

Seminar March 3, 2010

Sustainable Development Indicators, Objectives and Scenarios

Scenarios for a sustainable development in 2050

ALAIN HENRY and SYLVIE VARLEZ

Task Force on Sustainable Development

Content

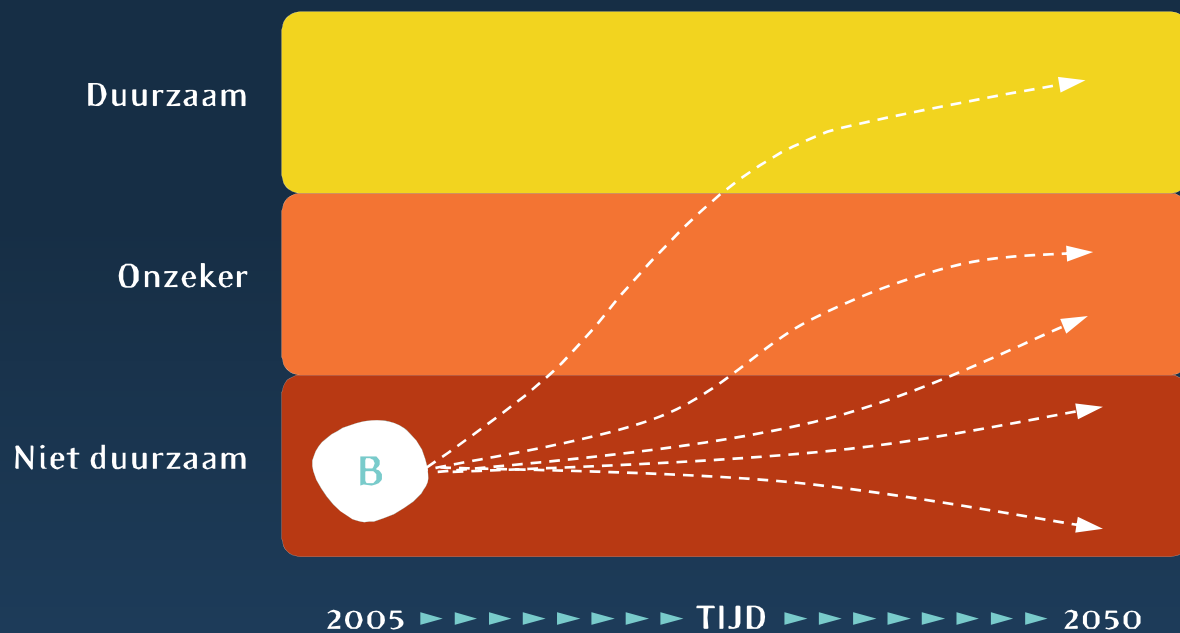
- 1. Introduction and methodology**
- 2. Overall description of objectives and scenarios**
- 3. Focus on the energy sub-system**
- 4. Focus on the food sub-system**
- 5. Conclusions**



1. Introduction and methodology



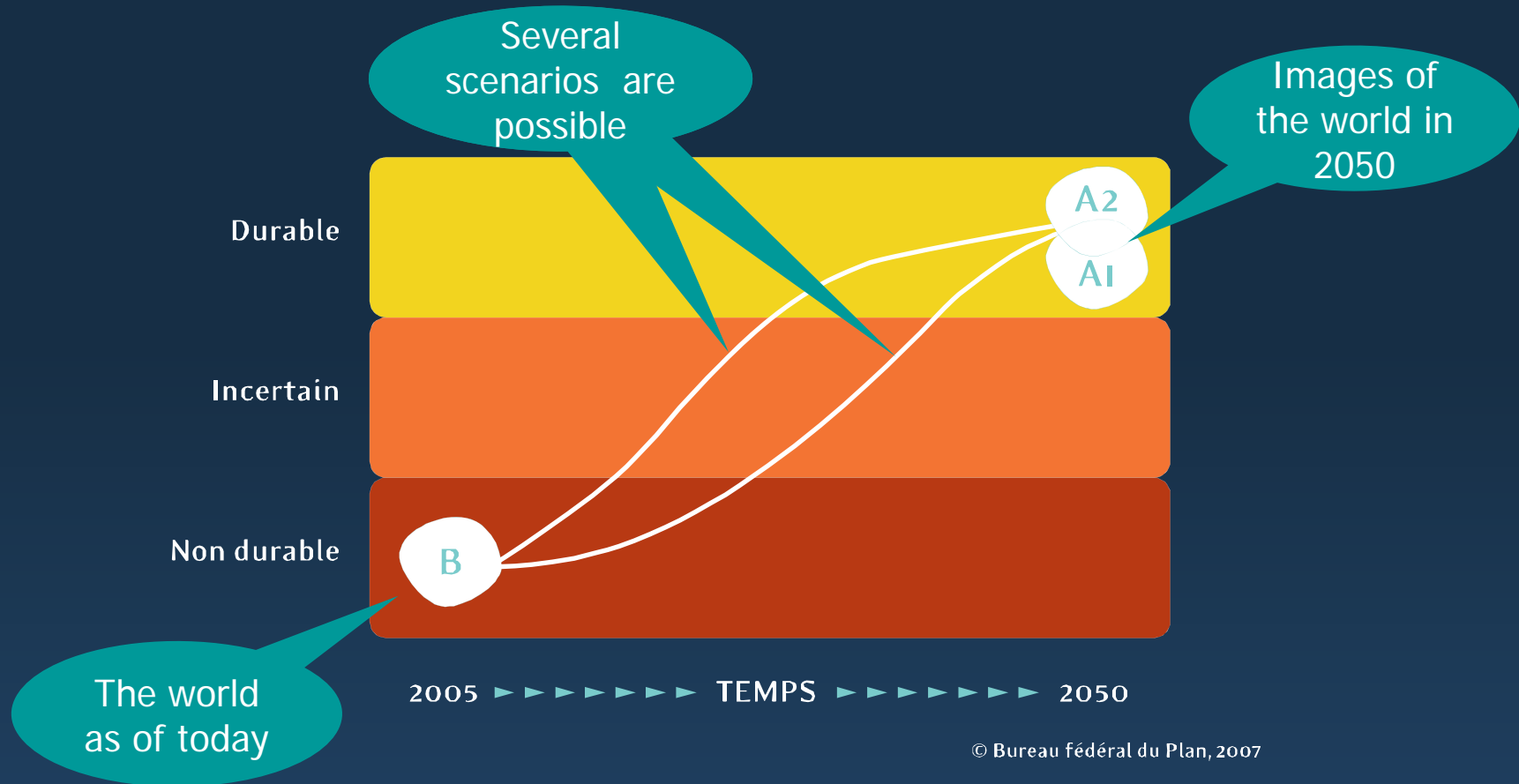
Which world and which Belgium in 2050 ?



© Federaal Planbureau, 2007



A backcasting approach

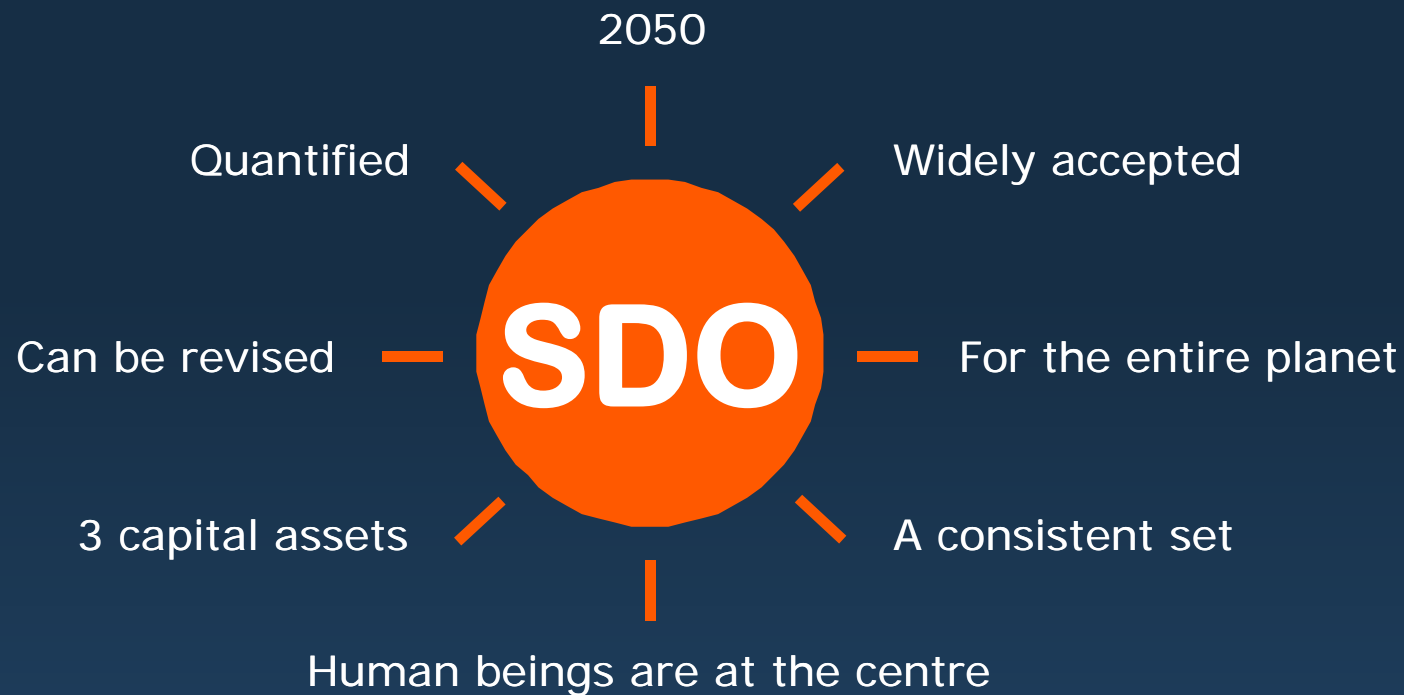


2. Overall description of objectives and scenarios



Images of the world in 2050

- A set of Sustainable Development Objectives (SDOs), based on international texts agreed at UN or EU level



- Other information on the international context, technology, demography, etc.



Sustainable development objectives

- **Mains sources used to define the 21 SDOs**
 - Universal declaration of Human rights (1948)
 - Rio (1992) and Johannesburg (2002) conferences
 - WHO reports (1998, 2006)
 - Millenium Ecosystems Assessment (2005)
- **Examples of SDOs**
 - Eradication of poverty
 - Health: Life expectancy at 76 years (world average)
 - Education: at least secondary school for all
 - Very low pollution levels
- **All SDOs are reached – by hypothesis – in the scenarios presented here**



Two scenario's to reach the SDOs and the images of the world

- **Business as usual is not an option**
 - The current energy system is not sustainable (IEA)
 - Western diet cannot be extended to the entire world
- **Together with a group of 16 non-FPB experts, the TFSD chose two scenarios that lead to the SDOs**

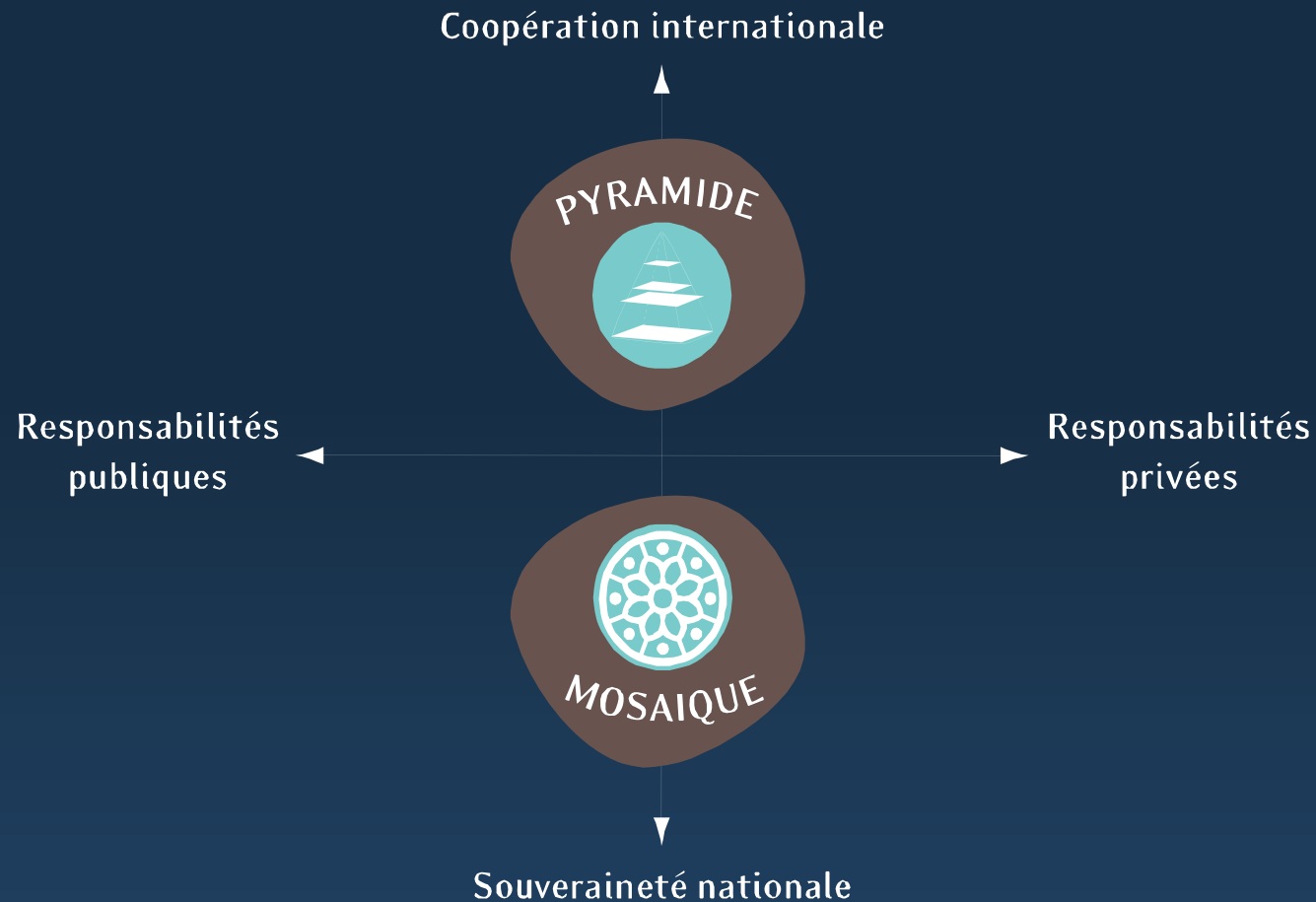
Pyramid



Mosaic



Two scenarios reaching two images of the world in 2050



More details on the images of the world in 2050 and the scenarios - general





World governance	Strong	As today
Progress	Technologies	Social organisation
Uncertainty	Will technology deliver ?	Social acceptance ?
Capital productivity	++	+++
Labour productivity	+++	++
Energy productivity	++	+++
Healthcare	Curative-oriented	Preventive-oriented
Education	More heterogeneous	More homogeneous



More details on the images of the world in 2050 and the scenarios - Belgium



GDP growth ¹	+1.8%	+1.8%
Population growth ¹	+0.1%	+0.1%
Employment rate	+	++
Households' size		
Hours worked	+	++

1: source : MALTESE model, Report of the Ageing study Committee 2007

- These scenarios illustrates two extreme situations; in the real world, they are not mutually exclusive and could be combined in many ways**



3. Focus on the energy sub-system

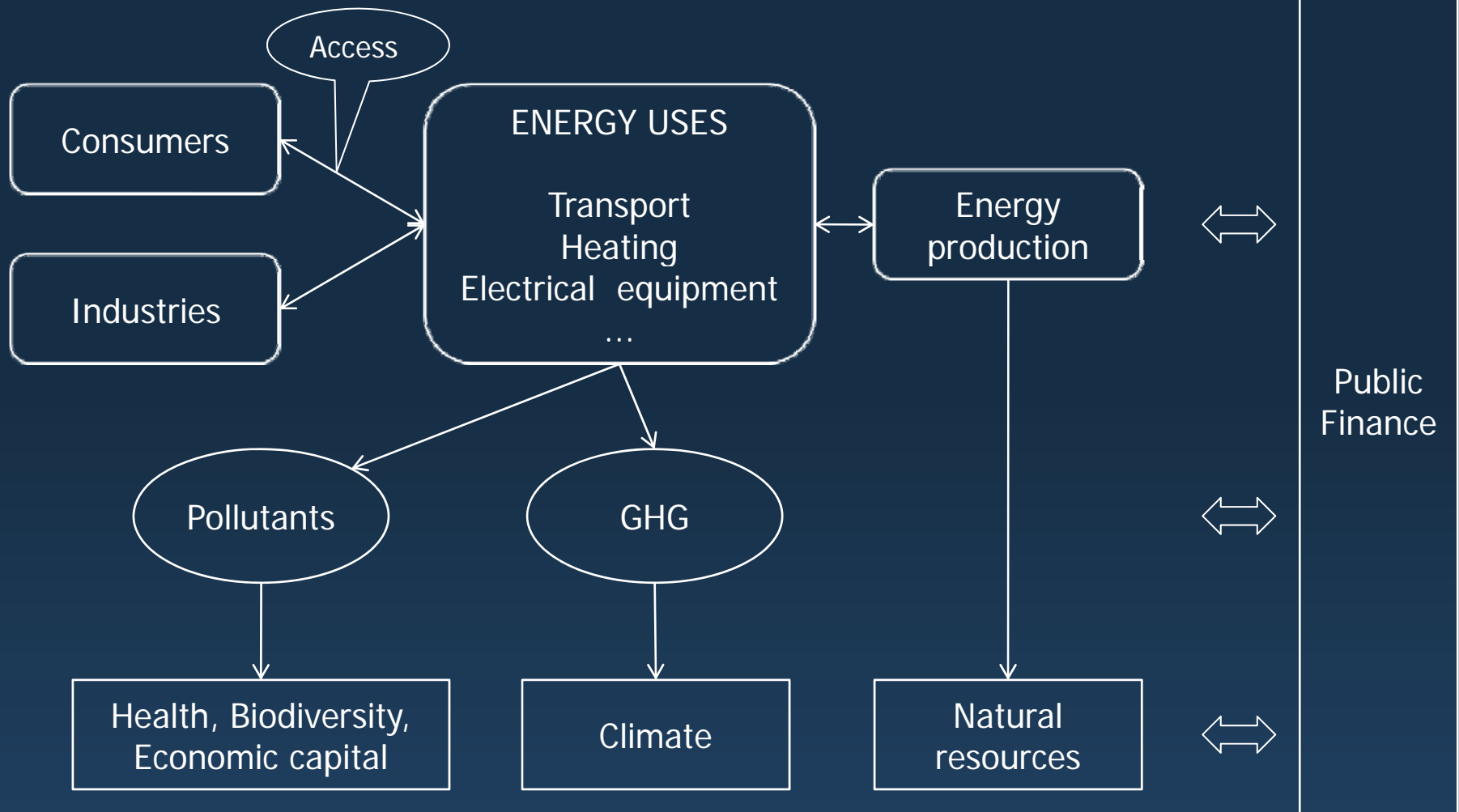


SDOs and the energy sub-system

- **Global warming limited to 2°C:** -70% of GES emissions in Belgium between 1990 and 2050
- **Eradication of poverty:** access to basic energy services for all
- **Use of non-renewable resources limited, when no substitution is possible**
- **Use of renewable resources below their replacement rate**
- **Very low pollution levels**



The energy sub-system



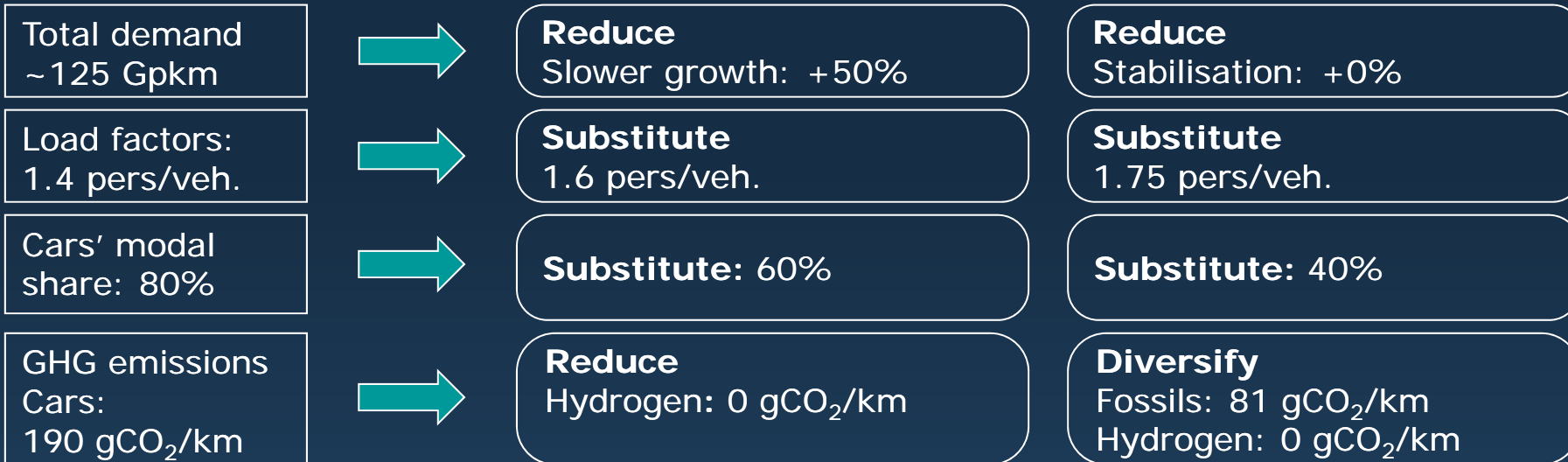
Passenger transport in Belgium

Key changes between 2007 and 2050

Current situation 2007



Key changes 2007-2050



Transport

- **Investment in infrastructure**
 - Public transport (especially in Mosaic)
 - Hydrogen production and distribution (especially in Pyramid)
- **Changes in land use and behaviours**
 - Stabilisation (Pyramid) or reversal (Mosaic) of urban sprawl
 - Progressive restructuring of land uses in order to decrease transport demand
 - Increased in willingness to use non automobile transport modes
- **These are only two examples that lead to the SDOs; other changes are possible, for example**
 - Batteries instead of hydrogen/fuel cells as energy storing device
 - Other load factors and modal shares



Electricity in Belgium

Key changes between 2007 and 2050

**Current situation
2007**



**Key changes
2007-2050**



Gross final
consumption:
~90TWh



Reduce : 77 TWh
Diversify: + 69 TWh for
hydrogen
Total: 146 TWh

Reduce: 68 TWh
Diversify: + 52 TWh for
hydrogen
Total: 120 TWh

Centralised
production:
dominant



Diversify: 43 TWh
mostly with CCS

Diversify: 14 TWh
mostly with CCS

Decentralised
production:
marginal



Diversify
Cogeneration: 37 TWh
Wind: 56 TWh
Solar: 10 TWh

Diversify
Cogeneration: 47 TWh
Wind: 49 TWh
Solar: 10 TWh



Electricity production

- **Reduction of electricity demand by households and industry in the two scenarios, driven by efficiency and**
 - Slowdown of the electrification of households
 - Growth more oriented towards services (Mosaic)
- **Limited CCS capacity in Belgium**
 - Storage solutions have to be found abroad (Pyramid)
 - Need of transport capacity (Pyramid)
- **Management of the nuclear phase-out**
 - Gap between production and demand for about 10 years after the phase-out;
 - Large imports for 10 years (Pyramid); transport capacity is needed
- **These are only two examples that lead to the SDOs; other changes are possible**



GES emissions in the two scenarios



Mt CO ₂ eq	1990	2050	90-50	2050	90-50
Energy	30.7	8.2	-73%	8.6	-72%
Industry	49.9	20.5	-59%	18.5	-63%
Transport	20.6	0.1	-99%	2.3	-89%
Agriculture	16.0	6.2	-61%	6.7	-58%
Residential	20.9	4.0	-81%	5.6	-73%
Services	4.4	2.1	-51%	1.7	-61%
Waste	3.4	0.0	-100%	0.0	-100%
Total (without bunkers)	145.8	41.1	-72%	43.4	-70%
International bunkers	17.1	10.7	-37%	8.4	-51%
Total (with bunkers)	162.9	51.9	-68%	51.7	-68%



Examples of short-term policies

- **International:** support ambitious climate policies for 2020
- **Regulatory and economic instruments:** ensure that new large commercial sites can easily be reached with public transport
- **Corporate social responsibility:** increase awareness on the negative impacts of company car systems (fuel consumption, accident rate) and encourage them to provide alternative
- **Consumers social responsibility:** implement *school of consumption (FPSD 2)*
- **Research and development:** support R&D on material flows, life-cycle analysis, interdependencies between social et environmental issues...

4th Federal Report: pp. 74-96



Examples of long-term policies

- **International:** support ambitious climate policies, in particular for international transport
- **Regulatory and economic instruments:** Internalise external costs (road pricing, carbon taxes or quotas...)
- **Corporate social responsibility:** contribute to rising awareness and training of construction workers on energy performance
- **Consumer social responsibility:** start courses on environmental impacts of consumption and production patterns
- **Research and development:** reorient subsidies towards renewable energies

4th Federal Report: pp. 96-117



4. Focus on the food sub-system

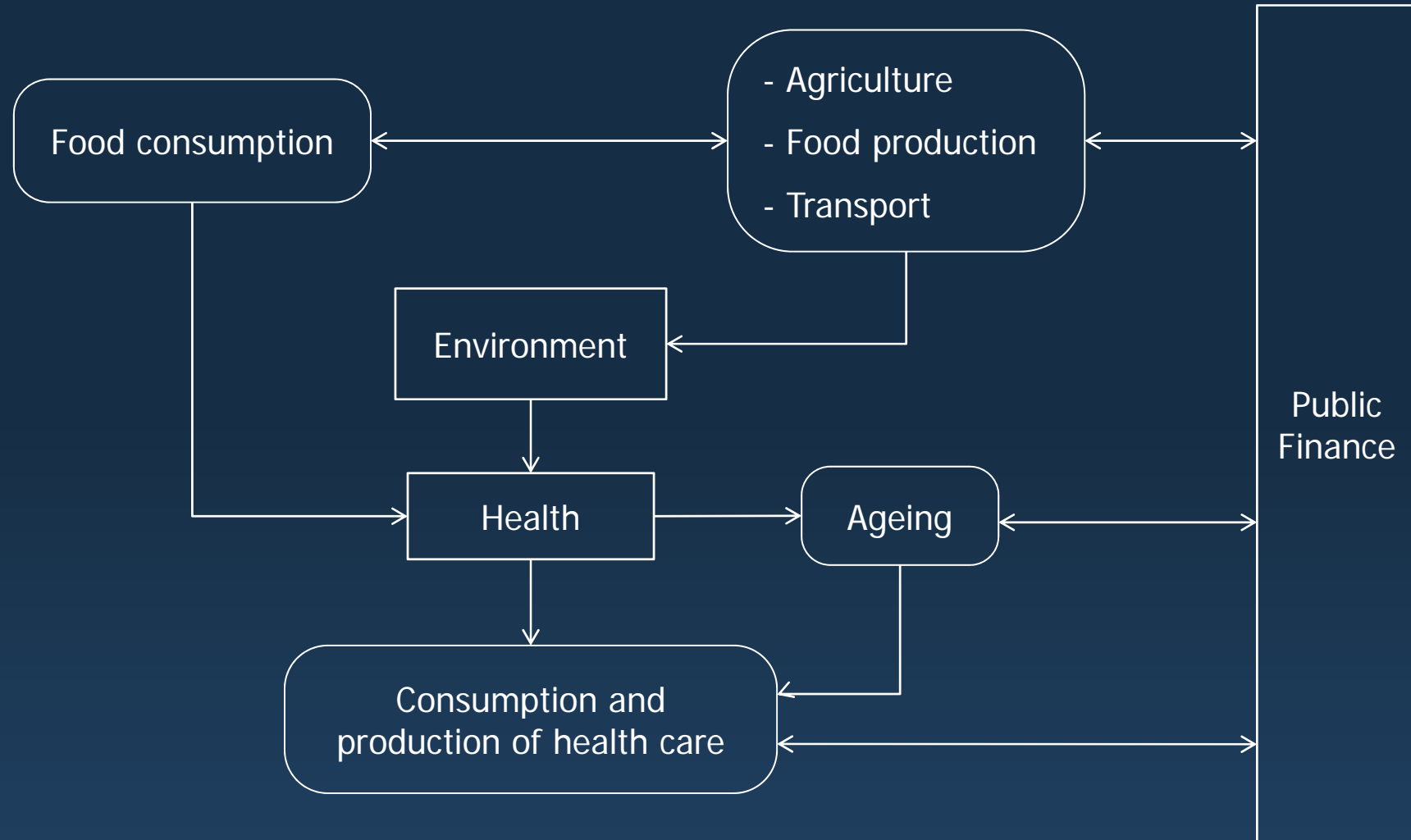


SDOs and the food sub-system

- **Eradication of poverty:** sufficient high quality food for all
- **Life expectancy:** 76 years (world average)
- **Development within ecosystem's carrying capacity**
- **Very low pollution levels**
- **Global warming limited to 2°C**
- **Reduction of the current rate of biodiversity loss to its natural level**



The food sub-system



Food consumption in Belgium

Key changes between 2007 and 2050

Current situation 2007



Key changes 2007-2050



Fruits and
vegetables:
256.5g/d/p



Substitute → 500g/d/p,
more variety

Substitute → 700g/d/p,
much more variety

Meat: 160g/d/p



Substitute → 50g/d/p
(+ other proteins' sources)

Substitute → 75g/d/p
(+ other proteins' sources)

Sugars, salt and
fats above
nutritional
recommenda-
tions



Reduce: getting closer to
nutritional
recommendations

Reduce: achieving
nutritional
recommendations



Food production in Belgium

Key changes between 2007 and 2050

Current situation
2007



Key changes
2007-2050



Agricultural production in Belgium

Key changes between 2007 and 2050

Current situation
2007



Key changes
2007-2050



Intensive use of inputs



Reduce fertilizers and pesticide use



Specialize: highly intensive and highly controlled agriculture

Substitute: organic agriculture

Research not directed towards SD



Diversify: centralized research, GMO, nanotechnologies

Substitute: local knowledge, agro-ecology



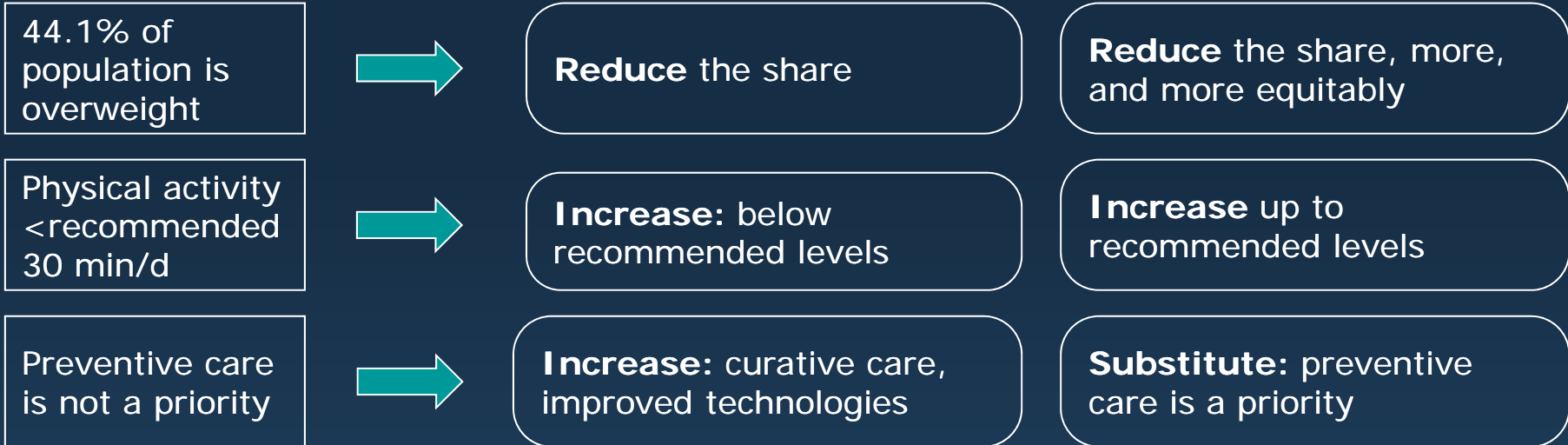
Impact of food on health in Belgium

Key changes between 2007 and 2050

**Current situation
2007**



**Key changes
2007-2050**



Examples of short term policies

- **International:** support the Marrakech process promoting sustainable consumption and production patterns
- **Regulatory and economic instruments:** prepare and implement a label on the CO₂-equivalent content of food
- **Social responsibility of producers:** promote participation of producers to the *EU Platform for Action on Diet, Physical Activity and Health*
- **Social responsibility of consumers:** include food and physical activity in the school curriculum
- **Research and development:** investigate production of biodegradable packaging

4th Federal Report: pp. 74-96



Examples of long term policies

- **International:** promote food sovereignty for developing countries in CSD and UN
- **Regulatory and economic instruments:** help people facing a risk of poverty to adopt sustainable food patterns
- **Social responsibility of producers:** establish partnerships with Horeca to get them producing sustainable menus
- **Social responsibility of consumers:** include the study of links between food, agriculture, health and environment in the school curriculum
- **Research and development:** create a research centre on the psychology of dietary behaviour, sustainable agricultural technologies...

4th Federal Report: pp. 96-117



5. Conclusions

Lessons learned on 2050 scenarios

These energy and food scenarios suggest that it is possible to:

- Choose a "*time horizon [that] is long enough to allow considerable scope for deliberate choice**" and to system changes
- Define consistent SDOs answering to:
 - Political and collective choices of the Belgian society
 - Hypothesis on the international context and progress of knowledge
- Build examples of paths to reach the SDOs which are:
 - Not projections of life conditions or policies
 - Not mutually excluding sets of choices, but sets that can be combined
 - Supporting visions enabling the debate about political decisions

* Source: Karl H. Dreborg, 1996, *Essence of backcasting*, Futures, Vol 28, No 9, pp813-828

