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MIDTERM REPORT ON SOLAR PHOTOVOLTAIC SYSTEM PROJECT FOR OFF-GRID SETTLEMENTS

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12 March 2019

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USAID ENERGY PROGRAM

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DATA

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Practice Area: Energy Security, Solar Photovoltaic Project, Off-Grid Settlements, Off-Grid High Mountain Households

Key Words: Energy Security, Solar Photovoltaic, Off-Grid

ACRONYMS

CFD	Contract for Difference
CPPA	Corporate Power Purchase Agreement
EnCT	Energy Community Treaty
EU	European Union
FiT	Feed in Tariff
GoG	Government of Georgia
GoG	Government of Georgia
GPPA	Government Power Purchase Agreement
IPP	Independent Power Producer
MoESD	Ministry of Economy and Sustainable Development of Georgia
PPA	Power Purchase Agreement
PPP	Public Private Partnership
REC	Renewable Energy Certificate
ROC	Renewable Obligation Certificate
SPP	Solar Power Plant
USAID	United States Agency for International Development
VAT	Value Added Tax
VRE	Variable Renewable Energy

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INTRODUCTION

In October 2016, Georgia signed the Energy Community Treaty (EnCT) signaling the country's commitment to direct future energy planning and market development towards approximation with the European Union (EU). This step commits Georgia to enhancing the security of energy supply by promoting the development of relevant infrastructure, increasing market integration and gradual regulatory approximation towards key elements of the EnCT, and promoting the use of renewable energy sources. In order for Georgia to meeting its strategic commitments in the energy sector, the United States Agency for International Development (USAID) is providing technical assistance and policy advice on legal, regulatory and institutional reform issues, including facilitating investment and deal structuring, engineering and environmental analyses, financial planning, and outreach, and other consulting. This technical assistance, ("USAID Energy Program") is being rendered by Deloitte Consulting LLP, under a USAID contract, AID-OAA-I-13-00018.

The objective of USAID Energy Program is to support Georgia's efforts to facilitate increased investment in power generation capacity as a means to increase national energy security, facilitate economic growth, and enhance national security. The project will have a significant impact on energy market reform efforts of the Government of Georgia (GoG) to comply with the country's obligations under the EnCT. The investment objective will be achieved through the provision of technical assistance to a variety of stakeholders in the energy sector.

The purpose of USAID Energy Program is to: (1) support Georgia in energy market development per Georgia's obligations under the EnCT, (2) build the capacity of the GoG and relevant institution(s) to evaluate the fiscal and long-term impacts of regulatory changes, (3) promote energy investments, primarily in variable renewable energy development, (4) to support integration of non-hydro renewable energy into the power system, and (5) provide strategic advisory services to the GoG to increase Georgia's energy security.

The ultimate goal of this Program is to enhance Georgia's energy security through improved legal and regulatory framework and increased investments in the energy sector. The ultimate expected outcome of this Program is an energy market legal and regulatory framework that complies with European requirements and encourages competitive energy trade and private sector investments.

The GoG asked USAID Energy Program to assist in developing viable solutions to bring power for off-grid villages, in cooperation with the international donor organizations.

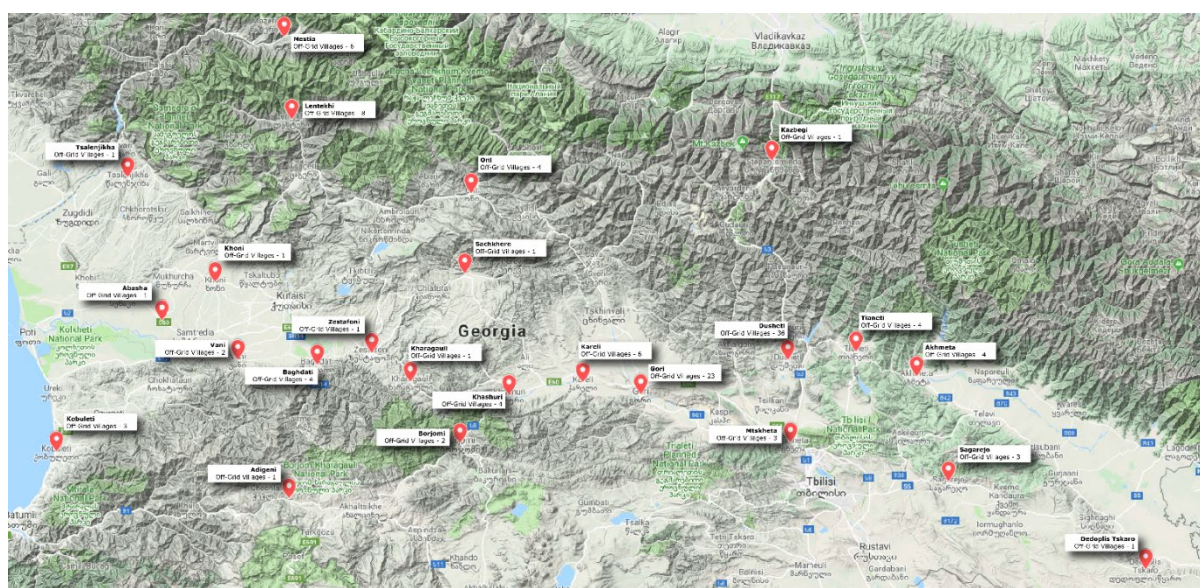
SUMMARY

The GoG has a policy to ensure that all residents have access to electricity, however, still there are few remote villages with no access to the electricity grid. The development of electricity grid in those remote villages is related to high expenses and hard-working conditions. Furthermore, recently Georgia joined the European Energy Community and hence undertook the obligation to implement mandatory reforms in the energy sector in compliance with EU Energy Aquis. In accordance with the treaty, the GoG has undertaken an obligation to ensure the supply of energy sources to all citizens of the country. However, certain residents were not engaged in the electrification program due to a high price of grid connection.

In support of Georgia's efforts to facilitate increased investment in power generation capacity as a means to increase national energy security and facilitate economic growth and enhance national sovereignty, an alternative approach was proposed by USAID Energy Program to the GoG to provide an off-grid solution, namely, solar home systems with battery backup.

According to the Energy Department of the Ministry of Economy and Sustainable Development of Georgia (MoESD), there are around 400 identified priority off-grid houses in the high mountain regions of 120 villages in Georgia with no access to electricity.

Figure 1: Map of Settlements with no access to the Electricity Grid



USAID Energy Program, as a project initiator, initially, implied a complementary supply of household with electrical equipment. However, the Ministry expressed interest in the implementation of the project, hence the parties agreed on further collaboration. The parties selected Non-Governmental Organization (NGO) Energy Efficiency Center Georgia (EECG) to coordinate the implementation of the project.

The Prime Minister of Georgia revealed an interest in the successful implementation of the project and decided to participate in co-funding of the project. Hence, the GoG has passed a resolution to commit approximately USD \$350,000 for 25% of the capital cost of the project based on the Full System configuration.

Since 100% of financing of the project is not available, the Project funding could be considered as follows: 25% - by the central budget of the GoG and the remaining 75% - subject to grant funding from potential International Financial Institutions (IFI) and Donor organizations.

In order to facilitate the project implementation, USAID Energy Program and EECG prepared a concept paper. In addition, several meetings were held with the MoESD, Ministry of Regional Development and Infrastructure of Georgia (MRDI), Local Municipalities as well as with donor organizations, and other interested parties.

OFF-GRID SOLAR PV SYSTEM PROJECT CONCEPT FOR HIGH MOUNTAIN HOUSEHOLDS

The main goal of the project is to provide basic electricity to a vulnerable population in remote areas of Georgia and create improved conditions in order to encourage them to stay in their home villages, to feel secure as residents, and enhance the possibilities for tourism development, which will boost the economy of the region.

USAID Energy Program and EECG jointly developed a concept paper (Annex 3) on off-grid solution. The MoESD and MRDI studied a concept plan for the installation of solar Photovoltaic (PV) panels for off-grid high mountain households. The following solutions for electrification of off grid households are proposed:

1. Full System comprises 750 W PV (250 W x3) panel equipment on each permanent off-grid household and electrical equipment (5 LED lamps, DC/AC inverter and compatible GEL Battery) as well as power meter.
 - The Full System cost ~ \$3,500 delivered (with GEL accumulators);
 - The Full System cost ~ \$4,000 delivered (with Lithium -Ion accumulators).
2. Basic Mobile System comprises 100 W PV panel installation on each seasonal off-grid consumer (i.e. Shepherds / Cowboys that are frequently changing location) with integrating electrical equipment (5 LED lamps, DC / AC inverter and compatible Lithium -Ion and optional power meter).
 - The Basic System cost ~ \$1000 with Lithium -Ion accumulators.
3. Microgrid system, might be applicable in settlements with a relatively high density of houses.
 - An average cost per one microgrid with more than 20 houses could be estimated as \$7000.00 USD per one consumer.

According to available information, out of 400 off-grid households over the country, 200 are in 58 villages of Dusheti region and 80% of these 200 houses are located at the border occupied by Russia.

INDIVIDUAL MEETINGS WITH DONOR ORGANIZATIONS

As noted above, the project funding could be as follows: 25% - by the GoG and the remaining 75% - subject to grant funding from potential IFI's and Donor organizations. In order to assist the GoG in obtaining remaining funds, USAID Energy Program and EECG discussed the financing possibilities at a Donor Organization's Meeting at the MoESD. Later, the individual consultations were organized with the Embassy of Czech Republic, German Government-Owned Development Bank (KfW), Caucasus Environmental NGO network (CENN), Embassy of Romania, EU Delegation, Green Climate Fund (GCF) and World Bank (WB).

USAID Energy Program and EECG set up meetings with the following donor organizations:

- **The Embassy of Czech Republic:** The embassy mainly supports the Small and Medium Size Enterprises (SME) to address the issues from the economic perspective. Although the plan is to enhance the installation of PV systems for guest houses, some agricultural plants might be considered as well.
- **EU Delegation:** Mr. Andrzej Bartosiewicz created awareness of the project among the representatives of multi-donor fund e5p (Eastern Europe Energy Efficiency and Environment Partnership). The fund has about USD 1 mln left from the year 2018 and may provide required reserves, however the request should be made at the GoG level.
- **WB:** The WB is running the Regional Development (RDP) and Infrastructure Development (IDP) projects. There is a high likelihood of attracting financial support for off-grid solar PV projects within the RDP. However, several requirements should be met: 1) justification that the concept design is the best solution for project implementation; 2) project sustainability; 3) the GoG must contribute at least 50% of the total cost; 4) the request should be made at the GoG level, in particular, Municipal Development Fund under the MRDI.

- **Embassy of Romania:** The ambassador H.E Mr. Radu-Liviu Horumba promised to discuss this issue to the Romanian Agency for International Development (RoAid). However, in accordance with the RoAid procedures, this may take some time.
- **GCF:** GCF representatives exhibited interest in the project. GCF is usually dealing with larger scale projects, however the prospect for adding an energy efficient stoves, individual water supply, sewage and water heating systems remain as an alternative. Hence, the request for a grant in amount of USD 1 mln could be an option.
- **KfW:** Although the project fails to fit KfW scope of work Ms. Nino Shanidze, Senior Project Coordinator hinted the possibility of sponsoring the project from a fund allocated to the GoG under the *Policy Based Loan Project*, which contains a grant up to EUR to 8.5 mln for the energy efficiency issues.
- **CENN:** Mr. Rezo Getiashvili, Environmental Projects' Coordinator noted that under the project EU for Georgia's - European Neighbourhood Programme for Agriculture and Rural Development (ENPARD) program envisages the grant in amount of USD 20,000, aimed at the development of tourism and deforestation. The total budget of ENPARD is about 20mln EURs, which covers forestry, agricultural and tourism development.

All donors reveal long / medium term interest in the project. Also, further study on the long-term sustainability of the project was advised as well as the establishment of local communities. In order to fit the ongoing Energy Efficiency projects, representatives from donor organizations recommended adding EF stoves and water heating systems to the project design. All donors noted that, the request should be made at the level of the GoG.

SURVEY ON EXISTING OFF-GRID ELECTRICITY CUSTOMERS

With the goal of identifying the overall situation in off-grid villages, the precise number of household and their desire, USAID Energy Program has been engaged in data collection in off-grid settlements of Georgia. The questionnaire was composed with the help of Mr. Giorgi Abulashvili, it contains information about residents of households, their situation, income, distance from other households.

The image shows a detailed survey form for off-grid households. It includes sections for household identification, electricity usage (e.g., number of lights, fans, TV, mobile phone), and household characteristics (e.g., number of people, type of house, access to roads). The form is designed for data collection in off-grid settlements.

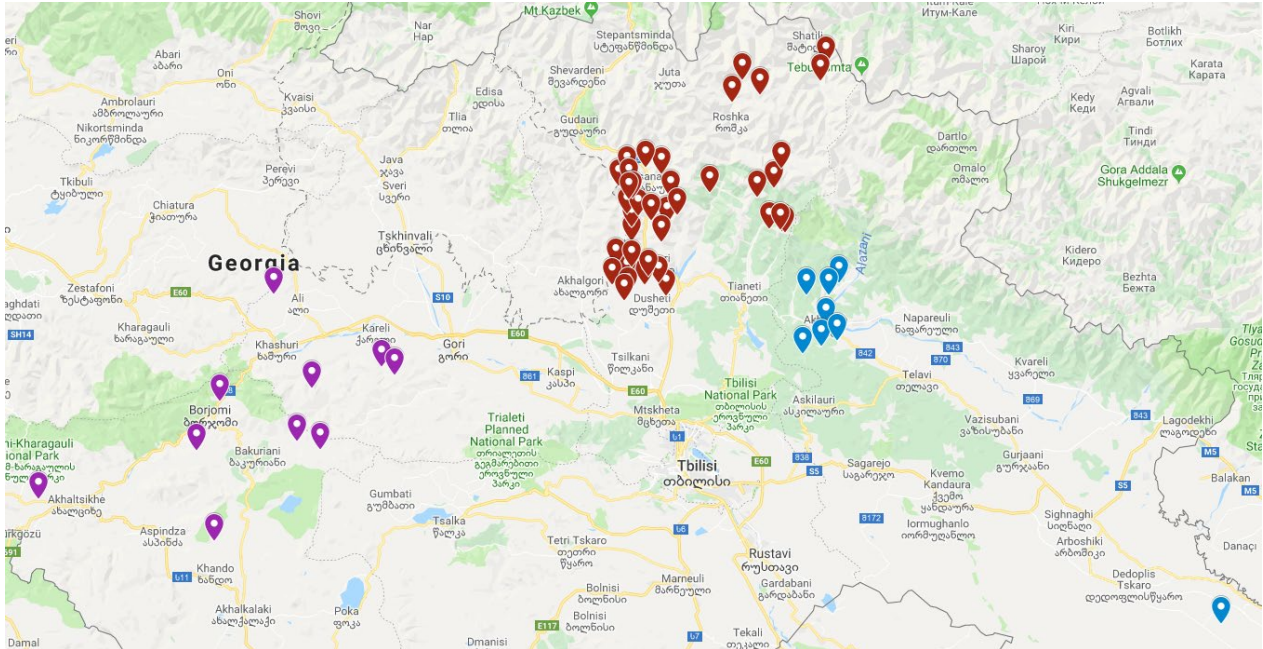
Survey, Off-Grid Households (Template)

The image shows a summary survey form for off-grid villages. It lists categories such as Region, Village, Number of Houses in Total, Number of Permanent Houses, Number of Seasonal Houses, and Condition of the access road to the village. The form is designed for data collection in off-grid settlements.

Survey, Off-Grid Villages (Template)

USAID Energy Program has been engaged in data collection in off-grid settlements of Georgia. In that regard, the representative of the program visited remote villages in the regions of Borjomi-Kharagauli, Kakheti, Kvemo-Kartli, Mtskheta-Mtianeti, Samtskhe-Javakheti and Shida-Kartli, Municipalities: Dusheti, Borjomi, Akhaltsikhe, Gori, Kareli, Khashuri, Akhmeta, Dedoplistskaro and Tetritskaro. Due to the weather conditions, USAID Energy Program temporarily stopped the survey process in the off-grid high mountainous areas.

Figure 2: Visited Off-Grid Settlements



In total, 331 houses were counted, out of which 271 homeowners were surveyed (in some cases, a neighbor or a representative of the municipality was questioned). Among surveyed houses, 131 were permanent and 200 were seasonal houses. 71 households were unattainable, due to the absence of homeowners or / and road conditions. In most cases the access-roads are available in villages, however certain minor communities have no access-roads (Annex 1, 2).



Village Gverdisubani, Borjomi Municipality



Village Velebi, Gori Municipality



Village Dre, Gori Municipality



Village Tchontili, Dusheti Municipality



Village Chalissopheli, Dusheti Municipality



Village Toncha, Dusheti Municipality

MAIN FINDINGS

Obtained primary information revealed the following main findings:

- Despite the hard-social conditions of residents, population is willing to pay for electricity in amount of GEL15-20 per month; we found that the average income of the surveyed population is about GEL 400, the main source of their income is animal industry, farming and monthly pension;

- Technological solutions can provide electricity at relatively reasonable cost per household, using solar;
- Project funding is not secured. The GoG is ready to commit approximately USD \$350,000 for 25% of the capital cost of the project based on the full system configuration. Still, 75% is lacking.

NEXT STEPS

To assist GoG in achieving the main goal, ensure all residents access to the electricity, USAID Energy Program in cooperation with MRDI, MoESD and EECG, will implement the following activities:

- USAID Energy Program team will resume survey process in the remaining, off-grid settlements, Western part of Georgia (as soon as weather conditions are improved, most likely from March / April);
- USAID Energy Program intends to subcontract EECG to advise the GoG on off grid technologies to use, and where to get financing;
- At the request of MRDI, USAID Energy Program and EECG will continue assistance in procurement process and specifications of technical requirements on Autonomous Microelectronic Solar Power Plant (SPP) Set for Permanent Households of the Off - Grid Villages (Annex 5).

ANNEXES:

1. Midterm Data Base on Off Grid Households;
2. Midterm Data Base on Off-Grid Villages;
For detailed data, follow the link:
<https://drive.google.com/open?id=1alc5AWUOPStZbCZIL0uXjzNrVE26Wg3z>
3. Concept Paper on Off Grid Solar PV System Project for High Mountain Households;
4. Presentation on Off Grid Solar PV System Project for High Mountain Households;
5. Technical requirements on Autonomous Microelectronic SPP Set for Permanent Households of the Off - Grid Villages.

ANNEX 1: MIDTERM DATA BASE ON OFF-GRID HOUSEHOLDS

#	Region	Municipality	District	Village	House owner's name	Interviewed person's Name	№ of houses	Permanent house	Seasonal Houses	№ of residents	M	F	Age - M	Age -F	Living (heating) area m2	№ of living (heating)	Annual Consumption of Wood (m3)	Existing solar PV	Average monthly income	Willingness to pay for electricity	Per month fixed (GEL)	Access road
1	Mtskheta-Tianeti	Dusheti	Chonkadze	Mchedliankari	Iago Mchedlishvili	Iago Mchedlishvili	1	1		2	2	0	N/A	N/A	20	1	N/A	N/A	180	Yes	15	Yes
2	Mtskheta-Tianeti	Dusheti	Chonkadze	Mchedliankari	Izolda Iarajuli	Izolda Iarajuli	1	1		4	2	2	N/A	N/A	120	7	N/A	N/A	480	Yes	5	Yes
3	Mtskheta-Tianeti	Dusheti	Chonkadze	Mchedliankari	Lasha Mchedlishvili	Lasha Mchedlishvili	1	1		1	1	0	N/A	N/A	50	2	N/A	N/A	300	Yes	20	Yes
4	Mtskheta-Tianeti	Dusheti	Chonkadze	Mgliani	Koba Pitskhelauri	Koba Pitskhelauri	1		1	4	1	3	N/A	N/A	60	1	N/A	N/A	338	Yes	15	Yes
5	Mtskheta-Tianeti	Dusheti	Chonkadze	Mgliani	Dato Pitskhelauri	Dato Pitskhelauri	1		1	4	2	2	N/A	N/A	25	1	N/A	N/A	270	Yes	15	Yes
6	Mtskheta-Tianeti	Dusheti	Shatili	Kistani	Tariel Tchincharauli	Tariel Tchincharauli	1		1	3	2	1	N/A	N/A	40	2	N/A	N/A	0	Yes	30	Yes
7	Mtskheta-Tianeti	Dusheti	Shatili	Kistani	Imeda Tchintcharauli	Imeda Tchintcharauli	1		1	4	3	1	N/A	N/A	30	2	N/A	N/A	0	Yes	30	Yes
8	Mtskheta-Tianeti	Dusheti	Shatili	Kistani	Giorgi Tchintcharauli	Giorgi Tchintcharauli	1		1	3	1	2	N/A	N/A	20	2	N/A	N/A	0	Yes	30	Yes
9	Mtskheta-Tianeti	Dusheti	Shatili	Giorgitsminda	Bakur Gogotchuri	Bakur Gogotchuri	1	1		2	1	1	N/A	N/A	140	6	N/A	N/A	0	Yes	50	Yes
10	Mtskheta-Tianeti	Dusheti	Shatili	Giorgitsminda	Shalva Gogotchuri	Shalva Gogotchuri	1	1		5	4	1	N/A	N/A	70	4	N/A	N/A	1000	Yes	30	Yes
11	Mtskheta-Tianeti	Dusheti	Shatili	Giorgitsminda	Nikoloz Gogotchuri	Nikoloz Gogotchuri	1		1	3	2	1	N/A	N/A	100	4	N/A	N/A	0	Yes	30	Yes
12	Mtskheta-Tianeti	Dusheti	Shatili	Giorgitsminda	Arsen Gogotchuri	Arsen Gogotchuri	1		1	4	2	2	N/A	N/A	120	4	N/A	N/A	0	Yes	30	Yes
13	Mtskheta-Tianeti	Dusheti	Shatili	Giorgitsminda	Elguja Gogotchuri	Elguja Gogotchuri	1		1	3	1	2	N/A	N/A	70	3	N/A	N/A	0	Yes	30	Yes
14	Mtskheta-Tianeti	Dusheti	Shatili	Giorgitsminda	Garsevan Zviadauri	Garsevan Zviadauri	1		1	2	1	1	N/A	N/A	80	4	N/A	N/A		Yes	30	Yes
15	Mtskheta-Tianeti	Dusheti	Shatili	Giorgitsminda	Eter Gogotchuri	Eter Gogotchuri	1		1	3	0	3	N/A	N/A	25	2	N/A	N/A	0	Yes	30	Yes
16	Mtskheta-Tianeti	Dusheti	Shatili	Mutso	Leila Zviadauri	Leila Zviadauri	1	1		5	4	1	N/A	N/A	130	7	N/A	N/A	650	Yes	10	Yes
17	Mtskheta-Tianeti	Dusheti	Shatili	Mutso	Garsevan Zviadauri	Garsevan Zviadauri	1	1		3	1	2	N/A	N/A	120	6	N/A	N/A	650	Yes	15	Yes
18	Mtskheta-Tianeti	Dusheti	Shatili	Ardoti	Shota Ardotele	Shota Ardotele	1		1	3	1	2	N/A	N/A	150	5	N/A	N/A	300	Yes	20	Yes

#	Region	Municipality	District	Village	House owner's name	Interviewed person's Name	№ of houses	Permanent house	Seasonal Houses	№ of residents	M	F	Age - M	Age - F	Living (heating) area m2	№ of living (heating)	Annual Consumption of Wood (m3)	Existing solar PV	Average monthly income	Willingness to pay for electricity	Per month fixed (GEL)	Access road
19	Mtskheta-Tianeti	Dusheti	Shatili	Ardoti	Zurab Zviadauri	Zurab Zviadauri	1	1		5	3	2	N/A	N/A	50	2	N/A	N/A	80	Yes	15	Yes
20	Mtskheta-Tianeti	Dusheti	Shatili	Ardoti	Tamaz Ardoteli	Tamaz Ardoteli	1	1		7	4	3	N/A	N/A	125	12	N/A	N/A	2000	Yes	40	Yes
21	Mtskheta-Tianeti	Dusheti	Shatili	Ardoti	Khvtiso Murghuevi	Khvtiso Murghuevi	1		1	1	1	0	N/A	N/A	60	3	N/A	N/A	180	Yes	15	Yes
22	Mtskheta-Tianeti	Dusheti	Shatili	Ardoti	Zezva Ardoteli	Zezva Ardoteli	1		1	4	3	1	N/A	N/A	90	3	N/A	N/A	1500	Yes	20	Yes
23	Mtskheta-Tianeti	Dusheti	Shatili	Ardoti	Avtandil Zviadauri	Avtandil Zviadauri	1		1	2	1	1	N/A	N/A	60	3	N/A	N/A	1000	Yes	20	Yes
24	Mtskheta-Tianeti	Dusheti	Shatili	Ardoti	Marine Daiauri	Marine Daiauri	1	1		5	3	2	N/A	N/A	100	8	N/A	N/A	800	Yes	20	Yes
25	Mtskheta-Tianeti	Dusheti	Shatili	Ardoti	Zaur Zviadauri	Zaur Zviadauri	1	1		6	3	3	N/A	N/A	60	5	N/A	N/A	1500	Yes	20	Yes
26	Mtskheta-Tianeti	Dusheti	Shatili	Ardoti	Pridon Zviadauri	Pridon Zviadauri	1	1		4	2	2	N/A	N/A	90	5	N/A	N/A	0	Yes	20	Yes
27	Mtskheta-Tianeti	Dusheti	Ukanaps havi	Tchidali	Avtandil Jabanasvili	Avtandil Jabanasvili	1	1		3	2	1	N/A	N/A	100	3	N/A	N/A	200	Yes	30	Yes
28	Mtskheta-Tianeti	Dusheti	Ukanaps havi	Eliagza	Giorgi Bibghiasvili	Giorgi Bibghiasvili	1	1		1	1	0	N/A	N/A	15	1	N/A	N/A	0	Yes	15	No
29	Mtskheta-Tianeti	Dusheti	Ukanaps havi	Khoshara	Ivane Tetiashvili	Ivane Tetiashvili	1	1		4	2	2	N/A	N/A	50	2	N/A	N/A	215	Yes	15	Yes
30	Mtskheta-Tianeti	Dusheti	Ukanaps havi	Chalakhevi	Naziko Buchukuri	Naziko Buchukuri	1	1		1	0	1	N/A	N/A	40	2	N/A	N/A	215	Yes	15	Yes
31	Mtskheta-Tianeti	Dusheti	Ukanaps havi	Vakisopeli	Iveri Tselauri	Iveri Tselauri	1		1	3	1	2	N/A	N/A	40	2	N/A	N/A	1000	Yes	40	Yes
32	Mtskheta-Tianeti	Dusheti	Ukanaps havi	Vakisopeli	Meredi Jabanasvili	Meredi Jabanasvili	1	1		1	0	1	N/A	N/A	20	1	N/A	N/A	200	Yes	10	Yes
33	Mtskheta-Tianeti	Dusheti	Ukanaps havi	Vakisopeli	Sanata Tsokilauri	Sanata Tsokilauri	1		1	4	3	1	N/A	N/A	60	3	N/A	N/A	500	Yes	20	Yes
34	Mtskheta-Tianeti	Dusheti	Ukanaps havi	Vakisopeli	Giorgio Tsokulauri	Giorgio Tsokulauri	1		1	2	2	0	N/A	N/A	60	4	N/A	N/A	215	Yes	20	Yes
35	Mtskheta-Tianeti	Dusheti	Ukanaps havi	Vakisopeli	Shalva Tsokulauri	Shalva Tsokulauri	1		1	2	1	1	N/A	N/A	100	6	N/A	N/A	300	Yes	20	Yes
36	Mtskheta-Tianeti	Dusheti	Ukanaps havi	Vakisopeli	Vladimer Tselauri	Vladimer Tselauri	1		1	1	1	0	N/A	N/A	20	1	N/A	N/A	215	Yes	20	Yes
37	Mtskheta-Tianeti	Dusheti	Gudamak ari	Atnokhi	Amiran Aptsiauri	Amiran Aptsiauri	1		1	2	1	1	N/A	N/A	50	2	N/A	N/A	215	Yes	10	No
38	Mtskheta-Tianeti	Dusheti	Gudamak ari	Bakhani	Kako Tsiklauri	Kako Tsiklauri	1	1		4	3	1	N/A	N/A	35	2	N/A	N/A	300	Yes	15	No

#	Region	Municipality	District	Village	House owner's name	Interviewed person's Name	№ of houses	Permanent house	Seasonal Houses	№ of residents	M	F	Age - M	Age - F	Living (heating) area m2	№ of living (heating)	Annual Consumption of Wood (m3)	Existing solar PV	Average monthly income	Willingness to pay for electricity	Per month fixed (GEL)	Access road
39	Mtskheta-Tianeti	Dusheti	Gudamakari	Chobalauri	Neli Beqauri	Neli Beqauri	1		1	7	3	4	N/A	N/A	50	2	N/A	N/A	120	Yes	20	No
40	Mtskheta-Tianeti	Dusheti	Gudamakari	Bursatchili	Teimuraz Tsiklauri	Teimuraz Tsiklauri	1		1	5	3	2	N/A	N/A	20	1	N/A	N/A	80	Yes	20	Yes
41	Mtskheta-Tianeti	Dusheti	Gudamakari	Bursatchili	Malkhaz Tsiklauri	Malkhaz Tsiklauri	1		1	7	2	5	N/A	N/A	40	2	N/A	N/A	50	Yes	20	Yes
42	Mtskheta-Tianeti	Dusheti	Gudamakari	Bursatchili	Giorgi Aptsiauri	Giorgi Aptsiauri	1	1		2	1	1	N/A	N/A	10	1	N/A	N/A	15	Yes	5	Yes
43	Mtskheta-Tianeti	Dusheti	Gudamakari	Bursatchili	Zura Aptsiauri	Zura Aptsiauri	1		1	2	1	1	N/A	N/A	30	2	N/A	N/A	50	Yes	10	Yes
44	Mtskheta-Tianeti	Dusheti	Gudamakari	Bursatchili	Temur Aptsiauri	Temur Aptsiauri	1		1	2	1	1	N/A	N/A	40	2	N/A	N/A	50	Yes	10	Yes
45	Mtskheta-Tianeti	Dusheti	Gudamakari	Bursatchili	Gocha Aptsiauri	Gocha Aptsiauri	1		1	2	1	1	N/A	N/A	20	2	N/A	N/A	50	Yes	10	Yes
46	Mtskheta-Tianeti	Dusheti	Gudamakari	Bursatchili	Robert Tsiklauri	Robert Tsiklauri	1		1	2	1	1	N/A	N/A	40	2	N/A	N/A	30	Yes	10	Yes
47	Mtskheta-Tianeti	Dusheti	Gudamakari	Bursatchili	Grigol Tsiklauri	Grigol Tsiklauri	1	1		2	1	1	N/A	N/A	70	3	N/A	N/A	432	Yes	5	Yes
48	Mtskheta-Tianeti	Dusheti	Gudamakari	Bursatchili	Archil Tsiklauri	Archil Tsiklauri	1		1	2	1	1	N/A	N/A	40	2	N/A	N/A	30	Yes	15	Yes
49	Mtskheta-Tianeti	Dusheti	Barisakho	Ukanakhadu	Nodar Kareuli	Nodar Kareuli	1		1	2	1	1	50	48	70	3	2	N/A	30	Yes	15	Yes
50	Mtskheta-Tianeti	Dusheti	Barisakho	Zeistecho	Mikheil Arabuli	Mikheil Arabuli	1	1		1	1	0	77	0	30	1	5	N/A	215	Yes	30	No
51	Mtskheta-Tianeti	Dusheti	Barisakho	Zeistecho	Gigla Arabuli	Gigla Arabuli	1		1	6	3	3	45, 24, 21	78, 40, 25	40	2	2	N/A	1000	Yes	30	No
52	Mtskheta-Tianeti	Dusheti	Barisakho	Tsinkhadu	Maia Gogotchuri	Maia Gogotchuri	1		1	3	2	1	53, 25	43	40	2	4	N/A	960	Yes	20	Yes
53	Mtskheta-Tianeti	Dusheti	Barisakho	Tsinkhadu	Totia Arabuli	Totia Arabuli	1		1	1	1	0	81		40	1	2	N/A	215	Yes	20	Yes
54	Mtskheta-Tianeti	Dusheti	Barisakho	Tsinkhadu	Givi Arabuli	Givi Arabuli	1		1	2	1	1	54	80	40	2	2	N/A	1000	Yes	40	Yes
55	Mtskheta-Tianeti	Dusheti	Barisakho	Tsinkhadu	Giorgi Arabuli	Giorgi Arabuli	1		1	11	5	6	40, 37, 19, 17, 10	40, 30, 16, 13, 8, 2	80	3	2	N/A	800	Yes	30	Yes
56	Mtskheta-Tianeti	Dusheti	Barisakho	Tsinkhadu	Mzekala Arabuli	Mzekala Arabuli (Gamgebeli)	1		1	2	1	1	53	81	100	5	2	N/A	215	Yes	30	Yes

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57	Mtskheta -Tianeti	Dusheti	Barisakho	Khakhmati	Shota Aludauri	Babale Tchintcharauli (neighbour)	1	1	4	2	2	58, 26	50, 29	60	2	2	N/A	10 00	Yes	20	Yes	
58	Mtskheta -Tianeti	Dusheti	Barisakho	Khakhmati	Koba Aludauri	Babale Tchintcharauli (neighbour)	1	1	4	2	2	46, 18	43, 18	10 0	6	2	N/A	50 0	Yes	30	Yes	
59	Mtskheta -Tianeti	Dusheti	Barisakho	Khakhmati	Goderdzi Aludauri	Babale Tchintcharauli (neighbour)	1	1	4	2	2	61, 27	55, 25	11 0	6	2	N/A	20 0	Yes	15	Yes	
60	Mtskheta -Tianeti	Dusheti	Barisakho	Khakhmati	Mariam Aludauri	Babale Tchintcharauli (neighbour)	1	1	2	1	1	42	80	40	2	2	N/A	21 5	Yes	10	Yes	
61	Mtskheta -Tianeti	Dusheti	Barisakho	Khakhmati	Tariel Aludauri	Babale Tchintcharauli (neighbour)	1	1	2	1	1	39	36	90	4	2	N/A	30 0	Yes	30	Yes	
62	Mtskheta -Tianeti	Dusheti	Barisakho	Khakhmati	Giorgi Aludauri	Babale Tchintcharauli (neighbour)	1	1	3	2	1	40, 10	75	30	2	2	N/A	40 0	Yes	20	Yes	
63	Mtskheta -Tianeti	Dusheti	Barisakho	Khakhmati	Shamil Aludauri	Babale Tchintcharauli (neighbour)	1	1	5	1	4	42	35, 12, 10, 7	30	2	2	N/A	20 0	Yes	15	Yes	
64	Mtskheta -Tianeti	Dusheti	Barisakho	Khakhmati	Granja Aludauri	Babale Tchintcharauli (neighbour)	1	1	4	2	2	48, 27	50, 25	30	1	2	N/A	30 0	Yes	15	Yes	
65	Mtskheta -Tianeti	Dusheti	Barisakho	Khakhmati	Bada Aludauri	Babale Tchintcharauli (neighbour)	1	1	3	2	1	80, 45	75	50	3	2	N/A	30 0	Yes	15	Yes	
66	Mtskheta -Tianeti	Dusheti	Barisakho	Khakhmati	Dato Aludauri	Babale Tchintcharauli (neighbour)	1	1	2	2	0	45, 43	0	70	4	2	N/A	10 00	Yes	30	Yes	
67	Mtskheta -Tianeti	Dusheti	Barisakho	Khakhmati	Ilia Aludauri	Babale Tchintcharauli (neighbour)	1	1	3	1	2	46	45, 20	10 0	4	2	N/A	0	Yes	20	Yes	
68	Mtskheta -Tianeti	Dusheti	Barisakho	Khakhmati	Babale Tchintcharauli	Babale Tchintcharauli	1	1	5	2	3	42, 10	65, 34, 2	80	3	3	N/A	10 00	Yes	30	Yes	
69	Mtskheta -Tianeti	Dusheti	Barisakho	Chirdili	Bidzina Arabuli	Bidzina Arabuli	1	1	2	1	1	30	31	20 0	9	10	N/A	30 00	Yes	10 0	Yes	
70	Mtskheta -Tianeti	Dusheti	Barisakho	Chirdili	Paata Arabuli	Grisha Arabuli (neighbour)	1	1	4	3	1	51, 26, 23	49	90	3	3	N/A	12 00	Yes	30	Yes	

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71	Mtskheta -Tianeti	Dusheti	Barisakho	UkanaKkho	Tariel Tchintcharauli	Mamuka Tchintcharauli(neighbour)	1	1		1	1	0	65	0	70	3	3	N/A	N/A	Yes	15	Yes
72	Mtskheta -Tianeti	Dusheti	Barisakho	UkanaKkho	Mamuka Tchintcharauli	Mamuka Tchintcharauli	1	1		2	1	1	37	40	80	2	10	N/A	0	No	N/A	Yes
73	Mtskheta -Tianeti	Dusheti	Barisakho	UkanaKkho	Dato Tchintcharauli	Giga Pavliashvili (neighbour)	1		1	4	3	1	65, 39, 20	42	20	1	3	N/A	N/A	Yes	10	Yes
74	Mtskheta -Tianeti	Dusheti	Barisakho	UkanaKkho	Nikoloz Tchintcharauli	Nikoloz Tchintcharauli	1	1		1	1	0	65	0	15	1	5	N/A	21 5	Yes	15	Yes
75	Mtskheta -Tianeti	Dusheti	Barisakho	Ghelisvake	Ivane Burduli	Bachana Teterauli (neighbour)	1		1	2	1	1	75	70	20 0	6	5	N/A	43 0	Yes	30	Yes
76	Mtskheta -Tianeti	Dusheti	Barisakho	Ghuli	Givi Kistauri	Bachana Teterauli (neighbour)	1		1	4	2	2	42, 39	40, 38	80	2	2	N/A	N/A	Yes	15	Yes
77	Mtskheta -Tianeti	Dusheti	Barisakho	Ghuli	Rostom Kistauri	Bachana Teterauli (neighbour)	1		1	3	2	1	54, 27	52	20	1	2	N/A	N/A	Yes	15	Yes
78	Mtskheta -Tianeti	Dusheti	Barisakho	Ghuli	Toma Kistauri	Bachana Teterauli (neighbour)	1		1	2	1	1	82	77	50	2	3	N/A	N/A	Yes	15	Yes
79	Mtskheta -Tianeti	Dusheti	Barisakho	Ghuli	Omar Kistauri	Bachana Teterauli (neighbour)	1		1	5	2	3	60, 35	76, 54, 33	50	2	3	N/A	N/A	Yes	15	Yes
80	Mtskheta -Tianeti	Dusheti	Barisakho	Biso	Mamuka Ketelauri	Mamuka Ketelauri	1		1	9	7	2	65, 38, 30, 19, 18, 3, 2	63, 30	10 0	3	5	N/A	30 0	Yes	20	Yes
81	Mtskheta -Tianeti	Dusheti	Barisakho	Biso	Gogi Ketelauri	Mamuka Ketelauri (neighbour)	1		1	3	2	1	73, 22	75	40	2	2	N/A	30 0	Yes	20	Yes
82	Mtskheta -Tianeti	Dusheti	Barisakho	Zemo Barisakho	Gocha Tchintcharauli	Mzekala Arabuli (Gamgebeli)	1		1	3	2	1	80, 45	77	40	2	3	N/A	43 0	Yes	15	Yes
83	Mtskheta -Tianeti	Dusheti	Barisakho	Zemo Barisakho	Guram Kavtaradze	Mzekala Arabuli (Gamgebeli)	1		1	5	4	1	43, 20, 12, 5	39	20	1	3	N/A	90 0	Yes	20	Yes
84	Mtskheta -Tianeti	Dusheti	Barisakho	Zemo Barisakho	Merab Tchintcharauli	Mzekala Arabuli (Gamgebeli)	1		1	2	1	1	42	75	15	1	2	N/A	21 5	Yes	15	Yes
85	Mtskheta -Tianeti	Dusheti	Barisakho	Akusho	Khvtiso Liqokeli	Khvtiso Liqokeli	1	1		4	2	2	71, 28	66, 24	50	2	5	N/A	43 0	Yes	10	Yes
86	Mtskheta -Tianeti	Dusheti	Barisakho	Akusho	Giorgi Liqokeli	Mzekala Arabuli (Gamgebeli)	1		1	1	1	0	70	0	70	4	5	N/A	21 5	Yes	10	Yes
87	Mtskheta -Tianeti	Dusheti	Barisakho	Akusho	Khvtiso Liqokeli	Khvtiso Liqokeli	1	1		2	1	1	58	57	70	3	7	N/A	10 0	Yes	10	Yes
88	Mtskheta -Tianeti	Dusheti	Barisakho	Tchalisopeli	Davit Liqokeli	Mzekala Arabuli (Gamgebeli)	1	1		7	4	3	46, 18, 13, 11	43, 16, 15	80	3	7	N/A	35 0	Yes	10	Yes

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89	Mtskheta -Tianeti	Dusheti	Barisakho	Tchalisopeli	Vaja Liqokeli	Mzekala Arabuli (Gamgebeli)	1		1	2	1	1	50	75	15	1	2	N/A	215	Yes	10	Yes
90	Mtskheta -Tianeti	Dusheti	Barisakho	Tchalisopeli	Gigia Liqokeli	Gigia Liqokeli	1	1		1	1	0	77	0	30	2	5	N/A	215	Yes	10	Yes
91	Mtskheta -Tianeti	Dusheti	Maghaloskari	Migriaulta	Nugzar Butkhashvili	Tamaz Patarashvili (neighbour)	1	0	1	2	1	1	59	47	20	1	3	N/A	200	Yes	15	Yes
92	Mtskheta -Tianeti	Dusheti	Maghaloskari	Migriaulta	Levan patarashvili	Levan Batarashvili	1	1		3	2	1	81,47	67	60	3	10	N/A	430	Yes	10	Yes
93	Mtskheta -Tianeti	Dusheti	Maghaloskari	Migriaulta	Valiko Mtchedluri	Valiko Mtchedluri	1	1		1	1	0	51	0	20	1	6	N/A	50	Yes	10	Yes
94	Mtskheta -Tianeti	Dusheti	Maghaloskari	Kanatia	Eter Zhizhiashvil	Roland Zurabashvili (Gamgebeli)	1		1	2	1	1	30	60	20	1	2	N/A	N/A	Yes	15	Yes
95	Mtskheta -Tianeti	Dusheti	Maghaloskari	Kanatia	Zelimkhan Udzilauri	Zelimkhan Udzilauri	1		1	3	2	1	60, 25	26	50	2	5	N/A	0	Yes	10	Yes
96	Mtskheta -Tianeti	Dusheti	Maghaloskari	Kanatia	Kako Udzilauri	Roland Zurabashvili (Gamgebeli)	1		1	3	2	1	55, 25	50	15	1	3	N/A	N/A	Yes	10	Yes
97	Mtskheta -Tianeti	Dusheti	Maghaloskari	Kanatia	Nugzar Papiashvili	Nugzar Papiashvili	1	1		2	1	1	58	47	20	1	10	N/A	400	Yes	15	Yes
98	Mtskheta -Tianeti	Dusheti	Pasanauri	Daviturebi	Givi Davituri	Givi Davituri	1		1	2	1	1	62	58	20	1	5	N/A	N/A	Yes	15	Yes
99	Mtskheta -Tianeti	Dusheti	Pasanauri	Mejilaurebi	Piruz Gvritishvili	Levan Mitiashvili (neighbour)	1		1	3	2	1	62, 35	59	30	2	2	No	N/A	Yes	10	Yes
100	Mtskheta -Tianeti	Dusheti	Pasanauri	Mejilaurebi	Giorgi Gvritishvili	Levan Mitiashvili (neighbour)	1		1	2	1	1	45	47	40	2	2	No	N/A	Yes	10	Yes
101	Mtskheta -Tianeti	Dusheti	Pasanauri	Mejilaurebi	Levan Mitiashvili	Levan Mitiashvili	1		1	2	1	1	68	55	70	3	2	No	215	No	0	Yes
102	Mtskheta -Tianeti	Dusheti	Pasanauri	Chadis Tsikhe	Nino Kavtaradze	Arsen Kavtaradze (neighbour)	1		1	5	2	3	55, 52	75, 50, 41	40	2	2	No	215	Yes	15	Yes
103	Mtskheta -Tianeti	Dusheti	Pasanauri	Chadis Tsikhe	Arsen Kavtaradze	Arsen Kavtaradze	1		1	1	1	0	70	0	40	1	2	No	400	Yes	20	Yes
104	Mtskheta -Tianeti	Dusheti	Pasanauri	Chadis Tsikhe	Avto kavtaradze	Arsen Kavtaradze (neighbour)	1		1	2	2	0	54, 36	0	20	1	2	No	N/A	Yes	15	Yes
105	Mtskheta -Tianeti	Dusheti	Pasanauri	Chadis Tsikhe	Ushangi Kavtaradze	Arsen Kavtaradze (neighbour)	1		1	2	2	0	61, 25	0	50	2	3	No	N/A	Yes	15	Yes
106	Mtskheta -Tianeti	Dusheti	Pasanauri	Chadis Tsikhe	Natela Abuladze	Arsen Kavtaradze (neighbour)	1		1	4	3	1	35, 30, 24	55	30	1	2	No	N/A	Yes	15	Yes
107	Mtskheta -Tianeti	Dusheti	Pasanauri	Chadis Tsikhe	Tengiz Abuladze	Arsen Kavtaradze (neighbour)	1		1	5	3	2	68, 60, 28	31, 25	30	1	2	No	215	Yes	15	Yes

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108	Mtskheta-Tianeti	Dusheti	Pasanauri	Chadis Tsikhe	Naziko Kavtaradze	Arsen Kavtaradze (neighbour)	1		1	2	1	1	55	71	20	1	2	No	215	Yes	15	Yes
109	Mtskheta-Tianeti	Dusheti	Pasanauri	Chadis Tsikhe	Rezo Abuladze	Arsen Kavtaradze (neighbour)	1		1	2	1	1	85	80	15	1	2	No	430	Yes	15	Yes
110	Mtskheta-Tianeti	Dusheti	Pasanauri	Chadis Tsikhe	Grisha Abuladze	Arsen Kavtaradze (neighbour)	1		1	3	2	1	86,70	55	40	2	3	No	430	Yes	20	Yes
111	Mtskheta-Tianeti	Dusheti	Pasanauri	Sodeve	Ushangi Janiashvili	Levan Mitiashvili (neighbour)	1		1	1	1	0	50	0	70	3	2	No	N/A	Yes	10	Yes
112	Mtskheta-Tianeti	Dusheti	Pasanauri	Sodeve	Imeda Janiashvili	Levan Mitiashvili (neighbour)	1		1	2	1	1	55	51	25	1	3	No	N/A	Yes	10	Yes
113	Mtskheta-Tianeti	Dusheti	Pasanauri	Sodeve	Vakhtang Gvritshvili	Levan Mitiashvili (neighbour)	1		1	2	1	1	64	62	30	1	2	No	N/A	Yes	10	Yes
114	Mtskheta-Tianeti	Dusheti	Tchartali	Sakere	Katsa Kavtaradze	Katsa Kavtaradze	1		1	2	2	0	82,38	0	50	2	5	No	300	Yes	15	No
115	Mtskheta-Tianeti	Dusheti	Tchartali	Sakere	Omar Kedelashvili	Zviad Kavtaradze (neighbour)	1		1	3	2	1	72,40	69	100	4	5	No	430	Yes	15	No
116	Mtskheta-Tianeti	Dusheti	Tchartali	Sakere	Roza Kavtaradze	Zviad Kavtaradze (neighbour)	1		1	3	2	1	36,33	56	30	1	5	No	N/A	Yes	15	No
117	Mtskheta-Tianeti	Dusheti	Tchartali	Zemo Muguda	Mikheil Tsikhelashvili	Zurab Chitauri (Gamgebeli)	1		1	2	1	1	44	36	30	1	3	No	N/A	Yes	15	Yes
118	Mtskheta-Tianeti	Dusheti	Tchartali	Zemo Muguda	Vakhtang Gigauri	Zurab Chitauri (Gamgebeli)	1		1	2	1	1	65	60	40	2	2	No	N/A	Yes	10	Yes
119	Mtskheta-Tianeti	Dusheti	Tchartali	Zemo Dolakedi	Vano Kavtaradze	Shmagi Chokheli (neighbour)	1		1	2	2	0	52	18	30	2	5	No	N/A	Yes	15	Yes
120	Mtskheta-Tianeti	Dusheti	Tchartali	Zemo Dolakedi	Davit Chokheli	Shmagi Chokheli (neighbour)	1		1	1	1	0	55	0	70	2	5	No	N/A	Yes	20	Yes
121	Mtskheta-Tianeti	Dusheti	Tchartali	Zemo Dolakedi	Lado Chokheli	Shmagi Chokheli (neighbour)	1		1	4	2	2	65,63	61,58	90	3	5	No	N/A	Yes	15	Yes
122	Mtskheta-Tianeti	Dusheti	Tchartali	Zemo Dolakedi	Niko Aptsiauri	Shmagi Chokheli (neighbour)	1		1	1	1	0	70	0	50	2	5	No	215	Yes	15	Yes
123	Mtskheta-Tianeti	Dusheti	Tchartali	Zemo Dolakedi	Shmagi Chokheli	Shmagi Chokheli	1		1	3	3	0	25,23,21	0	30	2	5	No	600	Yes	15	Yes
124	Mtskheta-Tianeti	Dusheti	Ananuri	Tsikhisopeli	Kartlos Tchikaidze	Kartlos Tchikaidze	1	1		6	4	2	48,41,36,34	67,34	40	2	15	Yes	455	Yes	10	No
125	Mtskheta-Tianeti	Dusheti	Ananuri	Tsikhisopeli	Bitchia Tchikaidze	Bitchia Tchikaidze	1	1		1	1	0	44	0	20	1	15	Yes	60	Yes	10	No
126	Mtskheta-Tianeti	Dusheti	Ananuri	Tsikhisopeli	Levan Tchikaidze	Levan Tchikaidze	1	1		4	2	2	68,27	68,41	60	2	15	Yes	500	Yes	25	No
127	Mtskheta-Tianeti	Dusheti	Ananuri	Avanesi	Amiran Rostiashvili	Amiran Rostiashvili	1	1		4	2	2	63,40	67,38	40	2	15	No	400	Yes	25	Yes

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128	Mtskheta-Tianeti	Dusheti	Gremiskhevi	Toncha	Demur Lagazasvili	Demur Lagazasvili	1	1		2	1	1	47	42	60	2	12	No	600	Yes	25	Yes
129	Mtskheta-Tianeti	Dusheti	Gremiskhevi	Toncha	Zurab Kherkeladze	Zurab Kherkeladze	1	1		4	2	2	38, 27	66, 22	30	2	10	No	500	Yes	20	Yes
130	Mtskheta-Tianeti	Dusheti	Gremiskhevi	Toncha	Spartak Matiasvili	Spartak Matiasvili	1	1		2	1	1	37	33	20	1	10	No	500	Yes	20	Yes
131	Mtskheta-Tianeti	Dusheti	Gremiskhevi	Toncha	Koba Jikauri	Koba Jikauri	1	1		1	1	0	35	0	20	1	13	No	500	Yes	15	Yes
132	Mtskheta-Tianeti	Dusheti	Zhinvali	Pudznari	Tebro Kistauri	Tebro Kistauri	1	1		2	1	1	77	72	80	2	15	Yes	530	Yes	30	Yes
133	Mtskheta-Tianeti	Dusheti	Zhinvali	Pudznari	Malkhaz Iarajuli	Malkhaz Iarajuli	1	1		3	1	2	60	45, 16	40	2	15	Yes	520	Yes	20	Yes
134	Mtskheta-Tianeti	Dusheti	Bazaleti	Tchontili	Iason Khinchagashvili	Shushana Khinchagashvili (neighbour)	1		1	4	2	2	84, 56	82, 53	90	3	5	No	430	Yes	15	Yes
135	Mtskheta-Tianeti	Dusheti	Bazaleti	Tchontili	Shushana Khinchagashvili	Shushana Khinchagashvili	1	1		4	1	3	53	82, 42, 37	70	2	7	No	500	Yes	20	Yes
136	Mtskheta-Tianeti	Dusheti	Bazaleti	Tchontili	Nugzar Papiashvili	Nugzar Papiashvili	1		1	4	2	2	65, 39	64, 37	30	1	7	No	500	Yes	15	Yes
137	Mtskheta-Tianeti	Dusheti	Bazaleti	Tchontili	Vladimer Khinchagashvili	Vladimer Khinchagashvili	1	1		1	1	0	90	0	40	1	7	No	215	Yes	15	Yes
138	Mtskheta-Tianeti	Dusheti	Bazaleti	Tchontili	Evgenia Khabulovi	Evgenia Khabulovi	1	1		1	0	1	0	70	30	1	5	No	180	Yes	5	Yes
139	Mtskheta-Tianeti	Dusheti	Bazaleti	Tchontili	Maia Sanashvili	Maia Sanashvili	1		1	4	3	1	52, 21, 10	52	70	3	7	No	215	Yes	15	Yes
140	Borjomi-kharagauli	Borjomi	Borjomi	Patara Dabadzveli	Zura Lomidze	Lasha Kevlishvili (Gamgebeli)	1		1	3	2	1	52, 29	50	25	2	15	No	N/A	Yes	20	Yes
141	Borjomi-kharagauli	Borjomi	Borjomi	Patara Dabadzveli	Lasha Samsonashvili	Lasha Kevlishvili (Gamgebeli)	1		1	2	1	1	31	28	30	2	15	No	N/A	Yes	20	Yes
142	Borjomi-kharagauli	Borjomi	Borjomi	Patara Dabadzveli	Abesalom Makharashvili	Lasha Kevlishvili (Gamgebeli)	1		1	4	3	1	84, 28, 25	80	20	2	12	No	N/A	Yes	20	Yes
143	Borjomi-kharagauli	Borjomi	Borjomi	Patara Dabadzveli	Soso Makharashvili	Lasha Kevlishvili (Gamgebeli)	1		1	2	1	1	67	66	20	2	13	No	N/A	Yes	15	Yes
144	Borjomi-kharagauli	Borjomi	Borjomi	Patara Dabadzveli	Shalva Okropiridze	Lasha Kevlishvili (Gamgebeli)	1		1	4	2	2	52, 27	75, 51	25	2	12	No	N/A	Yes	15	Yes

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145	Borjom-kharagauli	Borjomi	Borjomi	Patara Dabadzveli	Gia Mekhrishvili	Lasha Kevlishvili (Gamgebeli)	1		1	3	2	1	72, 40	68	30	2	10	No	N/A	Yes	15	Yes
146	Borjom-kharagauli	Borjomi	Gujareti	Gujareti	Sergo Barbakadze	Kakha Tediashvili (Gamgebeli)	1		1	3	3	0	50, 37, 35	0	20	2	12	No	N/A	Yes	15	Yes
147	Borjom-kharagauli	Borjomi	Gujareti	Gujareti	Gogita Palveliani	Kakha Tediashvili (Gamgebeli)	1		1	2	1	1	47	44	100	4	15	No	N/A	Yes	15	Yes
148	Borjom-kharagauli	Borjomi	Gujareti	Gverdis Ubani	Dato Shengelia	Dato Shengelia	1	1		1	1	0	49	0	70	3	15	No	N/A	Yes	15	Yes
149	Borjom-kharagauli	Borjomi	Gujareti	Gverdis Ubani	Roberti Tsitskishvili	Roberti Tsitskishvili	1	1		2	1	1	86	82	20	2	15	No	360	Yes	15	Yes
150	Samtskhale-Javakheti	Akhaltsikhe	Adigeni	Parekha	Slava Sarkisiani	Slava Sarkisiani	1	1		4	1	3	34	32, 7, 3	70	3	3	No	300	Yes	10	Yes
151	Samtskhale-Javakheti	Akhaltsikhe	Adigeni	Parekha	Roza Dalaginiani	Roza Dalaginiani	1	1		2	1	1	60	57	70	3	3	No	200	Yes	10	Yes
152	Samtskhale-Javakheti	Akhaltsikhe	Adigeni	Parekha	Venera Ghviniashvili	Venera Ghviniashvili	1	1		1	0	1	0	86	90	3	10	No	180	Yes	10	Yes
153	Shida-Kartli	Khashuri	Khashuri	Kobi	Genadi Bosikovi	Genadi Bosikovi	1	1		2	1	1	63	60	70	3	15	No	500	Yes	20	Yes
154	Shida-Kartli	Khashuri	Khashuri	Kobi	Zhenia Ikoshvili	Vepkhvia Bliadze (Gamgebeli)	1		1	1	0	1	0	80	60	2	7	No	215	Yes	20	Yes
155	Shida-Kartli	Khashuri	Khashuri	Aleksandre Tskaro	Givi Karsanovi	Giorgi Lomidze (Gamgebeli)	1		1	4	3	1	69, 45, 38	62	70	2	7	No	N/A	Yes	15	Yes
156	Shida-Kartli	Khashuri	Khashuri	Aleksandre Tskaro	Gogi Nekerashvili	Giorgi Lomidze (Gamgebeli)	1		1	7	6	1	70, 55, 49, 36, 33, 30	69	40	2	7	No	430	Yes	15	Yes
157	Shida-Kartli	Kareli	kareli	Saterdze	Qristo Kapanadze	Givi Elbakidze (Gamgebeli)	1		1	2	1	1	75	71	60	2	10	Yes	430	Yes	15	Yes
158	Shida-Kartli	Kareli	kareli	Saterdze	Nunu Kurtanidze	Nunu Kurtanidze	1	1		2	1	1	70	65	80	3	20	Yes	430	Yes	15	Yes
159	Shida-Kartli	Kareli	kareli	Saterdze	Iuri Kapanadze	Givi Elbakidze (Gamgebeli)	1		1	2	1	1	55	49	40	1	7	No	N/A	Yes	15	Yes

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160	Shida-Kartli	Kareli	kareli	Saterdze	Marina Romanovskaia	Givi Elbakidze (Gamgebeli)	1		1	3	1	2	33	56, 32	25	1	7	No	N/A	Yes	15	Yes
161	Shida-Kartli	Kareli	kareli	Saterdze	Elguja Kurtanidze	Givi Elbakidze (Gamgebeli)	1		1	6	4	2	70, 68, 36, 32	58, 56	80	3	7	No	430	Yes	15	Yes
162	Shida-Kartli	Kareli	kareli	Saterdze	Giorgi Kurtanidze	Givi Elbakidze (Gamgebeli)	1		1	2	1	1	47	84	40	2	7	No	215	Yes	15	Yes
163	Shida-Kartli	Kareli	kareli	Saterdze	Imeda Kapanadze	Givi Elbakidze (Gamgebeli)	1		1	5	2	3	42, 5	40, 18, 15	60	2	7	No	N/A	Yes	15	Yes
164	Shida-Kartli	Kareli	kareli	Saterdze	Zoia Kokoshvili	Givi Elbakidze (Gamgebeli)	1		1	3	2	1	46, 42	70	80	3	7	No	215	Yes	15	Yes
165	Shida-Kartli	Kareli	kareli	Saterdze	Davit Gagnidze	Givi Elbakidze (Gamgebeli)	1		1	5	2	3	60, 36	59, 47, 45	70	3	7	No	N/A	Yes	15	Yes
166	Shida-Kartli	Kareli	kareli	Mekheti	Givi Marghishvili	Emzar Gegelashvili (Gamgebeli)	1		1	2	1	1	48	44	80	2	10	Yes	N/A	Yes	15	Yes
167	Shida-Kartli	Kareli	kareli	Bani	Parizeti Totraevi	Parizeti Totraevi	1	1		1	0	1	0	76	70	4	15	Yes	215	Yes	15	Yes
168	Shida-Kartli	Kareli	kareli	Tkemala	Robert Gelashvili	Robert Gelashvili	1	1		2	1	1	50	49	20	1	15	Yes	N/A	Yes	10	Yes
169	Shida-Kartli	Kareli	kareli	Tkemala	Givi Masurashvili	Givi Masurashvili	1	1		2	1	1	65	64	40	1	15	Yes	400	Yes	30	Yes
170	Shida-Kartli	Gori	Mghebriani	Mghebriani	Paata Davitashvili	Robinson Davitashvili (Gamgebeli)	1		1	2	2	0	44, 23	0	70	2	7	No	N/A	Yes	15	Yes
171	Shida-Kartli	Gori	Mghebriani	Mghebriani	Tariel Gigauri	Robinson Davitashvili (Gamgebeli)	1		1	2	1	1	59	55	20	1	7	No	N/A	Yes	15	Yes
172	Shida-Kartli	Gori	Sakauri	Tsiteltskaro	Asmat Jighladze	Asmat Jighladze	1	1	0	2	1	1	57	56	20	1	10	Yes	1000	Yes	10	Yes
173	Shida-Kartli	Gori	Sakauri	Tsiteltskaro	Gocha Beglarashvili	Gocha Beglarashvili	1	1	0	2	1	1	53	45	20	1	10	Yes	500	Yes	5	Yes
174	Shida-Kartli	Gori	Sakauri	Tsiteltskaro	Samson Jukashvili	Gia Okropiridze (Gamgebeli)	1		1	1	1	0	39	0	10	1	5	No	500	Yes	15	Yes
175	Shida-Kartli	Gori	Sakauri	Tsiteltskaro	Zurab Khabalashvili	Gia Okropiridze (Gamgebeli)	1	1		2	1	1	59	85	60	2	15	Yes	180	Yes	20	Yes
176	Shida-Kartli	Gori	Mghebriani	Tami	Vazha Karelidze	Robinson Davitashvili (Gamgebeli)	1		1	1	1	0	80	0	80	2	7	No	N/A	Yes	15	Yes

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177	Shida-Kartli	Gori	Mghebriani	Tami	Jemal Jinekashvili	Robinson Davitashvili (Gamgebeli)	1		1	1	1	0	69	0	70	3	7	No	215	Yes	15	Yes
178	Shida-Kartli	Gori	Mghebriani	Tami	Nugzar Jinekashvili	Robinson Davitashvili (Gamgebeli)	1		1	2	2	0	76, 50	0	60	3	7	No	215	Yes	10	Yes
179	Shida-Kartli	Gori	Mghebriani	Tami	Levan Tsotniashvili	Levan Tsotniashvili	1	1		5	2	3	41, 14	35, 16, 11	30	1	15	Yes	400	Yes	10	Yes
180	Shida-Kartli	Gori	Ateni	Khandisi	Tamaz Vanishvili	Tamaz Vanishvili	1	1		1	1	0	31	0	100	5	15	No	500	Yes	30	Yes
181	Shida-Kartli	Gori	Boshuri	Gaichaant Ubani	Ksenia Makashvili	Ksenia Makashvili	1	1		1	0	1	0	71	20	1	10	Yes	215	Yes	15	Yes
182	Shida-Kartli	Gori	Sakavre	Sakavre	Gela Ginturi	Gela Ginturi	1	1		2	2	0	65, 49	0	80	3	15	Yes	300	Yes	20	Yes
183	Shida-Kartli	Gori	Sakavre	Sakavre	Lamara Kurashvili	Lamara Kurashvili	1	1		2	1	1	65	65	20	1	18	Yes	300	Yes	20	Yes
184	Shida-Kartli	Gori	Boshuri	Ipnara	Giorgi Kazarashvili	Giorgi Kazarashvili	1	1		6	3	3	30, 29, 27	87, 59, 31	40	2	20	Yes	300	Yes	30	Yes
185	Shida-Kartli	Gori	Boshuri	Ipnara	Temo Datashvili	Temo Datashvili	1	1		4	2	2	80, 47	75, 40	40	3	10	No	N/A	Yes	30	Yes
186	Shida-Kartli	Gori	Boshuri	Ipnara	Temo Khorbaladze	Kakha Tinikashvili (Gamgebeli)	1		1	2	2	0	55, 40	0	20	1	5	No	N/A	Yes	30	Yes
187	Shida-Kartli	Gori	Boshuri	Ipnara	Sergo Tvauro	Kakha Tinikashvili (Gamgebeli)	1		1	6	3	3	87, 57, 27	80, 65, 26	30	2	5	Yes	600	Yes	20	Yes
188	Shida-Kartli	Gori	Sakavre	Pitsesi	Marine Koshadze	Marine Koshadze	1	1		2	1	1	38	62	80	3	10	Yes	215	Yes	20	Yes
189	Shida-Kartli	Gori	Sakavre	Pitsesi	Zurab Banetashvili	Zurab Banetishvili	1	1		2	1	1	68	31	100	3	10	Yes	400	Yes	20	Yes
190	Shida-Kartli	Gori	Sakavre	Pitsesi	Elguja Beglarashvili	Elguja Beglarashvili	1	1		2	1	1	63	61	90	3	10	Yes	215	Yes	20	Yes
191	Shida-Kartli	Gori	Sakavre	Pitsesi	Nanuli Shatakishvili	Nanuli Shatakishvili	1	1		3	2	1	79, 47	69	100	5	18	Yes	430	Yes	20	Yes
192	Shida-Kartli	Gori	Sakavre	Pitsesi	Maia Akhalkatsi	Maia Akhalkatsi	1	1		4	2	2	55, 26	88, 55	50	2	18	Yes	500	Yes	30	Yes
193	Shida-Kartli	Gori	Sakavre	Pitsesi	Sergo Ninoshvili	Gia Okropiridze (Gamgebeli)	1		1	2	2	0	59, 33	0	70	2	5	Yes	N/A	Yes	20	Yes
194	Shida-Kartli	Gori	Kvakhvrel	Velebi	Nikoloz Kalkhitashvili	Nikoloz Kalkhitashvili	1	1		1	1	0	60	0	40	2	20	No	N/A	Yes	20	Yes
195	Shida-Kartli	Gori	Kvakhvrel	Velebi	Viktor Khachirashvili	Viktor Khachirashvili	1	1		4	3	1	77, 47, 16	77	90	3	20	Yes	500	Yes	30	Yes

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196	Shida-Kartli	Gori	Kvakhvrel i	Velebi	Dali Kisishvili	Dali Kisishvili	1	1		3	2	1	42, 28	70	70	3	20	Yes	400	Yes	30	Yes
197	Shida-Kartli	Gori	Kvakhvrel i	Velebi	Valeri Kalkhitashvili	Valeri Kalkhitashvili	1	1		4	2	2	51, 22	49, 26	90	3	5	No	N/A	Yes	30	Yes
198	Shida-Kartli	Gori	Kvakhvrel i	Velebi	Mareba Khachirashvili	Mareba Khachirashvili	1	1		3	1	2	52	81, 51	30	1	10	No	215	Yes	30	Yes
199	Shida-Kartli	Gori	Kvakhvrel i	Velebi	Tamar Kalkhitashvili	Tamar Kalkhitashvili	1	1		3	1	2	20	76, 45	40	2	20	Yes	400	Yes	20	Yes
200	Shida-Kartli	Gori	Kvakhvrel i	Velebi	Ramaz Kalkhitashvili	Robinzon Davitashvili (Gamgebeli)	1		1	3	1	2	27	60, 29	100	4	5	No	215	Yes	30	Yes
201	Shida-Kartli	Gori	Kvakhvrel i	Velebi	Maradi Shermadini	Robinzon Davitashvili (Gamgebeli)	1		1	2	1	1	44	40	50	2	10	No	N/A	Yes	30	Yes
202	Shida-Kartli	Gori	Ateni	Dre	Zurab Khachidze	Zurab Khachidze	1	1		2	1	1	41	40	50	2	15	No	300	Yes	30	Yes
203	Shida-Kartli	Gori	Ateni	Dre	Tristan Vanishvili	Robinzon Davitashvili (Gamgebeli)	1		1	3	2	1	70, 30	67	30	1	7	No	N/A	Yes	30	Yes
204	Shida-Kartli	Gori	Ateni	Dre	Shalva Vanishvili	Shalva Vanishvili	1	1		1	1	0	59	0	20	1	20	No	500	Yes	30	Yes
205	Shida-Kartli	Gori	Ateni	Dre	Temur Vanishvili	Temur Vanishvili	1	1		3	3	0	58, 33, 32	0	20	1	15	No	1500	Yes	30	Yes
206	Kakheti	Dedoplistskaro	Dedoplistskaro	Didi Shiraki	Otar Botchorishvili	Otar Botchorishvili	1	1		2	1	1	66	64	50	2	15	Yes	360	Yes	20	Yes
207	Kakheti	Dedoplistskaro	Dedoplistskaro	Didi Shiraki	Anzor Musaevi	Anzor Musaevi	1	1		1	1	0	55	0	30	1	15	Yes	100	Yes	10	Yes
208	Kakheti	Dedoplistskaro	Dedoplistskaro	Didi Shiraki	Zurab Bochorishvili	Zurab Bochorishvili	1	1		6	1	5	43	43, 13, 11, 9, 8	120	4	15	Yes	400	Yes	20	Yes
209	Kakheti	Dedoplistskaro	Dedoplistskaro	Didi Shiraki	Otar Arabuli	Otar Arabuli	1	1		1	1	0	48	0	20	1	15	Yes	200	Yes	15	Yes
210	Kakheti	Dedoplistskaro	Dedoplistskaro	Didi Shiraki	Giorgi Likokeli	Giorgi Likokeli	1	1		2	2	0	57, 48	0	20	1	10	Yes	200	Yes	15	Yes
211	Kakheti	Dedoplistskaro	Dedoplistskaro	Didi Shiraki	Shalva Gogochishvili	Shalva Gogochishvili	1	1		1	1	0	80	0	30	1	10	No	180	Yes	20	Yes
212	Kakheti	Dedoplistskaro	Dedoplistskaro	Didi Shiraki	Besik Kabanashvili	Besik Kabanashvili	1	1		6	4	2	52, 21, 18, 12	42, 14	70	3	15	Yes	300	Yes	30	Yes
213	Kakheti	Dedoplistskaro	Dedoplistskaro	Didi Shiraki	Temur Lamazoshvili	Temur Lamazoshvili	1	1		2	1	1	63	54	40	2	15	Yes	200	Yes	15	Yes

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214	Kakheti	Dedoplistskaro	Dedoplistskaro	Didi Shiraki	Gocha Kabanashvili	Gocha Kabanashvili	1	1		5	3	2	50, 22, 21	43, 25	70	3	15	Yes	200	Yes	15	Yes
215	Kakheti	Dedoplistskaro	Dedoplistskaro	Didi Shiraki	Bikenti Chokuri	Bikenti Chokuri	1	1		1	1	0	70	0	40	2	15	No	180	Yes	15	Yes
216	Kakheti	Dedoplistskaro	Dedoplistskaro	Didi Shiraki	Davit Jervalidze	Bezhan Sukhashvili	1		1	2	1	1	42	40	40	2	5	Yes	N/A	Yes	15	Yes
217	Kvemo-Kartli	Tetritskaro	Shekhvetili	Ugudeti	Tangul Musaevi	Mikheil Aptsiauri	1		1	1	1	0	58	0	50	2	10	No	N/A	Yes	20	Yes
218	Kvemo-Kartli	Tetritskaro	Shekhvetili	Didi Namtvriani	Archil Aptsiauri	Archil Aptsiauri	1	1		2	1	1	67	60	50	2	15	Yes	430	Yes	10	Yes
219	Kvemo-Kartli	Tetritskaro	Shekhvetili	Didi Namtvriani	Badri Gabidauri	Badri Gabidauri	1	1		2	1	1	57	60	60	2	20	Yes	215	Yes	25	Yes
220	Kakheti	Akhmeta	Akhmeta	Bughaani	Almaskhan Tchintcharauli	Vazha Naskidashvili (Gamgebeli)	1	1		3	1	2						N/A		N/A	N/A	No
221	Kakheti	Akhmeta	Akhmeta	Bughaani	Tamaz Tchintcharauli	Vazha Naskidashvili (Gamgebeli)	1	1		3	2	1						N/A		N/A	N/A	No
222	Kakheti	Akhmeta	Akhmeta	Bughaani	Giorgi Aludauri	Vazha Naskidashvili (Gamgebeli)	1	1		2	1	1						N/A		N/A	N/A	No
223	Kakheti	Akhmeta	Akhmeta	Bughaani	Nodar Kbiltsetskhlashvili	Vazha Naskidashvili (Gamgebeli)	1	1		2	1	1						N/A		N/A	N/A	No
224	Kakheti	Akhmeta	Akhmeta	Bughaani	Ketevan Ghubianuri	Vazha Naskidashvili (Gamgebeli)	1	1		1	0	1						N/A		N/A	N/A	No
225	Kakheti	Akhmeta	Akhmeta	Bughaani	Sanata Ghubianuri	Vazha Naskidashvili (Gamgebeli)	1	1		1	0	1						N/A		N/A	N/A	No
226	Kakheti	Akhmeta	Akhmeta	Jaburi	Zakaria Gutashvili	Vazha Naskidashvili (Gamgebeli)	1	1		1	1	0						N/A		N/A	N/A	No
227	Kakheti	Akhmeta	Akhmeta	Bukhrevi	Eter Khadilashvili	Vazha Naskidashvili (Gamgebeli)	1	1		1	0	1						N/A		N/A	N/A	No
228	Kakheti	Akhmeta	Akhmeta	Bukhrevi	Teimuraz Khutsurauli	Vazha Naskidashvili (Gamgebeli)	1		1	1	1	0						N/A		N/A	N/A	No

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229	Kakheti	Akhmeta	Akhmeta	Bukhrevi	Teimuraz Torghvashvili	Vazha Naskidashvili (Gamgebeli)	1	1		1	1	0						N/A		N/A	N/A	No
230	Kakheti	Akhmeta	Akhmeta	Ingeti	Davit Petriashvili	Lasha Udzilauri (Gamgebeli)	1	1		1	1	0						N/A		N/A	N/A	No
231	Kakheti	Akhmeta	Akhmeta	Kvernadzeuli	Tariel Gigauri	Vazha Naskidashvili (Gamgebeli)	1	1		2	1	1						N/A		N/A	N/A	No
232	Kakheti	Akhmeta	Akhmeta	Kvernadzeuli	Mikheil Gigauri	Vazha Naskidashvili (Gamgebeli)	1	1		1	1	0						N/A		N/A	N/A	No
233	Kakheti	Akhmeta	Akhmeta	Kvernadzeuli	Shota Tchintcharauli	Vazha Naskidashvili (Gamgebeli)	1	1		1	1	0						N/A		N/A	N/A	No
234	Kakheti	Akhmeta	Akhmeta	Kvernadzeuli	Shalva Tchintcharauli	Vazha Naskidashvili (Gamgebeli)	1	1		1	1	0						N/A		N/A	N/A	No
235	Kakheti	Akhmeta	Akhmeta	Chopchauri	Mamuka Khosiauri	Vazha Naskidashvili (Gamgebeli)	1	1		1	1	0						N/A		N/A	N/A	No
236	Kakheti	Akhmeta	Akhmeta	Chopchauri	Tengiz Kakichashvili	Vazha Naskidashvili (Gamgebeli)	1	1		1	1	0						N/A		N/A	N/A	No
237	Kakheti	Akhmeta	Akhmeta	Ipnisgori	Giorgi Dzegligashvili	Vazha Naskidashvili (Gamgebeli)	1		1	2	2	0						N/A		N/A	N/A	No
238	Kakheti	Akhmeta	Akhmeta	Ipnisgori	Gia Khinchlashvili	Vazha Naskidashvili (Gamgebeli)	1		1	2	2	0						N/A		N/A	N/A	No
239	Kakheti	Akhmeta	Akhmeta	Ipnisgori	Nugzar Makhauri	Vazha Naskidashvili (Gamgebeli)	1		1	2	2	0						N/A		N/A	N/A	No
240	Kakheti	Akhmeta	Akhmeta	Ipnisgori	Manana Aludauri	Vazha Naskidashvili (Gamgebeli)	1		1	2	1	1						N/A		N/A	N/A	No
241	Kakheti	Akhmeta	Akhmeta	Ipnisgori	Tamaz Khinchlashvili	Vazha Naskidashvili (Gamgebeli)	1		1	2	2	0						N/A		N/A	N/A	No
242	Kakheti	Akhmeta	Akhmeta	Ipnisgori	Levan Makhauri	Vazha Naskidashvili (Gamgebeli)	1		1	2	2	0						N/A		N/A	N/A	No

#	Region	Municipality	District	Village	House owner's name	Interviewed person's Name	№ of houses	Permanent house	Seasonal Houses	№ of residents	M	F	Age - M	Age - F	Living (heating) area m2	№ of living (heating)	Annual Consumption of Wood (m3)	Existing solar PV	Average monthly income	Willingness to pay for electricity	Per month fixed (GEL)	Access road
243	Kakheti	Akhmeta	Akhmeta	Ipnisgori	Avto Petviashvili	Vazha Naskidashvili (Gamgebeli)	1		1	3	3	0						N/A		N/A	N/A	No
244	Mtskheta-Tianeti	Dusheti	Barisakho	Blo	Gogia Gigauri	Mzekala Arabuli (Gamgebeli)	1	1		1	1	0	45		40	3		N/A	240	Yes	10	No
245	Mtskheta-Tianeti	Dusheti	Barisakho	Ache	Kakha Likokeli	Mzekala Arabuli (Gamgebeli)	1		1	3	2	1	31,55	55	40	2		N/A	240	Yes	10	No
246	Mtskheta-Tianeti	Dusheti	Barisakho	Tchimgha	Gigla Ochauri	Mzekala Arabuli (Gamgebeli)	1	1	0	1	1	0	60		40	2		N/A	240	Yes	10	No
247	Mtskheta-Tianeti	Dusheti	Barisakho	Chirdili	Berdia Arabuli	Mzekala Arabuli (Gamgebeli)	1		1	3	2	1	30,60	49	40	2		N/A	240	Yes	10	No
248	Mtskheta-Tianeti	Dusheti	Barisakho	Chirdili	Paata Arabuli	Mzekala Arabuli (Gamgebeli)	1		1	5	3	2	52,30,25	30,50	40	2		N/A	240	yes	10	No
249	Mtskheta-Tianeti	Dusheti	Barisakho	Chirdili	Jemal Arabuli	Mzekala Arabuli (Gamgebeli)	1		1	3	2	1	50,23	48	40	2		N/A	240	yes	10	No
250	Mtskheta-Tianeti	Dusheti	Barisakho	Chirdili	Zviadi Arabuli	Mzekala Arabuli (Gamgebeli)	1		1	3	1	2	37	55,30	40	2		N/A	240	Yes	10	No
251	Mtskheta-Tianeti	Dusheti	Barisakho	Chirdili	Grisha Arabuli	Mzekala Arabuli (Gamgebeli)	1		1	4	2	2	50,30	50,32	40	2		N/A	240	Yes	10	No
252	Mtskheta-Tianeti	Dusheti	Barisakho	Chirdili	Davit Arabuli	Mzekala Arabuli (Gamgebeli)	1		1	4	2	2	27,55	80,48	40	2		N/A	240	Yes	10	No
253	Mtskheta-Tianeti	Dusheti	Barisakho	Motsmao	Tristan Arabuli	Mzekala Arabuli (Gamgebeli)	1		1	1	1	0	57		40	2		N/A	240	Yes	10	No
254	Mtskheta-Tianeti	Dusheti	Barisakho	Motsmao	Giorgi Arabuli	Mzekala Arabuli (Gamgebeli)	1		1	4	2	2	55,25	30,50	40	2		N/A	240	Yes	10	No
255	Mtskheta-Tianeti	Dusheti	Barisakho	Motsmao	Davit Arabuli	Mzekala Arabuli (Gamgebeli)	1		1	1	1	0	34		40	2		N/A	240	Yes	10	No
256	Mtskheta-Tianeti	Dusheti	Ukanaps havi	Vakisopeli	Tamar Tsokilauri	Shalva Tsitsenauri (Gamgebeli)	1	1		2	1	1	28	60	40	2		N/A	240	Yes	10	No
257	Mtskheta-Tianeti	Dusheti	Ukanaps havi	Vakisopeli	Vakhtang Tsokulauri	Shalva Tsitsenauri (Gamgebeli)	1		1	1	1	0	76		40	2		N/A	240	Yes	10	No
258	Mtskheta-Tianeti	Dusheti	Ukanaps havi	Vakisopeli	Tariel Tsokulauri	Shalva Tsitsenauri (Gamgebeli)	1		1	1	1	0	74		40	2		N/A	240	Yes	10	No
259	Mtskheta-Tianeti	Dusheti	Ukanaps havi	Vakisopeli	Avtandil Jabanasvili	Shalva Tsitsenauri (Gamgebeli)	1	1		3	2	1	64,39	52	70	4	10	N/A	200	Yes	30	Yes

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260	Mtskheta -Tianeti	Dusheti	Ukanaps havi	Akhadi	Mirian Gorelashvili	Shalva Tsitsenauri (Gamgebeli)	1		1	1	1	0	54		40	2		N/A	240	Yes	10	No
261	Mtskheta -Tianeti	Dusheti	Ukanaps havi	Akhadi	Frushki Gorelashvili	Shalva Tsitsenauri (Gamgebeli)	1		1	2	1	1	63	40	40	2		N/A	240	Yes	10	No
262	Mtskheta -Tianeti	Dusheti	Ukanaps havi	Akhadi	Tsiuri Gorelashvili	Shalva Tsitsenauri (Gamgebeli)	1		1	2	1	1	30	56	40	2		N/A	240	Yes	10	No
263	Mtskheta -Tianeti	Dusheti	Ukanaps havi	Khoshara	Khvtiso Mgelashvili	Shalva Tsitsenauri (Gamgebeli)	1		1	1	1	0	54		40	2		N/A	240	Yes	10	No
264	Mtskheta -Tianeti	Dusheti	Ukanaps havi	Khoshara	Sulkhan Guliasvili	Shalva Tsitsenauri (Gamgebeli)	1		1	2	1	1	55	54	40	2		N/A	240	Yes	10	No
265	Mtskheta -Tianeti	Dusheti	Ukanaps havi	Matura	Tekla Khiblashvili	Shalva Tsitsenauri (Gamgebeli)	1		1	1	0	1		42	40	2		N/A	240	Yes	10	No
266	Mtskheta -Tianeti	Dusheti	Ukanaps havi	Matura	Merab Tadiauri	Shalva Tsitsenauri (Gamgebeli)	1		1	2	1	1	40	81	40	2		N/A	240	Yes	10	No
267	Mtskheta -Tianeti	Dusheti	Ukanaps havi	Matura	Davit Akriani	Shalva Tsitsenauri (Gamgebeli)	1		1	1	1	0	55		40	2		N/A	240	Yes	10	No
268	Mtskheta -Tianeti	Dusheti	Ukanaps havi	Tchicho	Vakhtang Cholagauri	Shalva Tsitsenauri (Gamgebeli)	1	1		1	1	0	85		40	2		N/A	240	Yes	10	No
269	Mtskheta -Tianeti	Dusheti	Ukanaps havi	Tsabaurta	Zurab Elizbarashvili	Shalva Tsitsenauri (Gamgebeli)	1		1	1	1	0	54		40	2		N/A	400	Yes	10	No
270	Mtskheta -Tianeti	Dusheti	Ukanaps havi	Udzilaurta	Irakli Lashkarashvili	Shalva Tsitsenauri (Gamgebeli)	1	1		2	1	1			40	2		N/A	240	Yes	10	No
271	Mtskheta -Tianeti	Dusheti	Shatili	Ardoti	Shota Zviadauri	Amiran Gogochuri (Gamgeneli)	1	1		3	2	1	54, 21	47	50	5	10	Yes	900	Yes	20	Yes
272	Mtskheta -Tianeti	Dusheti	Shatili	Ardoti	Shota Zviadauri	Amiran Gogochuri (Gamgeneli)	1	1		3	2	1	55, 21	47	51	3	10	Yes	100	Yes	20	Yes
273	Mtskheta -Tianeti	Dusheti	Shatili	Ardoti	Jokola Zviadauri	Amiran Gogochuri (Gamgeneli)	1		1	5	3	2	55, 21, 19	56, 17	120	5	6	No	900	Yes	10	Yes

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274	Mtskheta -Tianeti	Dusheti	Shatili	Andaki	Soso Zviadauri	Amiran Gogochuri (Gamgeneli)	1	1		4	3	1			120	6	15	Yes	1200	Yes	20	No
275	Mtskheta -Tianeti	Dusheti	Shatili	Andaki	Gela Zviadauri	Amiran Gogochuri (Gamgeneli)	1		1	1	1	0	51		50	3	7	Yes	1500	Yes	20	No
276	Mtskheta -Tianeti	Dusheti	Shatili	Giorgitsminda	Irakli Gogotchuri	Amiran Gogochuri (Gamgeneli)	1		1	3	2	1	59,24	55	50	3	10	Yes	1000	Yes	10	No
277	Mtskheta -Tianeti	Dusheti	Shatili	Giorgitsminda	Levan Gogotchuri	Amiran Gogochuri (Gamgeneli)	1	1		7	5	2	46, 11, 5, 4, 1	36, 13	120	4	10	Yes	1200	Yes	10	No
278	Mtskheta -Tianeti	Dusheti	Shatili	Giorgitsminda	Amiran Gogotchuri	Amiran Gogochuri (Gamgeneli)	1	1		5	3	2	62, 27, 21	55, 29	120	4	9	No	800	Yes	20	No
279	Mtskheta -Tianeti	Dusheti	Shatili	Khonistchala	Shaliko Shetekauri	Amiran Gogochuri (Gamgeneli)	1	1		3	1	2	57	55, 25	70	4	15	Yes	N/A	Yes	10	No
280	Mtskheta -Tianeti	Dusheti	Shatili	Khonistchala	Khakhoni Shetekauri	Amiran Gogochuri (Gamgeneli)	1		1	5	4	1	49, 23, 22, 4	46	80	5	7	Yes	1000	Yes	20	No
281	Mtskheta -Tianeti	Dusheti	Shatili	Khonistchala	Tolkha Shetekauri	Amiran Gogochuri (Gamgeneli)	1		1	5	2	3	27, 26	50, 23, 22	72	6	5	No	800	Yes	20	No
282	Mtskheta -Tianeti	Dusheti	Shatili	Khonistchala	Lukhumi Shetekauri	Amiran Gogochuri (Gamgeneli)	1		1	3	2	1	22, 20	45	60	3	6	No	900	Yes	20	No
283	Mtskheta -Tianeti	Dusheti	Shatili	Khonistchala	Elguja Shetekauri	Amiran Gogochuri (Gamgeneli)	1	1		4	3	1	44, 17, 10	40	30	2	7	No	1000	Yes	20	No
284	Mtskheta -Tianeti	Dusheti	Shatili	Khonistchala	Tengiz Shetekauri	Amiran Gogochuri (Gamgeneli)	1	1		4	3	1	62, 37, 31	59	50	3	15	Yes	500	Yes	10	No
285	Mtskheta -Tianeti	Dusheti	Shatili	Khonistchala	goderdzi Shetekauri	Amiran Gogochuri (Gamgeneli)	1		1	5	4	1	55, 28, 26, 24	50	90	5	4	No	950	Yes	15	No
286	Mtskheta -Tianeti	Dusheti	Shatili	Khonistchala	Ucha Shetekauri	Amiran Gogochuri (Gamgeneli)	1		1	5	3	2	39, 20, 10	37, 17	50	2	5	No	300	Yes	10	No
287	Mtskheta -Tianeti	Dusheti	Shatili	Khonistchala	Vepkhvia Shetekauri	Amiran Gogochuri (Gamgeneli)	1	1		5	4	1	47, 20, 15, 12	41	80	5	15	Yes	1000	Yes	20	No
288	Mtskheta -Tianeti	Dusheti	Shatili	Khonistchala	Irakli Shetekauri	Amiran Gogochuri (Gamgeneli)	1	1		4	3	1	61, 29, 23	56	40	2	10	Yes	400	Yes	10	No
289	Mtskheta -Tianeti	Dusheti	Shatili	Khonistchala	Givi Shetekauri	Amiran Gogochuri (Gamgeneli)	1		1	4	3	1	56, 29, 25	51	50	2	5	No	500	Yes	10	No
290	Mtskheta -Tianeti	Dusheti	Shatili	Khakhabo	Badri Mindikauri	Amiran Gogochuri (Gamgeneli)	1	1		7	3	4	54, 52, 3	78, 39, 11, 4	130	5	15	Yes	500	Yes	10	No
291	Mtskheta -Tianeti	Dusheti	Shatili	Khakhabo	Paata Khabiauri	Amiran Gogochuri (Gamgeneli)	1		1	1	1	0	39	0	75	3	5	Yes	500	Yes	10	No
292	Mtskheta -Tianeti	Dusheti	Shatili	Archilo	Tengiz Zviadauri	Amiran Gogochuri (Gamgeneli)	1	1		5	3	2	59, 21, 19	45, 17	120	4	15	No	600	Yes	10	No

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293	Mtskheta -Tianeti	Dusheti	Shatili	Archilo	Amiran Zviadauri	Amiran Gogochuri (Gamgeneli)	1		1	7	3	4	43, 21, 1	40, 19, 19, 16	80	2	10	Yes	550	Yes	10	No
294	Mtskheta -Tianeti	Dusheti	Shatili	Lubaiskari	Berdia Tchintcharauli	Amiran Gogochuri (Gamgeneli)	1		1	3	2	1	47, 41	72	55	2	6	No	130	Yes	5	No
295	Mtskheta -Tianeti	Dusheti	Ukanaps havi	Vakisopeli	Ivane Tselauri	Shalva Tsitsenauri (Gamgebeli)	1	1		4	1	3	88	81,50, 41	40	4	10	Yes	480	Yes	20	Yes
296	Mtskheta -Tianeti	Dusheti	Gudamak ari	Bursatchili	Zviadi Tsiklauri	Malkhaz Tsiklauri	1		1	2	1	1	45	45	20	2	5	No	100	Yes	5	Yes
297	Mtskheta -Tianeti	Dusheti	Gudamak ari	Bursatchili	Guliko Tsiklauri	Malkhaz Tsiklauri	1		1	3	1	2	80	75,62	30	2	5	No	100	Yes	5	No
298	Mtskheta -Tianeti	Dusheti	Gudamak ari	Bursatchili	Nugzari Aptsiauri	Malkhaz Tsiklauri	1		1	2	1	1	50	75	30	2	5	No	240	yes	5	Yes
299	Mtskheta -Tianeti	Dusheti	Gudamak ari	Bursatchili	Nugzari Chokheli	Malkhaz Tsiklauri	1		1	2	1	1	52	77	10	1	3	No	250	yes	5	Yes
300	Mtskheta -Tianeti	Dusheti	Gudamak ari	Bursatchili	Dato Chokheli	Malkhaz Tsiklauri	1		1	3	3		57,35, 31		20	2	5	No	100	Yes	5	No
301	Mtskheta -Tianeti	Dusheti	Gudamak ari	Bursatchili	Teimuraz Chokheli	Malkhaz Tsiklauri	1		1	1	1		57		15	1	3	No	300	Yes	5	Yes
302	Mtskheta -Tianeti	Dusheti	Gudamak ari	Bursatchili	Shalva Chokheli	Malkhaz Tsiklauri	1		1	4	2	2	80,50	72,50	15	1	3	No	300	Yes	5	No
303	Mtskheta -Tianeti	Dusheti	Barisakh o	Ubani	Amiran Chincharauli	Mzekala Arabuli (Gamgebeli)	1		1	3	2	1	42,37	80	50	3	5	No	1000	Yes	10	Yes
304	Mtskheta -Tianeti	Dusheti	Barisakh o	Dzedzeurta	Teimuraz Chincharauli	Mzekala Arabuli (Gamgebeli)	1		1	3	2	1	40,60	37	30	2	5	No	400	Yes	15	Yes
305	Mtskheta -Tianeti	Dusheti	Barisakh o	Dzedzeurta	Babo Chincharauli	Mzekala Arabuli (Gamgebeli)	1		1	2	1	1	60	60	30	2	5	No	400	Yes	10	Yes
306	Mtskheta -Tianeti	Dusheti	Barisakh o	Chie	Aleqsi Chincharauli	Mzekala Arabuli (Gamgebeli)	1		1	2	1	1	80	80	30	3	5	No	500	Yes	10	No
307	Mtskheta -Tianeti	Dusheti	Barisakh o	Chie	Natela Chincharauli	Mzekala Arabuli (Gamgebeli)	1		1	4	2	2	20,18	75,45	30	3	5	No	400	Yes	10	No
308	Mtskheta -Tianeti	Dusheti	Barisakh o	Chie	Omari Chincharauli	Mzekala Arabuli (Gamgebeli)	1		1	4	3	1	47,25, 13	45	30	3	5	No	400	Yes	10	No
309	Mtskheta -Tianeti	Dusheti	Ananuri	Avanesi	Gela Chopikashvili	Genadi Gulbatashvili	1	1		5	3	2	62,23, 17	56,17	50	4	10	N/A	350	N/A	10	Yes
310	Mtskheta -Tianeti	Dusheti	Barisakh o	Khakhmati	Badri Aladauri	Mzekala Arabuli (Gamgebeli)	1		1	2	1	1	43	78	30	2	5	No	240	Yes	10	Yes
311	Mtskheta -Tianeti	Dusheti	Shatili	Ardoti	Amiran Murguevi	Amiran Gogochuri (Gamgeneli)	1		1	4	2	2	35,2	30,4	70	4	5	No	700	Yes	20	Yes

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312	Mtskheta-Tianeti	Dusheti	Shatili	Ardoti	Imeda Murgaevi	Amiran Gogochuri (Gamgeneli)	1	1		1	1		80		20	1	10	Yes	300	Yes	5	No
313	Mtskheta-Tianeti	Dusheti	Shatili	Mutso	Mindia Chincharauli	Amiran Gogochuri (Gamgeneli)	1		1	4	2	2	37,8	31,5	40	3	5	No	500	Yes	10	Yes
314	Mtskheta-Tianeti	Dusheti	Shatili	Mutso	Khvtiso Chincharauli	Amiran Gogochuri (Gamgeneli)	1		1	2	1	1	66	62	30	2	5	No	500	Yes	10	Yes
315	Mtskheta-Tianeti	Dusheti	Pasanauri	Mejilaurebi	Eteri Gvritishvili	Davit Melikishvili	1		1	3	1	2	55	75,45	60	3	5	No	200	Yes	10	Yes
316	Mtskheta-Tianeti	Dusheti	Pasanauri	Mejilaurebi	Tariel Motiashvili	Davit Melikishvili	1		1	3	2	1	65,25	55	70	4	5	No	250	Yes	10	Yes
317	Mtskheta-Tianeti	Dusheti	Pasanauri	Mejilaurebi	Nino Gvritishvili	Davit Melikishvili	1		1	1		1		75	30	2	5	No	1000	Yes	10	Yes
318	Mtskheta-Tianeti	Dusheti	Pasanauri	Mejilaurebi	Natela Gvritishvili	Davit Melikishvili	1		1	1		1		60	40	4	5	No	300	Yes	10	Yes
319	Mtskheta-Tianeti	Dusheti	Pasanauri	Mejilaurebi	Ilo Gvritishvili	Davit Melikishvili	1		1	2	1	1	80	75	40	3	5	No	480	Yes	10	Yes
320	Mtskheta-Tianeti	Dusheti	Pasanauri	Mejilaurebi	Gia Motiashvili	Davit Melikishvili	1		1	1	1		50		70	4	5	No	300	Yes	10	No
321	Mtskheta-Tianeti	Dusheti	Pasanauri	Mejilaurebi	Giorgi Motiashvili	Davit Melikishvili	1		1	2	1	1	42	38	50	2	5	No	200	Yes	10	Yes
322	Mtskheta-Tianeti	Dusheti	Pasanauri	Mejilaurebi	Shio Motiashvili	Davit Melikishvili	1		1	2	1	1	80	75	40	2	5	No	480	Yes	10	Yes
323	Mtskheta-Tianeti	Dusheti	Pasanauri	Sodeve	Magdana Janiashvili	Davit Melikishvili	1		1	2		2		75,55	60	3	5	No	240	Yes	10	Yes
324	Mtskheta-Tianeti	Dusheti	Pasanauri	Sodeve	Gogi Gvritishvili	Davit Melikishvili	1		1	1	1		62		70	4	5	No	500	Yes	20	Yes
325	Mtskheta-Tianeti	Dusheti	Dusheti	Daviturni	Grigol Davituri	Davit Melikishvili	1		1	4	3	1	70,35,30	60	40	2	5	No	240	Yes	10	No
326	Mtskheta-Tianeti	Mtskheta	Nichbisi	Zemo Nichbisi's Zeubani	Kolia Chokheli	Davit Khizanishvili	1	1		3	Male		80		60	1	15	N/A	300	N/A	N/A	Yes
327	Mtskheta-Tianeti	Mtskheta	Nichbisi	Zemo Nichbisi's Zeubani	Omari Tsiklauri	Davit Khizanishvili	1	1		5	Male		70		50	1	15	N/A	300	N/A	N/A	Yes
328	Mtskheta-Tianeti	Mtskheta	Nichbisi	Zemo Nichbisi's Zeubani	Tsitsino Tsiklauri	Davit Khizanishvili	1		1	2		Female		70	40	1	15	N/A	300	N/A	N/A	Yes
329	Mtskheta-Tianeti	Mtskheta	Nichbisi	Zemo Nichbisi's Zeubani	Nina Rekhviashvili	Davit Khizanishvili	1	1		3		Female		80	40	1	15	N/A	300	N/A	N/A	Yes
330	Mtskheta-Tianeti	Mtskheta	Nichbisi	Zemo Nichbisi's Zeubani	Phiruzi Gogolauri	Davit Khizanishvili	1	1		2	Male		70		40	1	15	N/A	300	N/A	N/A	Yes
331	Mtskheta-Tianeti	Mtskheta	Nichbisi	Zemo Nichbisi's Zeubani	Tornike Tvauri	Davit Khizanishvili	1		1	3	Male		70		40	1	15	N/A	300	N/A	N/A	Yes

#	Region	Municipality	District	Village	House owner's name	Interviewed person's Name	№ of houses	Permanent house	Seasonal Houses	№ of residents	M	F	Age - M	Age -F	Living (heating) area m2	№ of living (heating)	Annual Consumption of Wood (m3)	Existing solar PV	Average monthly income	Willingness to pay for electricity	Per month fixed (GEL)	Access road
332	Mtskheta-Tianeti	Mtskheta	Lisi	Dzalaantkhevi	Grigir Morchiladze	Nukri Qobulashvili	1	1		15	Male		50		600	40	120	N/A		N/A	N/A	Yes
333	Mtskheta-Tianeti	Mtskheta	Lisi	Dzalaantkhevi	Dursunda Mamedovi	Nukri Qobulashvili	1		1	1	Male		67		0	0	10	N/A	300	N/A	N/A	Yes
Total							333	132	201	935	533	368	55	45	53	2	1363.0		415	298	16.7	

ANNEX 2: MIDTERM DATA BASE ON OFF-GRID VILLAGES

#	Region	Municipality	District	Village	Nº of houses	Permanent house	Seasonal Houses	Nº of household that was not questioned	Seasonal	Permanent	Nº of households that are empty
1	Mtskheta-Mtianeti	Dusheti		Mchedliankari	7	3	4	4	4	0	4
2	Mtskheta-Mtianeti	Dusheti		Mgliani	5	0	5	3	3	0	3
3	Mtskheta-Mtianeti	Dusheti	Shatili	Kistani	3	0	3	0	0	0	0
4	Mtskheta-Mtianeti	Dusheti	Shatili	Giorgitsminda	11	4	7	1	1	0	0
5	Mtskheta-Mtianeti	Dusheti	Shatili	Mutso	4	2	2	0	0	0	0
6	Mtskheta-Mtianeti	Dusheti	Shatili	Ardoti	14	8	6	0	0	0	0
7	Mtskheta-Mtianeti	Dusheti	Ukanapshavi	Tchidali	1	1		0	0	0	0
8	Mtskheta-Mtianeti	Dusheti	Ukanapshavi	Chalakhevi	1	1	0	0	0	0	0
9	Mtskheta-Mtianeti	Dusheti	Ukanapshavi	Eliagza	1	1	0	0	0	0	0
10	Mtskheta-Mtianeti	Dusheti	Ukanapshavi	Khoshara	5	1	4	2	2	0	2
11	Mtskheta-Mtianeti	Dusheti	Ukanapshavi	Vakisopeli	11	4	7			0	7
12	Mtskheta-Mtianeti	Dusheti	Gudamakari	Atnokhi	1		1	0	0	0	1
13	Mtskheta-Mtianeti	Dusheti	Gudamakari	Bakhani	1	1		0	0	0	0
14	Mtskheta-Mtianeti	Dusheti	Gudamakari	Chobalauri	3	0	3	2	2	0	2
15	Mtskheta-Mtianeti	Dusheti	Gudamakari	Bursatchili	16	2	14			0	0
16	Mtskheta-Mtianeti	Dusheti	Barisakho	Ukanakhadu	1		1	0	0	0	1
17	Mtskheta-Mtianeti	Dusheti	Barisakho	Zeistecho	2	1	1	0	0	0	1
18	Mtskheta-Mtianeti	Dusheti	Barisakho	Tsinkhadu	5		5	0	0	0	5
19	Mtskheta-Mtianeti	Dusheti	Barisakho	Khakhmati	13		13	0	0	0	12
20	Mtskheta-Mtianeti	Dusheti	Barisakho	Chirdili	8		8	0	0	0	2
21	Mtskheta-Mtianeti	Dusheti	Barisakho	Ukanakho	6	3	3	2	2	0	3
22	Mtskheta-Mtianeti	Dusheti	Barisakho	Ghelisvake	1		1	0	0	0	1
23	Mtskheta-Mtianeti	Dusheti	Barisakho	Ghuli	4		4	0	0	0	4
24	Mtskheta-Mtianeti	Dusheti	Barisakho	Biso	4		4	2	2	0	4
25	Mtskheta-Mtianeti	Dusheti	Barisakho	Zemo Barisakho	3		3	0	0	0	3
26	Mtskheta-Mtianeti	Dusheti	Barisakho	Akusho	3	2	1	0	0	0	1
27	Mtskheta-Mtianeti	Dusheti	Barisakho	Tchalisopeli	3	2	1	0	0	0	1
28	Mtskheta-Mtianeti	Dusheti	Maghaloskari	Kanatia	5	1	4	1	1	0	4
29	Mtskheta-Mtianeti	Dusheti	Maghaloskari	Migriaulta	3	2	1	0	0	0	0
30	Mtskheta-Mtianeti	Dusheti	Pasanauri	Daviturebi	1		1	0	0	0	1
31	Mtskheta-Mtianeti	Dusheti	Pasanauri	Mejilaurebi	11		11	0	0	0	2
32	Mtskheta-Mtianeti	Dusheti	Pasanauri	Chadis Tsikhe	9		9	0	0	0	8
33	Mtskheta-Mtianeti	Dusheti	Pasanauri	Sodeve	5		5	0	0	0	0
34	Mtskheta-Mtianeti	Dusheti	Tchartali	Sakere	3		3	0	0	0	0
35	Mtskheta-Mtianeti	Dusheti	Tchartali	Zemo Muguda	3		3	1	1	0	1
36	Mtskheta-Mtianeti	Dusheti	Tchartali	Zemo Dolakedi	5		5	0	0	0	0
37	Mtskheta-Mtianeti	Dusheti	Ananuri	Tsikhisopeli	3	3		0	0	0	0
38	Mtskheta-Mtianeti	Dusheti	Ananuri	Avanesi	2	2		0	0	0	0
39	Mtskheta-Mtianeti	Dusheti	Gremiskhevi	Toncha	7	4	3	3	3	0	3
40	Mtskheta-Mtianeti	Dusheti	Zhinvali	Pudzari	2	2		0	0	0	0
41	Mtskheta-Mtianeti	Dusheti	Bazaleti	Tchontili	10	3	7	4	4	0	7
42	Borjom-Kharagauli	Borjomi	Borjomi	Patara Dabadzveli	9		9	3	3	0	0
43	Borjom-Kharagauli	Borjomi	Gujareti	Gujareti	11		11	9	9	0	3
44	Borjom-Kharagauli	Borjomi	Gujareti	Gverdis Sopeli	6	2	4	4	4	0	0
45	Samtskhe-Javakheti	Akhaltzikhe	Adigeni	Parekha	4	3	1	1	1	0	0
46	Shida-Kartli	Khashuri	Khashuri	Kobi	2	1	1	0	0	0	0
47	Shida-Kartli	Khashuri	Khashuri	Aleksandre Tskaro	2	0	2	0	0	0	0
48	Shida-Kartli	Kareli	Kareli	Saterdze	9	1	8	0	0	0	0
49	Shida-Kartli	Kareli	Kareli	Mekheti	3	0	3	2	2	0	0
50	Shida-Kartli	Kareli	Kareli	Bani	3	1	2	2	2	0	0
51	Shida-Kartli	Kareli	Kareli	Tkemala	3	2	1	1	1	0	0
52	Shida-Kartli	Gori	Mghebriani	Mghebriani	3	1	2	1	0	1	0
53	Shida-Kartli	Gori	Sakauri	Tsiteltskaro	8	3	5	4	4	0	0
54	Shida-Kartli	Gori	Mghebriani	Tami	4	1	3	0	0	0	0
55	Shida-Kartli	Gori	Ateni	Khandisi	1	1	0	0	0	0	0
56	Shida-Kartli	Gori	Boshuri	Gaichaant Ubani	1	1	0	0	0	0	0
57	Shida-Kartli	Gori	Sakavre	Sakavre	2	2	0	0	0	0	0
58	Shida-Kartli	Gori	Boshuri	Ipnara	5	2	3	1	1	0	0
59	Shida-Kartli	Gori	Sakavre	Pitsesi	6	5	1	0	0	0	0
60	Shida-Kartli	Gori	Kvakhvrel	Velebi	8	6	2	0	0	0	0
61	Shida-Kartli	Gori	Ateni	Dre	4	3	1	0	0	0	0
62	Kakheti	Dedoplistskaro	Dedoplistskaro	Didi Shiraki	11	10	1	0	0	0	0

#	Region	Municipality	District	Village	№ of houses	Permanent house	Seasonal Houses	№ of household that was not questioned	Seasonal	Permanent	№ of households that are empty
63	Kvemo-Kartli	Tetritskaro	Shekhvetili	Ugudeti	2	0	2	1	1	0	1
64	Kvemo-Kartli	Tetritskaro	Shekhvetili	Didi Namtvriani	2	2	0	0	0	0	0
65	Kakheti	Akhmeta	Akhmeta	Bughaani	6	6	0	0	0	0	0
66	Kakheti	Akhmeta	Akhmeta	Jaburi	1	1	0	0	0	0	0
67	Kakheti	Akhmeta	Akhmeta	Bukhrevi	3	2	1	0	0	0	0
68	Kakheti	Akhmeta	Akhmeta	Ingeti	1	1	0	0	0	0	0
69	Kakheti	Akhmeta	Akhmeta	Kvernadzeuli	4	4	0	0	0	0	0
70	Kakheti	Akhmeta	Akhmeta	Chopchauri	2	2	0	0	0	0	0
71	Kakheti	Akhmeta	Akhmeta	Ipnisgori	7	0	7	0	0	0	0
72	Mtskheta-Tianeti	Dusheti	Barisakho	Blo	1	1	0	0	0	0	0
73	Mtskheta-Tianeti	Dusheti	Barisakho	Ache	1	0	1	0	0	0	0
74	Mtskheta-Tianeti	Dusheti	Barisakho	Tchimgha	1	1	0	0	0	0	0
76	Mtskheta-Tianeti	Dusheti	Barisakho	Motsmao	3	0	3	0	0	0	0
77	Mtskheta-Tianeti	Dusheti	Ukanapshavi	Akhadi	3	0	3	0	0	0	0
78	Mtskheta-Tianeti	Dusheti	Ukanapshavi	Matura	3	0	3	0	0	0	0
79	Mtskheta-Tianeti	Dusheti	Ukanapshavi	Tchicho	1	1	0	0	0	0	0
80	Mtskheta-Tianeti	Dusheti	Ukanapshavi	Tsabaurta	1	0	1	0	0	0	0
81	Mtskheta-Tianeti	Dusheti	Ukanapshavi	Udzilaurta	1	1	0	0	0	0	0
82	Mtskheta-Tianeti	Dusheti	Shatili	Andaki	2	1	1	0	0	0	0
83	Mtskheta-Tianeti	Dusheti	Shatili	Khonistchala	11	5	6	0	0	0	0
84	Mtskheta-Tianeti	Dusheti	Shatili	KhaKhabo	2	1	1	0	0	0	0
85	Mtskheta-Tianeti	Dusheti	Shatili	Archilo	2	1	1	0	0	0	0
86	Mtskheta-Tianeti	Dusheti	Shatili	Lubaiskari	1	0	1	0	0	0	0
87	Mtskheta-Tianeti	Dusheti	Barisakho	Ubani	1	0	1	0	0	0	0
88	Mtskheta-Tianeti	Dusheti	Barisakho	Dzedzeurta	2	0	2	0	0	0	0
89	Mtskheta-Tianeti	Dusheti	Barisakho	Chie	3	0	3	0			
91	Mtskheta-Tianeti	Dusheti	Dusheti	Daviturni	1		1	0			
90	Mtskheta-Tianeti	Mtskheta	Lisi	Dzalaantkhevi	2	1	1	0			
92	Mtskheta-Tianeti	Mtskheta	Nichbisi	Zemo Nichbisi's Zeubani	6	4	2	0			
Total					387	133	254	54	53	1	87

ANNEX 3: CONCEPT PAPER ON OFF-GRID SOLAR PV SYSTEM PROJECT FOR HIGH MOUNTAIN HOUSEHOLDS



CONCEPT PAPER

OFF GRID SOLAR PV SYSTEM PROJECT FOR HIGH MOUNTAIN HOUSEHOLDS

Goal of the Project

The main goal of the project is to provide basic electricity to vulnerable population in remote areas of Georgia, so to create improve their condition and allow them stay in their home villages, to feel secure as residents, and to enhance the possibilities for tourism development, which will boost the economy of the region.

Short Summary

Serving off-grid population with sustainable energy is of high importance for the Government of Georgia (GoG). According to the Energy Department of the Ministry of Economy and Sustainable Development of Georgia (MoESD), there are about 400 priority off-grid houses in the high mountain regions with no access to electricity.

MoESD studied in the concept development of a plan for the installation of solar PV panels for off-grid high mountain households.

Following solutions for electrification of off grid households are proposed:

Option a) Full System comprises 750 W PV (250 W x3) panel equipment on each off-grid household and electrical equipment (5 LED lamps, DC/AC inverter and compatible GEL Battery) as well as power meter.

The Full System cost is about \$3,500¹ delivered (with GEL accumulators²).

The Full System cost is about \$4,000 delivered (with Lithium -Ion accumulators³).

Option b) Basic Mobile System comprises 100 W PV panel installation on each off-grid consumer (i.e. Shepherds / Cowboys that are frequently changing location) with integrating electrical equipment (5 LED lamps, DC / AC inverter and compatible Lithium -Ion and optional power meter).

The Basic System is about \$1000 with Lithium -Ion accumulators⁴.

Option c) where it might be applicable (in settlements with relatively high density of houses i.e. village Upper Omalo in Akhmeta Municipality) introduction of more advanced renewable based microgrid system could be considered.

Micro grid is a localized interconnected group of electricity sources and loads within clearly defined electrical boundaries, having an ability to operate in autonomously as physical and economical system.

Main Components for proposed micro grids are as following:

- Generation facility mainly composed by PV farm with possible integration of micro wind and/or micro hydro and Alternative diesel Generator for security and reliability of supply to the final consumers;
- Storing Accumulator batteries;
- Control and Automation System;
- Group of closely (in 200-250 M from Generation facility) located consumers.

At around 15 such settlement might be selected from off-grid settlement in Georgia where:

An average cost per one microgrid with more than 20 houses could be estimated as \$7000.00 USD per one consumer.

¹ Note that all prices are indicative and includes equipment and installation cost. Final – precise Costs could be calculated when individual locations are defined.

² Up to 1500 discharge-charging cycle (above 3 years of life spend)

³ Up to 6000 discharge-charging cycle (above 15 years of life spend)

⁴ Due to reduced weight no option with GEL accumulators are considered for basic Systems



This Project consists of installing and servicing Options a, b and/or c for 400 homes, depending on financing and grant availability.

Project Initiator

USAID Energy Program was Project Initiator, as support Georgia's efforts to facilitate increased investment in power generation capacity as a means to increase national energy security and facilitate economic growth and enhance national sovereignty. Recently Georgia joined European Energy Community undertaking obligation to implement mandatory reforms in energy sector in compliance with European Union (EU) Energy Aquis. In accordance to the treaty, GoG has undertaken obligation to ensure the supply of energy sources to all citizens of the country. The USAID Energy Program provides technical assistance to Energy Efficiency Center Georgia (EECG) and MoESD for this purpose.

The Implementing Agency

The executing agency for this project on behalf of GoG is EECG. Having a mission to support renewable energy and energy efficiency utilization for sustainable development and to raise awareness on environmentally friendly energy technologies and solutions, over 19 years of its operation, EECG has implemented more than 90 projects. Project portfolio includes technical and economic feasibility studies, comprehensive market research, pilot and demonstration projects, trainings awareness rising, project financing, as well as analysis of national policies and regulations as well as their developments. EECG has obtained the status of "registered observer" to the Green Climate Fund.

EECG individually and/or as part of the consortia has worked with following major donors : the EU, USAID, International Finance Corporation (IFC), World Bank (WB), European Bank for Reconstruction and Development (EBRD), Nordic Environment Finance Corporation (NEFCO), United Nations Development Program (UNDP), British Petroleum – Georgia (BP-Georgia), Governments and number of international Non-Governmental Organizations (NGO's) consulting and engineering firms on promotion of energy efficiency among municipalities, working on capacity building of their personnel, development of energy efficient action plans, development of guidelines for municipal energy planning, CO₂ Calculation Tool and manuals in energy auditing, trainings, implementation of demonstration pilot projects in municipal and public buildings, organization of Intelligent Energy days.

Since 2014 EECG is a Covenant of Mayors (CoM) supporter in Georgia and works closely with 23 Covenant of Mayors signatories and supports local authorities in implementing sustainable energy policies, provides the administrative, promotional and technical assistance to them.

EECG is headed by Mr. George Abulashvili, Director, former advisor of the Energy Charter member countries in energy sector investments and implementation of Protocol on Energy Efficiency and Related Environmental Aspects (PEEREA) such as climate change mitigation, an expert consultant to the Georgian parliament on energy issues. Since 1996, initiator and manager number of local and international projects and programs.

Mr. Abulashvili has vast regional experience working on promotion of CoM activities and support to Signatories within responsible geographical area, coordinates works with Donors / International Financial Institutions (IFI's) as CoM East Country Expert for Georgia and Azerbaijan.

Project history

USAID Energy Program is mandated to provide technical assistance to Implementing Agency in Find rising but not capitalization to the project.

To raise money for the project USAID Energy Program has presented the concept and reached out to United Nations Industrial Development Organization (UNIDO), Asian Development Bank (ADB), German Investment Corporation (DEG), and Dutch Embassy in Tbilisi. USAID Energy Program conducted several meetings & ground trips with the representatives of Dusheti Municipality. According to available information, out of 400 off-grid households over the country, 200 are in 58 villages of Dusheti region and 80% of these 200 houses are placed at the border occupied by Russia.

On a scoping mission, USAID Energy Program team has visited Dusheti Municipality. During the visit, USAID Energy Program conducted a meeting with Municipal Authorities to discuss the details of the

Page 2 of 4

project implementation which considers installation of solar PVs for the high mountain off-grid houses. In addition, the further steps and scope of collaboration were deliberated. In total, there are 200 houses without electricity supply in Dusheti region. The Mayor expressed willingness to contribute to project execution which is of high importance for the development of the region.

After the meeting, USAID Energy Program team visited one of the high mountain village Tchontili, located in the vicinity of the border occupied by Russian Federation. There has been no electricity supply since 1990's. The meeting was conducted with the local community to create awareness on the importance of the project. USAID Energy Program have tested the sample of the PV system in one of local families.



This project (proposal) so far has gained the momentum and created need and desire for its implementation.

EECG in with USAID Energy Program intends to make a grant application to the interested institutions.

The equipment prices above are an average, based on quotations received in 2018, from:

- <http://solaricglobal.com/>;
- <https://www.facebook.com/suncroxsolar>;
- www.suncredit.co.uk.

Installation work to be conducted by experienced local companies: i.e. Green Energy, Sun House at c.

Latest Development

GoG has passed a resolution to commit approximately USD \$350,000 for 25% of the capital cost of the project based on the Full System configuration.

Deputy Minister of MoESD informally convened major donors to Georgia at the Central Asian Regional Economic Cooperation Program 2018 to work towards raising the remaining 75% needed. GoG's resolution requires financing commitment for the total project cost (i.e., the remaining 75%) to be obtained by December 31, 2018.

EECG with the support of USAID Energy Program discussed financing possibilities at a Donor Organization's Meeting at MoESD later in September. Participants expressed interest to contribute in the Off-Grid Solar PV project and become a part of a success story.

The individual consultations were organized with Embassy of Czech Republic, KfW, CENN, Embassy of Romania (ROAID), EU Delegation, Green Climate Fund, World Bank.



Long / medium term interest from all Donors were demonstrated. Further study on project long term sustainability and establishment of local communities were advised. In order to fit ongoing Energy Efficiency (EF) projects, representatives from donor organizations recommended to add EF stoves and water heating systems to the project design. All donors noted that, request should be made at the level of GoG.

Possible potential contributors:

- Czech Republic – possible collaboration in Pshav-Khevsureti and Gudamakari districts;
- GCF – Possibility to obtain grant up to \$ 1ml;
- E5P/NEFCO – has left 1ml USD grant for EF issues;
- ENPARD - has \$ 20,000 grant component program for tourism development and deforestation;
- WB - under the Regional Development (RDP) can consider the project financing with following conditions 1) Justification on the concept design; 2) project sustainability; 3) GoG must contribute at least 50% of the total cost; 4) the request should be made at the GoG level, particularly, Municipal Development Fund under the Ministry of Regional Development and Infrastructure.
- The Policy Based Loan Project has € 8.5ml grant component for energy efficiency issues.

In order to identify the precise number of household and their desires, USAID Energy Program team representative visited several villages in Dusheti region: Mgliani, Mcheliilankari, Chontili and villages of Pshav-Khevsureti and Gudamakari districts.

In total were questioned 48 households in 16 villages. Among them 28 seasonal and 21 permanent houses.

Important aspects are that, basically, all the locals are willing to pay for electricity at an average of 15-20 GEL per month; in most villages, there is an access to the road; but still there are several villages without access to the road, and the only way to get to the place is to ride the horses; In 1 village of Ukana Pshavi and 3 villages of Gudamakari districts were already electrified.

The following activities are planned to carry out in the nearest future.

1. USAID Energy Program will continue assisting GoG and EECG in identifying precise number of off-grid homes and their locations;
2. USAID Energy Program continuously will coordinate communication with Donor organizations:
 - Embassy of Lithuania
 - Polish Government
 - Heritage Resources Limited – Chinese anchor investors, running government-to-government projects.

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ANNEX 4: PRESENTATION ON OFF-GRID SOLAR PV SYSTEM PROJECT FOR HIGH MOUNTAIN HOUSEHOLDS



“Energy Efficiency Center Georgia”

Solar PV Systems for Off-grid Households in High Mountain Villages

Potential Implementer
George Abulashvili

November 6, 2018



ENERGY EFFICIENCY CENTRE GEORGIA

LITTLE BIT ABOUT Energy Efficiency Center Georgia (EECG)

www.eecgeo.org

Our mission - support renewable energy and energy efficiency utilization for sustainable development and raise awareness on environmentally friendly energy technologies and solutions

Our experience - over the course of 19 years of operation, has implemented more than 90 projects.

Our Project portfolio - technical and economic feasibility studies, comprehensive market research, pilot and demonstration of RE&EE technologies, trainings & awareness raising activities, project financing, as well as analysis and development of relevant national policies and regulations.

Donors and IFI's - individually and/or as part of the consortia EECG has worked with the following major donors: EU, USAID, IFC, ADB, WB, EBRD, CEB, NEFCO, UNDP, UNECE, BP-Georgia and others ...

Cooperation with GoG - as part of the team has completed working on drafts for the **First National Energy Efficiency Action Plan; Energy Performance Building Law of Georgia. National Renewable Energy Action Plan** and finalizing **Energy Efficiency Law** which are supported by the international donors.



Since 2017th EECG obtained status of registered observer to the [Green Climate Fund](#)

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MAP OF OFF GRID SETTLEMENTS



LIST OF HOUSES WITHOUT ELECTRICITY IN THE REGIONS OF GEORGIA

Region	Number of houses	Permanent resident	Seasonal resident
Samtske-Javakheti	16	13	67
Shida Kartli	134	51	124
Adjara	27	3	14
Racha-Lechkhumi	146	29	83
Kvemo Svaneti	48	22	36
Imereti	62	59	28
Samegrelo-Zemo Svaneti	271	88	167
Mckheta-Mtianeti	51	30	20
Total	755	295	539





PROJECT CONCEPT

Goal of the Project

The main goal of the project is to provide basic electricity to vulnerable population in remote areas of Georgia, so to create improve their life condition and allow them stay in their home villages, to feel secure as residents, and to enhance the possibilities for tourism development, which will contribute boosting of local the economy.

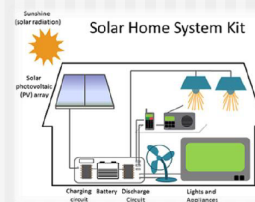
Short Summary

Serving off-grid population with sustainable energy is of high importance for the Government of Georgia. According to the Energy Department of the Ministry of Economy and Sustainable Development, there are about 400 priority off-grid houses in the high mountain regions with no access to electricity.

MoESD and UEP studied and contributed to the concept development for the installation of solar PV panels for off-grid households.



SOLUTIONS FOR ELECTRIFICATION OF OFF GRID HOUSEHOLDS ARE PROPOSED:



Option a) Full System comprises 750 W PV (250 W x3) panel equipment on each off-grid household and electrical equipment (5 LED lamps, DC/AC inverter and compatible GEL Battery) as well as power meter.

The Full System cost is about \$3,500 delivered (with GEL accumulators).

The Full System cost is about \$4,000 delivered (with Lithium -Ion accumulators).

GEL accumulators - Up to 1500 discharge-charging cycle (above 3 years of life spend)

Lithium -Ion accumulators - Up to 6000 discharge-charging cycle (above 15 years of life spend)

Note:

All prices are indicative and includes equipment and installation cost.

Final -costs could be calculated when individual locations are defined.





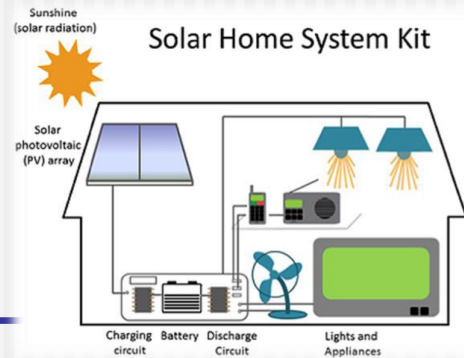
SOLUTIONS FOR ELECTRIFICATION OF OFF GRID HOUSEHOLDS ARE PROPOSED:

Option b)

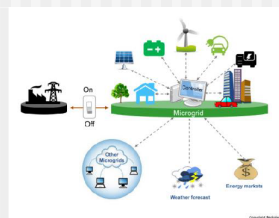
Basic Mobile System comprises 100 W PV panel installation on each off-grid consumers (i.e. Shepherds/Cowboys that are frequently changing location) with integrating electrical equipment (5 LED lamps, DC/AC inverter and compatible Lithium -Ion and optional power meter).

The Basic System is about \$1000 with Lithium -Ion accumulators.

Due to reduced weight no option with GEL accumulators are considered for basic Systems



SOLUTIONS FOR ELECTRIFICATION OF OFF GRID HOUSEHOLDS ARE PROPOSED:



Option C) where it might be applicable (in settlements with relatively high density of houses i.e. village Upper Omalo in Akhmeta Municipality and/or Ardoti of Dusheti municipality) introduction of more advanced renewable based microgrid system could be considered.

Micro grid is a localized interconnected group of electricity sources and loads within clearly defined electrical boundaries, having an ability to operate in autonomously as physical and economical system.

Main Components for proposed micro grids are as following:

Generation facility mainly composed by PV farm with possible integration of other generation facilities (wind, micro hydro and/or other locally available solutions) for security and reliability of supply to the final consumers;

Accumulator batteries

Control and Automation System

Group of closely (in 200-250M from Generation facility) located consumers

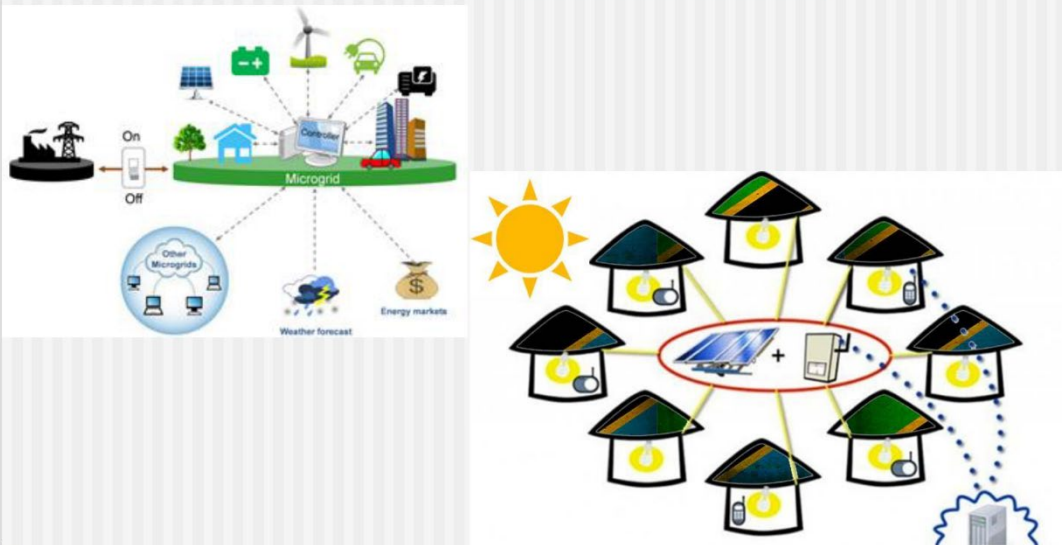
At around 15 such settlement might be selected from off grid settlement in Georgia where

An average cost per one microgram with more than 5-10 house could be estimated as \$7000.00 USD per one consumer.





ENERGY EFFICIENCY CENTRE GEORGIA



ENERGY EFFICIENCY CENTRE GEORGIA

SITE VISITS AND TESTING Q TO IDENTIFY NEEDS IN AROUND 15 VILLAGES OF DUSHETI MUNICIPALITY





ENERGY EFFICIENCY CENTRE GEORGIA

**SITE VISITS AND TESTING Q TO IDENTIFY NEEDS
IN AROUND 15 VILLAGES OF DUSHETI MUNICIPALITY**



ENERGY EFFICIENCY CENTRE GEORGIA

SOME INDIVIDUAL INSTALLATIONS ARE ALREADY THERE





SURVEY ON OFF-GRID VILLAGES

SURVEY ON OFF-GRID VILLAGES (Total data)
კითხვარი უწყის სოფლებში შიდა მუდრეზების შესახებ (დავამტყულო)

1. Region	Dusheti	
2. Village	Mgliani	
3. Number of Houses	5	
4. Number of Permanent Houses	0 (2 families are going to return)	
4.1 Total number of residents	-	
4.2 Total number of households	-	
5. Number of Seasonal Houses	2	
5.1 Total number of residents (if available)	8 (in summertime arrives 10-15 people)	
5.2 Number of households that are empty less than 3 months	2	
5.3 Number of households that are empty less than 1 year	0	
5.4 Number of households that are empty more than 1 year	3	
6. Number of Households that was not questioned	Permanent	Seasonal - 3
7. Condition of the excess road to the village	Satisfactory (vehicle with high passability can be achieved)	
8. Contact information of local "Gangebeli"	Nodar Kachkachuri mob: +995 577 38 41 91	

OFF-GRID VILLAGES (Total data)
შიდა მუდრეზების შესახებ (დავამტყულო)

	Dusheti	
	Mchediantkari	
3. Number of Houses	7	
4. Number of Permanent Houses	3	
4.1 Total number of residents	7	
5. Number of Seasonal Houses	0	
5.1 Total number of residents (if available)	0	
5.2 Number of households that are empty less than 3 months	0	
5.3 Number of households that are empty less than 1 year	0	
5.4 Number of households that are empty more than 1 year	4 (are not living more than 4 years)	
6. Number of Households that was not questioned	Permanent - 4	Seasonal - 0
7. Condition of the excess road to the village	Satisfactory (vehicle with high passability can be achieved, if the weather is dry)	
8. Contact information of local "Gangebeli"	Nodar Kachkachuri mob: +995 577 38 41 91	



MAIN FINDINGS

Site Visit data deviates from the original database

Permanent residence average monthly income varies from 0 to 1000 GEL

Willingness to pay monthly fixed price for electricity (5 - 50GEL)

O&M to be at household level (!)





ENERGY EFFICIENCY CENTRE GEORGIA

Meeting with Donors

Individual consultations with Tbilisi based donors organized

- Embassy of Czech Republic
- Embassy of Romania (ROAID)
- Green Climate Fund
- KFW
- CENN
- EU Delegation
- World Bank

Long/medium term interest from all Donors demonstrated

Consultations to be scheduled in nearest future

- Embassy of Lithuania
- Polish Government
- Heritage Resources Limited – Chinese anchor investors, running government-to-government projects



ENERGY EFFICIENCY CENTRE GEORGIA

MEETING WITH DONORS OUTCOMES & KEY MESSAGES

Potential contributors could be:

- Czech Republic – Possibility to collaborate in Pshav-Khevsureti and Gudamakari districts
- GCF – Possibility to obtain grant up to \$ 1ml
- E5P/NEFCO – Has left 1ml USD grant
- ENPARD - \$ 20,000 grant component program
- WB – RDP / IDP trough MDF, MRDI
- Policy Based Loan Project – € 8.5ml grant for EF

Request should be made at the level of GoG

Further study on project long term sustainability advised

Establishment of local communities advised





CURRENT STATUS AND NEEDS

Stakeholders are identified:

- Project initiators and Key stakeholders partners GoG (MoESD) and UEP
- Local PV system providers
- Off Grid settlements

Based on early assumptions estimated project cost is evaluated as USD 1,200,000.00
GoG have already allocated 25% as co-funding for electrifying off grid settlements

Needs for successful realisation of the project

- Data base of off-grid households to be checked and finalised
- Donor mapping finalised
- Prefeasibility study for selection of the final beneficiaries, technologies and o&m/
institutional structure to be predefined and detailed budget developed



THANKS!

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ANNEX 5: TECHNICAL REQUIREMENTS ON AUTONOMOUS MICROELECTRONIC SPP SET FOR PERMANENT HOUSEHOLDS OF THE OFF-GRID VILLAGES



Autonomous Microelectronic Solar Power Plant Set for Permanent Households of the Off - Grid Villages

Version a) structure of a power plant and technical parameters, guide price USD 4000

1. Solar panels: minimal peak power - no less than 750W. Duration of work - 25 years and more.
2. Battery: 6 voltage Monoblock, with jelly electrolyte Opzv type, energy capacity 6,6 kWh (274 Ah, 24v). Working resource 8-10 year (if 50% will be discharged) or 10 kWh jelly battery.
3. Solar charge controller: 40amp MPPT type (with maximum power of accompanying point). Maximum energy – 98% converting.
4. Invertor DC (Direct Current) 24 – AC (Alternating Current) 220v sinusoidal, with 2kW power.
5. Metal clasp for the solar panel (iron or aluminum) construction, with rotating function in one panel.
6. Grounding of the electrical equipment and arrangement of electric wiring in apartments: four point of the LED (Light Emitting Diode) lights, with independent switchers and with two plugs.

System delivery – installation deadline 2.5 – 3 months.

Technical opportunities: room lighting 10-15 points, television – receiver – 100W, energy efficient fridge – 200W, washing machine and other power supply of the electric drive domestic technology up to 300W capacity.

This system is for households with permanent residence status.

Version b) Station structure and technical data – guide price of the system delivery 800\$.

1. Solar panel: minimal peak power - no less than 100W.



EEC-333

2. No serving battery: (AGM, GEL) energy capacity no less than 0,85 kWh (70Ah 12V). Working resource 4-5 years (in case of 50% discharge).
3. Solar charge controller: 10amp.
4. Inverter DC (Direct Current) 12 – AC (Alternating Current) 220V, modified sinusoidal, capacity no less than 100W.
5. 5W capacity LED lights with autonomous plugs and with 3-meter electric wirings.

System delivery deadline 2-2,5 months.

Technical opportunities: flat lights (4 points), charging mobile phone, radio receiver, camera, player, lantern and other small batteries.

This system is for households: the households of that category do not have permanent resident status but visit high mountainous villages in summertime for 3-4 months and have a small farm or households with permanent resident status, who are engaged in seasonal migration. (summer and winter dwelling places are separated from each other with 1-4 kilometers.

Version c) Micro Grid – average price 55000 €.

1. Minimal peak power of the solar photovoltaic total additions – 10kW
2. Solar inverter – 10 kWh
3. Battery OPzV – 40 kWh
4. Island inverter – 6 kW
5. Diesel Generator- 8 kW
6. Power distribution network and accounting nodes.

Network delivery- installation deadline 3-4 months.

Technical opportunities: room lighting – 10-15 points, TV-receiver – 100W, energy efficient fridge – 200W, washing machine and other power supply of the electric drive domestic technology up to 1000W capacity.

USAID Energy Program

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