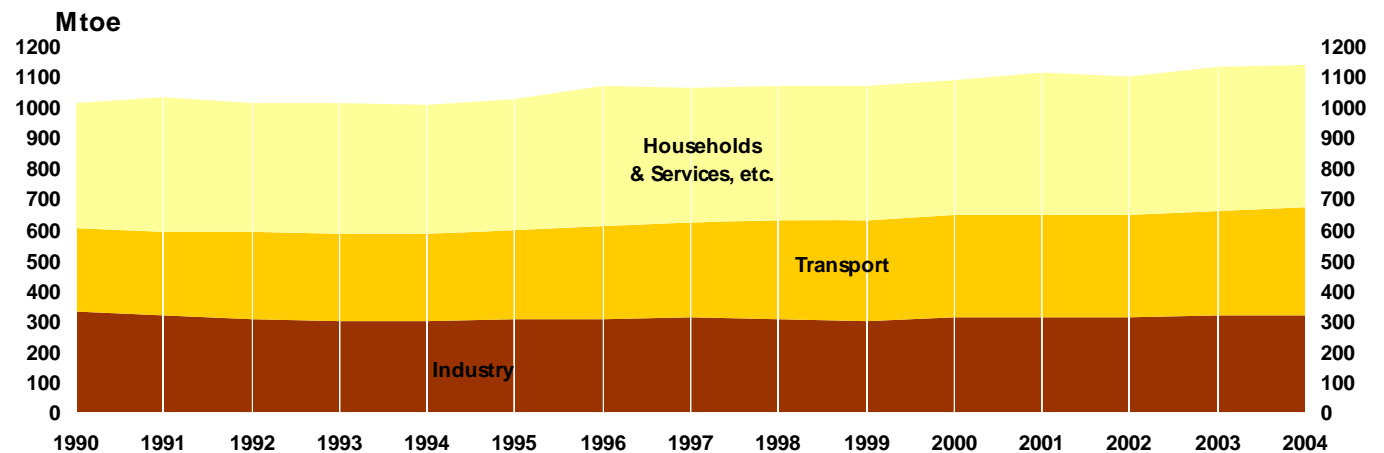# Elements of sustainable freight logistics

L2L-Conference – 4th BMBF-Forum for Sustainability
Session A2 Future of European Mobility
Tuesday, 8th of May 2007

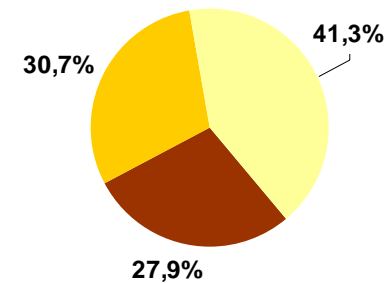**Prof. Dr.-Ing. Uwe Clausen**
Director of Fraunhofer IML
Chair of Transportation Systems and Logistics,
Dortmund University

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IML

Sustainability and Transportation
Final Energy Consumption - EU25 by sector

Source: Eurostat

Sustainability and Transportation
CO_2 Emissions by Sector

1990=1

	Power & heat	Industry
	Transport:	Households
	Services, etc.	Total

Source: Eurostat

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Sustainability and Transportation
CO$_2$ Emissions by Sector (2004, EU 25)

Services, etc. 6,8%

Power & heat 39,1%

House-holds 12,2%

Trans-port 26,4%

Industry 15,5%

by sectors

Inland Navi-gation 1,5%

Rail 0,8%

Air 13,6%

Road 84,1%
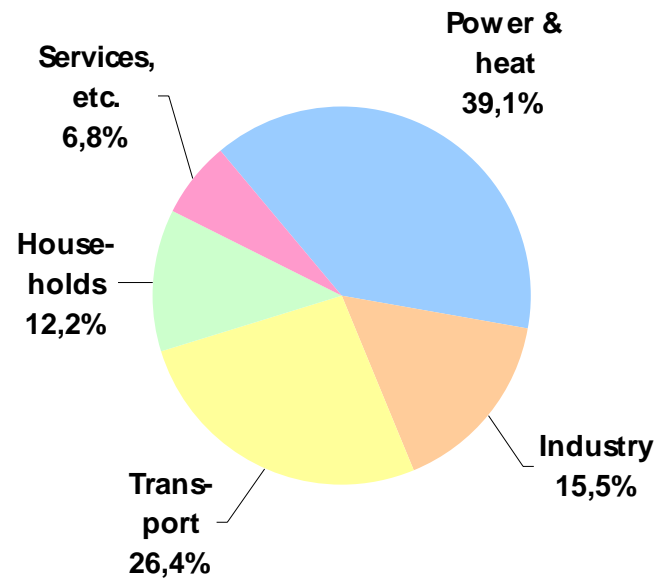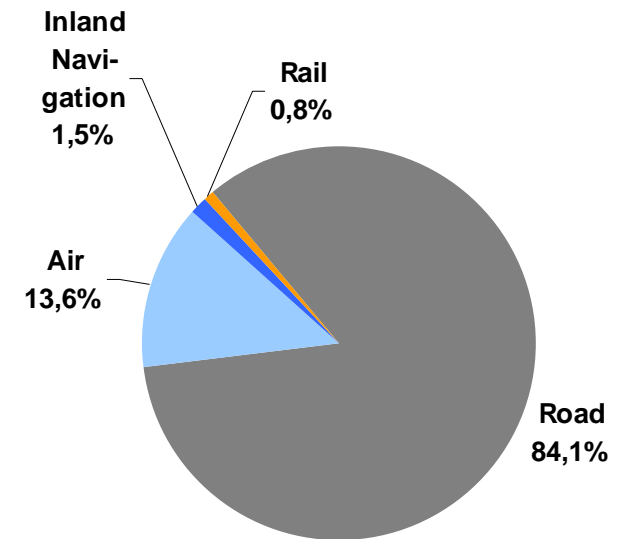
by modes

Source: Eurostat

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Why optimizing logistics networks & systems?

Inefficient structures and processes lead to more kilometers driven, more emissions exhausted and more trucks used!

Optimized structures help to proceed towards a sustainable development

Grown structures lead to:

- Inefficient network/transport design
- Inefficient organization of distribution regions
- Inefficient distribution centers
- Suboptimal deployment of existing infrastructure

Optimized structures allow for:

- Lower transport costs / less kilometers driven
- Less stock necessary
- Shorter delivery times
- Optimized logistics facilities for more efficient operations
- → **Better performance for more efficient logistics**

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How optimizing logistics networks & systems?

Different levels of optimization approaches:

- **Strategic level**
  → Planning of efficient logistic networks

- **Tactical level**
  → Selection and combining of different transport modes

- **Technical level**
  → Improvement of vehicle technology and
   use of alternative fuels

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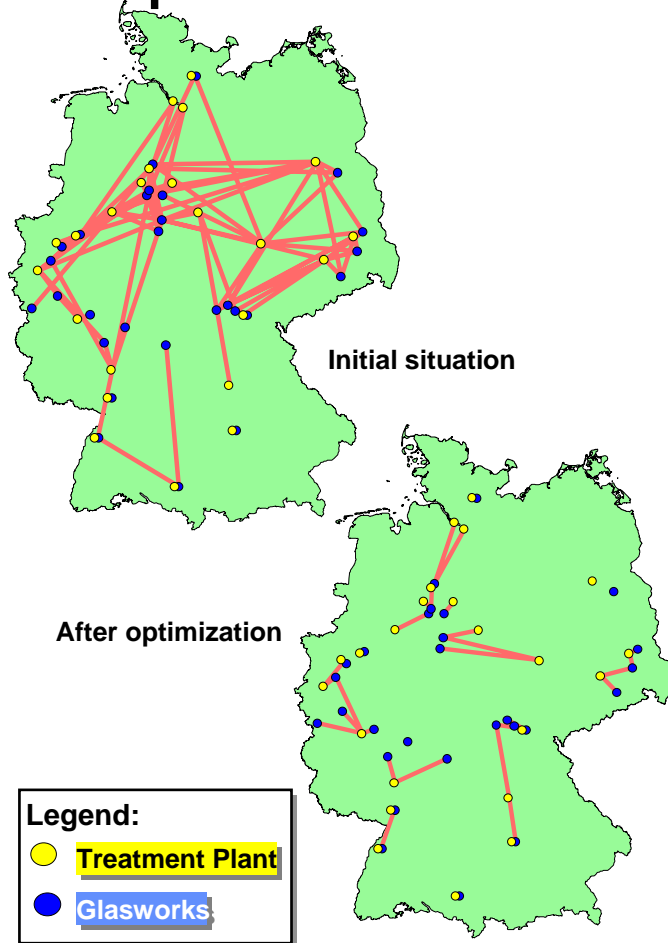# Efficient distribution

Example: European Car Distribution

Objectives

- Less kilometers driven

- Decrease logistics costs

- Improved delivery service

- Create synergies by bundling of transport volume

- Reduction of empty trips

- Cross-border optimization

Result: 12% improvement of transport efficiency

current situation

optimized model

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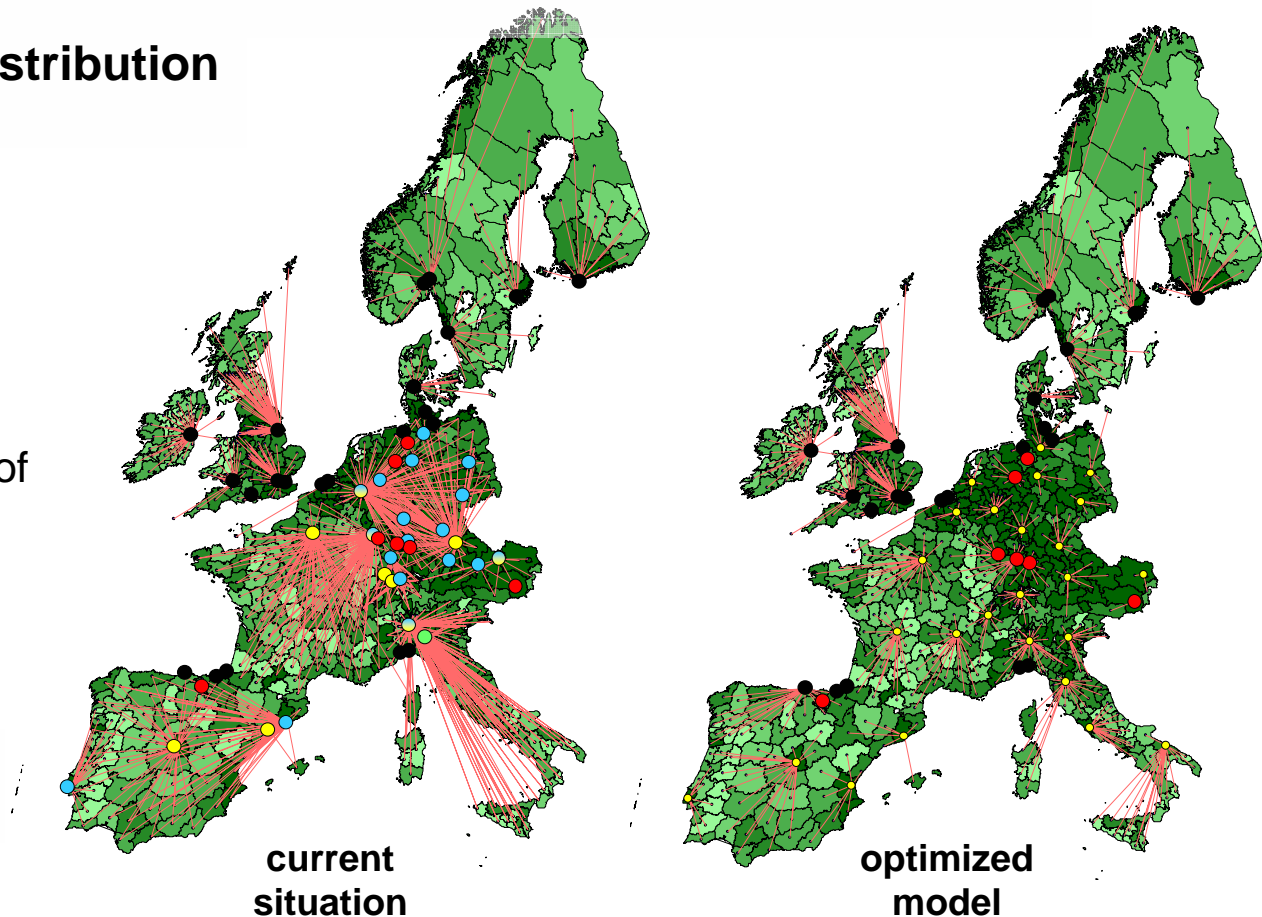
Example: Reduction of road transports for used glass

Initial situation

After optimization

Legend:
- 🟡 **Treatment Plant**
- 🔵 **Glasworks**

Initial situation

- Transport relations have grown complex over long distances
- 98% of transports for used glass initially take place on the road

Objective

- Reducing and avoiding transports for used glass on the road by assignment optimization, shift to alternative transport modes, and application of new information technologies (planning & scheduling tools)

Results

- Avoiding transport of used glass via road by approx. 30% with aid of a software planning tool and application of IT to reduce transport volumes
- Development of new vehicle – the Vario-Collector® – with separate, flexible compartments for collecting different types of glass

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# Transition from unimodal to intermodal networks

- High number of actors with different interests:
  Shippers, Shipping Lines, Seaport-Terminals, Seaports, Inland Shipping Lines, Railroads, Intermodal Transport Operators, Inland-Terminals, Logistics Service Providers, Packing Companies, …

- Bundling of large freight flows in the seaport allows a wide variety of transport alternatives and cuts costs

- Interface problems (technical, informational, organizational) through combination of different transport modes

- Huge number of processes and combination possibilities

- Competitiveness of transport alternatives depends largely on the given infrastructure network for barge, rail and road

➔ Higher Complexity

➔ More Infrastructure restrictions for barge and rail

Recent increase of the share of rail transport performance in Germany to 21%!

(2006, source VDV)

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Vehicle Technology:
Vario-Collector® - Logistic Solution for Separate Collection of Waste Glass
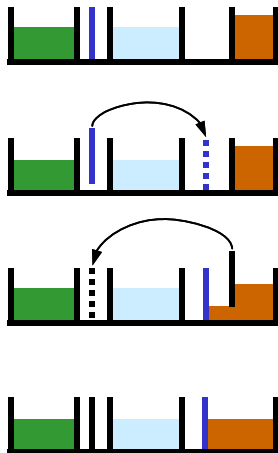
- The distribution of waste glass colours varies due to regional and seasonal deviations

- Rigid systems have to discontinue the collection tour when only one chamber is full

- The Vario-Collector® can adapt the chamber volumes to the glass colour fractions during the collection tour

- Empty room can be added gradually to either adjacent collection chamber (see illustration)

- Simple modification of existing vehicles, the crane is used to move the partition walls

- Optimal utilization of the collecting vehicle

- Up to 18% higher collection volume

- Less transports for the collection of waste glass

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Biofuels:
Optimized transports for biomass

- Biofuel production needs large amounts of biomass input
  e.g. CHOREN large-scale plant: ratio biomass/biofuel approx. 5:1 [kg/kg]

- Decentralized structures of biomass sources cause high volume of traffic
  → network planning (contracting with biomass producers)

- Seasonal arising of biomass complicates the continuous supply of the biofuels production
  → new farming techniques (e.g. farming presses), adapted transport and storage technology, optimal supply chain structures

Logistics optimization for biomass logistics means:

- development of integrated transport chains

- usage of information and communication technologies

- informational networking of all participants

- decision concerning centralized vs. decentralized structures

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# Biofuels: Biofuels as a part of sustainable transport

Biofuels advantages:

- Saving primary resources

- Reduction of CO_2-emissions and fostering of objectives of climate protection

- Chance for agricultural industry

Notice:

- As a prerequisite for sustainable logistics also the **sustainable production of biofuels** has to be considered
  → No import of biofuels which cause deforestation of rain forest
  → Sustainable cultivation of biomass
  → "competition" of different biomass utilizations (food, energy production, biofuels etc.)

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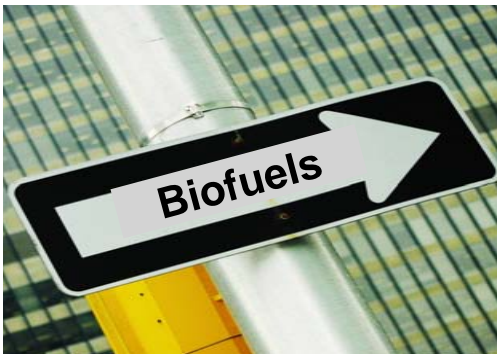
Thank you for your attention

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