# Report on Road Transport Best Industry Practices











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#### Introduction to the **Report on Best Industry Practices**

The International Road Transport Union (IRU) is a confederation of national road transport associations, together comprising the entire road transport industry worldwide, both carriers of passengers and of freight. It speaks for the operators of coaches, buses, taxis and trucks, from large transport fleets to small family companies.

At the 1992 Rio Earth Summit, member governments of the United Nations adopted Agenda 21, the comprehensive blueprint for achieving sustainable development world-wide. As called for in Agenda 21, the road transport industry developed the IRU Charter for Sustainable Development, which was unanimously adopted by all IRU Members at its World Congress in Budapest in 1996. The proactive *IRU Charter* is a commitment by the entire road transport industry to drive towards sustainable development. To date, road transport is the only mode of transport that has committed itself to this common goal.

The IRU charter was followed by the IRU initiative Driving Towards Sustainable Development. This initiative specified the principles and prerequisites required to achieve the common goal of sustainable development.

#### The critical success factors for achieving sustainable development are:

- Innovation: "At the source" are the most efficient and cost-effective measures for improving the environmental performance of road transport.
- Incentives: Engagement of governments to reward implementation of Best Industry Practices and technology to expedite penetration.

■ Infrastructure: Improved traffic flow is a sine gua non condition for sustainable development and requires more investments in road infrastructure.

In September 2000, the IRU published the IRU Guide to Sustainable Development, which is a logical next step on the IRU Agenda to sustainable development. The IRU Guide presents national action programmes from IRU member associations from Denmark, Germany, the Netherlands, Norway, Sweden, and the United Kingdom, which is pioneer work in striving for sustainable development. These programmes emphasise measures that significantly improve environmental performance, transport safety, fuel efficiency, awareness, and profitability.



The Guide as such is designed to be a flexible reference and modular aid for all national IRU Member Associations. The IRU members can choose from the Guide those modules that will best contribute to the achievements of sustainable development in their particular situation.

#### The six Modules are:

- Signing the *IRU Charter*
- Well Driven Campaign
- Environmental Management System
- Environmental Controlling
- Promotion of Best Industry Practices
- Driver Training

The IRU Report on Best Industry Practices is a followup to the IRU Guide to Sustainable development and it realises the Module 5.

The objective of the publication of such a report is to monitor the progress of implementation of sustainable practices at transport level and to prove that the existence of such best practices is profitable in the road transport industry. Finally the report should both encourage all road transport operators to imitate best industry practices (learning from the best) and also help to publicly recognize the achievements of the transport sector.

#### The IRU Report on Best Industry Practices

The IRU Report on Best Industry Practices presents best practices for sustainable development from the road transport industry. In this context, sustainable development practices are those that reduce environmental impact while continuing to satisfy market demand and maintaining the economic survival of the company. Contributions from the road transport industry can be achieved most effectively and rapidly if both the environment and the individual road transport operators are put in a



win-win situation. For example, lower fuel consumption results in reduced CO<sub>2</sub> emissions and lower fuel costs; improved safety leads to lower insurance costs as well as fewer accidents. In other words, the report is a compilation of forerunners from the road transport industry who have successfully implemented sustainable development practices in their companies.

In 2001, the national member associations of the IRU were called on to name some of their transport operator members who implemented measures that improved the sustainability of their company's activities and, thereby, were representative of a good example of successful implementation.

The selected transport operators were sent a questionnaire with questions about their services and Best Industry Practices. It was especially important to determine why the company was implementing the practice, what was their goal, what were the implications of the implementation, and what factors influenced the implementation. The questionnaire also asked about the implementation costs and the benefits for the environment. If possible, the benefits were represented in terms of numbers.

The IRU used the results of the questionnaire to select transport operators who had implemented practices that went above and beyond the legal requirements and companies that could clearly demonstrate that the implemented measures had ecological and economical benefits.

Within less than a year, the IRU was able to compile a compendium of Best Industry Practices (BIPs) from the road transport industry. The companies



included in the report range in size from small to large and are from several different countries. The number of returned questionnaires was so large that the IRU decided to publish the report in two volumes. Some of the companies actively pursue sustainable development in several areas of their company. As a result, these companies appear in both volumes of the report.

The first part of the report contains BIPs from 20 companies from Austria, Denmark, Germany, the Netherlands, Spain, Portugal, Sweden and the UK.

The following nine categories are used to present the information on the company BIPs in the IRU Report on Best Industry Practices.

#### The BIPs of some companies did not fall into any of the following categories:

- Environmental Management Systems
- Training and Incentives
- Vehicle Technology
- Disposition and transport planning
- Site-oriented practices
- Intermodal logistics
- Technical measures to improve the utilisation rate
- Monitoring fuel consumption
- Safety

The IRU does not vouch for the completeness of these categories. The presented BIPs vary greatly with regard to structure, systematic approach, and sophistication. However, they have one common goal: to contribute to sustainable development while improving the profitability of the company.

#### The practices range from very simple measures to complex practices.

1. For example, a company does not have to spend a lot of money to encourage staff members to use energy wisely. Drivers can learn fuel-efficient driving methods and driving safety tips at a driving school and be rewarded for positive driving performances. This can result in a considerable reduction in energy consumption. The staff responsible for transport scheduling, supported by information and communication systems, can help increase the utilization rate of the trucks and avoid unnecessary trips.

2. The use of cost-benefit analyses for complex Environmental Management Systems (EMS) is often underrated. The examples demonstrate that EMS help a company achieve their sustainable development aims by deriving effective measures from the environmental goals of a company. Transport companies can use EMS to show their customers how they have reduced the environmental impact of their daily operations. The implementation and documentation of the environmentally friendly measures' costs depend on the size of the company. Experience has shown that, in particular, small companies should not worry about these costs. 3. A road transport company does not only have vehicles, drivers, and other workers but also buildings, warehouses, and other facilities. For example, car wash facilities can be designed in such a way that as little water as possible is needed and, at the same, a high percentage of the service water is reused.

#### Each company has to select sustainable development measures that suit their own level of development.

The report also includes some BIPs that do not fit into any of the categories but fulfil all of the criteria for Best Industry Practices in the road transport industry. These special examples show that there are no boundaries for the innovative drive of transport companies when it is possible to combine ecological and economical progress. The range of examples in the report clearly shows that there are many different approaches that a road transport company can take when implementing Best Industry Practices in their company.

All of the examples in this report include a brief description of the company and its services, a description of the various measures the company has taken to drive towards sustainable development (= *Best Industry Practices*), information on the framework conditions and the process of implementation (timetable, resources used, cost involved, organisational implications and so on), benefits for the company and the environment (including a brief cost-benefit analysis or calculation of the payback period, wherever possible) and an information box containing the company's address and particulars of the contact person in the transport company. The examples are supplemented with charts, photographs, and diagrams.

The presented measures support the transport companies in their trying to be armed for the current developments in logistics. These are a stronger integration of individual companies in supply chain



Report on Road Transport BIPs \_\_\_\_

management (SCM) networks, the extension of logistic services as well as the reorganisation of logistic structures by the shipping industry. Increasingly, ecological issues play an important role in the companies' operations.

This report bears the good news that many impressive environmental accomplishments have already been realised by the road transport industry. In this way, the IRU report makes an important contribution to the international exchange of information. With this report, the IRU hopes to motivate other companies to follow the industry forerunners by implementing their own measures.

THE IRU Report on Best Industry Practices proves that transport companies can make an important contribution to sustainable development.



## **Improvement in Utilization** through Customer Incentives



#### **ÅMÅLS MILJÖHANTERING AB**

S

Åmåls Miljöhantering AB was founded in 1953 by Sixten Karlsson and taken over at the end of the 1980s by his descendant. Today, the company's main activity is the transport and temporary storage of environmentally hazardous waste (such as construction and industrial waste) and hazardous goods. In addition to transporting dangerous goods, it also treats wastewater for the industry.

The company employs 10 people, including six full-time drivers. The vehicle fleet consists of five trucks and two semi-trailer trucks. The company has 10 storage tanks for industrial waste, with a capacity of 420'000 litres. It also has a treatment plant for waste oil. The first waste-water treatment facility was built iln 1995. Today, three waste processing systems are in use. Transported goods amount to 30'000 tonnes per year. Approximately SEK 52'000 (EUR 5'500) is invested in training for safety goods transportation and environmental issues. All vehicles are submitted to the extra brake test. Since 1995, the firm's turnover has doubled and in 2000 reached SEK 15.53 million (EUR 1.64 million). Profits in that time have grown from SEK 1.34 million (EUR 142'000) to SEK 3.64 million (EUR 384'000).

The company's objectives were to avoid empty trips, improve company profits and reduce emissions by improving vehicle utilization. In the past, trucks often drove one way without a load. Since 1999, improved planning has ensured that the vehicles often have a load in both directions. Transporting recovered oil in one direction and cutting fluid or water on the return trip can counterbalance the unpaired use of vehicles.

The implementation process, which took only a few months, began with the company finding cargo that could be transported back to the facility in Åmål for processing in the wastewater treatment plant, and selecting customers who could provide loads in both directions. An incentive programme was put in place to this end, with Åmåls Miljöhantering offering a better transport price for these customers. This acquisition of extra loads was seen as a critical success factor for the implementation process. The company's customers helped to arrange return cargo for Åmåls Miljöhantering.

#### COSTS There were no implementation costs.

BENEFITS FOR THE ENVIRONMENT The main benefit for the environment is fewer kilometres driven, and thus lower emissions, for the same transport volume.

Vehicle utilization today averages 90%. Åmåls Miljöhantering offers better prices if the customer provides loads in both directions.

BENEFITS FOR THE COMPANY

Customers are very satisfied with this initiative since they also benefit from the incentive programme.

## **Reduction of Waste through** an Oil Treatment Plant

In addition to transporting hazardous waste and goods, Åmåls Miljöhantering wanted to treat its customers' waste water, offering a single point of contact for transport and disposal services. The main objective of this measure was to reduce the amount of waste.

In industrial machining, a mixture of water and 3-4% oil is used to reduce friction and cool the parts being manufactured. This waste water is stored temporarily before being processed by a state-of-the-art oil separator system. This system purifies water from motor maintenance and machining plants through a four-step clarification process: evaporation of the water, granular filtration through a ceramic membrane, reverse osmosis and, finally, active coal. The retrieved oil can be re-used as an energy source.

Åmåls Miljöhantering carried out a market analysis to test the feasibility of this BIP before implementation. The company had to decide whether it could afford this measure and how profitable it would be to operate a treatment plant.





#### COSTS

The total investment was approximately SEK 9.34 million (EUR 986'000).

BENEFITS FOR THE ENVIRONMENT The environment benefits from an overall reduction in waste and more efficient processing. Vehicle emissions have also been reduced because extra trips hauling waste are avoided.

#### BENEFITS FOR THE COMPANY

Substantial financial benefits have been obtained from charging customers for processing their waste. A positive return on investment has been projected after five years. The processing plant at Åmåls Miljöhantering is probably the most advanced in Sweden.

Customers are highly satisfied with having to deal with only one supplier for transport and waste processing. This gives Åmåls Miljöhantering a competitive edge over other transport companies.



## **Reduced Fuel Consumption and Accidents through Driver Training**

The company then assessed all legal requirements (environmental legislation). The main obstacle was obtaining the permits required to operate a treatment plant. A consulting firm handled all paperwork and permits with the authorities. It took one-and-a-half years to obtain all required documents and authorization to build the facility.

Vilokan was then selected as supplier of the wasteprocessing machine (see photo below) and was also responsible for building the facility, which took six months. All control systems were supplied by ÅF Consulting.

Finally, Åmåls Miljöhantering found enough customers to operate the treatment plant at maximum capacity.

#### OUTLOOK

A new sorting centre has recently been opened for recyclable goods collected from customers. The new centre will provide storage for paper, plastic, metal and burning waste before it is transported to other facilities in Sweden for further processing.

Åmåls Miljöhantering is currently examining the feasibility of a new burning facility. This would burn waste products extracted from the waste-water plant as well as other collected goods. In addition to this, it would provide heat and electricity to the surrounding communities.





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Berger Beteiligungsgesellschaft, located in Wörgl (Tirol, Austria), was founded in 1961 by Johann Berger. It specializes in transporting marble from Italy to Germany. Through its partners and associates, the company also transports various parts for the automobile industry.

Berger GmbH comprises several individual companies having a total annual turnover of more than EUR 145 million and employing about 650 people. The company provides services to all of Europe and has representatives in Austria, Germany, Italy, Belgium, Luxembourg and Romania.

Berger is active in the following business areas:

- transport
- logistics
- vehicle development and production
- garages
- service stations and rest stops.

The logistics and garage departments have been certified to ISO 9001 international quality management standards since 2001. The transport department was recertified in 2001. In 2000, Berger successfully implemented a driver training programme in which drivers participate at regular intervals and are thus kept up to date with the most recent changes in technology. The most important components of the training programme are economical driving methods and cargo security. Each truck is equipped with a driver handbook that includes information on economical driving methods, securing cargo and other topics. Berger built a special training centre for this programme that has three rooms for up to 60 participants. They also hired a director for the school who was trained by Daimler-Chrysler in Wörth. In order to analyse the economic and ecological effects of this programme, a performance measurement system was created that is used to determine data such as fuel consumption and the number of accidents per vehicle.







#### COSTS

Implementation costs for this Best Industry Practice amounted to EUR 72'000.

#### BENEFITS FOR THE ENVIRONMENT

Average fuel consumption was reduced from 32.97 litres/100 km to 32.70 litres/ 100 km, representing savings of 1.12%. The difference in the number of accidents was more dramatic than that in fuel consumption. The number of accidents in the second half of 2000 was only 76, compared with 102 in the first half, representing a reduction of 25%

#### BENEFITS FOR THE COMPANY

The 1.12% reduction in fuel consumption in the second half of 2000 cut costs by EUR 73'000. The potential savings for one year could therefore be extrapolated to EUR 146'000.

The company's repair costs were reduced by EUR 88'000 for the second half of 2000 because of the lower number of accidents resulting from the driver training programme.









## **Reduced Water Consumption by Using a Modern Washing Facility**

Berger's new washing facility allows the company to wash 9'000 trucks per year. To reduce the consumption of clean water and improve throughput time, the older three-brush system was replaced by a new five-brush washing facility. This new system was implemented in two months. The main problem encountered was installing it in the existing building.

## COSTS Total costs for the new truck washing system were approximately EUR 100'000. Modernization of the car-washing



#### 2'198 to 1'150 litres. At the same time, clean water consumption decreased from 510 litres to 255 litres. On the basis of 9'000 trucks being washed per year, this new system will save 2'295 m<sup>3</sup> of clean water annually. This represents a 50% reduction. The change from a three-brush to a five-brush system also drastically reduced the cycle time from 12 minutes to five minutes per wash.



#### BENEFITS FOR THE ENVIRONMENT

Wash-water usage was reduced from

#### BENEFITS FOR THE COMPANY

The installation of the new system reduced clean-water costs from EUR 1'835 to EUR 917 per year (at EUR 0.40/m<sup>3</sup>). In addition to the cost reduction, clean trucks are an image gain for the company - the appearance of the vehicle fleet is an important part of the company's image.



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## Measuring, Monitoring and **Reducing Fuel Consumption**



#### EGON SØRENSEN TRANSPORT A/S

(DK)

Egon Sørensen Transport A/S belongs to the Dutch transport company Vooruit A/S and offers reefer transports for fish products. The company carries fish for further processing to Hanstholm in Denmark, where it has 400 m<sup>2</sup> freezers as well as a workshop and a car wash. From there, the fish is transported to retailers in Denmark, the Netherlands, Germany and France.

Egon Sørensen has 31 employees. including 19 drivers. The company operates more than nine refrigerator trucks and semi-trailers.

For environmental protection, both internally and externally, the company invests DKK 2-3 million (EUR 270'000-400'000) per year. In day-to-day operations, it uses environmentally friendly materials and spare parts as well as technical equipment and chemicals. Furthermore, the company strives to minimize the consumption of electricity, heat, fuel and oil.

By the continuous measurement of fuel consumption and distance driven, the specific fuel consumption as well as the environmental impact can be determined. The drivers therefore have to record their mileage and fuel consumption after each trip and hand in a simple form. The company's secretary enters the data into a database once a month. The process of recording and inputting new data takes 1-2 hours per month.

On this basis, the company can at any given time calculate the total fuel consumption, total kilometres driven and kilometres driven per litre. In order to influence and motivate the drivers, the company publishes these measurements and calculations internally (see figure "Example graph of average fuel consumption per vehicle"). If a driver returns to earlier habits, the current measurements and calculations will reflect this.



For the company's main route, the drivers also record - in addition to distance and fuel consumption - the amount of goods transported. The results are then compiled per route, per vehicle, per driver and per customer, and can be expressed for a specific period of time. For this purpose, a software tool based on a common database application was developed with the help of external consultants. Development of the software tool took seven hours and the implementation 35 hours.



Example graph of the average fuel consumption per vehicle







#### BENEFITS FOR THE ENVIRONMENT

The current measurements and calculations of fuel consumption have improved transparency and increased the possibilities for determining and reducing the environmental impact of transportation. Along with driving courses, they helped to reduce fuel consumption by nearly 6'800 litres in 1999, which is equivalent to a reduction in CO<sub>2</sub> emissions of c.18 tonnes.

#### COSTS

The costs for software development were within an existing budget.

#### BENEFITS FOR THE COMPANY

The company is able to monitor and evaluate the effect of its initiatives. Participation in driving courses has, for example, resulted in fuel savings worth nearly DKK 34'000 (EUR 4'560). This is equivalent to 300 additional metres for every litre of fuel used.





## Introduction of Power **Saving Technology**

In 1998, consultants from the Technological Information Centre (TIC) performed an initial analysis of environmental issues at Egon Sørensen and identified electricity consumption as an important operational consideration for the company. Several measures for reducing electricity consumption were proposed in TIC's environmental statement 2000 and installation of new technology was carried out directly afterwards. Within six months, the results could be seen on the electricity meter.

These new technologies include, among other things, motion detectors and relays for refrigerator compressors. In rooms where in the past a light was permanently switched on, the new sensors only turn on the light if a person enters. Similarly, the new relays consume a minimal amount of electricity. This was especially important in the workshops, washing bay and freezers. Employees are requested to check that all electrical installations (computers, printers and so on) are shut off when they go home. The meter is read regularly to monitor electricity consumption.

The most important step during implementation was to identify which areas could be improved and how to do it. In particular, external advice about electricitysaving technology has assisted the company greatly.

#### COSTS

A total of DKK 19'000 (EUR 2'550) was invested in the new technology. The TIC consultancy fees were paid by the local authority from its environmental programme. In addition to capital investments for new technology, the company has also invested in encouraging employees to reduce electricity consumption.

#### BENEFITS FOR THE ENVIRONMENT

In the first six months after installation of the new technology, electricity consumption was reduced by approximately 6.529 kWh compared to the same period of the previous year.

This means that the emission of air pollutants was reduced by 4.6 kg  $CO_{2}$ 11.0 kg SO<sub>2</sub>, and 10.0 kg NO<sub>x</sub> (based on the national average published by the Danish Energy Agency).

#### BENEFITS FOR THE COMPANY

In the first six months after installation, the company saved DKK 9'000 (EUR 1'200) in electricity costs compared with the same period in the previous year. The DKK 19'000 (EUR 2'550) investment will thus be amortized in just over one year.



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EMONSCARGO

**EMONS CARGO BV** 

(NL

Emons Cargo is part of the Emons

Group with headquarters in Beuningen, the Netherlands, and a branch in Prague,

Czech Republic. The core activities at

Beuningen concentrate on double-deck

transport to and from destinations all

With 58 employees, including 45

drivers, the company achieves an

annual turnover of EUR 11 million and transports about one million pallets per

vear. The truck fleet consists of 23 tractor

units, 11 double-deck road-trains, 21

conventional double-deck trailers and

35 2WIN<sup>®</sup> trailers. The main market segments served by the company are

automotive, electronics, food/non-food,

organizations such as TLN (Transport

and Logistic Netherlands) and KNV (Koninkliik Nederlands Vervoer, Roval

Dutch Transport) to give presentations

to large audiences on double-loading

quality management standards.

Emons Cargo is certified to ISO 9002

Emons Cargo is regularly invited by

building materials and furniture.

and its advantages.

over Europe.

**Increased Efficiency** 





## **Double-deck Cargo for**

The company's main objective in developing the 2WIN® trailer was to reduce the number of transport movements required for cargo with a height of up to 1.80 m. The reason for this was the dramatic reduction in load factor experienced when transporting unstackable cargo with a height between 1.25 m and 1.80 m - it was simply not possible to move such loads efficiently. Based on a technique that is more common in the glass industry, Emons developed a special trailer with two floors, each with a free loading height of 1.83 m.

Trailer capacity was increased from 33 to 50 europallets in the first-generation vehicle and to 52 pallets in the current second-generation 2WIN<sup>®</sup> trailers. The built-in tail-lift has a maximum capacity of two tonnes and can therefore lift four 500 kg europallets up to the second loading level. The 2WIN<sup>®</sup> trailer has a maximum loading capacity of 25 tonnes, which sets the maximum individual pallet weight at 500 kg. All trailers are equipped with their own handling equipment.





The 2WIN<sup>®</sup> concept by Emons Cargo was developed jointly with the Irish trailer manufacturer Wilson. Emons already has more than 13 years' experience in the field of double-loading and brought all its special know-how into the development and construction process. The second generation of trailers is built by the German company Orthaus.

The major step in the implementation process was to build the first trailer. Construction of the high, onepiece side walls and integration of the loading lift with the special chassis and suspension were totally new. Planning, design, development and construction of the first four test trailers, each using a different technical solution, took three years. Based on experience with these test trailers, construction methods were then optimized to produce the standard 2WIN<sup>®</sup> Trailer type now in service. The concept is fully implemented in the transport market.

Demonstrating to the market that the 2WIN<sup>®</sup> concept brings both environmental and economic advantages needs time, however. Because the concept is relatively unknown, companies are tending to stick to conventional transport equipment.

#### COSTS

The price of the new two-floor trailer is about EUR 90'000. This is about twoand-a-half times that of a conventional single-floor trailer. The purchase cost of the 35 2WIN® trailers in service amounted to more than EUR 3 million.

In addition, Emons invested about two full man-years in design, construction and testing of the 2WIN® trailer.



BENEFITS FOR THE ENVIRONMENT The 50-pallet 2WIN® trailer offers 52% greater capacity than a conventional 33pallet trailer. This results in a reduction in kilometres driven of 34% for the same transport volume in terms of palletkilometres.

More specifically, Emons trucks each drive approximately 165'000 km per year. Fuel consumption of 32 litres/100 km with 2WIN® trailers is the same as with

conventional units. With its 35 2WIN® trailers, Emons has a yearly transport distance of 5.8 million trailer-km and a fuel consumption of 1.804 million litres. To provide the same transport performance of 289 million pallet-km with conventional trailers would require 8.8 million trailer-km, meaning fuel consumption of 2.7 million litres.

The company has therefore saved 3.0 million trailer-km and 930'000 litres of fuel in one year (see Figure "Fuel consumption").

Emons estimates that about 5% of all full-load shipments in Europe would be suitable for transport with the 2WIN® trailer. This would mean fewer shipments and fewer trucks on the road.

An additional benefit is the reduced requirement for packaging material, as the pallets are not stacked inside the truck during transport.



#### BENEFITS FOR THE COMPANY

The benefits for the company will grow in ratio to expansion of the network. Emons expects the benefits to grow by 5% over the next two years.

Another aspect is that all employees including the drivers are very positive about the concept and have pride in the product.

#### OUTLOOK

The company plans to expand its 2WIN® fleet up to 200 units over the coming two years. Further technical development will meanwhile allow two more pallets per trailer, increasing capacity to 54 pallets.



Report on Road Transport BIPs.





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## **Use of Intermodal Transport**



#### **EWALS CARGO CARE**

(NL) Ewals Cargo Care is active in national and international transport by road and rail (in the form of intermodal transport), and in logistic services in the areas of automotive, high-tech and retail goods.

The company employs 1'550 people, including 340 truck drivers. The truck fleet consists of 220 vehicles. Ewals owns 2'200 Mega Trailers, each with a volume of 100 m<sup>3</sup>, and about 1'200 swap-bodies and containers. Some 300'000 transports per year are operated in Europe with this equipment. The company has a warehouse capacity of 300'000 m<sup>2</sup> for its logistic services. Ewals uses scanners and satellite communication for tracking and tracing its cargo. Annual turnover is about EUR 280 million.

As chairman of the intermodal committee of the Belgian road transport association. Ewals Cargo Care is proactive in promoting intermodal transport. With regard to environmental policy, the organization plans to extend ISO 14001 certificates across Europe, including trucking companies.

The intermodal transport department concentrates on long-distance haulage with a fleet of 1,200 intermodal equipment units. For short-distance haulage, the flexibility and agility of road transport is preferred. Depending on the kind of goods and the transport distance, specially designed equipment is used to make full use of transport capacity. The appropriately named "Mega Railer" has a volume of 100 m<sup>3</sup> and a maximum payload of 28 tonnes.



Ewals has set up a hub-and-spoke network for longdistance haulage. At least two modes are used to transport the cargo from pick-up to delivery. The intermodal department is able to connect various economic regions and production locations of companies in different industries, for example by the daily shuttle train from Genk in Belgium to Novara in Italy. About 96% of the maximum length of the train and about 94% of the maximum payload are utilized by mixing various types of goods (for example, steel and high-volume goods) in the same consignment. The main terminal routes, with distances and traffic volume, are shown in the following figure:

Main terminal routes with distances and traffic volume									
main terminal routes			1999		%		2000		%
	km's		nr.	total distance			nr.	total distance	
Busto - Trelleborg	1.150		321	369.150	2,9%		91	104.650	0,7%
Busto - rebro	1.850		542	1.002.700	7,8%		467	863.950	5,8%
Genk - Novara	870		11.612	10.102.440	79,1%		14.436	12.559.320	83,7%
Antwerp - Novara	1.042		11	11.462	0,1%		46	47.932	0,3%
Rotterdam - Novara	1.025		601	616.025	4,8%		270	276.750	1,8%
Duisburg - rebro	1.175		474	556.950	4,4%		847	995.225	6,6%
Duisburg - Helsingborg	715		162	115.830	0,9%		229	163.735	1,1%
			13.723	12.774.557	100,0%		16.386	15.011.562	100,0%
				4040			46 20/	44.00/	



#### COSTS

No extra costs arise from the use of intermodal transport in this case because the price of intermodal transport over long distances is competitive with that of road transport.

BENEFITS FOR THE ENVIRONMENT An extensive study of the effects of rail transport on CO<sub>2</sub> and NO<sub>x</sub> emissions was carried out by TNO (Nederlandse Organisatie voor Toegepast Natuurwetenschapelijk Onderzoek, Netherlands Organization for Applied Scientific Research), CE (Centrum voor Energiebesparing en schone technologie, Centre for Energy-saving and Clean Technology) and RIVM (Rijks Instituut voor Volksgezondheid en Milieu, National Institute of Public Health and the Environment) and published in March 2000.

## **Monitoring Fuel Consumption**

Ewals Cargo Care developed special data sheets to monitor fuel consumption per truck. With the help of these sheets, the weekly fuel consumption is checked and recorded. Table 1 on the next page shows a sample data sheet:

Another measure involves calculation of the yearly average fuel consumption per truck. The actual consumption is then compared with these averages. This is done automatically by



In the study, CO<sub>2</sub> emissions of 74 g/ tonne-kilometre were calculated for a road transport with a payload of 13 tonnes. For an intermodal train transport with a payload of 250 tonnes, the average CO<sub>2</sub> emissions were put at 50 g/tonne-kilometre. Thus, for these payloads, using intermodal transport reduces CO<sub>2</sub> emissions by 32%.

In the case of Ewals Cargo Care, the emissions for road transport are as calculated in the study. The emissions for intermodal transport should be even lower, as the payload of the trains in use is significantly higher than in the assumptions for the study.

BENEFITS FOR THE COMPANY

When introducing its Genk-Novara shuttle train service, Ewals Cargo Care calculated that an average utilization rate of 92% would be needed to operate the train economically. This goal was reached and even bettered.

#### OUTLOOK

In 2000, Ewals Cargo Care introduced a new shuttle train service between Eisenach, Germany, and Zaragoza, Spain.





a computer program that indicates very good low averages (green figures) or very bad high averages (red figures). Based on the kinds of trip made by the truck (mountain, hilly or flat terrain, payload transported), the program tries to explain the difference between the weekly and annual average, (table 2 below).

The fuel consumption per truck per week is displayed graphically to enable drivers to monitor their own performance and to compare it with that of their colleagues.

Table 1 – Example of fuel consumption date sheet						
Week 1	Tankli	st driver		В	ill	
Truck	km-total	litres	driven	usage	litres	difference
G23	573′572	781	2′484	31.4	781	
G24	522′893	1′035	3′010	34.4	1′035	
G25	582′528	-	0	-	-	
G50	507'221	1′217	3′595	33.9	1′217	
G51	494′472	800	2′468	32.4	800	
G52	522′625	655	2′010	32.6	655	
G53	476′275	887	2′940	30.2	887	
G54	621′490	759	2′436	31.2	759	
G55	442′852	738	2′353	31.4	738	
G56	493′353	825	2′615	31.5	825	
G57	519′075	710	2′160	32.9	710	
			rec	l = too high		

#### Table 2 – Example of fuel consumption date sheet

	-		-			
Truck	2000 av. usage	usage group	km-total	litres total	Weel 1	k average 2
G23	31.4		16′544	5′678	31.4	32.4
G24	34.4		17′177	5′640	34.4	31.2
G25			11′688	4′133	-	35.8
		34.0				
G50	33.9		19′206	6′334	33.9	34.1
G51	32.4		15′008	4′775	32.4	32.4
G52	32.6		16′752	5′343	32.6	31.1
G53	30.2		18′245	5′572	30.2	29.6
G54	31.2		13′715	4′537	31.2	34.3
G55	31.4		16′802	5′432	31.4	28.4
G56	31.5		14′549	4′891	31.5	34.5
G57	32.9		15′845	5′138	32.9	34.1
re	d = too high	32.0				

COSTS The sheets were developed within Ewals during normal office hours. A cost calculation was not made during this process.

BENEFITS FOR THE COMPANY Management can react quickly to unusually

high fuel consumption because the data are recorded and published on a weekly basis. At the same time, employees are highly motivated to drive economically because they know that they will be compared to their colleagues.



BENEFITS FOR THE ENVIRONMENT

No actual benefit for the environment can be demonstrated for this measure. However, fuel consumption numbers are needed to calculate the benefits, both for the environment and the company, of other measures such as fleet modernization and driver training. Only by monitoring the fuel consumption can a positive effect of these measures on the environment be demonstrated. In addition, the monitoring motivates all employees to seek further reductions simply by encouraging their desire to improve performance.



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## **Reduction of Emissions by Use of Low-emission Vehicles**

#### H. P. THERKELSEN DER LOGISTIK - TRANSPORT - TERBIERL

#### H. P. THERKELSEN A/S



H.P. Therkelsen A/S was founded in 1918 and is owned by two brothers, Niels Peter Therkelsen and Mogens Therkelsen. The headquarters is in Padborg, Denmark, and there are two subsidiaries in Flensburg (Germany) and Skagen (Denmark). H.P. Therkelsen offers transport and logistics services for temperature-controlled groceries and manufactured goods within Europe and Scandinavia.

The company operates more than 150 transport units consisting of trucks, modern refrigerated semi-trailers, modern tilt-type semi-trailer trucks and special handling equipment. Each semi-trailer truck hauls an average of 2.4 million tonne-kilometres per year.

At its headquarters, H.P. Therkelsen has an 8'000 m<sup>2</sup> terminal for fresh food articles and a deep-freeze warehouse for 800 pallets. The company has 130 employees, including 75 drivers. Apart from its own fleet of vehicles, it also employs third-party freight carriers to ensure that customers' requirements are met. All vehicles are equipped with navigation and mobile communication systems.

All processes at H.P. Therkelsen are certified to ISO 9002 international quality management standards.

In 1998, the company's fleet of 70 transport units consisted of 50% FURO 2 and 50% FURO 1 trucks. Each year 12-15 new vehicles are purchased. In 2000, the company employed 36% EURO 3 trucks and 64% EURO 2 trucks. The purpose of the acquisition was to reduce exhaust emissions. Because of the importance of NOx in connection with the so-called "Ecopoints" for transport across Austria, a reduction in these emissions will ensure that the company can continue to transport goods to Italy.

Within the next three years, the company plans to replace all old vehicles with vehicles that meet EURO 3 standards. EURO 3 vehicles have an additional fuel consumption of 2-3%. H.P. Therkelsen has therefore launched an initiative to increase transport efficiency. In 2000, the company invested DKK 1.12 million (EUR 150'000) in new navigation systems for each transport unit and DKK 1.49 million (EUR 200'000) in modern communication technology. Better utilization of capacity is a high-priority issue for the company. Improved IT-based fleet planning was tested with 12 vehicles over six months. The result of the test led to the decision to employ GPS/GSM systems on all trailers. In this way, third-party freight carriers can also be monitored.







#### Reduction of emissions from 1998-2000 (1998=100) Index 100 80 60 40 20 NOx co HC

emission type

#### COSTS

Implementation costs are difficult to calculate because the vehicles are being replaced continuously. The new EURO 3 vehicles are financed by short-term lease contracts. H.P. Therkelsen invested DKK 2.61 million (EUR 350'000) in navigation and communication systems.

BENEFITS FOR THE ENVIRONMENT

For H.P. Therkelsen, the changeover to EURO 3 vehicles led to a significant reduction in emissions of NO<sub>x</sub>, HC, CO and particulates.



BENEFITS FOR THE COMPANY Because of the reduced NO<sub>v</sub> emissions, H.P. Therkelsen was able to continue transporting goods to Italy.

Year 1999

Year 2000

Improved information flow means better co-operation between scheduler and driver as well as the company and its major customers.

Drivers are motivated by the opportunity to drive new, modern vehicles. Because of the new communication system, they are also less disturbed by phone calls and paperwork.

company analyses results guarterly on the basis of comparative figures (the specific fuel consumption per vehicle is 33-35 litres/100 km). Current calculations of the numbers of losses and fuel consumption (km/litre) are published on the company's notice board. This public posting of the numbers motivates the drivers to drive more efficiently, work more consciously, and not to fall back into old habits. If a driver has driven accidentfree for 12 months, he is rewarded with an additional bonus.

The type of loss, amount of damage and the driver who was responsible for the damage are recorded in the company's database. Fuel consumption is recorded by instruments installed in each vehicle. This way, the number of losses and the resulting insurance premium for vehicles and goods can be minimized. In addition, drivers pay more attention to the goods consigned to the company by the customer.

The system has now become an integral part of the company's wage policy. This measure is accompanied by a "safety through communication" campaign.

## **Bonus System to Encourage Drivers** to Drive Safely and Fuel-efficiently

H.P. Therkelsen places great importance on instructing drivers how to drive safely and use fuel efficiently. Each year, therefore, the drivers undergo training in these subjects.

In 1997 the company established a bonus system to provide permanent motivation for the drivers. This rewards drivers who drive safely and fuel-efficiently, while a malus regulation reduces the bonus in case of accidents or fuel consumption above the norm. The



Report on Road Transport BIPs.





Year 1997 Year 2000

#### COSTS

Despite the cost of the bonus system, the result of this initiative has been reduced overall expenses for the company. Rather than spending more on insurance premiums, etc, H.P. Therkelsen prefers to share the savings with its employees. The initial costs for monitoring equipment on each vehicle are DKK 7'000-8'000 (EUR 939-1'073).

#### BENEFITS FOR THE ENVIRONMENT

- Competition between the drivers encourages them to drive in an environmentally friendly way.
- Lower risk of accidents and less environmental impact

#### BENEFITS FOR THE COMPANY

- Reduction of losses (-23%) and insurance premiums for vehicles and goods (-21%) between 1997 and 2000, during which time the fleet increased in number
- Continuous reduction in fuel consumption.
- More motivation for drivers to drive safely and fuel-efficiently.



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## **Improved Vehicle Utilization** through Mobile Sludge Drainage



#### JOMA SLAMSUGNINGSSERVICE AB S

Joma started operations in 1968 as a family business with a tractor-based machine station for emptying cesspits. It has since expanded to include suction and sluicing trucks. These trucks have been approved by ADR. The company uses a camera to inspect pipes inside buildings and underground.

Joma currently operates a fleet of five trucks and a semi-trailer truck. The company transported 17'000 tonnes in 2000 compared to 15'000 tonnes in 1998. Joma has a staff of eight, including five drivers. The company operates within a 100 km radius of Angsås in Småland, Sweden. Turnover increased from SEK 3.22 million (EUR 340'000) in 1995 to SEK 5.7 million (EUR 601'000) in 2000. The investment in personnel training was approximately SEK 254'000 (EUR 26'800).

Joma uses the best technology available in terms of trucks and equipment, and employs competent, well educated staff. The company is certified to both ISO 9002 and ISO 14001.

The Moos KSA system, with a specially equipped tank vehicle, was introduced for suctioning sludge from cesspits . When the waste water is sucked up into the vehicle's tank, a polymer is added that causes the sludge to flake, making it easier for the water to pass through the tank's filters. When the process is complete, the water can go back into the cesspit and the sludge residue remains in the vehicle's tank.

The company searched for suitable technologies to reduce environmental impact. It decided to focus on the Mobile sludge drainage concept and proposed this idea to its main client, Gislaveds kommun (the local authority). The authority approved the concept and the company opened negotiations with the equipment supplier, Simon Moos in Denmark.

Finally, Joma drew up a contract with the local authority, bought the system and trained its staff. Simon Moos supported this training during the initial stages. Joma has now been working with the concept for 10 years. It took approximately one-and-a-half years from the first meeting with the local authority to Joma receiving a contract specifying this technology. The contract was signed in 1990.



All employees are actively involved in the process of continuous improvement towards sustainable development. The company has an ongoing dialogue with the local authority.



#### COSTS

Equipping a truck with the Moos KSA system involved extra costs of about SEK 517'000 (EUR 54'600).

Driving distances and thus emissions have been radically reduced because the tank does not need to be emptied so often. One full KSA vehicle corresponds to six vehicles emptied in the conventional way.

The burden on the local authority's purification plants has also been lessened.



#### BENEFITS FOR THE ENVIRONMENT

#### BENEFITS FOR THE COMPANY

- Operating costs are approximately one sixth those of conventional equipment because of the reduction in driving distances.
- The company was able to take on several contracts for which mobile sludge drainage was an absolute necessity.
- The company benefits from saving fuel and tyres. Key figures are not available at the moment.

#### OUTLOOK

A detailed system for the acquisition of key figures has not been necessary up to now because, as a small company, management is very much involved in the daily activities. However, Joma is working on a more detailed system for tracking cost savings.



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## **Hot-water System Powered** by Geothermal Energy

LIMPENS ELSOO

#### J. W. LIMPENS & ZN BV

(NL)

J.W. Limpens & Zn BV, located in Elsloo in the south of the Netherlands, offers two services to its customers: international bulk transport and a cleaning facility for trucks dedicated to nonhazardous bulk products.

Since 1960, Limpens has focused its transport operations on silos, covering an area of about 500 km radius around Elsloo that includes Germany, the Benelux countries, southern UK and northern France. The fleet consists of 44 bulk trucks and more than 60 silo trailers with volumes ranging from 36 m<sup>3</sup> to 65 m<sup>3</sup>. Limpens transports silos for customers in the chemical, glass and building industries.

The Elsloo cleaning station services customers from more than 15 countries and cleans up to 80 vehicles per day. Over the past two-and-a-half years, some 32'000 trucks have been cleaned.

The company has 64 employees, including 48 drivers. The annual turnover is about EUR 7.25 million. Since 1991, Limpens has been certified to ISO 9002 quality management standards. In 1998, it received the SQAS (Safety Quality Assessment System) certificate. A geothermal energy system in combination with heat pumps works on a different principle from that of an ordinary heating system fuelled by natural gas or fuel oil. Instead of creating heat by burning natural gas or oil, the geothermal system uses the natural heat of the earth by means of a series of pipes, called loops, installed below the surface. Fluid circulating in the loop carries this heat to the building, then the indoor geothermal system uses electrically driven compressors and heat exchangers in a steam compression cycle (the same principle as used in a refrigerator) to concentrate the earth's energy and release it inside the hot-water system. This system is used both for cleaning trucks and heating the floor of the building.



The aim of introducing geothermal heating was to implement a system that had a high degree of reliability, low maintenance costs and a positive impact on the environment. The key step in the process was to find a system that fulfilled these goals and, once it had been found, to properly understand its working principle. After that, an installation company had to be found and the costs and advantages of the system were examined. The geothermal hot-water system was the first installation of its kind in the Netherlands.

The installation company, J.T.S. Energietechniek of Roermond, the Netherlands, provided support during the implementation phase, which took about two years, and also helped with additional information for this report.





#### COSTS

The implementation cost for the whole installation was EUR 250'000, of which EUR 98'000 was for the heating system itself. The cost for a conventional gas heating system would have been about EUR 43'000 but, thanks to a financial grant of EUR 35'000, the extra cost for Limpens was limited to EUR 20'000. The operating costs include only electricity and some maintenance.

#### BENEFITS FOR THE ENVIRONMENT

As the temperature of the ground or groundwater a few feet beneath the earth's surface remains relatively constant throughout the year, the geothermal energy system provides high-quality heating while consuming much less energy. Most of the energy used in a geothermal system is renewable energy from the ground - the COP (Coefficient of Performance), therefore, or the ratio between energy gained from the system as heat and energy put into the system in the form of electricity, is as high as 4.4. A further benefit is that the geothermal system is extremely quiet.

In concrete numbers, in the past twoand-a-half years a conventional system would have burned 136'250 m<sup>3</sup> of gas to produce the necessary amount of heat (931'814 kWh). This would have resulted in CO<sub>2</sub> emissions of 242'525 kg. The geothermal system needed only 211'776 kWh of electrical energy, resulting in CO<sub>2</sub> emissions of 127'065 kg or a saving of



# through Groupage Freight Service



more than 115'000 kg (calculated on the basis of CO<sub>2</sub> emission figures in "Energy Market Trends in The Netherlands 2000", published by the Energy Research Centre of the Netherlands).

#### OUTLOOK

The positive experience that Limpens has had with the geothermal energy system has been documented in several professional journals in order to promote acceptance of the system by other transport and cleaning companies.

BENEFITS FOR THE COMPANY The initial objective of finding a reliable system with low maintenance costs has been met. The system works very well and is almost maintenance-free. At the time of installation, break-even point was calculated to be at 4.7 years or 32'000 trucks washed (see Figure: Operating

The energy costs of the geothermal system compared with a conventional system heated by gas or oil are:



costs).

- Conventional system, per 1'000 trucks: EUR 1'159
- Geothermal system, per 1'000 trucks: EUR 541

Because the cleaning station became very successful and started using much more hot water, the break-even point of 32'000 trucks was actually reached after only two-and-a-half years. Even without the financial support, the break-even point would have been reached with only 88'000 trucks washed. For the 15'000 trucks expected to be cleaned in 2001, the savings in energy costs are EUR 9'280.

The cleaning station now employs five people. The floor heating system heats the office building where 16 people work.



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## J. W. SUCKLING TRANSPORT LIMITED GB

J. W. Suckling Transport Limited is an independent contractor specialized in providing petroleum tanker haulage services, both term hire and spot hire, to oil companies in the United Kingdom. The company has its head office adjacent to the M25 motorway in Essex (south-east England) and also has a smaller office in Scotland. Suckling Transport operates 48 tanker vehicles for the distribution of about one billion litres of petroleum spirit and distillate per year. The 90 employees, of whom 74 are drivers, generate an annual turnover of GBP 5 million (EUR 8.08 million).

It is part of corporate strategy to ensure that the service provided is reliable and consistent through the implementation of a quality management system. Suckling Transport is therefore certified to the ISO 9002 international quality management standard and the EN 12798 European quality standard for the transportation of dangerous goods. The TankShare service and Eco Guardian project demonstrate that sustainable operations can lead to economic benefits for the transport operator as well as customers.





# **Tankshare – Improved Utilization**

TankShare is the first groupage service for the fuels distribution industry in the UK. Suckling Transport has successfully minimized empty running through shared utilization of transport capacity by its customers. Vehicles carry petroleum products for several customers in the same region, reducing the number of vehicles required. For this purpose, Suckling Transport operates compartmentalized tanker vehicles suitable for carrying a variety of products, such as petrol, diesel and kerosene, without the need for cleaning or flushing of compartments.

In April 2000, a pilot scheme was launched and attracted significant interest amongst oil companies. Fourteen companies used the service during its pilot stage, paying rates based on a simple price-per-litre basis, by postcode, depending on delivery load size. The TankShare scheme was officially launched in October 2000 and now has 24 customers.



COSTS

TankShare is a commercial initiative and, apart from the purchase of new vehicles, required no specific funding to launch. The simple but resourceful idea of a groupage service for fuel distribution shows that, under certain circumstances, sustainable operations can be established without causing additional expenses.

#### BENEFITS FOR THE ENVIRONMENT

- Improved vehicle utilization.
- Consequent reduction in empty runnings.



#### **BENEFITS FOR THE COMPANY**

- Introduction to new customers and wider customer base:
- Geographical growth for business.
- Improved corporate image.
- Winner of the FTA Environmental Best Practice Award 2001
- Winner of the GreenFleet Award 2001.

The pilot scheme and initial TankShare service were established from oil terminals in southern England. In 2001 an additional service was launched in Scotland. Further locations will be added during 2002.

and emissions compared with the control vehicle and thus set a benchmark for the industry. At the same time, total operating costs were maintained.

#### COSTS

The cost of the tests amounted to GBP 22'000 (about EUR 35'500). All other costs were operational and recovered through haulage charges.

higher fuel efficiency. ■ Winner of the IFW Freighting Industry **Environmental Best Practice Award** 1999



## **Eco Guardian – Lower Emissions** and Fuel Consumption by a Comparative **Trial of Vehicle Technologies**

The objective of the *Eco Guardian* project (stage 1) was to conduct a comparative trial between two initially identical vehicles, one of which was then equipped with particle filters and operated on ultra-low-sulphur diesel (ULSD). The trial covered fuel consumption, emissions of the four main air pollutants (HC, CO,  $NO_x$  and particles) and the costs involved. The measure was verified twice, the first time immediately after implementation (first test), the second time after six months in use (second test).







As the figures below demonstrate, the Eco Guardian vehicle recorded enormous improvements in fuel consumption

#### BENEFITS FOR THE COMPANY

Reduction in total costs through

#### BENEFITS FOR THE ENVIRONMENT Fuel efficiency:

■ The Eco Guardian vehicle recorded an improvement of nearly 2% in fuel consumption against the control vehicle

**Emissions:** 

■ The Eco Guardian vehicle recorded significant reductions in emissions of all four air pollutants.

#### OUTLOOK

The vehicle identified by the first stage of the Eco Guardian project is now the industry standard. In a second stage, the influence of synthetic (rather than mineral) lubricants and energy-efficient tyres on fuel consumption and costs will be analysed.

Control vehicle Eco Guardian



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## **Improved Material Planning** through Communication



### **K. I. TRANSPORT**

(DK)

K.I. Transport was founded in 1979 and employs 45 workers, including 37 drivers, from its base in Toftlund, Denmark. Compared to the number of drivers, the company has a high number of office staff. The main reason for this is that it specializes in transporting piece goods rather than part or whole loads. This requires more handling, better transport control and more intense contact with customers. The company has more than 30 trucks at its disposal and employs five to six carriers with their own vehicles. K.I. Transport has a 3'000 m<sup>2</sup> warehouse, a cargo hotel, a workshop, a vehicle washing facility and a service centre.

The company has a lot of experience with transporting wood-burning stoves. It also transports aluminium profiles, iron, packaging, steel and agricultural machines. Its principal markets are Germany, Austria, Switzerland, the Benelux countries and Italy.

K.I. Transport has been active for many years in reducing the environmental impact of its operations. For example, rainwater has been collected and used to wash the vehicles. The company has also installed skylights in the warehouse to minimize the need for artificial lighting. Furthermore, the company enrols its drivers in training courses offered by truck manufacturers.

In the process of defining a mutual environmental strategy which was integrated into a two-year demonstration project, a communication group was founded that consists of members from K.I. Transport and its most important transport buyer, Krog Iversen & Co A/S. Management representatives participated in the first session of this group in order to support the project. In addition to management, staff members from the production and shipping departments of Krog Iversen also participated to generate greater understanding of the problems that K.I. Transport faced if there was a lack of information.

The goal of this group is to improve communication, thereby ensuring a faster exchange of data and knowledge about specific transport tasks, and understanding of the importance of the data needed by transport companies. For this purpose, the flow of information and goods was analysed from receipt of an order to delivery of the goods to the customer. In this co-operative approach by shippers and the transport company, the individual processes were clearly distinguished and possible areas of improvement were identified, particularly in the working conditions for staff in the material-planning department.





Before this group was formed, K.I. Transport was informed about quantities and destinations only when the loaded truck was scheduled to leave Krog Iversen. As a result, the vehicle was not fully utilized and the best possible route could not be planned. The company also had to allow time for route planning and leave space in the vehicle for buffering and rearranging goods. The additional time required not only increased actual transport costs but resulted in higher emissions and other costs.

Now, the goods are picked up from Krog Iversen and other manufacturers and stored temporarily in Toftlund. Depending on the volume of the goods, routes are planned for delivery to distribution areas in Germany on a fixed weekly schedule. The wood-burning stoves are delivered to individual agents in Germany on the socalled direct distribution principle, the driving plan being optimized for the shortest driving distances. Transport efficiency is increased through the use of an Internetbased freight market to identify and collect goods for the return trip to Denmark.



COSTS

The company expects the above initiatives to be part of a continuous and necessary process to improve customer relationships, and thus to incur no extra costs.

#### BENEFITS FOR THE ENVIRONMENT

By increasing the overall planning time for individual transport tasks from two to six hours, capacity utilization of the vehicles was increased by 5-10%.

The reduction in kilometres driven resulted in reduced fuel consumption and environmental impact.



## Driver Training for Improved Safety and Fuel Efficiency

A series of new procedures was agreed by the members of the communication group after three sessions. For example, material planning by Krog Iversen will now be based on the bills of lading and not on plans or invoices. This new focus will allow the bills of lading to contain new data.

In the past also, information was exchanged by fax, but the margin for error was too great. Today, information is exchanged by e-mail using attached files.

In order to change the processes and procedures that had been in existence for years, it was important to include those employees who used them in the communication group, giving them the chance to help in solving problems.

The positive results from this group have encouraged K.I. Transport to continue the twice-yearly sessions and extend these measures to other customers.



#### BENEFITS FOR THE COMPANY

- Overall, employees spend less time planning, loading and executing transport tasks (for example, adhering to rest times and other regulations).
- The number of damaged goods was reduced by 10% per year.
- Fuel costs were reduced.
- Fewer mistakes were made, communication was improved and IT was integrated more smoothly. Communication is now more direct and effective (members of the communication group know who they can contact in the other company).
- Mistakes are uncovered and resolved more quickly.
- Customer loyalty is increased.



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#### **METZGER SPEDITION GMBH**



Founded in 1946 by Hans Metzger Sr, Metzger Spedition is a national road transport operator located in Neu-Kupfer, Germany. Since 1994, the company has been under the leadership of Hans and Isolde Metzger, members of the younger generation. Today, business operations involve transport throughout Germany, with the main focus on source-destination links between Hamburg and western Germany.

A workforce of 70 people, including 50 drivers, ensures smooth operations with full and part loads. Every day, Metzger Spedition GmbH transports approximately 200 domestic part loads on a 24/48-hour delivery schedule.

Since establishing a quality management system in 1996, Metzger has also been active in environmental issues and in 1999 implemented an environmental management system certified to ISO 14001. Among the various environmental activities are two particularly successful best industry practices: "Driver Training for Improved Safety and Fuel Efficiency" and "Water-saving Equipment and Use of Rainwater for Vehicle Cleaning" A driver training programme was initiated in 1997. All drivers took part in "economy" and "safe driving" classes. The training focuses on teaching drivers, even the most experienced, moderate driving methods and correct gearbox handling. The first classes were offered over two weekends in the summer of 1997, when new drivers underwent individual training. In 1998, one of Metzger's experienced drivers was gualified to train others. At the same time, driver assessment began. Existing figures for fuel efficiency (before and after training) and accident records enable Metzger to chart and compare improvements. In this way, every driver can see how economically he has driven. Appropriate incentives were introduced to encourage and reward above-average economical and, thus, ecological driving behaviour. The causes of abnormally high fuel consumption were analysed in teams to find solutions.









Average fuel efficiency per year



#### COSTS

The training costs in 1997 amounted to EUR 6'100, which is equivalent to EUR 120 per year for each of the 50 drivers who had to be trained.

**BENEFITS FOR THE ENVIRONMENT** Fuel efficiency has increased by 12% (see Figure "Average fuel efficiency per year"). The company has saved a total of 30'000 litres in fuel. At the same time, CO<sub>2</sub> emissions have been reduced by a total of 81'000 kg.

The number of accidents has decreased by more than 8%.

#### BENEFITS FOR THE COMPANY

Fuel costs have decreased along with the savings in fuel consumption. A comparison with training costs led to a cost-benefit ratio of 2.5 in 1998.

Based on accident statistics, vehicle insurance premiums have been reduced by 5%.

#### OUTLOOK

Fuel efficiency figures for the year 2000 and the current trend of increasing accident costs have led to Metzger's decision to repeat driver training on a regular basis. In particular, new drivers will be trained in individual classes to achieve optimum performance.

## Water-saving Equipment and Use of Rainwater for Vehicle Cleaning

High-pressure cleaners produce large volumes of wastewater. A new water-saving high-pressure cleaner was put into operation in 1996. It has led to a significant reduction in water consumption and the associated costs. The installation of water cisterns enables high-priced drinking water to be substituted by rainwater (which is free of charge). A useful bonus is the absence of minerals in rainwater, which leads to better results when cleaning vehicles. In 1998, subterranean water cisterns were built when the new warehouses were erected, thus minimizing construction costs.



#### COSTS

The price of the high-pressure cleaner unit was EUR 2'820.

#### BENEFITS FOR THE ENVIRONMENT

The consumption of drinking water was reduced by 70% for 1999 compared with 1995 (see Figure "Cost and water consumption per year"). The total volume of sewage was reduced.



#### BENEFITS FOR THE COMPANY

The costs of drinking water and sewage disposal were reduced by more than 50% for 1999 compared with 1995.

#### OUTLOOK

The company plans to install a wash-water recycling system within the next three years in order to minimize waste. This decision will be based on a cost-benefit analysis. The use of rainwater will also be extended to other applications to minimize the consumption of drinking water.



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## **Security and Resource Efficiency through an Integrated Management System**



#### NIJMAN/ZEETANK HOLDING BV

(NL)

Nijman/Zeetank International Logistic Group specializes in providing transport services for petrochemicals, fuels, gases, glass and general cargo. It also offers logistic services such as handling and storage of containers, heating facilities (for liquid products), a weighbridge (up to 60 tonnes gross weight), drum filling and customs clearance. Nijman/Zeetank operates from four European sites in the Netherlands, Poland, France and the UK. The head office is located in Spijkenisse, the Netherlands.

Nijman/Zeetank International operates a fleet of about 250 trucks. It employs nearly 500 people, 312 of whom are drivers. The annual turnover is approximately EUR 55 million. In 2000, Nijman/ Zeetank transported 764'976 tonnes of glass and 700'828 tonnes of chemicals.

The Nijman/Zeetank International Logistic Group is ISO 9002 certified and also SQAS (Safety Quality Assessment System) assessed. Modern information technology, such as satellite navigation for the trucks and an integrated computer system, is used in all of its companies.

Companies that transport dangerous goods have to adhere to special legislation and customer requirements. The situation for an international operating company is further complicated by the variations in legislation in the countries involved and by the type of transport being used. The goods can be transported by road, rail or inland waterway. As a result, international transport companies have to navigate through a labyrinth of regulations.



To fulfil all the safety and environmental requirements, an Integrated Management System (IMS) was established in accordance with ISO 9001 / OHSAS 18001 (Occupational Health and Safety Assessment Systems). In addition, the SQAS (Safety Quality Assessment System) assessment series, the IMDG (International Maritime Dangerous Goods) code and



DGSA (Dangerous Goods Safety Adviser) directive were all involved in building up the system.

The key step for implementing the IMS was selection and purchase of suitable quality management software. This software includes a quality monitoring tool, a safety management tool and also an environmental tool, enabling Nijman/Zeetank to closely monitor the consumption of water, gas and electricity.

To ensure the success of the new software, the staff have to be trained internally. In addition, the suppliers, approval body and regulatory authorities have to be committed to it. The implementation is an ongoing process that is monitored by twice-yearly management reviews. The implementation phase began in December 1998 and is estimated to be complete by the end of 2001.

#### Costs for energy consumption





# Wate

Electricity

#### COSTS

The costs for the implementation are as follows:

- Internal training: EUR 2'500/person
- Software: EUR 20'000
- External training: EUR 5'000

#### BENEFITS FOR THE ENVIRONMENT

As a large proportion of electricity costs were related to electrical tank-container heating, a new and much more efficient steam heater was installed.

The amount of waste water will be considerably reduced as a result of installation of a modern washing tunnel that recycles water several times. Although the installation only took place in November 2000, the first figures already show a considerable decrease in water consumption.

#### BENEFITS FOR THE COMPANY

The reduced consumption of resources is of direct benefit to the company. The reduction in gas consumption between 1997 and 1999 resulted from moving into a new, better isolated building.

#### OUTLOOK

Other relevant figures, such as for fuel consumption, are already being monitored but the data are not yet available.



## **Reduction of Accidents by an Internal Training Programme:** "Challenge of the day"

One aim in the transport of dangerous goods must be 100% safety. In establishing its Integrated Management System, Nijman/Zeetank determined that there was no link between the special legislation and training or practice - existing training programmes were either oriented to driving practices or focused on quality and environmental issues. The impact that quality and environmental issues have on daily operations was often insufficiently recognized and respected. As a result, Nijman/Zeetank decided to develop internal training for logistic operations with the goal of achieving the highest possible level for this type of programme.

#### The training programme consists of three modules:

- Theoretical introduction, which can be quality/safety/environmental information and a legislation item (for example, the IMDG code).
- Background information on a customer, such as company organization; product information or Material Safety Data Sheet (MSDS).
- "Challenge of the day". This module is used to help participants learn from mistakes by examining case studies from actual company operations.

The project started in 1999 and is still ongoing. The key steps were writing and updating the course and checking the test. The Quality Manager is responsible for these steps.



#### COSTS

The course was written internally during office hours and consisted of a compilation of historical data, practice examples, etc. The total costs were about EUR 12'000 (200 hr at EUR 60/hr). The cost of the training itself is approximately EUR 2'500 per person.

#### BENEFITS FOR THE ENVIRONMENT

One result of the internal training programme is the 16% reduction in road accidents shown in the figure below. The target of 30 accidents was not met, however, partly because of the high labour turnover experienced by the company.

#### BENEFITS FOR THE COMPANY

Nevertheless, because of the overall reduction in road accidents, Nijman/ Zeetank received an insurance rebate of some EUR 7'500.

Integration of new employees has become a much easier task thanks to the internal training programme.

#### OUTLOOK

In the near future, the training programme will also be used in training inspectors of dangerous goods.



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## Loss Prevention for the **Vehicle Fleet**

nobi

#### NOBILIA INTERNATIONAL



Nobilia International, located in Verl North Rhine Westphalia, is a highly industrialized manufacturer of fitted kitchens. With a workforce of more than 1'300, the company produces and, using its own fleet of vehicles, delivers fitted kitchens for the German and other European markets. The fleet consists of 80 trucks and more than 200 trailers, for which there are 158 drivers. All vehicles have onboard navigation equipment and are equipped with telephones. In 2000, some 220'000 complete fitted kitchens were delivered to their destinations all across Europe, representing a goods volume of 870'000 m<sup>3</sup>.

Environmental protection at Nobilia begins with development of the product - the company has been researching the environmentally friendly design and manufacture of kitchen furniture since 1998 - and extends to the vehicle fleet. All of the trucks acquired in 2001 meet the EURO 3 standard.

■ office management

- route planning
- loading risks

Practical and theoretical training enables the drivers to estimate the distance, speed, width and height of vehicles. They also practise how to stay in their lane when going into a curve and how to change lanes when driving on different surfaces. For this, they receive training in avoidance manoeuvres, driving in circles, braking and shunting. The Nürburgring Formula 1 racetrack is used to simulate tough driving conditions and allows the drivers to handle, for example, hydroplaning during heavy rain.





Sustainable development in transport does not just mean a reduction in emissions. It also means road safety. Because of possible injuries and traffic jams, traffic accidents represent a problem for transport policies. However, they also have a direct economic effect on the transport operator. For this reason, Nobilia International implemented a loss prevention system for its vehicle fleet. With the help of HST (Hannover Sicherheitstechnik), a consulting firm, and in the context of an extensive risk analysis, the following processes, procedures and risks were analysed in depth:

- driver recruitment, deployment and organization
- material planning processes
- vehicle safety equipment
- number and type of accidents
- time and location of accidents

When all the data had been analysed, a customized loss prevention concept was developed that highlighted three areas in particular: driver training, driver recruitment and accident analysis.



Included in the loss prevention system are driver recruitment questionnaires and interviews about accidents. The qualifications and reliability of new drivers are tested during the job interview because in this way a course can be set for good safety performance when the drivers are recruited. If a driver has an accident, the circumstances and reasons are discussed in a meeting with his manager, based on the questionnaire and aimed at preventing future accidents. It is important that the manager is prepared for such meetings and communication training for managers is an important part of implementing this system.

A PC-supported system, called K-Control, is used to analyse and evaluate the accident. The fleet manager can use K-Control to generate reports

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The PC-supported system, called K-Control



COSTS The costs for implementing this system are not yet known.

#### BENEFITS FOR THE ENVIRONMENT

- a 57% reduction in the number of accidents
- less serious consequences of accidents (injuries, traffic jams)
- better fuel efficiency because of less damage to the trucks
- a reduction in emissions through the use of EURO 3 trucks

about the driver, vehicle or accident lists and avoid the time-consuming task of filling out accident reports. Data about the drivers, vehicles and locations involved in the accidents are captured and analysed on a continual basis and then used to tailor loss prevention measures.

#### Table listing various accident related costs

Direct costs resulting from accidents	Internal accident related costs
■ repair costs	<ul> <li>internal processing of paper for accidents</li> </ul>
■ towing costs	lost working time
rental car costs	wage continuation for sick e
Ioss of accident-related discounts	<ul> <li>higher dues for workers' compensation board</li> </ul>
lawyer fees	loss of sales and profit
surveyor fees	higher insurance costs through the second
■ court fees	downward adjustment, increased adjustment
	consequential costs becaus tarnished image

#### Table comparing different accident statistics

Accident statistics	Without a loss prevention system	With a loss prevention system
Number of accidents per year	88	38
Number of accidents per vehicle	1.1	0.48
Accident costs per year	EUR 306'000	EUR 132'100
Accident costs per vehicle	EUR 3'825	EUR 1′650
Internal accident related costs	EUR 205'000	EUR 87'400



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employees

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#### BENEFITS FOR THE COMPANY

By reducing the number of accidents from 88 to 38, the total cost of accidents was reduced from EUR 306'000 to EUR 132'100. Internal consequential costs were also considerably reduced.



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## **Reduction of Environmental Impacts by Management**



#### **OTTO GÖRGENS SPEDITION-**TRANSPORTLOGISTIK / LÜBECK D

Otto Görgens Spedition-Transportlogistik has a workforce of 18, including 12 drivers. The vehicle fleet consists of 10 MB trucks. Otto Görgens transports 32'000 tonnes per year and has invested EUR 920'000 in tractors and semi-trailers during the past three years. The company offers national and international goods transport, groupage, inventory turnover and semi-trailer transportation. The additional warehouse capacity is 1'000 m<sup>2</sup>.

In March 1998, the owner decided to prepare his company for the BGL (Bundesverband Güterverkehr, Logistik und Entsorgung, the German member association of IRU) label for quality, safety and environmental protection as well as for certification to ISO 9002 quality management standards. Once the necessary audits had been carried out, the certificates were received in July 1998.

One of the most important requirements for certification was for the whole company to be responsible for protecting the environment. This philosophy became the foundation stone for the best industry practices within the Otto Görgens company.

In collaboration with BGL, DaimlerChrysler and DEKRA Automobile Ltd, the company created a strategic concept for emission reduction while carrying out inventory control of its vehicles, volume of cargo, frequency of repair work, fuel consumption and the resulting environmental impacts. DaimlerChrysler is the manufacturer of MB trucks, while the DEKRA Type Approval Test Department/Technical Service is counted among the leading test laboratories in Germany.

Each driver himself keeps logs and creates graphs and diagrams with regard to load status, road/traffic conditions and fuel consumption. Real fuel consumption can be calculated using the diagrams from the driver logs and record sheets from the tachometer, which show distance driven and speed. The programme is further supplemented by the monitoring of repair costs, analysis of weak points and continued education for all drivers. To calculate future fuel consumption, the company determines the number of vehicles required based on expected cargo volumes, and this is made into a target specification.



The implementation phase for this BIP began in July 1998 and was executed by several staff members and one contract worker. In February 2001, all vehicles were equipped with EURO 3 engines. Testing for EURO 4 engines began in April 2001.



BENEFITS FOR THE ENVIRONMENT The following results have been achieved:

- savings in fuel: 19.3%
- savings in oil: 5.0%
- CO<sub>2</sub> emissions reduced by 38.7%
- NO<sub>x</sub> emissions reduced by 28.6%
- all vehicles run more quietly due to state-of-the-art technology.

COSTS A total of EUR 920'000 was invested in new vehicles. The cost for the contract worker was EUR 12'780

BENEFITS FOR THE COMPANY

#### The 13% increase in fuel prices at the end of 1998 and beginning of 1999 was made up for by the lower fuel consumption

## Safe Loading and its **Implications**

Training for safe loading of trucks was carried out within the context of certifying the company to the BGL label and ISO 9002 standards. All vehicles were equipped with improved load restraint systems. The company became involved in improving safety aspects because management decided to participate in a research group. The purpose of this group, which consists of transport



of the new vehicles. In 2000 fuel prices increased by a further 31% but 60% of this increase was again compensated for by reduced fuel consumption. At the same time, wear-and-tear costs were reduced by 56% and new-tyre costs by 24%. Other positive effects are:

- unification of available cargo space
- less repair work resulting in fewer standstills
- improved corporate image because of the new equipment
- increased motivation for the drivers because they are driving new vehicles
- increased feelings of responsibility among drivers because of their involvement in the implementation phase.

#### OUTLOOK

The company aims to improve its route planning process so that empty trips are avoided or minimized. Implementation of this round-trip planning measure will require the co-operation of all participating companies, not just Otto Görgens.

#### COSTS

The initial costs for training, monitoring and acquisition of load restraint systems amounted to EUR 3'600 in all. Annual recurring costs for training and material procurement will be approximately the same.

#### BENEFITS FOR THE ENVIRONMENT

The positive effects are:

- reduced fuel consumption resulting from optimized load distribution
- avoidance of spillage of dangerous substances.

These effects are not quantified because there are no statistics for damage resulting from improper loading.





companies, regional police, harbour police, port authorities in the city of Lübeck and various educational institutes, was to create guidelines for securing cargo.

The following procedures are planned or have already been implemented in order to ensure that all participants adhere to the guidelines for secure and reliable loading of trucks:

- training and re-training for all drivers and loaders
- provision of a sufficient quantity of load restraint systems
- implementation of self-monitoring
- development of application-oriented regulations for effective safe loading

An important part of this measure was to convince the drivers and loaders to pay more attention to securing cargo and to provide them with state-of-the-art load restraint systems.

The implementation phase for these guidelines, carried out by the staff and one contract worker, lasted about four months.



BENEFITS FOR THE COMPANY

The company expects to have lower repair costs for tarpaulins, roof arches and superstructures. If transport accidents decrease, it will also be able to benefit from lower insurance premiums. The long-term principles behind the programme for safe loading are:

- reduced damage during transport and fewer police-related delays lead to better customer relations
- improving safety helps to improve the corporate image.

#### OUTLOOK

Otto Görgens intends to continue training its drivers, improving its processes, managing and monitoring the improvements. The company will also continue to participate in the research group that set the guidelines for securing cargo.



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## **Regulations for Good Common Practices in the Road Transport** of Dangerous Goods



Trancister specializes in the transport of dangerous goods such as gasoline, fuel, oil and asphalt. The company was founded in 1982. The fleet currently comprises 34 trucks and 41 cisterns. Trancister, which has 44 employees, transports goods across Portugal and to Spain.

The company generates an annual turnover of EUR 3.2 million with more than 45 million tonne-kilometres of transported goods.

Trancister is associated with TREMC, another company that also transports dangerous goods and has the same general managers, and through this association is a SAVE organization. SAVE is an EU environmental programme, the goal of which is to develop and implement measures to reduce energy consumption.

These are based on specific acceptance conditions for employment, training courses, medical inspections, alcohol control and performance appraisals.

- Audits

- May 1998

Some obstacles arose during implementation. For

example, it was determined that the programme alone is not enough to prevent incidents. Also, there was an increase in operational costs. However, some areas have shown improvement, such as the number of road accidents per million kilometres. Trancister estimates that it will take three years to achieve the main objective.



The project started in March 1998 as an initiative of APETRO (the Portuguese Association of Oil Companies, associates of which include Shell, Galp and Exxon). The main goals are the reduction of accidents, crossovers, spillages and incidents that cause new accidents. The motto of the project is "No accidents in three years' time". The project involves a large number of procedures that can be summarized in six main groups:

#### **Driver regulations**

#### Vehicle regulations

These include the acquisition of vehicles with specific characteristics such as speed limiters and ABS, and an increasing number of inspection regulations.

■ Safety management systems

■ A set of procedures with the aim of increasing safety throughout the company's activities.

"Operational System of Supporting Accidents" This project is still in development.

■ ISO 9002 certification

Trancister implemented and certified the system by



## **Reduction of Fuel Consumption** supported by Monitoring

#### COSTS

The cost of implementation is estimated as 2-3% of annual turnover.

#### BENEFITS FOR THE ENVIRONMENT

- Elimination of spillages (oil pollution).
- Reductions in fuel consumption through training and defensive driving.



#### BENEFITS FOR THE COMPANY

- Reduced accidents through increased training (see Figure "Reduction of accidents").
- Increased general safety.
- Improved corporate image

Trancister expects to enjoy greater success in the coming years because this is a long-term programme. At present, the company is developing the "Operational System of Supporting Accidents" with other companies in the industry. Trancister is also carrying out an environmental survey.

OUTLOOK





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#### TRANSPORTES CAMPILLO SA



Transportes Campillo SA, founded in 1954, specializes in international road transport. The headquarters are located in a 40'000 m<sup>2</sup> complex in Valencia, with local offices elsewhere in Spain. The number of employees is 150, including 84 drivers. More than 40'000 shipments were handled in the year 2000. With an annual turnover of EUR 24 million, Transportes Campillo has more than 100 trucks available, its own fleet consisting of 84 EURO 2 trucks and 90 semitrailers. The site in Valencia includes a warehouse of about 10'000 m<sup>2</sup>, equipped with the most sophisticated security systems and operated by highly qualified personnel.

The main services offered by Transportes Campillo are:

- international road transport for full and part loads
- customs clearance
- air cargo
- maritime cargo
- logistics services

All services offered by the company are controlled by its own IT systems.

- as an instructor

The most sophisticated measure is the creation of tables that analyse fuel consumption by route, type of vehicle and transported weight. In total, 49 tables have been established for routes to nearly every country in Europe, with each table containing data on three types of vehicle. Separate tables have been created to show the fuel consumption for each driver.

One of the main obstacles to creation of the tables is the difficulty of determining the exact fuel consumption for every sector of a round trip, as the transported weight is often different. The problem here is that trucks usually do not measure the actual fuel consumption. For this reason and with the help of truck manufacturer IVECO, Transportes Campillo installed fuel-flow meters in a number of trucks. The following diagram, showing a Valencia-Irun-Netherlands-Irun-Valencia round trip, was developed with the help of specialists in the company's quality department.

50'000 40'000

> 30'000 20'000

10'000



- Transportes Campillo has implemented various measures to reduce fuel consumption, including:
- purchasing vehicles with automatic transmissions driver training and the assignment of one driver
- monitoring fuel consumption for each trip







#### COSTS

The cost of developing and maintaining the tables is difficult to quantify as this is still an ongoing process within the company. Driver training cost about EUR 3'600 and was carried out by a technician from IVECO.

#### BENEFITS FOR THE ENVIRONMENT

A significant reduction in fuel consumption was achieved. This reduction was largely due to driver training and the purchase of vehicles with automatic transmissions. Relating information from the graphs with the recorded kilometres driven by each driver, the illustration shows that, between 1998 and 2000, while the total distance driven increased by 42'992 km, fuel consumption was reduced by 104'034 litres, equivalent to 4.19%.

#### BENEFITS FOR THE COMPANY

Reduced fuel consumption results in lower fuel costs. Furthermore, bettertrained drivers reduce the number of accidents. Recording fuel consumption increases the motivation to drive economically and safely, and allows the company to take corrective measures quickly.

#### OUTLOOK

The fleet-wide installation of fuel-flow meters would provide much better "realtime" information about fuel consumption and would increase motivation for the drivers to use an ecological driving style.

#### Fuel consumption depending on type of gear shift



## **Reduction of Water** Consumption

The goal was to reduce water consumption at the company site in Valencia. This included washing trucks as well as general water consumption inside and outside the building. The following measures were taken:

- daily monitoring of the water meter
- monthly and yearly recording of water consumption
- inspection of the plumbing system
- purchase of a high-pressure truck washing system
- installation of a drip watering system for the gardens outside the building
- installation of toilets that use less water for flushing These measures were taken in various steps, starting

in 1998 and finishing at the end of 2000. The initiative was launched by the company management and carried out mostly by its own staff.

#### COSTS

The cost of the high-pressure washing system was about EUR 2'750. The drip watering system for the gardens cost EUR 3'365.

As the following chart shows, the consumption of drinking water was reduced by nearly 50%. This is especially remarkable in the dry southern parts of Spain where water shortages already occur in the summer months









BENEFITS FOR THE ENVIRONMENT

2000

#### BENEFITS FOR THE COMPANY

The yearly water costs for the company were reduced by about EUR 800. The reduction in water consumption was largely due to the purchase of the highpressure washing system and installation of the drip watering system for the gardens. The investment in water-saving equipment will therefore be amortized over about eight years. This calculation does not include the savings in manpower - the gardens were previously watered manually.

#### OUTLOOK

The next steps for the company will be to monitor the consumption of electricity and the removal of waste. In the future, the aim is to obtain certification to ISO 14001 environmental management standards.



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## **Reducing Accidents by Implementing a Safety Manual**



#### TRANSPORTES LUÍS SIMÕES

P Fernando Luís Simões launched his transport business in 1948 with the purchase of his first truck. In 1978, the first branch office was opened in Oporto and, in 1986, activities were expanded into the Spanish market. Today, Transportes Luís Simões (TLS) has a large and modern fleet, managing about 1'200 vehicles. Furthermore, there are now two major logistical operations centres in Portugal, near Lisbon and Oporto. The average annual turnover is about EUR 61 million.

The TLS strategic vision is: "To be an Iberian reference in the continuous improvement of operations, in order to secure client fidelity, employee participation, the best safety practices and minimal environmental impact."

In August 1995, APCER (the Portuguese Certification Association) certified the TLS quality system to ISO 9002 standards, making it the first Portuguese transport company to receive an ISO 9002 certificate.

In the pursuit of high-quality service and customer satisfaction, TLS aims to improve working conditions by reducing accidents and promoting a high guality of life for its employees.

For this purpose, TLS has developed a safety manual that defines and records the operations and procedures in use within the company. This manual is continuously updated and helps to ensure that all work sites use procedures that promote safety, health and hygiene. It also designates employees responsible for certain tasks and indicates when those tasks should be executed.

#### Through the safety manual, employees are provided with current information about:

- protective and preventive safety and health measures instructions to follow in case of severe danger
- first-aid, fire-extinguishing and evacuation measures in the event of an accident

#### The information and procedures in the safety manual are communicated to employees:

- when they join the company
- when they change work site or duties
- when new or modified equipment is introduced
- when new technologies are adopted
- when their activities involve employees of other companies





#### BENEFITS FOR THE ENVIRONMENT

The safety manual promotes and protects the health of employees and results in fewer work-related accidents (see Figure "Work accidents")

#### BENEFITS FOR THE COMPANY

- Improved quality of service. ■ Lower rate of absenteeism (see Figure "Missing days")
- Improvement of the internal and



#### Number of work accidents





external image of the company

#### COSTS

Although very difficult to quantify, direct cost benefits result from use of the safety manual:

- lower costs because of the reduction in injuries and incapacities
- Iower costs because of fewer operational failures
- lower training costs for new employees.

#### OUTLOOK

As long as it can show an appropriate cost-benefit ratio, the company will continue to progressively apply suitable measures regarding safety, health and hygiene in the workplace.

Rate of missing days for work accidents





## **Improved Efficiency through New Information and Communication Technologies (NICT)**

The NICT project is an investment that will improve communication between all operational centres. customers and drivers.

Implementation of NICT is divided into two phases. The first consists of an analysis of the company's current communications infrastructure. The second is the "Strategic Plan for Communications".

This plan outlines recommendations for the reorganization and optimization of existing systems in terms of functionality and research costs. The main aspects covered are the local and extended network infrastructure, mobile communications with the vehicles, Intranet and Internet architecture, communications with customers and system security. These have been implemented over the past three years and are currently in the test and improvement phase.

The SMART computer application for transport business management has made possible the bi-directional communication of data both between management and the vehicles and between customers and the centres. The company hired in computer programmers to transfer the necessary technology know-how to employees.



Investments over the past year in new information and communication technology have amounted to about EUR 550'000

COSTS

BENEFITS FOR THE ENVIRONMENT Reducing the number of empty trips (see Figure, "Evolution empty km")



#### BENEFITS FOR THE COMPANY

- Easier control of the company's objectives
- Better communication between clients, drivers and centres
- Simplified administrative processes
- Substantial reduction in communication costs



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## Implementation of an **Environmental Management** System (EMS)



#### **TRANSPORTES OCHOA SA**



Transportes Ochoa SA, headquartered in Zaragoza, Spain, is active in national and international road transport. The services offered include part loads, with a guaranteed delivery time, and full loads. A 24-hour service is offered for the Spanish market. Transportes Ochoa also offers logistics services and works as an airfreight agent (IATA).

The number of employees in the year 2000 was 1'075, including 175 drivers. The fleet consists of 125 long-distance trucks and 789 distribution vans, due to rise to 820 in 2001. More than seven million shipments were handled in the national part-load market in 2000, with a transport volume of 307'837 tonnes. There were 100'000 shipments in the international transport sector. Transportes Ochoa has 68 depots in Spain, with a total size of 93'965 m<sup>2</sup>, and four ware-

houses with an area of 17'000 m<sup>2</sup>. Transportes Ochoa is ISO 9002 certified and is in the process of implementing an environmental management system.

Forward-thinking companies consider environmental management to be an excellent opportunity to reduce their consumption of raw materials, water and energy while at the same time benefiting from various advantages such as decreased costs, higher competitiveness and an improved public image. For these reasons, Transportes Ochoa started the implementation process for an EMS in 1999 by participating in the SIGMA I and SIGMA II projects. The system is in accordance with the ISO 14001 standard.

These projects were backed by CETMO Confederación Española de Transporte de Mercancías (Spanish goods transport confederation), ASTIC Asociación del Transporte Internacional por Carretera (Spanish road transport association), ATYCA Iniciativa de Apoyo a la Tecnología y la Calidad (Initiative for the promotion of technology and quality) and the Spanish Ministry of Industry and Energy. Transportes Ochoa participated in the appropriate CETMO working groups and benefited greatly from the exchange of information and sharing of resources among all companies taking part.





The EMS is being developed for all services offered by Transportes Ochoa. The environmental manager, located in Zaragoza, is coordinating the project and reports directly to the board of directors.

The following key steps have already been carried out:

- selection of a consultancy company
- preparation of an "Initial Environmental Revision" by the Bureau Veritas Español based on data collected at the company's sites in Madrid and Zaragoza
- development of a work plan and time schedule for **EMS** implementation
- development of documentation (management manual, operational processes manual).

One of the major obstacles that Transportes Ochoa is encountering is the geographical scope of the standard, which includes all processes at all 68 company sites, spread all over Spain. The problem is that Spain is divided into autonomous regions and these are divided into municipalities. Both the regions and the municipalities have the authority to legislate locally on environmental matters and because this legislation is not always



#### COSTS

The breakdown of implementation costs to date is as follows:

Consultancy fees and	EMS
development costs	EUR 11'840

- Legal consultancy fees EUR 2'400
- EUR 22'550 Personnel costs
- Estimated certification
- costs: initial audit EUR 2'200 periodic audits EUR 750 each

BENEFITS FOR THE ENVIRONMENT

The fleet renovation has resulted in a significant decrease in fuel consumption. The mean fuel consumption in 1998 was 29.52 litres/100 km. This was reduced to 28.17 litres/100 km in 2000, representing a decrease of 4.56% in just two years (see Figure "Average Fuel Consumption"). In quantitative terms, Transportes Ochoa saved 232'971 litres thanks to the reduced average fuel consumption of the fleet.

BENEFITS FOR THE COMPANY

By reducing the average fuel consumption, Transportes Ochoa has managed to uncouple fuel price per kilometre from the strongly rising general fuel price over the period, as shown in the following figure. Over the total number of kilometres driven, this saved the company EUR 128'134 in the year 2000.

homogeneous, it is especially difficult to comply with all the legal requirements for application of the EMS.

The following figure (Fleet development) shows the first concrete measure that Transportes Ochoa has carried out in connection with EMS implementation - the renovation of its fleet. By the end of 2001, the entire fleet was due to have been renovated and the first EURO 3 standard trucks were to have been acquired.







#### OUTLOOK

At the time of writing, the documentation for the EMS was almost complete and certification was due to take place at the end of 2001.





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## Improved Efficiency through use of a **Guidance and Communication System**



**VSV FRAKT AB** 

S

VSV Frakt AB Western Svealand Timber Freight was formed more than 30 years ago by a number of independent road haulage companies, mostly employed in timber transport. VSV is an abbreviation for Västra Svealands Virkesfrakt. The basic concept behind the formation of VSV was to coordinate timber transport within a large geographical area to form a single commercial partner and thus increase efficiency. In time, the company's activities were extended to cover felling contracts and wood chippings.

Today, VSV is owned by 173 individual haulage companies, as well as by contractors and county organizations. The headquarters are in Karlstad and the company's operations are carried out in the surrounding area. VSV employs 500 drivers and logging operators. Gross turnover increased from SEK 425 million (EUR 44.9 million) in 1998 to SEK 519 million (EUR 54.8 million) in 2000. VSV works with an ISO 14001-certified Environmental Management System (EMS) for which the Swedish association Så acted as certification body.

VSV aims at sustainable development by offering harvesting and transport systems that have a lower impact on the environment. In order to support the introduction of an EMS and further increase the efficiency of its haulage work, the company has developed a computerized system for transport guidance and communication. The system is called TROMB (Transport Och Mobil Beordring, Transport and Mobile Instructions).

TROMB supports mobile communications and consists of a Geographical Information System (GIS), Global Positioning System (GPS), e-mail and emergency alarms. Each mobile unit consists of a computer, keyboard, mouse, monitor, GPS receiver, Mobitex, DARC (Data Radio Channel) communication and an alarm. Mobitex is a wireless network architecture necessary to support wireless terminals.

This system is the basis for:

- transport planning
- the distribution of transport orders
- direct mailing to the logging truck
- alarms in case of accident

Swedish wood buyers and sellers have formed an IT company called SDC. This clearing house provides all parties involved in the wood trade with the information needed for payment and accounting. The load data needed comprises information about the current wood load in cubic metres or tonnes.



The driver uses TROMB to navigate to the place where the timber is to be collected by means of a display in the truck cab. E-mail can also be used to reach all vehicles at once; which eliminates unnecessary driving and reduces environmental impact. In new trucks, the system can also be coupled with a vehicle data system that uses sensors to provide information on, for example, fuel consumption, temperature and service intervals.

The employees often work alone at night on logging roads. TROMB gives them more security by providing them with location information (via GPS) and an alarm system.

The drivers are first introduced to the system through a PC-based general training course. Then, all drivers participate in a two-day training course for the onboard





COSTS

The software was developed by VSV itself and accounts for most of the organization's investment in the system, although the detailed cost of this work has not been calculated. The hardware is the main cost for the individual drivers who are VSV's partners. The computers used in the rugged cab environment have to be able to cope with factors such as large variations in temperature, vibration, shock and dust. The cost is therefore considerably higher than for a standard office computer. Each mobile unit costs about SEK 60'000 (EUR 6'300) including mounting, accessories and antennas. The forestry research unit in Skogforsk nevertheless calculates that the system can be amortized in under two years.

#### BENEFITS FOR THE ENVIRONMENT

As an example, it has been possible to increase the efficiency of round-trip timber transports for one of VSV's main clients. Emissions were reduced significantly in 1999 compared with 1998.

On the basis of an annual survey of all logging trucks, it is estimated that the TROMB system will reduce CO<sub>2</sub>, NO<sub>x</sub>, and particle emissions by 5% per transported tonne between 1998 and 2003.



## **Driver Training for Improved Safety and Fuel Efficiency**

#### **Diagram showing how TROMB works**



equipment during which they are taught all the various functions of TROMB. VSV has built a special training centre where four drivers can learn simultaneously.

Implementation of the system began at the end of 1999 and will continue until 2002. At the time of writing, VSV had covered 35 out of 150 units.

One obstacle during implementation may be that some clients are not convinced of the benefits of the system and are reluctant to change.



#### BENEFITS FOR THE COMPANY

Information can easily be transferred between the mobile communication systems and the onboard units. This means that the logging trucks can operate over larger geographical areas and 24 hours a day. Also, the rate of returning cargo has increased. Telephone costs have decreased because of the e-mail system.

Along with increased efficiency in transport management, VSV benefits from lower administrative and communication costs. Staff can now be made available for tasks other than routine administrative work.

The benefits are shared equally between the partners, the customers and VSV's administration.



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## D Wullkotte & Hackmann was founded as

a common carrier in 1993 by Thomas Hackmann and Reiner Wullkotte. The purpose of the company was to provide skip-handler transport services, including the leasing of skips. It soon became clear, however, that a small company could not survive in the waste transport and disposal industry, so the founders were forced to target other areas of the transport market. Their new area of business became trucking services, providing other companies with drivers, tractor units and all the necessary equipment for pulling semi-trailers.

The company strives to take into account the special requirements of its customers and provides them with extensive service and support. To meet these individual customer needs, it has to provide tailored solutions, usually involving rental vehicles. The company is directly connected with an extensive pool of rental vehicles.

Wullkotte & Hackmann has a staff of 11, including ten professional drivers. There is a fleet of 10 tractor units for semi-trailers, which were driven a total of 1'537'000 km in 2000. The total turnover for 2000 was more than EUR 900'000.

Fuel consumption is the decisive cost factor in the transport industry and represents some 30% of company costs - only personnel costs are higher. The drivers are responsible for determining their fuel consumption. Any irregularities are analysed immediately and possible causes are discussed. If extra maintenance is required, the schedule is checked to see of this can be programmed in.





Excellence of service has been a central policy of the company since its foundation in 1993 and, through the use of targeted resource management, it is able to provide its customers with equipment of a high standard. In 1999, the company implemented a driver training programme to improve skills appropriately. For this programme, the company received support from road-safety consultants ADAC Fahrsicherheit GmbH, a subsidiary of the well known ADAC, Germany's leading private automobile association. Wullkotte & Hackmann's other partner in the driver training programme is the truck manufacturer DAF, which is the supplier of its new tractor units.







#### BENEFITS FOR THE ENVIRONMENT

The benefits for the environment that arise from defensive driving and accident avoidance are unquestionable but difficult to quantify.

Lower fuel consumption results in reductions both in emissions and the consumption of resources.

#### The training costs are EUR 610 per employee per year. This includes:

COSTS

- training in safe and economical driving training by specialists in transporting
- dangerous goods training by specialists in occupational
- safety methods
- training by company management

#### OUTLOOK

Not all goals of the driver-training programme have been achieved. The loss rate from minor accidents (for example, bumping stationary objects) did not improve. Since implementation of the first driver-training programme, however, there have been no incidents of damage or injury resulting in costs of more than EUR 2'500.

#### BENEFITS FOR THE COMPANY

Every accident that has to be handled through insurance increases the yearly premium by EUR 1'230 per vehicle. Accidents that are avoided therefore represent enormous savings. Like so-called opportunity costs, however, these potential savings are very difficult to quantify.

Based on an average of 145'000 km per driver per year, the costs for driver training are EUR 0.42/100 km. If the driver saves an average of 0.75 litres of fuel per 100 km through economical driving, then EUR 0.53/100 km is saved in fuel costs. The result is a cost advantage of EUR 0.10/100 km or EUR 151 per year. If fuel costs increase, this saving increases disproportionately. This calculation does not take into account the savings resulting from safe and careful driving methods that reduce maintenance and repair costs

## The Introduction of Low**emission Vehicles**

By implementing a quality management system and being awarded the BGL label of guality in 1998, the company committed itself to having low-emission trucks in its fleet.

Since 1998, all of the company's own trucks have been EURO 2 vehicles or better; in addition, the rental trucks it uses also meet EURO 2 standards.

Moving to the EURO 3 standard resulted in a one-time additional cost of EUR 1'300 per vehicle. Added to this are the costs of the estimated increase in fuel consumption of 1.5 litres/100 km. This increase can be minimized by using a longer rear axle transmission ratio, although this in turn requires an increase in engine output from 280 kW to 320 kW to maintain the tractive force. This solution does not entail extra fuel costs but does result in an additional one-time expenditure of EUR 2'300. Over a three-year amortization period, the annual cost is EUR 770. Calculated in other terms, the increased costs amount to EUR 0.53/100 km. This calculation does not include the surplus

profit gained from selling EURO 3 vehicles.

COSTS

#### BENEFITS FOR THE ENVIRONMENT The environment benefits from the use of modern engine technology, which greatly reduces emissions. The following data show the difference in emissions between a EURO 2 and a EURO 3 truck, based on an average year of driving (145'000 km): ■ CO: 18 kg ■ HC: 8.7 kg ■ NO<sub>v</sub>: 575 kg

■ Particulates:

At the time of writing, the company had not yet gained any quantifiable benefits from switching to low-emission EURO 3 vehicles. In view of the policies of the German government and the European parliament, it can be assumed that transport operators will at some time in the future be subject to the following: ■ distance-based road charges

- truck taxes
- smog driving bans
- reduction in Ecopoints

4.4 kg

#### BENEFITS FOR THE COMPANY



#### OUTLOOK

The company is preparing for these restrictions but a large investment will be needed to adapt the vehicle fleet to meet the conditions. This investment has not been planned for and will be difficult to finance based on current profitability. Management will have to plan carefully so that it can meet these requirements and retain all of the current workforce. It will take about four years to complete the switch to EURO 3 vehicles.



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