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ENERGY EFFICIENT CONSTRUCTION MATERIALS SECTOR IN GEORGIA

SECTOR OVERVIEWS

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EXECUTIVE SUMMARY

Thermal insulation is the most effective way to improve the energy efficiency of the buildings and reduce energy bills. Thermal insulation of the building envelop helps preserve the indoor heat during the winter, while keeping the building cool during the summer, improving comfort and saving energy. The key measures necessary for utilization of the energy saving potential in the construction sector, in addition to administrative and institutional measures, are thermal insulation, efficient lighting, insulation of modern, efficient windows and efficient in house system.

In Georgia annual energy consumption for residential energy consumption purposes is 40%. Thermal insulation has potential to reduce construction costs by 10-15% and residents' energy-related building expenditures by 45-50%. According to Georgian Constructors Federation, up to USD 50,000 is lost every 24 hours during winter due to the energy wasting tendencies in Georgia.

Georgian energy efficient construction materials sector is yet underdeveloped, with high growth potential supported by a strong and competitive construction industry. The market in Georgia is represented by perlite, glass wool, rock wool and polystyrene. Perlite and polystyrene insulation materials are produced locally as well as imported from Iran, Czech Republic, Italy, France and Turkey. Glass wool and rock wool are imported to Georgia from Turkey, Russia and Germany. The most frequently used local natural resources for production of construction materials are perlite, basalt, pumice, slate and tuff, the vast reserves of which are owned by Georgia. Growth rate of thermal insulation materials consumption in 2007 was approximately 35% over previous year, as recorded by private sector.

Use of thermal insulation construction blocks in building frames significantly reduces both the weight of the building, naturally reducing the cost of building of a foundation and walls of a building frame, and the natural losses into the environment, saving colossal sums spent by the country on heating during winter and cooling during summer period.

In addition to communicating the advantages of energy efficiency to builders and construction materials producing companies, consumers' awareness also needs to be raised. Many representatives of the construction materials producing companies and construction companies have declared that for energy conservation measures to succeed, the public needs to be educated on how energy-conserving will benefit them throughout their lifetime with more comfortable homes and lower energy bills.

SECTION 1. STRUCTURE

1.1 Perlite Insulation

Perlite is an amorphous volcanic glass that has relatively high water content. The expanded material is brilliant white, due to reflectivity of the trapped bubbles. Perlite resources on Paravan perlite mine represent approximately 23 million m^3 on the territory of 36.6 ha. From unexpanded "raw" perlite expanded perlite sand is produced for manufacturing of wall perlite blocks of the density of 500-800 kg/ m^3, and for production of monolith perlite concrete of the

density of 400-500 kg/ m^3. Due to its low density, ecological cleanness and accessible price perlite has found many commercial applications. In particular, it is used in lightweight plasters and mortals, insulation and ceiling tiles in the construction and manufacturing fields, agro industry, metallurgy, and for filtration of alcoholic and non alcoholic drinks.

Locally produced perlite is exported to Russia and Azerbaijan. Due to high demand, perlite use is growing not just on domestic (approximately 10 times more in 2007 than in 2006), but foreign market as well. Local supplier is adding two more stoves and by the end of March 2008 the company is expected to start perlite blocks production. Currently, perlite blocks are produced by Semi Ltd and HB Ltd. Besides local production, perlite is imported to Georgia from Iran, Czech Republic, Italy, France and Turkey. Perlite imports to Georgia in 2007 have increased by 44% and estimated USD 9,491. Perlite exports from Georgia in 2006 were 25.8% higher than in 2005 and estimated USD 57.96 million.

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Perlite Prices on Domestic Market - Expanded perlite 1 m3 -- USD 34.8 - 50.2

Due to the fact that there is only one perlite mine in Georgia, just one perlite manufacturing company -- the mining Company "PARAVANPERLITE" Ltd. operates.

1.2 Polystyrene (Foam Plastic)

Polystyrene (also called "foam plastic") is a polymer made from the monomer styrene, a liquid hydrocarbon that is commercially manufactured from petroleum. Polystyrene's most common use is an expanded polystyrene (EPS) and an extruded polystyrene (XPS), commonly known by the trade name Styrofoam. Expanded polystyrene is significantly more flammable than the extruded polystyrene, which makes it undesirable for thermal insulation. The demand for polystyrene has doubled within last three years, as reported by the private sector. Polystyrene is widely used in Georgia, mostly by private citizens for insulation of houses, rather than by construction companies. The polystyrene is imported from Turkey, Finland, Poland and Russia by GRC LLC and few other businesses. GRC LLC is an importer of XPC, glass wool and basalt stone. Other players of this sector of the market are small businesses that are importing polystyrene together with other construction materials. Separate import of polystyrene is not profitable as it is very light and takes much space. Importers are selling the product in "Eliava bazaar" and small shops.

Currently, there are two local polystyrene suppliers: Kemkheli Ltd. Thermo Insulation Materials and Interplast Building Materials Company.

Table 1. The Specifications of the Polystyrene Insulation[1]

Density, kg/m3	18
Thermal conductivity, W/m˚C	0.04
Thickness, cm	1 - 80

Table 2. Prices on Polystyrene on Local Market

Prices on Polystyrene Local Market			
	**Product Description**	**Size**	**EXW Price USD**
	Polystyrene 100X100X2 0.020 m²	m²	0.95 – 1.18
	Polystyrene 100X100X3 0.030 m²	m²	1.32 – 1.64
	Polystyrene 100X100X4 0.040 m²	m²	1.64 – 2.04
	Polystyrene 100X100X5 0.050 m²	m²	2.01 – 2.50
	Polystyrene 100X100X6 0.060 m²	m²	2.28 – 2.83
	Polystyrene 100X100X7 0.070 m²	m²	2.60 – 3.22
	Polystyrene 100X100X8 0.080 m²	m²	2.86 – 3.55
	Polystyrene 100X100X9 0.090 m²	m²	3.28 – 4.08
	Polystyrene 100X100X10 0.100 m²	m²	3.65 – 4.54
	Polystyrene 120X40X5 0.0240 m²	m²	0.89 – 1.10
	Polystyrene 120X50X5 0.030 m²	m²	1.11 – 1.38
	Polystyrene 120X100X5 0.060 m²	m²	2.22 – 2.76
	Polystyrene 120X2.8X5 0.168 m²	m²	6.23 – 7.74
	Polystyrene 400X100X5 0.200 m²	m²	7.42 – 9.21

1.3 Glass wool

Glass wool is imported to Georgia from Turkey and Russia. Demand on glass wool grows as thermal insulation materials are becoming more popular in Georgia. Glass wool is relatively cheap energy efficient construction material. Therefore, demand on it is higher than on stone wool (basalt). Glass wool is imported to Georgia by Knauf distributors and by GRC LLC. On average one square meter of glass wool on local market costs USD 1.68 – 1.80.

1.4 Stone wool

There is no production of stone wool in Georgia. It is imported from Turkey and Russia. Currently, demand on stone wool is steadily growing in spite of relatively high price. Market price of stone wool 1 m^2 is USD 10.7. Price of 1 $m^2$of stone wool at the origin is USD 5.4, customs clearance costs USD 2, and transportation cost varies from 30-35% of. Construction materials of well known brands such as Knauf and Izover can be found on Georgian market.

The main players of this market segment are: Knauf Marketing and GRC LLC.

[1] The information is obtained from private sector representatives.

1.5 Sandwich Panels

Sandwich panels are produced in Georgia by Interplast Building Materials Company, and are imported also, mostly from Turkey and Germany. The use of sandwich panels in construction increases the thermal resistance of the building, as well as simplifies and accelerates the building montage, and increases resistance of outer surface to influence of environmental factors. The demand for sandwich panels is growing as the construction sector develops. Currently, sandwich panels are frequently demanded by households for insulation of private houses.

Table 3. Prices on Sandwich-Panels on Local Market[2]

SANDWICH-PANELS	Size	EXW Price USD
Sandwich-Panel 0,5 (wall) (grey) Metal-0.55-0.40	m²	19,60
Sandwich-Panel 0,6 (wall) (grey) Metal-0.55-0.40	m²	21,19
Sandwich-Panel 0,7 (wall) (grey) Metal-0.55-0.40	m²	22,78
Sandwich-Panel 0,10 (wall) (grey) Metal-0.55-0.40	m²	24,36
Sandwich-Panel 0,5 (roof) (grey) Metal-0.55-0.40	m²	19,60

SECTION 2. LIGHT CONSTRUCTION MATERIALS

2.1 Pumice Blocks

Production of pumice blocks is relatively well developed, as pumice is one of the traditional light construction materials of Georgia. The demand on pumice blocks by construction companies is almost 95% more than on other light construction materials such as perlite blocks and airocrete. Another light construction material that can be produced in Georgia is slate block. There are large reserves of clay slate not used yet in construction. The reason of relatively low demand on other light construction materials is the lack of potential customers' awareness of their benefits.

Georgia is rich in pumice reserves that are located in different regions, where some small pumice block manufactures appear and disappear from time to time.

Present consumers of pumice blocks and pumice bricks are following construction companies: Axis, Center Point Group and other players of construction sector in Georgia.

The main players of this market segment are: Geokabadoki Ltd, Delta Ltd and Karier Ltd.

2.2 Perlite Blocks/Bricks

Light construction materials - perlite blocks and bricks are produced currently in Georgia. Consumption of perlite blocks and bricks experienced rapid growth of almost 100%, due to increased awareness of the customers. As construction companies get knowledge regarding perlites qualities, demand on the market goes up.

[2] The information is obtained from private sector representatives.

Local producers of perlite blocks and bricks have direct contact with perlite mining company, PARAVANPARLITE Ltd., which allows some reduction in transportation costs. Due to growing demand companies are planning to launch new production lines.

The main players of this market segment are: HB Ltd and Semi Ltd.

Table 4. Perlite Prices on Domestic Market

	Unit	Market Price (USD)
Perlite Block	each	1.67
Concrete Block	each	1.2
Perlite Brick	each	0.47
Clay Brick	each	0.40 - 0.56

Note: The price on perlite bricks is expected to rise by 30% by April 2008, due to the increase of cost on gas costs.
Exchange rate as of 2008-03-20 -- USD1=1.4940Gel
The cost of production represents 80-82% of the market price of the product.[3]

The building that is built with perlite blocks saves about 60% of energy that would have been used for its warming or cooling. The cost of construction decreases by 30-40%, as 3 cm perlite wall replaces 15 cm concrete wall.

2.3 Airocrete

Airocrete is one of the light construction materials that is produced in Georgia. There are some small companies producing airocrete located in different regions of Georgia. Most of them are newly established and are not yet truly stable. However, due to growing demand, currently operating companies are expanding, launching new production lines. More and more well known construction companies such as Axis, Center Point Group and others are becoming customers of light construction materials producers.

Airocrete's Construction-Technical Characteristics

Thermal conductivity coefficient of airocrete is **λ =0,154 vt/m^{0}C**. "**Light block**" is porous with the depth of **3180 sm^3**, which improves its thermal insulation character, as the general coefficient of air thermal conductivity **λ =0,023 vt/m^{0}C** is much lower than the coefficient of thermal conductivity of dense part of the material, block sizes - 600X300X200mm, density - 2,32kg/cm^3 .

Market Price of Airocrete

Price of airocrete block (60X30X20) with 1m^3 **D-800 Density**: 28pcs X USD 3.34 = USD **93.7**[4]

[3] The information is obtained from private sector representatives.
[4] Exchange rate as of 2008-03-20 USD1=1.4940Gel

Price of airocrete block (60X30X10) with 1m^3 **D-800 Density**: 56pcs X USD 2.0 = USD **112.4**
Cost of production of airocrete with 1m^3 **D-800 Density** is approximately GEL110 = USD **73.6**[5]

Table 5. Characteristics of airocrete and other construction materials

Material	Density kg/m^3	Thermal Conductivity Coefficient W/m˚C	Thickness of the wall in case of thermal conductivity, (m)	1 m^2 weight, kg
Concrete	2400	1,51	1,44	3456
Ceramsite concrete	1800	0,66	0,63	1134
Silicate brick	1800	0,77	0,73	1314
Airocrete DD-800	800	0,24	0,20	160

Note: At the expense of their lightness airocrete elements reduce static burden on bearing structure and foundation of the building by 25-30%.

The main players of the segment of the market are: Dugabi Plus Ltd, Porobeton Ltd and Evrobloki Ltd.

SECTION 3. PVC PANELS

The old-fashioned and worn-out windows still represent a large share in Georgia's building stock and serve as a major source of unwanted heat loss, discomfort, and condensation problems. In recent years, windows have undergone a technological revolution. It is now possible to have lower heat loss, less air leakage, and warmer window surfaces that improve comfort and minimize condensation.

Window can gain and lose heat in the following ways:

- Direct conduction through the glass, glazing, frame, and/or door;
- The radiation of heat into a house (typically from the sun) and out of a house from room-temperature objects, such as people, furniture and interior walls;
- Air leakage through and around windows.

PVC panels are produced in Georgia by Interplast Building Materials Company, and are also imported, mostly from Germany and Turkey. Interplast is the first and the only company in Georgia and the whole Caucasus region producing the broad range of building materials: metal-plastic profiles, plastic pipes, laminated floor, metal-tiles, sandwich-panels, blocks, gypsum board, foam plastic, foam rubber, PVC panels, etc. Despite that the company has started operating only on 30 October, 2007, it is currently exporting to Armenia and is in negotiations with Azerbaijan and Ukraine. According to the forecast, the demand on construction materials the company is producer of will grow by approximately 50% in 2008.

One of the biggest importers of PVC panels is Dio Ltd., which subsequently assembles panels and sells PVCs. Demand on PVC panels is growing from year to year due to increased consumer awareness re PVCs thermal insulation features. Up to 25% of warmth or cool is lost

[5] Prices do not include VAT.

through a window. Therefore, building of windows with low thermal conductivity is an important element of the construction.

The main players of the segment of the market are: Interplast Building Materials Company, Dio Ltd, Geo-Group Ltd and Europlast Ltd.

Table 6. Prices on PVC Panels on Local Market

Frames	Weight	Size	Price (EURO)
Aluminium little frame	3.0 kg	m²	75
Aluminium big frame	3.5 kg	m²	120
Metal frame	7 kg	m²	145

[6]

Frame material	U-value
Aluminum (no thermal break)	1.9-2.2
Aluminum (with thermal break)	1.0
Aluminum-clad wood/reinforced vinyl	0.4-0.6
Wood and vinyl	0.3 - 0.5
Insulated vinyl/insulated fiberglass	0.2 - 0.3

SECTION 4. LIGHTING

With current widespread use of inefficient lighting such as incandescent and halogen lamps (about 95% of the market) and very limited use of efficient lighting -- compact fluorescent bulbs, energy efficient lighting in Georgia has been identified as the most profitable and easy to implement energy efficiency measure. Replacing six million bulbs will positively contribute USD 85.6 million to Georgia's external trade balance over a five year period, with discounted present value of USD 54.3 million. Full replacement of efficient lighting has the potential to reduce the need for budget subsidization in the energy sector by USD 26 million every year.

Currently, there is no production of fluorescent bulbs in Georgia; rather they are imported from China, Czech Republic, Turkey, Germany and Poland.

SECTION 5. SOLAR WATER HEATING SYSTEMS

Solar water heater – also called domestic hot water system – can be cost-effective way to generate hot water for a home. It can be used in any climate, and the fuel it uses – sunshine – is free.

[6] The information is obtained from private sector representatives.

There are three companies operating currently in Georgia in this sector. As reported by the private sector, as the demand for solar water heating systems is rapidly growing, the quality and power of systems installed is correspondingly improving.

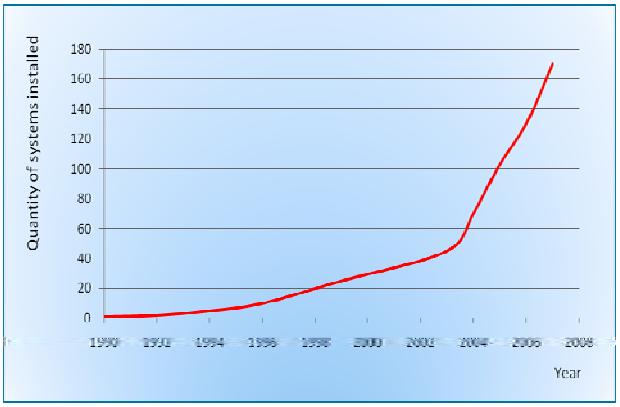
Table 7. Solar Electric Systems[7]

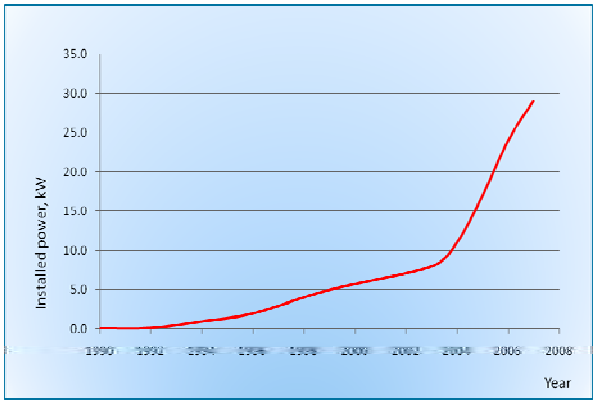
N	Type	Capacity Kilowatt/Cubic Meter	System Components	Usage	Preliminary Cost USD
1	W500V 220	**500/4**	1. Solar Panels 2. Accumulator 3. Controller 4. Invertors	Provision of continuous electricity to apartments and residential buildings through centralized lighting system.	7.5 – 8 thousand
2	KW1	**1000/8**	1. Solar Panels 2. Accumulator 3. Controller 4. Invertors	Consistent electricity provision for household electronics: computers, audio, video, kitchen appliances. Permanent power supply is warranted.	15 thousand
3	KW3	**3000/25**	1. Solar Panels 2. Accumulator 3. Controller 4. UPS	Consistent electricity provision for household electronics: computers, audio, video, refrigerator, air conditioner and etc. Permanent solar energy supply (not used for heating purposes).	45 thousand

The main players of the segment are: Solar Energy Ltd, Specheliotbomontaji JSC and AYDIO.

The chart below represents the operation dynamics of one of the leading company's in this market segment in Georgia:

[7] *Exact price of the system can be defined once the design is completed.*





SECTION 6. EXPORT/IMPORT

Imports and exports of different energy efficient construction materials to and from Georgia are chaotic. Construction materials of quite insignificant volumes are imported and exported mostly to Turkey, Azerbaijan, Russia and the Ukraine.

SECTION 7. MARKET TRENDS

Georgian producers cover some areas of production of energy efficient construction materials and light construction materials. New market players are welcome in these areas for further growth of already existing capacity and launching of the new production lines.

Georgia is rich in resources that can be used for energy efficient and light construction materials.

As estimated by private sector representatives, currently only about 10-15% of market potential is absorbed. As demand from construction sector is growing significantly, the producers and distributors of energy efficient construction materials are to launch new production lines.

Energy Efficient Construction Materials Sector's Growth Rate in Neighboring Countries

Country	**Growth Rate**
Armenia	18-20%
Azerbaijan	30-40%
Russia	50%
Georgia	**35%**

Different Information Re Energy Efficient Construction Materials in Georgia, 2008[9]

[8]		U – Value W/m^2 °C	Density	Thermal Conductivity (W/m ˚C)	Current Market Price	Cost of Domestic Production	Cost of Construction (excluding labor force)	Width of the Wall (cm)	Weight of the Wall (kg/m^2)	Energy Saving
1	**CONCRETE**	0.66	1200 kg/m^3	1.51W/m˚C	20x20x40cm **USD 1.20**	20x20x40cm **USD 0.96 - 0.98**	**USD 15**	80 - 1.00	225 - 250	20%
2	Expanded Perlite	N/A	500 - 800 kg/m^3	N/A	1 m^3 **USD 34.8 - 50.2**	1m^3 **USD 27.84 - 40.16**	1m^3 **USD 22.27 - 32.13**	25 - 30	N/A	40 - 60%
3	Polystyrene (Foam Plastic)	25 - 37	18 kg/m^3	0.04 - 0.027 W/m˚C	1 m^2 **USD 0.95 - 9.21**	N/A	N/A	N/A	N/A	N/A
4	Glass Wool	25	N/A	0.04 W/m˚C	1 m^2 **USD 1.68 - 1.80**	N/A	N/A	N/A	N/A	N/A
5	Stone Wool (Rock Wool)	27.7 - 29.4	135 - 250 kg/m^3	0.036 - 0.034 W/m˚C	1 m^2 **USD 10.70 - 14.70**	1 m^2 **USD 6 - 6.40**	1m^2 **USD 10.70-14.70**	7 - 10	10 - 12	35 - 40%
6	Sandwich Panel	N/A	N/A	N/A	1 m^2 **USD 19.60 - 24.36**	N/A	N/A	N/A	N/A	N/A
7	Pumice Blocks	N/A	30-35 kg/cm^2	N/A	10x20x40cm /20x20x40cm **USD 0.54 - 0.87**	10x20x40/20x20x40cm **USD 0.38 - 0.61**	1m^2 **USD 10.9**	20	137.5-150	N/A
8	Perlite Blocks	N/A	25kg/cm^2	0.35 kkal/m˚C	10x20x40cm/20x20x40cm **USD 1.00 - 1.60**	10x20x40/20x20x40cm **USD 0.70 - 1.12**	1m^2 **USD 20**	25 - 30	50 - 75	30-40%
9	Perlite Bricks	N/A	25-35 kg/cm^2	0.07-0.09 W/m^2	12x25x10/12x25x13cm **USD 0.48 - 0.52**	12x25x10/12x25x13cm **USD 0.38 - 0.42**	1m^2 **USD 15.6 - 19.2**	25	48 - 60	30-40%
10	Airocrete	6.49	2.32kg/cm^3	0.154W/m˚C	30x20x60cm **USD 3.21**	30x20x60 cm **USD 2.67**	1m^2 **USD 17.65**	20	143	30-40%
11	PVC Panels	N/A	N/A	N/A	1 m^2 **USD 3.13 - 4.33**	N/A	N/A	N/A	N/A	N/A

[8] The information is obtained from the private sector representatives.
[9] Exchange rate as of 2008-03-20 USD1=1.4940Gel.

Energy Efficient Construction Materials Sector in Armenia

The annual thermal energy consumption for residential heating purposes in Armenia is 11.15 million GCal. The thermal energy consumption can be decreased by 30% accounting to 3.35 million GCal per annum by using proper thermal insulation of residential buildings. The annual energy saving potential in municipal buildings as a result of improved thermal insulation is estimated at 0.67 million GCal.

The insulation market in Armenia is represented by perlite, glass wool, rock wool and polystyrene insulation. Perlite and rock wool insulation materials are produced locally. Glass wool insulation materials are imported from Turkey and Iran. Polystyrene is produced locally and also imported from Turkey. Other insulation materials produced in Turkey are imported through Georgia. Foreign suppliers do not have official representatives in Armenia.

Energy Efficient Construction Materials Manufacturers in Armenia

Perlite Insulation Manufacturers		
Armperlit Ltd	4, Tigran Metsi Ave. Yerevan, RA	(+37410) 580 043/562 800
Ariko Perlite CJSC	49, Komitas St. Yerevan, RA	(+37410) 239 212
Ecoperlite Ltd	40a Acharyan St. Yerevan, RA	(+37410) 616 804
Stone wool Manufacturers		
Arjermek Ltd	Hrazdan TPP territory-3, Hrazdan, RA	(+37491) 214 610
Polystyrene Insulation Manufacturers		
PROF AL Ltd	1 Paronyan St. Yerevan 0015	(+37410) 544 296/544 291
Efficient Lighting Product Manufacturers		
Eurotechnoluce Showroom	15a Alex Magoogian St. Yerevan 0070	(+37410) 572 300
Luys Specialized Chain Store	Vardanants St. 22; 26. Yerevan 0070	(+37410) 570 108
Efficient Windows Manufacturers		
AAB Concern	39, Arabkir St. House 1a Yerevan 0037	(+37410) 259 559
Armand Group OJSC	11, Tumanyan St. Yerevan 0001	(+37410) 520 272/520 262
Byur Karat Ltd	2, Abovyan St. Shirak Marz	(+374244) 51750/51686
Eurometal Ltd	49, Mamikonyants St. Yerevan 0051	(+37410) 255 073
Eorostan-Uyut Ltd	250, Armenakyan St. 2nd building. Yerevan 0047	(+37410) 655 752/652 870
GSC Window and Door Manufacturing Enterprise	50, Nor Aresh St. House 10. Yerevan 0050	(+37410) 455 992
MMM Ltd	254/1 Arshakunyats Ave. Yerevan 0007	(+37410) 442 212
Most Group	16, Azatutyan Ave. Yerevan 0014	(+37410) 281 311/294 017
Onix GC CJSC	55, Artsakhi Ave. 1, Charentsi St. Yerevan 0053	(+37410) 474 612/571 951

Raf Elit Ltd.	1, Charentsi St. Yerevan 0053	(+37410) 474 612/571 951
V.Aghababyan Ltd.	Lori Marz, Vanadzor, 5, S. Aghababyan St.; 41/19 Tigran Metsi	(+374322) 44528/43397
Val – an Prof Window and Door Manufacturing Enterprise	6, Tigran Metsi Ave. Yerevan 0010	(+37410) 543 512/523 512
Solar Water Heating System Providers		
Solaren Ltd	2/2 Shrjanain St.	(+37410) 777 113
Technokom Ltd.	2, Alikhanyan Yehbayrneri, Yerevan 0036	(+37410) 344 255/350 143
Sunenergy Ltd	2, Alikhanyan Yehbayrneri, Yerevan 0036	(+37410) 344 255/350 143

Energy Efficient Construction Materials Sector in the Ukraine

Energy efficient construction materials sector in the Ukraine is one of the most developed in the region. International brands such as Knauf and Izover have their official representatives in several cities of the Ukraine. Because the Ukrainian construction code includes the norms of thermal insulation, the sector develops rapidly and has good potential for further growth.

In Ukraine constructional, constructional-insulation, insulation types of perlite are being produced. The market price of constructional perlite block is 7 Hryvna, constructional-insulation perlite 1 m3 price – 5.6 Hryvna, 1 m3 insulation perlite's price remains 200 Hryvna, the cost of production of 1 m3 is 165 Hryvna. The highest demand is for constructional perlite, the market price of which is expected grow even more as the cement cost has recently increased by 22%.[10]

SECTION 8. HUMAN RESOURCES

In 2007 about 36 845 persons were engaged in construction sector in Georgia, approximately 2500-3000 (seasonal) were engaged in energy efficient construction materials and light construction materials production. The average salary in construction sector has increased by 58.7% in 2007 and reached approximately USD 415.5 per month.

Engineers of the sector are trained by foreign specialists fielded by private companies, on-the-job trainings are conducted on average every third month, and some engineers are receiving training abroad. Although there should not be a shortage of educated people on the labor market, the employers also have to train the workers in the plant (operating machinery, basic safety procedures etc.).

SECTION 9. STANDARDIZATION

The following companies operating in the sector have obtained an ISO 900x quality certificate:

[10] *Exchange rate as of 2008-04-02 -- GEL1=3.4001 Hrivna*

Company	Activity	Standard
Interplast Construction Materials Company	Energy Efficient Construction Materials Producer	ISO 9001:2000; ISO 22000:2005
Dio Ltd.	PVC	ISO 22000:2005

SECTION 10. RESEARCH AND DEVELOPMENT

Research is mainly conducted internally by the management of energy efficient and light construction materials producing companies or obtained through business consulting companies.

Energy Efficiency Centre (EEC) was established in 1998 by European Union within the framework of the EU Tacis Project "Creation of an Energy Efficiency Centre and Development Natural Energy Study in Georgia".

The main objectives of EEC are to: a) improve energy efficiency in the country; b) improve the country's energy balance; c) reduce the environmental impact; d) improve the competitiveness of industry and commerce.

"The Energy Efficiency and Cleaner Production Centre (EECP)", established in 2003 within the framework of the Georgian - Norwegian Capacity Building Program on Energy Efficiency and Cleaner Production was integrated into Energy Efficiency Centre Georgia in April 2005.

In 2006, with USAID support, information was collected to be posted on Ecobuilding Marketplace link on the Energy Efficiency Center's web site: www.eecgeo.org

Georgian Constructors Federation periodically evaluates sector development processes and overall, actively participates in the construction related discussions. The findings of evaluations and further development ideas are published in the Federation's newspaper "Mshenebeli".

NGO "Energy Efficiency -21. Georgia "(EE-21) was established in 2001 , according to rules of **UN ECE General Program**" Energy Efficiency 21". The special field of the Centre activities is to support to utilization of energy saving potential in the building sector of Georgia that should bring many benefits: leading to improve security of energy supply of Georgia; energy cost savings, improve building quality and reduce environmental impact. It leads to new job creation, in the construction sector and the industries supplying to this in Georgia.

SECTION 11. MAIN PLAYERS

Light Construction Materials Producers	
Mining Company "PARAVANPERLITE" Ltd. 0179 Georgia, Tbilisi 29, I. Abashidze Tel.: (+995 32) 917 154; 917 150; 917 155 Fax.: (+995 32) 222 562 www.perlite.ge	**HB Ltd.** 0159 Georgia, Tbilisi Digomi housing estate, 3rd block, 2nd building, apartment #2 Tel.: (+995 32) 45 41 70
Semi Ltd. 0194 Sairme St.	**Geokabadoki Ltd.** Rustavi, Kostava 14/13

1st Block, Apartment # 5 899 259 030	Fax: (+995 824) 141 267 Tel.: (+995 824) 141 267
Delta Ltd. 0177 Tbilisi, Georgia 56, Nutsubidze St. Tel: (+995 32) 316 713	**Porobeton Ltd.** 0194 Tbilisi, Georgia Panaskerteli St. Block # 17, apartment 45 Tel: (+995 32) 321 165
Metals Georgia Ltd. Didi Digomi Director: Torotadze Andro Mobile phone: (+995 77) 413 140	**Evrobloki Ltd.** Mtskheta St. Lane #8 Director: Chishkariani George Mobile phone: (+995 77) 710 877
Dugabi Plus Batumi, Achara Region (+995 99) 536 383	
Energy Efficient Construction Materials Producers and Distributors	
Kemkheli Ltd. Thermo Insulation Materials Georgia, Tbilisi 0137, 4, Kairo Street Tel.: (+995 32) 711 653 Mob.: (+995 99) 163 699	**INTERPLAST Building Materials Company** 0104 Tbilisi, Didi lilo Tel.: (+995 32) 260 041 www.interplast.com.ge
GRC LLC. 0119 Tbilisi, Georgia 141 Tsereteli Ave. Tel.: (+995 32) 355 955 Fax: (+995 32) 355 956 office@grc.ge www.grc.ge	**Knauf** 0160 Tbilisi, Georgia 19 Gamrekeli St. Tel.: (+995 32) 242 501 Fax: (+995 32) 242 504
PVC Panels Distributors	
Dio Ltd. 0194 Tbilisi, Georgia 55, Saburtalo St. Tel: (+995 32) 331 199 www.dio.ge	**Geo-group Ltd.** 0186 Tbilisi, Georgia 8, Qavtaradze St. Tel: (+995 32) 303 399/ 303 311 Fax: (+995 32) 303 399 geo-group-ltd@hotmail.com www.wintechpvc.com
Solar Water Heating System Providers	
Sustainable Energy Center - Sun House 0159, Tbilisi, Georgia Tel: +995 32 516 804 Tel/Fax: +995 32 525 969 www.sun.org.ge	**AYDIO** 0131 Tbilisi, Georgia Agmashenebeli Alley 10 km Tel: (+995 32) 516 416
Specheliotbomontaji JSC Kvemo Alekseevka, Navtis Hevi meladzen@gmail.com (+995 99) 452 210	

SECTION 12. MAIN REASONS TO INVEST IN THE ENERGY EFFICIENT CONSTRUCTION MATERIALS SECTOR IN GEORGIA

- Steadily growing sector with significant development potential;
- Absolute advantage among neighbor countries in presence of natural resources for production of energy efficient and light construction materials. There are vast reserves of natural raw material such as basalt, clay slate, pumice, perlite, tuff, sand and cement;
- Current production capacity of the domestic companies does not satisfy market demand;
- Current market penetration is 10-15%;
- Low production costs (cheap, self-initiated, intensive labor force);
- Relatively inexpensive raw materials;
- A stable and growing economy;
- Target potential: Georgia is located close to the target markets of the Caucasus, Black Sea, Russia, Central Asia, the Balkans and the EU (1 billion person market potential).

SECTION 13. INVESTMENT OPPORTUNITIES

- ***GRC LLC*** is ISOVER Company's importer of glass wool (2.52 tetri), XPS (18 GEL), rock (basalt) stone (16 GEL). The company imports mostly from Turkey, Finland, Poland, and Russia. According to company research, demand for these construction materials has increased by 50–60% in last three years. There is the opportunity to invest in the GRC LLC.
  Address: Tbilisi, 141 Tsereteli Ave. Tel: (995 32) 355 955, Lasha Labadze. www.grc.ge

- ***Kemkheli Ltd*** is operating since 1999. The territory occupied by the company is 2600 m^2. Currently, the company is the domestic producer of polystyrene, decoration materials, cornice and plinth from polystyrene. Further investment is needed for expansion of current production capacity of polystyrene 4 000 m^2.
  Address: Tbilisi, 4 Kairo St., General Director, Besik Khasia, (+995 99) 163 699; (+995 32) 711 653.

- ***HB Ltd*** is local perlite blocks producer founded in 2006. Currently, the company operates only one line of perlite blocks production, and the products are immediately sold. Due to significant growth of demand for production company needs further investments to add production line. 6500 m^2 building and 3 ha territory with railway on it is owned by the company. The company can mine the perlite rock and produce the final product - perlite block.
  Contact person: Paata Abashidze, General Director. Tel.: (+995 99) 577 771.

- ***Production of slate blocks***. Conductivity of which is 0.16 - 0.22 wt/mk (that of a brick is 0.8 wt/mk) and its specific gravity is 700 – 800 kg/m^3 (that of a brick – 1400 kg/m^3). As compared to a brick wall, the wall with the same thickness built by slate blocks would reduce heat losses twice. According to estimations of the company, price per furnace of capacity of 600-700 thousand blocks per year is expected to be 75 000 GEL. Price of these blocks will be 15-20% less than concrete block. According to estimations of the company, current average demand on construction blocks in Georgia is approximately 80-100 million annually.
  The objective of this project is to develop a technology and create a high temperature furnace that will produce low conductivity, low relative density, porous insulating construction materials using indigenous cheap resources, gradually replacing presently available construction materials – non-standard concrete blocks.
  Contact information: Nodar Kebhishvili, General Director. Tel.: (+995 97) 120 332.

- ***Semi Ltd*** is local perlite bricks producer founded in 2006. Currently, the company has only one line of perlite bricks production of monthly capacity – 150 000 bricks of thermal conductivity 0.09 mW/m^3 (thermal conductivity of the usual brick is – 0.9 mW/m3). The bricks produced by the company are immediately sold. Due to significant growth of demand for production company needs further investments to add production line.
  Contact information: Nodar Mindiashvili, General Director. Tel.: (+995 99) 259 030.

- ***Construction Federation:*** Launching of production of simprolit polystyrene concrete: Polystyrene is the material used for thermal insulation of the building, from which blocks (pulley) are produced around the world. The polystyrene itself has one drawback - it can be easily fired, but simprolit offsets this feature.

  Construction Association has:
  - the license for simprolet use;
  - prepared business plan and is ready for its implementation;
  - considerable experience in construction; and
  - highly skilled specialists.

  Amount needed: 250 000 GEL, the amount could be invested in parts in accordance to the project implementation steps.
  Contact information: Guram Khomeriki, Chairman of the Board of the Georgian Constructors Federation. Tel.: (+995 99) 745 092.

- ***Alioni – 99 Holding Company:*** Launching of production of basalt thermal insulation bars:
  "Alioni-99" Holding Company was founded on May 25, 1999. The company operates on the construction market for nine years in the following directions: architecture, construction, project management, construction expertise. "Alioni-99" Holding Company holds the quality management international certificate ISO 9001: 2000 in design, construction and project management.
  Contact information: Nugzar Dvali, President. Tel.: (+995 99) 572 480

  One of the mines of basalt best suited for thermal insulation is located in **Sachkhere, Chiatura**. "Alioni-99" has right for use of the mine. Basalt can be used for armature and light construction materials production. There is another mine of very high quality basalt located in **Marneuli**.

- ***Production of high-performance silicate heat-insulating materials:***
  The products can be used as screens and thermal protection of active furnaces as well as thermal mounts in construction, metallurgy, chemical, silicate, energetic, oil refinery, food and other industries for the purpose of saving the fuel by 5-10%.

  Capital investment up to USD 100 thousand is needed to increase of annual capacity to 100 thousand m^2 of product. In case of net profit amounting USD 2 per 1 m^2, annual profit will amount to USD 200 thousand, allowing for recouping the capital investment in six months.

  Properties of the product:
  - volume weight -- 0,2 - 0,6 t/m^3,
  - coefficient of thermal conductivity -- 0,07 - 0,2 kcal/Grad.,
  - compressive resistance -- 1-50 kgs/cm^2,
  - working temperature -- 400 - 600 ^{0}C

- acid resistance -- 97 - 99 %,
- water absorption -- 1 - 5 %,
- water resistance and cold resistance products (testing carried out at up to 15^0C),
- length and width 100 - 500 mm each, thickness 30 - 100 mm and more.

Contact information: Tamaz Gabadadze, Professor, Doctor of Science. Tel.: (+995 93) 561 437

- ***Porobeton Ltd*** was established in 2008, however the company predecessor has already been producing airocrete in small amounts for 3-4 years. Recently, as the demand for the product grew, the company started expansion. It has acquired technology for airocrete production, but the capacity is still not enough to satisfy the demand. Currently, Porobeton Ltd. rents 800 m^2 of territory. The thermal conductivity of the airocrete blocks produced by the company remains - 0.24 watt/m*OC, density – 800 kg/m^3.
  Contact information: David Nizharadze, General Director. Tel.: (+995 99) 550 449.

- ***Solar Energy*** is one of the leading companies among Solar Water Heating System Providers in Georgia. In majority of cases two totally different solar energy heating systems are used: (i) Solar water heaters with direct circulation and (ii) Solar water heaters with indirect circulation. The significant growth on the market is noticeable during last three years, due to growing prices on electricity and gas. The company would like to have partner/investor in order to increase capacity.
  Contact information: Levan Kobakhidze, Project Manager. Tel.: (+995 99) 155 483, www.sun.org.ge

- ***Opportunity to buy airocrete blocks manufacturing factory.*** The production capacity of the factory is 6 000 blocks per day. Cost of production is estimated at approximately USD 1.07, while the market price is USD 1.34. The factory is equipped with automatic technology in good condition. Occupied territory measures to 650 m^2 of building and 3 200 m^2 of land.
  Contact information: Guram Kemertelidze, the owner of the factory. Tel.: (+995 93) 589 126.

SECTION 14. STAKEHOLDERS

1. **Invest in Georgia. National Investment Agency**
   Ms. Tamuna Liluashvili, Director
   6 Khetagurovi Street, Tbilisi 0108, Georgia
   Telephone: 995-32-43-34-24; Fax: 995-32-92-11-22
   E-Mail: tamunal@investingeorgia.org
   Website: www.investingeorgia.org

2. **Ministry of Economic Development of Georgia**
   Ms. Eka Sharashidze, Minister
   12 Chanturia Street, Tbilisi, Georgia 0108
   Telephone: 995-32-99-69-96; Fax: 995-32-92-18-45

Also includes information on Statistics www.statistics.ge

Additional Key Organizations with Web Resources

US Embassy, Tbilisi	http://georgia.usembassy.ge
United States Agency for Int'l Development	http://georgia.usaid.gov
American Chamber of Commerce in Georgia	http://www.amcham.ge
Tbilisi Yellow Pages	http://www.yellowpages.ge/index
World Bank, Georgia	http://www.worldbank.org
International Monetary Fund	http://www.imf.ge
Georgia State Procurement Agency	http://www.spa.ge/en
Georgia Ministry of Economic Development	http://www.privatization.ge
European Bank for Reconstruction/Development	http://www.ebrd.org
European Union	http://www.eu.org
Young Economists' Association	http://www.economists.ge
Young Lawyers' Association	http://www.gyla.ge
Agency for State Procurements	http://www.spa.ge