BEniVer
Begleitforschung Energiewende im Verkehr

Energy Transition in Transport

Accompanying Research BEniVer

Juliane Prause
German Aerospace Center (DLR)
Project Coordinator

Gefördert durch:

Bundesministerium
für Wirtschaft
und Energie

aufgrund eines Beschlusses
des Deutschen Bundestages

DLR



BEniVer
Begleitforschung Energiewende im Verkehr

Energy Transition in Transport

- Research initiative “Energiewende im Verkehr” funded by the German Federal Ministry for Economic Affairs and Energy (BMWi)
- 15 research alliances with over 100 partners from academia and industry
- Development of sustainable synthetic fuels
  - production and application
  - transport sectors: road, aviation and navigation
- Accompanying Research project BEniVer to support the research alliances and to develop a roadmap
- Funding: EUR 87 million
- First projects started in summer 2018

BEniVer
Begleitforschung Energiewende im Verkehr

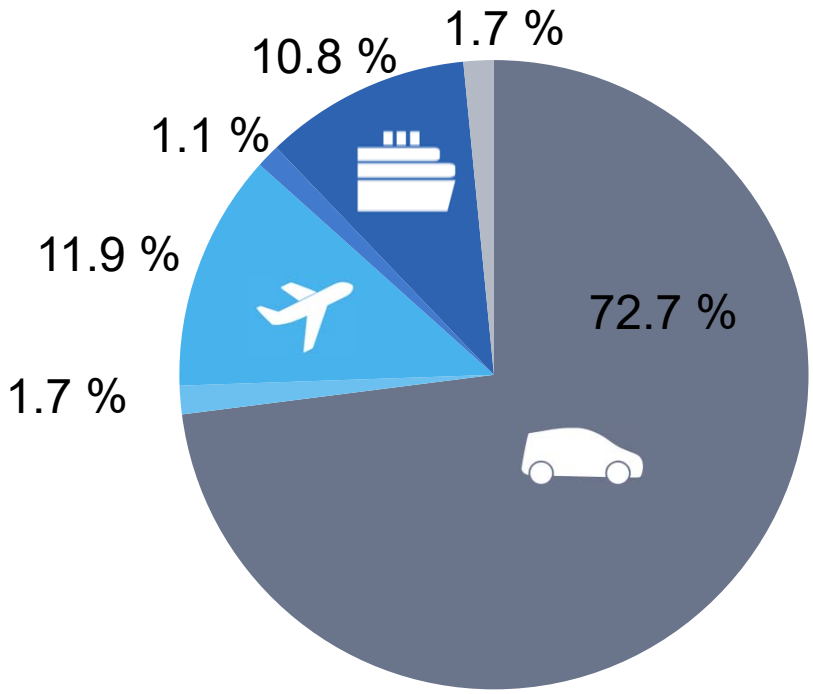
DLR



BEniVer
Begleitforschung Energiewende im Verkehr

Energy Transition in Transport

Final Energy Consumption by Transport Mode



- Road
- Aviation domestic
- Aviation international
- Navigation domestic
- International maritime bunkers
- Rail

Source:
EUROSTAT
EU-28, 2017

17.6 mTJ

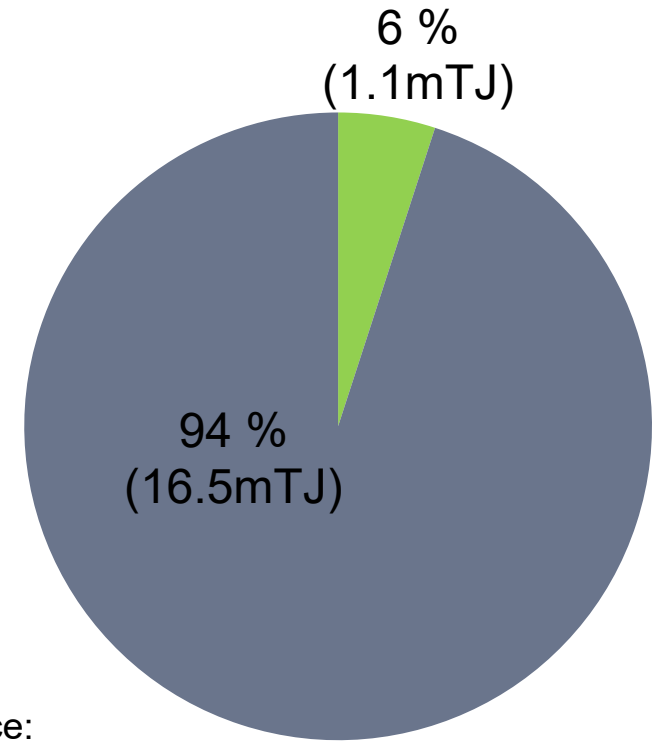
DLR



BEniVer
Begleitforschung Energiewende im Verkehr

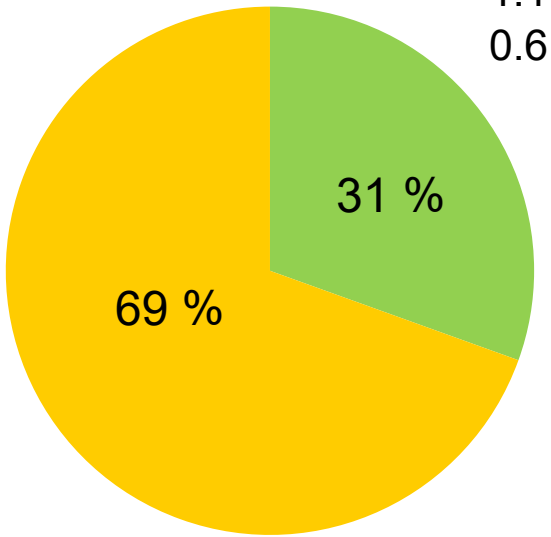
Energy Transition in Transport

Energy Consumption
in Transport



17.6 mTJ

Gross Production
of Electricity



3.6 mTJ Renewable
1.3 mTJ Wind power
1.1 mTJ Hydro power
0.6 mTJ Solar energy

11.9 mTJ

Source:
EUROSTAT
EU-28, 2017

DLR



BEniVer
Begleitforschung Energiewende im Verkehr

Energy Transport

Transport of Electricity



www.tennet.eu

Power Highway SuedLink
2 GW
0.06 mTJ/a

Transport of Natural Gas



www.nord-stream.com

Gas Pipeline Nord Stream
35 GW
1.10 mTJ/a

DLR



BEniVer
Begleitforschung Energiewende im Verkehr

Green Fuels

Green Fuels

SynFuels

H_2, Gas, Diesel, Gasoline
from renewable electricity, water and CO_2

- High technical potential
- Fuel-design/ -optimisation
- Full compatibility
- **Still at demonstration level**
- **Expensive**

BioFuels

2./ 3. Generation
from waste and algae

- Renewable sources
- Tank-plate obsolete
- Potential share 11%
- **Limited raw material base**

1. Generation
from canola, wheat, palm oil, etc.

- Share is capped at 7%
- No further expansion
- **Land-use competition**

DLR



BEniVer
Begleitforschung Energiewende im Verkehr

Energy Transition in Transport

Project	Partner	Application	Fuels (focus)	Research
MethQuest	27		methane	
C3-Mobility	21		methanol and derivatives	
E2Fuels	17		methanol, methane, hydrogen, OME	
SynLink	8		petrol, diesel, kerosene, alcohols	
BEniVer	7		various fuels	
KEROSyN100	7		kerosene	
PowerFuel	6		kerosene	
SHARC	5		---	
ISystem4EFuel	5		diesel	
PlasmaFuel	4		diesel	
MEEMO	4		methanol	
FlexDME	4		DME	
CombiFuel	3		hydrogen, methane	
MENA-Fuels	3		various fuels	
SolareKraftstoffe	1		petrol, MTBE, methanol, alcohols	

DLR



BEniVer
Begleitforschung Energiewende im Verkehr

Accompanying Research

Objectives:

- Ensure **comparability** of project results of the 14 technical research alliances
  - Scientific system analyses
  - Development consistent methods and boundary conditions in the initiative (workshops and working groups)
  - Consistent evaluation of research results
- **Roadmap** for the research, production and market introduction of renewable fuels together with the partners in the initiative "Energy Transition in Transport“
  - Which fuels have the highest potential?
  - Which quantities can be produced at what time?
  - Where do the energy, CO_2 and water come from?
  - How can synthetic fuels be integrated into the existing market?
  - How can society be involved in the transition process?

DLR



BEniVer
Begleitforschung Energiewende im Verkehr

Accompanying Research

Project partners within BEniVer

- DLR German Aerospace Center (7 instituts)
- IZES Insitute for Futurenergy- and Materialflow-systems
- FfE Research Center for Energy Economics
- UFZ Helmholtz Centre for Environmental Research
- DBFZ German Biomass Resarch Centre
- GWS Institute of Economic Structures Research

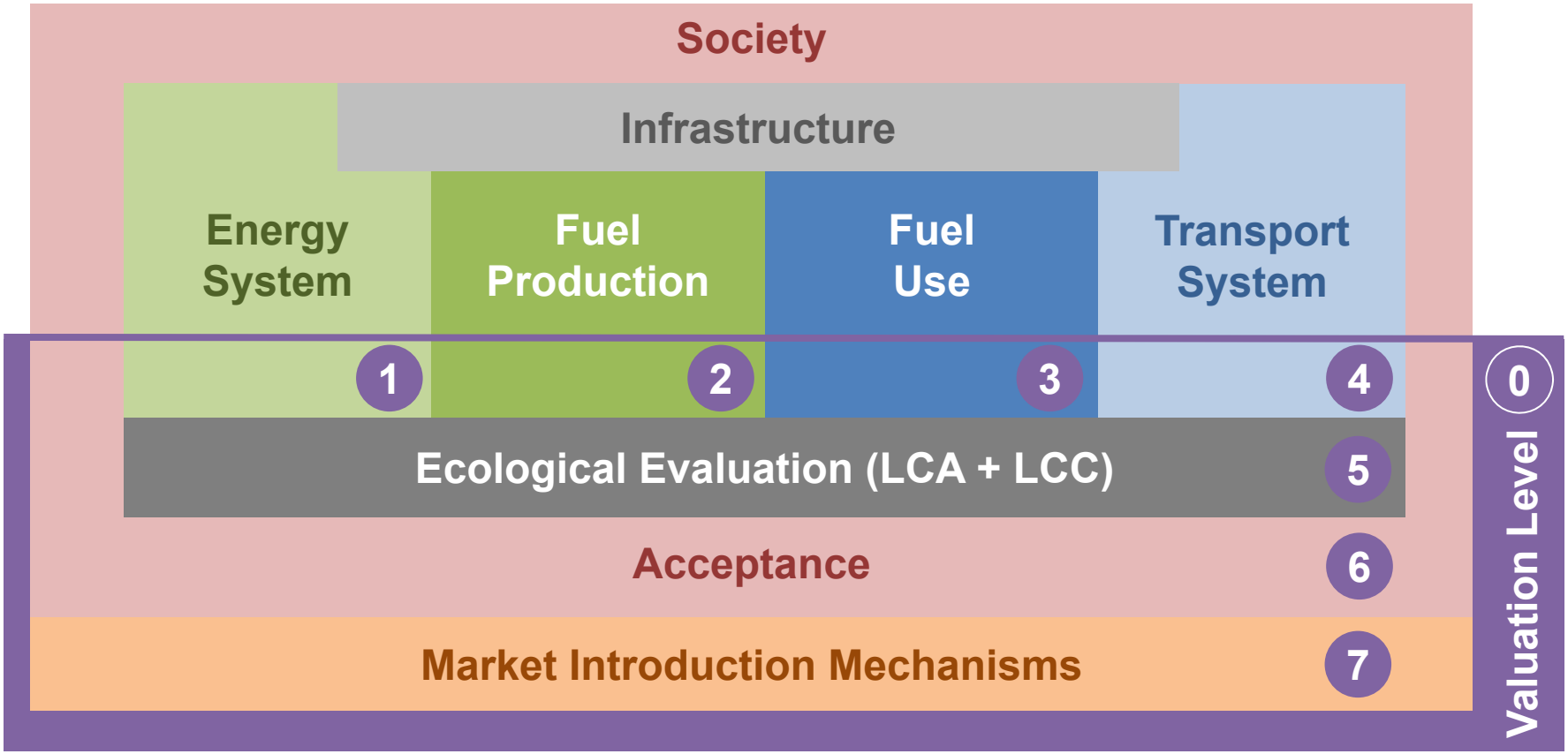
Project duration

- 01.06.2018 - 31.05.2022 (4 years)



BEniVer
Begleitforschung Energiewende im Verkehr

Accompanying Research



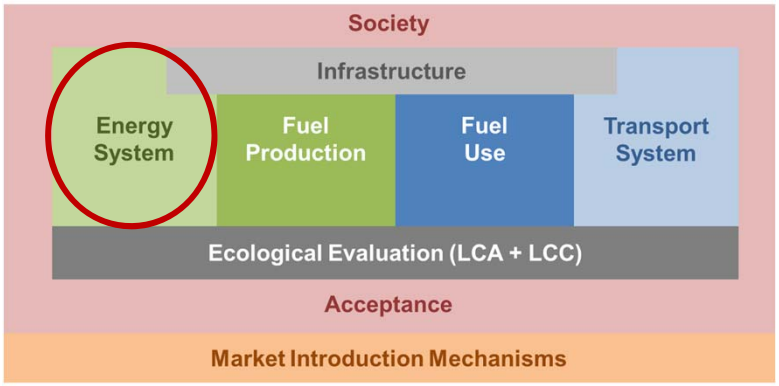
DLR



BEniVer
Begleitforschung Energiewende im Verkehr

Energy System (WP 1)

- Analysis of the role of synthetic fuels in future energy systems
- The impact of the production of synthetic fuels on the energy system
- Estimation of potentials for the supply of renewable resources
- Creation of a common scenario framework within the research initiative





DLR



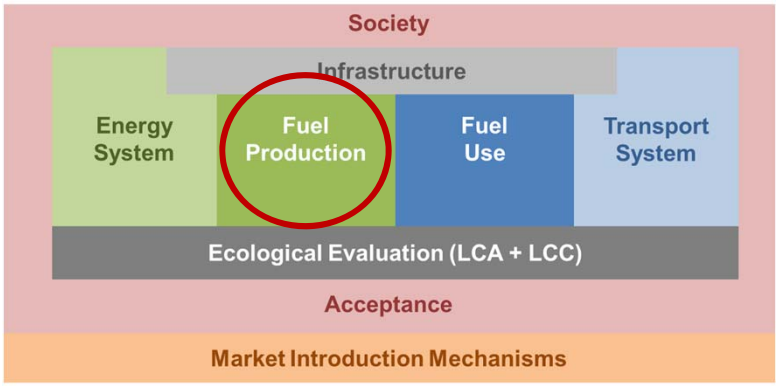
BEniVer
Begleitforschung Energiewende im Verkehr

Fuel Production (WP 2)

Development of a consistent assessment

- of the cost for production and
- key performance indicators

for different process routes



Determination of

- the progress of development,
- the development potential
- the remaining challenges

in dialogue with the research alliances



DLR



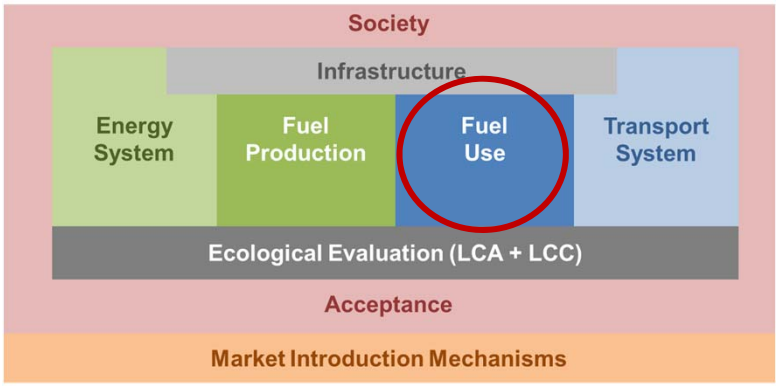
BEniVer
Begleitforschung Energiewende im Verkehr

Fuel Use (WP 3)

- Assessment of the performance and pollutant formation potential of fuels in all transport sectors: road, air and sea

- Technical evaluation of fuels
  - Environmental characteristics
  - Coverage range
  - Safety and Handling
  - Compatibility in existing applications

- Classification of the joint project results in an international context





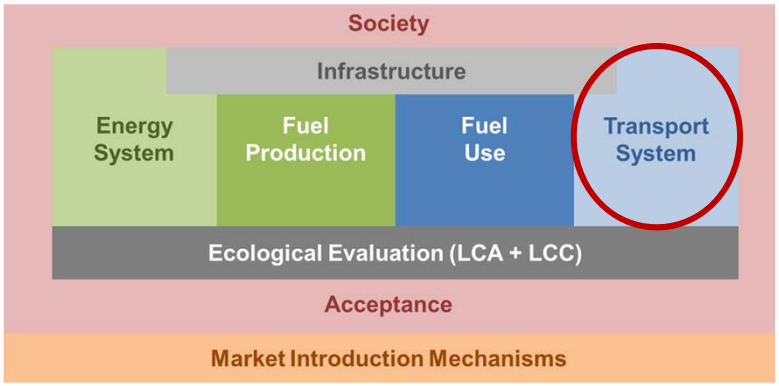
DLR



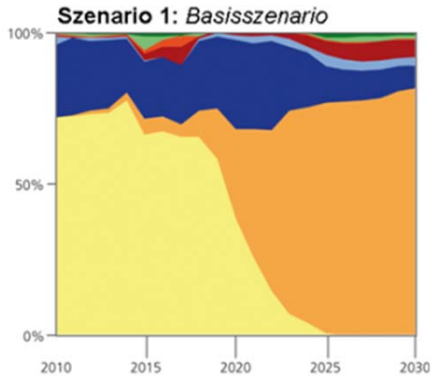
BEniVer
Begleitforschung Energiewende im Verkehr

Integration into the Transport System (WP 4)

- Development of target scenarios for the year 2050 for German road traffic
- Description of the necessary development and expansion paths
- Determination of infrastructure requirements



VECTOR 21
DLR Vehicle Technology Scenario Model



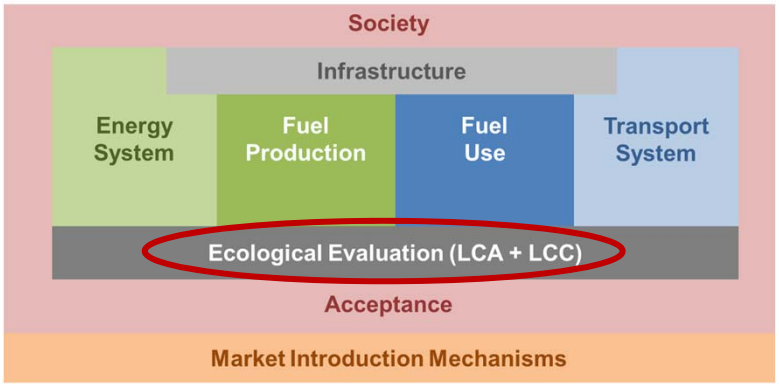
DLR



BEniVer
Begleitforschung Energiewende im Verkehr

Ecological Evaluation - LCA (WP 5)

- Life cycle assessment of
  - fuels
  - individual lifecycle stages
- Assessment of impact on climate and air quality





Ressources Fuel Production Transport Fuel Usage

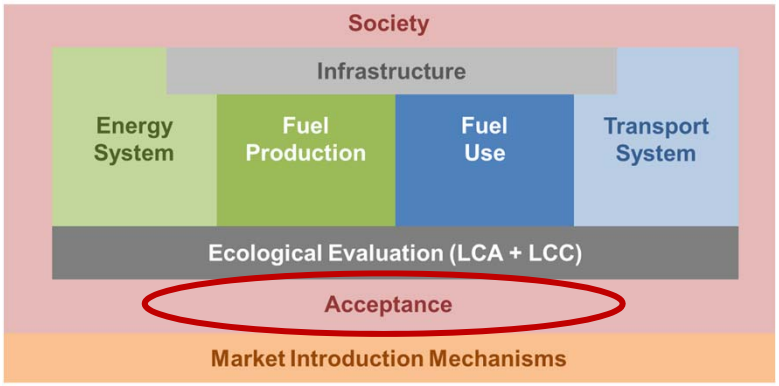
DLR



BEniVer
Begleitforschung Energiewende im Verkehr

Acceptance (WP 6)

- Analysis of media coverage of alternative fuels
- Analysis of actor-specific perceptions of the individual fuels with regard to:
  - Cost-benefit considerations
  - Environmental impacts
  - Risk perception and
  - Application suitability
- Harmonisation of acceptance research within the funding initiative





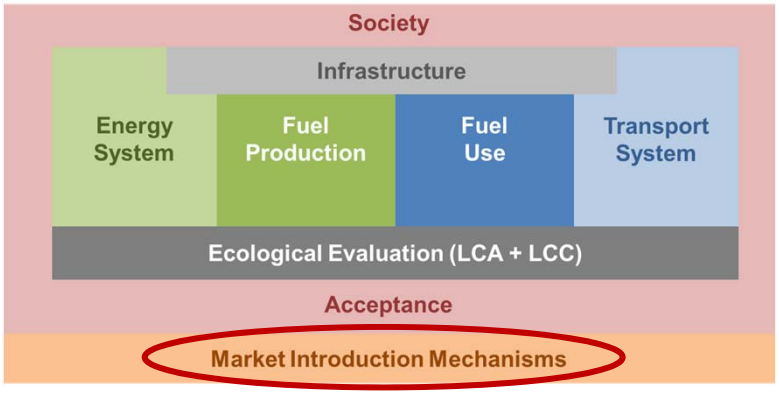
DLR



BEniVer
Begleitforschung Energiewende im Verkehr

Market Introduction Mechanisms (WP 7)

- Mechanisms in existing fuel markets and their response to the introduction of alternative fuels
- Macroeconomic effects of the introduction of electricity-based fuels
- Development of **robust market introduction mechanisms** taking into account the safeguarding of raw material availability and reliability for investments





DLR



BEniVer
Begleitforschung Energiewende im Verkehr

Energy Transition in Transport Conclusions

- Within in research initiative **„Energy Transition in Transport“**
  15 research alliances with more than 100 partners
  are funded by the German Federal Ministry for Economic Affairs and Energy
  to develop the production and application of a wide range of different alternative fuels

- The **accompanying research project BEniVer**
  - establishes **consistent methods** to allow for comparability of the investigated technologies and fuels
  - conducts **comprehensive evaluation** of research results with regard to technical, economic, ecological and social criteria
  - develops a **roadmap for synthetic fuels**

DLR



BEniVer
Begleitforschung Energiewende im Verkehr

Further information

www.energieforschung.de

Newsletter of the accompanying research

Next **Status Conference** of the initiative 11/2020



Contact: **BEniVer@dlr.de**

DLR

