Scenarios on eco-efficient transport for Europe:
A structured approach for involving stakeholders in TA processes

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Objectives and Structure

Objectives: to illustrate and discuss…

- …how scenarios can be used to give orientation for policy making
- …that not only the outputs but also the inputs of scenarios need to be assessed
- …it is useful to differentiate between desirability and feasibility of the inputs

Structure:

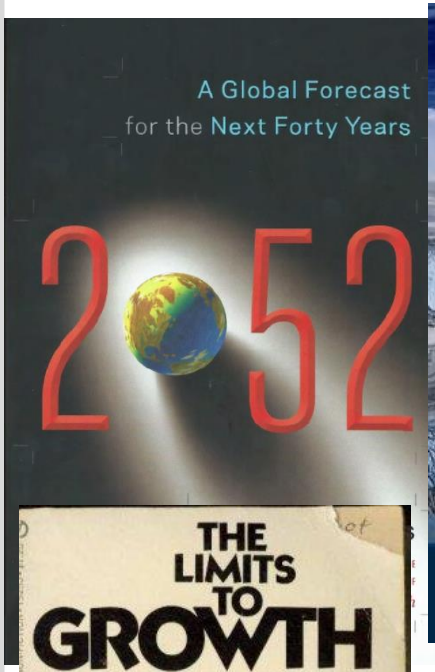
1. Theoretical background: Scenarios and public policy making
2. Practical example: STOA project “Eco-efficient transport”
3. Discussion + Conclusions

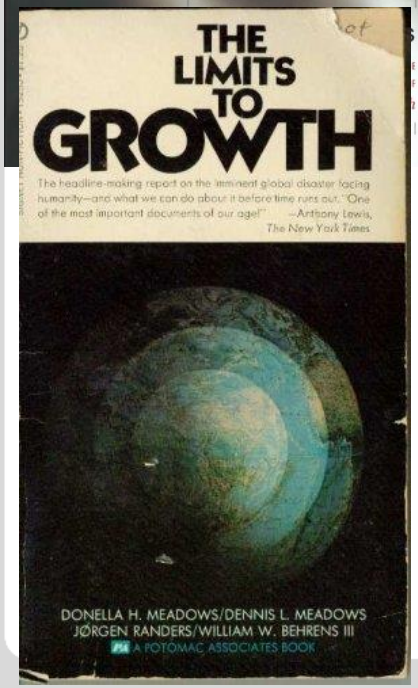
Scenarios matter!

- Observation: the number of scenarios in transport (and other sectors) increased heavily over the last two decades
- Scenarios are used to cope with uncertainty and complexity
- They are able to provide a systemic perspective
- Scenarios differ heavily in terms of purpose, scope, methodological approach, assumptions, results etc.
- Scenarios are increasingly used to give orientation for transition processes

> Scenarios matter - they exert influence on public policy making!

..a trend towards scenarios….





DLR Fraunhofer IWES IfnE

Long-term scenarios and strategies for the deployment of renewable energies in Germany in view of European and global developments

Summary of the final report

BMU - FKZ 03MAP146

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EU Transport GHG: Routes to 2

Developing a better understanding of the se
impacts and key sensitivities for the decarbo
of the EU's transport sector by 2050

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EUROPEAN PARLIAMENT

Science and Technology Options Assessment

STOA

The Future of European long-distance transport

Scenario Report

(IP/A/STOA/FWC-2005-28/SC27)

Eco-efficient Transport

Final report

Deliverable No.5 of the
STOA Project "Eco-efficient transport"

Commissioned by STOA and carried out by ETAG
Contract No. IP/A/STOA/FWC/2008-096/LOT2/C1/SC9
Ref.: Framework Contract No. IP/A/STOA/FWC/2008-096/LOT2/C1

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- Technology Centre AS CR, Prague

Scenarios: typologies and definitions

- Heterogeneity as regards design and usage of scenarios (e.g. they are used in military, in firms, in public policy making, in science)
- Different types of scenarios exist:
  - Explorative, normative / descriptive, prescriptive (Alcamo 2008)
  - qualitative, quantitative, hybrids (SAS)
- Homogeneity as regards definitions:
  - Scenarios are defined by many authors as a coherent illustration of possible future situations together with pathways that might lead to these situations
  - Scenarios are no predictions, working with scenarios means to acknowledge that different futures are possible

Scenarios and public policy making

Scenarios can have different functions for public policy making;

at least in theory, the following two can be distinguished:

- Output oriented:
  - They can help to **improve the understanding of possible cause-effect relations in a system** and on intended and unintended of intervention
  - Here it is mainly the **output** of the scenarios that aims at giving orientation
- Process-oriented:
  - They can be used to **trigger or structure a debate on certain issues**.
  - The **process** of working with the scenarios gives support to policy making.

Both functions are of societal relevance

Assessing scenarios

- Plurality of scenarios exist for the same socio-technical field (e.g. for energy or transport) > challenge of arbitrariness (Grunwald 2011) > assessment needed
- Results of scenarios are always based on current assumptions
- Ingredients and their assessment need to be transparent and understandable

> Inputs need to be assessed rather than outputs

- Helpful to differentiate whether scenarios or elements of the scenarios are:
  1. **Plausible** (is a certain development/scenario technically, economically feasible?)
  2. **Realistic** (can this development/scenario be considered as being likely or are other futures considered as being more likely?)
  3. **Desirable** (is the scenario in line with certain values or does it help meeting certain targets?)

> Desirability and feasibility as key-categories

Excurse: public participation in policy

- Stakeholders are highly relevant for socio-technical transformation
- Crucial to integrate societal interest in the development and/or assessment of scenarios > Stakeholders represent a broad range of societal interest
- Participation: involvement of different types of knowledge; expertise, practical knowledge, norms and values
- Analytical-deliberative discourse: separation between expert knowledge and societal norms/values (Renn 2008):
  - Analytical component: identifying potential consequences of decisions based on **expert knowledge**
  - Deliberative component: assessing the potential consequences on the basis of **societal norms, values, interests**

Stakeholders assessment of the scenarios

- Stakeholders bring in different kinds of knowledge
  - they are **experts** in a field > knowledge for assessing the feasibility and the potential consequences of a measure/policy option > **feasibility**
  - per definition stakeholders have **specific interests** or distinctive interpretations of what is valuable for the common good > **desirability**
- Important to differentiate – as far as possible – between these two aspects:
  - assessment of the plausibility / **feasibility** of a development
  - assessment of the **desirability** of a development

Thesis:

This differentiation is helpful to increase transparency in assessments and to get valuable hints on what could be promising policy measures

Methodology applied in the STOA project

- STOA project “Eco-Efficient Transport”: Combination of scenario building with stakeholders assessment of the scenarios and its elements
- Objective: to contribute to a more rational debate by highlighting fields of common understanding and areas where there are controversies

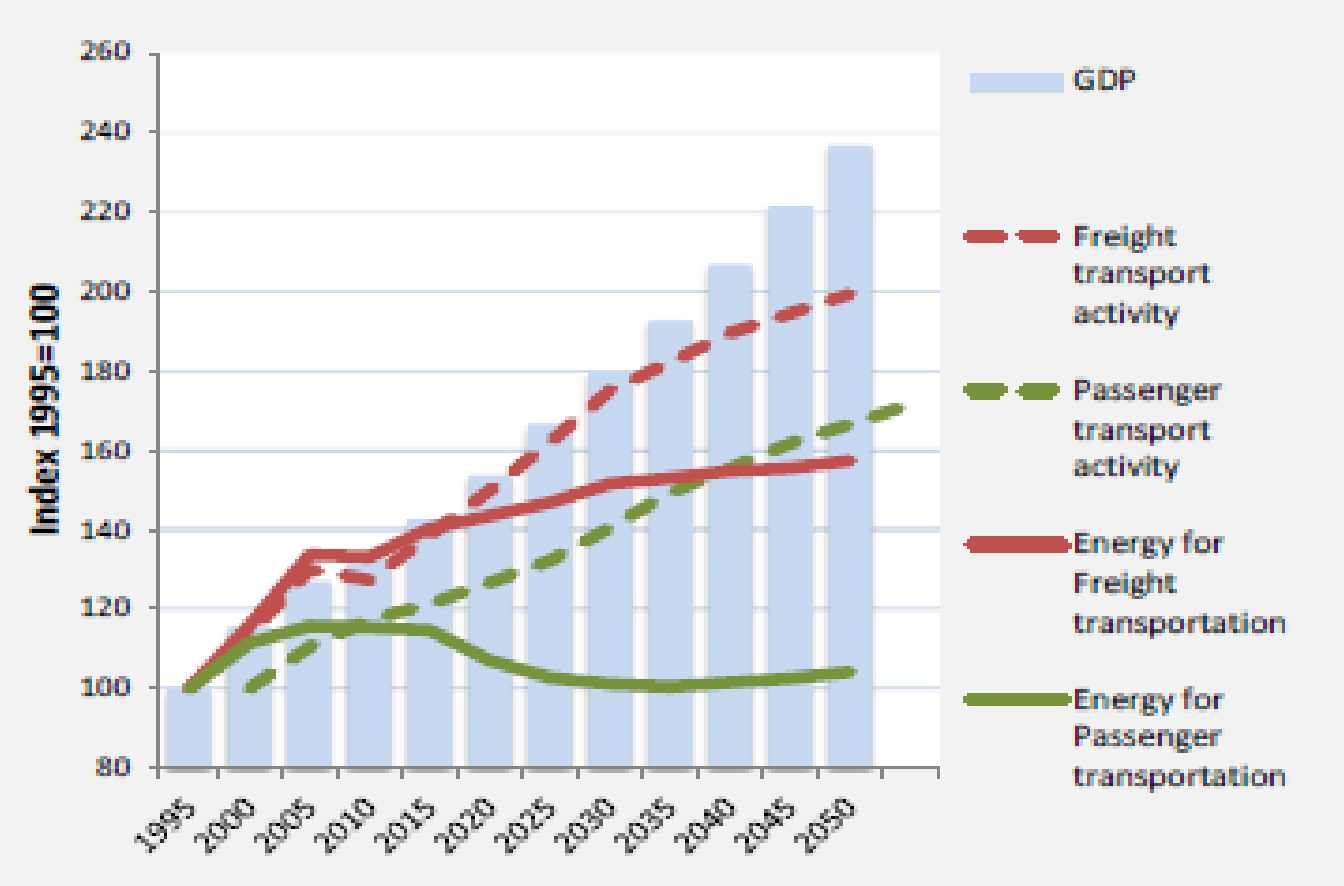
Step 1:

- Scenarios on eco-efficient transport for Europe were build; qualitative storylines combined with modelling (Transport Model ASTRA)
- Main idea: make basic principles and the ingredients transparent by following a “straightforward/ logical/understandable” approach for designing the scenarios

Step 2:

- Stakeholder assessment of scenarios with focus on the underlying assumptions
- Main idea: achieving transparency by differentiating between **feasibility a**nd **desirability** of the scenarios and its elements

Challenges for European Transport



Source: “EU ENERGY, TRANSPORT AND GHG EMISSIONS TRENDS TO 2050 REFERENCE SCENARIO 2013” (EC, 2013)

Three basic strategies towards eco-efficiency

1. Scenario 1: ***Making transport modes cleaner*** (users/goods use the same modes)

2. Scenario 2: ***Changing the modal split*** (users/goods use different modes)

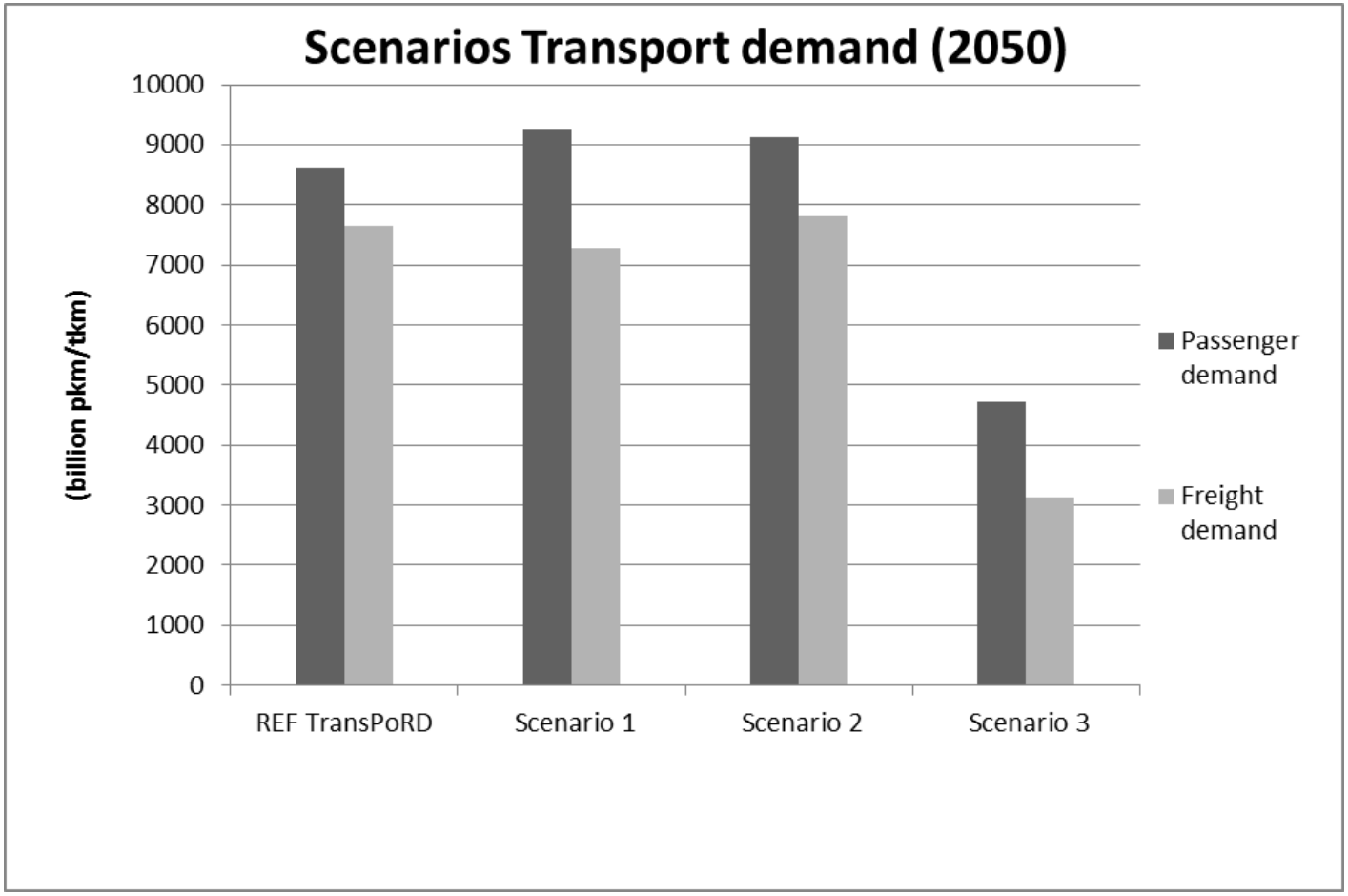
3. Scenario 3: ***Reducing growth rates in transport demand*** (users/goods have different origins/destinations)

- STOA panel deals with science and technology options assessment
- All scenarios intentionally assume high rates of innovation and diffusion of new technologies in society

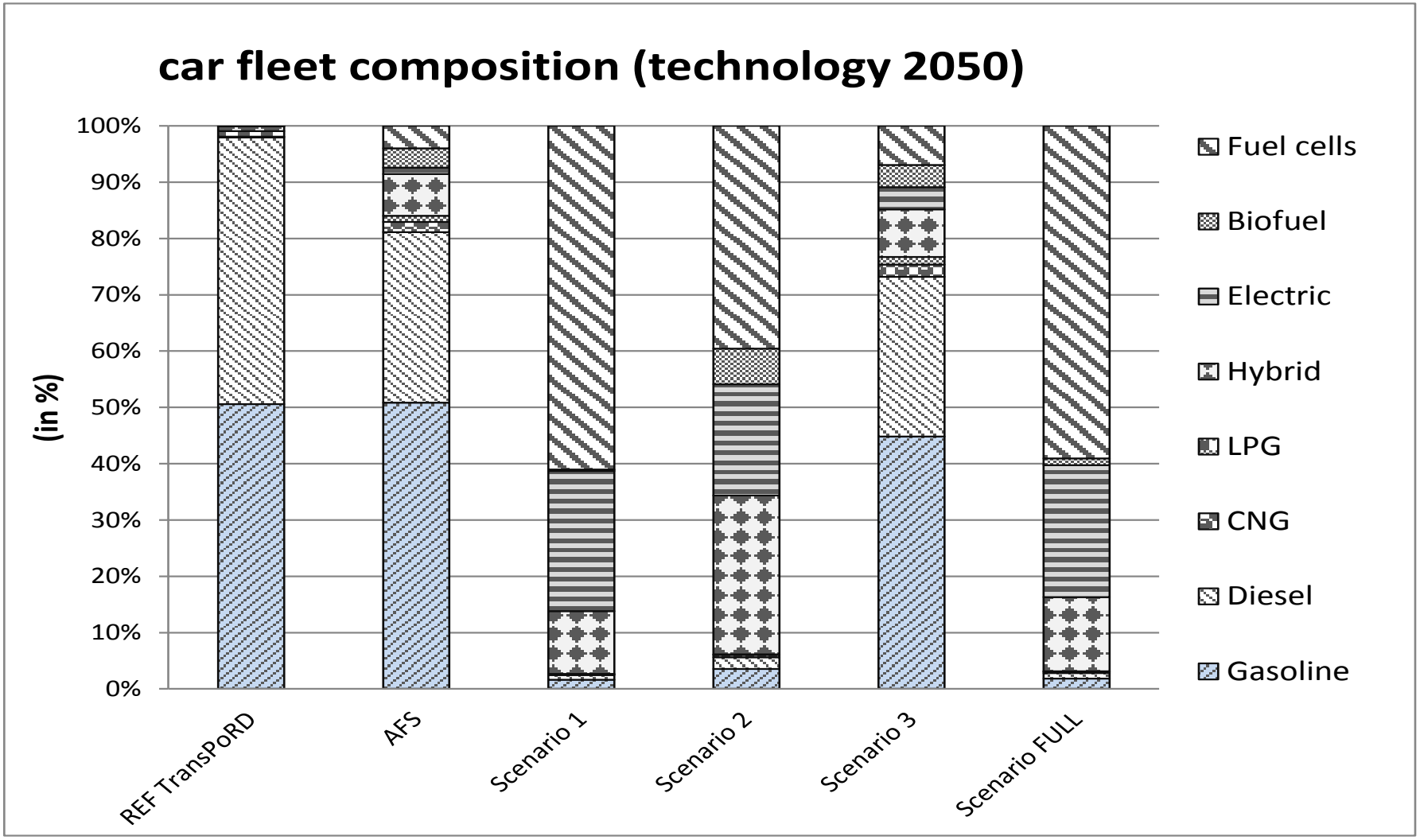
Main settings of the three scenarios

	Scenario I	Scenario II	Scenario III
Main focus on	Cleaner technologies	Shift to more eco-efficient modes	Avoid and reduce physical transport
Policies orientation towards	R&D, regulations and incentives	Financing of Infrastructures	Virtual mobility and eco-efficient land-use planning
Main technological changes is related to	Fuels & propulsions + vehicles / vessels	Infrastructures	ICT
Consequences for the users	Users/goods use the same modes and do not change travel patterns	Users/goods are change modes but origin and destination are basically the same	Origins and/or destinations are changed and passenger trips are shifted to virtual mobility

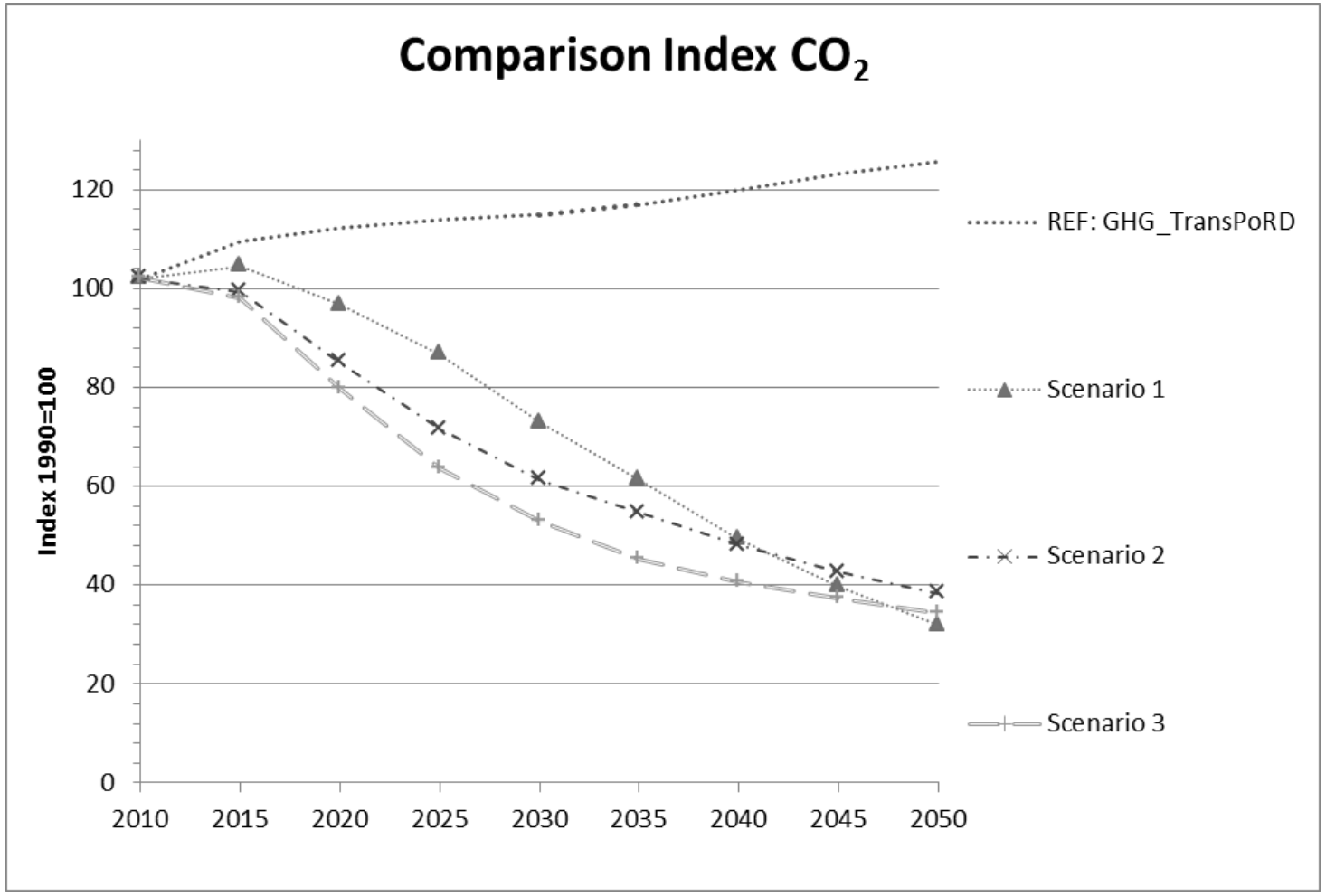
STOA scenarios: transport demand



STOA scenarios: car fleet composition



STOA-scenarios: CO2-reductions



Stakeholder consultation…

…to assess desirability and feasibility of the underlying assumptions

The stakeholder consultation was carried out in two steps:

1. A **survey** was conducted to collect opinions related to the **feasibility and desirability** of elements of the scenarios
2. A **workshop** was carried out. The results of the survey were used to focus and trigger the debate in the workshop.

- The invited stakeholders were mainly Brussels-based organisations in the transport area and the workshop was held in Brussels.
- 10 days before the workshop at the 22.1.2013 stakeholder received background information including summaries of the scenarios

14 Thesis (1-7) – extracted from the scenarios

1. Half of the **road based freight transport** (tkm) in the EU will be carried out by alternative propulsion technology (e.g. by hydrogen, gas, or biofuels).
2. More than half of the passenger cars sold per year will be **battery electric vehicles** with driving ranges of 400–500 km.
3. Only **local zero emission** (tank-to-wheel) passenger vehicles will be allowed **in European cities** of more than 100.000 inhabitants.
4. In Europe, half of the passenger kilometres travelled by car will be made using **full autonomous driving systems**. This allows driving without human assistance as the car keeps the road and navigates on its own.
5. An **interoperable electronic ticketing** application for public transport will be available all over Europe. This will enable users to use the same means of payment for different modes and services (including conventional public transport and e.g. bike-sharing, car-sharing).
6. In Europe, public transport, cycling (including e-bikes) and walking will have a **modal share of 75 % in urban areas** of more than 100.000 inhabitants.
7. An **interoperable road charging system** on the trans-European road network will be implemented in all EU states, taking account of the external costs of air pollution, noise pollution and congestion.

14 Theses (8-14)

8. A sophisticated EU regulatory framework (e.g. loan guarantee schemes, risk facility funds, creation of additional revenue streams) will make **infrastructure investments more attractive to the private sector**. That way, private capital will bear half the EU infrastructure development costs.
9. Common technical, administrative and legal **standards will be identical in the European rail network**. This will enable operators to seamlessly run trains across Europe.
10. The freight transport **volume (tkm) on inland waterways** will increase by 50 % (compared to 2012).
11. In **waterborne transport, operational improvements** (e.g. speed reduction, autopilot upgrade) and new technologies (e.g. alternative propulsion systems, propeller design, auxiliary use of wind power) will lead to a reduction of greenhouse gas emissions by 50 % (compared to 2012).
12. Widespread **application of tele-x (tele-working, tele-shopping, video-conferencing**, etc.) will lead to a reduction of transport-related greenhouse gas emissions by 25 % (compared to 2012).
13. A trend of **regionalisation** (driven by e.g. transport costs, societal values and related policies) will lead to a stronger spatial concentration of production and consumption of goods and services.
14. **Underground transport systems** (urban freight tubes) will be implemented and used for more than half of the urban goods distribution in larger European agglomerations (> 500.000 inhabitants).

Questionnaire and workshop on thesis/ assumptions

a) How would you assess your own expertise concerning this thesis?

- ○ I do research and publish in this field
- ○ I have only focal or generalized knowledge in this field
- ○ I am working in this field / following the professional discourse
- ○ I have no knowledge in this field

b) In which period would you expect this development to become true?

- ○ 2012-2015
- ○ 2016-2020
- ○ 2021-2030
- ○ 2031-2050
- ○ Later than 2050
- ○ Not realistic at all
- ○ I don't know

c) Which of the following factors could impede this development? *(multiple answers possible)*

- ○ Financial barriers
- ○ Capacity limit of infrastructures
- ○ Ongoing technical problems that need to be solved
- ○ Lack of government-funded research and development
- ○ Lack of entrepreneurial vision
- ○ Lack of political vision
- ○ Lack of societal acceptance
- ○ Uncoordinated institutional actions/responsibilities
- ○ Differing interests of involved stakeholders (e.g. politicians, industry, NGOs)
- ○ European and/or national legislation/regulation
- ○ I don't know

d) Is this development desirable?

○ Very undesirable ○ Undesirable ○ Desirable ○ Very desirable ○ I don't know

e) Reaching this development would have the following impacts: *(each row requires an answer)*

	negative impact	positive impact	both positive and negative impact	no impact	I don't know.
Growth of European economies	○	○	○	○	○
Labour and employment	○	○	○	○	○
Accessibility of the transport system	○	○	○	○	○
Reduction of congestion levels	○	○	○	○	○
Modal shift towards more resource-efficient transport modes	○	○	○	○	○
Reduction of transport volumes	○	○	○	○	○
Improvement of human health	○	○	○	○	○
Biodiversity	○	○	○	○	○
Reduced use of fossil fuels (oil/gas)	○	○	○	○	○
Reduced use of other non-renewable resources	○	○	○	○	○
Reduction of greenhouse gas emissions	○	○	○	○	○

other/comments:

> your own expertise

> in which period would you expect this development to become true (**feasibility**)

> Which of the following factors could impede this development

> Is this development **desirable**

> Reaching this developments would have the following impacts

Some findings of the stakeholder consultation

- Fuels/propulsion technologies: progress important; some stakeholders doubted that BEV will provide ranges of 400-500 km in 2050. Others expected it to become true before 2030
- In general, non-technical issues were seen as hampering factors
- Better understanding of dynamics in consumers preferences needed
- Systemic perspective needed for proper assessments (LCA)
- Mobility management needed; but different opinions on how to achieve this
- For example: controversy on the desirability of thesis 3 (zero-emission zones) and thesis 6 (75% of non-car-based modes in urban areas in 2050)
- Example of a thesis with high desirability and high feasibility: integrated ticketing
- Harmonised standards for rail was assessed as uncertain but highly desirable

Assessment of the scenarios

- Scenario 2 was identified as the most “robust” and “flexible” set of options.
- Scenario 1 could be an enabler for scenario 2
- Scenario 3: desirability and acceptability was questioned – contradicts the idea of moving goods and people freely

	Feasibility	Desirability
Scenario 1	Difficult	Yes (partly)
Scenario 2	Yes (partly)	Yes
Scenario 3	No	No

“Key areas” for reaching scenario 2

Twelve key areas were identified that are of major relevance for realising scenario II (which was considered as the most promising one)

1. Energy system
2. Cleaner cars
3. Cleaner trucks
4. Smart logistics
5. Automation
6. Integrated ticketing
7. Access instead of ownership
8. Shift to rail
9. Shift to short sea and inland shipping
10. Awareness of / making use of changes in habits and attitudes
11. Urban Design
12. Mobility pricing

Policy recommendations

Policies supporting eco-efficient transport should take the following points into account:

1. Research and development remains a basis for more eco-efficiency
2. More focus on understanding and un-locking the potentials of ICT
3. New business models (car-sharing, car2go, dynamic-rider-ship) are low-hanging fruits
4. LCA and systemic perspective needed (flexibility as an criteria)
5. Understanding consumers / markets (needed for scenario II)
6. Co-ordination and harmonisation
7. Long-term strategies (land-use planning) needs to take long-term acceptability into account

Conclusive remarks

- Approach proved to be understandable and helpful
- The results show that scenarios can be used as tools for communication and that it is crucial to have elements that structure the communication
- For stakeholders assessments it is useful to differentiate between “desirability” and “feasibility”
- Method illustrates well where controversies are located and where are promising pathways
- Transitions require a systemic perspective; not easy to get the stakeholders involved into such broader approaches
- Trade-off between broadness and attractiveness of the approach
- As any scenario process the approach had to cope with limitation in terms of time, money and skills of those involved in the process and with cognitive capacities of the addresses

Thank you for your attention