



LIFE Project Number
LIFE08 ENV/S/000269

FINAL Report

Covering the project activities from 01/01/2010 to 31/12/2014

Reporting Date
31/03/2015

LIFE+ PROJECT NAME or Acronym
CleanTruck

Project Data

Project location	
Project start date:	01/01/2010
Project end date:	31/12/2013 Extension date: 31/12/2014
Total Project duration (in months)	60 months (including Extension of 12 months)
Total budget	€ 3 509 314
Total eligible budget	€
EU contribution:	€ 1 280 195
(%) of total costs	
(%) of eligible costs	

Beneficiary Data

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The CleanTruck project was run by the Environmental & Health Administration of the City of Stockholm, AGA and OKQ8/IDS. CleanTruck was co-financed by EU Life+, Vinnova and the Swedish Energy Agency.

The Environmental & Health Administration of the City of Stockholm was responsible for project management, coordination, information and contact with the companies affiliated with the project.

AGA was responsible for the building of a filling station for liquid and compressed gas as well as filling stations for LIC and nitrogen gas.

OKQ8/IDS was responsible for the building of a fuel facility for ethanol diesel ED95.

This report has been prepared under the management of Per Erik Österlund, Project Manager. CleanTruck's various project managers: Björn Hugosson (2010–2011), Lova André Nilsson (2011–2012), Elin Skogens (2013), Per Erik Österlund (2014).

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Per Erik Österlund,
Project manager CleanTruck

"It takes courage to be among the first to invest in new technology in daily operation. We are proud of the carriers who participated in the CleanTruck project and by purchasing environmentally trucks shown that they are prepared to take risks. I emphasize that there is a need for further work. Through clear incentives, requirements and technology development, it is possible to influence developments in the direction of more efficient and fossilfree truck transportation in a city environment."

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2. Executive Summary

Sweden's largest urban clean vehicle fleet

Stockholm is growing. Today, Stockholm is the only region in the country that can compete with metropolitan regions abroad, such as Berlin, Hamburg and Amsterdam, in terms of the Gross Regional Product.

A growing city needs deliveries of goods. A growing population and trade entail a greater need for transports of goods into the city - and a corresponding increase in waste out from the city. This will demand an ever larger part of the available road space. Just as with public transport, it is important that society do a planning for this necessary goods traffic.

Although heavy traffic only constitutes around one tenth of the vehicles in the county, it accounts for one fifth of all emissions of greenhouse gases. Moreover, the emissions of nitrogen oxides and particulates from heavy traffic make large contributions to degrading the air quality in the city.

The goods traffic must therefore be environmentally adapted and here, CleanTruck has really shown the way. With more than five million vehicle-kilometres, run by 50 clean trucks, 18 transport companies in Stockholm have together succeeded in reducing the climate burden by more than 3,400 tonnes of carbon dioxide equivalents. This is comparable to 1,400 cars disappearing from the streets of Stockholm. The project has also considerably reduced nitrogen oxides and particulates and thereby contributed to better air quality in the city. The City of Stockholm has a route plan for how the city will become fossil-fuel free by 2050. The objective has been honed and the city is now working for a fossil-fuel free vehicle fleet as early as 2040. In the near future, requirements on the transports procured by the City of Stockholm will increase further.

The transports of the future in Stockholm will be clean. Everyone in the transport industry is needed to achieve the objective.

*Katarina Luhr
Vice Mayor of Environment*

CleanTruck was run by three parties: City of Stockholm, AGA and OKQ8/IDS. CleanTruck was financed with the support of the European Union environmental programme LIFE+, Vinnova and the Swedish Energy Agency.

The Environmental & Health Administration of the City of Stockholm coordinated the project and was responsible for project management. AGA was responsible for the building Stockholm's first filling station for liquid and compressed gas as well as filling stations for LIC and nitrogen gas. OKQ8/IDS invested in the world's first public fuel facility for ethanol diesel ED95.

18 private transport companies participated in the project. In total, the participating companies purchased 50 CleanTrucks and five refrigeration units for LIC. The trucks were used for waste collection, construction and goods and product distribution in Stockholm.

The CleanTruck Project

The carbon dioxide emissions from car traffic are decreasing, but for heavy duty traffic, the trend does not look as positive - the emissions of carbon dioxide are increasing due to a growing amount of transports. In the City of Stockholm, heavy traffic accounts for 4 per cent of the traffic measured as vehicle-kilometres, but for 23 per cent of the emissions (2013). In 2010, the emissions of greenhouse gases from heavy vehicles increased by 44 per cent compared with 1990. At the same time, the share of clean trucks was negligible. Something had to be done to break this negative trend.

Facilitating the introduction of clean trucks

CleanTruck was running between 2010 and 2014 and was the first project of its kind for heavy duty trucks. The aim was to hasten and facilitate the introduction of trucks with environmentally adapted technology. To get there, the project offered grants to interested distributors to compensate for the clean trucks being more expensive, and to OKQ8/IDS and AGA for establishing infrastructure. Focus was on heavy duty vehicles in city traffic, and only technologies that were partially unproven could be included in the project.

Three different kinds of clean truck technologies

The project included three different truck technologies all of which were on the threshold of market introduction when the project began in 2010:

- Ethanol ED95
- Methane diesel (i.e. methane gas and diesel)
- Hybrid electric trucks

Cryo Tech transport cooling

The Liquid Carbon Dioxide (LIC) technology was already on the market when CleanTruck began although on a small scale. The project offered grants for the incremental costs to introduce of the technology.

Nitrogen gas in tyres

Nitrogen gas in tyres was another technology included in CleanTruck. With the right tyre pressure, fuel consumption is reduced. In addition, wear on the tyres is reduced substantially, which means lower operating costs for the distributor.

Eco-driving

The driver affects fuel consumption to a high degree through his or her style of driving. CleanTruck included knowledge support as well as cost reimbursement for continued training in eco-driving for participating companies.

Evaluation

Participating transport companies that invested in environmental trucks were offered added expense compensation to make up for the more costly technology. At the same time, the companies committed to participate in the project's evaluation and to help distribute information to companies following suit.

An important link

CleanTruck constituted an important link between research and development and a full-scale introduction of new, environmentally adapted technologies, new filling stations for alternative fuels, filling stations for LIC and equipment for the inflation of tyres with nitrogen gas. The aim of the project was to demonstrate how carbon dioxide emissions and other emissions

from the goods transport sector can be reduced by introducing new technologies in heavy vehicles for urban distribution. The project's experiences should be of sufficient interest to inspire more efforts of a similar nature and imitators.

Results and conclusions

CleanTruck had the objective of reducing harmful emissions with:

- 3,345 tonnes of carbon dioxide equivalents
- 17 tonnes of nitrogen oxides
- 240 kg particulates (PM2.5 and smaller)

The project has met the objective: in the period 2010–2014 carbon dioxide emissions were reduced by 3,400 tonnes of CO₂ equivalents through CleanTruck.

Nitrogen oxides and particulates could, however, not be calculated since special measurements were not within the scope of the project. However, all trucks in CleanTruck meet the requirements for Euro V, and ED95 trucks and hybrid electric trucks also meet the requirements for EEV, which sets somewhat stricter requirements for nitrogen oxides and particulates. Hybrid electric trucks and the quiet liquid carbon dioxide (LIC) aggregates also helped reduce noise in the city.

CleanTruck is concluded in a situation where the project to some extent is back to square one. The next emission class, Euro VI, became a requirement at the end of 2013 and today, none of the vehicle technologies included in the project can be ordered (even if the truck manufacturers believe that several of the technologies will rebound).

The future for renewable fuels is also very uncertain. Required quotas, taxes and uncertainty about sustainability requirements and other regulations have put a major damper on investments in both fuel production and infrastructure for renewable fuels.

The ethanol trucks in the CleanTruck project have worked very well and are the ones with the highest carbon dioxide savings. There is still a strong scepticism in Sweden towards ethanol for both light and heavy trucks, despite extensive work on traceability, sustainability and a high degree of climate benefit including low emissions levels.

The entry of hybrid electric trucks into the market is interesting from many perspectives. The project established that the carbon dioxide reduction might not be at the top, but the vehicles have other qualities, that are very well suited to a city environment, such as night traffic and transportation where low noise is a requirement. Hybridisation is now also growing for truck equipment, which further reduces the emissions of carbon dioxide.

Vehicle gas is a good fuel with very high sustainability performance. In the project, the methane diesel trucks had a varying carbon dioxide reduction (0-41 per cent due to driving cycles). The results show that this kind of vehicle is best suited to regional transport assignments from an environmental perspective.

At the same time, advancements have been made for other renewable fuels. There are several models of Euro VI trucks approved for 100 per cent biodiesel (FAME/RME). The renewable low mixture in Swedish standard diesel (MK1 B5/7) of Fatty Acid Methyl Esters (FAME) and Hydrotreated Vegetable Oil (HVO) has increased substantially compared with the situation in the beginning of the project. Even 100 per cent renewable HVO-diesel is now in commercial

operation. An important point is that conventional diesel trucks are used, minimising the added expense and reducing the thresholds for haulier.

With CleanTruck, the City of Stockholm has taken an important step forward in terms of clean trucks. Among other things, the City has decided on a definition for clean trucks together with the City of Gothenburg. The City of Stockholm has also set the goal that 100 per cent of its own vehicles will be fossil free, 55 per cent of procured transport services will be fossil free and 10 per cent of new truck sales in the county will be clean trucks.

3. Introduction

3.1 The CleanTruck project

Environmental problem/issue addressed

The carbon dioxide emissions from car traffic are decreasing, but for heavy duty traffic, the trend does not look as positive - the emissions of carbon dioxide are increasing due to a growing amount of transports. In the City of Stockholm, heavy traffic accounts for 4 per cent of the traffic measured as vehicle-kilometres, but for 23 per cent of the emissions (2013). In 2010, the emissions of greenhouse gases from heavy vehicles increased by 44 per cent compared with 1990. At the same time, the share of clean trucks was negligible. Something had to be done to break this negative trend.

Outline the hypothesis to be demonstrated / verified by the project

The primary objective of CleanTruck is to demonstrate how reduction of greenhouse gas emissions from the EU road freight transport sector can be achieved by introduction of new techniques to urban goods distribution trucks.

Description of the technical / methodological solution

The project included three different truck technologies all of which were on the threshold of market introduction when the project began in 2010:

- Ethanol ED95
- Methane diesel (i.e. methane gas and diesel)
- Hybrid electric trucks

The Liquid Carbon Dioxide (LIC) technology was already on the market when CleanTruck began although on a small scale. The project offered grants for the incremental costs to introduce of the technology.

Nitrogen gas in tyres was another technology included in CleanTruck. With the right tyre pressure, fuel consumption is reduced. In addition, wear on the tyres is reduced substantially, which means lower operating costs for the distributor.

The driver affects fuel consumption to a high degree through his or her style of driving. CleanTruck included knowledge support as well as cost reimbursement for continued training in eco-driving for participating companies.

Expected results and environmental benefits

CleanTruck had the objective of reducing harmful emissions with:

- 3,345 tonnes of carbon dioxide equivalents
- 17 tonnes of nitrogen oxides
- 240 kg particulates (PM2.5 and smaller)

3.2 List of keywords and abbreviations

AGA	AGA AB
Biogas	Methane of biological origin, e.g. waste
Cryo Tech	Cooling aggregates, manufactured by Thermo King
ED95	Ethanol for use in heavy vehicles, consists of 95% ethanol and 5% water and ignition improver
LIC	Liquid carbon dioxide, CO2
Methane	CH4, fuel that can be used either in compressed or liquid form
Methane/diesel truck	Vehicle using a combination of methane (compressed or liquid form) and diesel to run a diesel engine
Vehicle gas	Methane gas of mixed origin: biogas and natural gas (LNG - Liquefied Natural Gas, CNG – Compressed Natural Gas, LBG – Liquefied Biogas, CBG – Compressed Biogas)
MF	City of Stockholm, Environmental and Health Administration (Miljöförvaltningen)
Natural gas	Methane of fossil origin
N2	Nitrogen gas
OKQ8	OKQ8/IDS

4. Administrative part

4.1 Description of the management system

Description and schematic presentation of working method

Action	2010				2011				2012				2013				2014			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
1: Ethanol ED95 fuel station	Red	Red	Red	Red																
2: Biomethane Fuel station	Purple	Purple	Purple	Purple																
3: CO ₂ filling stations and CO ₂ aggregates	Dark Grey	Dark Grey	Dark Grey	Dark Grey																
4: N2 filling stations	Light Grey	Light Grey	Light Grey	Light Grey																
5: Clean trucks for distribution																				
6: Heavy Eco-driving					Blue															
7: Stakeholder Dialogue																			Dark Green	
8: Dissemination	Yellow	Yellow	Yellow	Yellow					Yellow	Yellow	Yellow	Yellow					Yellow	Yellow	Yellow	Yellow
9: Monitoring and Evaluation		White			Dark Blue	Dark Blue														
10: Project Management	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink
11: Audit																			White	Dark Grey
12: After-LIFE Communication plan																			Orange	Orange

Figure 1. Timetable for CleanTruck

Activities

- Action 1: Ethanol ED95 fuel station
- Action 2: Biomethane fuel station
- Action 3: LIC filling stations and LIC aggregates
- Action 4: N2 filling stations
- Action 5: Clean trucks for distribution
- Action 6: Heavy Eco-driving
- Action 7: Stakeholder dialogue
- Action 8: Dissemination
- Action 9: Monitoring & Evaluation
- Action 10: Project Management
- Action 11: Audit
- Action 12: After-LIFE communication plan

Presentation of the coordinating beneficiary, associated beneficiaries and project organisation

CleanTruck will be managed by the Environment and Health Administration of the City of Stockholm (MF) and two associate beneficiaries, AGA and OKQ8. MF is a driving force for sustainable transport through the Clean Vehicles and Fuels Program and leads

Stockholm's fight against climate change through the Greenhouse Gas Project, a dedicated action programme against CO₂ emissions.

MF has extensive experience of European projects, in particular with reference to alternative fuels and clean vehicles. For example, MF was coordinator of BEST, Trendsetter and ZEUS and participant in the Biogasmax, Catalyst, CUTE, Moses, Plume, Niches, Elcidis and E-tour projects. MF is also an active member of European networks, e.g. Civitas, Polis, Eurocities, Citelec and ICLEI.

Associate beneficiaries

AGA is one of the leading distributor of biomethane and natural gas in Sweden and is part of the international Linde Group. OKQ8 is one of Sweden's largest distributors of petrol and diesel and operates 40 International Diesel Service (IDS) filling stations in Sweden and Denmark, which are devoted to the road freight transport sector. These beneficiaries bring extensive technical expertise to CleanTruck and increase the scope of dissemination activities and the potential for replication.

The beneficiaries have remained the same throughout the project period. A project team was formed consisting of representatives from the three project partners.

Meetings with the project team have been held regularly and have mostly been chaired by MF. A total of 37 meetings have been held during 2010-2014. The representatives in the project team were at the end of the project:

Mr Per Erik Österlund, MF, Project Coordinator (since March 2014)

Mrs Linda Barkman, OKQ8/IDS (since February 2014)

Mr Ragnar Sjödahl, AGA AB

Other representatives from the organisations have participated as and when relevant. Other key stakeholders for the project, specialists or consultants have been invited to the project team meetings as and when appropriate.

Separate meetings have been arranged to address specific issues. Depending on the situation, such meetings have been called for by the coordinating beneficiary or one of the associated beneficiaries.

Already at the start of the project MF set up a website at www.projectplace.com where all project related documentation is available. Access to the website is provided to all persons participating in the project. This setup facilitates the internal information sharing and coordination.

In addition to the beneficiaries, a range of stakeholders are committed to CleanTruck and have signed Letters of Intent indicating their desire to participate in the project and contribute towards a greener, cleaner road freight transport sector. These include truck manufacturers, fuel suppliers and urban goods distribution companies.

Other stakeholders play a key role in disseminating information on the project both during and after CleanTruck. These include international networks such as ICLEI, Eurocities and POLIS and interest groups including NTM, Swedish Association of Road Transport Companies. These stakeholders will inspire and encourage replication of CleanTruck in other EU cities.

Description of changes due to amendments to the Grant Agreement

The following changes are a result of Contract Amendments:

- The maximum investment support offered for hybrid electric truck has been raised from 100,000 SEK to 300,000 SEK, which is equivalent to 50% of the additional cost compared to a corresponding conventional diesel truck. This reflects the actual additional cost of the vehicle, which is much higher than estimated in the proposal. With the increased maximum support several new hybrid electrics are now entering the project and the project encompass 17 instead of the 6 electric hybrids estimated in the Mid Term Report. While ensuring that all techniques addressed in the project are represented through trucks joining the project (i.e. methane/diesel, ethanol, hybrid electric), the market demand will decide the final number of trucks represented in each category.
- The project focus is city distribution trucks. However, trucks used for waste collection have also been included in the project. Trucks used in construction industry, e.g. transport of building material or bulk transports such as gravel or sand, are also being considered.
- The CleanTruck project was planned to end 31 December 2013, but has been prolonged with one year until 31 December 2014.
- Due to the prolongation a second Progress Report was submitted in December 2013.
- Haulage companies can purchase clean trucks and enter the project until December 2013

Partnership agreement

The Partnership agreement was submitted to the Commission with the Inception Report in October 2010.

4.2 Evaluation of the management system

The CleanTruck project is a long project (2010-2014) and started back in 2008 with the planning, discussion with stakeholders, partners, truck manufacturers (OME) and implementation of the application process.

The project process is clear and it is easy to deduce the project. It is desirable that a project that extends over five years has continuity, and it is not optimal to have changed project manager four times. As circumstances still arises, especially over such a long time period, it is important with a transparent process, traceability and the establishment of an assistant project manager at an early stage.

The relationship with stakeholders in the CleanTruck project has been good and constructive. One of the project partners has also replaced members of the project team during the project period, which is easier because team members usually focus of one or more tasks in the project. It has been a great support to the project having contact with the monitoring team.

Important lessons from the CleanTruck project are to early in the project lay the foundation for accurate administrative routines for time reporting and financial reporting which are well coordinated.

It is also important to design the project carefully and think through all parts thoroughly, for example, how handled compensation is models in framework of the EU regulatory framework for leasing of vehicles, equipment, etc.

It is also desirable that the project establish contracts with stakeholders, fleet operators, distributors, etc. for the timetable for the reporting back so it does not arises discussions on this. It should also indicate clearly what should be reported and when.

5. Technical part

Answers to previous letters from the Commission regarding the technical actions are available in the following Annexes:

- A1 Letter of Memorandum 1
- A2 Letter of Memorandum 2
- A3 Letter of Memorandum 3
- A4 Letter of Memorandum 4

5.1 Technical progress, per task

Action 1 Ethanol ED 95 fuel station

The first public filling station for ED95 worldwide was opened on 2 September 2010 in Jordbro industrial park, south of Stockholm. The filling station is strategically placed in an area harbouring many distribution companies and other transport intensive businesses.

The establishment of the ED95 fuel stations was preceded by a study conducted by OKQ8/IDS completed in 2009 to clarify where the need for fuel ED95 was greatest in the Stockholm area.

The investigation revealed two sites that were highly relevant for establishment – the terminal area in Årsta and Jordbro industrial park. At both those locations, OKQ8/IDS had existing fuel stations for truck diesel.

At the start of the CleanTruck project several hauliers and shippers were interviewed about their views on and interest in Ethanol ED95. The Environmental and Health Administration of the City of Stockholm also arranged a briefing in Jordbro industrial park.

Kyl- och Frysexpressen, the only haulier furthermore investing in ED95 technology, did the investment as a business and sustainability case together with a customer, the food retailer ICA. ICA had their terminal in Jordbro but in 2012, the supplier chooses to open a new terminal in Årsta terminal area. This change of location resulted in all the trucks using only the haulier's home-based facility, a facility the haulier had already chosen to keep.

The ED95 product itself is well established on the world market, but developing a public distribution system for the product is a new challenge. As mentioned above, this filling station was the first public filling station for ED95 in the world. Due to the lack of detailed regulations, specific criteria were developed for all equipment used at the filling station in close dialogue with competent authorities and other actors. All solutions applied at the filling station were selected to ensure best available technology. The ambition is that the real life demonstration of equipment and technical solutions provided through this filling station will feed into the development of a regulatory framework for similar filling stations for ED95 in Sweden and in Europe. An example is the non-drip nozzle which was identified by OKQ8 and agreed upon with the competent authorities.

During six months in 2013 the ED95 fuel station in Jordbro was out of order. There was fuel in the storage tank but it was not possible to pump it up to the nozzle. The problem was however solved and the fuel station has been in operation without problems since then.

Kyl & Frysexpressen, the only haulier with ED95 trucks in the project, had access to fuel in their own home-based facility for most of this period.

The companies have been hesitating to invest in ED95 trucks. One reason is the lack of infrastructure since there is only one public station with ED95. They must have access to a reliable fuel supply system since there is no alternative fuel for the ED95 trucks. Noteworthy is the possibility of a home-based facility, like the one used in the project. A technical problem at the only public ED95 fuel station could mean a standstill for these trucks and loss of revenue for the companies as described above. There is also a lack of interest and confidence in the ethanol fuel, following a great, die-hard debate in Sweden about the potential environmental and social advantages and disadvantages of ethanol. There is still a strong scepticism towards ethanol for both light and heavy trucks, despite extensive work on traceability, sustainability and a high degree of climate benefit including low emissions levels. The ethanol trucks in the CleanTruck project have worked very well and are the ones with the highest carbon dioxide savings.

At the time of establishment of the ED95 fuel facility was correctly localized. Various commercial decisions by transportation partners eventually resulted in the plant selling less ED95 fuel, even though the 15 trucks were extensively used throughout the whole project but refuelled “at home”. Compared to the initial interest and expectation of more vehicles at more hauliers, the quantity of ED95 sold is of cause smaller.

Based on the CleanTruck project perspective, the establishment of ED95 fuel plant has been good, the function has been good. It has been tested in commercial operation, it has been evaluated from many perspectives, and OKQ8 have been able to set a standard for the Swedish market for a new drip-free refuelling nozzle.



Figure 2. Drip-free refueling nozzle.

The Diesel ethanol ED95 sold by OKQ8/IDS is delivered by SEKAB. The EU Directive¹ on the promotion of the use of energy from renewable sources 2009/28/EG requires that any ethanol sold as renewable fuel within EU must result in a total CO2 reduction of at least 35% compared to fossil fuel and also stipulates measurements to minimize negative impact on biodiversity and natural carbon sinks. The ethanol sold by OKQ8 in 2013 reached an average CO2 reduction of 68%.

¹ The EU Directive on the promotion of the use of energy from renewable sources 2009/28/EG of 23 April 2009 was implemented in Sweden through Lag om hållbarhetskriterier för biobränslen och flytande biobränslen, SFS 2010:598, 18 June 2010.

Action 2 Biomethane fuel station

The Action is completed with regard to storage tanks and the possibility to fill heavy vehicles with liquid methane as well as compressed methane. The filling station for compressed methane gas was inaugurated on December 2010. The equipment for filling with liquid methane has been in operation since early 2013. Operation of the fuel stations continue as planned.

During the development of the filling station, a close collaboration with local authorities was ensured and this proved to be very valuable. A close dialogue has also been held with the drivers of the vehicles, to ensure correct station design and proper handling of the equipment.

Several challenges were identified during feasibility and building phase, relating to the fact that this is new technique. The lack of standardised solutions and norms creates uncertainties with regards to time requirements and budgeting. One example is the permit procedure for flammable products which became far more extensive than what was initially indicated.



Figure 3. *The biomethane fuel station in Älvsjö with the project group. From left: Peter Morath and Johan Bynke, OKQ8, Ragnar Sjödahl, AGA, Elin Skogens, Stockholms Stad, Per-Erik Österlund, OKQ8/IDS – later Stockholms Stad, Lova André Nilsson, Stockholms Stad.*

The location is Älvsjö, in close vicinity to the main access routes to Stockholm. The station capacity is 5 million m³ per year, allowing around 125 heavy trucks to top up at the station every day.

The vehicle fuel AGA sell is a mix of biogas and natural gas. A large part of the biomethane sold in Stockholm is locally produced from the sludge from wastewater treatment plants in the city. The biomethane is upgraded at the treatment plant and then transported to the filling stations. In 2011 an extended piping system was inaugurated, allowing the upgraded gas to be pumped directly to the filling stations without truck transport. The extended piping system currently covers 7 of the total 20 public filling stations and also non-public fuelling stations at 2 bus depots. One of the new filling stations is, just like the station connected to CleanTruck, dedicated to heavy duty vehicles (Preem Högdalen).

The demand for biomethane as a vehicle fuel has increased substantially during the last few years. At the same time, the biomethane production capacity has developed at a slower pace. To meet the demand, and to build up a market for increased biomethane production, natural gas (i.e. of fossil origin) has been imported to fill the gap. There is currently a risk for shortage of biogas and then fossil gas has to be offered instead. As this would be unacceptable in the long run, demand promoting activities have been slowed down. Favourable news is however that the Cities of Stockholm and Täby have decided to start gathering their organic waste and produce biogas from this, so in a few years' time, the biogas shortage will decrease.

In Sweden, the supply of liquefied biomethane (LBG) is very limited and there is only one upgrading facility established in Lidköping, 360 km from Stockholm. Transporting the liquefied LNG/LBG is more cost effective and gas companies often establishes such tank facilities and are thereby able to offer both LNG and CNG at these filling stations. In the longer term, the Stockholm area needs to build an upgrade installation to produce liquefied biomethane to meet the market.

Production of compressed biomethane (CBG) is somewhat good in Sweden, and several projects are underway to improve the availability of CBG. The biomethane production sites in Stockholm produce compressed biogas. At one of the sites, preparations were on-going to produce liquid biomethane during 2012 through very promising technology. Unfortunately, the company engaged to deliver the equipment was not able to do so and disappeared from the market. Due to the current uncertainties for the future of the RED- and Fuel Quality Directives and hence future EU policies in this field, no attempt to find a new equipment supplier has been made, instead all investments are currently put on hold.

Sales of methane gas (LNG/CNG and LBG/CBG) on mass balance in 2014 ended slightly below the 2013 (see figure). Happily, however, biomethane share has increased from 62 percent to 66 per cent in Stockholm. This is due to imports from production facilities in Sweden - production in Stockholm area has not increased in 2014.

Stockholm area consumes 25 percent of all vehicle gas in Sweden, and 26 percent of the biomethane gas. Stockholm have 10 per cent of all gas-driven cars in Sweden, 16 per cent of all gas buses, 22 per cent of all light gas trucks and 30 per cent of gas-driven heavy trucks.

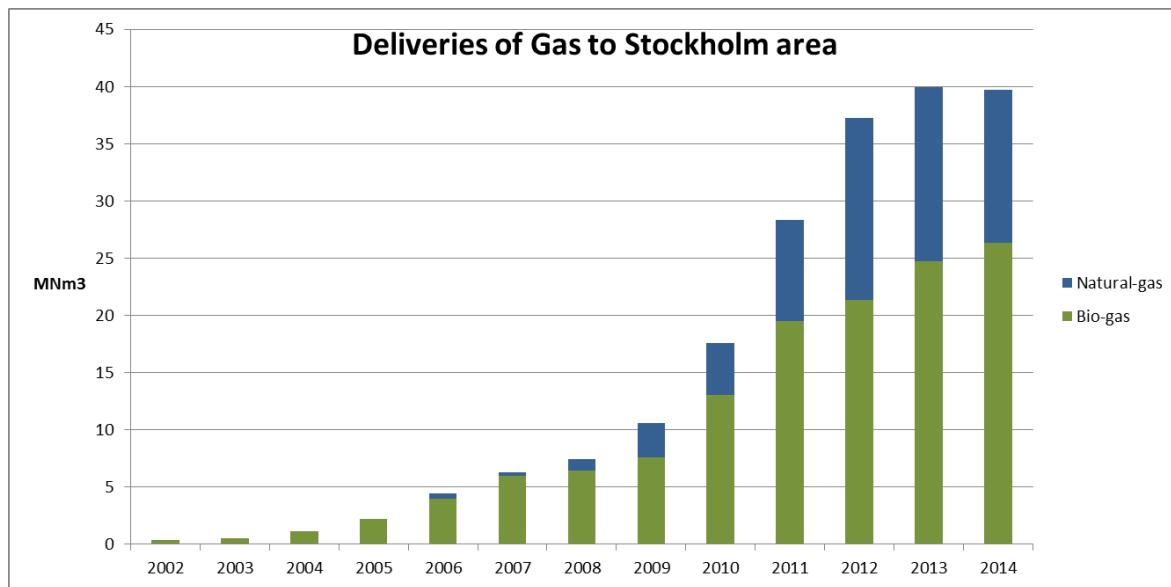


Figure 4. Deliveries of gas to the Stockholm area 2002-2014

Unless biomethane production not increases, especially of liquefied biomethane (LBG), Stockholm risk to eventually get a higher share of fossil methane (LNG/CNG) in the system since the proportion of gas vehicles is steadily increasing.

Action 3 Filling stations for LIC and Cryo Tech aggregates

The Action is completed with regard to the number of LIC (liquid carbon dioxide) stations that will be installed and the operation of the LIC-stations continues as planned.

At the CleanTruck project planning (2009), there were few options in the market to traditional cooling systems for transport cooling, especially with less carbon dioxide loaded systems. Thermo King (Ingersoll Rand) had developed a CryoTech aggregate using liquid carbon dioxide (LIC) together with a heat exchanger. AGA AB provides a recycled LIC, namely a by-product collected from an oil refinery.

CleanTruck project saw the great advantages of such a system for various reasons - reduced net carbon dioxide footprint, reduced noise levels (Peek certified), no emissions of particulates (PM) or nitrogen oxides (NOx) and very high cooling capacity.

During the project period (2010-2014) more systems that competed with an LIC systems was introduced in the market. The advantage of other systems (e.g. Frigoblock) is that no new infrastructure for the filling of refrigerants (LIC) needs to be established, and these products have even lower noise levels.

In Stockholm, two pilot filling stations for LIC have been running for several years. Through the project CleanTruck, now two additional filling stations have been built in Kungens Kurva and Jordbro. Thus there now is a sufficient infrastructure to guarantee full service to a large number of users in the city.

Both filling stations in Kungens Kurva and Jordbro was delayed but in operation since summer 2012. The delay is mainly due to unexpected difficulties related to the lease

agreements with involved land owners. The CO₂ filling station located in Kungens Kurva is placed at a site provided by Volvo Truck Centre. The filling station in Jordbro is situated at the same location as the filling station for ED95. In Jordbro the equipment was installed and ready for operation at the beginning of March but there were some initial technical problems with the telecommunication system for the payment device. These problems were solved during April.

Organisationaly, the LIC equipment has been installed, owned and operated by AGA whereas the payment device, the cards and the direct client relations are within the responsibility of OKQ8. AGA and OKQ8 has signed a business agreement regulating the relationship between the two companies with regards to the LIC filling stations.

Early adopters of the new technique for refrigerated goods distribution services within the CleanTruck project are Svebol Logistics AB, Kyl- & Frysexpressen and Dafgårds. A total of five Cryo Tech aggregates have been installed in trucks participating in the project. Three of the trucks are Scania ED95 vehicles owned by the same haulage company. The owner reports that the aggregates provide perfect cooling, but that the operational cost has been higher than anticipated. A major reason for high costs is due to improper handling of the aggregate.

The demand for Cryo Tech aggregates to date has been lower than expected. This is due to the potentially high operational costs (partly as a result of high efficiency but also the handling) of LIC and also the fact that several of the CleanTruck trucks do not need cooling.

The three actors OKQ8, AGA and CryoTech, in charge of respectively selling LIC at the pump, offering the LIC as product and offering the LIC aggregates, are in a process of discussing the future of LIC. Together they try to find a solution to get more aggregates in operation, and there is a major responsibility on the marketing of the aggregates.

If the LIC system is used correctly, it is both cost-effective, reduces noise, carbon dioxide (CO₂), nitrogen oxide (NO_x) and particulates (PM). LIC system has relative expensive infrastructures which do not permit a broader market and is best suited to urban transport of refrigerated transports; the project has not seen any advantages in using LIC system at national or regional transport.

Experiences from developing the LIC fuel stations was reported in a short report (in Swedish), delivered with Progress Report 1 in December 2012.

Action 4 N2 filling stations

The Action is completed and operation of the four filling stations continues as planned.

There are international analysis that demonstrates a connection between the right tire pressure and reduced fuel use and reduced tire wear. Using nitrogen instead of compressed air in tires helps keeping the correct tire pressure for a longer period and reduces the wear on the tire. Normal air consists of around 80% nitrogen, 19% oxygen and 1 % other gases. The nitrogen molecules are larger than oxygen and filling the tire with nitrogen therefore results in less leakage through the tire. Nitrogen also lacks the aggressive characteristics of oxygen. A tire filled with nitrogen will show less wear both in the rubber and in metal details. With correct tire pressure, the truck will use less fuel and the tires will have a longer life. This saves both the environment and money.

Four filling stations connected to CleanTruck are placed at Däckia service stations in Farsta, Vallentuna, Arlandastad/Märsta and Spånga. The training of staff at Däckia was carried out in December 2011 and the filling stations were operational immediately after that. Support has been given to the stations by Däckia. AGA has had contact with the stations thru visits during 2012 and supporting with customer prospects and information material during 2013. The Däckia personal is also engaged in a competition for selling the most nitrogen.

In Sweden there is a small market tradition (7-10 %) to replenish nitrogen in tires, among private vehicle owners as well as in commercial vehicles. Having the “green cap”, i.e. having nitrogen in the tyres, is increasingly becoming status for car drivers. A corresponding development is yet to be seen on the heavy duty side.

Because air is free and nitrogen costs money, the market introduction has been not been easy for Däckia gas and AGA. Customers contacting AGA have been put in contact with Däckia or the local filling station. There have been about 5-8 new customers, e.g. members of bigger transport companies.

The nitrogen has come from an Air Separation Unit (ASU) in Avesta, Sweden.

AGA has had contacts with another tire shop during late 2013 opening for an increased number of stations and tire brands in during 2014. This could enhance the possibility to sell N-Tire® to truckers that prefer other suppliers than Däckia.

An information campaign targeting primarily heavy vehicles was developed and ran in late 2012 and early 2013, including a series of three ads in respectively the magazine Proffs and the magazine Svensk åkeritidning (magazine for The Swedish Association of Road Transport Companies) with professional drivers as target group. The senders were jointly the CleanTruck project, AGA and Däckia, the actor running the filling stations.

AGA is continuously working on their product N-Tyre (nitrogen in tyres) and during 2013 and 2014 launching a campaign targeting tire workshops for car and heavy duty vehicles to market their equipment and gas on more locations nationally.

OKQ8/IDS, the CleanTruck project stakeholder, thought it was worth trying nitrogen in fuel truck rigs. The contract was drawn up with a trucking company in Stockholm of four fuel truck rigs that were given the opportunity to try Nitrogen gas (N₂) on three trucks, leaving the fourth as reference truck with air in the tires.

The test period was started in 2011 and was completed in 2013. A fuel truck rig in Sweden is running in three shifts and rolls about 200 000 km a year with an average fuel consumption of 5 liters per 10 km. Over time a fuel saving of 2 per cent was observed on these fuel trucks against the reference vehicle in the fleet operator. Peak year was 2012 when the fuel saving was 3.5 percent.

In this test, the saving is approximately 22,000 to 25,000 SEK per year in reduced fuel costs. The cost of filling nitrogen depends on various commercial terms and will be about 5200 SEK for a fuel truck rig. A Swedish fuel truck rig has 26 wheels and because they have summer and winter tires, they needed two (2) fillings each year equalling yearly total cost of nitrogen gas (N₂) around 10 400 SEK.

The cost of Nitrogen in tires on a fuel truck rigs are around 50 percent of the cost savings due to reduced fuel consumption detected in the small test OKQ8 conducted.

Nitrogen gas (N₂) in the tires provides a more constant tire pressure and thus reduced rolling resistance, how this correlates to the fuel consumption is difficult to demonstrate. Tires are a very big cost of a truck rig and a longer life (more kilometres) will lead to a better overall economy if using nitrogen (N₂) in tires, there are previous tests that the correct tire pressure can provide substantial savings in tire wear, but it is very difficult to demonstrate this in the very limited survey CleanTruck conducted.

We suggest a larger study is done of the aspects of nitrogen in tyres, bringing more types of vehicle combinations.

Experiences from developing the nitrogen fuel stations was reported in a short report (in Swedish), delivered with Progress Report 1 in December 2012.

Action 5 Clean trucks for distribution

The Action is completed in terms of all vehicles being delivered.

A total of 50 clean trucks have been procured within the project – 17 hybrid electrics, 15 ethanol ED95 and 18 methane/diesel. The trucks are distributed as described in the table below.

Table 1. Clean trucks for distribution

Company name	Type of truck ¹⁾	No of truck s	Delivery date
Ragn-Sells AB	Volvo CNG FL 240	1	2010-05-07
	Volvo Dennis CNG FL240	2	2011-09-01
	Volvo Electric Hybrid	1	2011-10
Svebol Logistics AB	Volvo CNG FE	1	2010-05-19
	Volvo Electric Hybrid	1	2014-01-01
Kyl- & Frysexpressen	Scania ED95	3	2010-04-13
	Scania ED95 P270LB6x2*4MNB	6	2011-10-28
	Scania ED95 P270LB4x2MNB	3	2011-11-04
	Scania ED95 P270 6x2*4	1	2012-06-29
	Scania ED95	2	2013-10-31
Dafgårds	Volvo CNG FL 4*2	1	2010-12
IL Recycling Service AB	Volvo CNG FLH 240 4x2	1	2011-09-01
Wiklunds Åkeri AB	Volvo CNG FLL 240 4x2	1	2011-10-17
	DAF Electric Hybrid	1	2012-07-01
	DAF Electric Hybrid	1	2012-09-14
	Volvo CNG FLL 240 4x2	1	2012-04-01
	DAF Electric Hybrid	1	2013-12-15
	DAF Electric Hybrid	1	2013-12-15
	Volvo Electric Hybrid FE 6*2	1	2013-12-15
MTAB	Volvo CNG FLH 240	1	2011-09-09
Sodexo	Volvo CNG FE FES 340	1	2011-10-01

Company name	Type of truck ¹⁾	No of trucks	Delivery date
Marko Kaj Moving AB	Mercedes Electric Hybrid	1	2011-09-15
Posten Logistik/PostNord AB	Volvo Electric Hybrid FES 300	1	2012-01-01
LMTE/Per Svensson Transport AB	Volvo CNG FLH 240 Volvo CNG FES	2 1	2012-01-01 2013-03-01
Svevia Maskin AB	Volvo Electric Hybrid	1	2012-03-01
Carlsberg Sverige AB	Volvo Electric Hybrid FE300 6*2 Volvo CNG FE 340 6*2	1 1	2012-11-01 2012-11-01
Sita Sverige AB	Volvo Electric Hybrid	1	2012-12-17
Trångsunds Åkeri AB	Volvo CNG FL 4*2 Volvo CNG FLL	1 1	2013-01-14 2013-10-17
OLAB AB	DAF Electric Hybrid DAF Electric Hybrid DAF Electric Hybrid	2 1 1	2013-05-29 2013-12-15 2013-12-15
Deep åkeri/Carrier Transport	Mercedes Electric Hybrid	1	2013-10-11
Seppos Service AB	Volvo CNG FLL 240 Volvo CNG FL 4*2	1 1	2013-03-26 2013-07-05
Total number of delivered trucks		50	

1) Types include the following: CNG FL and CNG FE are two models of the methane/diesel truck using compressed methane. Methane/diesel is also called dual-fuel. ED95 is the ethanol truck. EH is the electric hybrid, where Mercedes, Volvo and DAF provide different models.

At project launch in January 2010, only one of the four² vehicle techniques were ready for commercial release. That was the ethanol truck (ED95) produced by Scania. The hybrid electric (then only offered by Mercedes-Benz), the methane/diesel with compressed gas and the methane/diesel with liquid gas were delayed.

Sale start for the methane/diesel truck using compressed gas was achieved in spring 2010. The first delivery of a methane/diesel truck using liquid methane was in November 2011. The first hybrid electric truck was delivered to Stockholm in fall 2011. The late delivery of trucks resulted in less trucks than expected being sold. Furthermore, during project implementation period we have experienced a weakened financial and political support for investments related to renewable fuels. This has specifically resulted in the market actors being reluctant to extend the ED95 infrastructure.

Measures have been undertaken to address these concerns: To allow more time for the haulage companies to purchase clean trucks and enter the project, the project management group decided in dialogue with the EU Monitor to prolong the period for allowing new trucks to enter the project with an additional 12 months, i.e. up to December 2012. Furthermore, a decision not to limit the project to goods distribution trucks was made, including for example trucks transporting waste. With regards to the hybrid electric, a change was made to increase the financial support from a maximum of 100,000 SEK to a maximum of 300,000 SEK (still keeping the principle of 50% of the additional cost compared to a corresponding conventional

² Three techniques including ethanol ED95, hybrid electric and methane/diesel with compressed gas CNG. Four if including liquid methane included in the project but in practice getting investment support from the BiMe Trucks project.

diesel truck). Finally, after insurance that the techniques for ED95, methane/diesel and hybrid electric were all represented in the project, the project have been flexible to let the market demand decide the number of trucks in each category. The total budget would thus stay unchanged.

Comparing with what was outlined in the project proposal, please note the following changes (also mentioned in the section “1. Administrative information”):

- The project focus is city distribution trucks. However, trucks used for waste collection have also been included in the project. Trucks used in construction industry, e.g. transport of building material or bulk transports such as gravel or sand, are currently also being considered.
- The maximum investment support offered for electric hybrid truck has been raised from 100,000 to 300,000 SEK, reflecting the actual cost of the vehicle
- While ensuring that all techniques addressed in the project are represented through trucks joining the project (i.e. methane/diesel, ethanol, electric hybrid), the market demand may decide the final number of trucks represented in each category
- Haulage companies can purchase clean trucks and enter the project until December 2013. This is to reflect the fact that the methane/diesel truck (both the version with compressed methane and the version with liquid methane) as well as the electric hybrid truck were not ready for commercial introduction until mid-2011.

Action 6 Heavy eco-driving

The project CleanTruck offers financial support and technical advice to develop a long-term plan for continuous implementation and improvement of eco-driving skills. Haulage companies investing in support systems for eco-driving and follow-up may receive investment support from the project. The support system is often a trip computer providing immediate data and monitoring for the driver and/or the company. The project engagement has resulted in hauliers setting up strategies for implementation; eight (8) drivers educated in eco-driving, 22 trucks retrofitted with equipment for driver support in eco-driving and 43 drivers have been trained on the equipment and use it daily in their work.

Eco-driving has shown to reduce fuel consumption substantially. The average driver reduces the consumption 10-15% already after the first training session. Revised regulations regarding mandatory training for professional drivers of heavy duty trucks in Sweden were implemented in 2010 and training on heavy eco-driving is now mandatory. This training is a requirement for all professional drivers of heavy vehicles in the European Union. Transport operators who engaged in CleanTruck and bought environmentally trucks found it unnecessary to educate drivers two times at the same thing, therefore have the project not been able to justify hauliers to notify drivers to specialized training drivers to the extent that was budgeted. However, research shows that to achieve a long-lasting effect from the training, continuous feedback and support mechanisms are necessary.

The CleanTruck project focus was not only on driving in a more fuel efficient manner, but also on helping the drivers to find how to maximize the proportion of fossil-free energy. For example, to reach the best results when driving a hybrid electric, focus has to lie on maximizing driving time on electricity. In equal way, when driving a methane diesel truck, focus is on highest possible share of methane gas instead of diesel. Eco-driving with clean trucks is therefore different from the traditional eco-driving techniques. When it comes to

hybrid electric the challenge is not only to use the electric, but also to recharge the batteries most effectively.

At the introduction of new vehicle technologies and fuels, it is important the support systems for drivers and fleet owners have been developed in the vehicle. The drivers experience is very important to the success of the introduction of a new vehicle, and feedback on driving manners and also information on how the vehicle is functioning is crucial for the driver experience. In the hybrid electrics only a green light indicates the truck is running on electricity, and it is not possible to measure the level of electricity versus diesel (which also causes a dissemination problem for both the haulier and external activities like CleanTruck). The methane/diesel truck also has a light indicating gas operation to the driver. Also here it is not possible for any measuring of gas consumption – only diesel consumption is possible to follow.



Figure 5. Eco-driving support system

Eco-driving with ethanol ED95

The technique for driving green with an ethanol ED95 truck does not differ from a conventional diesel truck.

Eco-driving with hybrid electric

A hybrid electric truck does best running on electricity - not just from an environmental and noise perspective, but also from a cost perspective since electricity is cheaper than diesel and the hybridisation itself is a major added cost. The proportion of electricity becomes highest in drives with a lot of breaking (which recharges the batteries) and few stops. The vehicle also has to drive a little faster sometimes in order to charge the batteries. For the driver, there is a possibility to some extent of controlling this through a control for boost charging. This, however, increases the diesel consumption.

Eco-driving with methane/diesel

A methane/diesel truck is well suited to regional transport with few starts and stops, as the vehicle runs on diesel only at low speeds. A well-planned route with an even speed can sometimes show lower diesel consumption and a higher share of gas, in spite of a somewhat longer drive.

More on this subject was reported in the special deliverable on Heavy Eco-driving and Stakeholder Dialogue in September 2014. A revised version of this deliverable is available in Annex T4 – Sparsam körning/Heavy Eco Driving.

Action 7 Stakeholder dialogue

To create interest, trust and confidence in the project and in the new techniques promoted by the project, a large range of communication activities have been undertaken from the start of the project and these activities have continued during the project. Examples on communication activities during 2010 and 2013 are presented in the previous reports.

Table 2. Stakeholder dialogue

Date	Title of speech/stand	Event	Audience	National/international	Size of audience
2014- 02- 19	CleanTruck in Stockholm	CleanTruck breakfast meeting	Haulage companies, truck drivers, vehicle manufacturers	National	20
2014-08-19	The City of Stockholm delivers	Truck 2014	Haulage companies, truck drivers, vehicle manufacturers	National	100
2014-09-12	The City of Stockholm delivers	Swedish haulage association Fair	Haulage companies, truck drivers, vehicle manufacturers	National	100

Breakfast meetings

A recurring activity to keep a vivid dialogue with the participating hauliers in CleanTruck is our breakfast meetings. They occur whenever there is a specific topic to discuss, like the new strategy for clean vehicles and fuels in Stockholm, or at a regular basis during spring and fall. These meetings offer an opportunity to learn more on each other's experiences, on what is new and upcoming in politics or the market, or just discuss hot transport topics for the day. These meetings are also very valuable for the project to know more about what is functional or not, to ask on specific topics or to learn what would be valuable activities to continue focusing on.

Workshops

Over the years, CleanTruck has co-arranged seminars and workshops with different actors. In general, workshops are used to focus on a specific topic where the invited participants are expected to be active and contributing in the search of a possible solution or just to increase the common knowledge and understanding on that topic.

During 2013, two workshops have been arranged focusing on more sustainable goods transports.

First, a strategic, political level workshop for decision makers from both cargo owners, hauliers and property owners was arranged within the City of Stockholm. The aim was to open for a dialogue with market actors to increase the activity around city logistics in Stockholm.

Second, a workshop was arranged together with the business network Hagainitiativet, mainly representing transport service buyers, where CleanTruck participants mainly represented transport service sellers. The aim at this meeting was to let light on the common potential for climate smart road transports. With both performers and clients around the same table, many joint obstacles and opportunities were turned over and discussed. Interestingly, both sides saw the same keys lying in especially cooperation and dialogue.

During 2014 so arranged CleanTruck a breakfast seminar, and participate on seminar at Truck 2014 which is Scandinavia's largest trade fair for trucks and peripherals. Also attending were members of the project at smaller fairs during the year.

In January 2015 was held the final conference about CleanTruck with over 100 participants from all over Sweden, opener of conference was the Vice Mayor of Environment Katarina Luhr.

KNEG – a related collaborative aiming at climate neutral road haulage

KNEG, or Climate Neutral Road Haulage, is a national collaborative aiming at climate neutral road haulage by showing good examples of how the climate impact from road haulage might decrease through different measures. The initiative started in 2006 and has 14 members, of which OKQ8 is one, and focuses on transport efficiency, efficient fuel production, vehicle efficiency and increased use of renewable fuels. Experiences from CleanTruck is widely spread through for example the annual progress report of KNEG.

Policy framework review and political decisions based on lessons learned in CleanTruck

During the last few years sustainable goods transport has increasingly been addressed in the political debate in Sweden, at local as well as at national level. We would like to believe that the real life case study provided by the CleanTruck project has demonstrated that reduced fossil dependency is possible and also illustrated the need for a political leadership to develop the long-term and consistent policy framework that would enable a large scale transition towards sustainable goods transport solutions based on renewable fuels. Reference has often been made to CleanTruck and the experiences from the project. As an example of this, the City of Stockholm is now adopting a new strategy for clean vehicles and fuels. For the first time, heavy duty vehicles are addressed specifically, and based on the CleanTruck experiences.

The buyers of transportation services have proved an important stakeholder group throughout the project to be. It is a very heterogeneous group consisting of small and large organisations, of more or less transport intensity, of private and public sector, of local/regional, national and international goods streams. The common factor is they all crucially affect how the transports are being made. Obvious examples are where a haulier and their customer together have invested in clean trucks. More and more focus has been put on this issue in the project – examples are a wider focus within the City of Stockholm as one of those public sector buyers,

contribution to national recommendation on transportation procurement, a common workshop with a national sustainable business network etcetera.

Action 9 Monitoring & Evaluation

The Action is completed.

An Evaluation Plan for the project CleanTruck was finalised in late 2010, outlining key indicators, reporting intervals and responsibilities for collecting monitoring data. Data has been collected twice a year, through individual contacts with each haulage company, OKQ8 and AGA.

The data collection has unfortunately been more time consuming than anticipated and some of the data received has had insufficient quality. Surprisingly, in several cases not even the fuel consumption is monitored for each truck as a routine. To remedy this a lot of efforts have been made to discuss the required evaluation data with the hauliers.

To measure and analyse driver attitudes, two surveys have been developed: one to be handed out when the vehicle is just new, to capture the expectations of the drivers, and one to be filled after 3-6 months, to capture experiences and lessons learnt. The analysis of these surveys is made in Annex T3 – Driver attitudes and summarized in Chapter 5.3.

As mentioned earlier, several of the vehicle techniques were not ready for commercial launch at the time of project start in January 2010. The extended period for new vehicles to join the project, up to December 2013, was sufficient to achieve in total 50 vehicles (17 hybrid electrics, 15 Ethanol ED95, 18 methane/diesel).

The project results are presented in detail in Annex T1 - Evaluation Report and summarized in chapter 5.3 Evaluation of Project Implementation of this report.

Complementary action outside LIFE+

A Construction Consolidation Centre:

The Construction Consolidation Centre (CCC) is a part of the city's environmental goals for the new Stockholm Royal Seaport area. The goal is to reduce the environmental impact of transport and streamline materials management throughout the project area. The project has in its contract with the operator defined two broad objectives:

- "The purchaser's goal is that the CCC will be a spearhead in construction logistics."
- "The purchaser intends to promote research relating to construction logistics in order to use construction consolidation centre to create development in the industry."

The CCC in Stockholm Royal Seaport is a unique investment in the Swedish construction industry. The city will carefully monitor developments and conduct research in various areas to see what effects it generates. The vehicles used in the CCC are hybrid electrics also included in CleanTruck.

Off Peak Deliveries:

In June 2014, a pilot project for Off Peak deliveries, with a new silent electric hybrid truck, was launched. The aim is to exploit more hours of the day for deliveries.

The City of Stockholm has given an exemption from the ban on night transportation between 22.00 and 06.00 for heavy trucks to one hybrid electric truck that is included in the CleanTruck project. Initially three Lidl Stores in Stockholm are included. The project is collaboration between the City of Stockholm, Volvo Trucks, Lidl and Svebol Logistics. KTH University evaluate the project in the areas of noise, emissions and working environment.



Figure 6. Off Peak in the night time in Stockholm city centre

Outline the perspectives for continuing actions after the end of the project

The City of Stockholm has been appointed to lead GrowSmarter, a prestigious European project that will give European cities the opportunity to test smart, energy-efficient solutions.

The project GrowSmarter concerns how cities can use smart solutions to create more jobs and grow - while becoming more energy efficient and attractive to residents. Eight European cities have been selected as the "test cities", and first up is Stockholm, Barcelona and Cologne. Five other European cities then get the opportunity to test the smart solutions. The goal is that a lot of the technology to be spread out over Europe.

Stockholm, Barcelona and Cologne will now begin testing the latest in smart environmental technology. In Stockholm, the Årsta thoroughfare becomes a first testing ground. The old slaughterhouse area and Hammarby Sjöstad is also involved in the project, though on a

smaller scale. An overall goal is that energy consumption and emissions from transport will be reduced by 60 percent in the selected areas.

The project GrowSmarter is part of Horizon 2020, the EU Framework Programme for Research and Innovation. Read more about: Grow smarter and Horizon 2020 at
<http://www.grow-smarter.eu/home/>

See a movie about the Stockholm Royal Seaport CCC at
https://www.youtube.com/watch?v=uYg8qnI4wpg&feature=player_embedded#t=0

5.2 Dissemination actions

5.2.1 Objectives

The objectives of the communication plan within CleanTruck was objective of the communication plan within CleanTruck was to both support and contribute to the achievement of overall project objectives. Successful communication strategies often focus on three levels: internal project communications, local/regional/national communications and European/international communications. As internal project communications will be managed in Action 10 Project Management, the activities within Action 8 Dissemination focuses on external communications at the local/regional/national level and at the European/international level. The dissemination activities were planned to take place during the whole project period. Following this, the After-LIFE communication plan (Action 12) will be implemented (please refer to Annex D3).

5.2.2 Dissemination overview

The dissemination activities have taken place within Action 8 Dissemination. However, Action 8 Dissemination and Action 7 Stakeholder dialogue are naturally closely related and run in parallel.

MF has coordinated and lead the dissemination activities, based on considerable expertise and experience of communicating multi-stakeholder transport projects that demonstrate clean vehicles.

Local/regional/national communications

The activities of CleanTruck took place in the Stockholm area and therefore effective local and regional communication was especially important, both to inform citizens about the project and to reach out to stakeholders. Communications took a variety of forms, from networking events to articles in existing publications and media. A special edition of MF's Miljöbil newsletter titled "Clean trucks and fuels" was produced early in the project and disseminated to key stakeholders.

Stakeholders choose to participate in CleanTruck directly and actively (e.g. as transport company), indirectly and actively (e.g. a company hiring hauliers to transport goods on their behalf), or passively (e.g. a company willing to receive information and perhaps participate in meetings, but not ready to take the next steps). Information was designed to fit well to the differing needs of stakeholders whilst conveying the important messages, opportunities and experiences of CleanTruck. Information gained during Action 7 Stakeholder Dialogue was used further on to customise communications according to the needs of different target groups.

The Environment and Health Administration of the City of Stockholm (MF) knows from earlier projects that the operators of the first demonstration vehicles are very important actors who must be continually motivated, but can also be the ambassadors for the project.

Increasing public awareness of the impact of goods freight transport on the climate and urban environment and highlighting the potential of clean trucks may lead to increased consumer

pressure for clean supply chains. Such a development has stimulated to greater interest in CleanTruck.

Logos were displayed on all participating vehicles/equipment and notice boards displaying information about CleanTruck at relevant prominent locations at the filling stations. Beneficiaries have established webpages about the project on their existing websites.

European/international communication

The project, its scope, design, participants and objectives was described in the existing channels and formats that LIFE+ provides. Furthermore, project participants and ambassadors played a central role in disseminating project results across their European networks.

Both AGA and OKQ8 are international companies and disseminated CleanTruck information via their internal company networks. AGA is a part of Linde Gas and OKQ8 is part-owned by Kuwait Petroleum International. Both companies have international affiliates and together the companies are represented in most EU nations.

CleanTruck also used existing international networks (such as ICLEI, Eurocities and WBCSD), relevant organisations dealing with clean transport and/or environment (e.g. POLIS) and specific projects (e.g. Biofuel Cities, Catalyst, CIVITAS, BEST, and Biogasmax). Project participants and ambassadors played a central role in disseminating project results across their European networks.

MF and the Clean Vehicles group, together with AGA and OKQ8, frequently welcomed international delegations on study tours of the city's ethanol and biomethane operations. Moreover, the City and partners have been invited to present this work at international conferences. Both study tours and conferences provided opportunities to inform wider audiences about the results of CleanTruck.

The project has produced a printed summary of the final report in English and Swedish in an accessible, easy-to-read style. This report includes evaluation of key project results.

CleanTruck symbol and Life+ logo on participating vehicles and equipment

All equipment and vehicles financed within the project are “branded” with CleanTruck symbol and with Life+ logo. To make it easy for companies to comply with these requirements the project has offered two possibilities: either to acquire Life+ and CleanTruck stickers from the project, or to download the logos and symbols to include them in their own design following the guidance from the project. Information has been accessible to design agencies etc, all to make this easy to implement for each individual company.



Figure 7. *Stickers provided by the project*

Participating companies could choose between applying stickers provided by the project on their vehicles and other equipment, or include project symbol and Life+ logo in their own design.

Study visits

Clean Vehicles in Stockholm has welcomed groups on study visits, sometimes for a presentation and sometimes also for on-site visits.

During 2014 the City of Stockholm welcomed City of Trondheim and presented the CleanTruck project as well as the general clean vehicle project.

Study visits during 2010-2013 have been described in previous CleanTruck reports, e.g. Progress Report 2, December 2013.



Figure 8. Example of company-own design and message on the clean truck - including project symbol (in the real life also life+ sticker is added on the vehicles)

The project website: www.stockholm.se/cleantruck

The website www.stockholm.se/cleantruck is up and running since early 2010. The site has been continuously updated as the project progressed. A summary description of the project in English is provided. The detailed information is provided in Swedish, as most users are expected to be Swedish and based in the Stockholm region. The page provides project related information and previously also application forms for joining the project.

Website with information on clean vehicles in Sweden: www.miljofordon.se

The website [miljofordon.se](http://www.miljofordon.se) was launched in 2003 as a result of the collaboration between the three largest cities in Sweden: Stockholm, Gothenburg and Malmö. The website is run by Stockholm and Malmö together. The site provides independent information on vehicles

classified as “clean vehicles” according to the Swedish legislation, based on data from the vehicle providers. The aim is to facilitate for a vehicle procurer to select an environmentally smart vehicle by compiling all relevant data in one place and thereby allow a fair comparison between different brands and models. The site has focused on passenger cars.

Information from the CleanTruck project has been used to develop an improved version of miljofordon.se with more comprehensive information on clean heavy duty vehicles.

Newsletter: Clean Vehicles in Stockholm

The city of Stockholm started the newsletter *Clean Vehicles in Stockholm* in 2000 to spread news and information about clean vehicles and the work of the city to support the introduction of clean vehicles in Stockholm. The CleanTruck project and examples from project related activities have continuously reported on in the newsletter. 2014.

Visitor statistics and number of subscribers during 2010-2013 have been reported in previous CleanTruck reports, e.g. Progress Report 2, December 2013.

Table 3. *Visitors at websites and subscribers of newsletter*

Year	Name of website / newsletter			
	www.stockholm.se/miljobilar incl.../cleantruck	www.miljofordon.se	Newsletter Clean Vehicles in Stockholm	IDS Newsletter
2014	~ 5400 visitors/year	~ 172 000 visitors/year	~ 3700 subscribers 4 times/year + online downloads	2500 x 8 times/year

Articles in different magazines and newsletters, websites e.g.

Articles in different magazines and newsletters, websites e.g. during 2014 are presented in Chapter 7.3 Dissemination annexes. . Similar activities during 2010-2013 have been described in previous CleanTruck reports, e.g. Progress Report 2, December 2013. Please refer to Annexes D4 to D19 for the dissemination annexes with examples of articles etc.

Films

The CleanTruck project decided to produce a 2.5 minute YouTube video on Swedish and English to describe briefly the CleanTruck project's vital parts. In order to meet the information needs that currently exist, and meet new readers and disseminators, the films have been viewed over 600 times (March 2015) (Annexes D17 and D18).

Presentations at conferences and seminars

Presentations at conferences and seminars during 2014 are listed in the table below. Similar activities during 2010-2013 have been reported in previous CleanTruck reports, e.g. Progress Report 2, December 2013.

Table 4. *Presentations at conferences and seminars during 2014 and beginning of 2015*

Time	Title of speech	Event	Audience	
2014-08-23	<i>Stockholm Delivers</i>	<i>Truck 2014 Exhibition, Elimä, Jönköping</i>	<i>Hauliers, freight forwarders vehicle manufacturers</i>	<i>National</i>
2014-09-12	<i>Stockholm Delivers</i>	<i>Swedish haulage company's exhibition</i>	<i>Hauliers, freight forwarders vehicle manufacturers</i>	<i>Lokal Stockholm Area</i>
2015-01-06	<i>CleanTruck Results</i>	<i>VTI transport forum in Linköping</i>	<i>Researchers, national authorities, City authorities</i>	<i>National</i>
2015-01-27	<i>CleanTruck Results</i>	<i>CleanTruck Final Conference, Stockholm</i>	<i>Hauliers, freight forwarders vehicle manufacturers, City authorities, oil & energy company</i>	<i>National</i>

Advertising

During 2014 have not the CleanTruck project done advertising in newspapers, previously advertising have been described in previous CleanTruck reports, e.g. Progress Report 2, December 2013

Other dissemination material

A card that is distributed to the consignees of goods delivered in CleanTruck vehicles with information about the vehicles and the project.

This card was distributed to all participating companies. The purpose with the card is that the driver shall hand it over when delivering the goods thus raising awareness to the fact that the delivery was done with a CleanTruck.

5.3 Evaluation of Project Implementation

Table 5. *Evaluation of project implementation*

Action	Foreseen in the revised proposal	Achieved	Evaluation
1: Ethanol ED95 fuel station	The fuel station will supply ethanol in ED95 blend to 13-33 vehicles operating within CleanTruck.	Within CleanTruck, the world's first public filling station for ED95 opened in Jordbro. There has also been an opportunity for companies to themselves have a private filling solution in cooperation with SEKAB. Refrigerated transport provider Kyl- och Frysexpressen is the only company that chose to invest in ED95 trucks in the scope of CleanTruck and currently has a total of 15 trucks.	The ED95 fuel plant has been functioning. It has been tested in commercial operation, it has been evaluated from many perspectives, and OKQ8 have been able to set a standard for the Swedish market for a new drip-free refuelling nozzle. During six months in 2013 the fuel station was out of order. There was fuel in the storage tank but it was not possible to pump it up to the nozzle. The problem was however solved and the fuel station has been in operation without problems since then.
2: Biomethane fuel station	The fuel pump will supply biomethane for use in dual-fuel trucks to 15-28 vehicles operating within CleanTruck.	CleanTruck has contributed to a filling station for liquid and compressed gas adapted for heavy traffic in Älvsjö. CleanTruck has resulted in 18 methane diesel trucks at 11 transport companies in the Stockholm region. All of the vehicles use compressed gas.	Several challenges were identified during feasibility and building phase, relating to the fact that this is new technique. The lack of standardised solutions and norms creates uncertainties with regards to time requirements and budgeting. One example is the permit procedure for flammable products which became far more extensive than what was initially indicated.
3: LIC filling stations and LIC aggregate	The pumps will provide LIC to heavy vehicles	Within the scope of CleanTruck, a total of five trucks have installed LIC units. Through CleanTruck two filling stations have been able to be built - in	Both filling stations in Kungens Kurva and Jordbro were delayed mainly due to unexpected difficulties related to the lease agreements with

Action	Foreseen in the revised proposal	Achieved	Evaluation
		Kungens Kurva and in Jordbro. Outside the Stockholm region, there are another eight filling stations for the coolant.	involved land owners. There were also some initial technical problems with the telecommunication system for the payment device. All these problems were solved.
4: N2 filling stations	4 pumps will provide nitrogen vehicles	Within the scope of CleanTruck, four tire service stations at Däckia were equipped with equipment to fill tires with nitrogen gas. The equipment is in Farsta, Spånga, Arlandastad and Vallentuna.	The training of staff at Däckia was carried out in December 2011 and the filling stations were operational immediately after that. Support has been given to the stations by Däckia. AGA has had contact with the stations thru visits during 2012 and supporting with customer prospects and information material during 2013.
5: Clean trucks for distribution	Procurement of 46-73 clean trucks by various companies in Stockholm. 13-33 of these trucks will run on ethanol ED95, 15-28 on biomethane in dual-fuel systems and 13-16 will be electric-hybrid. The final distribution per vehicle type will depend on market demand. Companies procuring these vehicles undertake to employ a range of measures specified by the project	A total of 50 clean trucks have been procured within the project – 17 electric hybrids, 15 ethanol ED95 and 18 methane/diesel by 18 private transport companies.	The experiences from the operation of the 50 clean trucks are summarized below and described more in detail in the Evaluation Report.

Action	Foreseen in the revised proposal	Achieved	Evaluation
	coordinator (i.e. CO2 aggregate, nitrogen in tires, Heavy Eco-driving, etc).		
6: Heavy Eco-driving	At least 100 drivers will be trained in Heavy-Eco driving	In the project have eight (8) drivers educated in eco-driving. 22 trucks in the CleanTruck project have been retrofitted equipment for driver support in eco-driving. 43 drivers have been trained on the equipment and use it daily in their work	Eco-driving has shown to reduce fuel consumption substantially. The average driver reduces the consumption 10-15% already after the first training session. The CleanTruck project focus was on getting the drivers to use the highest proportion of fossil-free energy and this is different from the traditional eco-driving techniques with conventional trucks.
7: Stakeholder dialogue	Stakeholder dialogue with fleet managers, drivers, other cities and companies others	A large range of dialogue activities have been undertaken from the start of the project and these activities have continued during the project.	The evaluations of activities directed towards stakeholders are described more in detail in chapter 5.1 Technical progress, per task.
8: Dissemination	The objective of the dissemination within CleanTruck was to both support and contribute to the achievement of overall project objectives using communication strategies focused on internal project communications, local/regional/national communications	The objective has been achieved. Examples are: Webpages Newsletter Information on available truck models and clean fuels Project information published in existing newsletters Layman's report published in Swedish and English (Annexes D1 and D2) Presentation of	The dissemination activities are summarized more in detail in chapter 5.2 Dissemination actions. Please also refer to Annexes D1 to D19)

Action	Foreseen in the revised proposal	Achieved	Evaluation
	and European as well as international dissemination.	experiences at several international and national conferences Study visit concept developed Contributions to newsletters/websites published by stakeholders	
9: Monitoring & Evaluation	Completion of Evaluation Report	An Evaluation Plan for the project CleanTruck was finalized in late 2010, outlining key indicators, reporting intervals and responsibilities for collecting monitoring data. Data has been collected twice a year, through individual contacts with each haulage company, OKQ8 and AGA.	The project results are discussed below and they are presented in the Evaluation Report and in chapter 5.3 Evaluation of Project Implementation.
10: Project Management	The objective was to have an efficient and transparent project management in order to deliver all reports on time and achieve the milestones on schedule.	The project was delayed but the overall objectives have been achieved.	The project management is discussed below and in chapter 4.2 Evaluation of the management system
11: Audit	Project complies with relevant regulations	Achieved	The Audit report is attached to the Final Report (Annex F20)
12: After-LIFE Communication plan	The dissemination activities taking place during the project period will be followed by the actions described in the After-LIFE communication plan.	The After-LIFE Communication plan is attached to the Final Report (Annex D3)	

Success and failures of the methodology applied, results of actions conducted and the cost-efficiency of actions

During the project, there was an opportunity for interested transport companies to obtain compensation for the higher purchase price of the clean trucks. The compensation was provided by EU Life+, Vinnova and the Swedish Energy Agency and amounted to 50 per cent of the incremental costs compared with a conventional diesel truck, though maximised to SEK 50,000 per ethanol truck, SEK 300,000 per hybrid electric truck and SEK 125,000 per methane/diesel truck. In addition, CleanTruck contributed SEK 6,400 to purchases of refrigeration units for LIC refrigeration and SEK 2,800 for training in economical driving or for the purchase of technical equipment for economical driving.

Distributors and transport buyers

CleanTruck has shown that collaboration creates conditions for win-win situations where transport buyers, goods owners and distributors can find profitability in investing in clean trucks. Worth mentioning in this context are ICA and Kyl- och Frysexpressen, Lidl and Svebol Logistic as well as the City of Stockholm through the construction consolidation centre in the Royal Seaport and Wiklunds åkeri.

Consumer requirements, often driven by an active CSR engagement, are a driving force which may foster a development towards more sustainable transports. There is a major commercial value in offering an environmentally good alternative, which has been obvious through CleanTruck.

Long-term agreements are beneficial for investments in clean trucks. The overall economy does not rest in the vehicle cost, but rather in the transport agreements.

Worth mentioning are also the companies participating in CleanTruck who did not have any customer requirements or investment costs shared. These businesses took the investments as part of their responsibility for the climate and local environment, hoping to be rewarded for this engagement by future customers and development. Among these are OLAB and Marko Kaj Moving.

Not all clean trucks fit all assignments. The advice is to be careful in identifying the transport assignment before choosing vehicle technology and fuel.

Attitude surveys in the project show that the internal driving forces for the investment in clean trucks increase the longer the trucks have been in operation. The project has identified that when the environmental efforts permeate operations, acceptance for the environmental efforts increase radically and that growing numbers of transport companies want to be on the forefront for future business opportunities. Driving a clean truck also raises public awareness about saving resources, for instance by driving more economically.

Many transport companies, as well as goods owners, have borne witness that the networking in CleanTruck has given them impulses to go further in their own environmental efforts, which have been as important as the hardware.

Authorities and decision makers

When new products are introduced on the market, it may be difficult for authorities concerned and permit issuers to find reference materials to base decisions on.

In CleanTruck, this was true for the introduction of the infrastructure for ED95 and liquified gas (LNG/LBG). The filling station for liquified gas had a strong delay. This affected the introduction of methane/diesel trucks with liquified gas. Through CleanTruck, there are now prepared materials and experiences to use in establishments of these fuels.

It is of great importance that the infrastructure investments are made and that municipalities and the business community hasten the inevitable development towards a more renewable transport sector.

A growing population and trade entail a greater need for transports of goods into the city - and a corresponding increase in waste out from the city. Just as with public transport, it is important that society plans for this necessary distribution traffic.

Long-term thinking and well-established playing rules mean everything to achieving the objective of a fossil-free vehicle fleet. In the course of the project, the playing rules have changed considerably. One positive aspect was the introduction of the vocational competence certificate for professional drivers with compulsory economical driving. Among the more problematic aspects were the uncertain decisions on tax rules for renewable fuels and quota obligations.

It is important that work continues on developing certified emissions values for trucks, which would open up for example for clean truck premiums and bonus-malus systems.

Vehicle manufacturers

The vehicle technologies in CleanTruck were new on the market and were introduced in small volumes.

Support systems were therefore not adapted to the clean trucks' conditions and therefore have not been able to be fully used. In general, the drivers have been able to obtain information about their driving, but the follow-up of fuel consumption and driver behaviour by fuel type have not worked properly. It is hence likely that there is unutilised potential for further efficiency enhancements.

In CleanTruck, the relationship to the truck manufacturers and their general agents has been very good. The contact with the manufacturer's dealer network has been more difficult. The truck salespeople working in the dealer network are the closest to the users of trucks and the ones who can really make a difference in terms of the introduction of clean trucks.

Compare the results achieved against the objectives: clearly assess whether the objectives were met and describe the successes and lessons learned.

CleanTruck had the objective of reducing harmful emissions with:

- 3,345 tonnes of carbon dioxide equivalents
- 17 tonnes of nitrogen oxides
- 240 kg particulates (PM2.5 and smaller)

The project has met the objective: in the period 2010–2014 carbon dioxide emissions were reduced by 3,400 tonnes of CO₂equivalents through CleanTruck.

Nitrogen oxides and particulates could, however, not be calculated since special measurements were not within the scope of the project. However, all trucks in CleanTruck meet the requirements for Euro V, and ED95 trucks and hybrid electric trucks also meet the

requirements for EEV, which sets somewhat stricter requirements for nitrogen oxides and particulates. Hybrid electric trucks and the quiet liquid carbon dioxide (LIC) aggregates also helped reduce noise in the city.

CleanTruck is concluded in a situation where the project to some extent is back to square one. The next emission class, Euro VI, became a requirement at the end of 2013 and today, none of the vehicle technologies included in the project can be ordered (even if the truck manufacturers believe that several of the technologies will rebound).

The future for renewable fuels is also very uncertain. Required quotas, taxes and uncertainty about sustainability requirements and other regulations have put a major damper on investments in both fuel production and infrastructure for renewable fuels.

The ethanol trucks in the CleanTruck project have worked very well and are the ones with the highest carbon dioxide savings. There is still a strong scepticism towards ethanol for both light and heavy trucks, despite extensive work on traceability, sustainability and a high degree of climate benefit including low emissions levels.

The entry of hybrid electric trucks into the market is interesting from many perspectives. The project established that the carbon dioxide reduction might not be at the top, but the vehicles have other qualities, that are well suited to a city environment, such as night traffic and transportation where low noise is a requirement. Hybridisation is now also growing for truck equipment, which further reduces the emissions of carbon dioxide.

Vehicle gas is a good fuel with very high sustainability performance. In the project, the methane/diesel trucks had a varying carbon dioxide reduction (0-41 per cent depending on driving cycle). The results show that this kind of vehicle is best suited to regional transport assignments from an environmental perspective.

At the same time, advancements have been made for other renewable fuels. There are several models of Euro VI approved for 100 per cent biodiesel (FAME/RME). The renewable low mixture in Swedish standard diesel (MK1 B5/7) of Fatty Acid Methyl Esters (FAME) and Hydrotreated Vegetable Oil (HVO) has increased substantially compared with the situation in the beginning of the project. Even 100 per cent renewable HVO-diesel is now in commercial operation. An important point is that conventional diesel trucks are used, minimising the added expense and reducing the thresholds for hauliers.

With CleanTruck, the City of Stockholm has taken an important step forward in terms of clean trucks. Among other things, the City has decided on a definition for clean trucks together with the City of Gothenburg. The City of Stockholm has also set the goal that 100 per cent of its own vehicles will be fossil free, 55 per cent of procured transport services will be fossil free and 10 per cent of new truck sales in the county will be clean trucks.

CleanTruck is an important step on the way to show the possibilities for more sustainable, fossil-free goods transports in the city environment. There is a need for continued work in the footsteps of CleanTruck with financial support and shared technical evaluation.

Hauliers cannot themselves take the entire responsibility to convert to a clean truck fleet. In order for it to be a real transition, the introduction of new, alternative technology must be stimulated by various stakeholders.

Indicate which project results have been immediately visible and which results will only become apparent after a certain time period.

18 private transport companies participated in the project. In total, the participating companies purchased 50 clean trucks and five refrigeration units for LIC. The trucks were used for waste collection, construction and goods and product distribution in Stockholm.

ED95 in CleanTruck

Within CleanTruck, the world's first public filling station for ED95 opened in Jordbro in the Municipality of Haninge where many logistics companies are located. There has also been an opportunity for companies to themselves have a private filling solution in cooperation with SEKAB.

Refrigerated transport provider Kyl- och Frysexpressen is the only company that chose to invest in ED95 trucks in the scope of CleanTruck and currently has a total of 15 trucks.

The ED95 trucks...

- reduce CO₂eq by 68 per cent compared with conventional diesel trucks
- have an extra cost of SEK 100,000 compared with a conventional diesel truck
- are best suited for city distribution
- have covered between 22,000 and 310,000 km, which is 2,000,000 km in total.

The methane/diesel trucks in CleanTruck

CleanTruck has resulted in 18 methane/diesel trucks at 11 transport companies in the Stockholm region. All of the vehicles use compressed gas.

The first methane/diesel trucks in CleanTruck were delivered in spring 2010 and some were also included in a large field test conducted by Volvo. The truck was put into regular production in 2011 and began to be delivered in the latter part of 2011.

The vehicle has functioned well and the participating companies are generally very satisfied. The drivers do not perceive it to be a problem to fill two different fuels - as long as there is a good supply of vehicle gas. On the other hand, the vehicle can run on diesel alone, in the event of a gas shortage, which decreases the vulnerability substantially.

Methane/diesel trucks...

- reduce CO₂eq by between 0 and 41 per cent compared with conventional diesel trucks
- have an extra cost of SEK 250,000 compared with a conventional diesel truck
- Are best suited for long-distance and regional transport
- Are less suited for city transport with short driving cycles including many starts and stops
- Have covered between 80,000 and 600,000 km, which is 1,470,000 km in total.

Hybrid electric trucks in CleanTruck

Interest in hybrid electric trucks was initially very low among the CleanTruck companies, mainly due to the high additional cost compared with conventional trucks. The project then raised the compensation from SEK 100,000 to SEK 300,000 which provided results. More and more companies became interested in the technology and ultimately, a total of 10 transport companies invested in 17 hybrid electric trucks from Volvo, Mercedes-Benz and DAF.

In CleanTruck, the hybrid electric trucks were used in varying transport assignments; waste collection, goods deliveries, building logistics, Truck-Mounted-Attenuator (TMA) service

vehicles for goods deliveries at night (Off Peak). It has been good for the evaluation to get reports on so many vehicles in a wide range of transport assignments.

17 trucks: 8 DAF 160 hp, 2 Mercedes 218 hp, 7 Volvo 306/336 hp. 15 two-axle trucks, 3 bogie trucks. The payload capacity varies from 3.7 to 13.9 tonnes.

The hybrid electric trucks...

- reduce CO₂eq by 15 per cent compared with conventional diesel trucks³
- have an extra cost of SEK 600,000 compared with a conventional diesel truck
- are best suited to city distribution and where low noise levels are required
- have covered between 220 and 98,000 km, which is 610,000 km in total
- require that the vehicle runs both at even and high speed with a lot of breaking to charge the batteries, and drive slow with as few starts as possible in order to achieve the goal of maximal use of electrical operations.

If relevant, clearly indicate how a project amendment led to the results achieved and what would have been different if the amendment had not been agreed upon.

At the project application the goal was to get 80 clean trucks in Stockholm. Various circumstances such as late truck introductions and higher expenses made the CleanTruck project request an amendment to about 60 clean trucks. A total of 50 clean trucks have been procured within the project – 17 electric hybrids, 15 ethanol ED95 and 18 methane/diesel. The trucks are distributed as described in Table 1. The amendment made it possible to increase the number of purchased vehicles in CleanTruck and to prolong the evaluation period. Without the amendment there would have been fewer clean vehicles in operation and less operating experiences.

Indicate effectiveness of the dissemination and comment on any major drawbacks

CleanTruck project has had a major impact among Stockholm trucking companies and the City of Stockholm has taken important decisions to increase the proportion of clean trucks in the city.

The late introduction of electric hybrid trucks have led to the evaluation time for these is not as long as for other vehicles in the project.

Although a lot of work was done to introduce ethanol trucks to the market, only one company choose this technique, and it's better for evaluating if more (different) hauliers chosen the technology.

The fact that it was not possible to measure the electricity used in the hybrid electrics and the gas used in the methane/diesels was a drawback evaluation-wise.

³ Fuel consumption in Hybrid electric trucks does not correlate to known variables, such as permitted load, stated tonnage, automatic/manual gear box, bogies/single-axle, length, bodywork or engine size. The most likely is that the traffic rhythm on the route driven and the individual driving style are what most determine the carbon dioxide savings for hybrid electric trucks.

5.4 Analysis of long-term benefits

The carbon dioxide emissions from car traffic are decreasing, but for heavy duty traffic, the trend does not look as positive - the emissions of carbon dioxide are increasing due to a growing amount of transports. In the City of Stockholm, heavy traffic accounts for 4 per cent of the traffic measured as vehicle-kilometres, but for 23 per cent of the emissions (2013).

From 1990 to 2010, the emissions of greenhouse gases from heavy vehicles increased by 44 per cent. At the same time, the share of clean trucks was negligible. Something had to be done to break this negative trend

The CleanTruck project demonstrates with the use of three truck techniques of heavy duty vehicles, how to reduce fossil fuel dependency in road freight transports.

CleanTruck shows the importance of the right transportation concept (including motor technique, fuel and equipment etc.) at the right place and cooperation between all actors, vehicle and fuel suppliers, customers and society, hauliers and drivers.

CleanTruck clarifies the need for political leadership and that long-term and consistent policy is needed to enable large-scale transition to sustainable freight transport solutions where availability to renewable fuels is fundamental. Sustainable transports are of great need for a sustainable society and the project is an important and useful reference for national and local strategy.

"A great deal has been done in terms of incentives on the car side, but they are almost non-existent on the heavy vehicle side. So these kinds of projects are needed; they are important to take the first steps. But they need to be followed up and supplemented with overall incentives to bring about more energy-efficient vehicles and to increase the use of renewable energy. I think the central components of this kind of project are demonstration and procurement, especially when it concerns vehicles that go into the city."

Håkan Johansson, National Coordinator Climate Issues, Swedish Transport Administration

With CleanTruck, the City of Stockholm has taken an important step forward in terms of clean trucks. Among other things, the City has decided on a definition for clean trucks together with the City of Gothenburg. The City of Stockholm has also set the goal that 100 per cent of its own vehicles will be fossilfree, 55 per cent of procured transport services will be fossil free and 10 per cent of new truck sales in the Stockholm area will be clean trucks.

CleanTruck had the focus on enabling clean trucks in Stockholm, that mean that fuel suppliers, vehicle manufacturers and fleet operators together have increased their rate of investment in sectors that are better for the environment. The debate in society has shifted from traditional transport to more environmentally friendly transport on commercial terms. CleanTruck has also led to the development of other environmentally friendly fuels and vehicle technologies have a better commercial impact.

"There are national environmental targets on doing away with fossil fuels. Consequently, it's good that a project like CleanTruck brings up examples of sustainable alternatives to get a less fossil dependent vehicle fleet. CleanTruck is important as it points out alternatives, it points out research and it points out what is actually doable. But the buyers of transports also have a lot of power in being involved and making a change; this needs to be something the

customers demand in order to be done in a commercial manner. I think that those who choose to adapt who adopt environmental thinking and try to meet the customers' demands, are the ones who will be the long term winners."

Torbjörn Heierson, Regional Manager, Swedish Association of Road Transport Companies

It is very important that the work with vehicle environment continue in Stockholm to reduce emissions of particulates and nitrogen oxides to create a pleasant and friendly city to live in, and here is the possibility for truck transport to switching to more environmentally friendly modes of crucial importance. The city of Stockholm has now aims to reduce the total CO2 emissions of 3 tons per capita to 2.3 tonnes per capita (2015-2019) and the goods traffic is unimportant sector to reduce emissions of CO2.

The city of Stockholm is now continuing with GrowSmarter, city logistics, off-peak project and co-transportation projects where several members of the CleanTruck project is involved.

CleanTruck constituted an important link between research and development and a full-scale introduction of new environmentally adapted technologies, new filling stations for alternative fuels, filling stations for LIC and equipment for the inflation of tyres with nitrogen gas. The aim of the project was to demonstrate how carbon dioxide emissions and other emissions from the goods transport sector can be reduced by introducing new technologies in heavy vehicles for urban distribution. The project's experiences should be of sufficient interest to inspire more efforts of a similar nature.

CleanTruck has shown in a good way that when clean trucks, infrastructure and fuel implemented at the same time you have the best effect.

Environmental Trucks and infrastructure for fossilfree fuels are more expensive to set up than conventional trucks and fuel and need to be helped into the market. Projects like CleanTruck are valuable to show the market it can function with a contribution to interested hauliers and fuel companies. A project like CleanTruck is followed with interest by other stakeholders, and project knowledge and results will be valuable in other projects for many years to come.

CleanTruck has shown that collaboration creates conditions for win-win situations where transport buyers, goods owners and distributors can find profitability in investing in clean trucks.

- Long-term agreements are beneficial for investments in clean trucks. The overall economy does not rest in the vehicle cost, but rather in the agreements of transports.
- Not all clean trucks fit all assignments. The advice are identifying the transport very well before choosing vehicle technology and fuel
- Consumer requirements are a driving force which may foster a development towards more sustainable transports (CSR) – there is a major commercial value in offering an environmentally good alternative.
- It is many stakeholders and it is the classic chicken-and-egg principle. Who will go first? Vehicle manufacturers who develop a truck that, is it the customers who demand it and want to buy them, or is it the fuel companies that will set up the infrastructure to be able to fill the tanks? Everything has to happen at the same time.

Attitude surveys in the project show that the internal driving forces for the investment in clean trucks increase the longer the trucks have been in operation. The project has identified that

when the environmental efforts permeate operations, acceptance for the environmental efforts increase radically and that growing numbers of transport companies want to be on the forefront for future business opportunities. Driving a clean truck also raises public awareness about saving resources, for instance by driving more economically.

Many transport companies, as well as goods owners, have borne witness that the networking in CleanTruck has given them impulses to go further in their own environmental efforts, which have been as important as the hardware.

The EU wants to harmonize instruments and therefore it is reasonable to assume that the current tax exemption for renewable fuels will be replaced by a quota or similar. This currently has a major impact on investment in renewable fuels as well as infrastructure.

Another EU policy contentious issue that can have a direct impact on the production of renewable fuels are ILUC-proposal (Indirect land use change), advocating the EU to restrict the use of biofuels from agricultural crops, and it can have a direct impact in the future on access of biofuels.

However, as mentioned by many representatives from the haulage companies and from large transport buyers, the policy framework at national and EU level is critical in ensuring a competitive situation for sustainable goods transport modes. This includes issues such as taxation systems for fuels, vehicles, energy and CO₂, local and national traffic rules, as well as the level of policing of the regulations that already exist.

6 Comments on the financial report

In addition to the information presented below, see chapter 8. Further information and certificates can be seen in the financial annexes F1-F20. In annexes F6, F17 and F18 three letters of memorandum - financial issues are attached. Annexes F7-F16 and F19 relates to these three letters.

6.1. Summary of Costs Incurred

PROJECT COSTS INCURRED			
Cost category	Budget according to the grant agreement*	Costs incurred within the project duration	%**
1. Personnel	847 298	901 277	106
2. Travel	20 417	4 821	24
3. External assistance	346 032	408 003	118
4. Durables: total <u>non-depreciated cost</u>			
- <i>Infrastructure sub-tot.</i>	1 253 763	1 495 557	114
- <i>Equipment sub-tot.</i>	17 204	0	0
- <i>Prototypes sub-tot.</i>			
5. Consumables	1 613	1 876	116
6. Other costs	855 484	926 642	108
7. Overheads	167 502	183 560	110
TOTAL	3 509 313	3 924 558	112

*) If the Commission has officially approved a budget modification indicate the breakdown of the revised budget
Otherwise this should be the budget in the original grant agreement.

**) Calculate the percentages by budget lines: e.g. the % of the budgeted personnel costs that were actually incurred

Comments on the budget lines:

Personnel costs: Ended up over budget, since the project were prolonged for one year.

Travels: Most trips have been national. In some cases, the beneficiaries have been reimbursed for the expenses of trip when they have been seminar holders. AGA and OKQ8 have not reported every CleanTruck related trip on the project due to their administrative routines.

External assistance: The cost for risk analysis concerning the biomethan fuel station has exceeded the budget, as well as the support of the project management. The latter due to the prolongation of the project period. A short film about CleanTruck's result has also been produced.

Infrastructure: The main reason for the exceedance is the construction of AGA's gas station. The budget did not include equipment to fuel liquid LNG. Due to this miscalculation, and the great exceedance of the budget, AGA has only reported 75% of the actual costs incurred.

Other costs: Two national institutes (Vinnova and Energimyndigheten) have been co-financers of the trucks. Their share of the support was 50 % at the time of application, but due to the fall of the euro, their share has increased.

Consumables: The budget was quite low, and overdrawn by about 200 euros until 2013. Since then, the consumable costs have not been reported. Several stakeholder meetings have been held.

Overheads: Has been calculated as 7 % of the costs incurred.

6.2. Accounting system

Time registration systems

MF

The Environment and Health Administration (MF), uses a web-based system called Agresso to keep track of all working time for each employee, specified at project, and most often also at sub-project level. For CleanTruck, six sub-projects were created. These sub-projects follow the action plan - action five to ten. In Agresso the project codes for CleanTruck are:

0620 – Action 5 Clean trucks for distribution
0621 – Action 6 Heavy eco driving
0622 – Action 7 Stakeholder dialogue
0623 - Action 8 Dissemination
0624 – Action 9 Monitoring and evaluation
0625 – Action 10 Project Management

The employee reports his or her project time, internal time (department meetings and such) and absent time into Agresso. After the employee has approved of and saved the report, only one person, the system manager, can make changes and corrections in Agresso.

Once a week, if the time registration is not complete, a reminder is sent by the Agresso system to the employee.

Once a month, the CleanTruck administrator prints out time sheets from Agresso to excel. These are then signed by the employee and the head of department.

The cost per action statement in chapter 6.5 generally follows the action codes for the time reported in the Agresso system. Although for action 8, 9 and 10 some correlations have been done, due to an estimated over-registration on action 10.

AGA

Today all employed at AGA AB (AGA) time report electronically in Notes. However, there have been no codes for CleanTruck projects in Notes. All time spent on the CleanTruck projects have been reported manually, to the line manager. Subsequently, the line manager has approved. AGA uses the Life+ timesheets templates.

OKQ8 payroll accounting system

OKQ8/IDS AB (OKQ8) uses Flex, a time management system. All employees have access to their time record through Internet and a special portal to Flex. Every month the reports are approved by the employee and authorised by his or her manager. The manager signs the report electronically. If not approved and authorised no salary can be paid. All information is transferred to the internal system Hogia.

In the time management system all employees report if they have been absent for any reason. In the system, a specific time account is dedicated for CleanTruck. The time management system also produces the total number of annual working hours (i.e. time spent on CleanTruck as well as other work) for each person.

It is possible to extract and print records indicating when and by whom the working hours for each person has been approved and authorised.

The payroll system Hogia, will update G/L with a journal voucher each month.

Accounting Systems

MF

Agresso is also used as accounting system of costs and incomes. Transactions concerning the CleanTruck project are coded in the same way as the time:

0620 – Action 5 Clean trucks for distribution
0621 – Action 6 Heavy eco driving
0622 – Action 7 Stakeholder dialogue
0623 – Action 8 Dissemination
0624 – Action 9 Monitoring and evaluation
0625 – Action 10 Project Management

All invoices that are sent to MF should have a reference person or/and a project reference. These references shall be given by the person in charge of the purchase.

All invoices are scanned and put into the Agresso system. The accounting assistants (one or two assistants at each department) receive the invoices digitally through a web link sent by e-mail. The assistants digitally assign account codes and project codes and the invoice is thereafter sent to and certified by the person in charge of the purchase. Finally the invoice and cost is certified by the authorized manager. All attestations are made digitally. All invoices are then saved in Agresso, linked to each cost and account.

For some expenditures (16 expenditures, approximately 24 000 euros) the consolidated cost per action statement does not completely follow these Agresso codes. The statement is a best possible estimation. There are sometimes difficulties in determining whether an expense is related to stake holder dialogue or project management, or if it should be counted as dissemination cost or a stakeholder dialogue cost etc. In the Financial statement for MF, see annex F3 and the excel file in annex F1b, the cost allocation and calculation is transparent.

AGA

AGA, which is part of the Linde Group uses today SRM purchasing system.

Before sending an invoice, the supplier must have a purchase order number which he/she writes on the invoice. Without the number the system cannot receive the invoice and will return it to the supplier. That results in that only confirmed orders can get into the system and get accepted and paid for.

It is up to each project leader to add right invoice to correct project. Continuously during the projects, the project leaders reports to the steering group how the project develops, they follow budget and time schedule etc. This has also been applied in the CleanTruck/Life + projects. That means that all invoices received in CleanTruck projects can easily be linked to Life+.

OKQ8

OKQ8 uses ASW as General Ledger. In this system all costs and incomes are registered.

Supplier invoices are scanned and registered in IBS Attest. Invoices will be administered, booked and authorized in this system. G/L is updated daily with information from IBS Attest. Transactions concerning the CleanTruck projects are coded F0329.

A report of transactions coded on the CleanTruck project can easily be produced.

6.3. Partnership arrangements (if relevant)

The associated beneficiary enters their own information in the financial tables. The coordinating beneficiary then enters the overhead costs.

A first pre-financing payment (40 % of each partners contribution) was made to AGA and OKQ8 after completed Inception report.

A mid-term pre-financing payment (30 % the contribution) was made to OKQ8 after completed mid-term report. As the letter from the commission, dated 2012-07-11 indicated that AGA's personnel costs provisionally were considered ineligible, along with other remarks of their financial statement, MF has delayed the mid-term pre-financing payment to AGA.

6.4. Auditor's report/declaration

PwC has been the external auditor of the project. Their contact data is:

PwC
113 97 Stockholm
Sweden

The auditor's report is attached in annex F20.

6.5 Summary of costs per action

Action no.	Short name of action	1. Personnel	2. Travel and subsistence	3. External assistance	4.a Infrastructure	4.b Equipment	4.c Prototype	5. Purchase or lease of land	6. Consumables	7. Other costs	TOTAL
1	Ethanol ED 95 fuel station	2 298	-	-	122 664	-	-	-	-	-	124 962
2	Biomethane fuel station	121 561	-	37 392	1 301 886	-	-	-	-	-	1 460 839
3	CO2 filling stations and aggregates	28 940	-	-	71 007	-	-	-	3 003	-	102 950
4	N2 filling stations	3 827	-	-	-	-	-	-	-	-	3 827
5	Clean trucks for distribution	35 768	-	-	-	-	-	-	907 497	-	943 265
6	Heavy eco driving	7 154	-	-	-	-	-	-	-	16 142	23 295
7	Stakeholder dialogue	92 119	2 558	37 129	-	-	-	-	1 876	-	133 682
8	Dissemination	158 936	270	130 199	-	-	-	-	-	-	289 405
9	Monitoring and evaluation	107 304	-	23 527	-	-	-	-	-	-	130 830
10	Project Management	343 371	1 994	179 757	-	-	-	-	-	-	525 123
11	Audit	-	-	-	-	-	-	-	-	-	-
	Overhead	63 089	338	28 560	29 397	-	-	-	131	64 865	186 380
	TOTAL	964 367	5 159	436 564	1 524 954	-	-	-	2 007	991 508	3 924 559

Action no.	Short name of action	Budget	TOTAL	Total outcome minus budget	% of budget line actually incurred
1	Ethanol ED 95 fuel station	236 269	124 962	- 111 307	53%
2	Biomethane fuel station	926 620	1 460 839	534 219	158%
3	CO2 filling stations and aggregates	298 535	102 950	- 195 585	34%
4	N2 filling stations	38 754	3 827	- 34 927	10%
5	Clean trucks for distribution	815 720	943 265	127 545	116%
6	Heavy eco driving	54 042	23 295	- 30 747	43%
7	Stakeholder dialogue	97 473	133 682	36 209	137%
8	Dissemination	286 933	289 405	2 472	101%
9	Monitoring and evaluation	214 531	130 830	- 83 701	61%
10	Project Management	370 784	525 123	154 339	142%
11	Audit	2 151	-	2 151	0%
	Overhead	167 502	186 380	18 878	111%
	TOTAL	3 509 314	3 924 559	415 245	112%

Action 1: The cost of the ED station was lower than expected. Location and standard of the fuel facility met the applicable safety regulations without further action. The costs of ground works/ground preparations could therefore be kept down. The cost of risk analysis was also overrated. The station was built on an existing filling station, why the existing infrastructure could be used. This was unknown at the time of application.

Action 2: The main reason for the exceedance is the construction of AGA's gas station. The budget did not include equipment to fuel liquid LNG. Due to the underestimation of infrastructure costs, and the great exceedance of the budget, AGA has chosen to only report about 80 % of the actual investment for the biomethane station. The cost of risk analysis was also higher than budgeted.

Action 3: The demand for aggregates has been lower than expected. The reason for this has been described in chapter 5 technical part. Due to the underestimation of infrastructure costs, and the great exceedance of the budget, AGA has chosen to only report about 1/3 of the actual investment for the LIC stations.

Action 4: No equipment cost for N2-filling stations has been reported, although the action is completed and the stations are running.

Action 5: Two national institutes (Vinnova and Energimyndigheten) have been co-financers of the trucks. Their share of the support was 50 % at the time of application, but due to the fall of the euro, their share has increased.

Action 6: The project aimed for educating 100 drivers in heavy eco driving, but reached 51. Since 2010 heavy eco driving is mandatory for professional drivers and therefore the CleanTruck project has not compensated this training. Instead subsidy has been given for investment in support system in the vehicle as well as a higher level of training in heavy eco driving.

Action 7 - 10: A summing of these four actions shows that the budget for action 7-10 has been exceeded with 7 %. It is not always clear whether a cost should be allocated to dissemination or stakeholder dialogue, should it be stakeholder dialogue or monitoring and evaluation, monitoring and evaluation or project management etcetera. We have done the best possible estimation. But perhaps the project management and stakeholder dialogue has been slightly overestimated in relation to the dissemination and evaluation.

Action 7: The budget of stakeholder dialogue has been exceeded. The project encountered difficulties in getting cars to haulage companies. There was an early setback when the electric hybrid was delayed. There have been many meetings and contacts with truck manufacturers and transport buyers.

Action 8: The budget has not been reached. The travel made has mainly been allocated to action 7 and 10.

Action 9: The invoice for external assistance for project management support has not always been separated from the assistance for data collection and communication with the haulage companies. The cost of action 9 may therefore be under estimated.

Action 10: Due to the 25 % prolongation of the project, the project management has been more costly than budgeted.

Action 11: The auditing cost is about € 6 500, but has not been reported in the financial statement.

Overhead: Has been calculated as 7 % of the costs incurred.

7. Annexes

7.1 Administrative annexes

Table 6. *Administrative annexes already forwarded to the Commission with previous reports*

Administrative annex	Report
Partnership agreement	Inception Report

Table 7. *Administrative annexes to the Final Report*

Annex number	Title
A1	Letter of Memorandum 1
A2	Letter of Memorandum 2
A3	Letter of Memorandum 3
A4	Letter of Memorandum 4
A5	Final output indicators

7.2 Technical annexes

Table 8. *Technical annexes to the Final Report*

Annex number	Title
T1	Evaluation Report
T2	Technical specifications 50 clean trucks
T3	Driver attitudes
T4	Sparsam körning /Heavy Eco Driving (rev deliverable)

7.3 Dissemination annexes

Table 9. *Dissemination annexes to the Final Report*

Annex number	Title
D1	Layman's Report (in English)
D2	Layman's Report (in Swedish)
D3	After-LIFE Communication plan
D4	ABC-Åkarna 20150301
D5	CleanTruck Final Conference 20150127 007

Annex number	Title
D6_	CleanTruck_presentation_150107
D7_	www.akeritidning.se_CleanTruck Final Conference 20150127
D8	INTLOG_No_1_2015 CleanTruck
D9	Miljörapporten CleanTruck 20150129
D10	NyTeknik CleanTruck 20150311
D11	mis044-miljobilar-nr1.2015
D12	Svensk Åkeritidning nr 4 2015 sverigesradio.se CleanTruck Interview Gustaf Landahl 20150210: http://sverigesradio.se/sida/artikel.aspx?programid=103&artikel=6089084
D13	sverigesradio.se Scania interview: http://sverigesradio.se/sida/artikel.aspx?programid=103&artikel=6109596
D14	Article Truck 2014 på Elmia 20140821: http://www.akeritidning.se/svensk-akeritidning/nyheter/2014/08/21/elmia-lastbil-2014-miljofragor-i-storstadsmiljo
D15	www.nyteknik.se: http://www.nyteknik.se/nyheter/energi_miljo/bioenergi/article3884511.ece
D16	CleanTruck Film in English: https://www.youtube.com/watch?v=ihPmgVs4Pg4
D17	CleanTruck Film in Swedish: http://www.youtube.com/watch?v=AycZa2-sm14&sns=em
D18	CleanTruck Interview med Lova André Nilsson October 2011: http://www.youtube.com/watch?v=EzGuN2k33nQ
D19	

8. Financial report and annexes

The financial report can be read in the financial annexes listed below. Annexes F3-F5 are the printed versions of annexes F1b-F1c (excel files). The latter are therefore not included in the printed report. In comparison to annexes F3-F5, the excel files includes some additional information as to how the summary of cost per action (the table in chapter 6.5) has been calculated.

The consolidated cost statement claims the total budgeted Requested Community contribution of € 1 280 195. Compared to the budget, personnel costs have been moved from OKQ8 to MF, and therefor MF claims the Community contribution for these costs.

As to the eligible infrastructure costs reported for AGA and OKQ8, the *actual* depreciated costs during 2010-2014 are reported, although these exceed 25 % of the purchase cost.

Table 10. Financial annexes in this report

Annex number	Title
F1a	Standard payment Request
F1b	Financial statement MF in excel (only in digital version)
F1c	Financial statement AGA in excel (only in digital version)
F1d	Financial statement OKQ8i excel (only in digital version)
F2	Consolidated cost statement
F3	Financial statement MF
F4	Financial statement AGA
F5	Financial statement OKQ8
F6	Financial letter of memorandum 20120711
F7a	2010 MF Gross salary
F7b	2010 MF Salary slips all compensation per person
F7c	2011 MF Gross salary
F7d	2011 MF Salary slips all compensation per person
F7e	2012 MF Gross salary
F7bf	2012 MF Salary slips all compensation per person
F7g	2013 MF Gross salary
F7h	2013 MF Salary slips all compensation per person
F7i	2014 MF Gross salary
F7j	2014 MF Salary slips all compensation per person
F8a	Project place invoice 220701-3102988

Annex number	Title
F8b	Project place invoice 220701-3098517
F8c	Project place invoice 220701-3094138
F9	Compensation contracts three techniques
F10	AGA gross salaries and annual working hours
F11a	Frykhammar monthly working time sheets 2011-2012
F11b	Barkar monthly working time sheets 2011-2012
F12	AGAs purchasing process over 100 000 €
F13	AGA – Accounting standard rules depreciation
F14a	Invoice Extevent
F14b	Invoice Cryo AB
F14c	Invoice GEBAB
F14d	Contract Cryo AB
F14e	Contract GEBAB
F14f	Proof of payment Cryo AB
F14g	Proof of payment GEBAB and Extevent
F15	Österlund's monthly working time sheets 2011-2012
F16	Annual gross salary and hours OKQ8
F17	Financial letter of memorandum 20121120
F18	Financial letter of memorandum 20130419
F19	AGA's purchasing process
F20	Auditor's report