

LogInGreen Best Practices

O1 FINAL REPORT

Training Green Logistics Managers to Avoid the Environmental Effects of Logistics

www.greenlogisticmanager.com

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"

Contents

1.	Intorduction	1
2.	Green logistics system	2
2.1.	Green Transportation	3
2.2.	Green Warehousing	3
2.3.	Green packaging	4
2.4.	Green logistics data collection and management	5
2.5.	Waste management	5
3.	Collection of Best Practices	7
3.1.	Green Transportation	7
3.2.	Green warehousing	17
3.3.	Green packaging	18
3.4.	Green logistics data collection and management	21
3.5.	Waste management	23
4.	Results from Best Practices	25
5.	Conclusions	27

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"

1.Introduction

LogInGreen Best Practices - output consists in the description of best practices in Green Logistics in order to provide a benchmark for the following output. The best practices included will show the added value of a green approach in logistic sector in terms of CO2 reduction, cost saving and sustainability.

The aims of this work is to support mind change process and to describe innovative logistic management processes toward more environmental friendly logistics. This work offers a baseline to provide suggestions and models for the following project Output.

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"

2. Green logistics system

The green logistics is the expected outcome of modern logistics development. The logistics industry is emerging as a modern industry that relies on the specialization of socialized mass production and rapid economic development. It is closely connected to many current environmental friendly concepts such as green production, green marketing, green consumption and other green economic activities. Economic activities should not excessively consume resources just on the logistics section. In addition, green logistics is seen as a necessary way to reduce operating costs for companies. It is generally believed that from production to sales of a product, manufacturing accounted for only a small amount of the total time. The majority of the time is spent for warehousing, transportation, handling, packaging, distribution processing, information on processing and logistics processes. Therefore, the development of green logistics will definitely bring companies to a new eco-friendly operating structure.

The best practices are introduced via the different academic definitions of green logistics. The green logistics system, which encompasses green transport; green warehousing; green packaging; green logistics data collection and management; waste management, is presented. Considering the environmental sustainability, each component of the green logistics system is examined in detail.



"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"

2.1. Green Transportation

Transportation, which is a major logistics activity has a significant influence on the environment. For that reason, green transportation is one of the main components of green logistics.

The trends indicate that, despite technological advances, the environmental impacts of transport will grow unless action is taken at all levels - by government, business and individuals. There is a continuing need to reduce the environmental impacts of some forms of transport – particularly road and air travel - and promote more environmentally friendly transport options. The whole economy and society depends heavily on efficient road transport, 44% of the goods are moved by trucks and 85% of the persons by cars, buses or coaches.

The objectives for road transport are to promote efficient road freight and passengers transport services, to create fair conditions for competition, to promote and harmonise safer and more environmental friendly technical standards, to ensure a minimum fiscal and social harmonisation and to make sure that the rules in road transport are effectively applied without bad ecological impact.

Carbon dioxide emissions from transport have risen throughout the 1990s and now account for around one quarter of the total carbon dioxide emissions. These emissions contribute to climate change that has grave domestic and global consequences.

Transport contributes to poor air quality. Although discharges of many of the most damaging air pollutants have declined over the last decade, there are still “hot spots” in some city centres and along motorway corridors where concentrations of nitrogen dioxide and particulates from road vehicles exceed safe levels.

2.2. Green Warehousing

The framework towards sustainability of a warehouse consists of three stages. In the first stage, the simplest level of a green warehouse is an energy efficiency building with minimum requirements. This implementation focuses on the internal factors of the green warehouse such as heating, lighting, air changes and mechanical handling equipment. The energy efficient warehouse also has a measurement method to estimate and manage the energy consumption within the build-ing.

The next stage is to establish a low-emission and green energy warehouse. Energy consumption and green practices are not only accurately measured but also continuously improved during the warehouse's operations. In addition, the building is expected to consume renewable and green sources of energy to lower carbon emissions.

In the most advanced stage of green implementation, a sustainable warehouse exceeds environmental requirements and performs beyond existing standards. The warehouse managers focus on total lifetime

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"

emissions concerning macro level for environment and ecology. The warehouse can self-produce energy from renewable sources such as solar panels, winds turbines, and biomass. At this stage, the warehouse becomes a truly green component of the sustainable supply chain.

Cross-docking has been a trend in warehousing. It means that manufacturers or distributors, based on the information from stores, directly transport goods to wholesalers and retailers without storing the products in their warehouses. Through cross-docking, companies can cut their costs and achieve maximum efficiency with careful planning and shared information on sales. Many mass merchandisers and grocery chains such as Wal-Mart reportedly have used cross-docking. For those companies, they believe this type of operation is environmentally responsible because both the amount of land occupied by warehouses and the movement within the warehouses is reduced.

However, in fact, for most companies, warehousing is still one of their compulsory sections of logistics. Good warehouse layouts and warehouse management can save on operating costs and reduce environmental costs.

2.3. Green packaging

Most packaging materials are recyclable nowadays. Even plastic can be recycled, however due to a large amount of plastic types, including a biodegradable plastic, the recycling process requires an effective streaming of waste. The most common packaging materials are: glass that is used for bottles and jars and could be re-used if needed; metal represents steel or aluminium cans; plastic widely used for containing food and drinks, consumer goods as well as materials used in transportation in form of polystyrene foam; paper and cardboard are used not only in packages and transportation, but also in a form of paper bags and wrapping paper; wood is widely used in shipping industry.

There are different green strategies businesses can incorporate. The most common of them are:

1. Removal strategy – to remove all unnecessary layers from the package, minimizing extra waste;
2. Reduction strategy – to reduce the resources used for packaging material through larger unit sizes, refilled packages, reduced thickness of the package, switching to more environmentally friendly material, improving the resource efficiency of packaging process;
3. Reuse strategy – to offer reusable containers such as glass bottles, containers with refilling function, sturdy reusable shopping bags, etc.;
4. Recycling strategy – to recycle the waste, formed during production;
5. Biodegradability strategy – using biodegradable materials, including biodegradable plastic; and

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"

6. Technology developments strategy – to allow improvements in the eco-performance of product.

Green packaging should not be considered only as a tool of gaining a competitive advantage and satisfying the needs of customers, but also as a tool to help to reduce production expenses. For example recycling may lead to outstanding savings of raw materials and energy, while successful packaging reduction can significantly reduce total cost.

2.4. Green logistics data collection and management

The scientific methods of data collection and management which are paramount in the logistics management can not only optimize the management of the resources, but also reduce fuel consumption and increase profit.

Radio frequency identification (RFID)

According to the information collected, companies can recognize the date of the product' validity. Then, they can take actions to prevent returns or manage returns efficiently. The widely used technology in the information collecting today is called Radio Frequency Identification (RFID). It is a unique tool to identify and track products without direct visual contact. Through the instant traceability of RFID regarding the status of different products, companies can retain resources and track damages and losses easily.

Fuel consumption monitoring

Due to the rise in fuel prices, companies spend more and more money on fuel. Furthermore, for companies, it is fairly difficult to change the increasing trend of the fuel price. Therefore, the wisest choice for them is to reduce the cost of fuel by using a fuel monitoring system.

Generally, the fuel monitoring system is made up of three main components: fuel level sensors, special devices for storing data from fuel level sensors and personal computers with special fuel monitoring software for storing all the data and analyzing it. In this way, companies acquire full control over the use of fuel and can see the real detailed pictures of the vehicle activity.

2.5. Waste management

Waste management or waste disposal are all the activities and actions required to manage waste from its inception to its final disposal. This includes amongst other things collection, transport, treatment and disposal of waste together with monitoring and regulation. It also encompasses the legal and regulatory framework that relates to waste management encompassing guidance on recycling.

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"

Waste can take any form that is solid, liquid, or gas and each have different methods of disposal and management. Waste management normally deals with all types of waste whether it was created in forms that are industrial, biological, household, and special cases where it may pose a threat to human health. It is produced due to human activity such as when factories extract and process raw materials. Waste management is intended to reduce adverse effects of waste on health, the environment or aesthetics.

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"

3. Collection of Best Practices

Each project partner participated in the collection of best practices. The best practices were collected according to the Green Logistics System breakdown: green transport; green warehousing; green packaging; green logistics data collection and management; waste management. In all, 38 best practices, websites, research, project results and master's theses were collected from different countries.

3.1. Green Transportation

What we found from the best practices:

- "e-mobility is crucial for green logistics. Especially the application in urban settings seems to be very promising. The demonstrates that a well planned usage of different electric vehicles in urban logistics is economically viable while also having a positive impact on the environment."
- the combination of environmentally friendly types of transport on long stretches with the flexible modes.
- Reducing the use of fossil fuels and increasing the use of alternative fuels, economic driving habits, driver training, using electric cars and compliance with environmental programs and standards
- Creation of network, possibility to save costs and enhance environmental protection, good example of profitability for companies.
- Good practise to promote technology innovation, the spread of technologies which help to reduce the environmental impact and to save fuel costs. It could suggest to stipulate agreements with car/truck companies (e.g. Mercedes)
- Using the distribution way of one company (own electric vans) to distribute products of other companies, reducing number of vans circulating in the city, less traffic congestion, and maximization the load.
- A good example of company that successfully masters the gap between environmental protection and profitability.
- the ability to simulate and assess carbon footprint and efficiency can support in supply chain optimization and strategic decision making
- An example of sustainable management for trasport and warehousing
- a family run and environmentally-friendly certified company

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"

Best Practices: Green Transportation	
Title of project, research, article, network, initiative etc.	Topic and content in a nutshell
EMILIA - Electric Mobility for Innovative Freight Logistics in Austria	<p>This demonstration project focuses on innovative freight logistics for urban areas especially tailored towards a significant use of electric mobility ranging from e-cargo bikes to alternatively-fuelled road trains.</p> <p>The project EMILIA focuses on the following three major goals:</p> <ul style="list-style-type: none"> • The raising of awareness of the topic of e-mobility in urban logistics, • The improvement of technologies to carry out transport in urban areas using ecologically friendly vehicles and • The optimization of transport chains with novel logistics concepts, planning algorithms and applications <p>The demonstrators will run in the following areas: parcel delivery, pharmaceutical logistics, food delivery, and last mile transportation in inner cities.</p> <ul style="list-style-type: none"> • Optimize small cargo vehicles: increasing range and reducing cost and weight • Demonstrate that using electric vehicles in urban logistics is technically feasible and economically viable
With LKW WALTER you have one partner for all European truck loads on your side, who offers you the highest standards in terms of quality, safety and environmental protection. You will benefit from innovative transport solutions in combined transport and enjoy personal and competent support in all European languages.	the highest standards in terms of quality, safety and environmental protection.

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"

<p>Bulgarian Cluster Green Transport The very inception of the Cluster is driven by a strong accent on intermodal – the combination of environmentally friendly types of transport on long stretches with the flexible modes.</p>	<p>environmentally friendly types of transport</p>
<p>Smart sustainable mobility. A user-friendly transport system is a combination of intelligence, low carbon energy, and adaptable services</p>	<p>Key words: intelligent transport systems, smart mobility, mobility as a service, cooperative systems, low-carbon mobility, biofuels, electric vehicles, fuel cell vehicles, foresight</p> <p>Imagine a world in which people and goods can move with minimum impact on the local environment and climate. Imagine an intelligent transport system with smart infrastructure and smart, connected vehicles powered predominantly by renewable energy, and with enlightened end-users: private individuals and enterprises. Imagine a system that is actually based on user demand. That is what we would like to see.</p> <p>To put mobility and transport on the track to sustainability, we have to improve energy efficiency, switch to renewable energy and more efficient modes of mobility, and, most importantly, increase smartness at all levels of the system. In practice, the last point means smart and efficient mobility services, cooperative systems, and intelligent vehicles and infrastructure.</p> <p>VTT has a toolbox and the expertise to tackle all the key challenges of smart low-carbon mobility. And, to really make an impact, we are cooperating with all the key stakeholders in the field. Let us re-invent mobility and co-create a better future together!</p>

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"

Green freight logistics in Finland, Thesis	<p>This thesis deals with green or eco-friendly freight logistics in Finland. The topic of the thesis is topical and interesting, because the media are constantly talking about climate change and its impact on people and the environment.</p> <p>The main objective of the thesis is to find out how Transport companies in Finland take environmental issues into account and what measures they reduce the environmental impact of their transport. Other goals are to find out what kind of environmental disadvantages are caused by transport in Finland and what kind of national and international regulations have been made to protect the environment.</p>
MicroGreenLogistic - sharing of freight transportation	40 companies of footwear district in the Marche Region have adopted this project which consists in the use of an online platform of a transportation company to ship and deliver goods, saving costs, reducing the distance runs and therefore the CO2 emissions.
FOUR Eco-truck - NEWTON 120 kWh Li-ion 10T Chassis Cab	FOUR is a strategic alliance between four historical italian companies in the logistics sector. They use American electrical 100% green trucks for goods delivery.
Last mile ecological distribution - Calidad Pascual	In Madrid and Barcelona, the distribution of the goods in the "last mile" are made by 100% electric vans. Started in Madrid under the FREVUE Project, and continue alone now. One important aspect that have improved in Calidad Pascual is that have strategic agreements with other companies to distribute their products, that means load maximization and more productivity.

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"

Spanish Government- Plan MOVALT	It is a plan to encourage the purchase of electric vehicles, liquefied petroleum gas (LPG / Autogas), compressed natural gas (CNG) and liquefied gas (LNG), vehicles that propel with fuel cells and electric motorcycles. It has budget of 20.000.000€. In the same way, there is another budget (15.000.000€) for infrastructure, for the implementation of electric vehicle charging infrastructure.
Camion - Transport	It is one of Switzerland's leading transport and logistics companies today. Its core business is domestic distribution of general cargo by bimodal road/rail transport. It aims to have a leading role in Switzerland's transport ecology with its CAMION TRANSPORT programme, including environment-friendly vehicle fleet and transport performance, as well as education and further training, ecological procurement, waste separation and energy-optimised buildings.
DHL - Green Logistics Solutions	Carbon reporting: DHL provides an easy to understand Carbon Report that gives full transparency of the carbon emissions generated from your air, ocean and road freight moves within the DHL Global Forwarding & Freight network.
ZIEGLER - "Green logistics": focusing on the environment SUSTAINABILITY – A TREND IN THE LOGISTICS SECTOR	Transportation: switching truck loads to rail or water transportation reducing CO2 emissions by two thirds; conversion to the EURO 6 vehicles. Warehouses: use of LEDs (immediately bright, lower power consumption, and 25x lifetime longer); use of solar power to supply private households with electricity.
Galliker - Respect towards the environment	Combined railway-road transports; Active use of technological discoveries; Adoption of renewable energy tools; Education and promotion of a green attitude among our employees

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"

Best Practices: Green Transportation	
Title of project, research, article, network, initiative etc.	Topic and content in a nutshell
EMILIA - Electric Mobility for Innovative Freight Logistics in Austria	<p>This demonstration project focuses on innovative freight logistics for urban areas especially tailored towards a significant use of electric mobility ranging from e-cargo bikes to alternatively-fuelled road trains.</p> <p>The project EMILIA focuses on the following three major goals:</p> <ul style="list-style-type: none"> • The raising of awareness of the topic of e-mobility in urban logistics, • The improvement of technologies to carry out transport in urban areas using ecologically friendly vehicles and • The optimization of transport chains with novel logistics concepts, planning algorithms and applications <p>The demonstrators will run in the following areas: parcel delivery, pharmaceutical logistics, food delivery, and last mile transportation in inner cities.</p> <ul style="list-style-type: none"> • Optimize small cargo vehicles: increasing range and reducing cost and weight • Demonstrate that using electric vehicles in urban logistics is technically feasible and economically viable

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"

With LKW WALTER you have one partner for all European truck loads on your side, who offers you the highest standards in terms of quality, safety and environmental protection. You will benefit from innovative transport solutions in combined transport and enjoy personal and competent support in all European languages.	the highest standards in terms of quality, safety and environmental protection.
Bulgarian Cluster Green Transport The very inception of the Cluster is driven by a strong accent on intermodal – the combination of environmentally friendly types of transport on long stretches with the flexible modes.	environmentally friendly types of transport
Smart sustainable mobility. A user-friendly transport system is a combination of intelligence, low carbon energy, and adaptable services	<p>Key words: intelligent transport systems, smart mobility, mobility as a service, cooperative systems, low-carbon mobility, biofuels, electric vehicles, fuel cell vehicles, foresight</p> <p>Imagine a world in which people and goods can move with minimum impact on the local environment and climate. Imagine an intelligent transport system with smart infrastructure and smart, connected vehicles powered predominantly by renewable energy, and with enlightened end-users: private individuals and enterprises. Imagine a system that is actually based on user demand. That is what we would like to see. To put mobility and transport on the track to sustainability, we have to improve energy efficiency, switch to renewable energy and more efficient modes of mobility, and, most importantly, increase smartness at all levels of the system. In practice, the last point means smart and efficient mobility services, cooperative systems, and intelligent vehicles and infrastructure.</p> <p>VTT has a toolbox and the expertise to tackle all the key challenges of smart low-carbon mobility. And, to really make an impact, we are cooperating with all the key stakeholders in the field. Let us re-invent mobility and co-create a better future together!</p>
Green freight logistics in Finland, Thesis	This thesis deals with green or eco-friendly freight logistics in Finland. The topic of the thesis is topical and interesting, because the media are constantly talking about climate change and its impact on people and the environment.

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"

	<p>This topic has caused a great deal of discussion among people and businesses, because more and more efforts should be made on the environmentally friendly transport. The thesis has not been commissioned for any company but the subject has become interested in logistics and environmental issues.</p> <p>The main objective of the thesis is to find out how Transport companies in Finland take environmental issues into account and what measures they reduce the environmental impact of their transport. Other goals are to find out what kind of environmental disadvantages are caused by transport in Finland and what kind of national and international regulations have been made to protect the environment.</p> <p>The research part of the work consists of information that was found on the websites of different transport companies. Support for research has also included topical news articles related to green transport logistics.</p> <p>The material used in the research framework was Internet publications, press releases from different organizations, newsletters, press articles and literature in the field of logistics. The thesis deals with freight logistics as part of the supply chain, green logistics, the impacts of transport and climate change, climate change mitigation measures, various environmental programs and standards, and transport companies operating in Finland and their environmentally friendly solutions. The conclusion of the study was that the Transport companies operating in Finland are already investing heavily in ecology, but there is still a need for improvement. The ways in which Transport companies invest in ecological transport are different environmental programs, driver training, modern transport equipment and alternative fuels.</p> <p>The thesis will decide on a reflection that includes describing your own thesis process and evaluating your own work, as well as examining the results of the thesis. The thesis was conducted during the autumn of 2015 and the spring of 2016.</p>
--	--

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"



MicroGreenLogistic - sharing of freight transportation	40 companies of footwear district in the Marche Region have adopted this project which consists in the use of an online platform of a transportation company to ship and deliver goods, saving costs, reducing the distance runs and therefore the CO2 emissions.
FOUR Eco-truck - NEWTON 120 kWh Li-ion 10T Chassis Cab	FOUR is a strategic alliance between four historical italian companies in the logistics sector. They use American electrical 100% green trucks for goods delivery.
Last mile ecological distribution - Calidad Pascual	In Madrid and Barcelona, the distribution of the goods in the "last mile" are made by 100% electric vans. Started in Madrid under the FREVUE Project, and continue alone now. One important aspect that have improved in Calidad Pascual is that have strategic agreements with other companies to distribute their products, that means load maximization and more productivity.
Spanish Government- Plan MOVALT	It is a plan to encourage the purchase of electric vehicles, liquefied petroleum gas (LPG / Autogas), compressed natural gas (CNG) and liquefied gas (LNG), vehicles that propel with fuel cells and electric motorcycles. It has budget of 20.000.000€. In the same way, there is another budget (15.000.000€) for infrastructure, for the implementation of electric vehicle charging infrastructure.

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"

Camion - Transport	It is one of Switzerland's leading transport and logistics companies today. Its core business is domestic distribution of general cargo by bimodal road/rail transport. It aims to have a leading role in Switzerland's transport ecology with its CAMION TRANSPORT programme, including environment-friendly vehicle fleet and transport performance, as well as education and further training, ecological procurement, waste separation and energy-optimised buildings.
DHL - Green Logistics Solutions	Carbon reporting: DHL provides an easy to understand Carbon Report that gives full transparency of the carbon emissions generated from your air, ocean and road freight moves within the DHL Global Forwarding & Freight network.
ZIEGLER - "Green logistics": focusing on the environment SUSTAINABILITY – A TREND IN THE LOGISTICS SECTOR	Transportation: switching truck loads to rail or water transportation reducing CO2 emissions by two thirds; conversion to the EURO 6 vehicles. Warehouses: use of LEDs (immediately bright, lower power consumption, and 25x lifetime longer); use of solar power to supply private households with electricity.
Galliker - Respect towards the environment	Combined railway-road transports; Active use of technological discoveries; Adoption of renewable energy tools; Education and promotion of a green attitude among our employees

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"

3.2. Green warehousing

What we found from the best practices :

Managing inventories, and thereby material flows, is of key importance for achieving efficient and sustainable supply chains. Green inventory management is characterized by complementing the traditional economic (cost) focus with environmental (emissions) considerations.

Title of project, research, article, network, initiative etc.	Topic and content in a nutshell
Developing the implementation of green warehousing at IKEA Finland, Thesis	Sustainability has become an increasingly important trend in supply chain management recently. The green warehouse, a crucial element in the sustainable supply chain, should be implemented strategically and efficiently. The thesis aims to develop the implementation of green warehousing at IKEA Finland with three investigative questions (IQs). The research examines the IKEA's current warehouse sustainability with a focus on energy efficiency (IQ1), waste management (IQ2) and creates developing proposals for the IKEA's sustainable warehouse in the future (IQ3).
Green Inventory Management	Managing inventories, and thereby material flows, is of key importance for achieving efficient and sustainable supply chains. Green inventory management is characterized by complementing the traditional economic (cost) focus with environmental (emissions) considerations. In this chapter we identify and discuss key questions and challenges for green inventory management research. We do so by categorizing the costs and emissions of operating an inventory system into those associated with: ordering and transporting items, holding items in stock, and not satisfying customer demand on time.

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"



3.3. Green packaging

What we found from the best practices :

- "When a product moves to the transportation phase, there are many different opportunities to reduce its carbon footprint. You may be able to reduce the overall size of the exterior packaging or replace the amount or type of interior packaging. In addition to using less, making a product's overall size smaller allows more products to be transported at once, reducing the number of vehicles in use. Lighter packages also do not weigh down vehicles as much, which means they don't have to use as much power to move. You can also consider the method itself, as each transport mode has very different characteristics.
- The use phase of a product is sometimes more difficult to control, since the consumer is ultimately the one using the product. A major way to influence the carbon footprint in this phase is by considering the suitability of packaging to your product; the packaging can be optimized around the product and its packing, reducing unnecessary waste. Packaging solutions which can be reused can also reduce environmental impact significantly.
- Finally, the end of life phase can be modified in a few ways to reduce the product's overall carbon footprint. Products can be made out of materials that can be recycled or that biodegrade more quickly. They can be made reusable, too; some companies offer return or even buyback programs in which they offer a small incentive to customers who turn in their older products for recycling."
- "Producing ecological packaging
- Eco packaging or sustainable packaging depends on much more than the choice of materials. Brands are looking at a wide range of parameters to produce ecological packaging.
- Material usage: reduced packaging, reduced product to packaging ratio, reduce the volume...
- Optimization of transportation throughout the complete life cycle: product and cube rightsizing, pallet and shipper designs.
- Efficient (even renewable) energy use
- Optimal recyclability of the packaging, with extra attention to biodegradable materials"

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"



Best Practices: Green Packing	
Title of project, research, article, network, initiative etc.	Topic and content in a nutshell
Having a green attitude and recycling as a cause is valid for everyone in our office – separate collection of waste has long been a part of everyday life. Since the beginning of 2010 we launched the special campaign “Green Door”.	green attitude and recycling https://allied.bg/green-movers/
ECOPACK BULGARIA (Sofia), a network of companies	The first packaging recovery organization licensed by the Ministry of Environment and Waters in Bulgaria http://www.tvb.bg/en/
Ecocollect JSC is an organization established for the purpose of collective performance of the obligations of entities launching packed goods on the market in the Republic of Bulgaria and responsible for the subsequent separate collection of the waste generated from packaging and the utilization thereof.	separate collection of the waste generated from packaging and the utilization http://www.ecocollect.bg/en/za-nas
Beneficial, healthy, and safe for both individuals and communities during its life cycle. Materials are sourced, manufactured, shipped, and recycled through the use of renewable energy. Meets market criteria for cost and performance. Packaging is manufactured using clean production practices and technologies. Physically designed to optimize both energy and material.	When a product moves to the transportation phase, there are many different opportunities to reduce its carbon footprint. You may be able to reduce the overall size of the exterior packaging or replace the amount or type of interior packaging. In addition to using less, making a product's overall size smaller allows more products to be transported at once, reducing the number of vehicles in use. Lighter packages also do not weigh down vehicles as much, which means they don't have to use as much power to move. You can also consider the method itself, as each transport mode has very different characteristics. The use phase of a product is sometimes more difficult to control, since the consumer is ultimately the one using the product. A major way to influence the carbon footprint in this phase is by considering the suitability of packaging to your product; the packaging can be optimized around the product and its packing,

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"

	<p>reducing unnecessary waste. Packaging solutions which can be reused can also reduce environmental impact significantly.</p> <p>Finally, the end of life phase can be modified in a few ways to reduce the product's overall carbon footprint. Products can be made out of materials that can be recycled or that biodegrade more quickly. They can be made reusable, too; some companies offer return or even buyback programs in which they offer a small incentive to customers who turn in their older products for recycling.</p>
Get started with eco packaging	<p>Eco packaging: a case study</p> <p>Using Cape Pack software, American retail warehouse club 'Sam's Club' optimized its packaging and pallet layout. The results speak for themselves: The new, improved, package uses 78% less material by weight It uses 66% less corrugate or 778 less trees (114 tons) per 1000 pallets of product The new design saves 933 million BTU's per 1000 pallets Saves 184,943 lbs (83888.73kg) of CO2 per 1000 pallets Saves 465,281 gallons (1761,28 m³) of waste water per 1000 pallets Saves 51,670 lbs (23437,11kg) of solid waste per 1000 pallets The new package offers 32% reduction of fossil fuel consumption & GHG emissions over the old package</p>
How Eco-Packaging Impacts Sustainability	<p>https://www.industrialpackaging.com/blog/how-eco-packaging-impacts-sustainability</p>
Sustainable Packaging Coalition	<p>https://sustainablepackaging.org/</p>
Prim Pac	<p>Since 1968, Prim Pac has been the competent partner in the food and industrial packaging sector. They design innovative, tailor-made packaging solutions for their films, bags and trays</p>

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"

3.4. Green logistics data collection and management

What we found from the best practices :

- For applying green logistics, it is important to first (numerically) know what benefits or disadvantages a specific type of transport has. Based on this knowledge more sustainable solutions can be provided
- Consider the trademark elements for training of competences needed within the company; consider elements needed for the certification.

Best Practices: Green Management Data Collection and Management	
Title of project, research, article, network, initiative etc.	Topic and content in a nutshell
Lean & Green	Lean and Green is an incentive programme. It stimulates companies to grow to a higher level of sustainability by taking measures which do not only bear cost savings, but also reduce the negative environmental impacts. Front-runners (trans-shippers, transport companies and municipalities) are committed to achieve their CO2 reduction and profitability targets by deploying different types of measures.
EcoTransIT World - Ecological Transport Information Tool	EcoTransIT World calculates environmental impacts of different carriers across the world. This is possible due to an intelligent input methodology, large amounts of GIS-data and an elaborate basis of computation. Data and methodology are scientifically funded and transparent for all users. EcoTransIT World is designed for companies of all sizes. It supports them in analyzing comprehensive logistical solutions as well as in studying single transportation routes or shipments.

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"



Green Monitor won the 'Information & Document Management Solution of the Year' award at the eight European IT & Software Excellence Awards ceremony in London, UK.	
The Centralized Condition-Based Maintenance and Manufacturing Support System Project (Green Monitor)	<p>Scientific analysis on existing maintenance methodologies and available solutions, and developing an innovative maintenance concept</p> <p>Development of software system that will incorporate the latest technology trends and solutions, including the possibility to run in the cloud and on mobile devices</p> <p>Testing and verification of the product, the approach efficiency, and the green effect</p>
Green Logistics - a handbook for a company, project	<p>Raw materials and / or suppliers</p> <p>Choice and use of modes of transport</p> <p>Transportation planning and piloting / piloting</p> <p>Co-operation opportunities</p> <p>Objectivity and Meters</p> <p>The company's vehicle policy</p> <p>Staff Development</p> <p>The potential added value of greens to businesses</p>
SosLog - Sustainable Logistic protocol	<p>The Sustainable Logistics protocol offers a personalized path that allows the company to implement sustainability in its organization and to have a predefined and recognized guide. The protocol needs to be approved in two steps, and validated every year.</p>

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"

3.5. Waste management

What we found from the best practices

- Reducing waste: The best environmental and cost-effective solution is to reduce the amount of waste created.
- Re-using materials: Where material use and waste generation cannot be reduced, re-use should be considered as the next step.
- Recycling waste: If waste cannot be reduced or re-used it should be segregated for recycling wherever possible.

Best Practices: Waste Management	
Title of project, research, article, network, initiative etc.	Topic and content in a nutshell
FCC Environment CEE	All our solutions are based on a sustainable waste management. We see waste as a resource; from the moment of collection, through various treatment, with the goal to maximize the recycling and the recovery of the collected materials.
The process of decommissioning industrial facilities and mobile objects (aircraft, ships, trains and oil platforms) at the end of their working life poses economic, health and environmental challenges that require two complementary forms of expertise: the ability to decommission and deconstruct a site or object for easier management, and the ability to recycle the resulting waste and clean up ground pollution	DECOMMISSIONING
Save the Planet - 9th Exhibition for South-East Europe	Waste Management & Recycling 27 – 29.03.2018
Ecocompost Sofia Waste management Ecocompost was founded in 2007 and today we are the first and, so far, the only Bulgarian company specialized in home composting. In Ecocompost we believe that composting is the most efficient way to reduce and recover organic waste. For that purpose, we aim to promote	

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"

<p>COMBATING CLIMATE CHANGE</p> <p>The company has at its disposal a number of tools to help reduce its overall greenhouse gas emissions, including day-to-day management, controlling emissions at facilities it operates, and the use of renewable and alternative energy. Veolia is also working to minimize the carbon footprint at customer sites.</p> <p>REDUCING POLLUTION AND PROTECTING HEALTH</p> <p>Reducing pollution and waste from our activities is a priority for Veolia:</p> <p>Eliminating water pollution - 6 billion cubic meters treated at the 3,442 or so urban wastewater treatment plants we operate;</p> <p>Minimizing atmospheric pollution - Veolia brings all its expertise to bear on minimizing the impact of its activities on air quality. All our emissions on a global scale are well below the limits set by the EU Industrial Emissions Directive.</p> <p>Drinking water quality - Giving priority to the health and safety of consumers, Veolia deploys the technologies needed to produce and distribute water that meets the highest standards of quality.</p>	<p>ASSESSING, PROTECTING AND INCREASING BIODIVERSITY</p> <p>Treating wastewater, collecting and processing waste and managing energy resources responsibly are all activities that contribute to the preservation and development of ecosystems. Veolia is committed to going even further by helping to design ecosystem services and deploying initiatives and solutions aimed at protecting and strengthening ecosystems.</p>
<p>Ecobulpack Sofia Waste management</p> <p>Ecobulpack is the leading National Packaging Waste Recovery Organization. We provide dependable, reliable and responsible waste management solutions. Our team creates and maintains efficiency in the process of managing packaging waste from the industry, commercial facilities, .</p>	
<p>https://zerowasteeurope.eu/waste/</p>	
<p>http://ec.europa.eu/environment/waste/prevention/practices.htm</p>	

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"

4. Results from Best Practices

Results of CO2 reduction, cost saving and sustainabilities

Transportation

- **"Electric vehicles** are more energy efficient, quieter, and they produce significantly lower levels of CO2 and air pollutants compared to standard vehicles
 - It is assumed, that in future scenarios electric vehicles can be permitted in times or areas which are restricted to transport activities conducted by other goods vehicles."
- 40 companies of footwear district of Marche (Italy) in the first three months of 2012 have routed 11 thousand km less, have diminished CO2 emissions of 42,69% and have saved 38,31% of fuel.
- The goal of Four is to reduce to **zero CO2 emissions**, especially in the historical centre of the city and in the city centre through innovative and sustainable trucks powered with renewable energy.
- It is estimated a 45% **cost reduction**. 75km/day, 20 kgCO2/day and 5 ton CO2/year. Reduction of 50% acoustic impact.
- It is estimated a unit saving of 0.85 toe (Tonne of oil equivalent) /year, per conventional vehicle replaced for more than 10 years.
- In April 2015 it became the first Swiss transport and logistics company to be certified as compliant with EN 16258. It received a Eco Performance Award in May 2012.

Data collection and management

- **"Increased company profitability; Limited climate change; Reduced emissions.**
- The main target of **the Lean and Green programmed** is reducing CO2 emissions by 20% in five-years time while simultaneously increasing profitability. Other end-users benefits include affordable services and reduced congestion."
- The project results are a free to use online tool that **calculates the environmental effects of different transportation modes**
- Since it is a new procedure, there are not yet companies that achieved the trademark, but some companies have started the protocol phases to get it. The protocol aims **to implement sustainability** not only to reduce CO2 emissions, but also to satisfy social, economic and environmental needs. The trademark allows customer to choose green for their purchases.

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"



Results to support mind change process

- As a service (parcel delivery) is using **e-mobility**, they act as role model for innovative cargo services and might even stimulate using e-mobility in the private sector
- It is a **new way of thinking of freight transportation based on a carbon free strategy**.
- It represents a way of reducing to zero the CO2 emissions due to freight transportation.
- **The future in the city distribution is under the electric vehicles** that do not have polluting emissions.
- Eco packaging or sustainable packaging depends on much more than the choice of materials. Brands are looking at a wide range of parameters to produce ecological packaging.
 - **Material usage**: reduced packaging, reduced product to packaging ratio, reduce the volume...
 - **Optimization of transportation throughout the complete life cycle**: product and cube rightsizing, pallet and shipper designs...
 - **Efficient (even renewable) energy use**
 - **Optimal recyclability of the packaging**, with extra attention to biodegradable materials
- "There have been several similar initiatives like the Lean and Green programme attempting to better the logistics conditions for different players. However, achieving sustainability was not in the top of the companies agenda. Lean and Green provided enough incentives and options for companies to become more sustainable, but also attracting non-sustainable companies to join the programme. In addition, Lean and Green focused not only on the 'greening' part, but also on the profitability part giving an additional reason for companies to participate."
- Yes, the protocol encourages companies to think at a sustainable strategy to achieve the trademark.

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"

5. Conclusions

Conclusion on the collection of best practices shows that a number of good studies and projects have been carried out. However, the best practices now collected have been largely focused on Green Transportation. Reducing CO2 emissions and changing the way of thinking in transport planning and vehicle fleet acquisition often give businesses a positive corporate image.

As regards the environmental friendliness of warehousing, best practices focused on increasing energy efficiency in warehouse buildings, the use of adequate and proper stockholding resources and warehousing optimization in the supply chain.

Concerning packaging, environmental friendliness was centered on best practices for the development of packaging materials and their optimal use. The best practices also took into account the impact of packaging materials on company image and consumer behavior.

Lean Management was considered as the best practice in green data collection and management. Pure data gathering and its utilization in the environmentally friendly management of logistics can take into account the collection of economic driving information. This information has a direct connection to fuel consumption and timing behavior.

Waste management is at the top of recent logistic trends and has been the subject of various studies. The concept of revolutionary economy has raised the recycling of waste to a new value as one waste is another raw material.

"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"



"The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein."

"This project has received grant support from Movetia funded by the Swiss Confederation. The content reflects the authors' view and Movetia is not responsible for any use that may be made of the information it contains"