



# PROMOTION OF BIODEISEL IN GEORGIA

Development of Alternative, Renewable, Environmentally Friendly Fuel in Georgia

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## Ilia State University ( ISU)



- **Ilia State University (ISU)**, [www.iliauni.edu.ge](http://www.iliauni.edu.ge) established in 2006 in Tbilisi, Georgia, is a higher education institution that strives for academic excellence and integrity in teaching and research. With its over 800 academic staff, and 10 thousand students the university strives to provide excellence in all areas of academic practice and scientific research.
- ISU has four Schools – Arts and Sciences, Business, Law and Engineering, Ilia State University unites 25 Research Institutes, Centers and Laboratories, the diverse profile of these research institutions and laboratories create excellent opportunities for teaching and research.
- Ilia State University has successfully implemented many innovative projects has been on the cutting edge of developing and introduction of alternative, renewable, eco-friendly energy technologies in Georgia.



## Energy projects implemented at ISU

- The project ***“Promotion of Biodiesel in Georgia”*** started in 2012 and successfully completed in 2015. First time in Georgia’s history the transport was powered by non-petroleum based fuel and the university fleet started working on biodiesel. The project of ISU has theoretically proven and practically demonstrated that Georgia can start production of its own alternative, renewable eco-friendly fuel – biodiesel and bring economic and ecological benefits.
- The university In 2012 started and in 2016 successfully was completed a project ***“Introduction of Clean Energy by Solar Electricity Generation System in Georgia”*** a governmental Grant from the Japanese Government, first time in Georgia a 350 kWt photovoltaic systems was installed in Tbilisi, capital of Georgia. This project clearly demonstrated the possibility of the country to diversify energy supply by adopting and implementing modern technologies.
- The university has completed a project to design and test and make a utility model of a new type of wind engine ***“Vertical Axis Segmented Wind Engine”***. The project offered technological solutions based on “bio-techniques” or biological solutions of technical issues. The new technology offers the cheap and reliable technology to use wind energy for electricity generation or other useful works.





## Georgia almost entirely depends on imported hydrocarbons

- In 2012 842,3 K tons oil fuel was imported
- In 2013 import of oil fuel (gasoline, diesel) was 855,9 K tons, this number is by 1,6% higher than in 2012
- in 2014 import of oil fuel in Georgia reached 912 K tons and it is 10% more than the figures of the same period in 2013
- Import of oil fuel is constantly increasing and there is no sign that the upward trend will be changed
- The main suppliers are Romania 34%. Azerbaijan 27,1% Bulgaria 15.4% also Russia, Greece, Turkmenia, Italy
- The big lump of hard currency is paid for imported oil products and that contributes a great deal to the negative trade balance of the country

## Air pollution in urban areas is critical



- It's a proven fact that the main cause for such a critical level are technically faulty cars.
- Every day 625 municipality buses move in the streets of Tbilisi, the capital of Georgia
- Each bus consumes on average 40 liters of diesel fuel
- Every day around 25 tons of diesel fuel is burnt
- In Tbilisi alone 65 tons of CO<sub>2</sub> is emitted in the atmosphere every day
- Number of respiratory diseases is being increased
- The enactment of the law on technical inspection of vehicles has been postponed until next year as well. This is mainly due to social factors – a large part of the older cars simply cannot pass inspection
- Every year, air pollution kills about 6.5 million people worldwide
- Georgia is in the top least of the countries where air pollution is deadliest, with countries ranked by deaths per 100,000 people. This includes deaths linked to sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), particulate matter (PM).

**S O S !!!**

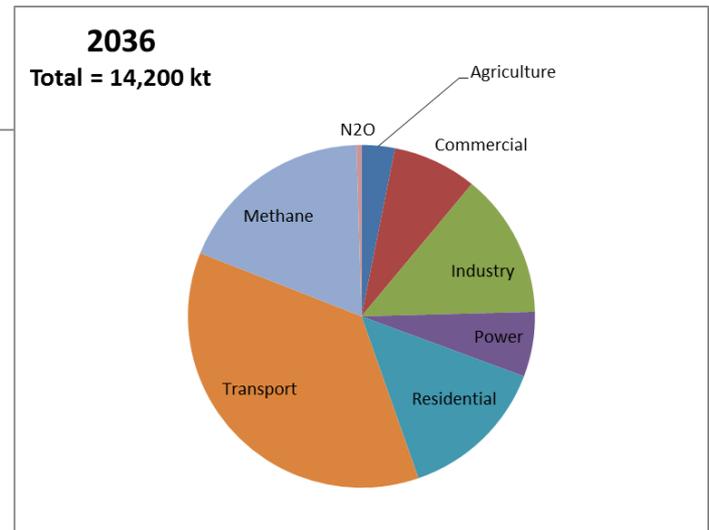
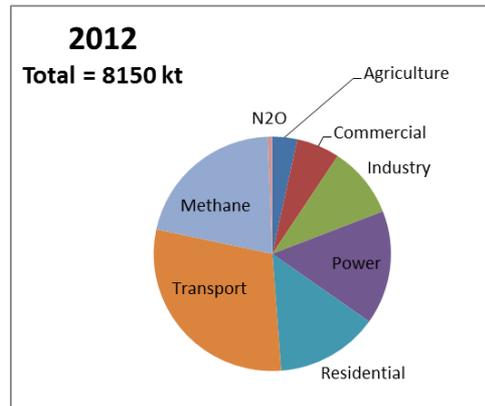
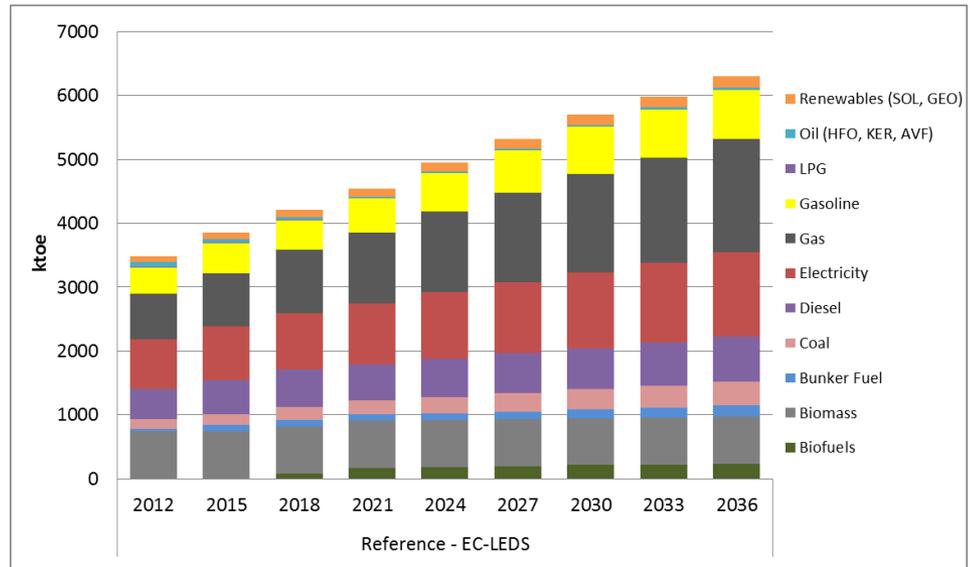


**Where is the solution ?**



# BAU scenario vs LEDS in Georgia

- ISU carried out research, made calculations and came up with the assumptions under the program “Low Emissions Development Strategies” (LEDS) According to the research and findings is Business as usual (BAU) scenario takes place Georgia will face steady and increased oil products import and consumption.
- The share of diesel fuel will be around 15-17% of the total consumption and it will also maintain upward trend.
- The studies of BAU scenario show that CO<sub>2</sub> emissions will be steadily increasing within the period of 2012 -2036. Air pollution level will also remain high.



## Tbilisi city hall needs solutions

- The government, the mayor and city hall of Tbilisi, tried several options to deal with these problems.
- One of the largest projects was to introduce new coaches (buses) working on Natural gas.
- However, a large part of Tbilisi municipal transport still remains relatively old, diesel engine buses.
- The city did introduce new coaches, but they will not go instead of the old ones – they will be added to the existing routes. This means that the number of outdated and technically defective vehicles will not reduce in Tbilisi.
- And though Natural gas is preferable than diesel fuel in terms of ecology and air pollution, still natural gas is a kind of fossil fuel and it contributes towards climate change and global warming.



*Tbilisi, the capital of Georgia from IV AD, has faced many troubles, invasion, occupation, it was destroyed and rebuilt many times but the current problem seems critical and so far no effective solution has been found*



**635 old type yellow buses running on diesel fuel vs 25 modern MAN busses powered by natural gas**

## Transport and related pollution cause big problems, especially in the cities



- Tbilisi, the capital is overloaded with vehicles, in the city with 1.5 mln. population approximately 1mln vehicles move every day.
- The Air is heavily polluted, especially in Tbilisi, as well as in the other large cities of Georgia.
- Transport is the main contributor to air contamination, around 80% of air pollution is attributed transport.
- Every year number of diseases related to air contamination has been increasing
- Every day 625 municipality buses move in the streets of Tbilisi, the capital of Georgia
- The Municipal Elections 2017 will take place in Georgia on October 21.
- At these elections, self-governing cities will elect mayors as well as members and chairs of local councils.
- Urban ecology, air pollution, problems associated with transport are main issues the contenders promise to deal with.



**in October 2017, 59 municipalities and five self-governing cities, including Tbilisi, will elect their Mayors and City Councils.**

## ISU offered a solution

- And then Ilia State University stepped in and offered completely different, innovative revolutionary solution – to say no to petroleum based fuel and switch on an alternative , renewable, eco-friendly fuel – biodiesel.
- ISU was always actively involved in research and development of transport sector in Georgia. The University has conducted research about the transport sector of Georgia, obtained statistics, classified the transport, and analyzed the energy they use with special focus on public and municipality transport.
- The research of ISU identified the key problems in the sector, especially those of the municipality transport and related Greenhouse gas (GHG) emissions. Based on the research the university has come up with solutions



- According to the statistics and the research of ISU public transport in Georgia is mainly used by Women, children, persons with disabilities and older citizens therefore ISU efforts to improve efficiency of public transport is very important for these citizens.
- The University then worked with Tbilisi City Hall presented the results of the research and offered the solutions. The municipality of Tbilisi’s was especially interested in the possibility to change petroleum based fuel by bio-fuel, namely biodiesel. ISU started working with the transport department if Tbilisi City hall to develop clean sustainable “Green” transport for the city.



## Biodiesel - alternative, renewable, carbon-neutral, eco-friendly, fuel



- **Scientific definition:** Biodiesel is defined as mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats
- or, Biodiesel is the name of a clean burning alternative fuel, made from natural vegetable oils, animal fats, and advanced non-food alternative crops
- Biodiesel is meant to be used in standard diesel engines and no engine modification is required; Biodiesel can be used alone, or blended with petrodiesel
- Biodiesel is better for the environment because it is made from renewable resources and has lower emission compared to petroleum diesel
- Biodiesel is a renewable, eco-friendly fuel
- Biodiesel is a carbon-neutral fuel
- Biodiesel is excellent solution for urban transport
- 1 ton of biofuel saves 2,65 tons of CO<sub>2</sub> emission in the atmosphere

## Promotion of Biodiesel by ISU pilot project

- To demonstrate all these qualities of biodiesel and to persuade the Tbilisi City Hall authorities ISU decided to carry out a practical demo project and clearly and practically demonstrate the advantages of Biodiesel.
- Thanks to the financial support the project received from US embassy in Georgia , it was able to identify and purchase a biodiesel producing machine with the capacity 500 liter per day, manufacturer and supplier of wish was Duke Dominion Ltd. Bulgaria
- Suppliers in Tbilisi began to provide secondary ( used cooking oil) which serves as a raw material for biodiesel production



Bulgarian expert, Mr. Vasili Berejiani, Director of the Bulgarian company Duke Dominion Com Ltd. manufacturer of Biodiesel machine, arrived to Tbilisi Georgia and provided one week intensive training for Georgian Technical team on biodiesel production



Chain of supermarkets SMART is one of our best one of our suppliers and partner. They regularly supply used oil from their chains located in Tbilisi, Georgia

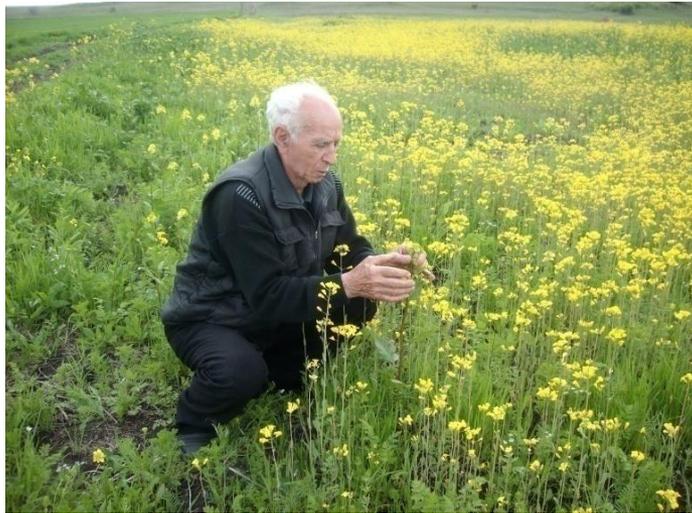
## First vehicles powered by biodiesel

- ISU decided that personal example would be most effective and convincing so ISU started to operate its own vehicles on biodiesel.
- Thus first time in Georgia's history in the Streets of Tbilisi papered the vehicles powered nit by oil and/or fissile fuel, but alternative, renewable eco-friendly and carbon-neutral fuel – biodiesel.
- A promotional and educational movie has been made and a web site [www.biodiesel.ge](http://www.biodiesel.ge) has been launched.

**This Ford Transit, of ISU made hystory – it was he first car powered by not petroleum based fuel, but by an alternative, renewable fuel in Georgia**



## Biodiesel production will give new impulse to agriculture development in Georgia

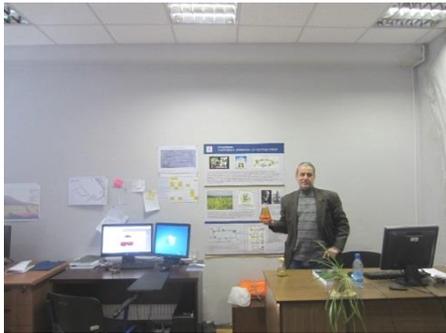


- The raw material for biodiesel is plant oil, and the best source for plant oil is Rapeseeds, ( Canola, Latin: *Brassica napus*)
- Under the ILIAUNI project “Biodiesel in Georgia” 10 hectares of land were cultivated in Kakheti region, eastern Georgia.
- The scientists from ILIAUNI and agronomists controlling the Canola fields Dedoplistskaro municipality, Kakheti Region, eastern Georgia



- **Canola (*Rapeseed*) fields in Kakheti region, Eastern Georgia, May 2012**
- **This new plant culture was adopted very well in eastern Georgia**

# Outcomes of the project “Promotion of Biodiesel in Georgia”



- The team of scientists working on this project have proven that Georgian can develop production of its own alternative, renewable eco-friendly, carbon-neutral fuel – biodiesel.
- Ilia State University, first time in Georgia’s history has started production of alternative, renewable, clean, eco-friendly fuel – biodiesel



- ILIAUNI has successfully finished the model of industrial cycle for biodiesel production – cultivating Canola, producing oil, biodiesel and the oilcake – the food for livestock.
- The university has prepared agro-economical calculations and is ready to provide scientific and practical advices to the industry of Georgia.



- We have proven that Georgian can develop production of its own alternative, renewable eco-friendly, carbon-neutral fuel – biodiesel, curb GHG emissions, create new green jobs, diversify the country’s energy supply sources, give new impulse to Georgian agribusiness, reduce harmful pollution and ultimately strengthen the country’s energy and political independence and ensure steady development.

## New developments and Biodiesel production

- The government of Georgia started to realize the importance to develop alternative, renewable eco friendly and carbon neutral fuel of its own.
- Production of biodiesel will diversify energy supply, strengthen economy, create new enterprises and new jobs, improve ecological conditions especially in the cities of Georgia. Production of biodiesel will strengthen energy and political independence, of the country
- One of the leading oil importer and distributor company in Georgia FREGO expressed interest to commercialize the achievements of ISU
- ISU and FREGO together have launched a new company Biodiesel Georgia Ltd.
- The new established company has received a prize for start –ups and financial support from the Government of Georgia and received low interest loan to develop biodiesel production in Georgia
- Biodiesel Georgia Ltd. is planning to purchase a small/medium size biodiesel plant and start production of biodiesel from used cooking oil on the first stage, which will be followed by canola oil as a raw material for biodiesel production.
- There are legislative obstacles, parliament imposed excise tax on biodiesel, which is not reasonable in Georgia’s case.
- We need new regulations restricting usage of cooking oil in food chain again – such as poultry etc.
- Awareness rising champagne is needed for both general public and decision makers



# Action Plan of Biodiesel Georgia Ltd



- Evaluation of the energy used for public transport in Tbilisi, the capital of Georgia and in the cities members of Covenant of Mayors
- Production and testing of biodiesel as alternative, renewable, eco-friendly fuel
- Attracting the restaurants, fast foods, other companies to participate in the project,
- Launch the campaign “From the Pan into the Tank”
- Launch the campaign “Your Oil our Advertisement”
- Start the process of gradually changing the petro-diesel by biodiesel in the city busses
- First vehicles powered by biofuel start working in the cities of Georgia
- Technical evaluation of biodiesel as an effective alternative fuel for the internal combustion engines
- Evaluation of the performance of the engine working on biodiesel
- Evaluation of energy efficiency by using biodiesel instead of petro-diesel
- Evaluation of the ecological benefits of biodiesel
- Cultivate land under Rapeseed ( *Brassica napus*) in eastern Georgia
- Rising awareness of general public about the ecological benefits that biofuel can bring to the environment
- Publishing brochures, flyers, other printing materials
- Creation of an educational promotional documentary movie on energy efficiency – case biodiesel
- Theoretical and practical demonstration that Georgia can produce its own alternative, energy effective, renewable, eco-friendly fuel.
- Launch new municipality buss fleet powered by biodiesel.



# Thank you!

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