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Environmental Limits and Decision Making

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- Monetise LCA impacts and add to LCCA result
 - Select lowest cost
- Treat LCCA and LCA results as continuous variables and co-optimize using Pareto surface
 - Select option within financial budget with lowest LCA impacts

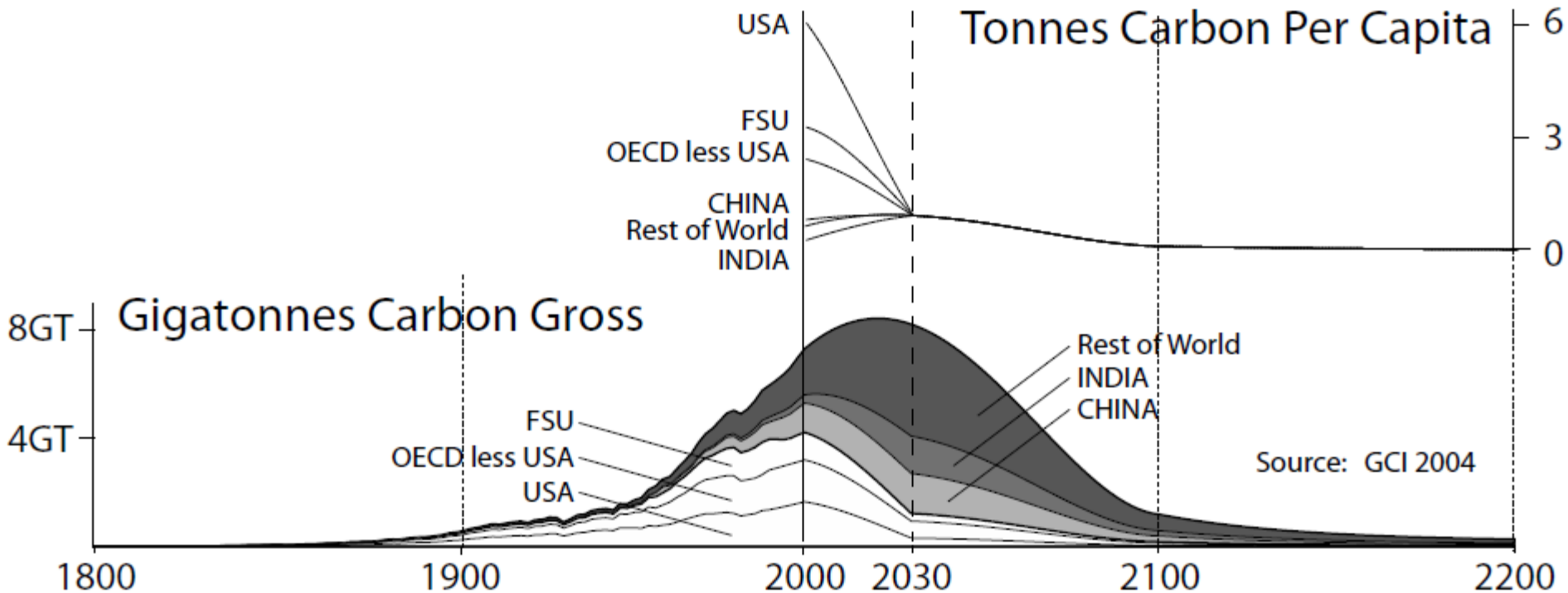
- Monetise LCA impacts and add to LCCA result
 - e.g. Carbon tax but market mechanism does not work
 - Estimates of financial implications of climate change are far greater than fiscal penalties
 - Discount rate should double cost every decade
 - How to monetise other global, regional, local impacts?

- Treat LCCA and LCA results as continuous variables and co-optimize using Pareto surface
 - How to decide what level of (normalised / weighted) LCA impact is sustainable?

Sustainability requires us to live within environmental limits

- Impact on budget of meeting targets for LCA impact
 - Environmental limits are due to the laws of physics not those of economics
 - But some have spatial and temporal variability

Contraction and Convergence



This example shows rates of C&C negotiated as regions.
This example is for a 450ppmv Contraction Budget, Converging by 2030.

Contraction and Convergence



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What fraction of our 'one-tonne lives' should be spent on roads?

Perhaps start with a 80% reduction strategy

EcoFootprint

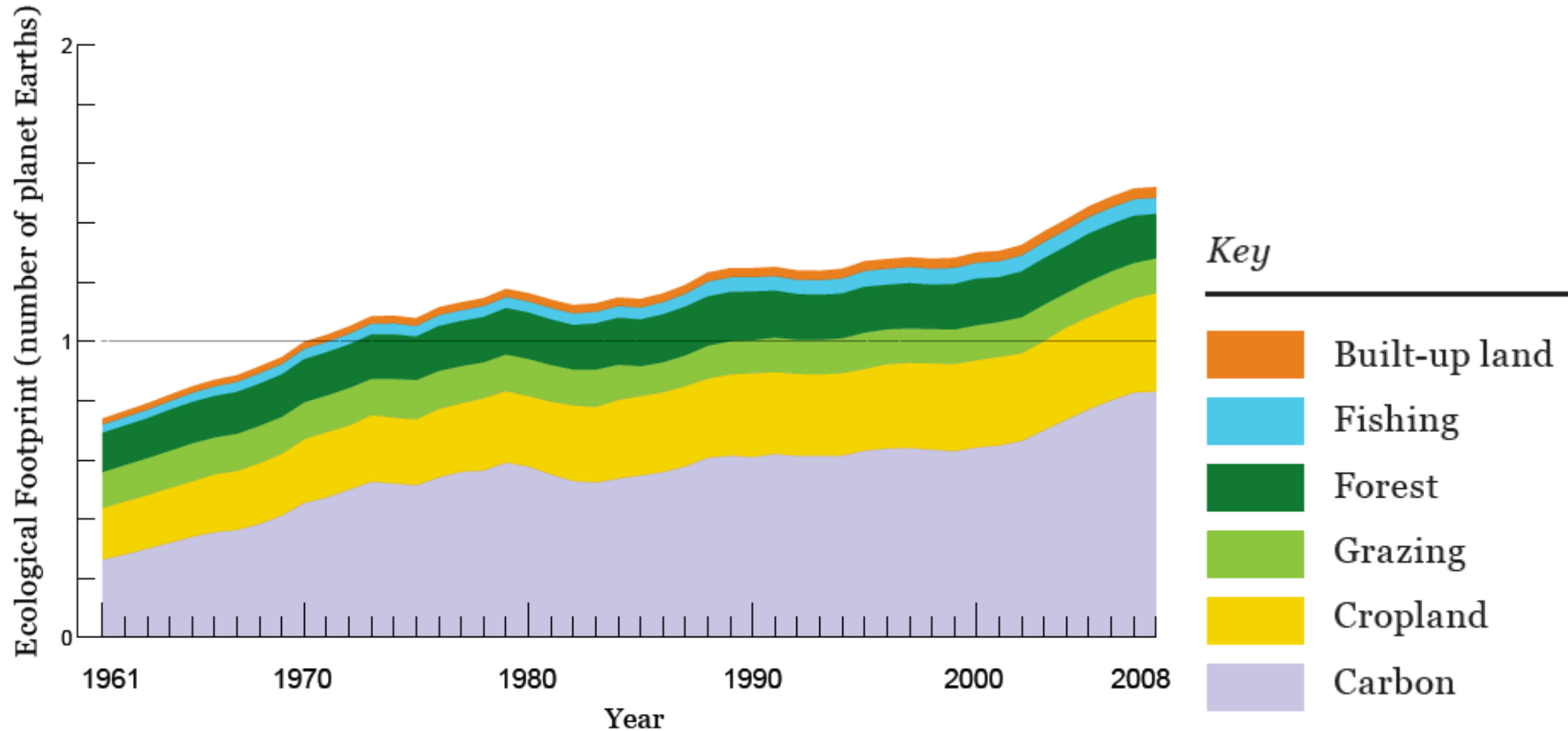


Figure 3: Global Ecological Footprint by component, 1961-2008 The largest component of the Ecological Footprint is the carbon footprint (55%) (Global Footprint Network, 2011).

Resources are a global and regional impact

- At a global scale resources other than limestone and asphalt binder are important

Local impacts

- May be controlled by regulation
- And are spatially sensitive

Ways Forward?



1. Monetisation based on realistic costs (e.g. Stern Report (UK) for climate change) and future increasing costs (e.g. of climate change adaptation)
2. Carbon reduction strategy
3. Pavement Ecofootprint
4. Broader sustainability policy (including Responsible Sourcing)
5. Dynamic (temporal and spatial) pavement LCA methods to analyse results



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