Sustainable transport

5 Socio-economic and ecological resilience

Socio-economic sustainability issues

Sustainable infrastructure planning and design must consider the emissions, water and sustainability benefit of particular infrastructure types and planning approaches. Infrastructure will be at best inefficient without consideration of resilience to climatic events.

Climate change adaptation

Climate change mitigation

Climate change resilience (biophysical and transition risks)

Location and land use

Construction materials and construction

Operations

Ecology and biodiversity
physical impact of hard infrastructure

- Clearing of land in ecologically sensitive areas *Example*: Trans-Congo 1,600km road connecting Bangui, Kisangani and Kampala
- Large areas of forest will be logged in order to build transmission lines and roads. Tropical forest species may be especially vulnerable to environmental changes associated with roads and linear clearing.
- Roads can impact regional hydrology
- Changes to river biodiversity and alterations in species diversity
- Changes in the pattern of marine ecosystems.
  Example: Expansion of Inga III and Grand Inga project located 50km upstream of the mouth of the Congo River. The Congo River disgorges into the Atlantic where it creates a huge nutrient plume, which is one of the largest carbon sinks in the world. Disruption of the plume could be a major threat to marine ecology and has implications for global carbon cycles.

Ecology and biodiversity
infrastructure enables further impacts

The direct physical impact of roads and associated hard infrastructure is significant. But this is not the major driver of ecological impacts.

Rather, it is the economic, settlement and extraction practices infrastructure enables and often encourages that has the most significant implications for the spatial-ecological dynamics on the continent.

Roads, as well as railways and port access when they intrude into new regions can improve the economic viability of resource extraction and promote new agricultural production in once inaccessible areas.

Protecting the most sensitive ecosystems while encouraging more sustainable approaches to mineral and resource use are at the heart of addressing the impacts of these resource corridors and present a huge challenge.

Trade-offs and full cost accounting

There may be times when decisions about trade-offs in the benefits and costs (including the ecological costs) of infrastructure delivery need to be made. This will require:

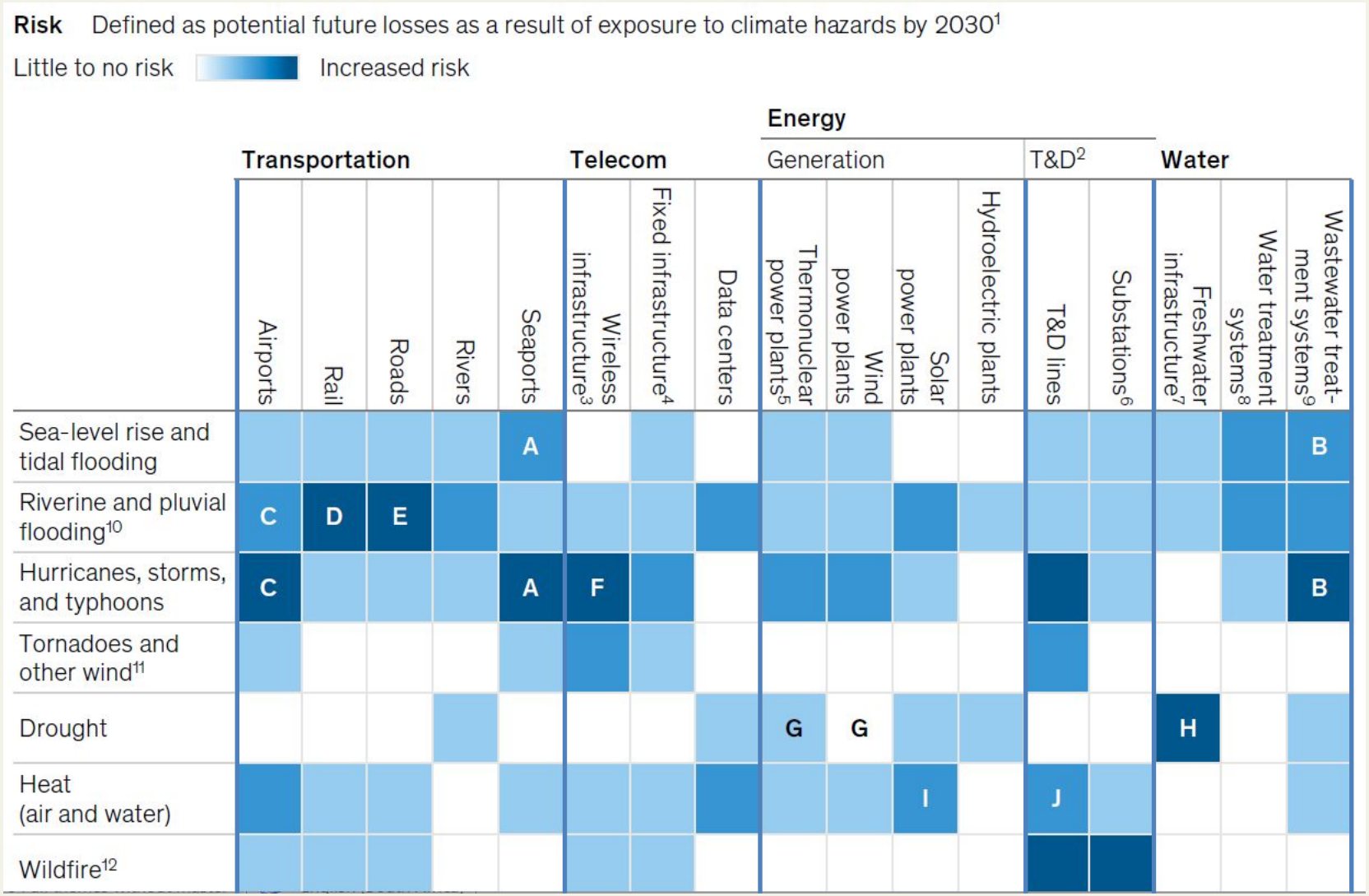
- spatially explicit environmental assessments about location and prioritisation of infrastructure
- civil society engaged in decisions that determine the location and form of major infrastructure corridors
- investors evaluating the environmental, ecological and social costs of major infrastructure

Infrastructure planning decisions are based on narrow cost/benefit analyses, which underestimate lifecycle costs and exclude consideration of social and environmental costs. Need to include:

- Externality costs
- Value of ecosystem services

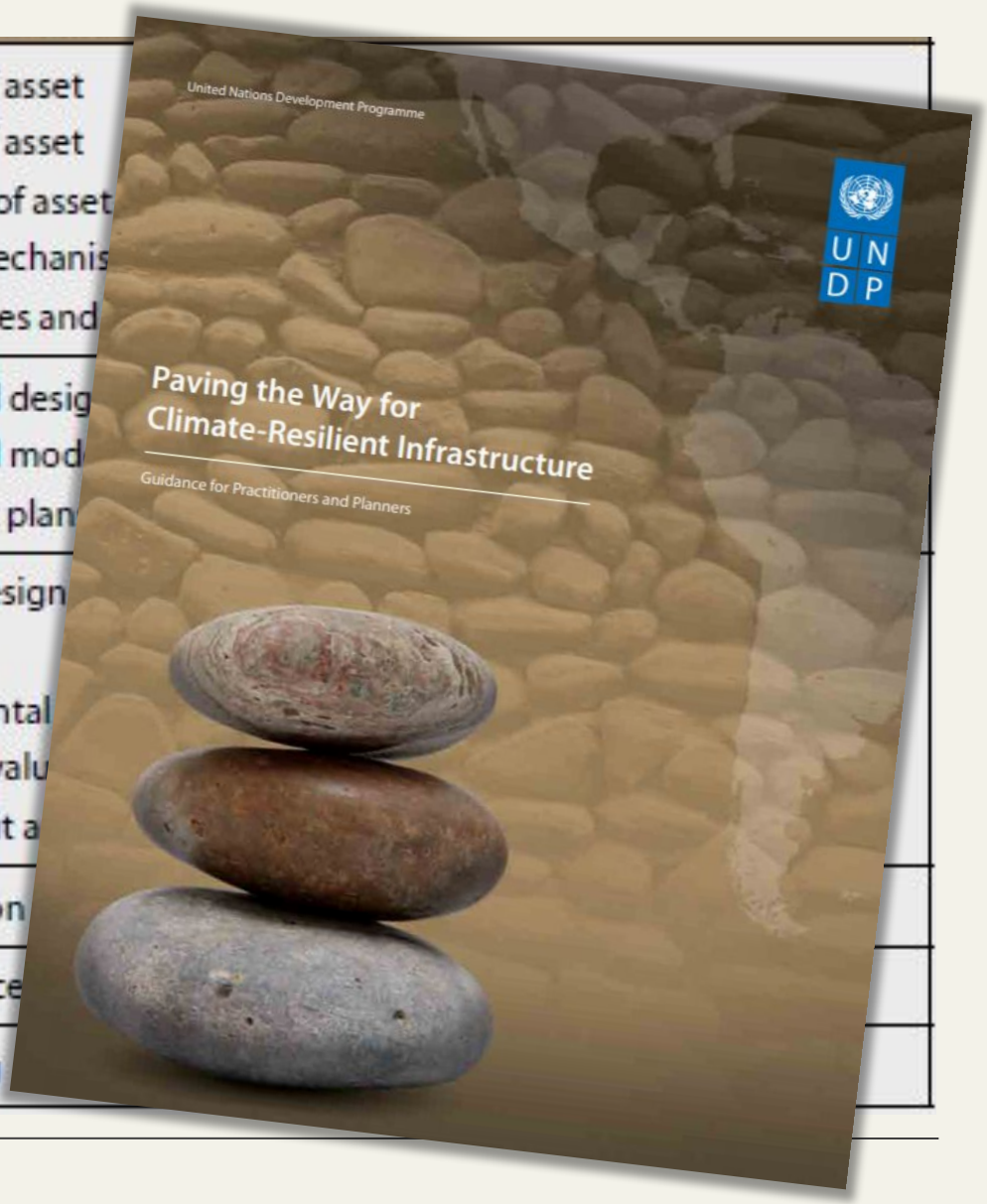

Sustainable transport
5
Climate change adaptation and resilience

Impacts on infrastructure



Decision points on resilience /adaptation

Policy and planning	Location of asset Capacity of asset Design life of asset Funding mechanis Design codes and
Conceptual design	Conceptual desig Conceptual mod Investment plan
Detailed design	Detailed design Modeling Environmental Financial evalu Cost-benefit a
Construction and establishment	Construction
Asset management	Maintenance
Monitoring and adaptation	Retrofitting



Ideas to build infrastructure resilience

- "Toughen up" existing infrastructure e.g. raise elevations in flood areas
- Install new sustainable and resilient infrastructure
- Design to withstand risks
- Reasess engineering and building standards
- Nature-based solutions e.g. mangroves
- A system-wide approach to protecting people and assets
  e.g. flood-proof homes and roadways near those homes
- Resilience planning e.g. build inventory levels in supply chains, and establish alternate locations and/or suppliers to source from, to protect against interrupted production
- Back-up power sources
- Climate risk to be embedded in all capital expenditure decisions

In risk-prone areas, should the state increase protection, or curtail new developments? and perhaps even abandon some areas, and relocate people and assets?

Mitidaption

Non-structural measures

Any measures not involving physical construction such as building codes, land-use planning laws and their enforcement, research and assessment, information resources, and public awareness programmes.

Structural measures

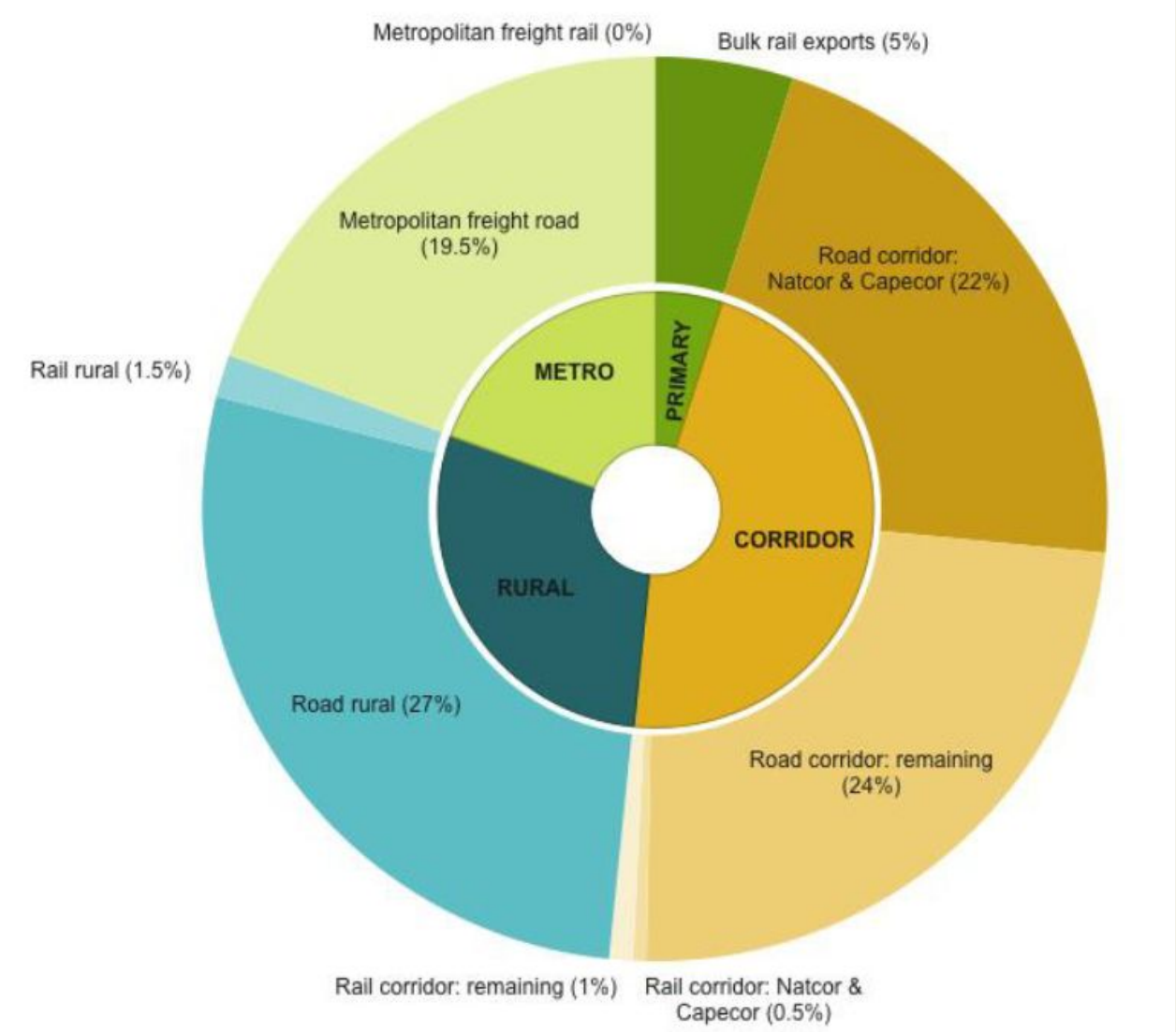
Any physical construction to reduce or avoid possible impacts of hazards, such as flood levees, ocean wave barriers, earthquake-resistant construction and evacuation shelters. The potential to generate additional development benefits will be critical in the weighting regional options.

Sustainable transport

6

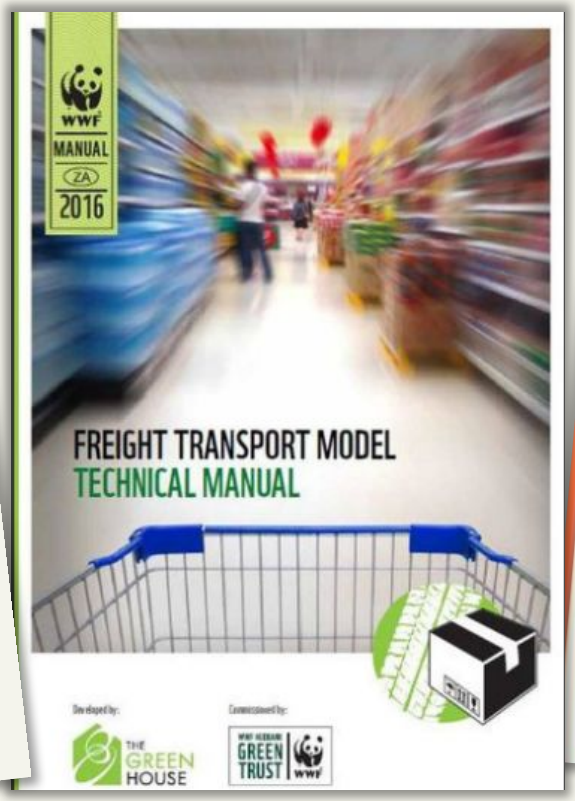
Climate change mitigation

Carbon emissions
freight transport

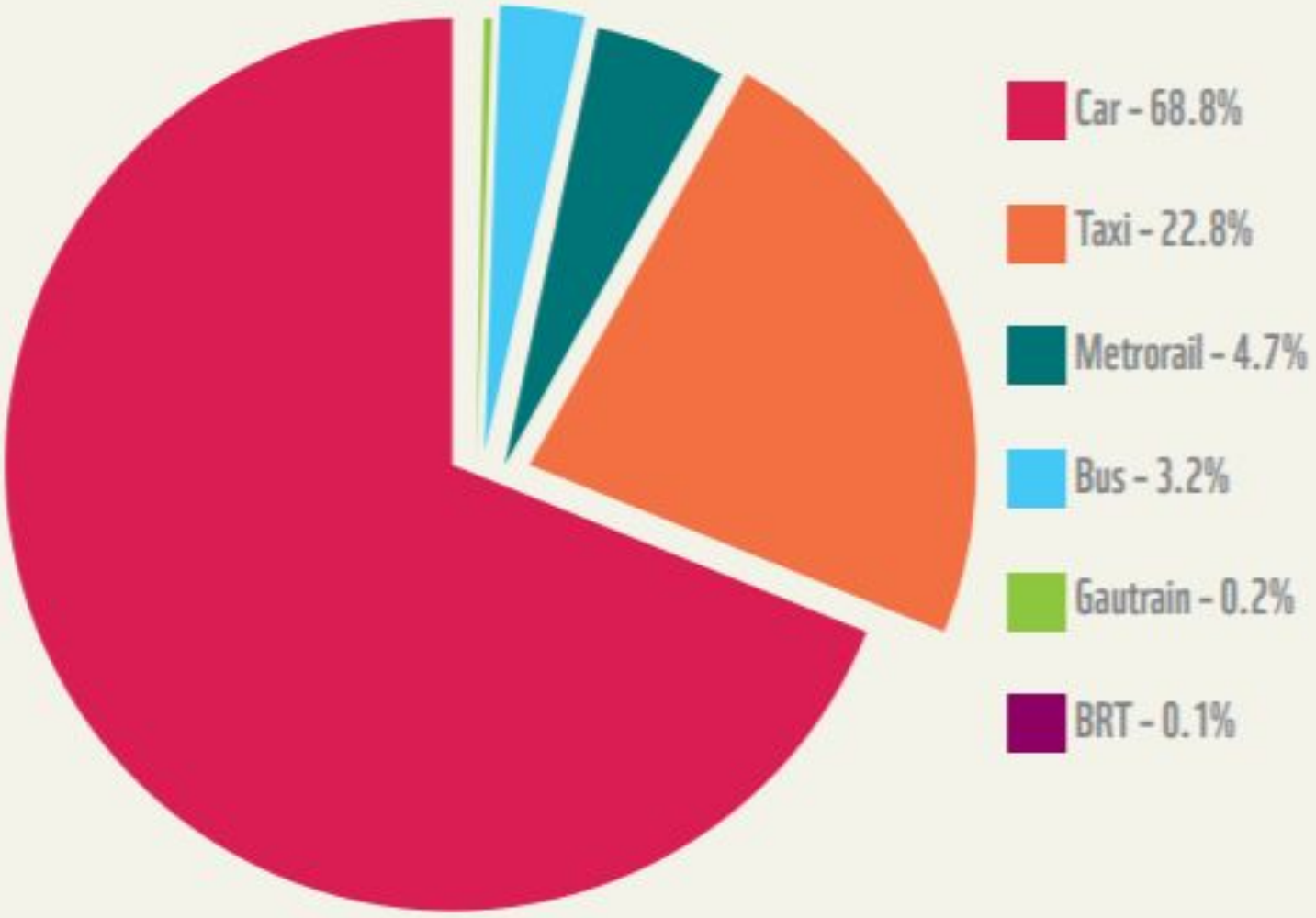


Carbon emissions freight transport

- avoid / reduce
- shift
- improve



Carbon emissions
passenger transport



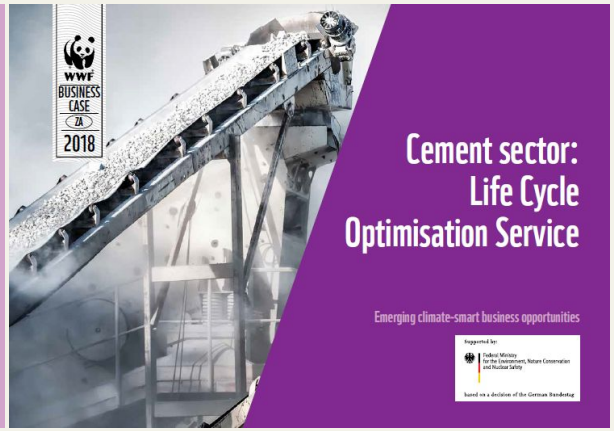
Carbon emissions passenger transport

- avoid / reduce
- shift
- improve

Carbon emissions construction materials

- Extraction
- Processing
- Waste
- Logistics

30% global emissions come from heavy industry – cement, concrete, iron, steel, aluminium



Leadership Group for Industry Transition

What if … Infrastructure corridors are designed with the purpose of building local value-chains and supporting regional trade, but with a strong focus on **decoupling growth from environmental impact**. The impact of infrastructure delivery on the environment is curtailed and companies are required to invest significantly in preserving and returning damaged ecological zones. Far greater attention is focused on the lifecycle and legacy impacts of infrastructure for agriculture, industry and extractive processes. A new approach to infrastructure master-planning considers social utility, legacy and environmental impacts. Strip development and extractive transport corridors are re-thought and their footprint dramatically cut.