



Quarterly **Energy** Review - Q3, 2014

In this quarterly report we review and analyze the main trends in Georgia's energy sector. In particular, we discuss developments in the use of three main energy sources: electricity, oil products and natural gas. The report is comprised of following sections:

1. Electricity Sector

- **Quarterly Balances**
- **Electricity Generation/Consumption**
- **Renewable Electricity Generation Patterns**
- **Electricity Consumption**
- **How expensive is electricity in Georgia?**
- **Electricity trade**

2. Natural Gas

- **Natural Gas trade data**
- **Natural Gas statistics for Import Price**

3. Oil Products

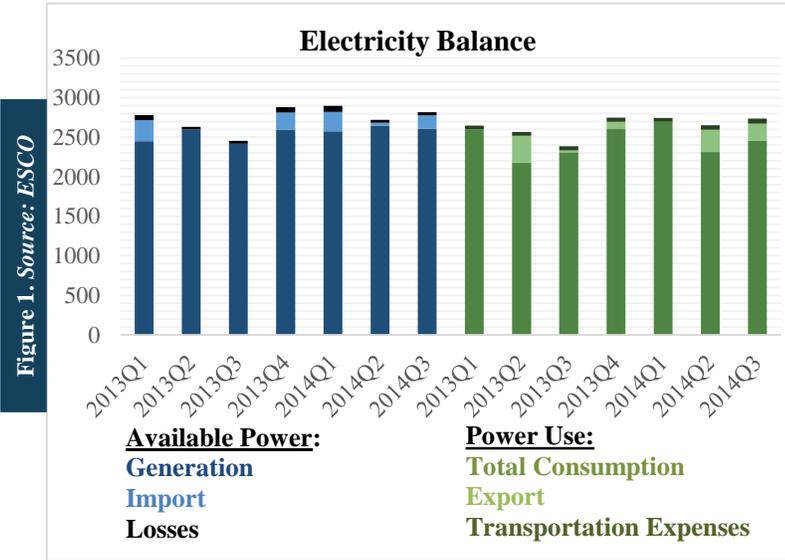
- **Gasoline/Diesel Import**
- **Import Price statistics**
- **Import patterns by type of gasoline**
- **Import patterns by type of Diesel**

1. Electricity Sector Review

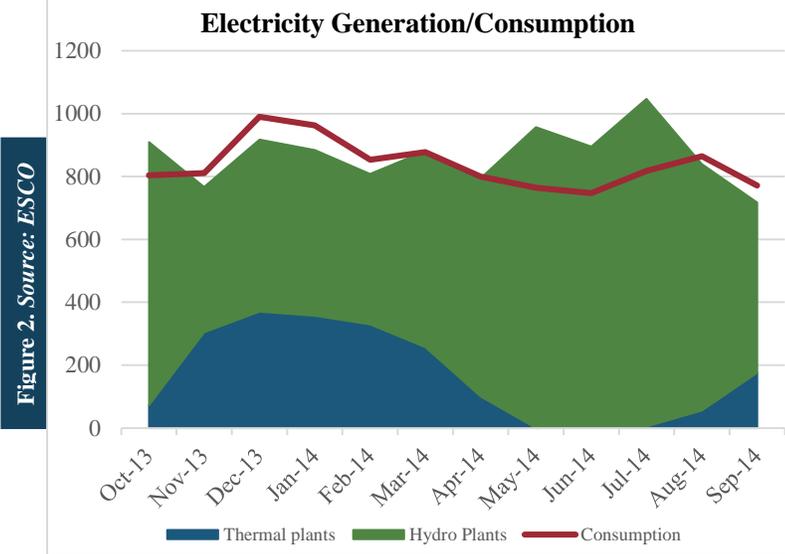
The first three quarters of 2014 have been successful for the sector, both in terms of adding new generation capacity and starting new projects. Several important hydropower projects have been completed including: 87MW Paravani HPP, 19MW Larsi HPP and 8MW Aragvi HPP. At the same time, some challenges concerning the security of energy supply came to the surface in the third quarter.

New renewable power generation plants become operational in Georgia

Compared to the corresponding quarter in 2013, electricity generation in the third quarter increased by 8% (reaching 2,604 mil kWh) continuing the trend observed in the first and second quarters (increase by 5% and 2% respectively – See Figure 1). **In the second quarter, annual generation reached its historic maximum of 2,648 mil kWh.** This is remarkable given that the winter of 2013-2014 was one of the driest in recent years! Besides, in July 2014, monthly electricity generation reached a historical peak of 1,048 mil kWh, most of which was produced by hydropower plants.



In the third quarter of 2014, power consumption increased significantly. Total consumption for the quarter increased 6% year-on-year (reaching 2,453 mil. kWh), also continuing the trend of 4% and 6% y-o-y increases (reaching 2,693 mil. kWh and 2,312 mil. kWh respectively) in the first two quarters of 2013, respectively (See Figure 1).



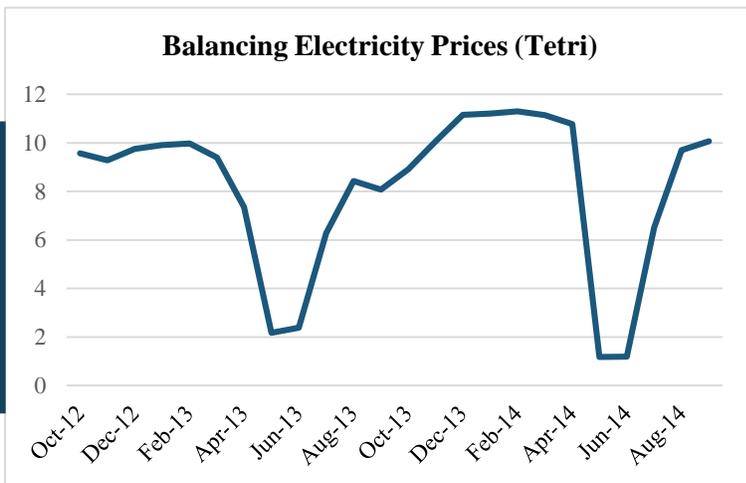
An important accident occurred at the end of July, when due to damage of 500KV and 220KV transmission lines connecting Western and Eastern Georgia, most of the Eastern region, including Tbilisi, experienced a blackout of more than 4 hours. **This accident has exposed the challenges of ensuring reliable domestic electricity supply in Georgia, as well as the need for additional transmission capacity connecting the two parts of the country.**

Georgia's electricity sector continues to exhibit a strong seasonal pattern (See Figure 2). In summer months, hydropower generation peaks due to increased water flows, providing Georgia with a surplus of electricity that can be exported. On the other hand, Georgia remains a net importer of electricity during winter months (1st and 4th

quarters). The gap between demand and local supply is closed through imports – of electricity and of natural gas used by domestic thermal power plants.

In the second and third quarters of 2014, electricity generation exceeded consumption by 336 and 151 mil kWh, respectively (see Figure 2). Conversely, in the first quarter of 2014, generation fell short of consumption by approximately 120 mil kWh. This seasonal mismatch is best illustrated by the fact that electricity consumption reached its monthly maximum in January (962 mil kWh as compared to generation of 885 kWh), whereas monthly generation peaked in July 2014 (1,048 kWh). In order to close the gap, in the first quarter of 2014 around 37% of electricity was generated by gas-fired thermal power plants. In the second and third quarters, thermal power plants accounted for only 4% and 9% of total generation, respectively.

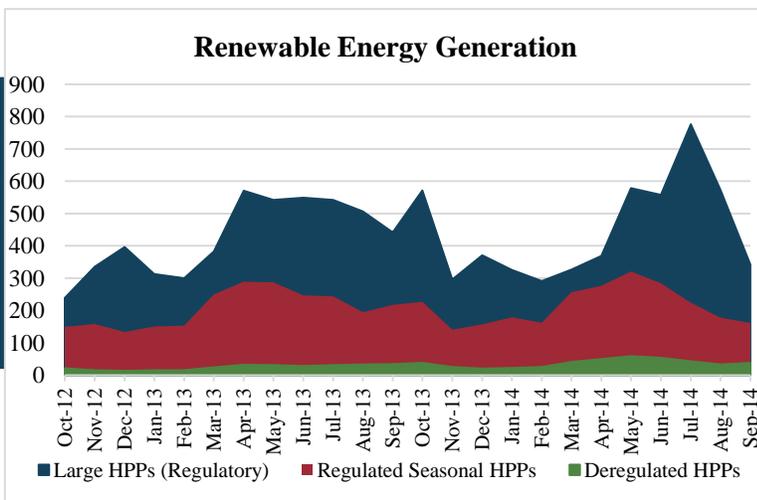
Figure 3, Source: ESCO



The seasonal variation in power generation sources is reflected in ESCO's (the state-owned power market operator) prices for Balancing Electricity (see Figure 3). With hydropower generation picking up in May and June, prices for balancing electricity sharply decline every year. In 2014, May and June prices have also fallen y/y, i.e. compared to the same period in 2013 (by 1 and 1.19 Tetri per kWh, respectively). Conversely, Balancing Electricity prices during the high demand period have increased y/y.

Georgian government policies to liberalize electricity markets start bringing dividends

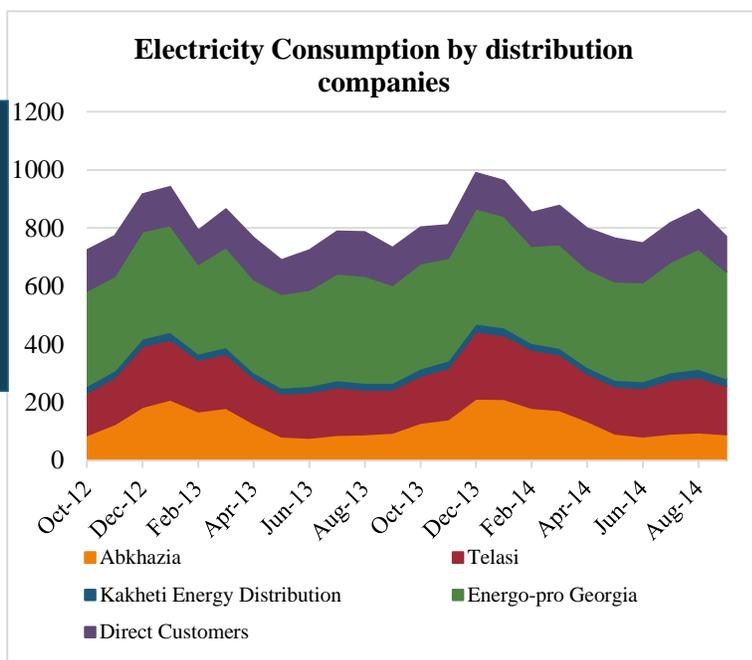
Figure 4, Source: ESCO



Large hydro power plants are key players in Georgia's electricity market. For example, more than half of July's electricity generation came from Enguri HPP (around 569 mil. kWh). Additionally, **generation by small- and medium-size deregulated HPPs (which are free to directly contract consumers) grew by 60-80% over the first three quarters of 2014 compared to the same period of last year** (See Figure 4). This points to the success of the Georgian government's attempts to liberalize the electricity market.

Electricity consumption picks up across the entire country

Analysis of consumption across different types of consumers (see Figure 5) highlights certain patterns. Consumption by Direct Customers (i.e. large industries, such as Georgian Manganese) remains stable over the years and represents around 15-18% of total consumption. Looking at the figures of electricity consumption of the different power distribution companies provides an insight on the evolution of the Georgian economy. Electricity consumption in Tbilisi (coverage area of Telasi) has grown by 16% on average in the last quarter and 7% in the first two quarters (year-on-year). In Kakheti, (coverage area of Kakheti Energy Distribution) consumption grew by 14% in the third quarter, and by 8% and 3% in the first and second quarters.



The high growth rate for Kakheti in July, August and September can be explained by a successful harvest and a consequent busy season in winemaking industry. Finally, for the rest of Georgia (represented by Energo-pro Georgia – except Abkhazia and Tskhinvali region) electricity consumption in the 3rd quarter grew by 8%, and by 6% and 5% in the first two quarters of 2014 (always year-on-year). Growth of electricity consumption throughout Georgia might reflect recovery from the slower economic growth in 2013. Increased consumption in the third quarter of the year can also be related to economic activity in the rapidly growing tourism sector.

FOCUS: ENERGY EDUCATION AT ISET

The International School of Economics offers its master students the possibility to pursue a concentration in Energy and Natural Resource Management. This program is sponsored by the Norwegian Ministry of Foreign Affairs. Thanks to Norway's generosity, ISET has been able to engage specialized faculty, including prominent international scholars, and develop special courses, such as Economics of Energy Markets (Prof. Norberto Pignatti, ISET), Environmental Economics and Policy (Prof. Hans Wiesmeth, Technical University, Dresden), Natural Resource Management (Prof. Rögnvaldur Hannesson, Norwegian School of Economics (NHH)). The concentration offers ISET students the possibility to intern with companies and government agencies operating in the sector, attend topical seminars, and visit HPP plants, oil and gas pipeline infrastructure projects, and national parks. Going forward, ISET seeks to deepen its cooperation with the Norwegian School of Economics and other centers of excellence in the field of energy and environmental economics.

How expensive is residential electricity in Georgia?

Cross-country comparisons of prices, including that of electricity, are not straightforward. Most often economists apply the concept of Power Purchase Parity (PPP). The concept is based on the assumption that, in the absence of any external influences, identical goods will have the same price in different countries when expressed in the same currency. Actual implementation of the concept is riddled with imperfections and assumptions, but it serves as a broad measure for international comparisons.

In a more simple approach, we have borrowed the idea from *The Economist* magazine to use the McDonald's Big Mac as the good to which to reference the prices of, in this case, the electricity prices for residential consumers. As its customers know, the Big Mac is the same product with the same ingredients all across McDonald's restaurants worldwide and it includes input costs from a wide range of sectors in the local economy.

For a meaningful comparison of electricity prices, we have defined a baseline monthly consumption of 201 kWh and we have internalized, where relevant, other costs that might be part of the monthly electricity bill such as the rental of metering equipment.

Since the price of electricity often varies within a country, we are comparing electricity prices across cities. Moreover, we can only look at cities which have McDonald's outlets. Thus, our comparison for electricity prices, as of July 2013, is between the following cities: Chisinau, Istanbul, Kyiv, Moscow, Riga, Tbilisi and Vilnius. Given the fact that residential electricity prices are frozen for Tbilisi until December 2016, the data are good for comparison purposes. In most other cities, prices will have stayed the same or have increased as a result of regular adjustments of the wholesale electricity price against inflation.

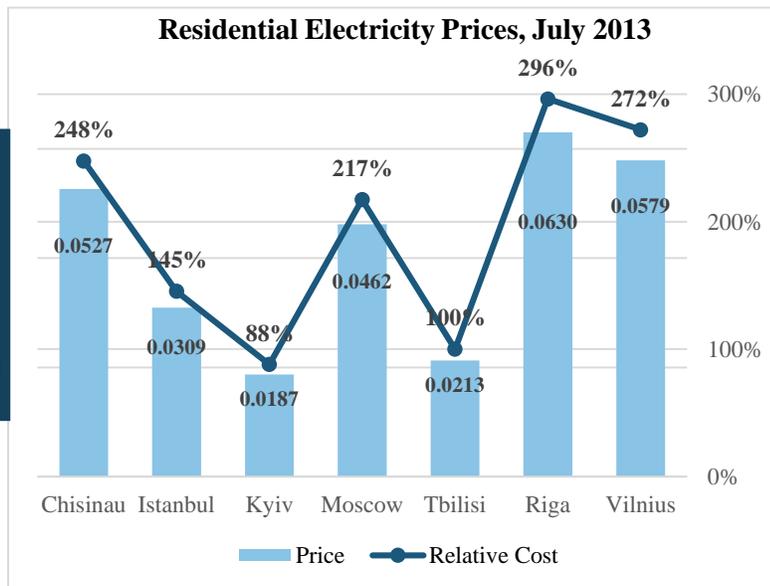
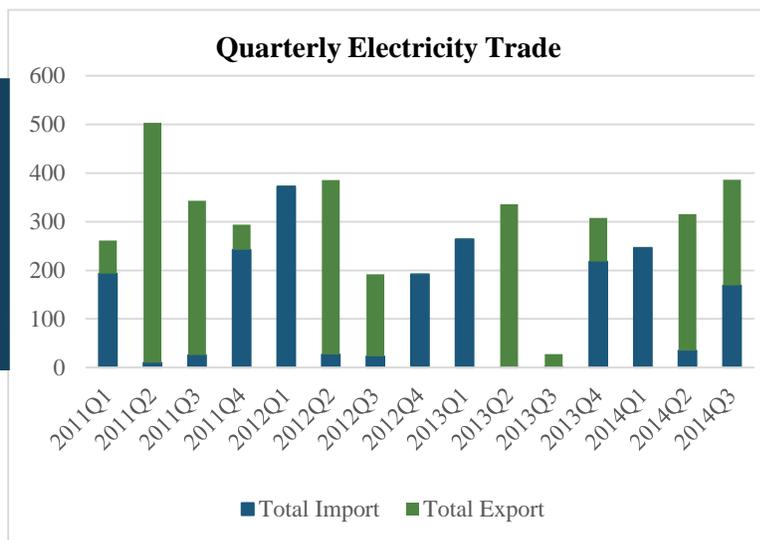


Figure 6. Source: ESCO

The columns in the graph represent the value of 1 kWh of electricity adjusted for PPP. The line is the comparison of this value amongst the seven cities relative to Tbilisi (100%). As we can see, in July 2013, the price of residential electricity in Tbilisi was only marginally more expensive than in Kyiv and cheaper than in any other location.

Georgia still has a long way to go to become a stable electricity exporter in the region

Figure 7. Source: ESCO

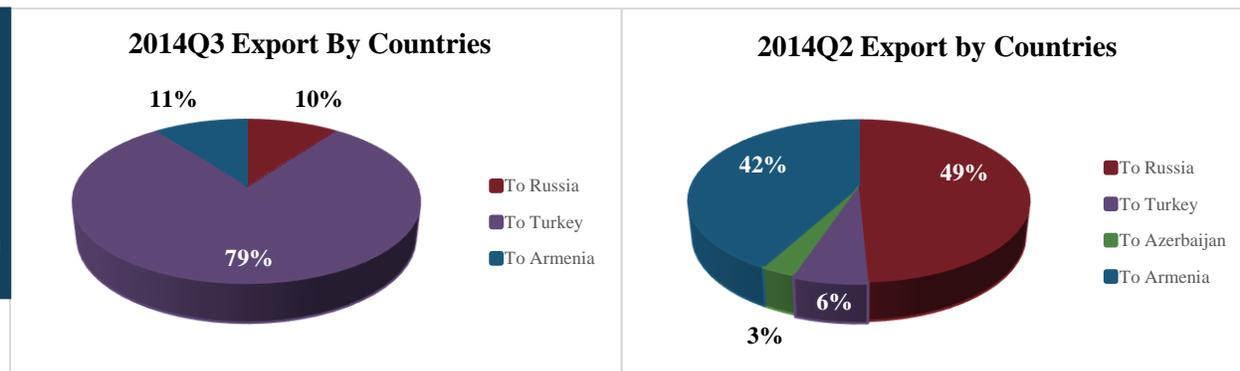


Trade data show that both electricity exports and imports increased significantly in the 3rd quarter of 2014. That said, in the 2nd quarter electricity exports fell short (by 16%) of their 2013 level. Affected by very strong seasonal factors and having only limited transmission capabilities, Georgia is yet unable to act as a reliable electricity supplier of the regional market.

In the third quarter, most of Georgia's electricity was exported to Turkey (see Figure 8), while in the second quarter exports were mainly directed to Russia and Armenia. Improved regulation of

cross-border electricity trade and development of additional generation capacity shall create the basis for increased regional trade in electricity.

Figure 8. Source: ESCO



List of MoU's signed in 2014 Q1-Q3

Investor	Signature Date	Date of Commissioning	Plant Name	Capacity
Ltd. Hidrolea	17.02.2014	31.12.2020	Darchi-Omaleti HPP	16.9 MW
Ltd. Hidrolea	17.02.2014	31.12.2018	Kasleti 1 HPP	8.1 MW
Ltd. Hidrolea	17.02.2014	31.12.2017	Kasleti 2 HPP	8.1 MW
Ltd. Machakhela HPP 1	24.07.2014	N/A	Machakhela HPP 1	23 MW
Ltd. Machakhela HPP 1	24.07.2014	N/A	Machakhela HPP 1	19 MW
Total Capacity				75.1MW

2. Natural Gas

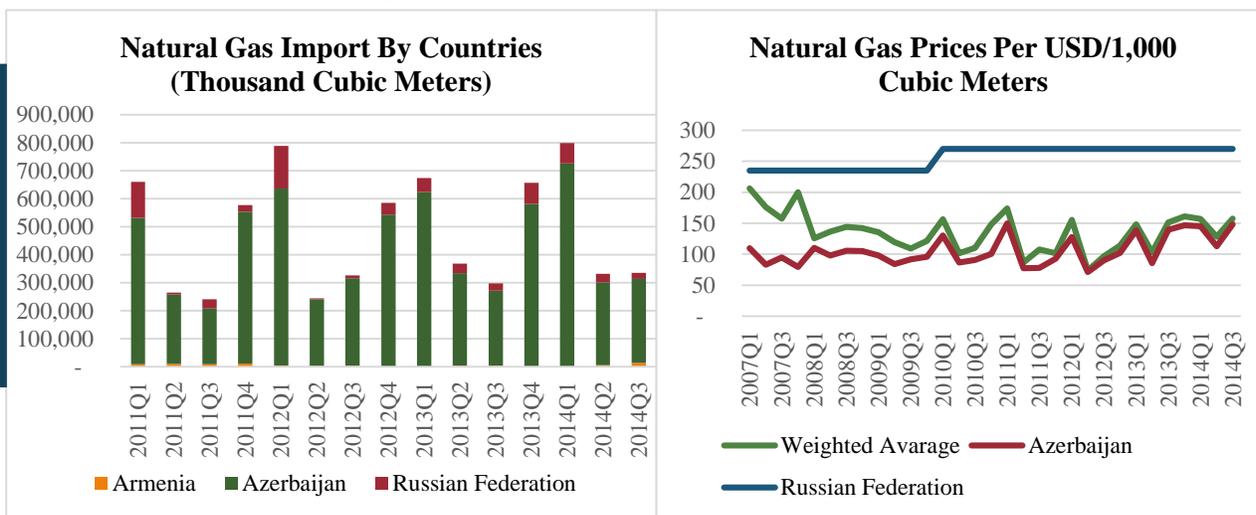
Natural gas is one of the key sources of energy in Georgia's energy balance. In particular, it is the primary source of energy for urban commercial and residential heating, on the one hand, and Georgia's thermal power generation (which makes up for the seasonal shortage of hydropower generation and provides balancing services), on the other. Nearly all of Georgia's natural gas consumption depends on imports from its neighboring countries: Azerbaijan, Russian Federation and Armenia. Azerbaijan has been dominating Georgia's gas imports since the 2006 incident on the South Caucasus pipeline, and is considered the most reliable partner for the country's energy imports. Georgia imports gas from the Russian Federation at a discounted rate in exchange for transiting Russian natural gas to Armenia.

Georgia has to develop gas storage facilities in order to ensure gas supply security.

As Georgia does not have yet any natural gas storage facilities, its imports cover immediate consumption needs. Apart from being a very profitable business, development of gas storage facilities would help ensure Georgia's gas supply security.

In the absence of a strong industrial base, residential and power generation sectors are Georgia's major energy consumers. This is the main factor behind the strongly seasonal pattern of energy consumption, and of natural gas in particular (See Figure 9). Typically, the country's energy consumption is highest during the last and first quarters of the calendar year. In this regard, 2014 was a usual year. In the third quarter of 2014, Georgia imported 335 million cubic meters of natural gas, a 13% annual increase. Furthermore, the country imported 798 (18% annual increase) and 332 (-10% annual decrease) million cubic meters in the first and second quarters of 2014, respectively. In the nearest future, natural gas consumption and imports in Georgia are expected to grow significantly, as the state-owned Partnership Fund completes the construction of a new 230 MW gas-fired power plant in Gardabani.

Figure 9. Source: Geostat



The transit role that Georgia provides for a number of international gas transportation routes, allows it to get its natural gas at a discounted compared to most other import-dependent countries in Eastern Europe. Georgia buys natural gas from Russia at a fixed discounted rate of USD 270 per thousand cubic meters which is paid against the fees for gas transit services to Armenia. From Azerbaijan, Georgia receives gas at a lower rate than from its northern neighbor; the rates depend on the volume of natural gas imported. For imports from Azerbaijan, Georgia paid on average USD 148 for thousand cubic meters in Q3, around USD 112 in Q2 and USD 145 in Q1 of 2014.

3. Oil Products Review

Petrol and diesel are primary energy sources for the transport sector in Georgia. Seeking cheaper fuel, Georgian car owners try to switch to more efficient alternatives. Figure 8 clearly shows this pattern of Georgian car owners trying to change from relatively expensive petrol to compressed natural gas (CNG) or to diesel that is consumed in a more efficient manner. From Q1 2011, the volume of diesel fuel imports exceeds petrol. There can be two reasons for this adjustment: the first is the massive installation of CNG equipment in petrol engine cars. Second, as diesel engine uses fuel more efficiently, more diesel cars are purchased than in previous years.

Petrol and diesel consumption: Georgians seek cheaper alternatives for transport fuels

In the first two quarters of 2014, Georgia imported, respectively, 77,625 tons and 94,208 tons of petrol. As for diesel fuel, the country imported around 99,458 tons and 113,437 tons, respectively. It should be noted that as Georgia does not have an operating oil refinery plant, nor does it have official reserve requirements for fuel distribution companies, the country's imports cover current consumption needs. Thus, seasonal patterns are observed in the import and consumption of oil products as well.

Import prices for petrol are higher than for diesel in most months (see Figure 10). Furthermore, given that diesel engines are typically more efficient, this may explain why diesel imports have significantly grown over the past several years. In the second quarter, average import price per liter of petrol was around USD 1.03 per liter, while the price of diesel fuel was around USD 0.92. Petrol imports added 6 US cents per liter in the third quarter, whereas diesel prices remained stable. Given the import patterns of petrol and diesel, lower quality fuels define the average prices. There is a big difference between import volumes of lowest and highest quality fuels. Georgian drivers and transport operators primarily make their consumption decisions based on fuel price, rather than quality and efficiency. Since the majority of vehicles registered in Georgia are more than 10 years old, there is a certain rationale for using lower quality fuels.

Figure 10. Source: Geostat

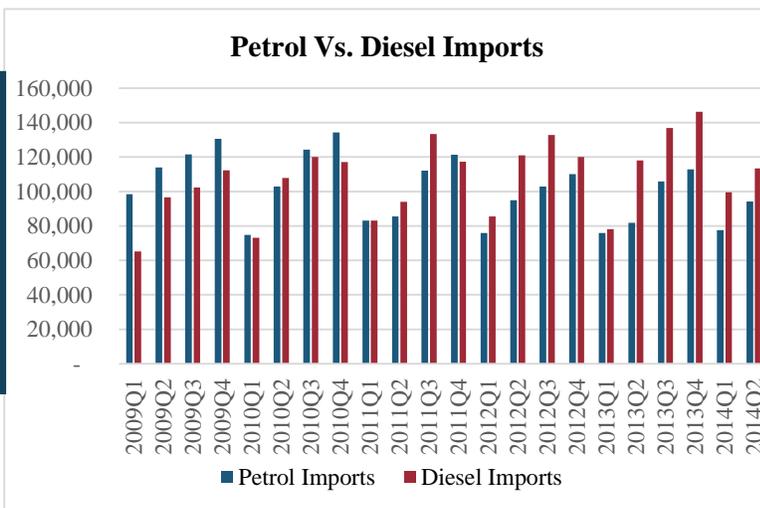
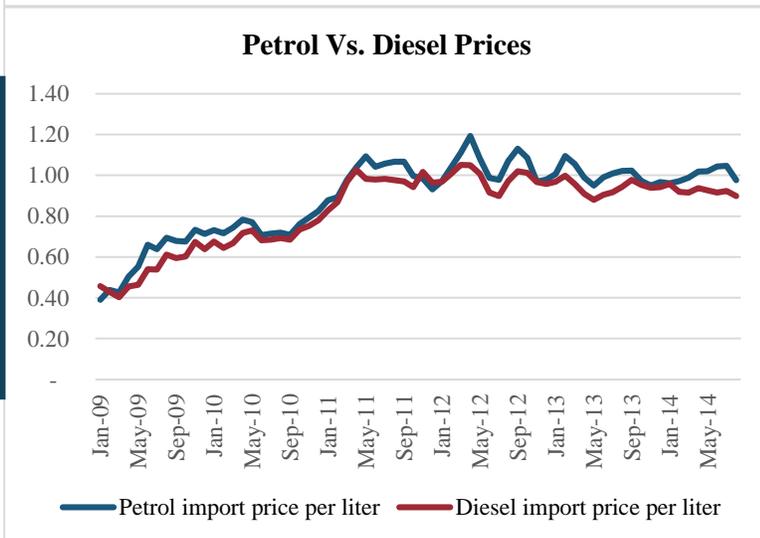


Figure 11. Source: Geostat



Retailers of petroleum products are expanding their facilities to sell Compressed Natural Gas for transportation

The import characteristics of different fuel types are representative of Georgian consumption patterns (see Figure 12). In the second quarter, around 69% of total petrol imports were of the lowest quality fuel (octane rating <95); around 28% of medium quality (95 < octane rating < 98), while only 3% were of the highest quality (octane rating > 98). The same configuration of imports is observed in the first quarter of 2014. Import statistics of diesel fuel show a smaller difference between the highest (36% of total for Q2 2014) and lowest quality products (54% of total for Q2 2014).

Figure 12. Source: Geostat

