

WEATHER - Workshop

Adapting transport to weather extremes

“Impacts of Climate Change on Logistics”

May 20th 2011
Rotterdam

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Short Profile

Legal Form	Independent, private non-profit foundation
Founded in	1954
Locations	Bremen, Bremerhaven
Capacity	60 permanent staff members
Directorate	<i>Prof. Dr. Hans-Dietrich Haasis</i> <i>Prof. Dr. Frank Arendt</i> <i>Prof. Dr. Burkhard Lemper</i>
Board of Trustees	Decision makers from industry, science and politics
Scientific Advisory Board	Experts from transport industry, commerce and science
Sponsoring Body	Companies and individual members from the maritime industry



- Applied research and consulting in the field of shipping economics and maritime logistics
- Interface of research, development and practice, transfer between science and economy
- Work in interdisciplinary project teams at two locations
- Wide spectrum of services and scientific consulting in three departments
 - Logistics Systems
 - Maritime Economics and Transport
 - Information Logistics

Focus areas:

- Corporate system integration of intermodal transport
- Configuration of synergetic regional networks, such as freight villages or logistics centers
- Process-oriented design of sustainable business models
- Knowledge management and collaboration controlling, e.g. for logistic networks and supply chains
- Meso-logistics
- Supply Chain Controlling
- Resource efficiency
- Multi-agent systems



Climate Change & Logistics



Results of ISL studies

“Development prospects of the logistics cluster in
the Metropolitan area of
Bremen-Oldenburg northwest”

- **Project „northwest 2050“**
- Impacts of climate change on logistics sector/
Results of ISL studies
- Analyses of supply chains
- Perspectives

The metropolitan area of Bremen-Oldenburg northwest



„northwest 2050“

- Contract Period: 2009 - 2014
- Cluster: Energy, Nutrition and **Port/Logistics**
- Objective: Generating a „Roadmap of change“

➔ ISL-Tasks:

Dialog management and prognosis of the development perspectives of the Port/Logistics Cluster

- Empirical study: ISL - Questionnaire
- Expert interviews
- Organisation of workshops
- Supply Chain Analyses

Project status

○ Done

○ In Progress



Results

- Project „northwest 2050“
- **Impacts of climate change on logistics sector / Results of ISL studies**
- Analyses of supply chains
- Perspectives

→ **Sensitivity / Vulnerability**

→ **Measures**

→ **Forecast**

Until 2050

- Rise of mean average temperature +1 to +2°C
- Increase of summer days*1 2 to 9,6 days
- Decrease of ice days*2 16 to 3,7 days
- Increase of total precipitation (stronger seasonal differences) 3 to 9 %
- Increase of heavy rain incidents*3 0 to 1 day
- Change of frequency of storm days*4 -1,3 to +3 days
- Raise of the mean sea level (comparing to 1980-1999) 9 to 70 cm
- Raise of storm surge water levels (comparing to 1980-1999) 19 to 111 cm


•*1 days with max. temperature $\geq 25^{\circ}\text{C}$

•*2 days with max. temperature $\leq 0^{\circ}\text{C}$

•*3 days with precipitation $\geq 20 \text{ mm}$

•*4 days with wind speed $\geq 17,2 \text{ m/s}$

Estimation of the Logistics Cluster regarding the **Climate Change**



→ Important finding: more than 90% of respondents did not notice any influence on their business through climate change



Status: End of 2009/Beginning of 2010

Where are the **vulnerabilities**?

- Existing **vulnerabilities in firms' supply chains** as well as in the considered region
- Ensuring the transport of goods is **subject to potential interference and consequently risks of disturbances**
- Overall **expected vulnerabilities** surveyed of the sector are **relatively small**
- But increasing problems of **major climatic events** (e.g. heavy storms) are viewed as **quite problematic**

Expectations of the logistics cluster (1)

- Nearly 75% consider the interference of the increase in **storm surges and storm events** as significant or very significant
- Over 2/3 of the respondents measure the **rise in sea-levels** as a *significant* or *very significant* impact
- Increase of **higher wind speed**:
 - For almost 2/3 *very influential* nuisance
 - Only about 15% measure this influence rather *insignificant to completely insignificant*

Expectations of the logistics cluster (2)

- Increase in **extreme heavy precipitation** :
 - 50% of the respondents rated as *significant or very significant factor*
 - 25% rated as *rather nonsignificant or nonsignificant factor*
- 50% of all respondents considered the increase in **heat waves** in summer as *significant or very significant* source of interference for the company, 1 / 4 of the opposite opinion, about 15% consider this to be a neutral factor

Expectations of the logistics cluster (3)

- About 1 / 3 of the companies surveyed considered the **raising air temperature** as *significant* or *very significant*
- Almost 50% estimate this criterion as rather *insignificant to negligible*

Which **potential risks** are recognized by the cluster?

Current:

- Higher wind speeds threaten terminal operations
- Required investments to limit damage
- Increasing costs: Investments in buildings and vehicles

Future:

- Maybe negative effects on freight transportation
- Immensely high costs of coastal protection
- Potential threats on business' livelihoods

What is the reaction of the cluster?



➔ **Sensitivity / Vulnerability**

➔ **Measures**

➔ **Forecast**

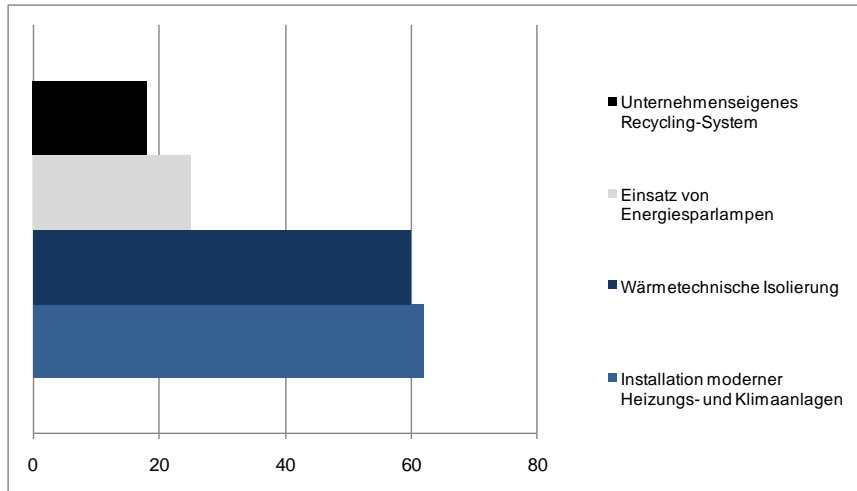
Which measures has the logistics cluster already got realized?

- Building-related,
- Resource-related,
- Vehicle-related,
- Organisational as well as
- Employee-related measures

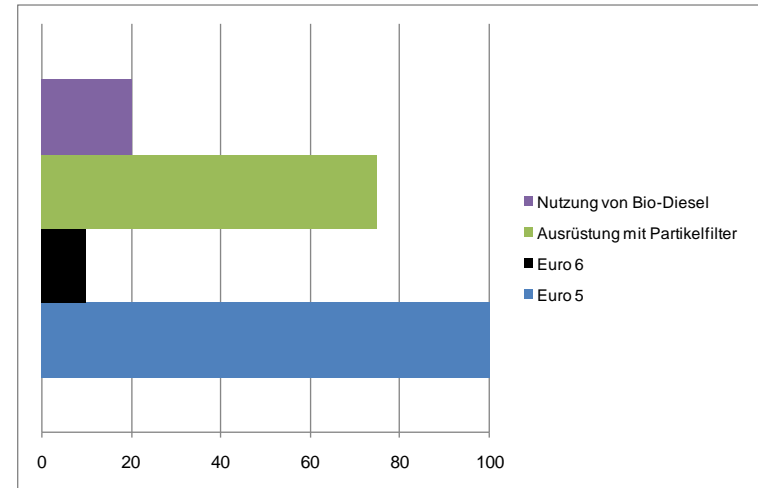
→ Climate protection measures!

„Northwest 2050“ - Results (9)

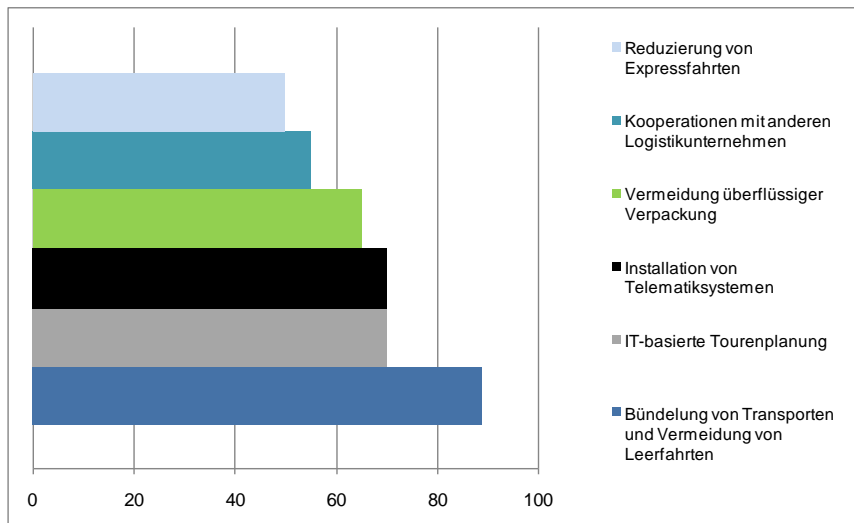
Building-related measures



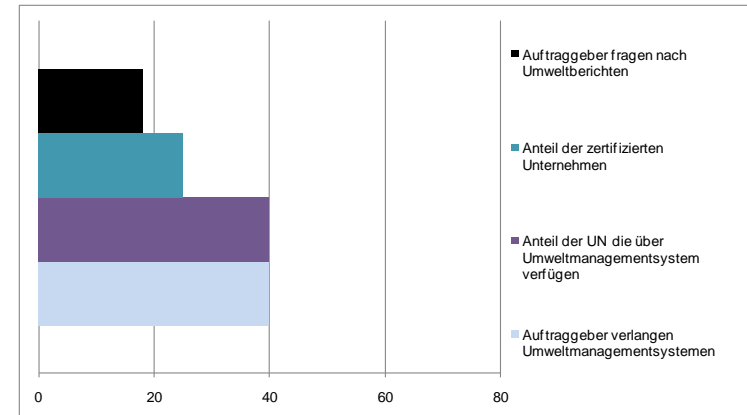
Vehicle related measures



Organisational Measures



Organisational Measures



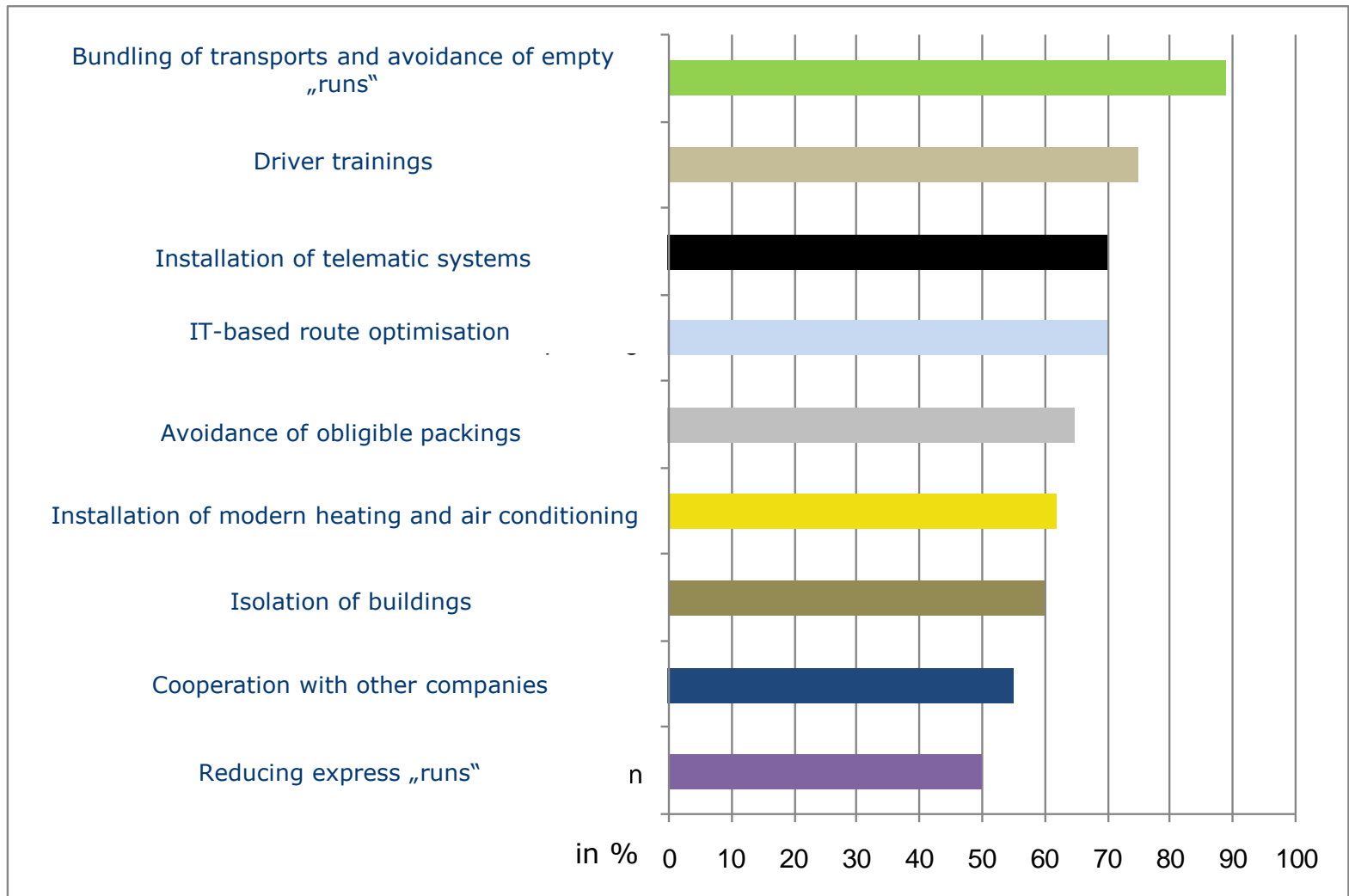
Employee-related measures

- Driver training
- economic use of resources

Resource-related measures

- about 58% of the respondents use **alternative modes of transport**
- **Photovoltaics** play a role in about every 10th. company of the cluster
- about 40% of the companies already plan this investment
- **Rain water collection** tanks play a role in every 10th. company
- Every 5th. company already plans this investment to use this resource
- Company owned wind turbines play no role at the moment

Summary of significant measures



Which role do the realized measures play?

- Measures of the companies aim for greener logistics and help to support the climate
- „Green Logistics“ means protecting the environment and in addition to that reducing current impacts of climate change
- **Climate protection** is the important first step

Climate change: estimating the sensitivity



Auswirkung weltweit
Ø 8,1



Auswirkung auf eigenes Unternehmen
Ø 4,9



Auswirkung auf „MR HB-OL“
Ø 6,0



Auswirkung auf Logistikbranche der „MR HB-OL“
Ø 5,8



10 = Threat / 1 = Chance

→ **Sensitivity / Vulnerability**

→ **Measures**

→ **Forecast**

ISL-Forecast (1)

- Forecast regarding of large time horizon is a **big challenge**
- **Impacts** of climate change **depend on** the occurrence of a **particular scenario**
- Measures: **organizational** and **building-related measures** are in the foreground (mitigation)
- Other categories also very important
- **„Green“ logistics** is of increasing importance

ISL-Forecast (2)

- Companies that so far have not implemented any measures could follow the trend of innovative companies

In the future:

- More stringent environmental **regulations** expected
- **increasing costs** for companies: for example technical facilities to meet emissions standards, costs for certification are of increasing importance
- **Customers** could increase pressure on actors of the cluster (environmental reports; management systems)

ISL-Forecast (3)

- Actions taken by companies can contribute to climate change
- Upon the occurrence of particularly significant and **extreme disturbances** (such as storm surges and floods) the **current coastal protection might not provide adequate protection**
- Traffics of local companies in "MR Bremen-Oldenburg" could partly come to a standstill

Where and in what respect is a **need for action?**

- More **awareness** of the cluster regarding adaptation
- ISL-analysis shows that **not all companies are conscious** about climate change
- **Adaptation measures** of companies could be needed
- Need of action by Bremen and Lower Saxony
 - Protective measures in terms of **coastal protection**, i.e. ensuring continuity of services of companies in the ports

Summarized results of ISL survey

- **First** determination of expectations of the logistics cluster regarding climate change: currently small changes for the companies due to climate change
- The cluster already realizes many **measures according to climate protection (mitigation)**
- Climate protection in the MR Bremen-Oldenburg northwest alone won't be enough --> **adaptations to prevent of interferences could be important in the future**

- Project „northwest2050“
- Impacts of climate change on logistics sector /
Results of ISL studies
- **Analyses of supply chains**
- Perspectives

Results of the ISL - Supply Chain Analyses



„Transportation of food“

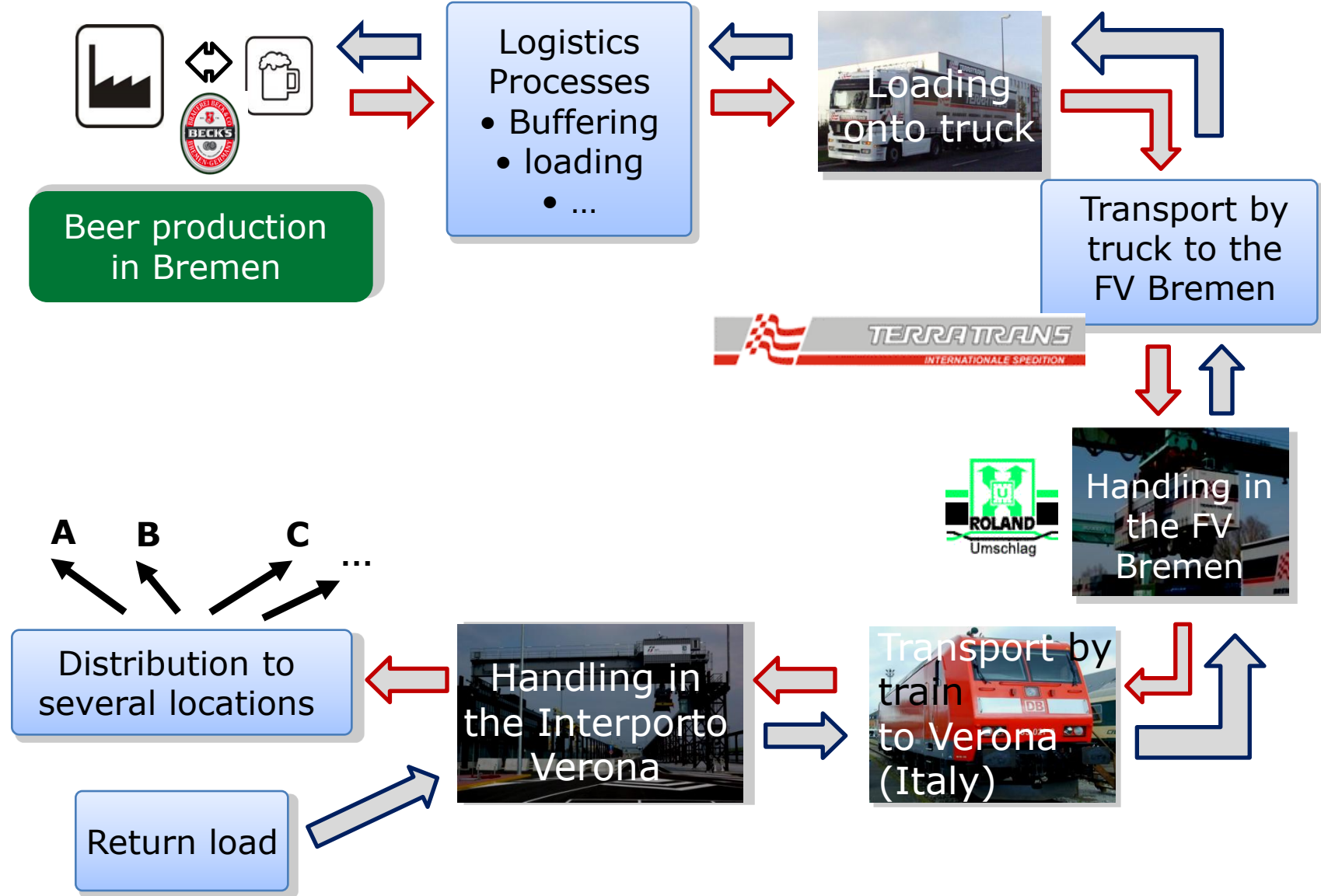


- Regional Context
+ international connection



- Object of interest in public
- Example for a „Threat“ due to climate change

Alps passing transports of food - From Bremen to Verona (Italy) -



Sensitivity of the supply chain „Transportation of food“

- Damage of foils due to heat in summer
- Alternative foil which is insensitive to coldness in the winter
- roofs of warehouses ➡ Wind and snow load
- Extreme precipitation
- Truck and train transportation ➡ Wind load
- Partially critical temperatures which have impact on the „Beer“
- Possible landslides in the Alps



Adaptation measures of the supply chain **„Transportation of food“**

- Application of new, durable covers/tarps and foils during truck/train transport
- New building or conversion of existing warehouses
- Optimisation of company-owned drainage facilities



- **in the future: transports of goods in refrigerated semi-trailers (reefers) could be possible**

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Findings:

- Analysed companies already notice the impacts of the climate change partially
- Sensitivities/vulnerabilities of supply chains could have been analysed
- First adaptation measures are taken (coastal protection but also companies' measures)
- Coastal protection is main element for the region
- In the future innovative measures can possibly be needed (reg. storms etc.) --> companies

***Thank you for
your attention!***

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