White Paper

On Options for Improving Automotive Fuel Economy in Georgia

Georgia, 2014

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This document was developed within the framework of the project: *Initiation of an Auto Fuel Efficiency Programme in Georgia & Development of the Caucasus Fuel Economy Initiative (CFEI).* The project is being implemented by CENN in cooperation with the Partnership for Road Safety (PfRS) and with the assistance of the partners of the Global Fuel Economy Initiative (GFEI), most notably the UN Environment Programme (UNEP), the International Energy Agency, the Institute of Transportation Studies of UC Davis, and Gianni Lopez of Centro Mario Molina Chile.

Steering committee members representing different institutions of Georgia supervised the implementation of the project, enabling CENN to consider the opinions and visions of all interested parties and stakeholders.

1. Summary

This policy white paper has been developed by the Caucasus Environmental NGO Network (CENN) within the framework of the project *Initiation of an Auto Fuel Efficiency Programme in Georgia & Development of the Caucasus Fuel Economy Initiative (CFEI)*. Financed by the Global Environmental Facility and the European Commission, the goal of the project is to catalyze the development of national fuel economy plans, targets and policies in the Caucasus sub-region through partnership with the Global Fuel Economy Initiative. This will lead to increased auto fuel economy at the national level and lower CO_2 and pollutant emissions from the auto sector.

The project is being implemented by CENN in cooperation with the Partnership for Road Safety (PfRS) and with the assistance of the partners of the Global Fuel Economy Initiative (GFEI), most notably the UN Environment Programme (UNEP), the International Energy Agency, the Institute of Transportation Studies of UC Davis, and Gianni Lopez of Centro Mario Molina Chile. This document aims to outline a clear set of strategies that will help inform Georgia's National Fuel Economy Plan.

The Global Fuel Economy Initiative[1] exists to promote debate and discussion around the issue of fuel economy. On the basis of current evidence about existing technologies huge gains could be made in the fuel economies of emerging and transitional economies to address the pressing issues of climate change, energy security and sustainable mobility. To this end, the GFEI partnered with numerous institutions in Georgia through the Caucasus Environmental NGO Network in order to support and develop the Caucasus Fuel Economy Initiative.[2] This paper is a product of this collaboration, and the expertise provided by GFEI partners and experts at the International Energy Agency (IEA), the Institute of Transportation Studies at UC Davis, the United Nations Environment Programme (UNEP), and Centro Mario Molina Chile.

It is important that Georgia improves the fuel economy and overall pollutant emissions performance of its light duty vehicle (LDV) fleet to obtain the following benefits:

- lower GHG emissions, reducing Georgia's contribution to climate change;
- improve air quality in Georgian cities;
- lower energy and health costs for consumers;
- long term reduction in fuel imports, improving Georgia's macro-economic situation;
- comply with international standards and best practice;
- Improve EU integration process, complying with requirements of the Association Agreement.

By producing a white paper that will facilitate the development of a national fuel economy plan, we aim to contribute to advancing Georgia's agenda for cleaner, more efficient vehicles.

This document was developed using international experience and experts' judgment of Georgia's current situation. Georgian car fleet data (imported new and used vehicles) from the years 2008, 2010, 2011 and 2012 was used in conjunction with the GFEI Fuel Economy Policies impact Tool (FEPIt), the GFEI Feebate Simulation tool, and the GFEI auto fuel economy baseline and fuel economy projection methodology and tool[3]. Based on this in-depth and multi-dimensional analysis, a list of actions was produced that, we propose, will inform the Georgian auto fuel economy improvement plan.

[1] www.globalfueleconomy.org
[2] http://www.gfei-caucasus.org
[3] The baseline methodology and projection tool are both available online from http://www.unep.org/transport/gfei/autotool/nextsteps.asp

Georgia's LDV fleet is characterized by an ageing fleet, primarily imported from Western Europe, Japan, and the USA, with an average fuel economy of 189 grams of CO_2/km in 2012; this is one of the worst fuel economies of a fleet in Europe and well above the global average (as of 2011 the global fuel economy average[4] for LDV's is 167g CO_2/km (7.2 Lge/100km[5])). This situation has developed due to Georgia's inefficient LDV legislation system, in particular its taxation regime for vehicle imports, which does not incentivize cleaner, more efficient vehicles but rather encourages the purchase of older vehicles.

This document outlines **five specific supportive strategies** to create or improve existing systems to increase Georgia's auto fuel economy to reach a national average of 140g CO_2/km by 2020[6], including:

1. Vehicle fuel economy labeling
2. Used import restriction (in terms of vehicle age)
3. CO_2-based light duty vehicle acquisition and/or registration tax
4. CO_2-based light duty vehicle ownership tax
5. Fuel quality standards (as a supportive measure for cleaner, more efficient technology)[7]

Implementation of these strategies will require the cooperation and efforts of the following state institutions: the Ministry of Finance, the Ministry of Environment and Natural Resources Protection, the Ministry of Economy and Sustainable Development, the Ministry of Internal Affairs, and the Ministry of Regional Development and Infrastructure.

[4] http://www.globalfueleconomy.org/Documents/Publications/wp8_international_comparison.pdf
[5] Liter-gasoline-equivalent per 100 kilometer, taken as 1 g/km CO_2 = 0.043103448275862 l/100km.
[6] This figure was identified by the GFEI Fuel Economy projection tool developed by the International Energy Agency, available online from http://www.unep.org/transport/gfei/autotool/nextsteps/estimating_policy_impacts.asp
[7] See Annex 3 for the order of implementation

2. Introduction

2.1. Need for the White Paper

In Georgia, Light Duty Vehicles (LDVs) are mainly purchased as second-hand vehicles and imported from Western Europe, Japan and the USA. The overall population of imported vehicles, however, ranged in vintage from 1 to over 20 years old, with an average (mean) age of about 13 years and a most frequent (modal) age of 14 years. This is one of the oldest imported auto fleets in the world.

As of 2012 the national average fuel economy of Georgia's LDVs is 189 grams of CO_2/km[8] (included second hand vehicles), significantly higher than Europe's average of 140 grams of CO_2/km[9] (where imported second hand vehicle are marginal and not included). In addition to the high greenhouse gas emissions of these vehicles, the fuel quality in Georgia is poor, with a high level of sulfur (150 mg/kg and 200 mg/kg for gasoline and diesel respectively[10]), benzene and aromatic hydrocarbons thus adding to the overall pollutant emissions. These issues are compounded by year-on-year increases in fuel consumption in Georgia; combined gasoline and diesel consumption in 2000 amounted to 230,000 tons, by 2011 consumption was 830,000 tons[11]. All of this fuel was imported, leading to a significant financial drain on the country's economy and macroeconomic vulnerabilities.

The existing situation is caused by gaps at the policy and institutional levels[12], particularly the:

- Non-existence of a strategy with a clear vision of how to improve the situation in the on-road transport sector.[13]
- Fragmented and inconsistent transport policies.
- Absence of monitoring mechanisms in Georgia - mandatory technical inspection of LDVs in Georgia has been suspended since 2004;[14] fuel quality monitoring is not conducted by any governmental institution.
- No fiscal policy incentives to increase fuel efficiency and lower pollutant emissions from imported vehicles.
- Lack of a centralized management in the transport sector and inefficient communication between governmental institutions responsible for managing the sector.

This results in the following challenges:

- An aging, often poorly maintained LDV fleet (on average 10-15 year old vehicles), concentrated in the major cities of Georgia (especially Tbilisi), which is creating problems due to inefficient use of fuel and high emissions of conventional pollutants (including particulate matter). The transport sector accounts for the majority of air pollution, producing 71% of air pollution in Georgia and more than 95% of air pollution in Tbilisi.[15]
- At the local level, the greatest costs of air pollution from on-road transport are to human health, calculated in health costs.

[8] This figure was calculated using the IEA projection tool outlined in chapter 3.
[9] http://ec.europa.eu/clima/policies/transport/vehicles/index_en.htm
[10] As of January 1st 2014.
[11] Presentation given by the Ministry of Environment Protection and Natural Resources of Georgia on 27.05.2013
[12] http://www.cenn.org/wssl/programs/Georgia_Institutional_Analysis_GFEI_ENG.pdf
[13] The national program on the *Reduction of Pollution from the Transport Sector for 2013-2016* was prepared by the Ministry of Environment and Natural Resources Protection of Georgia and submitted to the government of Georgia for approval by the end of 2013.
[14] On January 28th, 2014, the Government of Georgia announced that mandatory vehicle testing will resume on March 1st 2015 - http://www.economy.ge/en/media/news/technical-supervision-of-vehicles-in-georgia/
[15] Presentation given by the Ministry of Environment and Natural Resources Protection of Georgia on 27.05.2013.

- Georgia is spending 855 million dollars on fuel imports annually, totaling 12% of total imports.[16] This weakens its macro-economic situation and exposes Georgia to oil price volatility.

Therefore, immediate actions are required to reduce the negative impact of the transport sector on the environment, human health and economic security.

2.2. Overall Aim of the White Paper

The aim of this paper is to help develop a national policy strategy that will improve fuel economy in Georgia through the use of EU fuel and vehicle standards, and international experience and best available technology for cleaner, more efficient vehicles. This, in turn, will translate into lower CO_2 and non-CO_2 emissions, lower costs to consumers, and improved macro-economic situation through lower national fuel import costs.

This policy paper has been developed based on national discussions[17], and international and national experts' advice, taking into account the current situation in Georgia and results of the GFEI Fuel Economy Policies Impact tool and the GFEI Feebate Simulation tool. Representatives of all relevant institutions were involved in the process through the Project Steering Committee, details of the Project Steering Committee can be found in Annex 2.

[16] http://www.geostat.ge/index.php?action=page&p_id=137&lang=eng
[17] Please see http://www.gfei-caucasus.org/ for more information.

3. Background Information

3.1. What is Fuel Economy?

Fuel economy improvement means reducing fuel use per unit vehicle travel (or increasing travel per unit of fuel use), which reduces overall fuel use for a given distance traveled. Automobile fuel economy improvement can be achieved with the help of pricing and tax strategies, technologies, behavioral changes and integrated planning techniques. There are a number of benefits from fuel economy improvement including reduced costs for automobile users, improved air quality, increased energy security and reduced CO_2 emissions.[18]

To achieve these advantages, particularly the reduction in CO_2 emissions, the UNEP, FIA, ITF, and IEA formed the Global Fuel Economy Initiative (GFEI) in 2009;[19] ICCT and UC Davis joined more recently. The 3 core activities of the GFEI are:

1. Data development and analysis of fuel economy potentials by country and region.
2. Support for national and regional policy-making efforts.
3. Outreach and awareness raising activities amongst stakeholders (e.g. vehicle manufacturers).[20]

Georgia joined the GFEI in 2011 with the initiation of the project *Initiation of an Auto Fuel Efficiency Programme in Georgia & Development of the Caucasus Fuel Economy Initiative (CFEI)*. The aim of the project is to introduce the GFEI approach to the South Caucasus countries using Georgia as a GFEI sub-regional node.

3.2. IEA Projection Tool

This white paper uses the IEA's Fuel Economy Policies impact Tool (FEPIt) to estimate the current fuel economy of Georgia and the estimated fuel economy by the year 2020 with a business-as-usual scenario and a supportive policy scenario. These projections will serve as a basis for the recommended fuel economy targets of Georgia. They will also be used to highlight fuel economy improvement (both potential and realized), highlight national trends, identify beneficial policies and identify potential costs.

The GFEI FEPIt methodology is as follows:

1. National LDV fleet data and tax systems are acquired from official sources.
2. The data is 'cleaned' to make it compatible with tool data input requirements.
3. The data is inserted into the tool and projection algorithms are run.
4. Projections and recommended fuel economy policies are highlighted by the algorithms and further developed by expert analysis.

3.3. Feebate Simulation Tool

[18] For more information, visit http://www.unep.org/transport/gfei/autotool/understanding_the_problem/About_Fuel_Economy.asp
[19] http://www.globalfueleconomy.org/about/Pages/AboutHome.aspx
[20] http://www.globalfueleconomy.org/about/Pages/AboutHome.aspx

This paper's recommendations are also based on a Feebate Simulation Tool, developed by the GFEI, ICCT and CE Delft, Netherlands. The tool offers users the possibility to input country specific data and design a feebate[21] system relevant to the country. In particular, the tool calculates a feebate 'pivot point'[22] or fuel economy 'limit' that may act as a de-facto standard, along with expected revenues/costs to government, and fuel economy improvements or reductions in CO_2 emissions from vehicles.

3.4. Current Policies and Regulations

Although Georgia does not currently have a strategy, or specific policies, to improve or regulate auto fuel economy, it does have some mechanisms that impact fuel economy that can be altered to improve the situation. Below is a brief description of the current situation with regards to policies and regulations related to fuel economy in Georgia.

3.4.1. CO2-Based Light Duty Vehicle Ownership Tax

There is currently no LDV ownership tax in Georgia. Therefore LDV owners in Georgia are not obliged to pay annual fees depending on the fuel efficiency of their vehicle.

As there is no LDV inspection system currently in place in Georgia implementation of this tax is considered to be costly and logistically difficult by the government. In addition, these systems are considered extremely unpopular by the Georgian electorate.

Due to the implementation of vehicle testing standards in March 2015[23], this tax is considered to be more feasible from 2015 onwards.

3.4.2. CO_2-Based Light Duty Vehicle Acquisition Tax

The current taxation system for imported vehicles in Georgia is dual, and not linked to fuel economy. Instead, the tax varies according to the engine volume and age of the vehicle. Initially, and in accordance with clause 188 of Georgia's tax code, cars are subject to an excise tax that is levied based on vehicle age and engine size:

Table 1 - Georgian Excise Tax

Car age, years	Price, GEL per engine cm^3
1 or less	1.5
2	1.4
3	1.3
4	1.2
5	1
6	0.7
7-12	0.5

[21] Feebates are essentially a fee on inefficient technology and a rebate on efficient vehicles.
[22] A feebate or feebate-like pivot point determines the cost-revenue distribution between the government and the market. Vehicles with fuel efficiency worse than the pivot point are subject to additional taxes and fees, and vehicles with fuel efficiency better than the pivot point are subject to tax breaks or rebates.
[23] http://www.economy.ge/en/media/news/technical-supervision-of-vehicles-in-georgia

13	0.6
14	0.7
More than 14	0.8

Given that the lowest rates of taxation are for vehicles between 7-12 years of age, the excise tax stimulates the import of older cars (see Figure 1 regarding the tax applicable to new, 2001-2007, and pre 2001 vehicles). And this is reflected in the distribution of vehicle age discussed above. In addition to the excise tax, according to clause 197 of the Georgian code, cars are subject to an import tax. When importing a car and additional sum of 0.05 GEL per engine cm3 is added. An additional 5% of this initial amount is added for every year of the vehicle's age; however, this tax contributes only a negligible amount to the total tax, and therefore does not sufficiently incentivize newer/lower emitting vehicles.

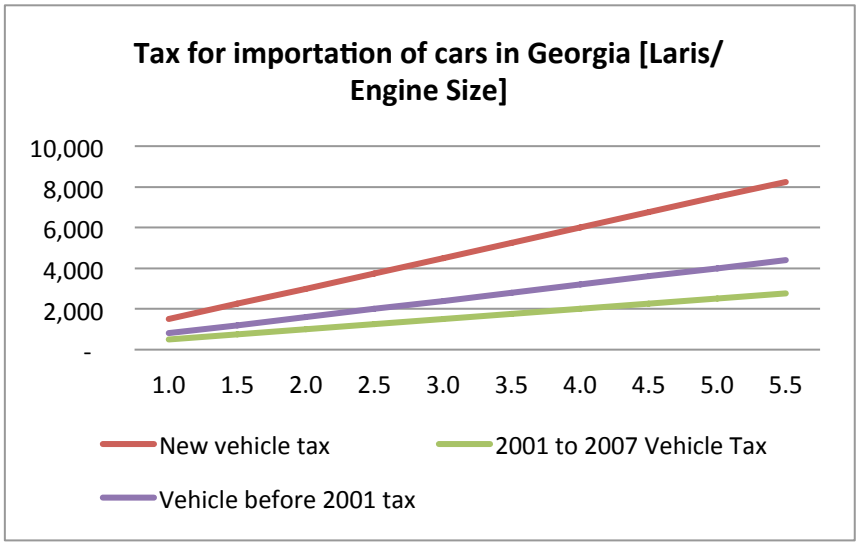

Figure 1 - Tax for Importation of Cars to Georgia

3.4.3. Labeling

There is currently no labeling of vehicles or fuel economy rating system in Georgia.

3.4.4. Fuel tax / Fuel tax differentiation

The following differentiated fuel taxes are currently in place in Georgia:

- Gasoline – The importer should pay 250 GEL per ton + 18 % VAT
- Diesel – The importer should pay 220 GEL per ton + 18 % VAT

3.4.5. Used import restriction

There is currently no restriction on the age or any other criteria to import used LDVs to Georgia.

3.4.6. Fuel quality standards

Georgia is currently in the process of improving fuel quality standards. The comparison of national gasoline and diesel fuel quality standards with current EU standards are highlighted in the tables below.

Table 2 - Comparison of gasoline fuel quality standards in Georgia with current European standards

Current European standards: (as of 01.11.2013)	Georgian Standards	
	Georgian fuel standards from January 1, 2012 to January 1, 2014:	Georgian fuel standard as of January 1, 2014:
Lead – Not more than 0.005 g/L[24]	Lead – Not more than 0.005g/L	Lead – Not more than 0.005g/L
Benzene volume fraction – Not more than 1%	Benzene volume fraction – Not more than 3%	Benzene volume fraction – Not more than 3%
Aromatic Hydrocarbons volume fraction – Not more than 35%	Aromatic Hydrocarbons volume fraction – Not more than 42%	Aromatic Hydrocarbons volume fraction – Not more than 42%
Sulfur – Not more than 10mg/kg	Sulfur – Not more than 250mg/kg	Sulfur – Not more than 150mg/kg

Table 3 - Comparison of diesel fuel quality standards in Georgia with current European standards

Current European standards: (as of 01.11.2013)	Georgian Standards	
	Georgian fuel standards from January 1, 2012 to January 1, 2014:	Georgian fuel standard as of January 1, 2014:
Cetane number – Not less than 51	Cetane number – Not less than 47	Cetane number – Not less than 48
Sulfur – Not more than 10 mg/kg	Sulfur – Not more than 300 mg/kg	Sulfur – Not more than 200 mg/kg
Density at 15OC – Not more than 845 kg/m3	Density at 15OC – Not more than 845 kg/m3	Density at 15OC – Not more than 845 kg/m3
Polycyclic aromatic hydrocarbons weight fraction – Not more than 11%	Polycyclic aromatic hydrocarbons weight fraction – Not more than 11%	Polycyclic aromatic hydrocarbons weight fraction – Not more than 11%

3.5. Conclusion

An analysis of the current policies and regulations governing fuel economy in Georgia indicates that national standards do not correspond to EU requirements; in many cases (used import restriction, labeling, etc.) policies do not even exist.

New LDVs in the Georgian fleet necessitate the reduction of sulfur levels in imported fuel[25], this need will be increased as future fuel economy policies incentivize new vehicles. In addition to this,

[24] Considered to be unleaded.
[25] For example, EURO 5 and 6 vehicles require near-zero sulfur fuels for operation, http://transportpolicy.net/index.php?title=EU:_Light-duty:_Emissions

improvements in fuel quality standards will also decrease pollutant emissions of older LDVs that exist in the Georgian fleet.

Significant development of the policies and regulations governing fuel economy is required to ensure that Georgia comes into line with EU standards.

4. Fuel Economy Trends in Georgia and status as of 2012

4.1. Latest Fuel Economy Trends in Georgia

To form a view of the trends in fuel use and light duty vehicle size, as well as to identify the most effective policies and realistic targets LDV fleet, data from Georgia was collected from the Custom Service Department of the Ministry of Interior and collated by experts. Data was collected for the years 2008, 2010, 2011 and 2012.

The data was inserted into an International Energy Agency (IEA) database and cleaned to bring it into line with data standards. It was then reviewed by François Cuenot of the IEA and the following conclusions were drawn from the data.

The LDV fleet of Georgia shows a slight improvement in fuel economy year on year. However, this improvement has been slowing down drastically in the last couple of years. The annual improvement rate of 1.3% from 2008 – 2010 was cut by half to 0.6% from 2010 – 2012. The current average fuel economy of light duty vehicles in Georgia is 189 g CO_2/km, down from 196 g CO_2/km. At this pace, Georgia cannot hope to get below 170g CO_2/km by 2020, which would not be satisfactory, compared to where other countries stand.[26]

Due to the slow rate of improvement, policies are needed in Georgia to help accelerate the rate of improvement of fuel economy. The reform of the Georgian registration taxation system is the most obvious strategy, especially to stop encouraging the import of old/inefficient used LDVs that are making the Georgian light duty vehicle fleet unsafe (both in terms human health and road safety) and environmentally-unfriendly.

Regarding fuel economy, since new European and Japanese vehicles have rapidly become more efficient in the past 3-5 years, having only a few such vehicles imported suggests that the average fuel economy in the Georgian fleet is likely to be worse than in the EU (though the few new vehicles should be similar, depending on the size mix). This fact is shown in the Figure 2 below, with Georgia added to IEA rankings of other countries for a global comparison. It is obvious that Georgia ranks as one of the worst fuel economy countries for 2008 and 2010, with a clarifying note that for all other countries in the figure only new LDVs are included whereas for Georgia, the newly registered vehicles cover a 20-year age range. However, this comparison is useful to situate Georgia in comparison with other countries.

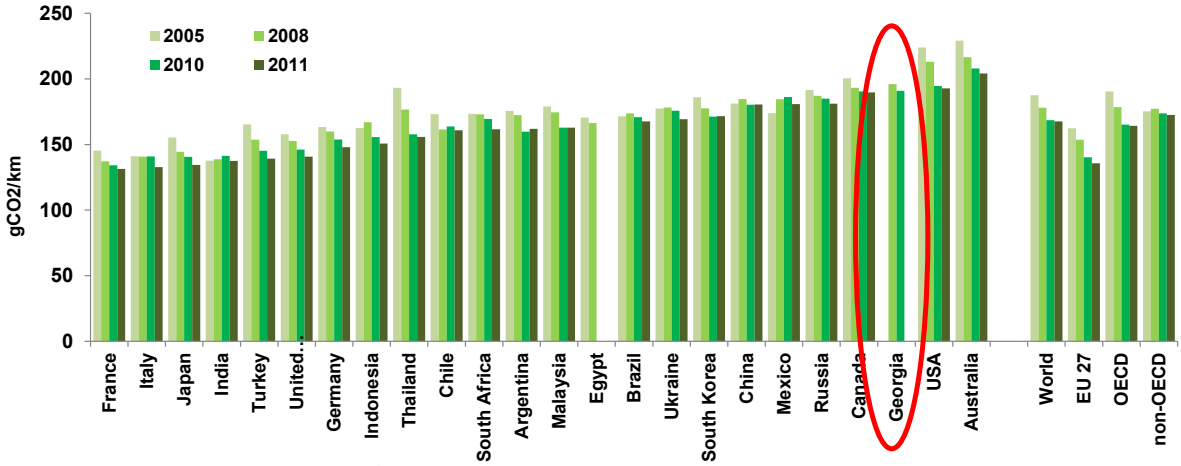

Figure 2 - Fuel economy by country[27]

[26] http://www.globalfueleconomy.org/Documents/Publications/workplan.pdf
[27] http://www.globalfueleconomy.org/Documents/Publications/wp8_international_comparison.pdf

4.2. Age Distribution

The registration tax system in Georgia gives a significant incentive to buy older light duty vehicles as the tax is lower. The direct result is that light duty vehicles entering Georgia are older, with limited or no inspection to ensure they are safe and comply with minimum standards. Higher registration volumes occur for 12, 13 and 14 year old LDVs (Figure 3). Recent trends in 2011 and 2012 indicate that vehicles newer than 2 years old have increased their market share significantly to 7% of the new registrations in 2012, compared to 1% in 2008. Nevertheless, 2012 also witnessed a higher share of 16 years and older light duty vehicles, to 10%. Therefore, it appears the market is becoming divided into two as very new and very old light duty vehicles are both gaining market share. This trend would need to be confirmed in the near future as registrations data becomes available.

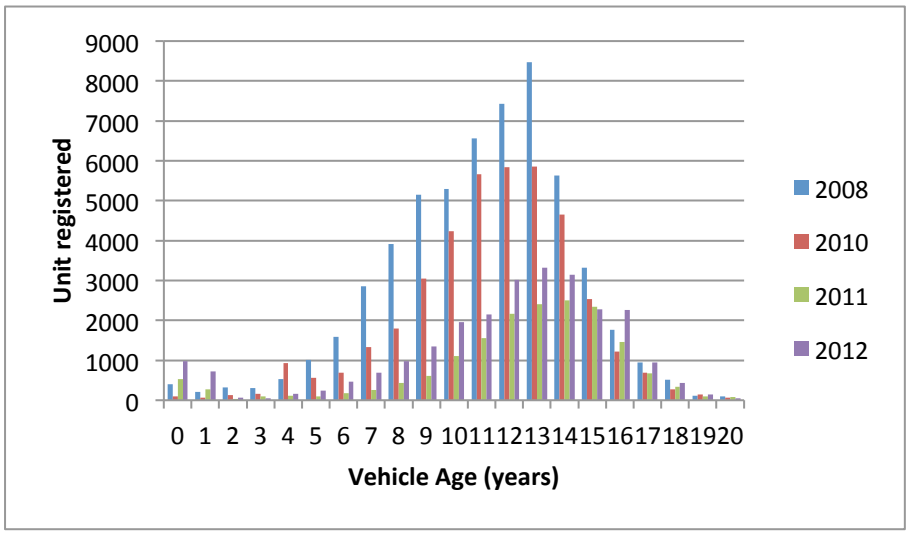

Figure 3 - Age of LDV registrations, 2008 to 2012

4.3. Light Duty Vehicle and Engine Size

With regards to gasoline light duty vehicles the data revealed that light duty vehicle size is decreasing slowly in Georgia. Between 2008 and 2012 the total share of large gasoline light duty vehicles fell from 55% of total light duty vehicles to 39% of total light duty vehicles (Figure 4). Conversely, the share of small gasoline light duty vehicles increased from 7% to 11%.

With regards to diesel light duty vehicles analysis of the data revealed that light duty vehicle size is increasing rapidly in Georgia. Between 2008 and 2012 the share of large light duty vehicles increased from 3% to 16%.

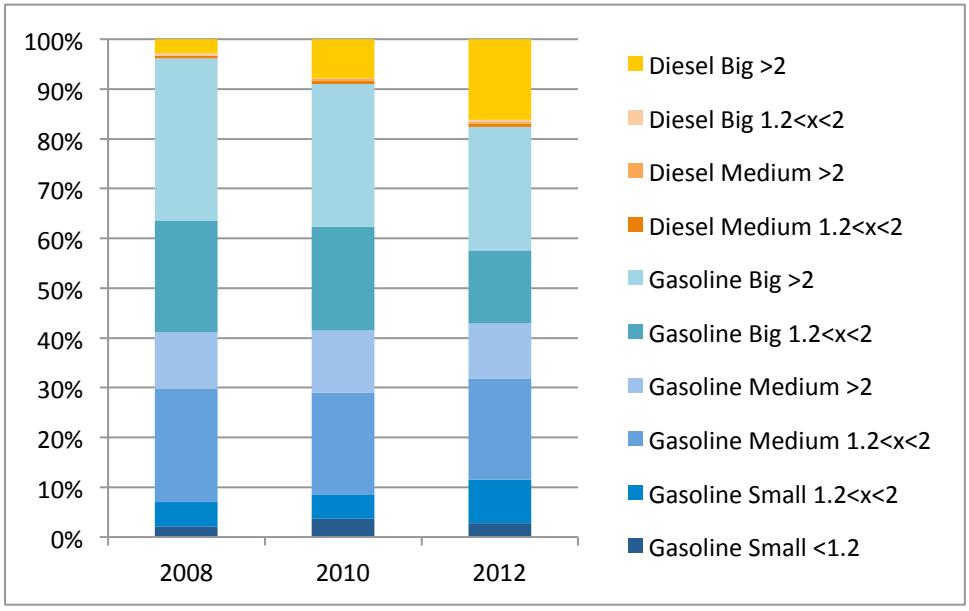

Figure 4 - Light duty vehicle size evolution, by fuel type and engine size, 2008 to 2012

Overall, light duty vehicle size is getting smaller while engine size is getting bigger (Figures 5 and 6), showing that the downsizing effect on internal combustion engines has still to impact the Georgian market in the coming years. Small engines below 1.2 Liters are still not popular and have a tiny share of the market. The registration tax system is also based on the engine size, showing that the fiscal lever on engine size does not seem to be working effectively.

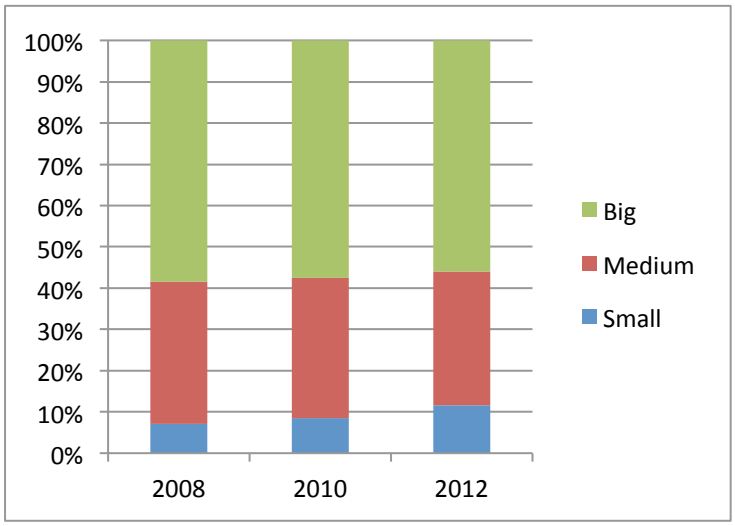

Figure 5 - Light duty vehicle size

Figure 6 - Light duty engine size

4.4. Fuel Type

There is a clear trend of dieselization within the data, showing an increase in the number of diesel light duty vehicles from 4% in 2008 to 18% in 2012 (Figure 7). This trend is not likely to change in the near future, as the countries of origin of the used light duty vehicles have a higher share of diesel light duty vehicles in their fleets. The evidence suggests that by 2020 one third or more of all new LDV registrations will be diesel.

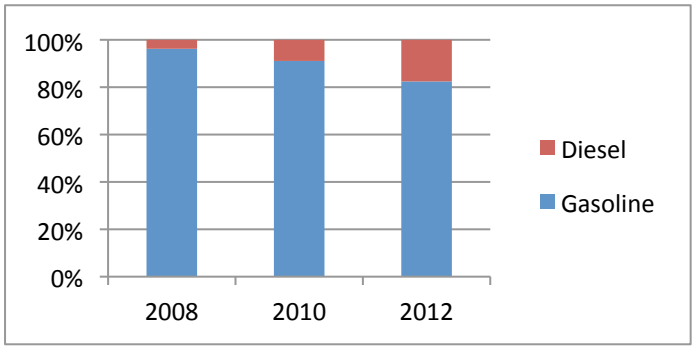

Figure 7 - Fuel types of new registrations, 2008 to 2012

4.5. Impact of Dieselization on FE / Air Quality

The process of dieselization carries with it both negative and positive consequences for Georgia. While diesel emits lower levels of CO_2 emissions (and will therefore reduce overall GHG emissions) it produces higher levels of particulate matter and has higher sulfur content, reducing the air quality of the country, and major cities in particular. This is where Georgia's fuel quality, in particular diesel fuel and sulfur levels, become crucial. Improving the fuel quality standards to require 50 parts per million or below gasoline and diesel will ensure that particulate matter emissions do not increase as preference for diesel engines increases. Diesel filter and catalyst technology requires clean, low sulfur fuel in order to work properly.[28]

4.6. IEA projections

4.6.1. Fuel economy with policies

Assuming that the abovementioned policies are fully implemented, the FEPIt indicates that Georgia can expect to reach a fuel economy of 144 g CO_2/km by 2020. The target suggested by the IEA expert was 140 g CO_2/km by 2020. This objective seems ambitious but realistic; by 2020, average new EU car is expected to be below 100 g CO2/km, leaving Georgia further margin for improvement after 2020.

4.6.2. Fuel Economy without Policies

If the status quo is maintained in Georgia then the FEPIt predicts that Georgia's fuel economy will be 174 g CO_2/km by 2020. Given that Georgia relies heavily on used imports from European countries, strong dieselization of the market is expected in the near future, as many more diesel vehicles will be made available.

[28] http://www.unep.org/transport/pcfv/pdf/sulphurreport.pdf

5. Recommended Actions

5.1. Immediate opportunities in Georgia, where largest impacts can be made:

The GFEI Fuel Economy Policies impact Tool, with support from the IEA and GFEI experts, identified a number of policy approaches that could provide the opportunity to improve auto fuel economy in Georgia substantially. These policies are listed below, and are listed in order of their required implementation:

5.2. First action item (2015): Labeling

Labeling is considered to have an important impact on fuel economy. Providing consumers with information on fuel economy helps the vehicle purchaser to make informed decisions. Labeling is essential for the successful implementation of LDV registration tax (Chapter 5.4). Labeling will also address the low awareness of fuel economy, which is prevalent amongst Georgian LDV users.

With regards to Georgia, labeling is considered to have a particularly large impact due to the need to change opinions amongst LDV customers in Georgia. Due to the technical difficulties and costs involved in a full labeling system it is recommended to initially begin labeling only for new vehicles.

Aspects of labeling in Georgia should include the follow aspects:

- Absolute, not relative, to incentivize fuel efficient vehicle types
- Color based (for high visibility)
- All new vehicles at the initial stage (to simplify implementation), followed by mandatory full LDV fleet labeling
- Display fuel cost savings (to highlight benefits of fuel efficient vehicles)
- Number system (to ensure labeling simplicity)
- Display fuel economy and CO_2 emissions (fuel economy to underline direct fuel cost savings, CO_2 emissions to ensure that the labels are in line with CO_2 based registration/ownership taxes)
- Mention driving style and vehicle use benefit (to increase understanding of fuel economy)
- Georgian/English language (to ensure maximum comprehension)
- Display tax band (once applicable via CO_2 based ownership tax)
- Display vehicle make, type, age, fuel type (for general information)[29]
- Web-based platform operated by the Georgian government to ensure reliability and trust in information published

The NEDC test cycle is recommended to be used to ensure that labels are in line with international standards; in addition, NEDC is considered to be one of the easiest test cycles to implement. The ICCT test cycle conversion tool will also be used to convert data from other sources into NEDC standards such as JC08 and CAFE.

[29] Georgia is planning to ratify the Agreement of Economic Commission for Europe: *Concerning the adoption of uniform technical prescription for wheeled vehicles, equipment and parts which can be fitted and/or be used on wheeled vehicles and the conditions for reciprocal recognition of approvals granted on the basis of these prescriptions* (done at Geneva on 20 March 1958). The process of ratification has already been initiated.

Labeling should be implemented in two stages. The first stage, starting in 2015, will require labeling of all new vehicles imported into Georgia. The second stage will start in 2016, and require labeling of all used and new vehicles in Georgia. This will allow Georgian authorities to transmission smoothly into the practice of comprehensive, mandatory labeling.

Figure 8, below, is an example of a successful labeling system implemented by the UK government. The label displays a high visibility color based rating alongside estimated fuel costs, environmental information and vehicle specifications. This data allows consumers to make informed decisions regarding the environmental specifications of the vehicle.

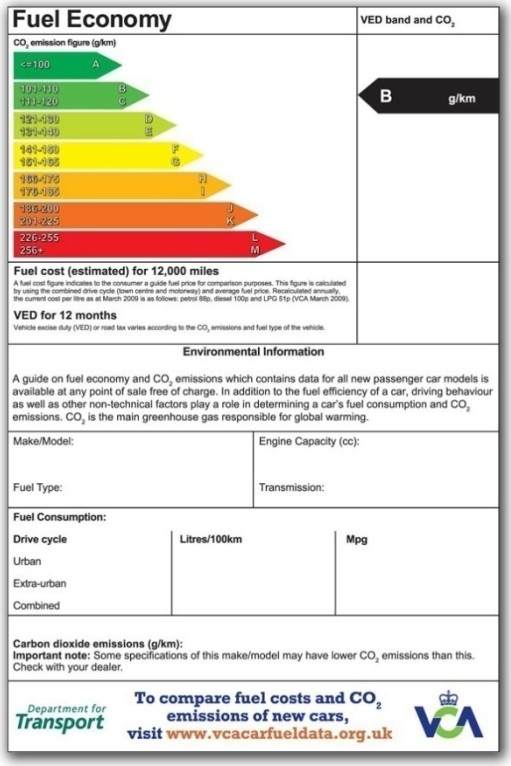

Figure 8 - UK LDV label

5.3. Second action item (2014-2015): Fuel quality standards

Improvement of fuel quality standards for gasoline and diesel (in line with EU requirements) is an important strategy in reducing air pollution. As the new generation of EURO 5 and EURO 6 vehicle technology requires EU quality fuels to operate properly and maximize technology benefits, the improvement of fuel quality standards should be framed by vehicle imports.

Improving fuel quality standards will involve amending legislation to bring it into line it with EU standards.

This process will require two specific studies to identify the implementation dates and rapidity of fuel quality standards improvement that are feasible for Georgia. Firstly, fuel flows should be analyzed by looking at where Georgia gets its gasoline and diesel fuel from and what is possible given current fuel flows. Secondly, a cost benefit analysis of the costs to both importers and consumers is required, to minimize any foreseen negative impacts on consumers and businesses operating in Georgia.

These studies will be used to develop a timeline for the implementation of improved fuel quality standards in Georgia.

5.4. Third action item (2017): CO_2-Based Light duty vehicle acquisition/registration tax

CO_2-Based Light duty vehicle acquisition tax is considered by the FEPIt to have a high impact on fuel economy. Fuel economy-based acquisition taxes have proven very effective in influencing purchase decisions by changing the relative purchase cost of different vehicles, and providing LDV dealers with a tool to help influence customer choices, especially in conjunction with a fuel economy label.

Feebate System in Georgia

To obtain a suitable vehicle feebate[30] or acquisition tax that will incentivize low emission vehicles, the available car fleet data from 2012 was combined with a GFEI Feebate Simulation Tool to produce indicative results for a Georgian feebate system.

The GFEI Feebate Simulation Tool identified an initial pivot point of 182.7 grams CO_2/Km, meaning that under a feebate or feebate-like system vehicles with fuel efficiency better than 182.7 grams CO_2/Km should be incentivized. Vehicles with fuel efficiency worse than 182.7 grams CO_2/Km should be disincentivized. Over time, this will need to be adjusted as people respond by buying more efficient and lower CO_2-emitting vehicles. This pivot point has been identified to ensure revenue neutrality in the base year.

The specifics of the Georgian market are a very high rate of imported second hand vehicles and no national car industry. Due to this, the feebate-like system of CO_2 based vehicle tax for first-time registration of new and 2nd hand imported vehicles will potentially be, depending on the levels of tax, a very effective strategy. Due to the fact that the proposed feebate-like system does not include rebates, it will be necessary to replace the existing tax system with the feebate-like system. This will allow fiscal incentives to be offered for fuel efficient vehicles through a reduction in overall tax rates.

This system will work by assigning either a flat tax rate related to grams of CO_2 emitted/km, or a percentage of the car's cost for each gram of CO_2 emitted/km. Additional research is required to specify these exact parameters. The cost of the new vehicle registration tax will use the identified 182.7 grams CO_2/Km as its pivot point, charging more than previous taxes for vehicles that emit more, and less for vehicles that emit less.

An important preparatory activity for the implementation of an LDV registration tax will be the employment of a full labeling system in Georgia. As the data required for labeling and registration tax are the same, an in-place labeling system will ensure that all relevant state bodies have the necessary information and expertise to effectively identify and implement an LDV registration tax. This action should be implemented within 2 years of completing the vehicle labeling process.

5.5. Fourth action item (2020): CO_2-Based Light duty vehicle ownership tax

CO_2-Based Light duty vehicle ownership tax is considered by the FEPIt and GFEI experts to potentially have a very high impact on fuel economy. Annual fees based on fuel economy will provide further incentives to buy a fuel-efficient vehicle, as they would increase the annual operating budget for LDVs with poor fuel economy. Ownership fees may be more effective in influencing purchase of second hand vehicles, which are generally less efficient, and whose owners are more cost-sensitive.

[30] A 'feebate' system is a combination of additional fees for high polluting or inefficient vehicles and simultaneous rebates for purchases of low polluting of fuel efficient vehicles. Feebates can be implemented either directly or through existing tax systems.

Successful implementation of the vehicle ownership tax requires identification of a pivot point, which should be identified during the vehicle inspection process. The tax rate should be in the same format as the vehicle registration tax, annual vehicles inspections and labeling system; to ensure it is easily understandable. This tax should be updated on a yearly basis to keep up to date with changes in the national LDV fuel economy average.

It is important that the ownership tax be conducted after the implementation of annual vehicle inspections, as this will give the opportunity to locate a pivot point from the information gained. Vehicle inspection also simplifies the implementation of an ownership tax because it can be added to the vehicle inspection fee. It is recommended to implement ownership tax within 5 years of full vehicle inspections taking place.

5.6. Fifth action item (2015 - 2020): Used import restriction

Although used import restrictions were considered to currently have a low impact on fuel economy by the FEPIt (see Figure 9), they do stand to produce valuable improvements in the air quality and safety standards of Georgia's LDV fleet. In addition to this, phased-in used import restrictions may offer Georgia the possibility of significantly improving the fuel economy of its LDV fleet by 2020, due to significant fuel economy improvements in European vehicles since 2008.

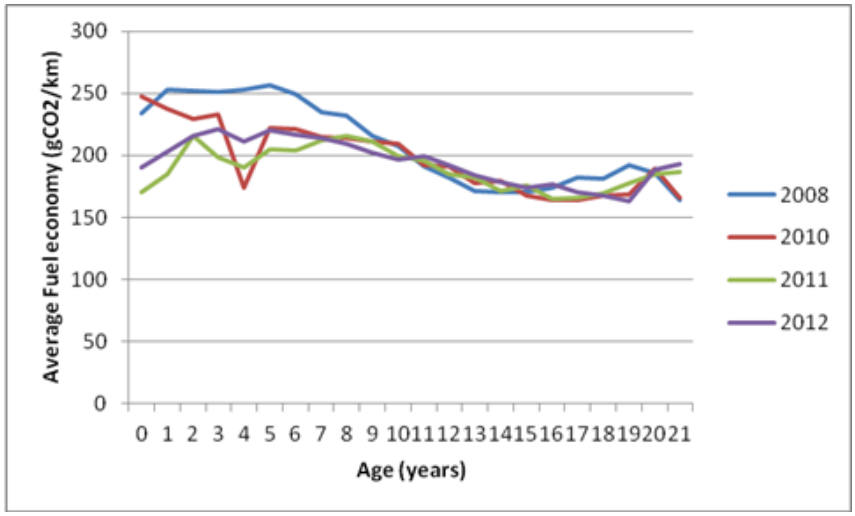

Figure 9 - Average Georgian LDV age

As we can see from Table 4, implementing a ban on imported 2nd hand vehicles over 17 years would have only a negligible effect on the market (less than 5%), while a ban on vehicles over 16 years would affect over 10% of used imports, and therefore negatively impact cost sensitive consumers in Georgia.

Table 4 - LDV imports affected by age ban

LDV import age ban	Average[31] % of imports affected
15	19.456
16	10.814
17	4.987
18	2.229

[31] From the years: 2008, 2010, 2011 and 2012.

19	0.920
20	0.493
21	0.246
22	0.108
23	0.047
24	0.015

Based on this analysis, an initial ban on LDVs 17 years old or older is suggested, with the maximum age requirement falling by one year for every year in place. Starting the restrictions in 2015 would immediately stop the import of all non-EURO 2 LDVs[32] from Europe (Georgia's largest import market) and allow Georgia to reach minimum imported LDV age of 2008 by 2020 (see Table 5), bringing them into line with EURO 4 LDVs by 2019.

Table 5 - LDV age ban and maximum import age

Year	Maximum age of imported LDV	LDV age ban
2014	any	none
2015	1998	17
2016	2000	16
2017	2002	15
2018	2004	14
2019	2006	13
2020	2008	12

[32] http://www.dieselnet.com/standards/eu/ld.php

6. Summary of Recommended Actions[33] (with timeline, targets and responsible bodies)

Action	Date of implementation	Responsible Institution(s)	Comments
Labeling indicating CO2 emissions, fuel economy, model, age, fuel type, tax band, etc.	March 1st 2015 for new vehicles imported into Georgia; March 2016 for all new and second hand vehicles in Georgia	Ministry of Finance – Customs Service; Ministry of Economy and Sustainable Development – Land Transport Agency	Labeling's significance as a preparatory activity for the implementation of registration taxes makes it an essential component of a fuel economy policy for Georgia. This action will also help to address the lack of awareness regarding fuel economy in Georgia.
Fuel quality standards should be incrementally brought into line with EU standards	October 1st, 2015 (October 1st, 2014 for cost benefit analysis)	Ministry of Environment and Natural Resources Protection; Ministry of Economy and Sustainable Development – Certification bodies	Despite recent improvements in fuel quality standards over the past few years, further improvements are required to bring them into line with EU standards. This will require implementation of a cost benefit analysis.
CO_2 based Light Duty Vehicle registration tax	January 1st 2017 for new imports; January 1st 2018 for 2nd hand imports.	Ministry of Finance institutions	This is considered to have a high level of importance. This system will work by assigning either a flat tax rate related to grams of CO2 emitted/km, or a percentage of the car's cost for each gram of CO2 emitted/km. Additional research is required to specify these exact parameters.
CO_2 based Light Duty Vehicle ownership tax	Within 5 years of full implementation of the labeling system	Ministry of Finance – Tax institutions	This action is considered to be a high priority for Georgia as it will incentivize: fuel efficient vehicle acquisition of non-imported vehicles, fuel efficient driving practices, and discontinuation of inefficient vehicles. However, this action is considered to be unpopular and logistically difficult to implement. Therefore it is recommended to undertake an additional research in 2017 to assess the FE track record in Georgia, set new targets for 2025 and see whether the implementation of this tax is still important.
Used import restriction for vehicles over 17 years old, reducing by one year every year	Between January 1st 2015 and January 1st 2020	The Ministry of Finance; The Ministry of Internal Affairs – The Service Agency	This action is considered to be important due to the high quantity of used imported vehicles in Georgia. The initial age of import restrictions was selected to reduce its impact on cost sensitive consumers.

[33] Please see implementation calendar in Annex 3.

7. Conclusions

Analysis of the current situation indicates that immediate actions are available to decrease the negative impact of the transport sector on human health and the environment, both in terms of CO_2 and non-CO_2 emissions. The most effective method of achieving this is the development of Georgia's LDV fuel economy and the improvement of fuel quality in the country.

The average fuel economy of Georgia's LDV fleet is currently 189 g CO_2/km, improving at a rate of 0.6%/year, with an anticipated average fuel economy of 174g CO_2/km by 2020, if current trends continue. Analysis of the situation by international fuel economy experts and projection tools has helped to identify 5 strategies through which the Georgian government can improve the fuel economy of its car fleet to an estimated 140 g CO_2/km by 2020, which would bring Georgia in line with international targets.[34] These strategies include:

1. Labeling
    - Indicating CO_2 emissions, fuel economy, model, age, fuel type, tax band, etc.
    - To provide information for and support a registration tax.
    - Initially implemented for all new vehicles, then for all new and second hand vehicles.
2. Used import restriction
    - For vehicles over 17 years old (affecting an estimated 4.987% of imports), reducing by one year every year to reach a maximum LDV age of 12 years by 2020.
3. CO_2-Based Light duty vehicle acquisition/registration tax
    - Based on the results of the feebate simulation tool a CO_2 based registration tax (updated annually) is recommended.
    - Supported by, and implemented within 2 years of, a labeling initiative.
4. CO_2-Based Light duty vehicle ownership tax
    - Implementation of a vehicle ownership tax should be pegged to the LDV registration tax and updated on a yearly basis.
    - Supported by annual vehicle inspections, scheduled to start in March 2015.
5. Fuel quality standards
    - After implementation of a cost benefit analysis.
    - Incrementally brought into line with EU standards to support increased EURO 5 and EURO 6 vehicle imports.

Implementation of these 5 strategies within the next 5 years is important to ensure that the target of 140g CO_2/km is reached by 2020, that national legislation meets EU fuel standards, and that fuel economy improvement continues after 2020.

[34] The average fuel economy (L/100 km) of new cars in OECD countries could be improved 30% by 2020 and 50% by 2030 at low or negative cost taking into account fuel savings. Improvements of the same order of magnitude appear possible in non-OECD countries where car fleets are growing fastest. Improving the efficiency of new cars at this rate would make possible at least a 50% improvement in the average fuel economy of all cars on the road worldwide by 2050 – thus, the GFEI 50:50 Initiative.

8. Annexes

Annex 1 – Steering Committee Members

#	Name, Surname	Institution
1	Francesca Mazzucco	European Union Delegation to Georgia
2	Jill Kelly	United States Agency for International Development
3	Manana Mosidze	Environmental Protection and Natural Resources Committee of Parliament of Georgia
4	Ketevan Kordzakhia	Ministry of Environment and Natural Resources Protection
5	Noe Megrelishvili	
6	Nino Kvernadze	Ministry of Economy and Sustainable Development of Georgia
7	Elizbar Darchiashvili	LEPL Land Transport Agency
8	Pavle Jugeli	Ministry of Internal affairs
9	Irakli Jibladze	Tbilisi City Hall, Municipal Transport Department
10	Lela Sturua	National Center for Disease Control and Public Health
11	Mevlud Meladze	National Automobile Federation in Georgia
12	Kakha Karchkhadze	Ilia State University
13	Jaba Mamulashvili	Begiashvili & Co, Partner

Annex 2 – Map of Institutional Stakeholders