, by several percentage points of GDP. Given present inequality in income and wealth this would entail serious distributional consequences unless addressed. Thus equity and social justice considerations should intrude. The existing social and economic case for redistributing incomes is augmented by an environmental case. There is some theory and evidence that emissions co-vary with

inequality (Grunewald 2015). However I want to concentrate in this paper on the recomposition argument.

This entails a re-analysis of consumption emissions along two new axes: *emissions intensity* and *necessity.*

The emissions intensity of consumption

It is possible to plot the emissions from different categories of consumption, using both national and global input-output matrices. When combined with national consumer expenditure surveys these then yield data on the emission *intensities* of different types of domestic consumption (measured by CO2e/£). Studies of several OECD countries reveal that housing and domestic energy (including water, electricity, gas and other fuels) exhibit the highest emission intensities, followed by transport, food and restaurants/hotels. Lower carbon-intensive categories of consumption in all countries include: education, communication, clothing and footwear and some consumables. This pattern holds for countries such as the UK, US and Netherlands (Kerkhof et al 2009).

A recomposition policy would seek to encourage private consumer spending on low carbon areas and discourage high carbon consumption. However, Norway and Sweden exhibit much lower carbon intensities for housing and domestic energy, due to extensive use of district heating using biomass, better insulated dwellings and mostly renewably generated electricity from hydropower. This reveals the inter-relationship between eco-efficiency (S1) and recomposition (S2) policies.

Recomposition: From 'luxuries' to 'necessities'

We have already noted that to pursue low carbon consumption in a context of extremely high inequality may worsen distributive outcomes. If further recomposition is needed to meet our climate targets then we must grasp the nettle of distinguishing necessities from 'luxuries'.

The dominant driver of consumer emissions in all developed countries is household income:[1] a doubling of household income usually results in consuming goods and services that emit 80-90% more greenhouse gases. Rising inequality comes with a climate as well as a social cost.

But more relevant to a recomposition strategy is to distinguish necessary from non-necessary consumption. There are essentially two approaches to this: an economic one and a social one. The empirical, market-based way of distinguishing necessities

[1] This is usually calculated as equivalised household income (that adjusts for household size and composition), or in some studies total household expenditure.

and luxuries is to observe consumer behaviour and calculate the income elasticity of demand for different goods and services. If demand rises more slowly than income (elasticity <1) this indicates a necessity; if demand rises more rapidly than income (elasticity >1) it denotes a non-necessities or 'luxury' (Chitnis et al, 2014).

Estimates for the UK reveal that electricity is a fundamental necessity, and so is other fuel, food, alcohol, and communication. Spending on the remaining goods and services rises faster than income, an accepted measure of 'non-necessities': transport, clothing, furnishings, recreation and culture, restaurants and hotels, education and health.[2] If the price of necessities rises faster than that of luxuries, this alone will redistribute purchasing power from lower to higher income households and will have a regressive impact on the distribution of real incomes. (Such a process in energy charges has been charted in the UK and other countries, accounting for the inequitable impact of some S1 policies that raise domestic fuel bills).

Putting these together: necessity x emissions

Putting the last two forms of composition together enables us to plot carbon intensity against the necessity of different forms of consumption. Table 2 provides a summary of recent findings for the UK in 2009, based on the expenditure elasticity method. The figures in brackets show the shares of total GHG emissions accounted for.

Table 2: Categories of personal consumption by necessity and emission content, UK 2009

	Low emission *(<1 tonne CO2e/£000)*	High carbon *(>1 tonne CO2e/£000)*
Necessities *(income el <1)*	Alcoholic beverages/tobacco (0.7%) Communication (1.2%)	All domestic energy (electricity, gas, other fuels) (26.9%) Food (12.9%)
Non-necessities *(income el >1)*	Clothing and footwear (2.6%) Other housing (2.3%) Furnishings (5.0%) Recreation and culture (8.7%) Restaurants and hotels (5.0%) Health (0.5%) Education (0.3%) Miscellaneous (4.2%)	All transport (vehicle fuels, other transport) (22.5%)

Source: Chitnis et al 2014: Tables 5, A.5

[2] Education and health are here and in Table 2 included as "non-necessities" since the issue in this section relates to private (market-based) consumption; of course social consumption on these services is necessary and relatively equitable.

This reveals a fundamental dilemma. Most non-necessities (as defined and measured by observed consumer behaviour) are low carbon, whereas two key necessities – domestic energy and food – are carbon- and GHG-intensive and account for 40% of total emissions. There are *no* low emission necessities apart from alcohol and communication, though communication technology is destined to expand its scope in the future. In the other corner, 'transport', which includes all forms from private cars to air travel, is classified here as a high-carbon non-necessity, accounting for nearly a quarter of total emissions.

This points to a fundamental contradiction between securing emission reductions and ensuring an equitable distribution. Further studies of marginal emission intensities suggest that simply redistributing income to low-income households would raise, rather than lower, emissions (Ravaillon et al 2000; Chitnis et al 2014). Equity and sustainability are not easy to reconcile using classic income redistribution. It requires other, more interventionist eco-social policies, as discussed below.

Clearly these consumption categories are too gross and encompass important differences. For example transport includes both basic car use for commuting and shopping, and vacation flights; part of the latter will fairly be described as luxuries, but the former are low-elasticity 'locked-in' expenditure that necessitate their use given present infrastructure. Second, the low carbon domestic energy in Sweden and Norway, noted above, demonstrates how such infrastructure can profoundly reduce the eco-efficiency of specific sectors and thus the equity-sustainability trade-off pictured in Figure 3.

Using observed expenditure elasticities is an empirical, market-based way of distinguishing necessities and luxuries. Alternative, more collective methods have been developed within social policy and the long tradition of poverty research. This has spawned a wide range of budget studies to identify a basket of basic good essential for effective participation in one's society. There is not the space here to discuss these in detail, but we can note the 'decent life budget' approach, developed by Bradshaw et al (2008) in the UK that is now being adopted in many other countries. It is constructed using two sources – 'consensual discussions' among ordinary people informed at successive stages by expert feedback.

This exercise has resulted in a minimum consumption bundle that in some respects differs radically from the norm. For example the UK citizen forums have decided that, except for families with children, private cars are luxuries and not necessary for a decent standard of living – citizens could use public transport plus taxis instead. Another disjuncture from actual standards was the assumption that households occupy dwellings closely associated to their size. In the other direction, necessary food expenditures were agreed to be higher than present due to the consumption of more fresh fruit and vegetables.

Druckman and Jackson (2010) have gone on to calculate hypothetical UK emissions assuming the entire population were living on this 'decent life budget'. They conclude that emissions would be 37% lower than actual consumption-based UK emissions in 2004. Almost every category of consumption would deliver lower emissions except for food. Reductions were particularly noticeable in transport, household energy, restaurants and hotels, and miscellaneous household goods and services. In this hypothetical scenario, total UK consumption emissions would fall from 26tCO2e per average household to 16tonnes. This is a significant reduction, but this still equals 7.3tonnes per person – well above the 2050 goal of 2tonnes per person.

There is an urgent need for more research on the necessitousness of different types of consumption which would permit a more fine-grained version of Table 3.

Three proposals for eco-social policies

'Recomposition' provides an important unifying concept and provides the basis for potential synergies between economic, social and environmental policy goals (cf Sommestad in Morel et al (eds) 2012). Can we construct 'eco-social' policies, defined as policies that simultaneously and explicitly pursue both equity/justice and sustainability/sufficiency goals? I conclude by sketching three ways forward: taxation, pricing and rationing.

1. Tax consumption/ high-energy luxuries

The economist Robert Frank (2011) has argued for a progressive consumption tax, on sustainability as well as equity grounds. A major justification of this is that the spending habits of the rich foster an unending expansion in mass wants and desires. A progressive consumption tax would certainly contribute to curbing this spiral. However, it is not as progressive as it first seems, since a progressive consumption tax equals a progressive income tax that excludes savings. Since the share of savings rises with income, this alone would benefit higher-income groups more. I would argue that further selective taxation of high-GHG luxuries is more important, based on the matrix introduced in the previous section.

2. Variable energy prices: public allocation of socio-natural resources

An alternative approach is to modify the prices charged for certain necessities, and notably public utilities. Instead of flat rate tariffs for electricity or gas, or more often, tariffs that decline with consumption, variable energy pricing would impose lower charges for the first x units of electricity and gas consumed, followed by progressively higher charges for subsequent units. In effect such policies would extend the range of goods that are subject to some measure of non-price allocation. Tony Fitzpatrick (2014) identifies a set of 'socio-natural resources', like energy and water, over which citizens have little control following their privatisation over the

past two decades. Policies are needed to bring the ownership and control of such vital services back under some form of common ownership, as advocated by the 'commoning' movement. This would also permit the more deliberate allocation and pricing of energy. It would directly contradict the privatisation of energy supply and distribution and other natural monopolies.

3. *Rationing: Personal carbon allowances*

A separate, radical proposal is to ration carbon by awarding equal personal carbon allowances to all citizens (with lower allowances for children?) within a national emissions cap that would normally decrease year by year. (Environmental Audit Committee, 2008 ; Fawcett and Parag, 2010). In effect, a dual accounting standard and currency is developed – energy, goods and services have both a money price and a carbon price. In a trading scheme, those who emit less carbon than the average could sell their surplus and gain, while higher emitters would pay a market price for their excess. Advocates claim that a scheme covering domestic energy, road fuel and air travel would on average be quite progressive. In addition, there is some evidence that it could generate psychological and normative motivations to encourage and sustain the kind of behavioural change that leads to emissions reduction. The idea has been criticized on a number of grounds, but it would seem well-suited as an additional recomposition policy.

These are just three of examples of the novel policy thinking required to marry social and sustainable goals. However, this is not to dismiss the range of redistributive S1 social policies that currently constitute one half of total social expenditure. The continuing environmental relevance of inequality and social policies for redistribution is the topic of another paper.

Conclusions

The conclusions are set out in the summary at the beginning of this paper.

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*Cover Image: Refuelling *Hanno* at Samakh, Tiberias (now in Israel), October 1931

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