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Romania, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan

EUROPEAID/120569/C/SV/MULTI

Regulation on the Transport of Dangerous Goods along the TRACECA Corridor

Azerbaijan, Georgia, Kazakhstan, Turkmenistan and
Ukraine

Progress Report 2

October 2006 – March 2007



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A project implemented by
NEA and its partners HPTI,
UMCO and Hoyer Gaslog



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Report cover page

Project Title:	Regulation on the Transport of Dangerous Goods along the TRACECA Corridor (TRACECA)	
Project Number:	EUROPEAID/120569/C/SV/MULTI	
Country:	Azerbaijan, Georgia, Kazakhstan, Turkmenistan, Ukraine	
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Table of Contents

Report cover page	2
1 Project synopsis	4
2 Summary of project progress since the start of the project.....	6
2.1 Introduction	6
2.2 The LPG transport chain	6
3 Project progress in the reporting period	14
3.1 Introduction	14
3.2 Status of achievement of project objectives	14
3.2.1 Economic analysis of all possible schemes.....	14
3.2.2 Integrated technical scheme for LPG Transportation.....	15
3.2.3 Study of the regulatory authorities	16
3.3 Country Visits and Project events	17
3.3.1 Meetings Team Leader	17
3.3.2 Other Meetings	21
3.4 Project Administration	23
3.5 Risks and assumptions	23
4 Summary of Project planning for remainder of the project.....	24
Annex 1 Project Interim Report	25
Annex 2 Resource Utilisation Report	27
Annex 3 Output Performance Report	28
Annex 4 Plan of Operations for the Next Period (Work programme) (Form 1.6).....	29
Annex 5 Programme and Participants Workshop Hamburg	31
Annex 6 Evaluation Hamburg Seminar	37
Annex 7 Programme Workshop Istanbul.....	40



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1 Project synopsis

Project Title:	Regulation on the Transport of Dangerous Goods along the TRACECA Corridor Azerbaijan, Georgia, Kazakhstan, Turkmenistan and Ukraine (TRACECA)
Project Number:	EUROPEAID/120569/C/SV/MULTI
Country:	Azerbaijan, Georgia, Kazakhstan, Turkmenistan, Ukraine

Overall project objectives: The introduction of an alternative, economic and modern transport scheme of LPG in the TRACECA region, which will minimize existing high transportation costs and improve safety in handling procedures of dangerous goods but not limited to LPG only

Specific project objectives: To deliver a feasibility study which includes the technical, economical, financial, environmental and legal/institutional appraisal for the transport of LPG through the TRACECA corridor.

Project results:

1. An economic analysis of all possible schemes and modes of transportation of LPG in the region, with calculations and recommendations on the operational costs and capital investments
2. The presentation of a completely integrated technical scheme for LPG transportation.
3. A study of the regulatory authorities and their conformity with international and UN standards for the storage and transportation of LPG and chemicals.

Planned outputs: Additional to the progress reports (2) and final report for this project, six working papers (WP) will be produced:

- ❖ WP 1 Market Analysis Report (Task 1A)
- ❖ WP 2 Transport Forecast Report (Task 1B)
- ❖ WP 3 Transport Facilities Appraisal Report (Task 2A)
- ❖ WP 4 Safety Conditions Report (Task 2B)
- ❖ WP 5 Legal and Institutional Framework report (Task 3)
- ❖ WP 6 Economic Appraisal Report (Task 1C)

The project will organise three multi-country workshops and combine two of these with short study tours:

- ❖ WP 1 and 2 have been discussed in Istanbul, Turkey, combined with a short study tour, which makes it possible to have discussions with stakeholders from Turkey as described in the Terms of Reference.
- ❖ WP 3 and 4 have been discussed in Hamburg, Germany, combined with a short study tour aiming at the technical aspects of transport of dangerous goods.
- ❖ WP 5 and 6 are planned to be presented and discussed in Baku.



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Project activities:

Result 1: Economic analysis of all possible schemes

- Task 1A: Analysis of the market for LPG products
- Task 1B: Development of transport forecasting scenarios for LPG
- Task 1C: Economic appraisal of LPG transport schemes

Result 2: Integrated technical scheme for LPG Transportation

- Task 2A: Appraisal of existing transport facilities of LPG
- Task 2B: Appraisal of the safety conditions for LPG transport

Result 3: Study of the regulatory authorities

- Task 3A: Analysis of agreements and treaties
- Task 3B: Review of dangerous goods legislation
- Task 3C: Analysis of regulatory authorities

Project starting date: 18 March 2006

Start date of activities: 18 March 2006

Project duration: 18 months

Inputs:

International expertise:

- 216 man-days Team Leader/Transport Economist
- 144 man-days Task Leader Engineering and Operations
- 144 man-days Task Leader Legal and Environmental Matters
- 140 man-days Other Experts

Local expertise:

- 315 man-days Project Manager Kazakhstan
- 315 man-days Project Manager Azerbaijan
- 315 man-days Project Manager Georgia
- 110 man-days Short-term local senior experts
- Organisation of local support point in the beneficiary countries

Project implemented by: NEA Transport Research and Training (The Netherlands) and its partners in the consortium:
HPTI Hamburg Port Training Institute (Germany)
UMCO (Germany)
Hoyer Gaslog (Germany)



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2 Summary of project progress since the start of the project

2.1 Introduction

In the period from October-March two very important events took place: the workshop on economic aspects of LPG transport in Istanbul, Turkey, and the workshop on technical issues in Hamburg, Germany. Working Paper 1 and 2 were finalised, presented and discussed in Baku.



Workshop in Istanbul, November 2006

2.2 The LPG transport chain

The supply side, in Kazakhstan and Turkmenistan, is potentially abundant (see Working Paper 1) and not likely to be a constraint for project feasibility. The main challenge is to find the consumer markets and this is largely dictated by the 'door-to-door' transport costs. *Estimation of realistic (door-to-door / total chain) transport cost is therefore the project's most critical activity.*

Constructing an LPG pipeline from Baku to Supsa/Batumi of around 1,000 km length and diameter 14"—capacity about 1.5 - 2 million ton/year—is roughly estimated to cost at least US\$ 400 million—but more likely US\$ 500 million. Adequate storage facilities-cum-seaport terminals are needed in addition at both (Caspian & Black Sea) ends—and at the receiving ends in as far as not already available (at present only in Samsun); constructing a typical LPG terminal with minimum 6-7,000 ton storage capacity (the amount to be pumped daily!) is estimated to cost at least US\$ 20 million. The annual capital cost (with



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30 years economic lifetime and at 12% interest⁺ rate—annuity 0.1241) and annual maintenance cost of 1% of the replacement value) would add up to roughly $(0.1241+0.01) \times (500 + 2 \times 20) = \text{US\$ } 72.5$ million which implies a unit cost per ton of US\$ 36–48 per ton LPG *excluding the operating costs of the pipeline-cum-terminals*—just to recover the investment and maintenance costs. Total LPG transport costs Baku-Black Sea (Georgia) would probably be in the order of US\$ 60 per ton at an annual throughput level of about 1.5 – 2 million ton/year—and significantly higher at a markedly lower throughput/demand. Furthermore, there is the need for investment in LPG tanker vessels for the supply to Baku guaranteeing a daily supply flow of at least 7,000 tons of LPG—e.g. 2-3 (rather 3 than 2) dedicated LPG tankers of 3,500 DWT, estimated to cost around 15 million Euro each.

In view of the market (demand) uncertainties and the likely gradual development of the market, an ‘incremental’ (stepwise increased) transport capacity solution with a significantly lower initial investment is believed to be the preferable approach. Therefore the LPG pipeline option is not further elaborated (at this stage).

The TRACECA corridor-focused transport chain considered here stretches from the LPG production sites—ex-refinery or ex-gas processing plant in Kazakhstan (TengizChevronOil or TCO) and/or Turkmenistan (Turkmenbashi or TMB) to “Western market” dispatch points in Turkey (Samsun), Bulgaria (Burgas or Varna), Romania (Constantia) and Ukraine (Odessa region). A main obstacle in this transport chain is the crossing of the Caspian Sea where two transfers between land and sea (at port terminals connected to the railways) need to be minimized in terms of time losses and costs.

As far as Kazakhstan LPG is concerned, the Caspian Sea obstacle can be easily avoided via Russia (railways) to an LPG Black/Azov Sea port terminal under construction at Taman (Krasnodar oblast; Ruski Mir Group with IFC financing). This LPG terminal (with an envisaged throughput capacity of 1 million tons/year) will be in a much better position than a similar terminal on the Ukrainian side of the Azov Sea (at Kerch), which is under consideration (and which would also compete with the current export terminals in the Odessa region). On first sight, this Kerch terminal would not seem very viable, more so since its shortest (rail) supply route also would pass over Russian territory (via Krasnodar/Kavkaz across the Azov Sea—where a tunnel has been considered for some time already but is unlikely to be feasible as well).

The alternative export route for Turkmenistan LPG would be via Iran (to Turkey) but this also requires crossing the Caspian Sea (i.e. from TMB to Neka or Amirabad—a distance marginally longer than TMB-Baku).

The overall ‘TRACECA’ strategy is to attempt to bundle the Kazakhstan and Turkmenistan LPG flows in Baku and transit them by railways to Georgia’s Black Sea coast—and possibly by direct rail to Turkey branching off South in Tbilisi¹. Whatever LPG quantities will be produced from the Azeri’s oil and/or gas fields, can be added to the total west-bound flow originating from Baku.

Disregarding the pipeline option, there are basically two rail transport variants with different requirements in terms of rail wagons, rail ferries or LPG terminals either in bulk (spheres/bullets) or in containers (dangerous goods area) in Aktyau/Kurk, Turkmenbashi, Baku, Batumi/Poti and at the receiving ends (Samsun, Burgas/Varna, Constantia and possibly Odessa/Ilyichevsk). The railways-oriented transport chain would be characterized by either:

- Rail Tank Cars (RTCs) specialized for LPG transport (bullets) and rail-ferries across the Caspian Sea with special license to carry dangerous goods (eliminating the need for terminals with LPG

¹ The Governments of Azerbaijan, Georgia and Turkey have concluded a (draft) agreement on a ‘New railway line Kars-Akhalkalaki-Tbilisi-Baku’ incorporating the construction of the missing link Kars-Akhalkalaki of 98 km length (68 km on Turkish territory and 30 km on Georgian territory—thus avoiding Armenian territory) and roughly estimated to require an investment of US\$ 250 million. If found feasible and an asset to the EU TEN-corridors strategy, it may still take another 5 years until this railway line will be operating.



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spheres/bullets at both ends², and dedicated LPG tankers of e.g. 3,500 DWT crossing the Caspian Sea). The LPG-RTCs would deliver at LPG terminals on Georgia's Black Sea coast (Batumi/Poti/elsewhere? –see Annex 2 for pictures of typical storage 'bullets' and LPG tank wagons), distributing across the Black Sea in dedicated LPG tank vessels, thus limiting the number of (transfer) pumping operations to just three, notably in Batumi/Poti terminal (2x: rail→storage & storage→ship) and at the receiving terminal on the West side of the Black Sea (1x: ship→storage). Alternatively, rail ferries could be considered across the Black Sea as well³ (eliminating two more terminal handling operations in Georgia), but this is presently no option for Turkey receiving LPG in sea tankers only. The only present example of this type of LPG transport from Turkmenbashi to Georgia is summarized in the Text box next page, followed by a first, preliminary estimation (example) of the 'Traceca' LPG transport chain price.

- Specialized LPG-tank containers (see pictures below) carried on flat rail wagons, rail ferries across the Caspian Sea⁴ and (part of general) container terminals dedicated for LPG/ dangerous goods at Georgia's Black Sea coast (Batumi/Poti/elsewhere?). From here LPG containers would be distributed across the Black Sea (together with other container flows).



LPG Containers

Of course, in both options, the various operations on railways, sea ferries and (bulk or container) terminals would require licensing for dangerous goods handling.

² Storage and four (transfer) pumping operations rail-storage & storage-ship and vice versa: in Aktyau/Kurk & TMB LPG-terminals (2x), in Baku LPG-terminal (2x)

³ Poti Port boasts permanent railway ferry connections with the ports of Constantza (Romania), Varna (Bulgaria) and Samsun (Turkey)

⁴ Eliminating the need for container terminals/double handling at both ends (TMB/Aktyau and Baku) and transfer of (just) the containers across the Caspian Sea.



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LPG transport Turkmenistan-Georgia

Caspian Shipping Company (CSC) and Azerbaijan/Georgian Railways have agreed to haul some 18,000 T of LPG from Turkmenbashi to Georgia (Batumi). Two shipments of around 1,000 T each have been completed. A 3rd one seems to be ready but the operations have reportedly been halted (by Azeri authorities) until clarification of the safety risks. As concerns the (Caspian) sea transport, responsibilities in Azerbaijan have been split between CSC, responsible for the (physical) operations and a new (State) company called 'Meridian' responsible for 'sales' (i.e. the forwarding business operations).

Likewise in Azeri Railways there is split between the (physical) railway operations (running the trains) by the Railways and the commercial operations by a (State) company called 'Transkavkaz' acting as rail forwarding agency.

Present (2nd half 2006) rates of goods carried in rail wagons across then Caspian Sea are determined as follows:

Price for putting one rail wagon on or off the ferry is US\$ 36.

Price for ferrying a loaded/ empty rail wagon across the Caspian Sea is

For TMB-Baku: US\$ 35/30 per m' length of RTC, i.e. US\$ 65/m' for the return trip,

For Aktyau-Baku: US\$ 40/35 per m' length of RTC, i.e. US\$ 75/m' for the return trip.

Without any (safety/risk) surcharge for LPG transport, the price for ferrying an LPG train of 28 wagons of 15 m length, carrying about 1000 T, including 'empty return' will come to:

For Turkmenbashi-Baku: $65 \times 28 \times 15 + 36 \times 28 \times 2 = \text{US\$ } 29,316$ —say almost US\$ 30/T and

For Aktyau-Baku: $75 \times 28 \times 15 + 36 \times 28 \times 2 = \text{US\$ } 33,516$ —say close to US\$ 35/T.

Reportedly, Azerbaijan Railways is charging for the LPG transport (in 35 T 'GOST SNG standard' tank wagons which are below EU standards) US\$ 25 ton for the 500 km distance Baku-Border with Georgia, i.e. US\$ cents 5/ton-km. When assuming these same rail transport rates for the stretches TengizChevronOil (Kazakhstan) → Aktau, a distance of also around 500 km, as well as for the stretch Azerbaijan-Georgian Border → Black Sea (Georgia), another distance of roughly 500 km—the transport costs TCO-Black Sea (Georgia) add up to US\$ 110/ton (3x US\$ 25 for 3 railway stretches of 500 km + US\$ 35 for the Caspian Sea ferry), excluding the costs of LPG train loading at trip origin (TCO) and train unloading at trip destination (e.g. Black Sea terminal). Assuming that these initial/final loading/unloading costs will be in the range of US\$ 10-15/ton, *the LPG product ex-Black Sea terminal would (at least) be some US\$ 135/ton higher than the ex-refinery/gas plant cost from TCO*. Suppose that the ex-factory offer would be around US\$ 40/ton—and therefore the 'Traceca' price ex-Batumi US\$ 175/ton—then the question is what LPG prices are offered ex-Odessa and ex-Taman/Kavkaz.

Elaboration of LPG transport chain details

Caspian Sea crossing of RTC's in (new) ferries similar to present CSC type/capacity is roughly estimated to be in the range of US\$ 32-42/ton LPG for TMB-Baku and in the range of US\$ 47-62/ton LPG for the Aktyau-Baku.

Details of the estimation are shown in Annex 3. As concerns the capital investment cost, the ferry's economic lifetime is set at 30 years, with an assumed interest rate (including 'administrative charges') of 12% p.a. and expressed as an 'annuity' (average annual cost over lifetime). As shown in the following table, annual maintenance costs are supposed to vary between 1-1.5% of the ferry's replacement costs. Pure operating costs differentiate between time-at-sea and time-in-port (loading/discharging RTCs) within a range 'factor' 2. The costs of pulling the RTCs off and on the ferry are expressed as US\$ 2/ton per movement on or off the ferry (i.e. US\$ 70/RTC movement—twice the quoted current price level in order to reflect upgrading/extension of the sea-land bridge facilities). Annual LPG volumes carried across the Caspian Sea per ferry would be close to 200,000 tons/year for TMB-Baku (200 trips/year), and close to 150,000 tons/year for Aktyau-Baku (150 trips/year).



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Cost of Ferry (28 RTC – 15 m)	Annual MTCE %	Operating cost Ferry at sea	Operating cost in (un)load port	Cost/Ton TMB-Baku	Cost/Ton Aktyau-Baku
US\$ 25 million (min)	1% (min)	US\$ 333/hour (min)	US\$ 188/hour (min)	US\$ 32 (min)	US\$ 42 (min)
US\$ 30 million (max)	1.5% (max)	US\$ 667/hour (max)	US\$ 375/hour (max)	US\$ 47 (max)	US\$ 62 (max)

Note: Apparently the minimum estimate for TMB-Baku seems to correspond almost with the (estimated) actual charge as discussed in the previous text box)

The current cost price of a (higher/'western' standard) equivalent of the presently operated RTC's for LPG transport, inherited from SoyuzGazProm (35 T load capacity), remains to be established [*Norbert Zimmer?*]

A typical train of ... LPG-RTC wagons pulled by (the equivalent of) a VL-8 or VL-11 electro-locomotive needs to be proposed/determined.

Although this may not yet be daily routine, it must be possible to achieve:

- Maximum 16 hours for Baku→Border with Georgia (almost 500 km),
- Maximum 4 hours for Azerbaijan-Georgia border crossing,
- Maximum 16 hours for Azeri-Georgian border→Black Sea terminal (also ~500 km).
- Total 36 hours (1.5 day) rail trip Baku-Black Sea.

The rail-ferry crossing requires 1.5 day; the train must be there when the ferry arrives, and time is needed to reassemble after leaving the ferry.

Currently, the freight train trip between TCO⁵ (Kazakhstan) and Aktyau (Caspian Sea) along some 500 km (the same distance as the stretches on Azerbaijan and Georgian territory) takes, reportedly, 5 days. It must be possible (how exactly remains to be proposed/ determined) to reduce this trip time to 2.5 days.

Loading (of 28 wagons with 35 t LPG each, i.e. ~70 cub.m) at TCO is estimated to take 36 hours including time losses (4 wagons loaded simultaneously at pumping capacity of 15-20 cub.m/hour, i.e. 7x4 hours 'net pumping time'), thus 1.5 day per block train.

RTC-unloading at a dedicated Black Sea LPG terminal might be faster if (say) 14 wagons could be discharged simultaneously, e.g. 2x4 hours 'net pumping time' and a total of 12 hours or 0.5 day per block train.

This 'Traceca' LPG transport scenario (no. 1) would imply an LPG/RTC block train turnaround time of 15 days (i.e. 1.5+2.5+1.5+1.5+0.5+1.5+1.5+2.5= 13 days 'net travel + loading/ unloading' time plus a 2 days allowance for various disturbances; the single trip distance is: ~ 1,500 km on railways plus 253 Nm across the Caspian Sea; roundtrip distance/time altogether 3960 km in 15 days).

Detailed block train costs calculations remain to be undertaken to assess whether an average ton-km price of US\$ cents 5 for LPG as recently transported (two 1000 T shipments) by AZRailways (see textbox next page) could indeed recover the full (long term marginal) cost today's and/or future rail transport (including rolling stock capital investment and maintenance costs, and cost charges for the use of the infrastructure).

⁵ A (near?) future alternative LPG origin will be Uzen, situated about 100 km from Aktau (close to rail connection, while for this distance a feeder pipeline to Aktau might be considered given adequate throughput quantities). This provides a much more interesting (transport) scenario than the (500 km) distant TCO origin of Kazakh LPG



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AZRailways

Typical current rail transport rates are:

- US\$ 25/ton of LPG carried from Baku to the Azeri/Georgian border (499 km) in 1000 Ton shipments in 28 wagons (35T) pulled by an electro-locomotive VL-8 or VL-11. [total charge US\$ 25,000 for 2 x 499 train-kilometers, 499 km loaded and 499 km empty return; total loaded train weight approximately 1,600 ton]
- US\$ 12/ton of petroleum carried from Baku to the Azeri/Georgian border (499 km) in about 2000 Ton shipments in 35 wagons (56-60 T) pulled by an electro-locomotive of the same type. [total charge US\$ 24,000 for 2 x 499 train-kilometers, 499 km loaded and 499 km empty return; total loaded train weight about 2,400 ton]

From these data we can derive an approximate, generalized cost figure for one (1) train-kilometer with (loaded) weight of 2,000 ton (+/- 20%) of US\$ 25 per train-km.

At this stage, and given the shared USSR history, this same generalized (average) figure might be applied as reference for rail transport costs in Georgia, Kazakhstan and Turkmenistan—until factual data from these countries can be shown.

If, however, for example, the cost recovering price plus some allowance for profit, would turn out to be US\$ cents 6-8/ton-km⁶, the *total LPG transport costs* from TCO (ex-gas plant Kazakhstan) to Black Sea storage would be in the order of **US\$ 157-207** (US\$ 1500x 0.06-0.08 rail + US\$ 42-62 (rail-ferry) + US\$ 25 loading TCO + unloading Black Sea).

LPG containers and Caspian rail ferry

LLS Baltic Container Services Ltd, Latvia quotes a price of Euro 25,000 for a 20 feet LPG tank container (ISO type IMO 5) when ordering 200 units (and when ordering 600 units), with 14 months delivery time. Ordering from Singamas (China) or affiliate company, the world's largest producer of normal containers (boxes), probably leads to lower prices. Another current price 'rumor' is US\$ 40,000 for a 60ft container (a newly introduced size—that is probably not suitable for consideration in our container scenario).

The common box containers currently go for prices in the range of, ex-works China. Container box prices increased significantly in the period 2003-2004—they were below US\$ 1350 per 20ft ex-works from most locations in China until late 2003, and reached around US\$ 2000 in the 2nd quarter of 2004, when the cost of hot-rolled Corten steel jumped by over 50% (to more than US\$ 600 per ton, while timber flooring and other material's costs also increased)⁷. *[it would be useful if some stable price relationship between ordinary box containers and dedicated LPG tank containers (in standard frame) could be derived.]*

Dedicated LPG tank containers would be carried on standard flat rail cars of 13-14m length, carrying two 20ft or one 40ft container, i.e. about 23 ton LPG per wagon⁸.

For the purpose of this (first, preliminary) exercise, the assumption is 40ft containers (2 TEU) costing US\$ 30,000 (approximately the quoted ex-Latvia price of a 20ft LPG container).

The annual 'capital and maintenance' cost of such a container depends on its lifetime (assume 10 years) and the (all-in) interest rate (assume 12%/year); under such assumptions, the 'annuity' is 0.177. With

⁶ A **ton-km**-cost of US\$ 0.06-0.08 (with 1000 Ton of LPG carried in each block train) corresponds with a (block) **train cost** of US\$ 30-40 per km—as there need to be produced 2 train-kilometers to shuttle 1000T (of LPG in this case) over 1 km; the other 1 km concerns the empty train returning.

⁷ For example, Singamas' margin over the raw materials cost of a 20ft box container at US\$ 1650 is approximately US\$ 250.

⁸ Apparently the GOST SNG standard (RF) RTCs for LPG, reportedly carrying 35 T, have larger sized tank, i.e. 13.5 m (internal) length and 2.6 m (internal) diameter *[verify!]*



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annual maintenance cost at 2% of replacement cost, the annual capital and maintenance costs would come to US\$ 5,910 per year⁹. If the lifetime would be just 5 years, the annual cost level increases to US\$ 8,910. Say that the annual cost of the 40ft LPG container will be in the range of US\$ 6,000-9,000. If such a container would be used just 8 times per year, i.e. that its turnaround time is 1.5 months, the cost of using just the container for transporting 23 ton LPG (8 times that year) comes to *US\$ 33-49/ton LPG* carried. *Based on the correct investment costs and realistic turnaround times (which remain to be determined) the pure cost of using the dedicated LPG container can be established with more confidence.*

The next step is to estimate the cost of container transport (2 TEU/FRC) in block trains between TCO/TMB to the Black Sea and across the Black Sea.

Azeri and Georgian railways

Maximum permissible train weight in Azerbaijan (on the main line to Georgia) is 3,000 tons. An ‘LPG-RTC’ block train of 28 wagons pulled by a VL-8 or VL-11 Electro-locomotive (of HP) would not exceed a total weight of 1,600 ton. Common numbers of wagons in (mixed) freight trains in Azerbaijan are around 35 (e.g. in October 2006: 772 freight wagons on 23 trains; the maximum registered is 57).

The VL-8/VL-11 electro-locomotives (from Russia) are said to cost around US\$ 3 million—significantly cheaper than ‘western’ equivalents quoted at a price of about US\$ 5 million [*verify!*]

A 40ft dedicated LPG container on a 13-14m long flat railcar will have a tare weight of approximately 20 ton, and a maximum (loaded) weight of 43 ton.

The ‘standard’ rail-ferry can accommodate maximum 30 flat cars of 13m length, i.e. 690T of LPG—about 70% of the quantity carried in the (old Russian) RTCs. This increases the Caspian Sea crossing cost (per ton LPG) to *US\$ 43-64/ton LPG* for the TMB-Baku crossing and to *US\$ 58-87/ton LPG* for the Aktyau-Baku crossing; details of the calculation (of the lower values) are contained in Annex 4. (two ferries, one TMB-Baku and one Aktyau-Baku would together lift 240,000 ton/year in containers, as compared to 340,000 ton/year in the larger capacity RTCs.)

High Caspian Sea-crossing costs of LPG containers on FRC on Rail-ferry

In view of the estimated, high rates (*US\$ 58-87/ton LPG*) it seems appropriate (despite earlier rejection of this possibility) to introduce a ‘sub-scenario’ of shuttling LPG scenarios across the Caspian in dedicated self-propelled barges (of adequate stability and sufficient fast!) with rail-barge/barge-rail container handling facilities on both sides (Aktau and Baku), optimizing the double container-handling on each side [therefore self-propelled container barge design and sea-side, rail-connected LPG container terminal design need to be roughly conceived!]

The next challenge is selection of container block train length—should it be 30 flat cars carrying 60 TEU (690 ton LPG) corresponding with the ferry loads, perhaps 1.5 ferry load or 45 flat cars (1,035 ton LPG) or even 60 flat cars (two ferry loads, 1,380 ton LPG)?

The 45 cars variant (1,035 ton LPG transports) seems most comparable with the RTC train alternative (and the loaded train weight would be in the order of 2,000 ton), while one might also consider new rail-ferries (dedicated for dangerous goods transport) that can accommodate 4 lines of 11-12 rail cars instead of 7-8 wagons per line (this might also decrease the Caspian Sea crossing cost per ton LPG carried in a container—see above).

The following activities need to be expressed in time needed and cost incurred:

⁹ Could one rent such an LPG container for say US\$ 6,000 per year (or US\$ 500 per month)? At 5 year average economic lifetime and the same interest rate, the annuity would be US\$ 8,910/year—some 50% more.



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- 1) Filling of the LPG containers at place of production (TCO/TMB¹⁰): before the train arrives—LPG container dwell time 5-10 days (?)
- 2) Loading of the (45) containers onto the flat rail cars: 0.5 day
- 3) TCO/TMB → Caspian Sea rail-ferry (Aktau/TMB) via railways: 2.5 days for TCO → Aktyau (1 day for TMB → TMB?)
- 4) Caspian Sea crossing: 1.5 day (same as RTC-scenario; cost equal or higher)
- 5) Baku → Black Sea: 1.5 day (same as RTC-scenario)
- 6) Unloading of (45) containers at Black Sea container terminal: 0.5 day
- 7) Loading of (45) empty return containers: 0.5 day
- 8) Black Sea → Baku: 1.5 day
- 9) Caspian Sea crossing by rail-ferry: 1.5 day
- 10) Return rail link to TCO (2.5 days) and TMB respectively.

For the TCO-Black Sea container block train, the chain adds up to 12.5 days 'net travel + loading/unloading' time to which an 1.5 day allowance for various disturbances should be added, bringing the total block train turnaround time to 14 days (marginally, one day, shorter than the LPG/RTC (block) train).

The LPG containers, however, will be longer underway—crossing the Black Sea for delivery 'on the doorstep' of the clients (in Turkey and Balkans). It is difficult to estimate how long it will take before they would return empty at the Black Sea port container terminal (Georgia)—perhaps between 14-28 days. Including a dwell time at the LPG production/filling plant of 5-10 days, this will lead to turnaround times of the LPG container of 33-52 days, perhaps rather 50 than 35 days. The uncertainties of both 'dwell' times across the Black Sea and at the production/fill plant, will make the system rather vulnerable (possible high/unexpected cost increases). The most optimistic container cost level would be around US\$ 24/ton LPG (cheap container used 11 times/year), the realistic container cost level, most likely US\$ 50-60/ton LPG (expensive container used 7 times/year).

If the container (block) train-kilometers can be supplied at a cost level of US\$ 25/train-km—and therefore 1,035 ton LPG TCO (Kazakhstan) → Black Sea (Georgia) in 45 containers carried for US\$ 75,000 (2 x 1500 x 250), the railway cost would be limited to US\$ 72.50 ton LPG.

Container loading (TCO) and unloading (Black Sea terminal) might cost in the order of US\$ 30 (?) per 40ft container move, i.e. US\$ 2.50/ton LPG.

Together with rail-ferry cost of about US\$ 60-80/ton LPG, the total transport chain cost add up to a range of **US\$ 185-215/ton LPG** (TCO/Kazakh→Black Sea).

¹⁰ The precise locations in Kazakhstan; TCO and Uzen? – and in Turkmenistan: TMB (map?) and Niap? Remain to be established/verified—at least in terms of distance to Aktau-(new) port and TMB-port respectively!



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3 Project progress in the reporting period

3.1 Introduction

This chapter will more in detail look at the progress made in achieving the project results.

1. An economic analysis of all possible schemes and modes of transportation of LPG in the region, with calculations and recommendations on the operational costs and capital investments
2. The presentation of a completely integrated technical scheme for LPG transportation.
3. A study of the regulatory authorities and their conformity with international and UN standards for the storage and transportation of LPG and chemicals.



Workshop presentation by AYGAZ, Istanbul, November 2006

3.2 Status of achievement of project objectives

The project is on schedule in the realization of the main project objectives, but concerning the realisation of the first Working Papers and Workshop in Istanbul we have a delay of approximately 1 ½ Month due to holiday season and difficulties to find a suitable date already in September/October .

3.2.1 *Economic analysis of all possible schemes*

This result is divided in the following Tasks:

- Task 1A: Analysis of the market for LPG products
- Task 1B: Development of transport forecasting scenarios for LPG
- Task 1C: Economic appraisal of LPG transport schemes

During the project reporting period the Working Papers 1 and 2, corresponding with Task 1A and 1B, were finalised after a corresponding Workshop/Study Tour in Istanbul, Turkey, where economical issues were discussed.



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3.2.1.1 *Workshop Istanbul*

On 2 and 3 November 2006 the Workshop/Study Tour on economical issues was organised in Istanbul, Turkey. Around 20 participants discussed a number of economic aspects of LPG transport in the TRACECA region, and additionally made a visit to the AYGAZ LPG terminal in Izmit, Turkey. Next to the participants from TRACECA Countries private business representatives of AYGAZ and SHELL participated in the workshop.



Visit to AYGAZ terminal Izmit Turkey, November 2006

3.2.1.2 *WP 1 and WP 2*

WP1 Market Analysis Report

The WP1 Market analysis report contains an analysis of the current market situation for LPG in the TRACECA region and in relation with Member States of the European Union. The report was presented and discussed in Baku, December 2006.

WP2

The WP2 Transport forecast report contains an analysis of the current transport situation for LPG in the TRACECA region and in relation with Member States of the European Union. The report was presented and discussed in Baku, December 2006.

3.2.2 *Integrated technical scheme for LPG Transportation*

This result is divided in the following Tasks:

Task 2A: Appraisal of existing transport facilities of LPG

Task 2B: Appraisal of the safety conditions for LPG transport

During the project reporting period the Workshop/Study Tour in Hamburg, Germany, was organised as input for the Working Papers 3 and 4.



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3.2.2.1 Workshop Hamburg

On 29 and 30 March 2007 the Workshop/Study Tour on technical issues was organised in Hamburg, Germany. Around 20 participants discussed a number of technical aspects of LPG transport in the TRACECA region, and additionally made a visit to the Northsea Gas terminal in Brunsbüttel and SHELL refinery in Heide, Germany. Next to the participants from TRACECA Countries private business representatives of UMCO and Hoyer Gaslog participated in the workshop.



3.2.3 Study of the regulatory authorities

This result is divided in the following Tasks:

- Task 3A: Analysis of agreements and treaties
- Task 3B: Review of dangerous goods legislation
- Task 3C: Analysis of regulatory authorities

In December 2006 activities in this result have been started.



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3.3 Country Visits and Project events

3.3.1 Meetings Team Leader



Team Leader Arndt von Oertzen calculating LPG transport prices during the Hamburg seminar March 2007

Meeting in the Ministry of Transport and Communication of Ukraine

3 October 2006

Attendants:

1. Mr. Grihoriy Lehenkiy, TRACECA National Secretary, Head of Department for Development and Co-ordination of Transport System, Ministry of Transport and Communication
2. Mrs. Tatiana Dyachenko, Head of Innovation-Investment Unit at the Department for Development and Co-ordination of Transport System, Ministry of Transport and Communication
3. Ivan I. Strohush – Head of Unit at the Department for Development and Co-ordination of Transport System, Ministry of Transport and Communication
4. Viktor V. Puzhalov - Deputy Head of Department for Safety on Transport, Ministry of Transport and Communication
5. Lyudmyla N. Trygub, Chief Specialist of the Main Commercial Department, “Ukrzaliznytsa” Railway Company

Concerning the opportunity for LPG transit via Ukraine, the following information was provided:

- “Ukrferry”(rail ferry boat) tariff from Poti/Batumi to Ilyichevsk – **\$2280** per one tank-wagon (2 days carriage by sea)
- **(\$0,75** per 1 ton in wagon + **\$150)** – terminal fee in port of Poti/Batumi
- **\$2,5** per 1 ton – terminal fee in the Port of Ilyichevsk
- only 22 tank-wagons can be loaded only on the upper deck of a ferry boat (as a dangerous cargo)



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- There are only 2 trips per week
- Railway tariff - \$35,46 per 1 ton from Ilyichevsk to board with Europe (Yagodyn, Batevo, Chop). Transit time is 5 days (200 km per day).
- Ukraine is interested in transit of LPG ex Traceca corridor to Europe (Poland/Hungary/Austria)
- So far the transport is much too expensive. TODAY'S benchmark is US\$ 221,- MT from TMB-Poland. We are checking if this rate can be met when tankers are used between Poti and Ukraine
- Speed of Ukrainian railways is disastrous – inter alia because of 3 (in words three) passing rail districts which seems to be 'treated' like border passings – change of personal/locos/documents check/cargo check etc.

For this project we therefore will look to Ukraine as a country with transit potential on the corridor Georgia – Europe.

Meetings TRACECA/Baku

5/6 December 2006

Participants:

Rustam Jelinaev	GS IGT (partially)
Akif Mustafayev	National Secretary (partially)
Lena Vasilevskaya	Data expert Traceca Baku
Cafarov Nazim	Energy expert ICT
Vadim Turdzeladze	Land Transport ICT
Nazim Mamedov	Sea Transport Expert ICT
Anar Ismail	Rail Transport Expert ICT
Adrian Roest Crollius	NEA Consultant (partially)
Kamran Abdulrazagov	National Coordinator LPG
Fatima Atakishiyeva	Traceca Baku (partially)

All participants the day before the meeting had received the initial English draft of WP 2 with the purpose to jointly finalise it. GS raised the objections as per previous memo in respect to the Progress report. Team Leader explained the status of the Project. The parties agreed that all matters mentioned in the memo are - respectively will be raised and clarified in WP 2. Discussions were held with all experts and valuable amendments and additions were made to WP 2. Prior to publication the final Russian version will be sent to the experts and they will comment finally within 1-2 working days. Draft of WP 2 was generally approved.

Meeting in the Ministry of Transport and Communication of Ukraine

6 February 2007

Attendants:

1. Mr. Grihoriy Lehenkiy, TRACECA National Secretary, Head of Department for Development and Co-ordination of Transport System, Ministry of Transport and Communication
2. Mrs. Tatiana Dyachenko, Head of Innovation-Investment Unit at the Department for Development and Co-ordination of Transport System, Ministry of Transport and Communication
3. Mr. Ivan Strohush – Head of Transport Corridors Unit at the Department for Development and Co-ordination of Transport System, Ministry of Transport and Communication
4. Mr. Viktor Puzhalov - Deputy Head of Department for Safety on Transport, Ministry of Transport and Communication
5. Mrs. Lyudmyla Trygub, Chief Specialist of the Main Commercial Department, "Ukrzaliznytsa" Railway Company
6. Mrs. Larisa Vyalkova, Deputy Head of Freight Traffic Marketing Department, "Ukrzaliznytsa" Railway Company
7. Mr. Taras Vovkiv, First Deputy Head of Board of Directors, State Stock Company "Ukrspetstransgas"



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8. Petro Leshko, representative of State Stock Company “Ukrspetstransgas”
9. Olga Senyuk, Local Expert

At the meeting the current situation on LPG transit via Ukraine was discussed. The representatives from “Ukrspetstransgas” provided information about the existing routes via Ukraine to EU border for LPG transport.

One route is going from Kazakhstan through Russia by rail via Ukraine to Europe and there is no need for infrastructure contribution on this way. On the Polish border the LPG can be transferred into European wagons (to be transported on narrow gauge in Poland). On the border with Romania and with Hungary a bogie exchange is used.

Another route is transit of LPG by sea and rail along the TRACECA corridor was already studied several years ago and this route was used only once. In case if LPG is from Turkmenistan then it may be profitable for transit. But there are some difficulties related to: - rail ferries connection, - tank wagons number limitation (placed on upper deck of ferry -22 wagons only), several border crossing passages.

Ukraine has a special plant –“Azovmash” for producing tank wagons especially for gas transport. The price of producing one wagon is quoted \$80000. The wagon pay-back period is 15-20 years. The “Ukrspetstransgas” company owns a stock of 2000 tank wagons, that are used in Ukraine and some of them in Kazakhstan. The rental cost is \$30 per one tank wagon or \$1 per 1 ton in wagon.

Ukraine has its own oil-processing plants in Kremenchug and Lysychansk. All gas received from oil processing is fully consumed. Ukraine receives LPG outside and exports 400.000 tons. 50% is domestic market and 50% is export. The LPG terminals in the port of Illichevsk, Odessa, Reni and Kerch is working on export. Ukraine is interested in import of LPG (coming from the sea) and transport to Europe.

At the meeting the WP 3 was discussed. All questionnaires were explained and it was promised by Mr. Strohus to send them to correspondent sea ports for filling in. Mrs. Trygub is responsible for filling in the part related to railway questions.

Also Hamburg Workshop arrangements were discussed. 2-3 delegates from Ukraine will be nominated for participation.

The meeting with Mrs. Marina Andreyanova, the Local Monitor, was held afternoon. She checked the conformity to Project schedule and, as she is a Leading Monitor of Inogate Projects, advised to get in touch with the INOGATE Secretariat in Kiev to avoid overlapping in Project activity.

The key points within the project :

- Ukraine is very cooperative
- Railways are operating very slow
- Ukraine (also together with the project) will undertake considerable efforts to check their competitiveness versus competing LPG routes – e.g. Kazakhstan/Baku/Batumi/Black Sea
- Calculations shall also be undertaken to check if routes like Batumi-Ukraine-Europe (also via Danube) are competitive



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Meeting with Dr. Teimuraz Gorshkov / Marketing Service Director Georgian Railways
7 February 2007

Attending: Grigol Matuashvili local coordinator

Georgian Railway is very interesting in the project and promised to support with any required information. We discussed about the transportation of LPG by railway wagons mainly, but they also offered us to consider the transportation of LPG by tank containers. To consider this option we ask them to make the cost calculations to see whether this option can be cost effective instead of transportation by rail wagons. The project will contact with them to get the cost calculations for the transportation of LPG by tank containers to see whether it can be considered as transport mode for that project. It was also clearly spelled out that Georgia mainly depends on the input/transit of Azerbaijan. Such project will only gain 'momentum' when supported by all authorities.

Meeting held in TRACECA Baku office
08 February 2007

General Secretary - Rustan Genaliyev

Nazim Mamedov - sea expert

Anar Ismail – expert

Vadim Turdzeladze -land transport

Natig Madatov - Leading adviser of National Coordinating Unit for the EU Technical Assistance in Azerbaijan

Fatima Atakishiyeva from TRACECA

Kamran Abdurazagov - Local Expert

Firstly the coming Hamburg seminar on technical issues was discussed, followed by discussion on the Working Papers 1 and 2.

The experts from TRACECA recommended to work on transportation of LPG in tank containers by dry vessels or barges from TBM & Aktau to Baku, which will make easy handling in rail - sea, sea-rail connections at the ports. The main dispute appeared on the calculation of rates. TRACECA experts based their opinion on the rates as per governmental information like rail way tariff program (Polus 2007). To summarize :

There were disagreements about future calculations : TRACECA experts recommended to calculate on the basis of the published tariffs, while the team leader advised that these tariffs have more often than not any relation to the real prevailing rates when all factors like extra charges, waiting times, rental of RTC's etc. have been considered. After some joint calculations the parties came however closer together.

The current figures for LPG transport in the TRACECA corridor are not very competitive. TRACECA could play an important role – including this study – to convince the decision makers for the right tariff policy. The 'bottleneck' role of Caspian Shipping (e.g. Ferry boats) was also discussed.

The idea of presenting WP 6 to all parties including investors at Astana (TRACECA Ministerial conferences) instead of Baku was welcomed by GS.

Some delicate matters – like non creditworthiness and non reliability of Azeri Railways were discussed. AZD works on prepayment basis and does more often than not return such prepayments when transport is not effected.

Possibly new larger LPG RTC's shall be considered



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Meeting MEP

09 February 2007

Middle East Petroleum (MEP)
Sergey Revin

MEP is actually one of the large 'players' in the transport sector. LPG transport however is too small yet to be looked at seriously.

Meeting Aztranspetrol

09 February 2007

Achmad Agaev

He and his company are actually undertaking transports of LPG and other Oil Products. He advised about monopolistic transport structures in Azerbaijan. We got from him the latest actual figures :

Roll on and off at TMB	US\$ 15 MT min.
TMB-FOB Batumi	US\$ 125 MT min.
RTC rental US\$ 40 per day for 14 days (slow !!) turnaround	US\$ 20 MT

To transport LPG at US\$ 160 MT (versus about US\$ 60-70 MT for Diesel transport) is not competitive

3.3.2 Other Meetings

Meeting Minutes MoT Ukraine / Railways

23 February 2007

Subject: WP legal and institutional issues

Attending:

1. Mr Yuriy Gerdzho – Head of Department on Safety
2. Mr Viktor Puzhalov – Deputy Head of Safety on Transport Department
3. Mrs Larisa Vyalkova – Head of Department on Freight Traffic marketing of Ukrainian Railways
4. Mr Ivan Strokush – Head of Unit on Transport Corridors Development
5. Mrs Olga Senyuk
6. Adriaan Roest Crollius

The meeting focuses on rail transport, as this is the only transport mode which would be practical to use in Ukraine for LPG transport on large quantities.

Legal system:

Ukraine law on dangerous goods for railways is for 70% harmonized to RID. It is expected that in July 2007 this is expanded to 100%. The tank container meet already the international requirements. The COTIF or SMGS(?) office in Warsaw is in charge of the approving the harmonization. It is expected that Ukraine joins the RID, however no timeframe is set yet. Ukraine is ready to join AND.

Currently Ukraine has some procedures on dangerous goods which are more strict than the RID, and some which are less. Examples are:

More strict – RID foresees every 7 year inspection of the pressure of tanks, whereas Ukraine foresees in a 5 year period; and even more frequent depending on the use of the tank.

Less strict: Ukraine does not use the iron plates indicating the content of the container, but instead it is painted on the tank in white (UN dangerous goods code); or the testing date is not clearly noted on the tank. The accidents card is only in Russian and Ukrainian but not in English.

The accidents card uses the UN codes, not the SMGS code.



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Institutional elements:

Under the MoT the Railway Inspectorate is in charge for checking the safety procedures. The Inspectorate is independent and reports to the MoT. The Inspectorate is mainly checking the tracks, wagons and locomotives. Packaging is under the shipper’s responsibility or plant factory.

The tanks are inspected by a separate entity: State Committee of Technical and Industrial Control. This entity is responsible for testing and control of the LPG tanks.

Recently Ukraine introduced special training courses for LPG transport. Permissions to transport dangerous goods are given for a one year period by the MoT. When accidents occur, the Railways reports to the Ministry of MNS. The MNS informs the Inspectorate. There is a smooth cooperation between these institutes.

In principle Ukraine uses the SMGS documents, as these can be used till the German border. Ukraine is now testing the Unified Bill of Loading

The environmental aspect is covered in the law; however the penalty system is not into place as the Inspectorate is not sufficient equipped and trained, so no strict control mechanism in place.



Gas RTC at the North Sea Terminal near Hamburg, 30 March 2007

LPG transport in practices:

At the moment the LPG transport is for 70% domestic transport. Ukraine cannot increase the international % at a short term, as no extra wagons are ordered; moreover Ukraine is not eager to send its tank wagons to Georgia or Turkmenistan as these countries are famous for not losing these wagons,

Each region has its own railway company. When the transport involves more regions, in each region the locomotive has to be changed and the accompanying documents checked.



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It is possible to run the train in 3 to 5 days from Odessa to the Polish border, depending on the number of shunting for procedures.

No big accidents happened so far during the transport of dangerous goods by rail. Rail is the safest mode of transport. There is a difference between the regulation and the daily practice. The Inspectorate finds quite some breaches during the inspections: for example during loading and the transport of LPG the temperature is not constant; this makes that the volume of LPG is at the end of the trip the volume is decreased. If training would be better this would not happen.

According to the records of the Inspectorate the shippers make more accidents than the railways do. These accidents are mostly due to human failures.

There is a maximum of dangerous goods trains, which depends on the quotas of Hungary, Poland and Slovakia. These countries allow only a certain number of dangerous goods train on their network. Ukraine

3.4 Project Administration

Adriaan Roest Crollius was approved as short term expert in December 2006 and will be working on Working Paper 5 legal and institutional issues.

Herve Richard was introduced and approved in the project in March 2007 and will be working on Working Paper 6. Herve Richard has extensive experience in the energy sector of CIS countries.

in January 2007 in Brussels during a meeting with Task Officer Ms Helisene Habart it was agreed to downsize the study from feasibility to pre-feasibility.

3.5 Risks and assumptions

Although the project probably would be very beneficial to Turkmenistan, this country has not yet endorsed the project and was therefore not included in the project activities yet (except for one visit by the team leader in May). The project team has been trying very hard to change this situation and include Turkmenistan in all our project activities. Nevertheless there are no clear signs that the project will be endorsed very soon. Although it will probably not effect the overall objective of the project, the fact that Turkmenistan does not participate may have a significant effect on the project purpose and project results. If this situation remains as it is at present, it may therefore be necessary for the successful implementation of the project to apply for an addendum to the contract to correct some of the project contents in relation to Turkmenistan.

Main emphasis from the beginning of the project is laid on gathering information about production data of LPG, for which especially the team leader and national coordinators have put a lot of effort. Nevertheless this is not always easy to collect as many companies regard this kind of information as confidential. We assume however that information received, after having been checked, is reliable, but can not guarantee this. This is one of the main reasons to downsize the project from a feasibility study into a pre-feasibility study.



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4 Summary of Project planning for remainder of the project

The main milestones of the project in terms of events, which will be organized, are the following:

September, 2007

Final Workshop

Baku, Azerbaijan (planned, but maybe another location will be proposed)

Participants

in principle 4/5 participants from each country.

Purpose:

Presentation and discussion of WP 5 and WP6
WP 5 Legal and Institutional Framework report (Task 3)
WP 6 Economic Appraisal Report (Task 1C)



Hamburg Workshop, March 2007



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Annex 1 Project Interim Report

(Form 2.2)

Project title : Transport of Dangerous Goods along the TRACECA Corridor		Project number : EUROPEAID/120569/C/SV/MULTI						Country : Azerbaijan, Georgia, Kazakhstan, Turkmenistan, Ukraine				Page : 1			
Planning period : 10/2006 - 03/2007		Prepared on : April 2007						Contractor : NEA and its partners in the consortium HPTI, UMCO and Hoyer Gaslog							
Project objectives : The introduction of an alternative, economic and modern transport scheme of LPG in the TRACECA region, which will minimize existing high transportation costs and improve safety in handling procedures of dangerous goods but not limited to LPG only. To deliver a feasibility study which includes the technical, economical, financial, environmental and legal/institutional appraisal for the transport of LPG through the TRACECA corridor.															
No	ACTIVITIES IMPLEMENTED	TIME FRAME 2006/2007						INPUTS							
		Months						PERSONNEL INTERNATIONAL (M-d)		LOCAL PARTNER (M-d) +)		EQUIPMENT AND MATERIAL		OTHER	
		10	11	12	01	02	03	Planned	Utilised	Planned	Utilised	Planned	Utilised	Planned	Utilised
1	Analysis of the market for LPG products	xxx	xxx	xxx	xxx	xxx	xxx	20	18	23	24	-	-	-	-
2	Development of transport forecasting scenarios for LPG	xxx	xxx	xxx	xxx	xxx	xxx	20	21	24	24	-	-	-	-
3	Economic appraisal of LPG transport schemes											-	-	-	-
4	Multi-Country Workshop/Study tour to present WP 1 and WP2 in Istanbul, Turkey		xxx					25	26	7	9	-	-	-	-



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Project title : Transport of Dangerous Goods along the TRACECA Corridor	Project number : EUROPEAID/120569/C/SV/MULTI	Country : Azerbaijan, Georgia, Kazakhstan, Turkmenistan, Ukraine	Page : 2
Planning period : 10/2006 - 3/2007	Prepared on : April 2007	Contractor : NEA and its partners in the consortium HPTI, UMCO and Hoyer Gaslog	

Project objectives :
The introduction of an alternative, economic and modern transport scheme of LPG in the TRACECA region, which will minimize existing high transportation costs and improve safety in handling procedures of dangerous goods but not limited to LPG only. To deliver a feasibility study which includes the technical, economical, financial, environmental and legal/institutional appraisal for the transport of LPG through the TRACECA corridor.

No	ACTIVITIES IMPLEMENTED	TIME FRAME 2006/2007						INPUTS							
		Months						PERSONNEL INTERNATIONAL (M-d)		LOCAL PARTNER (M-d +)		EQUIPMENT AND MATERIAL		OTHER	
		10	11	12	01	02	03	Planned	Utilised	Planned	Utilised	Planned	Utilised	Planned	Utilised
5	Appraisal of existing transport facilities of LPG	xxx	xxx	xxx	xxx	xxx	xxx	65	61	180	158	-	-	-	-
6	Appraisal of the safety conditions for LPG transport	xxx	xxx	xxx	xxx	xxx	xxx	35	36	43	45	-	-	-	-
7	Multi-Country Workshop/Study tour to present WP 3 and WP4 in Hamburg, Germany						xxx	20	18	30	28	-	-	-	-
8	Analysis of agreements and treaties			xxx	xxx	xxx	xxx	20	18	15	15	-	-	-	-
9	Review of dangerous goods legislation			xxx	xxx	xxx	xxx	20	18	15	15	-	-	-	-
10	Analysis of regulatory authorities			xxx	xxx	xxx	xxx	10	18	15	15	-	-	-	-
11	Multi-Country Workshop/Study tour to present WP 5 and WP6 in Baku, Azerbaijan											-	-	-	-
	TOTAL							235	234	333	333	-	-	-	-





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Annex 2 Resource Utilisation Report

(Form 2.3)

Project title : Transport of Dangerous Goods along the TRACECA Corridor		Project number : EUROPEAID/120569/C/SV/MULTI		Country : Azerbaijan, Georgia, Kazakhstan, Turkmenistan, Ukraine		Page : 1	
Planning period : 10/2006 - 3/2007		Prepared on : April 2007		Contractor : NEA and its partners in the consortium HPTI, UMCO and Hoyer Gaslog			
Project objectives : The introduction of an alternative, economic and modern transport scheme of LPG in the TRACECA region, which will minimize existing high transportation costs and improve safety in handling procedures of dangerous goods but not limited to LPG only. To deliver a feasibility study which includes the technical, economical, financial, environmental and legal/institutional appraisal for the transport of LPG through the TRACECA corridor.							
RESOURCES/INPUTS	TOTAL PLANNED	PERIOD PLANNED	PERIOD REALISED	TOTAL REALISED	AVAILABLE REMAINDER	FOR	
PERSONNEL (in man days)							
Team Leader	216	80	78	154	62		
Task Leader Engineering	144	70	62	121	23		
Task Leader Legal	144	50	54	84	60		
Project Manager Azerbaijan	315	105	105	210	105		
Project Manager Georgia	315	105	105	210	105		
Project Manager Kazakhstan	315	105	105	210	105		
International senior experts	140	35	40	70	40		
Local senior experts	110	20	18	24	96		
Total	1699	561	567	1083	616		
Incidental Expenditures in euro	180,000	60000	60000 (est)	75000 (est)	105000		





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Annex 3 Output Performance Report

(Form 2.4)

Project title : Transport of Dangerous Goods along the TRACECA Corridor		Project number : EUROPEAID/120569/C/SV/MULTI	Country : Azerbaijan, Georgia, Kazakhstan, Turkmenistan, Ukraine	Page : 1
Planning period : 10/2006 - 3/2007		Prepared on : April 2007	Contractor : NEA and its partners in the consortium HPTI, UMCO and Hoyer Gaslog	
Output results	Deviation original plan + or - %	Reason for deviation	Comment	
WP 1 Market Analysis Report (Task 1A)	1 ½ month later than planned	Difficult to find a suitable date for presenting at workshop due to holiday season		
WP 2 Transport Forecast Report (Task 1B)	1 ½ month later than planned	Difficult to find a suitable date for presenting at workshop due to holiday season		
Combined Multi-Country Seminar/Study Tour 1A/1B Istanbul, Turkey	1 ½ month later than planned	Difficult to find a suitable date for presenting at workshop due to holiday season		
WP 3 Transport Facilities Appraisal Report (Task 2A)	May 2007, 1 ½ month later than planned	Due to delay in WP 1 and WP 2		
WP 4 Safety Conditions Report (Task 2B)	May 2007, 1 ½ month later than planned	Due to delay in WP 1 and WP 2		
Combined Multi-Country Seminar/Study Tour 2a/2B Hamburg, Germany	March 2007, No delay			
WP 5 Legal and Institutional Framework report (Task 3)	Not applicable yet, target date September 2007			
WP 6 Economic Appraisal Report (Task 2C)	Not applicable yet, target date September 2007			
Combined Multi-Country Seminar (Task 2C/3) Baku/Azerbaijan	Not applicable yet, target date September 2007			



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Annex 4 Plan of Operations for the Next Period (Work programme) (Form 1.6)

Project title : Transport of Dangerous Goods along the TRACECA Corridor		Project number : EUROPEAID/120569/C/SV/MULTI					Country : Azerbaijan, Georgia, Kazakhstan, Turkmenistan, Ukraine			Page : 1	
Planning period : 4/2007 - 9/2007		Prepared on : April 2007					Contractor : NEA and its partners in the consortium HPTI, UMCO and Hoyer Gaslog				
Project objectives : The introduction of an alternative, economic and modern transport scheme of LPG in the TRACECA region, which will minimize existing high transportation costs and improve safety in handling procedures of dangerous goods but not limited to LPG only. To deliver a feasibility study which includes the technical, economical, financial, environmental and legal/institutional appraisal for the transport of LPG through the TRACECA corridor.											
		TIME FRAME						INPUTS			
		2007 (months)						PERSONNEL (Man-Days)		EQUIPMENT AND MATERIAL	OTHER
No	ACTIVITIES	04	05	06	07	08	09	International	Local		
01	Analysis of the market for LPG products										
02	Development of transport forecasting scenarios for LPG		xxx								
03	Economic appraisal of LPG transport schemes							80	180		
04	Multi-Country Workshop/Study tour to present WP 1 and WP2 in Istanbul, Turkey										



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Project title : Transport of Dangerous Goods along the TRACECA Corridor		Project number : EUROPEAID/120569/C/SV/MULTI						Country : Azerbaijan, Georgia, Kazakhstan, Turkmenistan, Ukraine		Page : 2	
Planning period : 4/2007 - 9/2007		Prepared on : April 2007						Contractor : NEA and its partners in the consortium HPTI, UMCO and Hoyer Gaslog			
Project objectives : The introduction of an alternative, economic and modern transport scheme of LPG in the TRACECA region, which will minimize existing high transportation costs and improve safety in handling procedures of dangerous goods but not limited to LPG only. To deliver a feasibility study which includes the technical, economical, financial, environmental and legal/institutional appraisal for the transport of LPG through the TRACECA corridor.											
		TIME FRAME						INPUTS			
		2006-2007 (months)						PERSONNEL (Man-Days)		EQUIPMENT AND MATERIAL	OTHER
No	ACTIVITIES	04	05	06	07	08	09	International	Local		
05	Appraisal of existing transport facilities of LPG	xxx	xxx	xxx	xxx	xxx	xxx	10			
06	Appraisal of the safety conditions for LPG transport	xxx	xxx	xxx	xxx	xxx	xxx	10			
07	Multi-Country Workshop/Study tour to present WP 3 and WP4 in Hamburg, Germany					xxx	xxx				
08	Analysis of agreements and treaties				xxx	xxx	xxx	22	45		
09	Review of dangerous goods legislation				xxx	xxx	xxx	22	45		
10	Analysis of regulatory authorities						xxx	22	45		
11	Multi-Country Workshop/Study tour to present WP 5 and WP6 in Baku, Azerbaijan							19	18		



Annex 5 Programme and Participants Workshop Hamburg



The European Union's Tacis TRACECA programme
for Armenia, Azerbaijan, Bulgaria, Georgia, Kazakhstan, Kyrgyz Republic, Moldova,
Romania, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan

EUROPEAID/120569/C/SV/MULTI

Regulation on the Transport of Dangerous Goods along the TRACECA Corridor

Azerbaijan, Georgia, Kazakhstan, Turkmenistan and Ukraine

TECHNICAL WORKSHOP IN HAMBURG, GERMANY

29-30 March 2007



This Project is funded
by the European Union



Participants

Name	First Name	Country	Position
Mammadov	Teymur	Azerbaijan	First Deputy Chief Department for Transport Operations Azerbaijan State Railway
Abdurazagov	Kamran	Azerbaijan	LPG project Local Coordinator in Azerbaijan
Umudov	Mahammad	Azerbaijan	General Director of "Meridian Shipping & Management" LLC
Ismayil	Anar	Azerbaijan	Expert in Transport Operations in Intergovernmental Commission Traceca (Azerbaijan)
Matuashvili	Grigol	Georgia	Project manager Georgia
Abuashvili	Nicoloz	Georgia	Deputy Director of Georgian Railway
Gelashvili	Davit	Georgia	Head of safety department of Georgian Railway
Chkhartishvili	Zviad	Georgia	Head of Marketing department of Poti Sea Port
Bekmagambetova	Gulnara	Kazakhstan	Assistant of National Secretary PS IGC TRACECA in Kazakhstan, Head of Complex Transport Problems Department of NII TK
Kulzhanbekov	Yerken	Kazakhstan	Chief specialist of Complex Transport Problems Department of NII TK
Naregeev	Bekbolat	Kazakhstan	First deputy of chairman of railways committee in TM&C
Manasbay	Aigul	Kazakhstan	Main specialist of marine ports dpt in TM&C
Gurbanov	Chary Marenovic	Turkmenistan	Representative of "Caspian Energy Projects LLP" company in Turkmenistan
Atabajev	Serdar Berdiyevich	Turkmenistan	Senior Oil and LPG expert and BP Turkmenistan
Kuzmenko	Yuriy	Ukraine	Head of Oil Terminal of the Commercial Sea Port of Odessa
Strohush	Ivan	Ukraine	Head of Unit on International Transport Corridors and Logistics at the Department for Development and Co-ordination of Transport and Communication Systems, Ministry of Transport and Communication
Puzhalov	Viktor	Ukraine	Deputy Head of Department for Safety on Transport, Ministry of Transport and Communication



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Workshop Resource Persons:

Name	First Name	Position	Company
Langeveld	Menno	Project Director	NEA
Broersma	Klaus	Technical Specialist	NEA
Westerkamp	Klaas	Market Short Term Expert	NEA
Herve	Richard	Technical Short-Term Expert	NEA
Oertzen	Arndt von	Team Leader	NEA
Schmidt	Jochen	Technical Short Term Expert	HPTI
Persdorf	Gerhard	Technical Short Term Expert	HPTI
Zimmert	Norbert	Project Manager Logistics& Transport	HPTI
Duschek	Peter	Managing Director	UMCO
Schloetelburg	Jürgen	Technical Short Term Expert	Hoyer Gaslog
Arlt	Wolfhard	Managing Director	HPTI
Gerstner	Peter	Deputy Terminal Manager	NSGT
Lindner	Timo	Supervisor	Shell Heide

Doroseev	Boris	Interpreter English-Russian	
Hufeland	Ljudmilla	Interpreter German-Russian	

Accommodation and Workshop Venue:

maritim Hotel Reichshof Hamburg
Kirchenallee 34-36
20099 Hamburg
Telefon +49 (0) 40 24833-0
Telefax +49 (0) 40 24833-888
info.ham@maritim.de



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THURSDAY, March 29, 2007

09.15 - 10.10

Welcome
Introduction of Participants
Introduction of NEA and NEA Project Team
Briefing on the Project and State of Activities

Mr. Menno Langeveld
Project Director, NEA

10.10. – 10.40

Introduction to HPTI and Technical Project Part

Mr. Norbert Zimmert
Project Manager Logistics & Transport, HPTI

10.40 – 11.00

Scope and Competence of UMCO

Mr. Peter Duschek
Managing Director, UMCO

11.00 – 11.20

Coffee Break

11.20 – 12.30

Safety in LPG Tanker Shipping

Mr. Jochen Schmidt
Shipping Expert, HPTI

12.30 – 13.30

Lunch Break
Meet the Experts

13.30 – 13.40

Introduction to Hoyer

Mr. Schlötelburg
Director, Hoyer Gaslog



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13.40 – 14.20

State-of the Art Equipment in LPG Surface Transport

Mr. Schlötelburg
Director, Hoyer Gaslog

14.20 - 15.20

**Improving existing approaches to safe DG transport
with focus on LPG**

Group Work of Participants

15.20 – 15.45

Coffee Break

15.45 – 16.40

**Defining Accident Scenarios –
Experience from DG Transport in Central Europe**

Mr. Norbert Zimmert
Project Manager Logistics& Transport, HPTI

16.40 – 17.00

Discussion of Results

18.30

Meeting at the Hotel Entrance
Transfer by Subway to the Port

19.00–22.00

Come Together and Harbour Cruise on the former
official state launch “Senator”
Dinner on-board



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FRIDAY, March 30, 2007

08.30

Meeting at the Hotel Entrance
Transfer by bus to Brunbüttel

09.45 – 11.15

**Visit to the Technical Installations of the North Sea
Gas Terminal (NSGT) handling Propane at
Brunsbüttel**

Mr. Peter Gerstner
Deputy Terminal Manager NSGT

11.15 – 12.00

Travel from Brunsbüttel to Heide

12.00 – 14.30

**Safety Standards and Safe DG Transport Means at a
Hinterland Site. Visit to the Shell Oil Refinery at Heide**

Mr. Timo Lindner
Supervisor, Shell Oil Heide

14.30 – 16.30

Travel to Hamburg
Late Lunch

Final Discussion
Evaluation



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Annex 6 Evaluation Hamburg Seminar

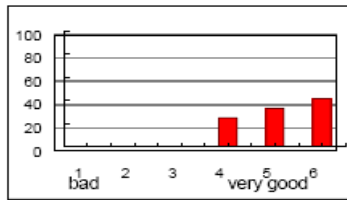
TECHNICAL WORKSHOP EVALUATION
Hamburg, 29th - 30th March 2007

How do you rate:

1 The organisation of the workshop?

Answers: 12

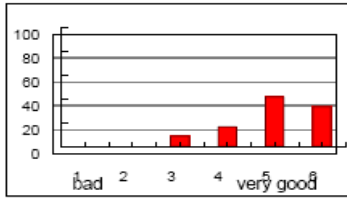
average: 5,2



2 The workshop room and facilities?

Answers: 12

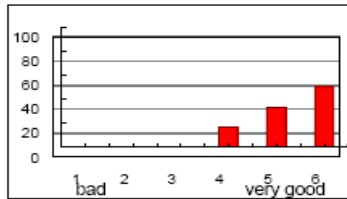
average: 5,0



3 The workshop in total?

Answers: 12

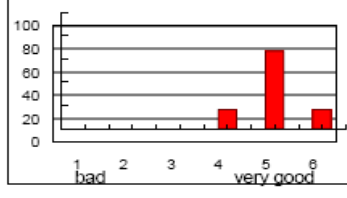
average: 5,3



4 The lectures in total?

Answers: 12

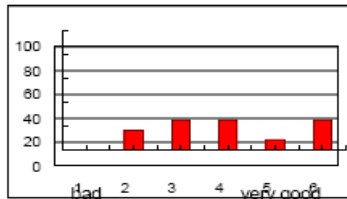
average: 5,0



5 The accommodation?

Answers: 12

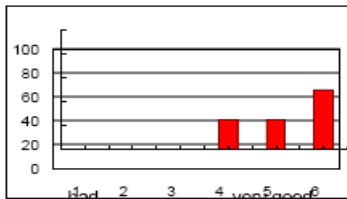
average: 4,0



6 The meals?

Answers: 12

average: 5,3





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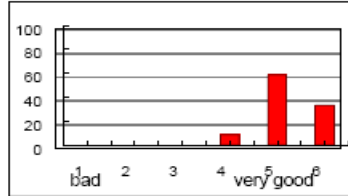


The individual contributions

7 Briefing on Project and State of Activities (Mr. Langeveld/ Mr. Oertzen)?

Answers: 12

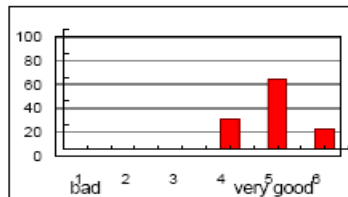
average: 5,3



8 Introduction to Project Consortia: NEA, UMCO, Hoyer, HPTI?

Answers: 12

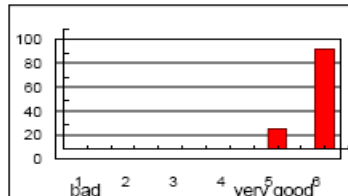
average: 4,9



9 Safety in LPG Tanker Shipping (Capt. Schmidt)?

Answers: 12

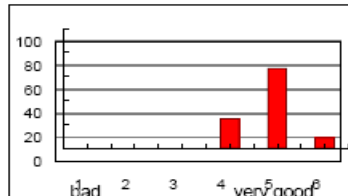
average: 5,8



10 State-of-the-Art Equipment in LPG Surface Transport (Mr. Schiötelburg)?

Answers: 12

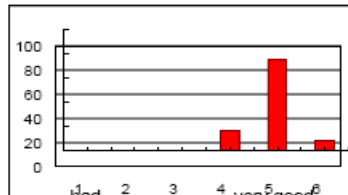
average: 4,8



11 Group Work on Safe DG Transport in the region?

Answers: 12

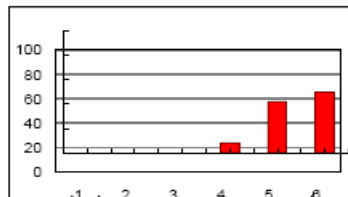
average: 4,9



12 Defining Accident Scenarios (Mr. Zimmert)?

Answers: 12

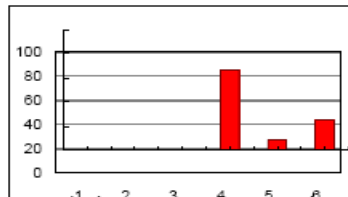
average: 5,4



13 Visit to the Technical Installations of North Sea Gas Terminal (Mr. ...)

Answers: 12

average: 4,6





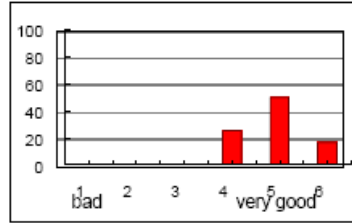
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14 Visit to the Shell Oil Refinery at Heide (Mr Lindner)?

Answers: 11

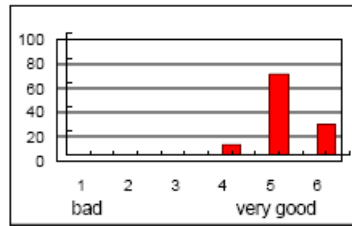
average: 4,9



15 Importance for the Job?

Answers: 12

average: 5,2



16 **The most important aspects of the workshop:**

- new ideas
- training aspect
- project promotion
- developing relations, sharing information & experience, pleasure with usefulness
- problems of sea transportation of LPG
- visit to gas terminal
- getting acquainted with the European organisation of LPG transports
- requirements for safety & environment

17 **Recommendation/Proposals**

The final discussion to be conducted in Astana
 continue this kind of workshop in different regions & countries
 organize such workshop in another EU country
 ask EU for extension will be useful
 next workshop in Holland
 need more days for the next workshop



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Annex 7 Programme Workshop Istanbul

Regulation on the Transport of Dangerous Goods along the TRACECA Corridor

Programme
Workshop/Study Tour
Task 1A/1B

Istanbul
Hotel Marmara Pera
2/3 November 2006

Wednesday 1 November 2006

Arrival at Hotel Marmara Pera Istanbul

21.00 Welcome Drink in Hotel Bar

Thursday 2 November 2006

09.30 Opening of the seminar by

09.45 Explanation of the project by *Menno Langeveld*

10.00 Introduction to the Turkish LPG market by *Aygaz/*

10.30 Coffee Break

11.00 Presentation of Working Paper 1 by *Klaas Westerkamp*

11.30 Discussion Working Paper 1

12.00 Presentation of Working Paper 2 by *Arndt von Oertzen*

12.30 Discussion of Working Paper 2

13.00 Lunch

14.30 Preliminary conclusions and coming activities in the project by *Menno Langeveld*

Friday 3 November 2006

Visit of Yarimca LPG installation located near Izmit

Saturday 4 November

Depart from Istanbul





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