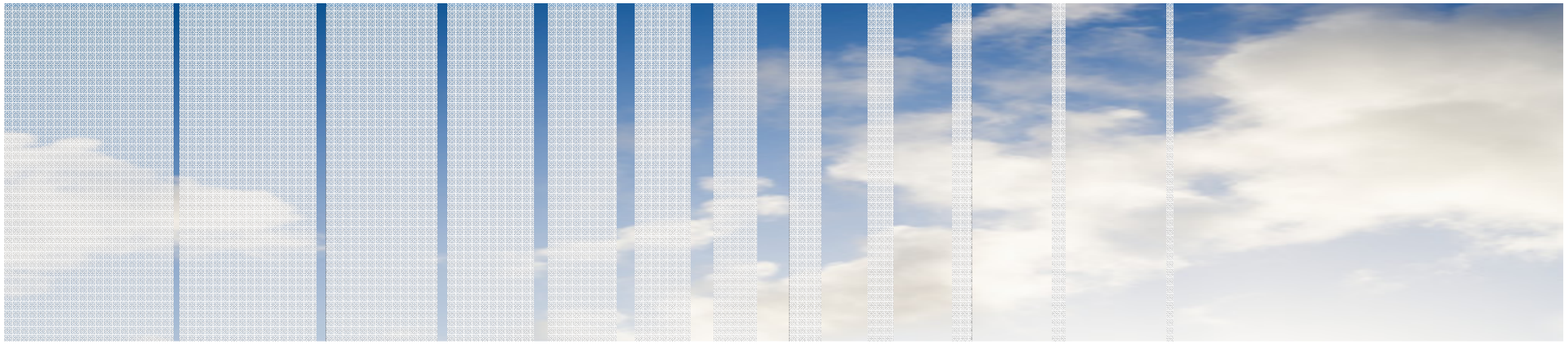
Netherlands Environmental Assessment Agency

Stockholm Resilience Centre
Research for Governance of Social-Ecological Systems

Getting into the Right Lane for 2050

Connecting long term vision to near term strategy

Jan Bakkes



Focus: Near-term action for long-term issues

Three issues

- Global land resources, food, biodiversity
- Energy, climate, energy security
- Transport and mobility

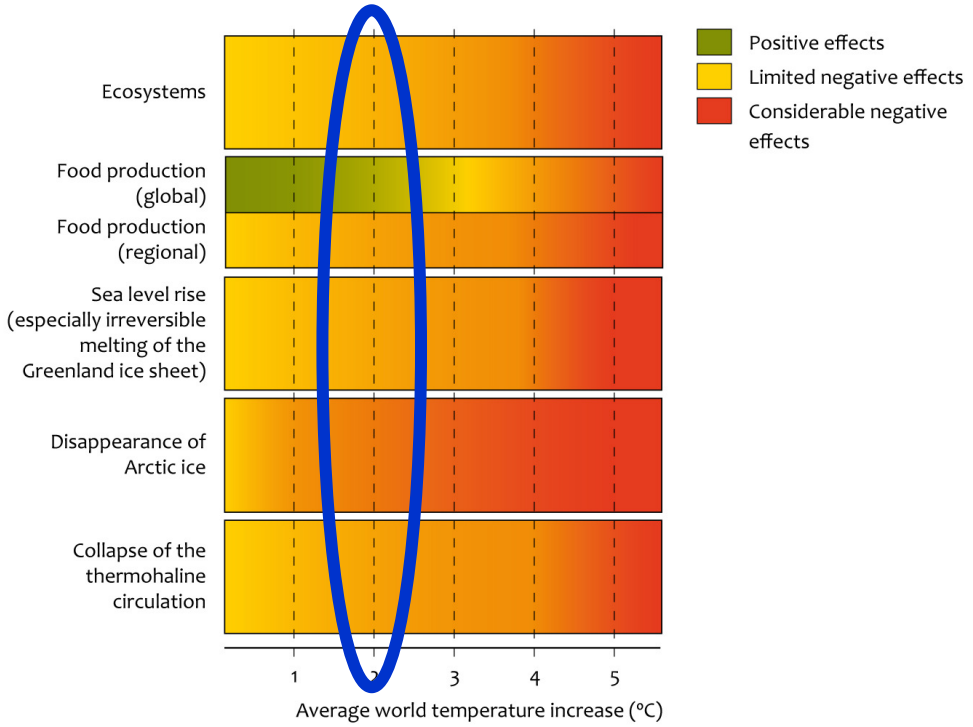
Approach

- Europe in a global context
- Back cast from long-term vision (2050)
- Specific cases for EU-level arrangements

II. Vision 2050: low-carbon energy system

- Decrease of emissions worldwide 50%, Annex-1 80-95%
- Vision for EU: 80% less GHG emitted within EU itself
- Strong diversification improves Security of Supply for EU

Risks of damage due to climate change



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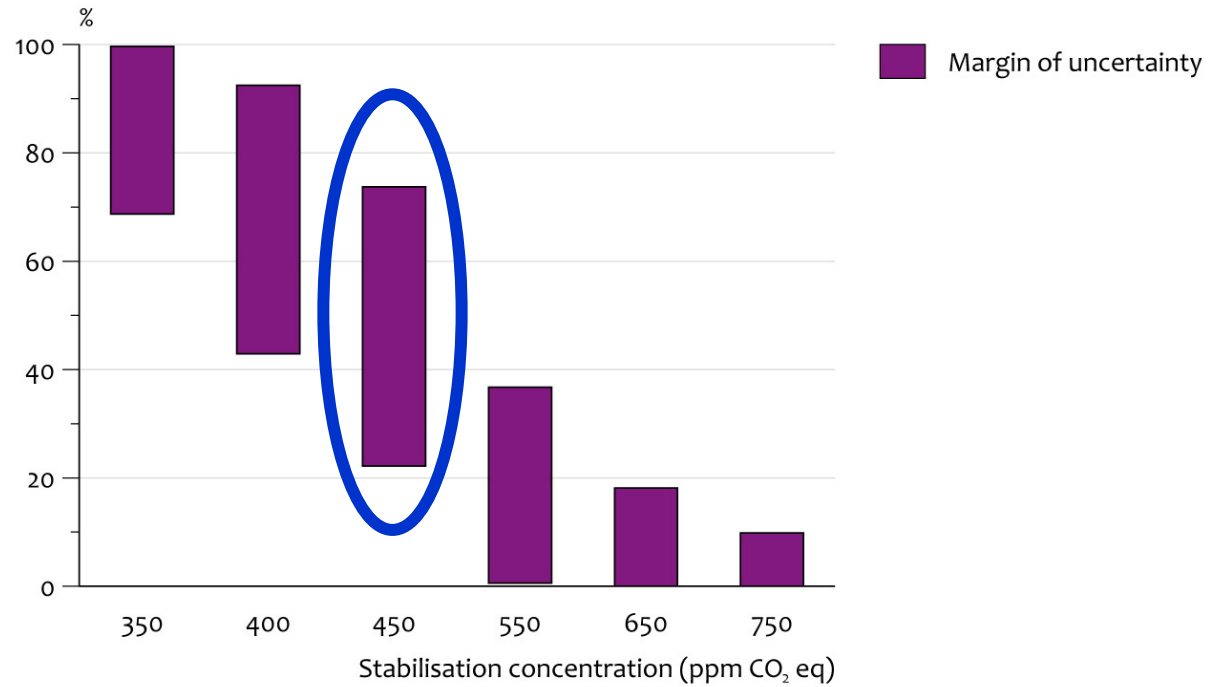
Chance of achieving the 2°C target



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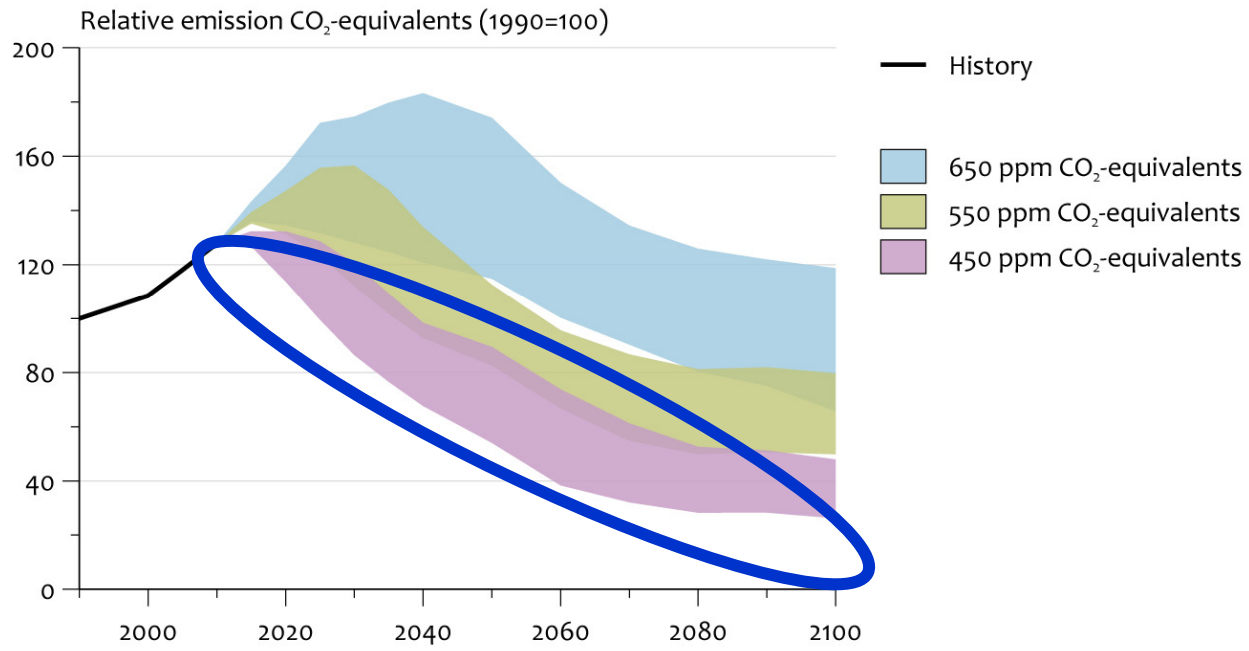
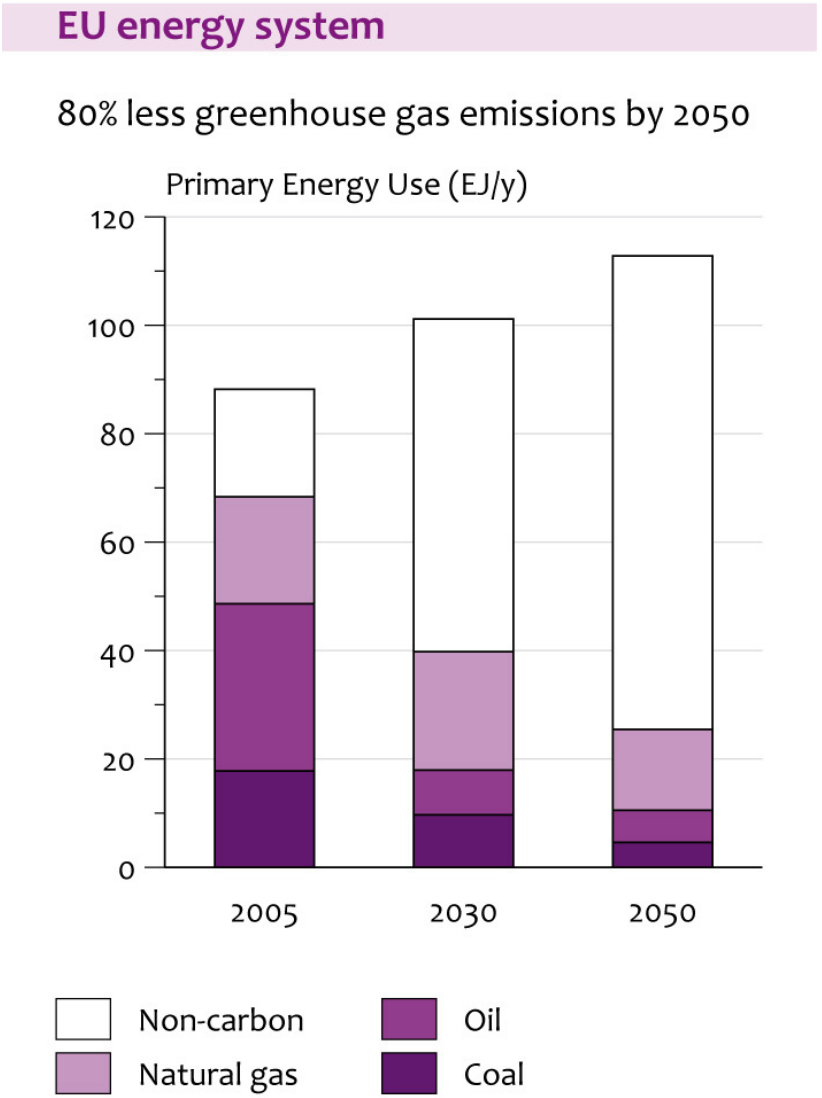
Emission clusters for stabilisation at 450, 550 en 650 CO_2-equivalents



EU energy system with 80% less greenhouse gas emissions by 2050

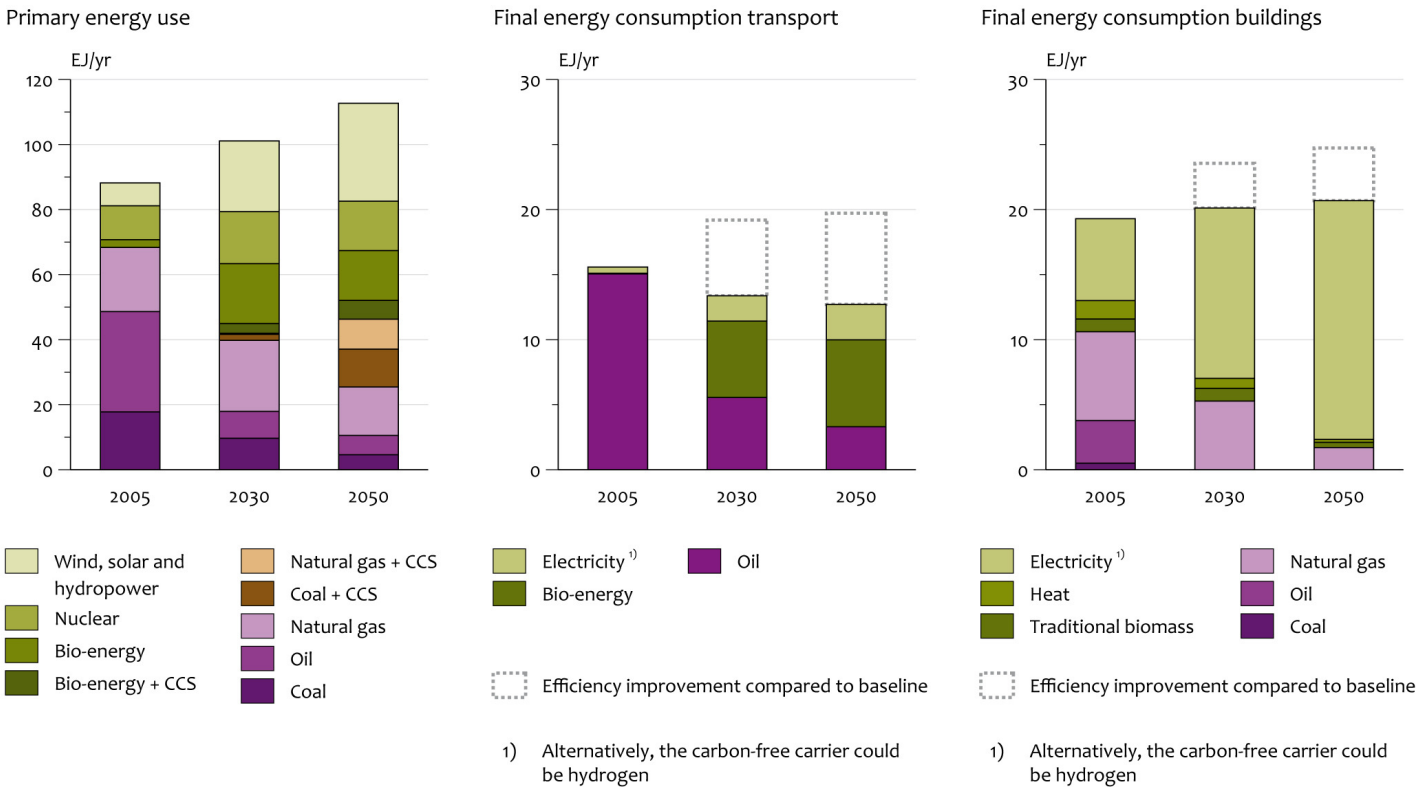
- Example modelling shows that the vision is attainable with identifiable technologies



The contours of a low-carbon society in the EU by 2050

- One option: focus on CCS + 20% renewables
- Cost-efficient on the basis of current expectations
- Prudent to maintain diversity

Towards a low-carbon EU energy system, vision

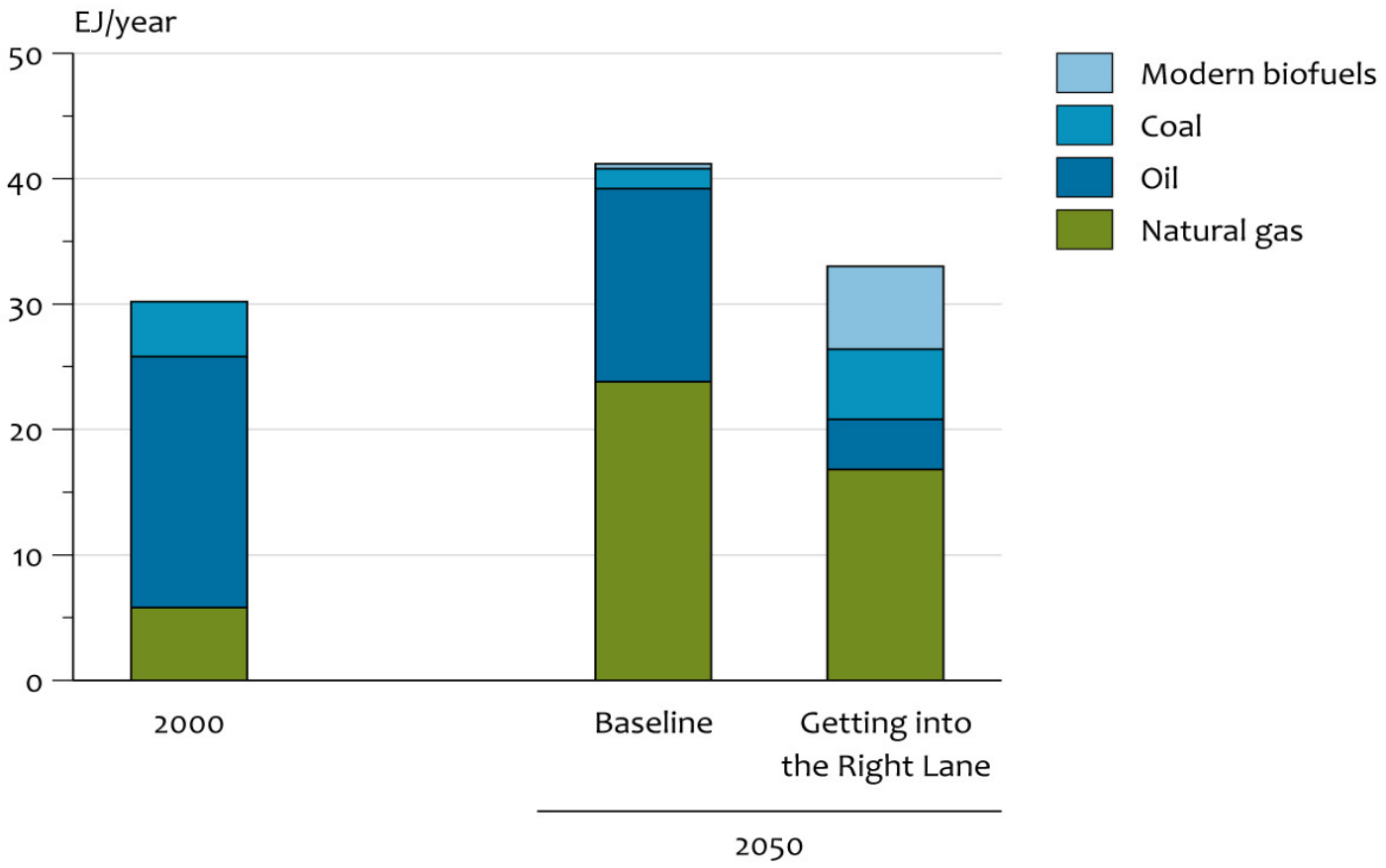


What does the vision mean for the EU energy system of 2050

- Centralised use of fossil fuels, with CCS
  - Only carbon-free end-use: electricity, hydrogen, biofuel
- Large-scale centralised power production
  - Renewable energy farms, CCS, nuclear
- Small-scale energy production by end-users
  - Solar PV, urban wind, geothermal
- Diversification increases security of supply
  - More endogenous energy production
  - Network for import natural gas: Russia, Central Asia, North Africa LNG
  - Coal, uranium and biomass from diversity of regions

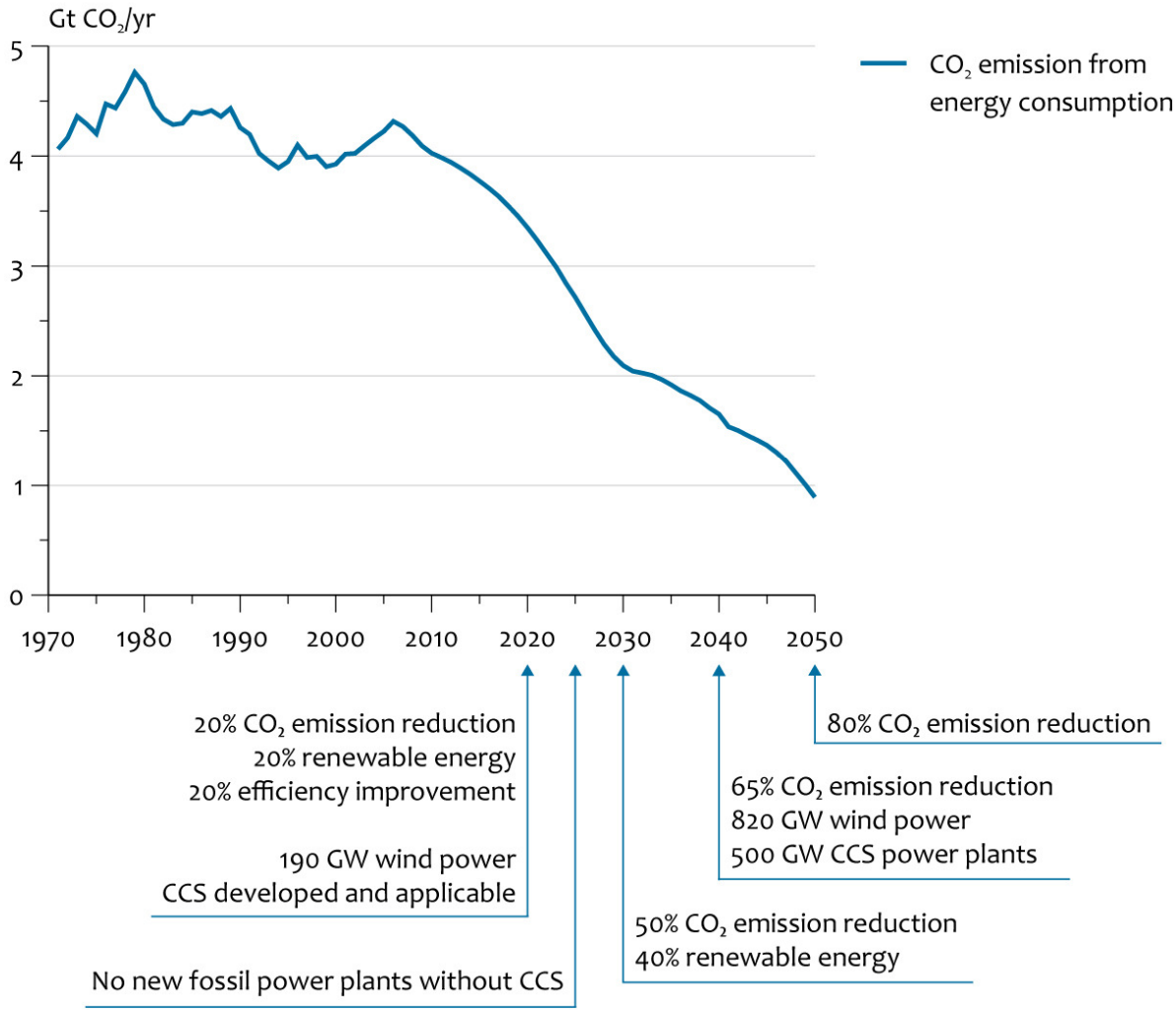
Do we need more Russian gas?

Energy imports EU



How to get there?

Pathway towards a low-carbon EU energy system, vision



What is on the critical path for the EU to 2050 ?

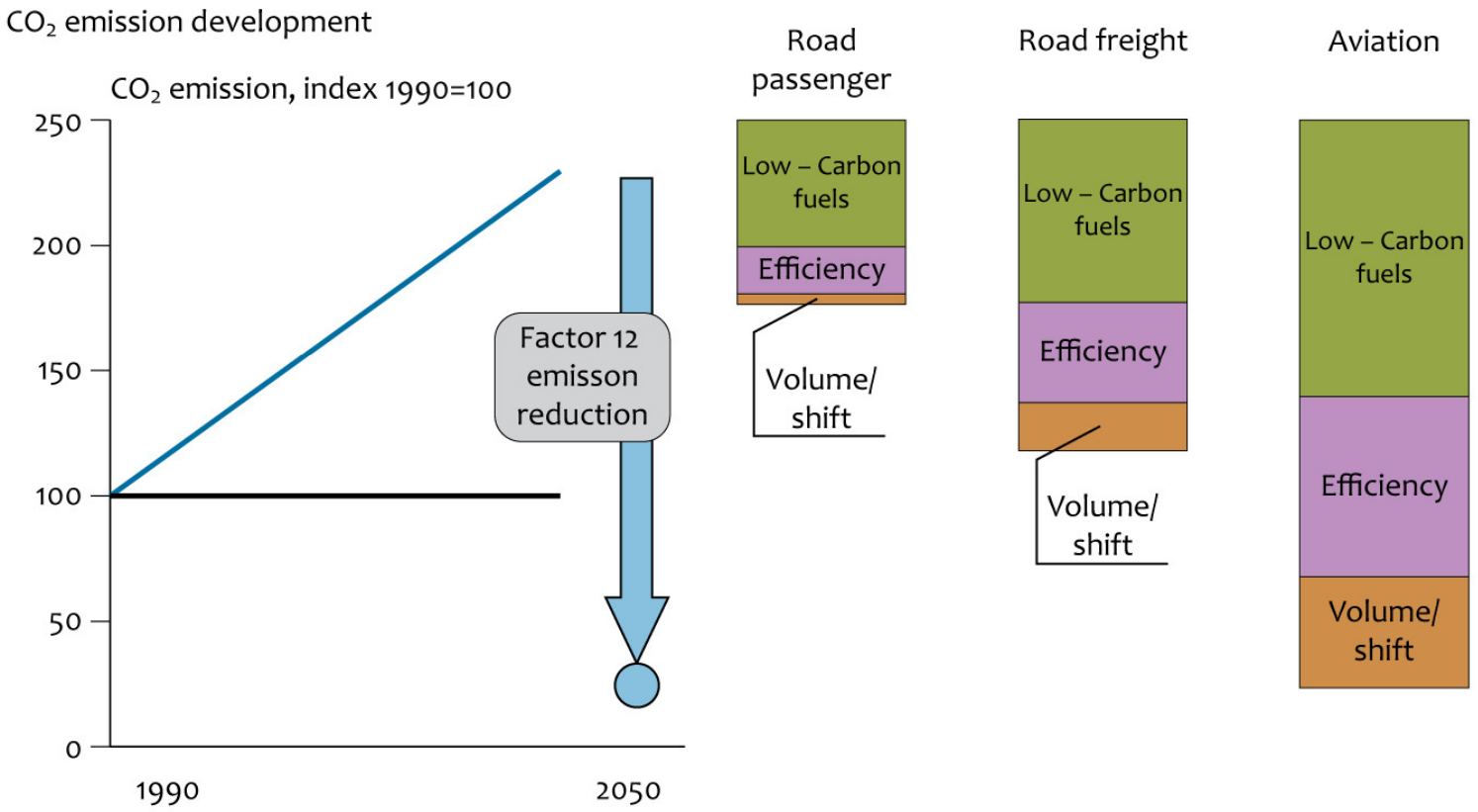
1. Build the electricity grid for 2050
2. Enlarge and harness the R&D for energy technologies
   - Broad range of technologies needing further development
3. Develop a long-term vision on EU energy system
   - A low-carbon EU economy as strategic goal

III. Vision for 2050 – Transport and mobility

80% less carbon dioxide emissions from EU transport by 2050

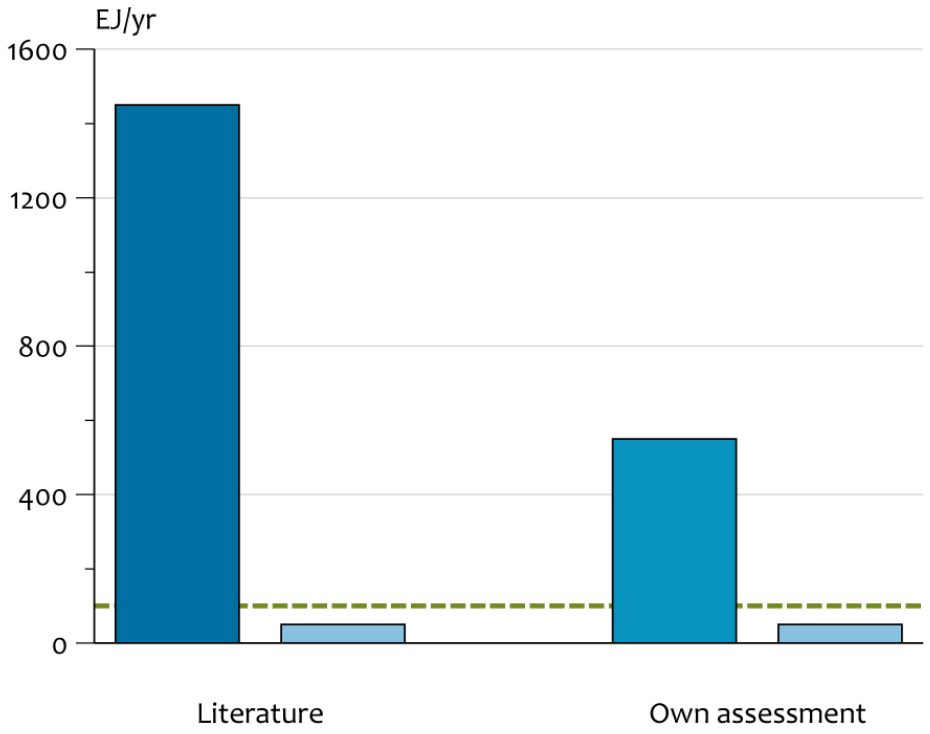
A route towards low-carbon transport

A route towards low carbon transport



Targeted allocation of bio-energy needed

Estimates of global bio-energy potential, 2050



Maximum estimate of technical potential found in the literature

Estimates of potential, modelled by taking into account constraints of water, soil, climate, nature protection and availability of agricultural residues

Maximum, under conditions of
* high agricultural yields
* 30% loss of forest
* 100% loss of grassland

Minimum, under conditions of
* low agricultural yields
* no loss of nature
* no residues

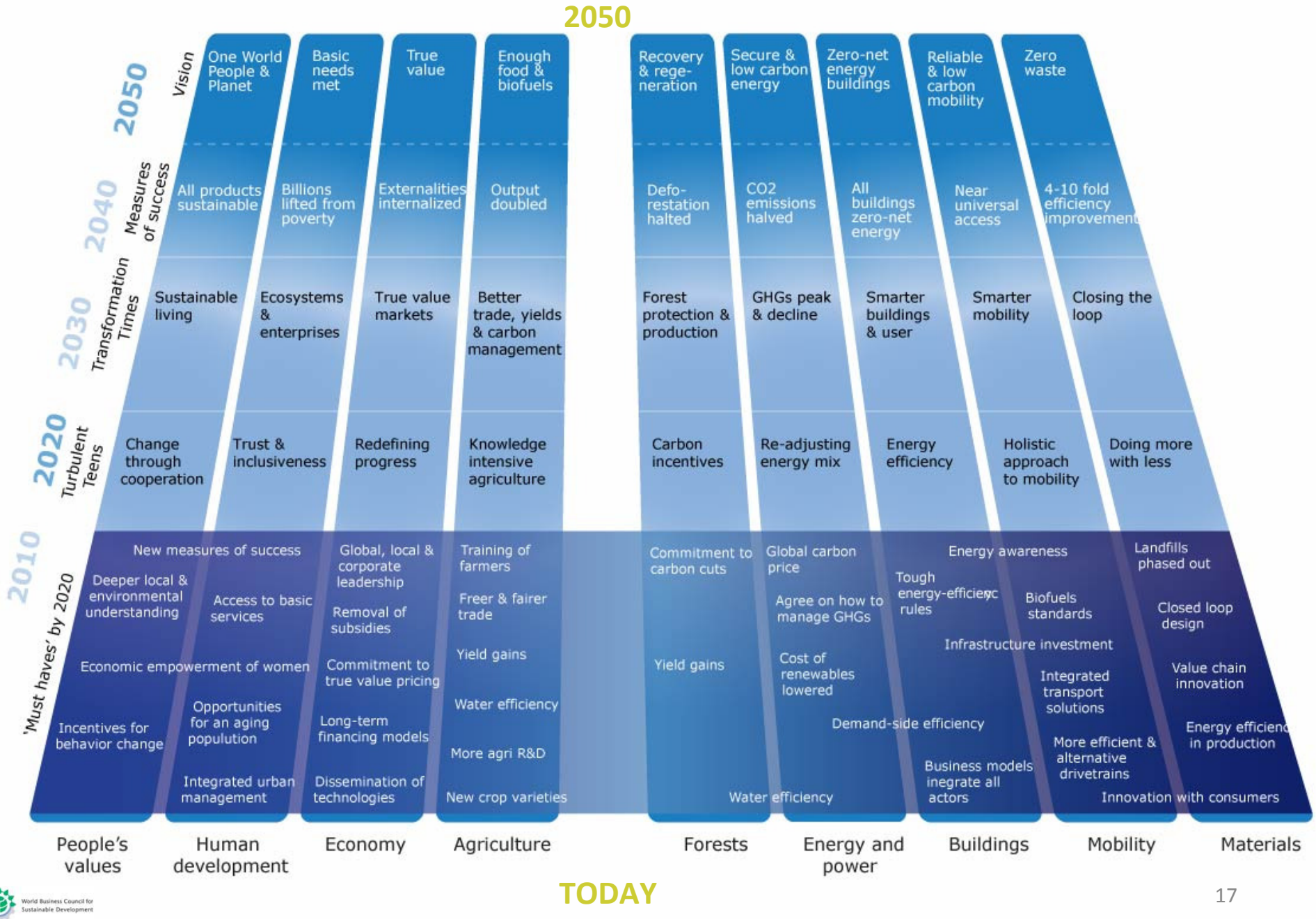
Used for 'Getting into the right lane for 2050'

Transport and mobility: What is on the critical path for the EU?

- Global agreements to start reducing carbon emissions from aviation and shipping, soon
- An integrated approach for the transport and energy sectors
- Better allocation of biofuels

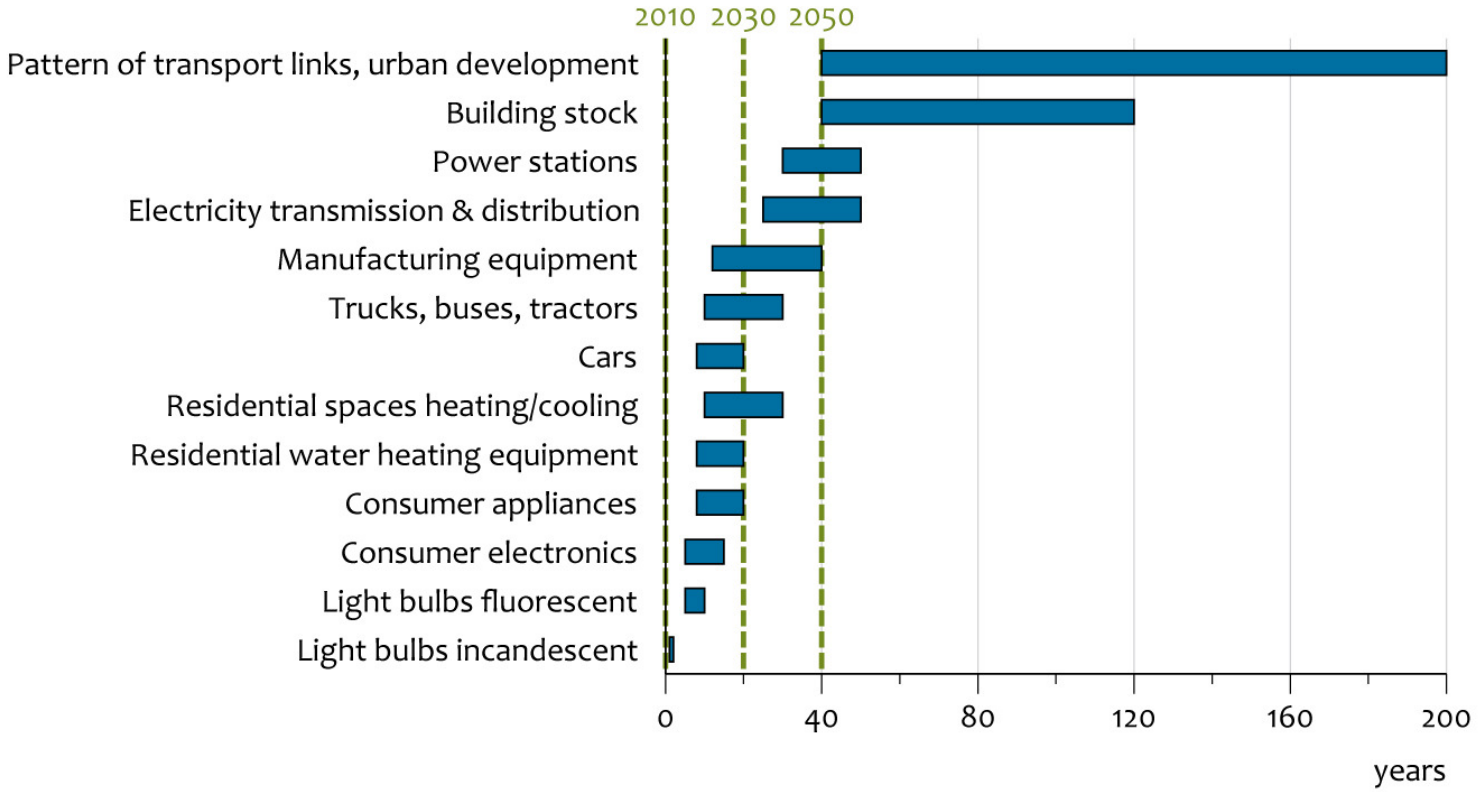
Others are also making these conncetions

The pathway to *Vision 2050*



System inertia is one of the link between long-term vision and near-term investments

Energy capital lifetimes



Source: Philibert and Pershing, 2002

Key notions

System inertia

- Interim solutions 2020-2030 may easily create lock-in
- New technologies require massive acceleration by 2020-2030 to reach visions

Capacity to deal with uncertainty and surprises in a crowded world

- Diversity as a strategic aim
- Flexibility by 2050 needs planning now – e.g. by long-term allocation of biofuels

The EU in this backcast

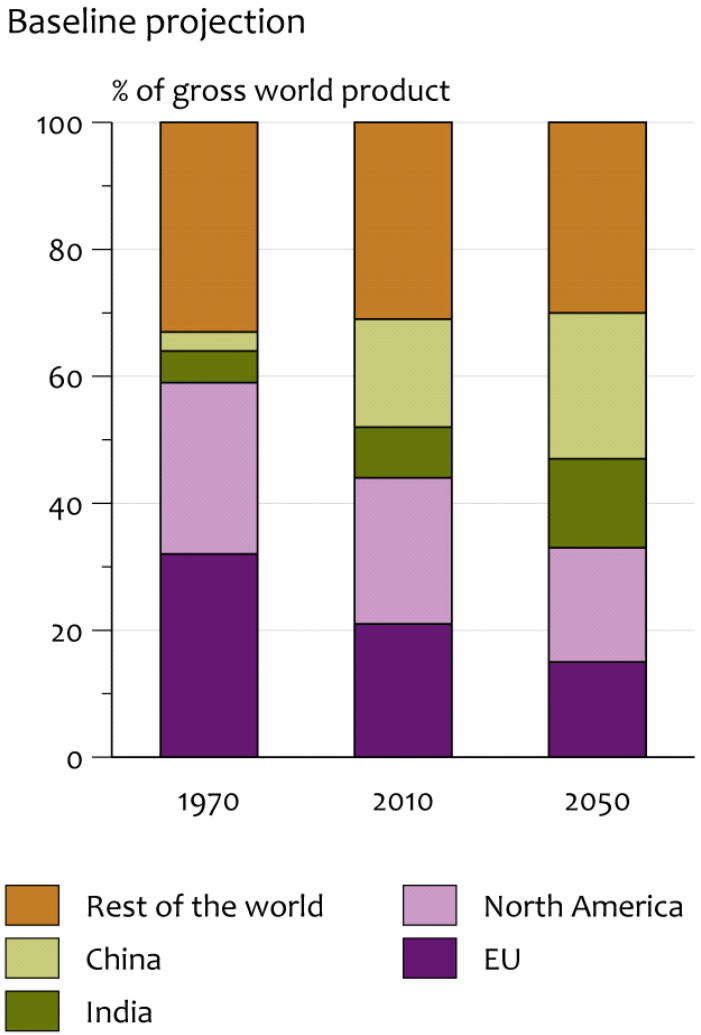
Global role

- EU an economic power; regulation and product standards its key tools
- EU's global leverage shrinks towards 2050. But it does not disappear completely.

Case for EU-level arrangements if:

- very long-term investment framework
- plan at the scale of the continent
- common market & keeping playing field level
- consolidated position in global negotiations

GDP of major world regions



Now is the moment to get in the right lane

- …To establish a vision of structural and technological changes required to move to a low carbon, resource efficient and climate resilient economy by 2050 which will allow the EU to achieve its emissions reduction and biodiversity targets; this includes disaster prevention and response, harnessing the contribution of cohesion, agricultural, rural development, and maritime policies to address climate change, in particular through adaptation measures based on more efficient use of resources, which will also contribute to improving global food security; ….