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GEORGIA POWER AND GAS INFRASTRUCTURE OVERSIGHT PROJECT (PGIOP)

FINAL REPORT

November 2, 2012-January 30, 2015

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This final report for the Georgia Power and Gas Infrastructure Oversight Project (PGIOP) covers the period from November 1, 2012 through January 30, 2015. It was prepared by Tetra Tech, Inc. (Tt) and falls under Task Order Number AID-EDH-00-08-00027 – AID-114-TO-13-00001.

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Executive Summary

USAID's Georgia Power and Gas Infrastructure Oversight Project (PGIOP) sought to assist the Republic of Georgia in improving its electrical and gas infrastructure, which was devastated by civil war, lack of regular maintenance, and under-investment. The project supported USAID's objectives of promoting energy security and fostering sustainable development by increasing access to electricity and natural gas supplies for households in western Georgia, promoting the development of the Poti Free Industrial Zone (FIZ) on the Black Sea, and securing power exports through in-country reliability-related infrastructure improvements. The activities assigned under PGIOP were managed by Tetra Tech (Tt).

To support USAID's objectives, PGIOP provided oversight and advisory support to the 1) Georgian State Electrosystem (GSE) in the upgrade, reconstruction and operation of the Georgia Improved Power Transmission Project (GIPTP) and 2) the Georgian Oil and Gas Corporation (GOGC) in gas transit infrastructure construction and rehabilitation activities.

Tt collaborated with GSE and GOGC to implement the following infrastructure projects:

- Construction of 76 kilometers (km) of a new DN 700 (711 mm) gas pipeline from Senaki to Kutaisi.
- Replacement of 58 km of 220 kV transmission lines (referred to as Senaki I and II), which were dismantled in 1992 during Georgia's civil war.
- Restoration of the power substations in Tskaltubo and Menji to support the Senaki I and II 220 kV transmission lines.
- Construction of 43 km of new DN 700 (711 mm) gas pipelines from Gori to Kareli and from Zestaphoni to Kutaisi.

Project Accomplishments

PGIOP supported the achievement of key benchmarks in the upgrading of both the electrical transmission lines and the rehabilitation of the gas network in the Republic of Georgia. The project's main activities are summarized below.

Component I: Electricity Transmission Upgrade, Reconstruction and Operation

Georgia Improved Power Transmission Project

Tt provided multi-phase oversight and technical advisory support for the design, procurement, and construction stages of the Senaki I and II power transmission lines and rehabilitation activities at

the Menji-Senaki and Tskaltubo Substations. Professional engineering services and technical support were also provided to Sakernergoremonti (SER) and GSE to ensure that all processes, procedures and reporting mechanisms met international standards. In the post-construction phase, Tt supported USAID and GSE to ensure that testing, commissioning, and energization were performed safely and successfully. The rehabilitation activities were critical for the operation of the electrical transmission network throughout and between eastern and western Georgia. As a result of PGIOP's successful collaboration with GSE and SER, the Menji-Senaki and Tskaltubo Substations were completed in June 2014 and the lines were successfully energized. The lines are now an integral component of the Georgia power grid.

Dissolved Gas Analyzer (DGA) Activity

Tt provided oversight management services for the procurement and installation of a dissolved gas analyzer (DGA) system. The final installation and testing of the system were completed in March 2014 and GSE is now able to remotely gather data from the relevant substations and monitor the system from the National Control Center (NCC) in Tbilisi.

Enhanced Emergency Control System (EECS) Activity

Tt provided daily independent on-site reviews of GSE's construction contractors, as well as their management and processes. PGIOP also offered comprehensive technical support to GSE in identifying, procuring and installing an EECS-smart grid network. In spring 2012, Tt oversaw the tendering process for the system; the contract was awarded to Schweitzer Engineering Laboratories, Inc. (SEL) in fall 2012. In January 2014, the factory acceptance tests (FAT) for Phase II were successfully completed and the EECS system became officially operational on March 27, 2014.

GSE Substations Rehabilitation Activity

Tt provided oversight and technical assistance to GSE on the procurement (including equipment delivery verification and installation) of protection and control systems equipment for ten substations as well as switchgears for 12 substations. At the close of the project, Tt prepared a report for USAID and GSE assessing the progress and quality of GSE's implementation of substation works.

Component II: Gas Transit Infrastructure Construction, Replacement and Rehabilitation

PGIOP provided program management oversight for GOGC on the full tender, procurement and construction of critical segments in the east-west gas pipeline. These major capital projects were monitored to ensure that they were completed on time, within budget, in conformance with design criteria, and built to approved plans and specifications. Tt also worked with GOGC to guarantee that these activities were implemented both efficiently and effectively.

Abasha-Senaki Pipeline (Phase II) Activity

This activity began under PGIOP's predecessor project, USAID's Power and Gas Infrastructure Project (PGIP). Under PGIOP, Tt provided program management oversight for GOGC on the survey, design, tendering, procurement and construction of the new 29 km Abasha-Senaki DN 700 (711 mm diameter) pipeline.

Kutaisi-Abasha Pipeline (Phase III) Activity

The focus of this activity, which began under PGIP, was to ensure management oversight for GOGC of the survey, design, tendering, procurement and construction, and drying activities for the new 47 km Kutaisi-Abasha DN 700 (711 mm diameter) pipeline. GOGC also introduced a new technology, horizontal directional drilling (HDD), to support the construction of this pipeline segment, which proved to be more efficient and environmentally friendly than alternative technologies.

Gori-Kareli and Zestaphoni-Kutaisi Pipelines (Phase IV) Activity

The survey, design, and tendering for the Gori-Kareli and Zestaphoni-Kutaisi pipeline segments were completed under PGIP. PGIOP provided management oversight for GOGC on the procurement, construction and drying activities of these projects. The two new DN 700 (711 mm diameter) pipeline segments were approximately 43 km in length and were completed by the close of 2014.

By December 31, 2014, all of these pipeline segments, with the exception of the Gori-Kareli segment, were connected and in active service, reliably and safely supplying natural gas to households and businesses from Zestaphoni to the port city of Poti.

GOGC and GGTC Operations and Maintenance Equipment Procurement (Phase V) Activity

Extensive technical support was also provided to GOGC and GGTC in preparing and overseeing a USAID-funded equipment procurement effort. This operation and maintenance equipment has been and will be used to expand both GOGC's and GGTC's capabilities for the construction and maintenance of GOGC pipelines using internal resources.

Capacity Building and Management Subcomponent

Capacity Building and Training Activities

In line with USAID's objective of building host country capacity, PGIOP provided intensive technical assistance and formal mentoring services to GOGC and GSE through on-the-job training, informal meetings, and stakeholder workshops. Throughout the duration of the PGIOP, Tt provided 150 people with specialized trainings in the following topics: emergency enhanced control systems, dissolved gas analyzers, cathodic protection and pipeline integrity management.

Oversight & Technical Support Activity: Power Transmission and Gas Sectors

Tt provided technical advisory services and program management oversight to GSE and GOGC for contracts and agreements related to gas and power infrastructure rehabilitation. It also provided guidance and technical assistance to USAID, counterparts and contractors in the areas of engineering, design, construction management and supervision. In addition, Tt's technical advisory services covered the preparation of bidding documents for construction and design as well as oversight of construction activities to ensure their compliance with local laws. The project's services directly supported USAID-funded procurements activities, which are described below.

USAID-Funded Procurement Activities

To meet USAID's objective of host country capacity building, Tt provided extensive support to GSE, GOGC and the Georgian State Transportation Company (GGTC) on USAID-funded procurements, including the tendering processes, the development of tender documents and technical specifications, and bid evaluations.

Long-Term Positive Impacts of PGIOP

Overall, PGIOP activities produced multiple long-term positive impacts for the Georgian people; these benefits are described in detail in the body of this report. By way of illustration:

- The construction of the Senaki I and II transmission lines and their integration into the GSE's power network were critical for the generation and consumption of power between eastern and western Georgia and in meeting the n-1 contingency alternative to the high-voltage Imereti 500 kV transmission line. Before the integration of the Senaki transmission lines, Georgia faced bottlenecks in the summer months that often led to regional outages.

- Due to the USAID-funded east-west pipeline rehabilitation and expansion, between October 2011 and December 2014, an additional 43.6 percent of customers in Poti were connected to natural gas, while the Samtredia market was reported to have reached saturation after growing by 16.4 percent.

- During the construction of the Georgia Improved Power Transmission Project (GIPTP) and all pipeline segments, none of the contractors or subcontractors experienced a time loss accident due to their adherence to USAID's and the Government of Georgia's (GoG) health, safety and environmental (HSE) standards.

In conclusion, the rehabilitation of gas pipeline and transmission networks in western Georgia provide a strong foundation for the continued development of the Georgian energy sector.

Acronyms

ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
BEO	Bureau Environmental Officer
CP	Cathodic Protection
DCVG	Direct current voltage gradient
DGA	Dissolved Gas Analyzer
DN	Diameter Nominal, standard denomination for pipe measurement
EA	Environmental Assessment
ECDA	External Corrosion Direct Assessment
EECS	Enhanced Emergency Control System
ENTSO-G	European Network of Transmission System Operators for Gas
EPC	Engineer, Procure and Construct
EU	European Union
FAT	Factory Acceptance Test
FIZ	Free Industrial Zone
GGTC	Georgian Gas Transportation Company
GIPTP	Georgia Improved Power Transmission Project
GoG	Government of Georgia
GOGC	Georgian Oil and Gas Corporation
GSE	Georgian State Electrosystem
HD	Horizontal Drilling
HDD	Horizontal Directional Drilling
ICDA	Internal Corrosion Direct Assessment
km	Kilometer
kV	Kilovolt
mm	Millimeter
NACE	National Association of Corrosion Engineers
NCC	National Control Center
NDT	Non-Destructive Testing
NOL	Letter of No Objection
OC	Oversight contractor
OD	Outside Diameter
OGCT	Oil and Gas Construction Trust
O&M	Operation and Maintenance
P&C	Protection and control
PCM	Pipe current mapping
PGIP	Power and Gas Infrastructure Project
PGIOP	Power and Gas Infrastructure Oversight Project
PIM	Pipeline Integrity Management
POWER	POWER Engineers, Inc.

QA/QC	Quality Assurance/Quality Control
ROW	Right of way
SCADA	Supervisory control and data acquisition
SEL	Schweitzer Engineering Laboratories, Inc.
SER	Sakenergoremonti (also known Georgia Energy Reconditioning)
SMSM	Sakmilsadenmsheni (also known as Georgia Pipeline Construction or GPM)
SOCAR	State Oil Company of Azerbaijan
SOW	Statement of Work
TO	Task Order
TSO	Transmission System Operator
Tt	Tetra Tech
USAID	United States Agency for International Development

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1. Introduction

This final report describes work completed under USAID Task Order AID-EDH-00-08-00027 – AID-114-TO-13-00001: Georgia Power and Gas Infrastructure Oversight Project (PGIOP). It covers the period from November 1, 2012 through January 30, 2015. For ease of reference, a comprehensive list of all project deliverables is provided in Annex I.

1.1 PGIOP Scope of Work

PGIP and PGIOP Cross-Over Activities

USAID's Georgia Power Infrastructure Project (PGIP), the predecessor project to PGIOP, began in May 2010 and ended with the commencement of PGIOP on November 1, 2012. PGIOP's scope of work comprised two components, including activities carried over from the PGIP Task Order (TO):

Component I

- Georgia Improved Power Transmission Project
- Dissolved Gas Analyzer Activity
- Enhanced Emergency Control System Activity
- Substations Rehabilitation Activity.

Component II

- Abasha-Senaki Pipeline (Phase II) Activity
- Kutaisi-Abasha Pipeline (Phase III) Activity
- Gori-Kareli and Zestaphoni-Kutaisi Pipelines (Phase IV) Activity
- Operation and Maintenance Equipment Procurement (Phase V) Activity.

Specific activities under the scope of work included, but were not limited to, the following:

- Planning
- Design
- Technical support and oversight
- Capacity building
- Collaboration with stakeholders.

The technical assistance PGIOP provided included a full range of expert engineering advice, procurement and contracting guidance, capacity building expertise, and the provision of analytical and technical support to the project's counterparts.
To implement PGIOP, Tt deployed a team of engineering professionals, technical specialists and support staff to Georgia to perform the oversight, design and technical assistance activities described below.

1.2 Detailed Work Requirements: Objectives and Components

The PGIOP project's mission was to provide in-country professional engineering and other technical services to support power and gas transmission improvements being funded by USAID on behalf of the Government of Georgia. To support this mission, the project's objectives and associated components, were:

Objective 1: Provide Oversight and Advisory Support to the Georgian State Electrosystem (GSE) in Electricity Transmission Upgrade, Reconstruction and Operation Related Issues.

Objective 2: Provide Oversight and Advisory Support to the Georgian Oil and Gas Corporation (GOGC) on Gas Transit Infrastructure Construction, Replacement and Rehabilitation Related Issues.

These objectives were achieved through the implementation of two components and associated activities:

PGIOP Components		
Component	I Electricity Transmission Upgrade, Reconstruction and Operation	II Gas Transit Infrastructure Construction, Replacement and Rehabilitation
Activities	▪ Georgia Improved Power Transmission Project (the Senaki I and II Power Lines and related bay works in substations)	▪ Abasha-Senaki Gas Pipeline (Phase II)
	▪ Dissolved Gas Analyzers (DGA)	▪ Kutaisi-Abasha Gas Pipeline (Phase III)
	▪ Enhanced Emergency Control System (EECS)	▪ Gori-Kareli and Zestaphoni-Kutaisi Pipelines (Phase IV)
	▪ GSE Substations Rehabilitation Projects	▪ GOGC/GGTC Operations and Maintenance Equipment Procurement (Phase V)
	Capacity Building and Management: GSE, GOGC and GGTC	

The remainder of this report describes the major activities under each objective (Section 2), the results achieved (Section 3), reports produced (Section 4), and health, environment and safety activities (Section 5). The final section presents recommendations for future program areas, with a focus on Component II activities.

2. Activities Undertaken to Achieve Program Objectives

Tt provided extensive oversight management and technical assistance to ensure that PGIOP activities achieved continuing progress.

2.1 Component I: Electricity Transmission Upgrade, Reconstruction and Operation

This component's activities focused on the design and reconstruction of the 220 kV Senaki twin chain power lines, and the rehabilitation of the Menji and Tskaltubo Substations to support the Senaki lines, the implementation of smart grid control mechanisms (dissolved gas analyzers and an enhanced emergency control system) and substation rehabilitation to improve efficiencies and reduce risks in transmission management. The key benchmark achievements under each activity are detailed in Section 3, "Results Achieved by Component."

Georgia Improved Power Transmission Project

The purpose of this activity was to provide oversight management and technical advisory services for the design and construction of the Georgia Improved Power Transmission Project (GIPTP). In 2010, USAID committed to supporting this project, in which GSE would rehabilitate and renovate the east-west power transmission network to enable the stable and secure supply of energy throughout Georgia. These rehabilitations were deemed critical for the operation of the electrical transmission network throughout the country and between eastern and western Georgia.

In consultation with GSE and other key stakeholders, USAID decided to fund the construction of the 57.8 km Senaki I and II power lines, with the intention of connecting the east-west power transmission network through the Menji-Senaki 220 kV Substation and the Tskaltubo 220 kV Substation. Before the project began, only nine towers remained of the original 211, and all facilities required replacement.

The GIPTP was selected as a priority because it targeted the replacement and repair of critical components of the Georgian electricity system. The original intent was to rebuild the line to its original configuration along the same right of way (ROW), with updates as needed to meet current local codes and industry standards.

In May 2010, USAID contracted Tt as an oversight contractor to support it and GSE in the preparation of preliminary and conceptual designs and technical specifications, and for advisory

services through the procurement and tendering stages of GIPTP. Tt subcontracted POWER Engineers (POWER) to supplement its professional engineering and technical advisory functions for this endeavor.

In addition, in order to create an effective scope of work (SOW) for the GIPTP construction, Tt performed survey work and devised an environmental assessment (EA) process. The EA process began in late 2010 with Tt performing both a ground survey and a geotechnical investigation. Afterwards, Tt worked with USAID to tender the geological and topographical survey work. The procurement process was performed in a competitive and transparent manner; the tender was published in February 2011 and awarded to Basiani 93 in March 2011. Basiani 93 completed its work in July 2011 and its comprehensive EA report was submitted to USAID in August 2011. This report supported the design process while providing the environmental guidelines for the SOW.

In addition, Tt and GSE identified and defined specific design criteria for the Senaki I & II transmission lines' construction while also developing the project plan, final design criteria, project schedule, and conceptual design plans. The final design criteria documents for the Senaki I & II 220 kV lines as well as the related bay works in Menji and Tskaltubo Substations were completed in July 2011.

Also in 2011, the procurement and tendering of GIPTP proceeded with Tt supporting USAID to ensure the process was transparent and fairly competed. In March 2012, USAID awarded the engineer, procure, and construct contract to SER and issued a notice to proceed in November 2012. The design criteria documents Tt prepared provided a framework for the final SOW awarded to SER.

At the time of award, the conceptual design documents, such as texts, conceptual design drawings, tables, and surveys, were provided to SER. In addition, GSE obtained land and easements for the ROW and SER was tasked with preparing the remaining engineering detailed design drawings, field drawings and shop design to complete the project.

However, almost immediately after the contract award, SER's weaknesses in design capacity became apparent, as it was unable to produce a final design on PLS-CADD. SER asked to use Tt's original PLS-CADD model (created during the EA) as the final model; USAID and Tt did not approve SER's request. As such, the design stage was halted as USAID and Tt worked with SER to facilitate a proper design process. The issue was resolved when SER hired an external consultant to build the PLS-CADD model and the project restarted once the design was approved.

In accordance with contractual obligations, SER submitted the final design documents for review from December 2012 through January 2013. Tt also evaluated all drawings and specifications to ensure proposed construction activities adhered to the contractual obligations. For instance, in response to USAID's request to submit an assessment of the GIPTP procurement requirements and the status of the procurement process, Tt prepared and submitted a manual inventory and tabulation of GSE's overhead lines drawings, which were given to SER.

Throughout the construction period, Tt was responsible for providing guidance to USAID, GSE and SER to ensure that the GIPTP contract and construction activities adhered to best international and national standards and legal frameworks. In addition, Tt maintained effective coordination and communications among USAID, GSE and SER to facilitate the resolution of all potential issues related to construction activities, documentation, and/or contractual obligations.

To promote transparent communication and ensure that document management and reviews were collaborative, Tt recommended using the Project Web Collaboration system. It also instituted a vendor submittal system to generate and maintain a permanent record of all project submittals, dispositions and associated comments. Under this system, the design documents were grouped into submittal packages and SER was required to revise and resubmit each complete document package until the entire package was returned with a no-objection letter (NOL) from Tt. This process ensured that all relevant parties were able to review and comment upon all documents, reports and designs.

As the construction progressed, several issues arose between GSE and two large landowners concerning land borders and tower locations. Subsequently, USAID, with Tt's assistance, engaged the Ministry of Energy to secure SER's access to these areas, and thus resolved these issues in a manner acceptable to all parties. The ROW issue halted the construction of tower foundations on the landowners' property until September 2013.

By March 2014, SER had substantially completed the construction of the Senaki I & II transmission lines, which included 211 new towers, some of which were installed in difficult terrain, and the installation of new equipment at the Menji and Tskaltubo substations.

In April and May 2014, Tt conducted a complete review and inspection of the Senaki I & II construction and quality of works, and prepared a punch-list, which was provided to SER and other stakeholders so that SER could remedy the construction defects identified. In parallel, Tt provided extensive assistance to SER's subcontractors to perform pre-energization and post-energization tests at the substations. During the outdoor equipment testing, a manufacturing defect with the breakers was identified and the breakers were removed from service. Subsequently, SER coordinated with its subcontractor ABB and the breakers were repaired or replaced.

Workmen constructing a 220 kV tower in the Imereti Region

Extensive reviews of the relay operating logic and system settings were performed. After several discrepancies and irregularities were identified, Tt facilitated discussions between SER and GSE and resolved the issues.

During late May and early June 2014, Tt performed follow-up inspections to confirm that corrective actions had been taken by SER to resolve punch-list items identified during the pre-commissioning and commissioning efforts. In addition, the oversight team visited tower sites and coordinated with SER and GSE to document the actions taken.

In June 2014, Tt observed pre-commissioning tests of the substations' primary equipment, confirming satisfactory operation of all apparatus prior to commissioning. During this process, some minor adjustments were required to the air break and ground switches to ensure long-term reliable operation.

In addition, Tt performed a detailed review of the primary equipment manufacturing and site test reports as well as the protective relay operating logic and settings. To confirm proper operation of the protection system, Tt observed the operation of protective element functions while SCADA-related commissioning efforts were performed by others.

While testing to confirm the consistency of phases, Tt determined that phase identification at Tskaltubo Substation was different from that at Menji Substation. The Menji phases A and B were found to be transposed and all three phases in reverse rotation, relative to Tskaltubo. To solve this issue in an effective and timely manner, SER modified the overhead connections to ensure phase consistency. In addition, control panel wiring was revised to allow proper operation of the protection system, including indications of line instrument measurements, alarms and fault clearing.

SER took the following corrective actions to resolve all items on the pre-commissioning punch-list:

- Replacement of signage
- Re-grading of tower sites
- Replacement of dead end tower jumpers
- Correction of insulator jumper strings
- Installation of tower base shims
- Additional ROW clearing
- Clarification of various manufacturer and test report submittal data.

With the completion of all critical punch-list items, the transmission and substations systems were deemed substantially complete. On June 6, 2014, Tt issued separate NOLs for energized testing of the substations and transmission system. On June 9, the transmission lines and substations passed the tests, and on June 10 the lines were declared commercially operational and formally under dispatcher control.

To ensure that SER resolved the remaining primary and tertiary punch-list items, a team of Tt, SER, and GSE staff inspected the transmission lines from June 11-13, 2014. Based on this inspection, GSE developed and distributed a punch-list to all relevant parties on June 16. SER utilized this list to complete final construction activities. On July 2, GSE's review commission submitted its final punch-list and on July 15 provided final as-built drawings. The closeout of all remaining primary and tertiary punch-list items was completed before the Tt oversight team issued a NOL for final turnover of the assets to GSE in July 2014.

Dissolved Gas Analyzer (DGA) Activity

The focus of this activity was the continued provision of oversight management services for the installation and effective use of a DGA system. This monitoring system maximizes the service life of transformers by monitoring the gas concentrations in dielectric transformer fluids in real time across the network and benchmarking those concentrations against industry standards to predict potential failures before they occur. The installation of this system thus met USAID's objective of assisting GSE in order to support the prolonged and productive life of transformers and critical substation equipment.

DGA measurements are accessible, via display monitors, to relevant substation operators and the Tbilisi-based National Control Center (NCC), while LumaSense (the vendor for the DGA system) will be available through March 2016 to monitor readings from its US-based offices.

Enhanced Emergency Control (EECS) System Activity

The focus of this activity was to provide oversight management and comprehensive technical support to GSE in identifying, procuring and installing an EECS-smart grid network. This new technology increased the reliability and efficiency of the Georgia transmission grid by eliminating redundancies in power production and dispatch.

GSE Substation Rehabilitation Activity

USAID and GSE undertook upgrades and modifications to rehabilitate 12 substations in the Georgian transmission and distribution systems. The scope of these activities included the replacement of existing relay protection and control (P&C) system equipment with microprocessor-based devices in 10 substations, the replacement of existing medium-voltage switchgear at 12 substations, and the integration of all new equipment to local human-machine interface panels at each substation and supervisory control and data acquisition (SCADA) at the Tbilisi NCC. All equipment was supplied pre-installed in modular enclosures.

GSE provided the design and has begun with the installation, testing, and commissioning of the subject relay and control and switchgear enclosures and equipment. GSE has contracted the P&C and switchgear vendors (SEL and Siemens, respectively) to provide integration of the substation sites. GSE intends to complete the commissioning and integration of some of the substations, under SEL and Siemens supervision, using in-house technical expertise.

Protection and control containers, GSE substation

Siemens switchgear containers at Gardabani Substation

Installation of switchgears at Gardbani Substation

In November 2014, Tt assessed the progress of GSE in the construction and commissioning of P&C system modifications at 10 substations and the installation of medium-voltage switchgear at 12 substations. The assessment included:

- A review of construction and commissioning schedules with GSE
- An evaluation of physical construction progress
- An assessment of the quality of construction
- Preparation of an assessment visit closeout report.

During the assessment, Tt met with GSE to review SCADA operations at the NCC and to review construction and commissioning schedules for each site. Project milestones and progress toward milestone completion were discussed. Site visits were performed at Gldani, Rustavi, Marneuli, Gori, Khashuri, Kutaisi, and Menji substations.

The assessment found that major construction and commissioning activities were complete at the Gldani and Kutaisi substation sites, while commissioning at Rustavi, Marneuli, and Menji substations was actively underway and scheduled for completion by the end of December 2014.

Based on the review of work in progress, the commissioning teams and substation staff appeared to be appropriately qualified to execute the tasks to which they were assigned. In general, construction was found to have been completed in a professional and workmanlike manner. Based on observations from site visits, interviews with key construction and commissioning personnel, and reviews of GSE's project schedule, the construction and commissioning of the 10 protection and control and 12 switchgear systems could be completed by the end of July 2015, but would require GSE to amend the current work approach or add additional resources.

In response to USAID's request, an international engineering/system adviser was assigned by GSE to provide project management oversight and support to GSE's project manager. In September 2014, with Tt's assistance, the adviser established a process and developed tools for project scheduling and progress monitoring and reporting. The GSE project management team performed very well in managing the projects.

As an example, one program management tool implemented was an internal GSE assessment of planned vs. actual (time and manpower) works for the two substations where GSE had completed the installation and commissioning of equipment. This information was used for estimating the time and manpower required for the works in the remaining substations. GSE has developed a project schedule for each substation, including installation, commissioning, and integration of equipment supplied by both SEL and Siemens, and the integration of equipment with the distribution companies.

The following project management tools were utilized for the substation projects:

- Microsoft Project schedule for each substation, and for all substations combined
- S-curve for each substation, tracking actual progress and projected completion date
- Weekly status report, including activities/accomplishments, equipment delivery, installation and commissioning work for each substation, S-curve for each substation, updated project schedule as needed, and plans for the following week.

2.2 Component II: Gas Transit Infrastructure Construction, Replacement and Rehabilitation

In this component, PGIOP provided program management oversight on behalf of GOGC for the full tender, procurement, and construction of critical segments in the east-west gas pipeline. Specially, Tt and GOGC monitored these major capital projects and their progress to ensure the projects were on time, within budget, in conformance with design criteria, and constructed to approved plans and specifications. Major activities under this component included the replacement of 12 km of undersized pipeline sections with new DN 700 pipeline, the rehabilitation of 48.3 km of leaking DN 500 (508 mm OD) pipeline through the construction of 71 km of a new DN 700 loop pipeline segment between Abasha and Kutaisi, and the construction of the 20 km, DN 700 Gori-Kareli and the 23 km, DN 700 Zestaphoni-Kutaisi pipeline segments.

The Poti-Senaki (Phase I) gas pipeline was constructed and put into service in October 2011 under PGIP. The tendering, procurement and construction activities for the Abasha-Senaki segment (Phase II) and the Kutaisi-Abasha segment (Phase III) began under PGIP, with construction continuing for Kutaisi-Abasha under PGIOP. The final acceptance for Phase II took place in April 2013, while Phase III was completed in April 2014. Survey, design and tender-related activities were conducted under PGIP for the Gori-Kareli and Zestaphoni-Kutaisi Phase IV pipelines, while construction commenced and was completed during PGIOP. The project activities and objectives were the same for both task orders.

At the end of the project, USAID supported the GOGC on the provision of 149 km of new gas pipeline infrastructure.

This component's activities and scope directly supported USAID's assistance objectives in the areas of economic growth and energy security. For instance, GOGC will continue building similar projects in the coming years, with the final activity being the installation of a new pipeline from Zestaphoni to Kareli and another segment from Gori to Sagaramo using GOGC funding. The completion of this project will increase the pipeline's delivery capacity from 0.4 B m^3 per year to approximately 2.4 B m^3 per year, securing reliable and safe delivery capacity of natural gas from Tbilisi to Poti. The achievements of the project are described in detail in Section 3, "Results Achieved by Component."

Abasha-Senaki Pipeline (Phase II) Activity

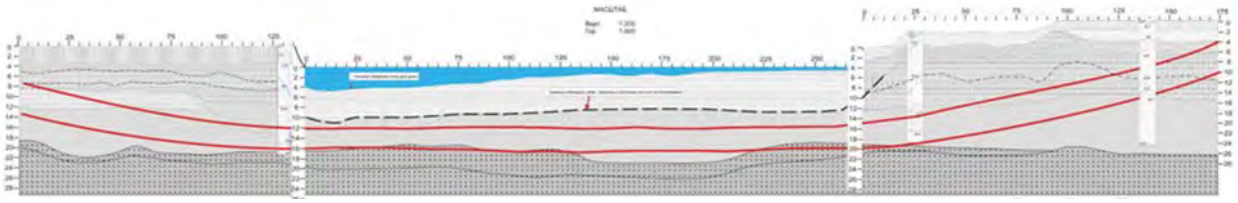
Here, PGIOP provided program management and technical advisory services to GOGC in the survey, design, tendering, procurement and construction activities for the new Abasha-Senaki 29 km long, DN 700 pipeline.

Kutaisi- Abasha Pipeline (Phase III) Activity

Under this activity, PGIOP provided program management and technical advisory services to GOGC in the tender, bidding, materials procurement, survey, design and initial construction activities on the new 47 km Kutaisi-Abasha DN 700 pipeline. Of particular significance, work included the development of plans for performing horizontal directional drilling (HDD) of the Rioni River Crossing. This is the first time that this technology had been used for pipeline construction in Georgia. Tt provided oversight of the development of the design of the HDD implementation plan, which included performing ground penetrating radar surveys of the proposed route to facilitate the safe routing of the pipe and develop a drilling plan for implementation by the construction

contractor. The resulting design specified a 570 m boring, reaching a maximum depth of 20 m below grade.

PGIOP provided these services to GOGC for the final completion of the construction and drying of this 47 km DN 700 segment, which was completed in April 2014.



HDD horizontal boring profile plan

Gori-Kareli and Zestaphoni-Kutaisi Pipelines (Phase IV) Activity

In this activity, PGIOP provided program management of the construction, processes and procedures for these pipeline segments, while also advising directly on construction methodologies. Construction began on the 23 km DN 700 Zestaphoni-Kutaisi segment and the 20 km DN 700 Gori-Kareli segment in March and April 2014, respectively. All construction works were completed by the close of PGIOP.

Work included the interconnection of all phases of the pipeline construction, including purging and loading of natural gas and the interconnection of all sales laterals to ensure an uninterrupted supply of gas and increased capacity to communities in western Georgia.

Pipeline lowering using excavators, Zestaphoni-Kutaisi pipeline segment

Welders working on a pipeline segment, Zestaphoni-Kutaisi

GOGC and GGTC Operations and Maintenance Equipment Procurement Activity

The focus of this activity was to provide support and oversight services to GOGC and GGTC for O&M equipment procurement. The equipment will be used to expand both GOGC's and GGTC's capabilities for the construction and maintenance of their pipelines using local resources. Additional oversight activities for the equipment procurement process included:

- Developing equipment lists
- Prioritizing equipment pieces per organizational and operational needs
- Jointly preparing equipment specifications
- Jointly preparing an internationally acceptable standard contract
- Reviewing bidding documents, and directly observing the tendering process and evaluation of the bids
- Verifying equipment delivery schedule, arrival, and acceptance with GOGC personnel.

USAID procured heavy construction equipment for pipelines at GOGC's Lilo Warehouse

2.3 Capacity Building and Management Subcomponent

Three activities were implemented under this subcomponent:

Capacity Building and Training Activities

As the oversight contractor, Tt provided capacity building assistance to GOGC and GSE through on-the-job training, informal meetings and stakeholder workshops. During the course of the project, Tt also evaluated each organization to determine its capacity assistance needs and proposed interventions to USAID for approval.

Specifically, after evaluating the technical capability and awareness of GOGC and GGTC personnel in the area of cathodic protection (CP) systems, Tt provided a CP specialist to support the acquisition of technical skills and knowledge at GOGC and GGTC. In addition, Tt completed an analysis of the pipeline maintenance rules currently utilized by GGTC for the operation and maintenance of the pipelines owned by GOGC. It also provided technical advisory services to GOGC and GGTC to develop a pipeline integrity management program (PIM).

Oversight and Technical Support Activity: Power Transmission and Gas Sectors

Tt provided project management oversight for contracts and agreements related to power and gas infrastructure rehabilitation. It also provided guidance and technical assistance to USAID, counterparts and contractors in the areas of engineering, design, construction management and supervision. In addition, Tt provided technical advisory services in the preparation of bidding documents for construction and design as well as oversight of construction activities to ensure their compliance with local law.

USAID-Funded Procurement Activities

During the course of the PGIOP project, Tt managed the timely preparation of detailed engineering designs, plans and cost estimates for USAID-funded procurement activities. Tt ensured that all designs complied with appropriate national standards, while always adhering to best international engineering standards. In addition, Tt provided high-caliber, professional engineering and technical guidance in the execution of power and gas activities. These activities encompassed all aspects of energy infrastructure projects, from conceptualization and analysis through approval.

3. Results Achieved by Component

3.1 Component I: Electricity Transmission Upgrade, Reconstruction and Operation

Georgia Improved Power Transmission Project

Tt provided oversight management and technical advisory services to support the complete design, construction, commissioning and energization of the Senaki I & II transmission network and the comprehensive rehabilitation of the Menji and Tskaltubo Substations. It also supported effective coordination among GSE, SER and SER's subcontractors to achieve the following benchmarks:

- 211 new towers were constructed.
- The Menji and Tskaltubo Substations were rehabilitated with primary equipment fully installed.
- Testing, commissioning, and energization of all equipment at both the Menji and Tskaltubo Substations were completed successfully.
- All parties witnessed the successful testing, energization, and operation of the Senaki I and II transmission lines and related substations on June 9, 2014.
- Outstanding construction punch-list items were resolved in a satisfactory manner by the close of the third quarter 2014.
- In September 2014, all relevant parties signed the GIPTP acceptance act, officially acknowledging the transfer of ownership of the Senaki I & II transmission lines and new primary equipment pieces in the Menji and Tskaltubo substations to GSE.
- USAID and Tt supported both SER and GSE to develop program management tools and skills to manage large-scale construction projects.

Following the safe and successful testing and energization of the Senaki I and II lines and related substations on June 9, 2014, Tt provided NOLs to USAID verifying that the transmission lines and relevant substations were ready for operation. On June 10, 2014, the power lines officially became an integrated part of GSE's high-voltage transmission grid and are supporting the secure and reliable supply of energy to households and businesses throughout Georgia. On August 27, representatives from the US Embassy, USAID, GSE, SER and PGIOP gathered at Menji and Tskaltubo Substations for the GIPTP In-Service Power Event to officially celebrate the completion of the Senaki I & II transmission lines.

Dissolved Gas Analyzer (DGA) Activity

In 2014, the final installation and testing of the DGA system were completed and GSE is now remotely gathering data from the relevant substations and monitoring the system from the NCC in Tbilisi. In March 2014, GSE, USAID, LumaSense and Tt signed the DGA acceptance act, marking the completion of the project and handover of the DGA system to GSE. The asset ownership transfer from USAID to GSE was signed in September 2014.

Tt continued to oversee the DGA project to ensure its successful implementation and also provided technical assistance to GSE. LumaSense's equipment warranty will continue through March 2016,

which also includes supporting and guiding GSE and remotely monitoring relevant data from its US-based office.

Enhanced Emergency Control System (EECS) Activity

Tt provided oversight management to GSE and SEL to install, test and commission EECS equipment at all planned GSE substations. In January 2014, a GSE/SEL team completed the factory acceptance tests (FAT) for Phase II, while the testing and commissioning of the EECS at all GSE substations (except Samux and Batumi) was completed in March 2014. A protocol was signed by USAID, GSE, SEL and Tt, declaring the EECS Phase II functional as of March 26, 2014. The EECS system became officially operational on March 27.

To ensure GSE's software and system were fully updated and prepared for all documented contingencies, an SEL engineer traveled to Georgia from June 1 through June 4 to oversee the system's final software upgrades and to provide training on safe and secure password management. On June 3, SEL gave a presentation to USAID, GSE, and Tt on the EECS system, its operational capabilities and potential long-term predictive capacities. Finally, to effectively support project close-out, Tt worked with SEL and GSE to address all punch-list items, which were resolved in June 2014, marking the close of the EECS project and its official handover to GSE. The ownership of the EECS assets was transferred to GSE in August 2014.

GSE Substation Rehabilitation Activity

Tt provided oversight and technical assistance to GSE on the procurement (including equipment delivery verification and installation) of protection and control systems equipment for ten substations as well as switchgears for 12 substations. At the close of the project: 1) Tt inspected and provided a NOL to USAID for payment for delivery of SEL equipment at all 10 substations, 2) GSE completed the installation and commissioning of P&C equipment at 5 substations, 3) Tt inspected the switchgear equipment delivered by Siemens at all 12 substations and provided USAID with a NOL for payment, and 4) Tt prepared a report for USAID and GSE assessing the progress and quality of GSE's implementation of substation works.

3.2 Component II: Gas Transit Infrastructure Construction, Replacement and Rehabilitation

Because the Poti-Senaki pipeline (Phase I) segment was put into service in 2012, Phases II-IV are reviewed here. At the close of the PGIOP project, all pipeline segments were filled with gas and put into service. An additional project success was that all construction activities were carried out safely, in adherence with USAID standards, resulting in no lost time due to accidents or injuries.

Abasha-Senaki Pipeline (Phase II) Activity

Tt provided comprehensive support services in the tendering, procurement, equipment delivery, and construction preparation of the 29 km Abasha-Senaki pipeline. GOGC awarded the construction of this segment to the Oil and Gas Construction Trust (OGCT) and construction began in late June 2012. Tt's oversight activities for this section included reviewing and commenting on tender documents for various materials and reviewing the bids for the construction activities.

The project was successful in completing aerial crossing of the Nogela and Tsivi Rivers. Originally, GOGC and OGCT intended to bypass these rivers by way of underground piping, but, after Tt performed pit boring, the ground was found to be unstable. GOGC then altered its original designs and drawings to integrate new plans for aerial crossings of both rivers. After GOGC's new designs were approved by the Ministry of Economic and Sustainable Development, construction activities resumed and the aerial crossings were successfully completed. Tt provided management oversight throughout this process by reviewing GOGC's new designs and drawings while also overseeing the status of pipeline construction activities. The Abasha-Senaki pipeline segment was completed in 2013.

Kutaisi-Abasha Pipeline (Phase III) Activity

The contract for the construction and rehabilitation of the 47 km Kutaisi-Abasha pipeline segment was awarded to SMSM in October 2012. Construction commenced immediately and was completed in April 2014. Tt's assistance ensured that the project reached key construction

benchmarks by introducing effective processes and procedures, providing advice on construction methodologies, and reviewing equipment operations and maintenance.

Of note, Tt supported both GOGC and SMSM in reaching the major construction benchmark of implementing the first successful horizontal directional drilling (HDD) operation in Georgia. To complete this operation, special drilling equipment was shipped from the USA, which arrived in February 2013. During the pre-tendering and implementation stages, Tt provided oversight and technical assistance to GSE on the procurement (including equipment delivery verification and installation) of protection and control systems equipment for ten substations as well as switchgears for 12 substations. At the close of the project, Tt prepared a report for USAID and GSE assessing the progress and quality of GSE's implementation of substation works.

For instance, Tt reviewed and provided comments on the revised method statement provided by Belaktris, SMSM's subcontractor. In addition, during the construction phase, the Tt team's field coordinators oversaw construction and provided technical assistance during regular site visits. The HDD of the Rioni River was completed on July 1, 2013 when Belaktris completed pulling the DN 700 pipe itself under the river.

Tt also oversaw the completion of the remaining 700 meters of the pipeline between the Rioni River crossing and the tie-in to the start of the Phase II Abasha-Senaki gas pipeline, which was completed in December 2014.

When nearing the completion of this segment, a critical issue was observed regarding the drying of the Abasha-Senaki pipeline segment. Per Tt's recommendation, GOGC provided USAID with the

relevant dew point readings, which demonstrated that the pipeline segment was dried to an acceptable level. Afterwards, Tt provided a NOL verifying that the pipeline had dried to an acceptable level in accordance with international best practices.

Gori-Kareli and Zestaphoni-Kutaisi Pipelines (Phase IV) Activity

These two new pipeline segments are DN 700 pipe, approximately 43 km in length, and were completed in late 2014.

In March 2014, SMSM began constructing the Zestaphoni-Kutaisi segment, under the supervision of GOGC, and completed construction on September 30. Following completion, the segment was dried and then, on November 30, it was connected to the Abasha-Kutaisi segment. On December 1, 2014, the pipeline segment was put into service by means of connection to the existing east-west pipeline (500 mm) near Zestaphoni. These newly rehabilitated pipeline connections are expected to more than double the delivery capacity from Zestaphoni to Poti at the current delivery pressure.

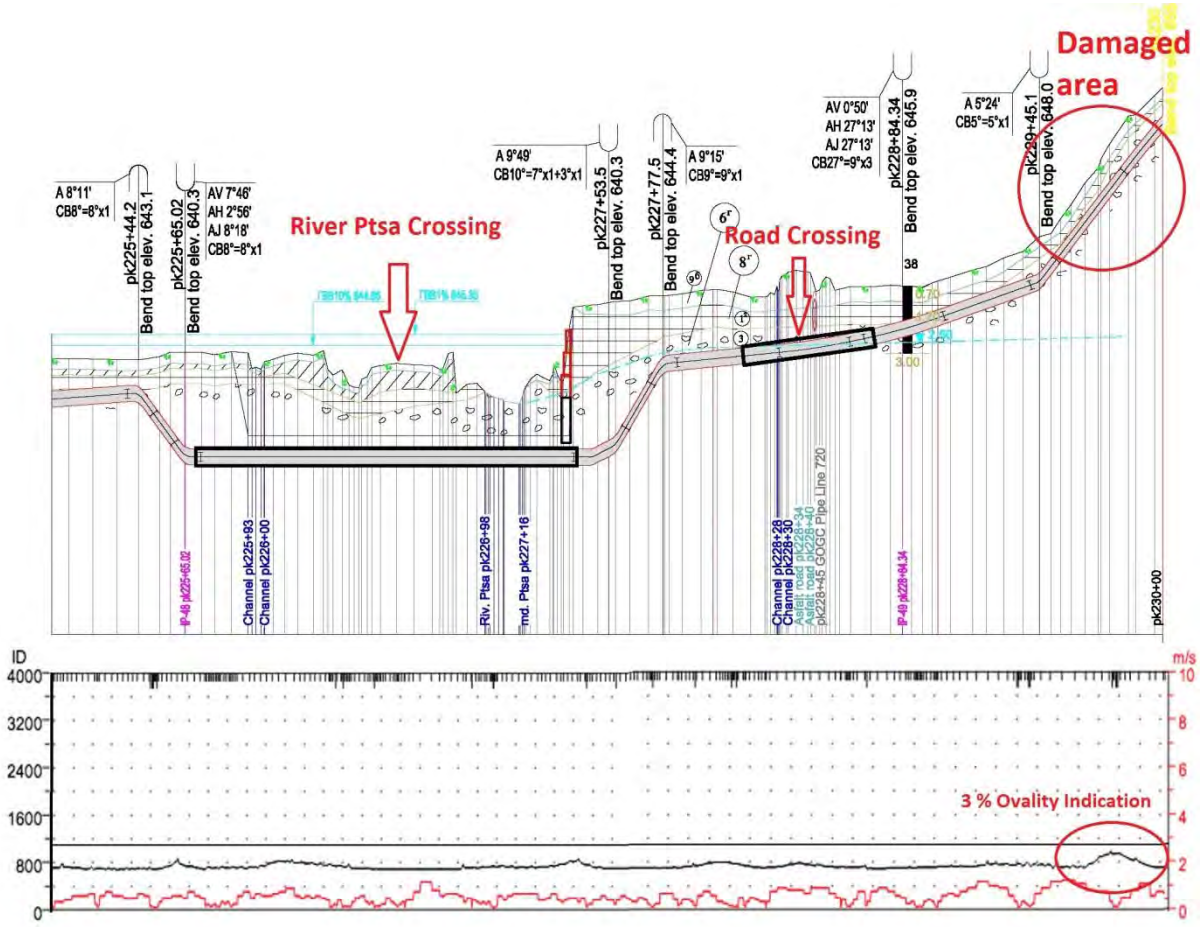
In April 2014, AHM Enerji, the contractor for the 20 km Gori-Kareli segment, began construction of the pipeline. After experiencing several initial delays, construction activities, including drying and pigging activities, were completed on December 10, 2014. The pipeline segment will be put into service in 2015 when all segments are connected following the completion of other GOGC rehabilitation works.

Tt's assistance ensured that this activity reached key construction benchmarks by introducing effective processes and procedures, providing advice on construction methodologies, and reviewing equipment operations and maintenance. Through effective collaboration with GOGC, SMSM and AHM Enerji, the following construction benchmarks were achieved:

- River Krivila aerial crossing
- River Cholaburi aerial crossing
- River Ptsa open cut crossing
- HD Crossings: SMSM used this technology to cross the east-west Zestaphoni-Kutaisi highway (E-60) as well as the main east-west Georgian Railway line.

In addition, due to an undetermined construction anomaly found during a cleaning process with a gauge pig, a decision was made to employ an intelligent caliper pig to locate and define the severity of the anomaly.

Intelligent caliper pig, Gori-Kareli pipeline segment



Pipeline alignment sheet with superimposed caliper tool data

After its first "run," the caliper pig found a 3 percent ovality within two pipe joints, which was within the acceptance criteria. This resulted in cost savings, as no repairs were necessary. This was the first time that this type of pig was used for construction quality control by GOGC.

All pipeline segments between Zestaphoni and Poti were connected and were placed in active service on December 1, 2014. The Gori-Kareli pipeline segments are in ready storage pending the completion of rehabilitation works by GOGC in 2015.

Measurable Impacts

Following the completion of the pipeline segment from Poti to Senaki in 2011, the design delivery capacity to Poti was 6.450 M m^3 per day or 2.354 B m^3 per year, and contained approximately 121,000 m^3 of line pack at 12 bar pressure in Senaki. The capacity was restricted to 0.955 M m^3 per day or 0.349 B m^3 per year, due to upstream operating constraints. The total line pack for this system is 891,000 m^3. These restrictions are being eliminated by the rehabilitation of the Georgian east-west pipeline.

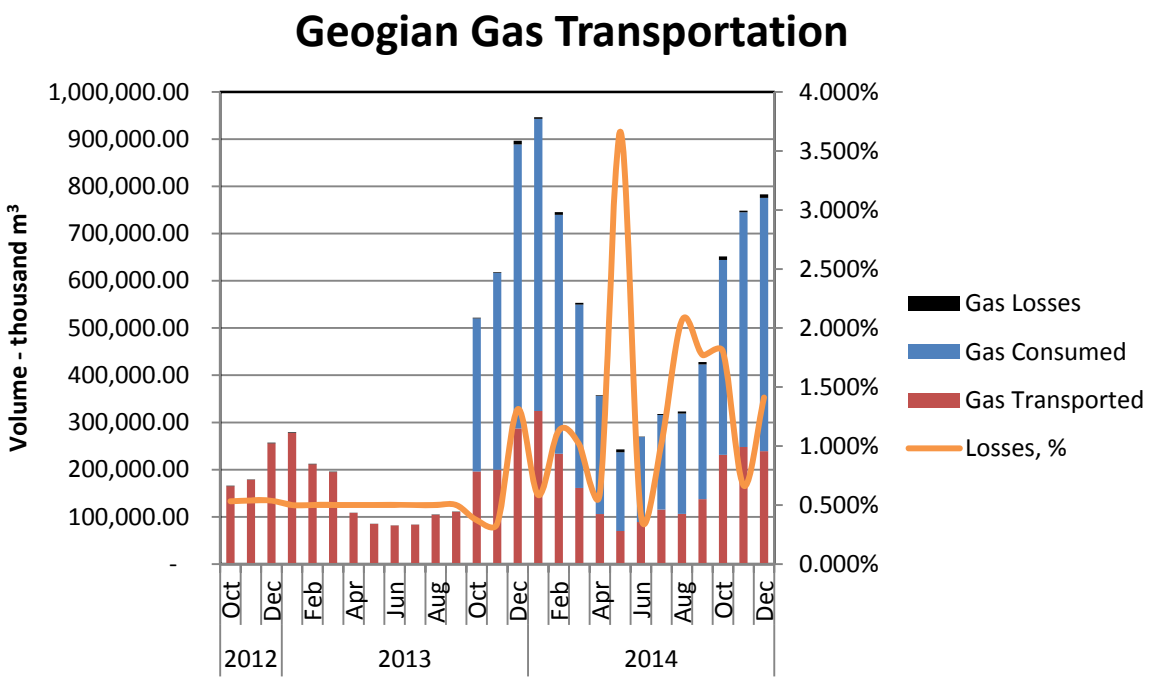
By connecting the recently completed USAID-funded pipeline segments and operating them at the same pressure as a loop line in parallel with the old east-west pipeline, the delivery capacity has increased, due to eliminating the flow restriction of using the upstream DN 500 line from Zestaphoni to Senaki. Following the full in-service usage of the rehabilitated east-west pipeline, the capacity has been increased to 3.136 M m^3 per day or 1.145 B m^3 per year with a line pack volume of 1,306,000 m^3.

Once all planned pipeline rehabilitation activities are completed in 2016, USAID's support will have helped increased the capacity of gas to western Georgia by eliminating restrictions by adding loop lines. When this system is operated at 12 bar, its delivery capacity will be 6.764 M m^3 per day or 2.469 B m^3 per year with a line pack volume of 2,078,000 m^3. This will result in increasing delivery capacity more than 6.5 fold and increasing line pack more than 2.3 times.

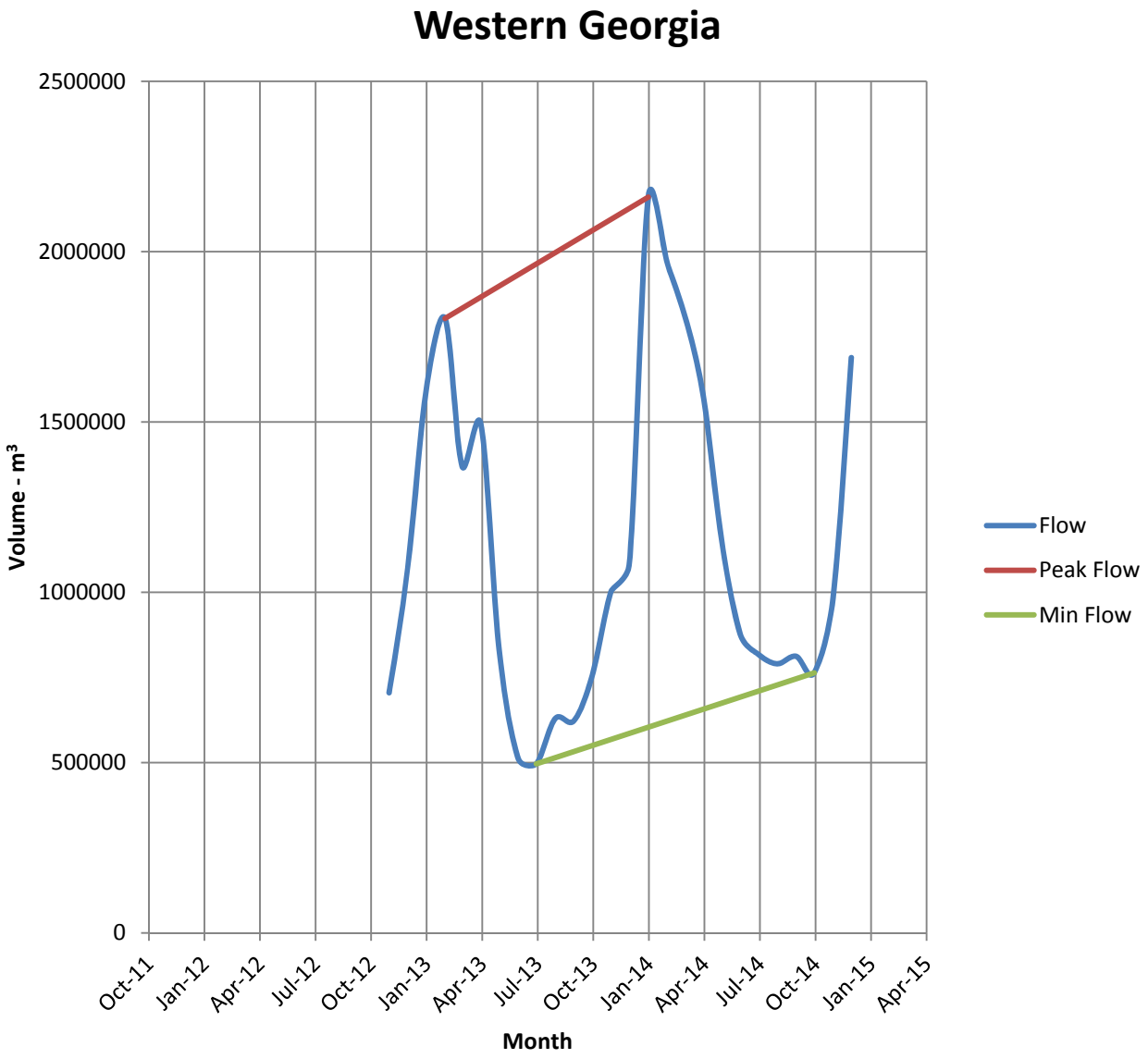
At that point, to minimize gas leakages in the existing system while increasing capacity, GOGC could install regulation at key points between the systems to allow the operation of the existing east-west system at 12 bar and the newly rehabilitated system at 20 bar. This will allow the combined east-west system to achieve a capacity of 9.029 M m^3 per day or 3.296 B m^3 per year with a line pack volume of 3,034,000 m^3. This method of operations will result in an almost 10-fold increase in delivery capacity and increase line pack volume by about 3.4 times the 2011 capacity in western Georgia from the Sagaramo hub. This will be accomplished by minimizing leakages by operating the old system at the lower pressure.

Over the course of the project, various natural gas industry metrics were gathered, which indicate that USAID funding significantly impacted the access to clean and safe natural gas supply. In addition, while the USAID-funded improvements have not directly impacted natural gas losses along the east-west pipeline, the principals and procedures implemented for future care of the new assets will over time allow for reductions in natural gas losses as GOGC fully implements a

pipeline integrity management program. This will also allow for expanded delivery flexibility by allowing the new system to be operated at a higher pressure, thus higher flows, and the old system at lower pressure to limit natural gas losses by operating the delivery systems at a lower pressure. The graph below provides Tt's calculated technical losses for the duration of the project.

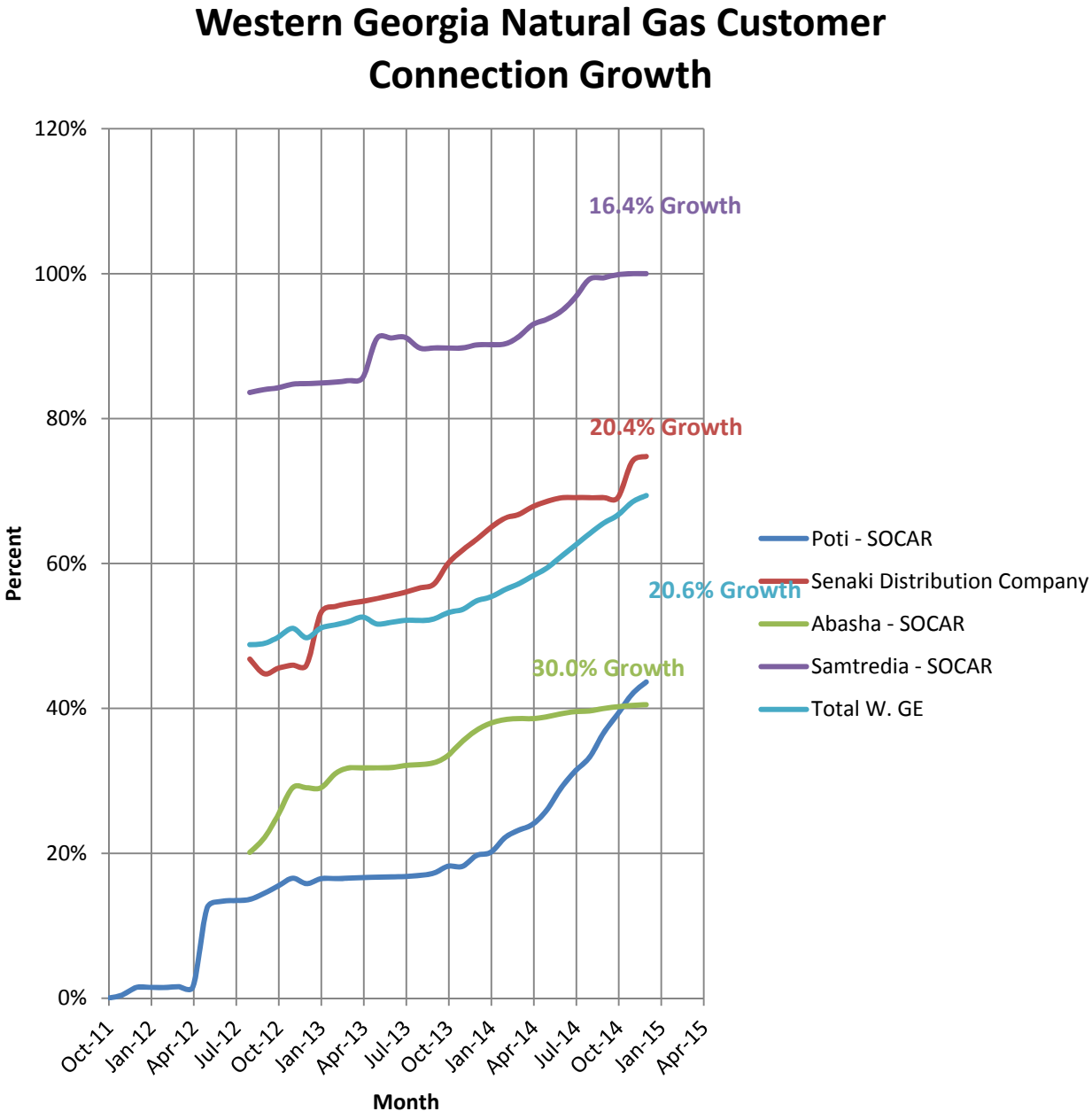


The following chart depicts the growth of natural gas consumption in western Georgia. The growth of gas consumption far exceeds the growth rate that is currently experienced in most countries, which is about 2 percent. The resulting growth will also reduce Georgian greenhouse gas emissions, as citizens will shift their energy use from wood and other heavy polluting fuels to natural gas for heating and cooking.



The following chart depicts the increased growth of connected customers to natural gas pipelines in western Georgia from October 2011 through December 2014 due to the USAID-funded east-west pipeline expansion. As indicated, an additional 43.6 percent of customers in Poti were connected to natural gas during this period, while the Samtredia market reached reported saturation by growing 16.4 percent. In comparison, normative growth rates for customer connections are about 12 percent in China and about 1.2 percent in the United States. Finally, due

to USAID's support of the east-west pipeline, western Georgia experienced an average growth of customer connection of 20.5 percent.



3.3 Capacity Building and Management Subcomponent

Capacity Building and Training Activities

During the course of the project, Tt provided comprehensive capacity building services in such areas as strategic planning, organizational structure and performance, engineering analysis and forecasting, least-cost planning, electrical grid and gas pipeline network organization, and operational efficiency.

GSE Interventions

Tt worked with GSE to build capacity and support the development of internal resources in program management, monitoring, evaluation, and reporting. For example, Tt supported GSE to establish a functional DGA department and assign skilled individuals, which Tt helped to train in order to ensure the long-term sustainability of the system.

Specifically, Tt provided guidance to the GSE's Procurement Department regarding its evaluation process, qualifications, and determination of product quality. In addition, Tt participated as an observer in the bid opening, bid evaluation and open bidding sessions held for all USAID-funded procurements. In order to create a sustainable process, Tt made recommendations for GSE to include more stringent criteria for bidders' technical qualifications in order to eliminate and/or disqualify poor-quality suppliers and middlemen from the process, prior to the financial evaluation stage.

Also, Tt worked to develop the capacity of SER (a local contractor) by:

- Assisting SER to finalize the design documents with PLS-CADD (Power Line Systems - Computer Aided Design and Drafting).
- Providing SER with an outline of a testing and commissioning plan, including an annotated copy of the actual relevant sections of the design specification.
- Reviewing SER's testing and commissioning plans submission and providing comments and advice for SER's development.
- Reviewing and providing comments on a quality assurance/ quality control report provided by SER.
- Coaching SER on the requirements and level of detail required for a final post-construction punch-list.

Following the energization of the lines, in response to GSE's request, Tt prepared a detailed compliance report for the commercial operation of the newly constructed transmission lines for GSE's management. In addition, at USAID's request, Tt provided an assessment report of the GIPTP process detailing its observations on all phases of project design and execution. In addition, Tt held information sessions with representatives from USAID and SER to obtain feedback on the key elements of the GIPTP lifecycle. In lieu of an information gathering meeting, the GSE team members opted to complete a questionnaire for their input to this report.

A demonstrated model of Tt's intensive capacity building efforts is the on-the-job training of GSE team members in the proper maintenance and operation of both the EECS and DGA equipment. Tt also provided informal professional development services to appropriate GSE team members to establish a functional DGA department and assign skilled individuals, which Tt helped to train. Regarding EECS, SEL engineers provided GSE personnel with comprehensive one-on-one professional relationship building and the following in-depth trainings:

- EECS Phase I Operations and Equipment Installation and Maintenance Training, November 2013
- EECS Phase II Operations, Equipment Installation and Maintenance Training, December 2013
- Phase II or "Centralized RAS or C RAS" operational issues as compared with "Decentralized RAS" or D RAS," validation of data path, and data paths (such as the use of ICON and GOOSE) differences in the live system, January 12-17, 2014
- EECS Phase II Operations and Equipment Installation and Maintenance Training, March 22-28, 2014
- EECS final software updates and software management, June 2014.

GOGC and GGTC Interventions

Tt evaluated the current technical capabilities and awareness of GOGC and GGTC personnel in the area of cathodic protection (CP) systems, and recommended proactive action steps to support the needed acquisition of technical skills and knowledge. In January and November 2014, a Tt CP specialist assessed the CP systems currently utilized in the GOGC pipelines, identified appropriate next steps to ensure the long-term sustainability of the CP systems, and trained key team members in CP monitoring and evaluation techniques such as close-interval potential surveys, direct current voltage gradient (DCVG) surveys, and pipe current mapping (PCM). In order to support practical technical skills acquisition, Tt's specialist provided hands-on training for both DCVG and PCM surveys.

In addition, Tt team members coached GOGC and its construction contractors by providing a number of procedures and informal trainings of local personnel. Some of these activities included:

- Improved cathodic protection methods and means of measurement
- Improved pipeline drying procedures
- Development of institutional knowledge regarding valve maintenance and repair
- Above-ground pipeline construction coating procedures.

In addition, Tt completed an analysis of the pipeline maintenance rules GGTC used for the operation and maintenance of the pipelines owned by GOGC. This analysis highlighted several areas for improvement. Tt then developed and distributed an O&M manual for both GOGC's and GGTC's usage. This manual adheres to international best practices and procedures, and will help guide the further development of modern pipeline maintenance rules for GGTC that follow international best practices.

Tt also provided technical advisory services to GOGC and GGTC to develop a pipeline integrity management program (PIM) to guide their pipeline integrity operations and maintenance. In September 2014, Tt provided GOGC and GGTC with the European Union and US international standards for PIM. GOGC, GGTC and Tt then designed an implementation plan during October-December, with Tt providing technical advisory services to GOGC and GGTC.

Technical Support Interventions - Power Transmission and Gas Sectors

Tt examined available studies, reports and other documents relating to the power transmission network and gas infrastructure upgrade and rehabilitative activities. It also provided comprehensive monitoring and evaluation activities, such as health, safety and environment site visits to all gas pipeline construction sites.

Examples of Tt's technical advisory support services included the following:

- Monitoring the adequacy and acceptability of delivered equipment and services under approved activities through field inspections. Tt's staff members visited equipment warehouses to ensure the relevant equipment pieces for pipeline construction and the

power transmission rehabilitation had arrived as ordered.

- Providing quality control/quality assurance (QA/QC) services, including materials measurement and analysis, and limited testing of equipment to ensure design specifications had been adhered to, as required.

- For Component I activities, Tt provided a variety of assessment and evaluation reports to support USAID and GSE such as S-curves and a GIPTP compliance report. For Component II activities, each month it collected information on the number of customers registered with gas distribution companies in Poti, Samtredia, Abasha and Senaki, and provided these USAID (see Annex 1).

USAID-Funded Procurement Activities

Following USAID's objective of host country capacity building, Tt provided extensive support to GSE, GOGC and GGTC on USAID-funded procurements, including the tendering processes, development of tender documents, technical specifications and bid evaluations.

Component I: GSE Substations Rehabilitation Projects. Tt provided oversight and technical assistance (including equipment delivery verification and installation) for GSE's procurement of protection and control systems equipment for ten substations as well as switchgears for 12 substations. In 2014, GSE completed the installation of the protection and control systems equipment for 5 substations.

In 2014, USAID extended GSE's substation rehabilitation contract from September 30, 2014 to July 31, 2015. GSE hired an oversight contractor to support these activities. To ensure a smooth transition to the selected contractor, in November 2014 the PGIOP team evaluated the status of equipment installations at selected substations and provided an assessment report to USAID for utilization by the oversight contractor.

To ensure the success of this activity, Tt also provided technical advisory services to GSE in the areas of contract negotiations with both SEL and Siemens to ensure that all design, delivery and equipment issues were effectively resolved. Tt also supported GSE with the procurement of construction and maintenance equipment, such as stringing equipment, which was delivered in September 2014.

Component II: GOGC and GGTC Operations and Maintenance Equipment Procurement.
Tt provided extensive support in preparing and overseeing the USAID-funded equipment procurement effort. This equipment will be used to expand both GOGC's and GGTC's capabilities for the construction and maintenance of their pipelines using local resources.

Tt's oversight activities for the equipment procurement process included:

- Developing equipment lists

- Prioritizing equipment pieces per organizational and operational needs
- Jointly preparing specifications of the equipment
- Jointly preparing an internationally acceptable standard contract
- Reviewing bidding documents, and directly observing the tendering process and evaluation of the bids
- Verifying equipment delivery schedules, arrivals, and acceptance by GOGC personnel.

4. Reporting

As part of its oversight management and advisory functions, Tt documented all project-related activities and meetings in reports submitted to USAID. In addition to the required deliverables and illustrative reports listed in Annex 1, Tt prepared weekly reports that reviewed the status of each component for USAID's reference. In addition, in line with USAID requests and/or the needs of the partner agencies, Tt prepared relevant compliance and assessment reports evaluating the status of construction activities by component.

A partial list of communications materials and reports submitted to USAID from November 2, 2012 through December 31, 2014 is provided below.

- Trip Reports
- Component I Field Reports and Construction Progress Charts, S-curves, and Green Screen Progress Reports
- Component II Field Reports and Construction Progress Charts, including S-curve Charts
- Notes on Discussion Topics for Steering Committee Meetings
- Weekly Status Reports
- Quarterly Reports
- Annual Reports
- Semi-Annual Performance Monitoring Reports
- Compliance Reports and Consultant's Conclusions
- Substation Rehabilitation Assessment Report
- Reviews, Comments and Letters of No-Objection, as requested
- PGIOP Assessment/Lessons Learned Report, Components 1 & 2
- Success Stories.

5. Health, Environment and Safety

The PGIOP team provided health, safety and environmental (HSE) oversight of Georgia's construction works through regular visits to the electric power lines and gas pipeline construction sites. When relevant, HSE trip reports were prepared and shared with USAID and the GoG's contractors. Moreover, findings and recommendations were discussed with the contractors while on site. All violations and non-compliance activities observed were communicated to the responsible personnel of the construction company at the time the violation or non-compliance event was first noted.

In July 2014, Tt coordinated a USAID Bureau Environmental Officer's (BEO) site visit to the Gori-Kareli pipeline segment, during which the BEO observed that all construction works and right of way activities were performed in adherence with USAID's environmental standards. In addition, no evidence of violations or non-compliance activities were observed.

An important accomplishment was that all construction activities over the entire duration of the project were performed without a single lost time accident.

6. Key Indicators and Performance Monitoring Data

In accordance with its contractual requirements, Tt prepared a performance monitoring plan (PMP) on a bi-annual basis to support project management. The PMP was developed using a results-based planning approach and included key project indicators, a logic framework and target values. The PMP methodology was developed through consultations with a Tt's PMP specialist and the PGIOP project team members. The PMP is a monitoring and evaluation (M&E) tool that is used to manage and assess project performance through the use of a set of indicators.

In gathering the PMP data and preparing the report for submission to USAID, the PGIOP team integrated the majority of USAID's mandated indicators while also providing supplemental indicators. The indicators fell into two categories:

- Program element-level indicators: These are indicators that address the extent to which progress was being made in achieving USAID's stated objectives of energy security, promotion of energy exports and economic development.

- Activity level indicators: These indicators focused on each of the program's subcomponents (e.g., Senaki - Poti natural gas pipeline construction, Menji - Tskaltubo electric transmission lines, and GSE smart grid) and identified indicators that could be used by USAID and the Tetra Tech team to monitor program progress and achievement.

Please see Annexes 3 and 4 for a PMP indicator performance tracking table, inclusive of graphics, for data gathered through December 31, 2014.

7. Recommendations and Future Program Areas: Component II

While Georgia has made tremendous progress in the area of gas infrastructure development, the sector remains weak in the areas of maintenance and institutional reform. In order for GOGC and GGTC to become self-sustaining and export-driven, the Georgian Government and its partners should address the following issues:

Regulations

The development and implementation of new gas sector regulations should focus on safety and standards, with tariffs and other financial issues taking a secondary role. The adoption of quality and internationally recognized design, construction and maintenance standards is critical for the productive future of the entire Georgian energy sector.

Georgia has been in the process of adopting the American Society of Mechanical Engineers (ASME) standards for transmission pipelines. This effort should continue to include other internationally accepted best practice standards, such as those offered by American Gas Association (AGA), American Petroleum Institute (API), American Society for Testing and Materials (ASTM), National Association of Corrosion Engineers (NACE), as well as additional applicable standards from ASME. This effort could utilize the US Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) as a model for reference. Where possible, the adoption of comparable European Union standards should also be considered.

Operation and Maintenance Roles and Responsibilities

The Georgian gas sector should be supported in clarifying the contractual relationship between GOGC and GGTC. This arrangement needs to be agreed upon and effected either through regulation or a contractual arrangement between the transmission system operator (TSO) and transmission company (Transco) that will hold all relevant parties accountable. This clarification would require the involvement of parliament and key Ministry of Energy representatives. Through this new arrangement, GOGC and GGTC will collaborate to ensure that the pipelines are adequately maintained to both international and Georgian governmental standards.

Improved Gas Metering and Loss Policies and Procedures

To further support improvements regarding the definition of roles and responsibilities discussed above, an improved set of measurement policies and standards should be jointly implemented by GOGC and GGTC or required by a governmental regulator. These should specify maintenance and proving requirements for existing measurement systems as well as improved accuracy requirements for future measurement systems to maintain the highest possible accuracy of gas measurement. Stringent and highly accurate methods of measurement will improve the overall measurement of gas flow and provide a highly accurate financial accounting of expenses and

revenues derived from gas transportation. This will also provide an accurate means for prioritizing and addressing lost revenues resulting from pipeline leakage. Once implemented, or concurrently, a transition to gas metering and transactions based upon energy (therms) rather than volumetric (cubic meters) or mass (kg) is highly recommended. This allows for integration into EU-based energy trading standards that will further facilitate the integration of the natural gas industry to requirements of the EU Association Agreement.

Long-Range Planning Tools

The GoG or a donor should provide support for the acquisition, including appropriate training, of a modern pipeline simulation software platform, such as Stoner Pipeline Simulator or Synergi Gas. This software allows for a more accurate determination of development needs and improves business decision making based upon accurate dynamic hydraulic modeling of the pipeline system. This is done using accurate design details of the existing system and allowing for rapid modeling of system expansions to determine how these modifications would affect the pipeline system's operations. This allows for the optimization of capital expenditures when considering changing markets, or exploring strategic asset management to maximize operational effectiveness with minimal costs. This will be especially important when GOGC begins using compressors on its system to remove dependency on other governments to maintain system integrity through higher pressures. Specifically, Georgia's natural gas pipeline system is pressurized by external parties. If the GoG decides to operate its pipelines at a higher and more efficient pressure, it will either need to build and operate its own compression or to negotiate a higher delivery pressure with external third parties. This software also helps to determine the economic factors that affect the optimal operating pressures. This will also facilitate the development of documents required for compliance with the EU Association Agreement, specifically the European Network of Transmission System Operators for Gas (ENTSO-G).

External Corrosion Direct Assessment (ECDA) Program

The Georgian Government and international partners should sponsor the development of an ECDA program at GOGC. An effective and sustainable ECDA program would be implemented by sponsoring a contractor to perform approximately 300 km of ECDA on pipelines of various vintages with the direct involvement of technical staff from GOGC. At the end of this activity, the equipment, software and training materials should be given to GOGC for future institutional knowledge building and technical skills acquisition. This would cost an estimated $300,000-$400,000.

Vani-Vale Pipeline Segment

The Georgian Government should consider the construction of the Vani-Vale pipeline segment. This project is approximately 50 km in length with an estimated construction cost of between $35 M and $40 M. This construction activity is of critical importance as it will provide east and west Georgia with an alternative connection point should the current east-west pipeline encounter a problem between Kutaisi and Sagaramo.

Internal Corrosion Direct Assessment (ICDA) Program

The Georgian Government should sponsor the development of an ICDA program at GOGC. This program could be implemented by sponsoring a contractor such as the companies ROSEN or TD Williamson to perform in-line inspection runs on selected pipelines and provide the baseline datasets. The sponsored contractor would also provide a software platform for future use by GOGC to promote long-term pipeline integrity management. Performing this activity on the newly constructed USAID-sponsored pipeline would cost approximately $250,000.

Procurement Practices

PGIOP recommends that the Georgian Government change its current procurement practices to alleviate practical barriers to international participation. At present, international companies are deterred from bidding on GOGC contracts due to the reverse auction process as well as the limitations posed by using Georgian legal standards rather than international legal practices. An example would be GOGC's procurement of materials needed for potential ICDA and ECDA projects. In these cases, GOGC should be guided through the procurement using internationally accepted standards (NACE) and procurement practices facilitated by USAID procedures. These suggested modifications would allow for quality of work assurance as well as price control.

Capacity Building Facilities

PGIOP recommends establishing a South Caucasus Gas Association to provide for continuous improvement of all aspects of pipeline engineering, operations and management, including operations and maintenance and pipeline integrity management. This association would be modeled on one or more of the following: the Interstate Natural Gas Association of America, the American Gas Association, and/or the Southern Gas Association. The association would be open to the following agencies:

- Gas pipeline operating companies in Georgia, such as GGTC, BP, SOCAR and Itera
- Construction companies such as GOGC, OGCT, Azertunel
- Other natural gas operators in the Southern Caucasus region
- Engineering and survey companies with expertise or interest in pipelines
- Technical centers and universities.

Donor support would help to establish and fund the association for two years, after which it would become self-sufficient through fees. The association would host workshops, publish periodic newsletters, and hold semi-annual training sessions in the following areas:

- Health, environment and social: Environmental management plans, landowner relations and surface management (erosion control and repairs), among others

- Technical and safety: Pigging, cathodic protection, waste management, moisture management, measurement, PIM standards and safety as work sites, among others

- Management principles: Operating, operations policy, legal requirements, quality management, recording keeping and record retention, and safety management.

It would also facilitate cooperative relations with other countries' associations and standards such as ASME, American National Standards Institute, and British standards. This program could facilitate participation from multiple international donors and would provide a mechanism for regional cooperation and collaboration.

Annex 1
List of Project Deliverables

Illustrative Reports on Electrical Component	PGIOP Assessment Report: Electrical and Gas Components
	GSE-GIPTP Compliance Report
	Assessment, 10 Substation Rehabilitation Project
Illustrative Reports for Gas Component	Drying Technologies, White Paper
	PGIOP Assessment Report: Electrical and Gas Components
	Cathodic Protection System Review and Recommendations
	Integrity Pipeline Management Manual
	Operations and Maintenance Manual
Technical Reports	Branding & Marking Plan
	Annual Report, FY 2013
	Quarterly Report, Q1
	Quarterly Report, Q2
	Quarterly Report, Q3
	Annual Report, FY 2014
	Quality Assurance and Quality Management Manual
	PGIOP Final Report
	Workplan, Updated 2014
Performance Monitoring Plans	PMP: October 2012- March 2013
	PMP: April 2013- September 2013
	PMP: October 2013- March 2014
	PMP: March 2014-September 2014
Weekly Reports	From November 2nd, 2012 to December 28th, 2014
Branding and Marking	Success Story: Improved Monitoring of High-Value Equipment Increases Power Reliability in Georgia
	Success Story: Enhanced Emergency Control System Provides Stable and Secure Power to Georgia
	Success Story: USAID-funded East-West Gas Pipeline Completion Secures Reliable Gas Supply in Georgia
	Success Story: USAID-funded Gas Pipeline Uses Smart Technology for the First Time in Georgia
	Success Story: USAID Supports the Development of Skills in Safe Pipeline Maintenance and Operation
	Success Story: USAID Supports Pipeline Construction and Maintenance Capabilities in Georgia
	Success Story: USAID and Georgia Partner to Support Reliable Power Supply Nationwide

Annex 2
Success Stories

Seven success stories were produced under PGIOP (final editing of these stories was completed in December 2014 in response to USAID comments):

- Improved Monitoring of High-Value Equipment Increases Power Reliability in Georgia
- Enhanced Emergency Control System Provides Stable and Secure Power to Georgia
- USAID-funded East-West Gas Pipeline Completion Secures Reliable Gas Supply in Georgia
- USAID-funded Gas Pipeline Uses Smart Technology for the First Time in Georgia
- USAID Supports the Development of Skills in Safe Pipeline Maintenance and Operation
- USAID Supports Pipeline Construction and Maintenance Capabilities in Georgia
- USAID and Georgia Partner to Support Reliable Power Supply Nationwide

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SUCCESS STORY

Improved Monitoring of High-Value Equipment Increases Power Reliability in Georgia

DGA equipment and software at the Zestaphoni Substation

	GARDA PHASE B	GARDA PHASE C	GARD AT1
Acetylene (C_2H_2)	25.3	4.0	41.9
Ethylene (C_2H_4)	43	12	85
Methane (CH_4)	0	0	0
Ethane (C_2H_6)	30	37	89
Hydrogen (H_2)	1	2	0
Carbon Monoxide (CO)	26	234	455
Carbon Dioxide (CO_2)	0	1691	2170
Nitrogen (N_2)	82010	79780	84660
Oxygen (O_2)	12295	13740	9650
Moisture	11	12	9

DGA equipment computer screen with data readings of key gases

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The 1990s' civil war, lack of regular maintenance, and inadequate investment devastated Georgia's electrical infrastructure, resulting in a highly insecure energy sector; with widespread outages. The lack of an operational country-wide power network prevented Georgia from meeting its domestic energy needs, attracting foreign investment, or becoming a part of the Southern Caucasus power exchange.

The Georgia State Electrosystem (GSE) faced frequent transformer failures, which necessitated expensive rehabilitation works and often caused lengthy power outages.

In November 2012, USAID's Georgia Power and Gas Infrastructure Oversight Project (PGIOP) began overseeing the rehabilitation of the Georgia power transmission network under USAID's Georgia Power and Gas Infrastructure Project (PGIP) and the renovation of equipment in key substations. Under this project, USAID supported the installation of dissolved gas analyzers (DGAs) in the Ksani, Gardabani and Zestaphoni substations.

A DGA system measures the nine main gases found in transformers and provides for their long-term operational capacity. Before the DGA system was installed, GSE measured the gas levels in transformers every six months; the new system provides readings every three hours. Substation staff and GSE's Tbilisi office can access these measurements via computer. In addition, LumaSense, the company that installed the DGA system, was available for the next year to guide GSE and monitor the readings from its US office.

The immediate benefits of the DGA system were evident quickly. After installing the DGA system in March 2013, engineers found several transformer units were at hazard levels and took immediate action to replace or refurbish them. In the long term, the DGA system will improve the efficiency of Georgia's energy sector and greatly reduce the risks of potential transmission line failures. Through PGIP, USAID is helping Georgia develop a truly self-sufficient energy sector that can meet domestic demand and become part of the regional power network.

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SUCCESS STORY

Enhanced Emergency Control System Provides Stable and Secure Power to Georgia

Georgia's east-west power transmission network and connecting substations have been in a state of disrepair and its equipment often malfunctions. This situation is compounded by the lack of regular infrastructural development and a perennial and significant generation-load imbalance, as the majority of energy generation is located in the west while the bulk of consumption occurs in the east.

To stabilize Georgia's power network, USAID's Power and Gas Infrastructure Oversight Project (PGIOP), under USAID's Georgia Power and Gas Infrastructure Project (PGIP) implemented a comprehensive Enhanced Emergency Control System (EECS) to provide stability during transient and critical moments within the power transmission grid, while also serving as a contingency-based system. As soon as a power transmission line trips, often due to an imbalance of power in a system, EECS responds by rebalancing the electricity being carried by a line and ensuring the line restarts properly.

USAID and GSE are implementing key PGIP infrastructure rehabilitation projects, such as the USAID-funded construction of the Senaki I & II transmission network, which will improve energy security on the weakest sections of the energy grid in the western part of Georgia. The EECS will ensure a balanced and controlled regulation of secure power to Georgian consumers and businesses. At present, EECS is accessed and programmed through GSE's Tbilisi National Control and Dispatch Center and operated by several highly trained GSE engineers.

The EECS system began operating in March 2014 and had immediate benefits. On May 2, the Enguri Substation experienced an equipment malfunction, causing the 500 kV Imereti line to trip. Without EECS in place, a country-wide blackout could have occurred. However, EECS immediately detected the trip and responded. As a result, consumers experienced a 10-minute power shortage as opposed to a several hours long blackout. In the short and long terms, the EECS system is improving the efficiency and quality of service in the Georgian energy sector and is significantly reducing the risks of potential transmission line failures.

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SUCCESS STORY

USAID-funded East-West Gas Pipeline Completion Secures Reliable Gas Supply in Georgia

Pipe segments being lowered into an open cut trench, Zestaphoni-Kutaisi segment

Horizontal directional drilling of the Rioni River, Kutaisi-Abasha pipeline segment

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A self-sustaining and multifunctional energy sector is essential in supporting Georgia's long-term political stability and economic growth. However, by 2005, the civil wars of the late 1990s, the lack of attention to regular maintenance, and paltry capital investment left Georgia's natural gas pipelines in poor condition. In addition, its gas transmission system experienced very high technical losses due to leakages and poor maintenance.

In 2010 USAID began funding the reconstruction of Georgia's gas pipelines, through the Georgia Power and Gas Infrastructure Project (PGIP), and overseeing the rehabilitation and construction of new natural gas pipeline segments from Poti to Gori through the Power and Gas Infrastructure Oversight Project (PGIOP). PGIOP collaborated with the Georgian Oil and Gas Corporation (GOGC) and its subcontractors throughout the process to ensure all construction was in accordance with best international standards.

This project included the successful completion of 149 km of DN 700 pipeline that was built in parallel to the existing DN 500 pipeline from Zestaphoni to Senaki, and a new line from Senaki to Poti. Additional pipeline segments were completed between Gori and Kareli that will be connected to this system in the future. It also brought to Georgia new construction techniques (e.g., horizontal directional drilling) and the project's oversight expertise allowed for the construction to be extended well beyond the original scope for the same cost.

All construction activities were completed by December 2014. The pipelines now provide natural gas to cities and towns from Poti to Zestaphoni. Its delivery capacity has increased from 0.4 to 1.2 billion cubic meters per year, while USAID's assistance has reduced emissions and overall technical losses significantly.

USAID's assistance has been instrumental in helping Georgia take a crucial step toward reaching energy security and sustainability. In the coming years, GOGC will build similar projects, such as the installation of a new pipeline from Zestaphoni to Kareli and another segment from Gori to Saguramo. Through USAID-funded activities as well as GOGC's planned pipeline expansions, GOGC will be able to provide a reliable and safe natural gas transportation system from Tbilisi to Poti.

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SUCCESS STORY

USAID-funded Gas Pipeline Uses Smart Pig Technology for the First Time in Georgia

Intelligent caliper pig

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Due to the civil wars of the late 1990s, lack of attention to regular maintenance, and poor capital investment, Georgia was unable to provide consistent energy to its citizens. To promote a secure energy supply, USAID provided investment and support to Georgia's natural gas sector through the Georgia Power and Gas Infrastrcuture Project (PGIP). In 2010, its Georgia Power and Gas Infrastructure Oversight Project (PGIOP) began overseeing the construction of a natural gas pipeline from Poti to Gori. PGIOP collaborated with the Georgian Oil and Gas Corporation (GOGC) and its subcontractors to ensure that all construction activities were safe and carried out according to best international standards.

In 2014, with USAID financial assiatnce, GOGC began the final phase of rehabilitating the 23 km of pipeline from Kutaisi to Zestaphoni and 20 km of pipeline from Gori to Kareli. In September, AHM Enerji of Turkey, the construction contractor, identified a potential irregularity in the internal geometry of the pipeline, which could have led to the pipeline's corrosion and failure, forcing AHM Enerji to replace a section of the pipe.

After GOGC, AHM Enerji and PGIOP reviewed the case, AHM Enerji obtained a caliper pig to analyze the pipeline segment. Gas pipeline pigs are devices that are inserted into and travel throughout the length of a pipeline driven by compressed air or natural gas. A caliper pig provides internal geometry information to evaluate internal defects and irregularities. It records the internal pipe diameter at a given location along the pipeline. An experienced pipeline engineer or technician can use this information to note the pipeline's welds, wall thicknesses, and bends, and locate damage that affects internal geometry.

On November 5, a caliper pig was run through the Gori-Kareli pipeline segment and no significant defects were found. This marked the first time that this smart technology was used in Georgia. GOGC will use the baseline data collected for future preventative maintenance activities.

Through USAID's support, improved construction and maintenance technologies and procedures have been embraced, and will be used to build and maintain pipelines throughout Georgia. The completed pipeline will provide a more reliable supply of natural gas to homes and industries throughout western Georgia.

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SUCCESS STORY

USAID Supports the Development of Skills in Safe Pipeline Maintenance and Operation

PGIOP team members check DN150 valve station to demonstrate proper operation

Through an assistance agreement between the US and Georgian governments, USAID committed to support the Georgian Oil and Gas Corporation (GOGC) and Georgian Gas Transportation Company (GGTC) in developing their ability construct and maintain government-owned gas pipelines.

USAID's Georgia Power and Gas Infrastructure Oversight Project (PGIOP) then began providing extensive support to GOGC and GGTC in general operations and maintenance (O&M), as well as pipeline integrity management (PIM).

PGIOP helped GOGC and GGTC build their technical skills in PIM hands-on trainings and meetings in October and November 2014. The result was a user-friendly PIM manual tailored to both entities' needs. It covers such topics as risk assessment, technical survey methods, and change management.

In addition, PGIOP analyzed the pipeline maintenance rules GGTC used in the O&M of GOGC pipelines, highlighting several areas for improvement. The project created an O&M manual for GOGC and GGTC to help guide the further development of pipeline maintenance rules for GGTC consistent with international best practices.

As a result of ongoing collaborations between PGIOP and GOGC, GOGC now has documented procedures in the following areas:

- Improved cathodic protection methods
- Improved pipeline drying procedures
- Technical skills for valve maintenance and repair
- Above-ground pipeline construction coating procedures.

Through these activities, USAID supported Georgia's gas sector in maintaining and operating gas pipelines throughout the country in a safe and sustainable manner. In addition, USAID, through the PGIOP team, worked with the management and technical staff at GOGC and GGTC to build critical technical skills and affect institutional change.

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SUCCESS STORY

USAID Supports Pipeline Construction and Maintenance Capabilities in Georgia

USAID-procured heavy construction equipment for pipelines at GOGC's Lilo Warehouse

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Through an assistance agreement between the US and Georgian governments, USAID has supported the Georgian Oil and Gas Corporation (GOGC) and the Georgian Gas Transportation Company (GGTC) in developing their abilities to construct and maintain the government's gas pipelines.

In April 2014, USAID's Georgia Power and Gas Infrastructure Oversight Project (PGIOP) began providing extensive support to GOGC and GGTC in preparing and overseeing USAID-financed equipment procurements under USAID's Georgia Power and Gas Infrastructure Project (PGIP). Previously, the Georgian gas sector had to rely on external sources for needed construction equipment and testing technology, which are critical for operating gas pipelines and providing emergency response.

The PGIOP team collaborated with GOGC and GGTC throughout all phases of the procurement process, including equipment selection, specification development, tendering, bidding, and equipment inspection and acceptance. The equipment will be used for heavy construction and material transportation, non-destructive testing, and pipeline integrity management (PIM).

Through this procurement activity, USAID also promoted sustainable development in Georgia, as PGIOP team members provided intensive hands-on training on the effective use of various PIM equipment and techniques.

In January and November 2014, a PGIOP consultant visited Georgia to instruct GOGC and GGTC on the theoretical and practical fundamentals for testing, evaluating and monitoring cathodic protection (CP) systems. The specialist also assessed the CP systems utilized in the GOGC pipelines and identified next steps to ensure their long-term sustainability. By preventing corrosion and identifying the locations of active corrosion, the proper operation of a CP system is a critical component of a comprehensive PIM program.

Through this procurement activity, USAID supported Georgia in safely and sustainably operating and maintaining its gas pipelines nationwide. It also worked with GOGC and GGTC's management and technical staff to build critical technical skills and affect institutional change.

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SUCCESS STORY

USAID and Georgia Partner to Support Reliable Power Supply Nationwide

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After the 1990s' civil wars, Georgia's east-west power transmission network and substations were in extreme disrepair, leaving a highly insecure energy sector with regular power outages. As a result, Georgia could not meet its domestic energy needs, attract foreign investment, or become part of the Southern Caucasus electricity transmission corridor.

In 2010, USAID's Georgia Power and Gas Infrastructure Project (PGIP) began rebuilding the Senaki I and II transmission lines, which connect the east-west transmission network with two critical 220 kV substations in Menji and Tskaltubo. The Power and Gas Infrastructure Oversight Project (PGIOP) provided the architect and engineering services. Through PGIOP, USAID also promoted sustainable development in Georgia by investing in a private sector partner. As a result of full and open competeition and in line with USAID Forward policies, USAID awarded the contract to rebuild the Senaki lines to Sakenergoremonti (SER), a Georgian construction firm.

Throughout the design, procurement and construction phases, PGIOP provided extensive technical advisory and capacity building support to SER. As a result of the partnership among USAID, PGIOP and SER, the two transmission lines, which stretch about 57.8 km and comprise 211 towers and substation works, were rehabilitated and constructed by April 2014.

In early June 2014, the power line officially became an integrated part of the Georgian State Elecrosystem's (GSE) high-voltage transmission grid and is supporting the reliable supply of energy throughout Georgia. On August 27, GSE, US Embassy, USAID, SER and PGIOP representatives gathered at Menji and Tskaltubo substations to celebrate the completion of the lines. Their integration into the GSE's power network is critical for the power grid's stability and security, with an n-1 contingency to the high-voltage 500 kV Imereti line. The Senaki lines will also support the stable and reliable transit of clean energy produced from local hydropower plants. This project, as well as USAID's continued support to Georgia, demonstrate the sustainable and deep partnership between the American and Georgian peoples and governments.

Annex 3
Gas Conections, Western Georgia

The table below indicate the number of customers by month, by gas distribution company, who are serviced by the newly built and rehabilitated GOGCs pipeline segments, the construction of which was overseen by Tt.

Western Georgia Natural Gas Customer Connection Growth

Region	Poti - SOCAR			Senaki Distribution Company			Abasha - SOCAR			Samtredia - SOCAR			Total W. GE
Month	Connected	Market Size	% Connected	Connected	Market Size	% Connected	Connected	Market Size	% Connected	Connected	Market Size	% Connected	% Connected
Oct-11	0	8000	0										
Nov-11	36	8036	0.4%										
Dec-11	121	8121	1.5%										
Jan-12	121	8121	1.5%										
Feb-12	121	8121	1.5%										
Mar-12	130	8130	1.6%										
Apr-12	130	8130	1.6%										
May-12	1135	9135	12.4%										
Jun-12	1234	9234	13.4%										
Jul-12	1247	9247	13.5%										
Aug-12	1263	9263	13.6%	2200	4700	46.8%	630	3130	20.1%	10200	12200	83.6%	48.8%
Sep-12	1355	9355	14.5%	2230	4980	44.8%	781	3531	22.1%	10504	12504	84.0%	49.0%
Oct-12	1467	9467	15.5%	2300	5050	45.5%	933	3683	25.3%	10703	12703	84.3%	49.8%
Nov-12	1588	9588	16.6%	2340	5090	46.0%	1126	3876	29.1%	11110	13110	84.7%	51.0%
Dec-12	1690	10690	15.8%	2341	5091	46.0%	1126	3876	29.1%	11180	13180	84.8%	49.8%
Jan-13	1779	10779	16.5%	2505	4705	53.2%	1126	3876	29.1%	11254	13254	84.9%	51.1%
Feb-13	1780	10780	16.5%	2591	4791	54.1%	1236	3986	31.0%	11359	13359	85.0%	51.5%
Mar-13	1788	10788	16.6%	2633	4833	54.5%	1281	4031	31.8%	11553	13553	85.2%	52.0%
Apr-13	1799	10799	16.7%	2664	4864	54.8%	1281	4031	31.8%	11960	13960	85.7%	52.6%
May-13	1804	10804	16.7%	2708	4908	55.2%	1283	4033	31.8%	10179	11179	91.1%	51.7%
Jun-13	1811	10811	16.8%	2753	4953	55.6%	1284	4034	31.8%	10271	11271	91.1%	51.9%
Jul-13	1817	10817	16.8%	2804	5004	56.0%	1301	4051	32.1%	10375	11375	91.2%	52.2%
Aug-13	1837	10837	17.0%	2872	5072	56.6%	1309	4059	32.2%	10493	11693	89.7%	52.1%
Sep-13	1879	10879	17.3%	2937	5137	57.2%	1324	4074	32.5%	10497	11697	89.7%	52.3%
Oct-13	1983	10883	18.2%	3000	5000	60.0%	1360	4060	33.5%	10499	11699	89.7%	53.2%
Nov-13	1998	10978	18.2%	3077	4977	61.8%	1440	4060	35.5%	10499	11699	89.7%	53.6%
Dec-13	2146	10896	19.7%	3151	4977	63.3%	1501	4061	37.0%	10542	11692	90.2%	54.8%
Jan-14	2195	10895	20.1%	3233	4977	65.0%	1543	4063	38.0%	10547	11692	90.2%	55.4%
Feb-14	2419	10895	22.2%	3299	4977	66.3%	1563	4063	38.5%	10559	11692	90.3%	56.4%
Mar-14	2524	10895	23.2%	3322	4977	66.7%	1567	4063	38.6%	10670	11692	91.3%	57.2%
Apr-14	2616	10895	24.0%	3376	4977	67.8%	1568	4063	38.6%	10870	11692	93.0%	58.3%
May-14	2827	10895	25.9%	3412	4977	68.6%	1578	4063	38.8%	10955	11692	93.7%	59.4%
Jun-14	3161	10895	29.0%	3437	4977	69.1%	1595	4063	39.3%	11085	11692	94.8%	61.0%
Jul-14	3413	10895	31.3%	3439	4977	69.1%	1607	4063	39.6%	11305	11692	96.7%	62.5%
Aug-14	3622	10895	33.2%	3439	4977	69.1%	1611	4063	39.7%	11603	11692	99.2%	64.1%
Sep-14	3996	10895	36.7%	3439	4977	69.1%	1625	4063	40.0%	11800	11867	99.4%	65.6%
Oct-14	4275	10895	39.2%	3439	4977	69.1%	1635	4063	40.2%	11867	11882	99.9%	66.7%
Nov-14	4576	10895	42.0%	3687	4977	74.1%	1642	4063	40.4%	11882	11882	100.0%	68.5%
Dec-14	4755	10895	43.6%	3721	4977	74.8%	1646	4063	40.5%	12110	12110	100.0%	69.4%

Annex 4
PMP Data Tables and Graphics through December 31, 2014

The following PMP data is presented through December 2014.

Performance Indicators	Baseline (Year Ending 10/01/2009)	Results (From 10/1/2012 to 03/31/ 2013)	Results (From 04/01/2013 to 09/30/ 2013)	Results (From 10/01/2013 to 03/31/2014)	Results (From 04/01/2013 to 9/30/2014)	Results (From 10/01/2014 to 12/31/2014)
a. Program Element Level Indicators						
i. Enhancing Georgia's Energy Security, Promotion of Exports and Economic Development – Program's Electricity Component						
Indicator PE1: Number of outages of the East-West Power Transmission Network	**Number of Outages:** **Engurhesi** was disconnected 4 times. 3 disconnec-tions upon request and 1 emergency disconnection **Imereti transmission line** was disconnected 20 times. In total, 12 were upon request and eight were due to an emergency. **Egrisi transmission line** – 2 disconnec-tions upon request. In total 26 disconnections	The East-West Power Transmis-sion Network was disconnect-ted three times during the reporting period.	The East-West Power Transmis-sion Network was disconnect-ted three times during the reporting period.	GSE's Dispatch Department reported that the East-West Transmission Network experienced the following number of outages, listed per month: - October, 2013: 6 - November, 2013: 5 - December, 2013: 30 - January, 2014: 20 - February, 2014: 6 - March, 2014: 5	GSE's Dispatch Department reported that the East-West Transmission Network experienced the following number of outages, listed per month: - April, 2014: 3 - May, 2014: 4 - June, 2014: 0 - July, 2014: 1 - August, 2014: 1 - September, 2014:1[1]	GSE's Dispatch Department reported that the East-West Transmission Network experienced the following number of outages, listed per month: - October, 2014: 1 - November, 2014: 0 - December, 2014: 1[2]

[1] These outages reflect TI level outages, which are defined as outages caused by forces within GSE's control. T2 level outages, or those caused by other companies and outside of GSE's control, are not included in this reporting.

[2] These outages reflect TI level outages, which are defined as outages caused by forces within GSE's control. T2 level outages, or those caused by other companies and outside of GSE's control, are not included in this reporting.

Performance Indicators	Baseline (Year Ending 10/01/2009)	Results (From 10/1/2012 to 03/31/ 2013)	Results (From 04/01/2013 to 09/30/ 2013)	Results (From 10/01/2013 to 03/31/2014)	Results (From 04/01/2013 to 9/30/2014)	Results (From 10/01/2014 to 12/31/2014)
Indicator PE2: Average duration of forced outages due to the backbone transmission system's failure	**Duration of Disconnec-tions:** **Engurhesi** disconnect-tions upon request 8 hours and 40 minutes Emergency disconnect-tion - 5 minutes **Imereti transmission line** – disconnect-tions upon request – 81 hours and 14 minutes. **Egrisi transmission line** was disconnect-ted 2 2 hours and7 7 minutes	During the reporting period, GSE reporte that the transmis-sion lines under the PGIOP task order experien-ced forced outages for an average of 26.67 minutes.	During the reporting period, GSE reported that the transmis-sion lines under the PGIOP task order experienced forced outages for an average duration of 53.67 minutes.	During the reporting period, GSE reported that the transmission lines under the PGIOP task order experienced the following average duration of forced outages: - October, 2013: 0.10 minutes - November, 2013: 0.32 minutes - December, 2013: 53.9 minutes - January, 2014: 0.90 minutes - February, 2014: 0.35 minutes - March, 2014: 2.2 minutes	During the reporting period, GSE reporte that the transmission lines under the PGIOP task order experienced the following average duration of forced outages: - April, 2014: 317 minutes - May, 2014: 317 minutes - June, 2014: 0 - July, 2014: 51 minutes - August, 2014: 76 minutes - September, 2014: 67 minutes	During the reporting period, GSE reported that the transmission lines under the PGIOP task order experienced the following average duration of forced outages: - October, 2014: 18 minutes - November, 2014: 0 minutes - December, 2014: 110 minutes[3]
Indicator PE3: Amount of electricity transited across the new transmission lines, due to backbone disruption	The GIPTP lines are not in place yet	During the reporting period, the GIPTP lines were not in place yet.	During the reporting period, the GIPTP lines were not in place yet.	During the reporting period, the GIPTP lines were not yet in place.	GSE does not track the amount of electricity transiting through the new transmission lines due to backbone disruption.	GSE does not track the amount of electricity transiting through the new transmission lines due to backbone disruption.

[3] The reported average forced duration of outages reflects T1 level outages, which are defined as outages caused by forces within GSE's control. T2 level outages, or those caused by companies and outside of GSE's control, are not included in this reporting. In addition, as of September 30, 2014, GSE changed its internal tracking methodology for this indicator.

Performance Indicators	Baseline (Year Ending 10/01/2009)	Results (From 10/1/2012 to 03/31/ 2013)	Results (From 04/01/2013 to 09/30/ 2013)	Results (From 10/01/2013 to 03/31/2014)	Results (From 04/01/2013 to 9/30/2014)	Results (From 10/01/2014 to 12/31/2014)
Indicator PE4: Percentage of electricity losses in the transmission network	1.7 % From GSE Annual Report for 2011, page 21; for year ending 12/31/2009	From the GSE 2012 Annual Repor, pge 15:, the technical losses are 1.80%	According to the GSE Human Resources Dept., the technical losses are 2.05%.	According to the GSE Human Resources Dept., the average technical loss for the reporting period was 1.93%.	GSE reported that the average technical loss for the reporting period was 1.11%.[4]	GSE reported that the verage technical loss for the reporting period was 1.36%.
Indicator PE5: Amount of exported electricity	Turkey is the most important strategic trading partner of Georgia for the export of electricity. In 2009 Georgia exported to: **Turkey** 184.345 million KWh **Russia** 525.817 million KWh **Azerbaijan** 21.465 million KWh **Armenia** 19.801 million KWh	From October 1-December 31, 2012, Georgia exported the following amounts of electricity: **Russia** 542,720 KWh During January-March 30, 2013, GSE reported no electricity exports.	During the reporting period, Georgia exported the following amounts of electricity: **Turkey** zero KWh **Russia** 281,282, 890 KWh **Azerbaijan** 6,611,843 KWh **Armenia** 73,160, 531 KWh	During the reporting period, Georgia exported the following amounts of electricity: - October, 2013: 0 - November, 2013: 0 - December, 2013: 3,195 kWh (Turkey) - January, 2014: 0 - February: 0 - March: 0	During the reporting period, Georgia exported to Armenia, Azerbaijan, Russia and Turkey the following amounts of electricity: - April, 2014: 614 KWh - May 2014: 161,597,473 KWh - June 2014: 118,891,578 KWh - July 2014: 197,868,648 KWh - August 2014: 19,096,348 KWh - September 2014: 704 KWh	During the reporting period, Georgia exported to Armenia, Azerbaijan, Russia and Turkey the following amounts of electricity: - October, 2014: 20,121,762 KWh - November, 2014: 27,470,237 KWh - Dcember, 2014: 58,585, 703 KWh

[4] As of September 30, 2014, GSE's reported technical losses will exclude incidences and technical losses experienced by lines owned by Sakresenergo. Prior reporting periods included technical losses incurred by Sakresenergo.

Performance Indicators	Baseline (Year Ending 10/01/2009)	Results (From 10/1/2012 to 03/31/ 2013)	Results (From 04/01/2013 to 09/30/ 2013)	Results (From 10/01/2013 to 03/31/2014)	Results (From 04/01/2013 to 9/30/2014)	Results (From 10/01/2014 to 12/31/2014)
Indicator PE 12: Number of customers, by customer categories, which receive access to electricity	Energo Pro, the electric distribution company, reported that 275,371 residential customers (about 744,000 persons) received electricity in Samegrelo, Imereti, and Guria. 14,202 commercial customers (budgetary and non-residential) 137 large commercial customers	According to Energo Pro's raw data, which was then tabulated and aggregated by Tt, the following customers received electricity in Samegrelo, Imereti and Guria: • Residen-tial: 334,766 • Comme-rcial (budgetary and non-residen-tial): 16,203; • Large comme-rcial: 482	According to Energo Pro's raw data, which was then tabulated and aggregated by Tt, the following customers received electricity in Samegrelo, Imereti and Guria: • Residen-tial: 406,547 • Commer-cial (budget-ary and non-residen-tial): 25,070 • Large comer-cial: 646	According to Energo Pro's raw data, which was then tabulated and aggregated by Tt, the following customers received electricity in Samegrelo, Imereti and Guria: • Residential: 406,547 • Commercial (budgetary and non-residential): 25,058 • Large commercial: 646	According to Energo Pro's raw data, which was then tabulated and aggregated by Tt, the following customers received electricity in Samegrelo, Imereti and Guria: • Residential: 406,632 • Commercial (budgetary and non-residential): 25,062 • Large commercial: 646	According to Energo Pro's raw data, which was then tabulated and aggregated by Tt, the following customers received electricity in Samegrelo, Imereti and Guria: • Residential: 406,632 • Commercial (budgetary and non-residential): 25,062 • Large commercial: 646

Performance Indicators	Baseline (Year Ending 10/01/2009)	Results (From 10/1/2012 to 03/31/ 2013)	Results (From 04/01/2013 to 09/30/ 2013)	Results (From 10/01/2013 to 03/31/2014)	Results (From 04/01/2013 to 9/30/2014)	Results (From 10/01/2014 to 12/31/2014)
ii. Enhancing Georgia's Energy Security, Promotion of Exports and Economic Development – Program's Natural Gas Component						
Indicator PE6: Number of customers, by customer category, that receive access to natural gas	SOCAR, the distribution company in Poti, will organize distribution system extension and customer connection-n related activities. Number of annually connected customers depends on initiatives of inhabitants. They have to make connection fee payment. Based on experience and prognoses, it is expected at least 15% of customers per annum will be connected to the network. Number of customers who will gain natural gas supply is: **Poti**: 15,759 residential and 195 commercial **Patara Poti**: 283 residential and 23 commercial **Sachochuo:** 91 residential **Chaladidi**: 524 residential and 19 commercial **Sakorkio:** 12 residential **Sagvichio**: 151 residential and 4 commercial **Mukhuri:** 765 residential and 35 commercial **Siriachkhoni:** 104 residential and 2 commercial **Golaskuri:** 84 residential	At the end of this reporting period, the following numbers of customers were connected to the gas network: **Poti**: 1,785 residential and 14 commercial **Abasha**: 1,250 residential and 31 commercial **Samtredia**: 11,647 residential and 313 commercial **Senaki**: 2,588 residential and 76 commercial	At the end of the reporting period, the following numbers of customers were connected to the gas network: **Poti**:1,961 residential and 22 commercial **Abasha**: 1,327 residential and 33 commercial **Senaki:**2,919 residential and 81 commercial **Samtredia:** 10,203 residential and 286 commercial	At the end of the reporting period, the following numbers of customers were connected to the gas network: **Poti:** 2,488 residential and 36 commercial **Abasha**: 1,529 residential and 38 commercial; **Senaki**: 3,237 residential and 85 commercial **Samtredia:** 10,369 residential and 301 commercial	At the end of the reporting period, the following numbers of customers (average) were connected to the gas network: **Poti:** 3,230 residential and 43 commercial **Abasha**: 1,559 residential and 39 commercial **Senaki:** 3,336 residential and 88 commercial **Samtredia:** 10,909 residential and 361 commercial	At the end of the reporting period, the following numbers of customers were connected to the gas network: **Poti:** 4,703 residential and 52 commercial **Abasha:** 1607 residential and 39 commercial **Senaki:** 3624 residential and 97 commercial **Samtredia:** 11,733 residential and 377 commercial.

Performance Indicators	Baseline (Year Ending 10/01/2009)	Results (From 10/1/2012 to 03/31/ 2013)	Results (From 04/01/2013 to 09/30/ 2013)	Results (From 10/01/2013 to 03/31/2014)	Results (From 04/01/2013 to 9/30/2014)	Results (From 10/01/2014 to 12/31/2014)
Indicator PE7: Percentage of natural gas technical losses	In 2009, Georgia consumed 1.188 billion cm of natural gas. Transit through GOGC system equaled 1.628 billion cm. Technical losses for 2009 were 0.72%.	GOGC reported an average technical loss of 0.51695%.	GOGC reporte an average technical loss of 0.50000%.	GGTC reported an average technical loss of 0.7925%.	GGTC reported an average technical loss of 1.7715%.	GGTC reported an average technical loss of 1.2921% .
Indicator PE8: Amount of investment leveraged from providing natural gas to the FIZ	Zero, there were no customers at the Poti FIZ	Zero, there were no customers at the Poti FIZ	Zero, there were no customers at the Poti FIZ	Zero, there were no customers at the Poti FIZ	Zero, there were no customers at the Poti FIZ	Zero, there were no customers at the Poti FIZ

Performance Indicators	Baseline (Year Ending 10/01/2009)	Results (From 10/1/2012 to 03/31/2013)	Results (From 04/01/2013 to 09/30/2013)	Results (From 10/01/2013 to 03/31/2014)	Results (From 04/01/2013 to 9/30/2014)	Results (From 10/01/2014 to 12/31/2014)
iii. Enhancing Georgia's Energy Security, Promotion of Exports and Economic Development – Program's Capacity Building and Management Improvement Component						
Indicator PE9: Number of persons participating in USG - funded workforce development programs (disaggrega-ted by sex and age)	Subject to contractor bid submission results	GSE training: 8 people; 6 men and 2 women; ranging in age from 22 yrs to 49 yrs. LumaSense provided training in DGA through PGIOP. No one was trained at GOGC through the PGIOP project.	The following courses were provided to GSE employees: EECS (ICON TDM Network): 5 GSE participants(all men). ranging in age from 27-58 yrs. EECS (SEL Relays), 5 GSE participants(all men), ranging in age from 27-58 yrs. EECS (RTAC SEL 3530-4, HMI SEL -3354 Zenon), 5 GSE participants(all men), ranging in age from 22-58 yrs. No one was trained at GOGC through the PGIOP project.	As related to the PGIOP task order, the following trainings occurred at GSE and GOGC: 49[5] GSE employees received training in the operations and maintenance of the emergency enhanced control systems (EECS) and dissolved gas analyzers DGA). These trainings were held in November 2013 and March 2014. GOGC reported that 12 people were trained in cathodic protection (CP) methodologies and maintenance in January 2014.	As related to the PGIOP task order, no GSE personnel received official trainings. However, through one-on-one professional relationships, PGIOP team members built capacity and technical skills and knowledge in the following areas: program management, data collection, procurement and strategic planning. As related to GOGC, no official trainings took place, but PGIOP team members provided capacity building and supported GOGC in the following areas: design, procurement, operations and maintenance and pipeline integrity. For further details, please see the PGIOP Annual Report covering the period from October 1, 2013 through September 30, 2014.	As related to the PGIOP task order, no GSE personnel received official trainings. However, through one-on-one professional relationships, PGIOP team members built capacity and technical skills and knowledge in the following areas: program management, data collection, procurement and strategic planning. On behalf of Tt, GOGCs personnel received training in the field of cathodic protection (CP) from Dr. Chris Ringas. Also, PGIOP team members provided support to GOGC, team practiced in using/ operating pipeline integrity monitoring equipment.

[5] 11 females and 38 males participated, with 37 employees ranging in age from 25-35 years, 9 employees ranging in age from 35-50 years, and 3 employees ranging in age from 50-75 years.

Performance Indicators	Baseline (Year Ending 10/01/2009)	Results (From 10/1/2012 to 03/31/2013)	Results (From 04/01/2013 to 09/30/2013)	Results (From 10/01/2013 to 03/31/2014)	Results (From 04/01/2013 to 9/30/2014)	Results (From 10/01/2014 to 12/31/2014)
Indicator PE10: Number of people gaining employment or better employment as a result of the program (disaggrega-ted by sex, age, new vs. improved employment)		25 persons GOGC (20 men and 5 women) During the period, GSE reported that 5 men, ranging in age from 33 to 37 yrs, gained direct employ-ment SER reported that 281 people gained employ-ment for the Senaki 220 kV project	41 people gained direct employ-ment (30 men and 11 women) through GOGC During the period, GSE reported that zero people gained direct employ-ment SER reported that 789 people gained employ-ment or better employ-ment for the Senaki 220 kV project	During the reporting period, GSE reported that 2 employees were promoted. 5 people (4 men and 1 woman) gained direct employment through GOGC. GOGC contractors have employed 130 people (129 men and 1 woman) on construction activities	GSE reported that one employee was promoted due to USAID-funded trainings (HICD Plus) GOGC reported that it hired an environmental specialist due to skills gaps highlighted by HICD Plus consultants Neither GSE nor GOGC tracked people promoted or hired due to PGIOP's capacity building interventions	Neither GSE nor GOGC tracked people promoted or hired due to PGIOP's capacity building interventions
Indicator PE11: Extent of contributions performed by counterparts GSE and GOGC (e.g., for each activity in the work plan, the number of activities and percent of effort where GSE and GOGC are able to lead with limited oversight)		Both GOGC and GSE reported that this indicator is not tracked.	Both GOGC and GSE reported that this indicator is not tracked.	Both GOGC and GSE reported that this indicator is not measured or evaluated.	Both GOGC and GSE reported that this indicator is not measured or evaluated.	Both GOGC and GSE reported that this indicator is not measured or evaluated.

Performance Indicators	Baseline (Year Ending 10/01/2009)	Results (From 10/1/2012 to 03/31/2013)	Results (From 04/01/2013 to 09/30/2013)	Results (From 10/01/2013 to 03/31/2014)	Results (From 04/01/2013 to 9/30/2014)	Results (From 10/01/2014 to 12/31/2014)
b. Component 1 Electric: Activity / Task Level Indicators (Custom Indicators - Outcomes)						
i. Task 1A: Reconstruction and Construction Subcomponent – Reconstruct the Twin Chain Senaki 220 kV Transmission Lines						
Indicator 1.1: Number of circuit kilometers constructed	Zero at start of the project.	Zero; the lines are not expected to be in service until the spring of 2014.	Zero; the lines are not expected to be in service until the spring of 2014.	Zero; the lines are not expected to be in service until the spring of 2014.	During the reporting period, the Senaki I & II transmission lines were fully constructed and put into service. These transmission lines stretche 57.8 km	Zero
Indicator 1.2: Amount of electricity carried through new transmission lines (measured in MWH)	Zero at start of the project.	Zero; the lines are not expected to be in service until the spring of 2014.	Zero; the lines are not expected to be in service until the spring of 2014.	Zero; the lines are not expected to be in service until the spring of 2014.	GSE measures electricity carried throughout the entire network, not individual transmission lines.	GSE measures electricity carried throughout the entire network, not individual transmission lines.
Indicator 1.3: Amount of investment gained, or made by GSE itself, to expand the network to Khorga (a.k.a. Mukhuri) Substation		Zero; Khorga Substation and network are forecast to be complete in 2015. GSE is working with several donors to provide funding for this project.	Zero; please see response at left.	Zero; the Khorga Substation is forecast to be complete in 2015. GSE is working with several donors to provide funding for this project.	GSE reported that EBRD and KfW are supporting for the reconstruction of the Jvari and Khorga Substations and associated transmission line, totaling 11.6 million euros. GSE is co-financing this project in the amount of 588,505 euros. In addition, the Asian Development Bank is committing 48 million USD to rehabilitate the Khorga and Marneuli Substations. Please see Indicator 3.9 for more details.	GSE reports that it gained 87, 420 euros in December 2014 for the expansion of the Khorga Substation.

Performance Indicators	Baseline (Year Ending 10/01/2009)	Results (From 10/1/2012 to 03/31/2013)	Results (From 04/01/2013 to 09/30/2013)	Results (From 10/01/2013 to 03/31/2014)	Results (From 04/01/2013 to 9/30/2014)	Results (From 10/01/2014 to 12/31/2014)
ii. Task 1B: System Monitoring of GSE Transmission Network Assets						
Indicator 1.4: Number of GSE owned high-voltage transformers failing and being forced out of service	Zero. No GSE owned HV transformers failed in this time period.	Zero. No GSE owned HV transform-ers failed during this reporting period.	Zero. No GSE owned HV transform-ers failed during this reporting period	GSE reported the following number of times that HV transformers were temporarily shut down and or forced out of service during the reporting period: October: 1 November: 1 December: 2 January: 1 February: 2 March: 1	GSE reported the following number of times that HV transformers were temporarily shut down and or forced out of service during the reporting period: April, 2014: 3 May, 2014: 1 June, 2014: 0 July, 2014: 0 August, 2014: 0 September, 2014: 1 Please note: Indicator PE1 includes the above-reported numbers.	GSE reported the following number of times that HV transformers were temporarily shut down and/or forced out of service during the reporting period: October, 2014: 0 November, 2014: 0 December, 2014: 3
Indicator 1.5: Amount of emergency maintenance funds spent due to unplanned transformer failures	Zero. No GSE owned HV transformers failed in this time period.	No funds were spent for emergency mainten-ance related purposes since no GSE owned HV transform-ers failed during the reporting period.	No funds were spent for emergency mainten-ance related purposes since no GSE owned HV transform-ers failed during the reporting period.	No funds were spent for emergency maintenance related purposes since no GSE owned HV transformers failed during the reporting period.	No funds were spent for emergency maintenance related purposes since no GSE owned HV transformers failed during the reporting period.	No funds were spent for emergency maintenance related purposes since no GSE owned HV transformers failed during the reporting period.

Performance Indicators	Baseline (Year Ending 10/01/2009)	Results (From 10/1/2012 to 03/31/2013)	Results (From 04/01/2013 to 09/30/2013)	Results (From 10/01/2013 to 03/31/2014)	Results (From 04/01/2013 to 9/30/2014)	Results (From 10/01/2014 to 12/31/2014)
Indicator 1.6: Number of customers affected by either a backbone transmission disruption and/or transformer failures (categorized by customer and type of failure)		The East-West power transmis-sion network disconnect-ted three times but no customers were affected by the disruption as customers received electricity through alternative sources.	The following regions were affected by the three blackouts: June 6: GSE reporte that the affected areas were Zestaphoni, Khashuri; Tt estimated the potential population impacted to be 137,700 people. August 27: GSE reported that the affected area was East Georgia; Tt estimated the potential population impacted was between 1,552,100 and 2,723,200 people[6] September 19: GSE reported that the affected areas were Abkhazia, Zugdidi, Menji (Senaki) and Batumi; Tt estimated that the potential population impacted was 320,900 people. See footnote below.[7]	GSE reported that it no longer collects data for the regions affected by the blackouts	GSE reported that it no longer collects data for the regions affected by the blackouts	GSE reported that it no longer collects data for the regions affected by the blackouts

[6] During this partial blackout, the transmission network's emergency control systems were activated. Therefore, it is impossible to determine which cities were affected during the partial blackout in East Georgia. The latter number integrates all major city centers including Tbilisi while the former does not include Tbilisi.

[7] http://www.geostat.ge/cms/site_images/_files/english/population/15.10.2013_krebuli%202012.pdf; the census data for Abkhazia were taken in 2009.

Performance Indicators	Baseline (Year Ending 10/01/2009)	Results (From 10/1/2012 to 03/31/2013)	Results (From 04/01/2013 to 09/30/2013)	Results (From 10/01/2013 to 03/31/2014)	Results (From 04/01/2013 to 9/30/2014)	Results (From 10/01/2014 to 12/31/2014)
iii. Task 1C: Smart Grid Implementation for a Segment of the GSE Network						
Indicator 1.7: Percentage of the transmission system operating with modern computerized (automated) control systems		At the end of this reporting period, three stations (15%) were fully automated (Gardabani, Navtugi, Alkhaltshikhe). Eleven stations (55%) were planned for upgrading (Zestaphoni[8] Gldani, Kutaisi, Rustavi, Menji, Batumi, Gori, Khashuri, Marneuli, Tskaltbuo, and Zugdidi). Six remain to be compelted (30%) (Vektori, Vardnili 1, Enguri, Zjinvali, Lisi, Gurjaani).	Please see the response at the left.	Please see the response at the left.	At the end of the reporting period, GSE reported that 30% of the transmission system was operating with modern computerized control systems. The following substations are upgraded: Didube, Lisi, Gldani, Kutaisi, and Zestaphoni 550 kV. By December 31, 2014, GSE will have completed upgrading the control systems at Menji, Marneuli and Rustavi. All substations will be completed by July 2015.	At the end of the reporting period, GSE reported that 30% of the transmission system was operating with modern computerized control systems. The following substations are upgraded: Didube, Lisi, Gldani, Kutaisi, and Zestaphoni 550 kV. By December 31st, 2014, GSE will have completed upgrading the control systems at Menji, Marneuli and Rustavi.

[8] Zestaphoni Substation was rehabilitated in 2010; currently GSE is adding a station monitoring and control system (SMCS).

Performance Indicators	Baseline (Year Ending 10/01/2009)	Results (From 10/1/2012 to 03/31/2013)	Results (From 04/01/2013 to 09/30/2013)	Results (From 10/01/2013 to 03/31/2014)	Results (From 04/01/2013 to 9/30/2014)	Results (From 10/01/2014 to 12/31/2014)
c. Component 2 Gas: Activity / Task Level Indicators (Custom Indicators - Outcomes)						
i. Task 2A: Senaki - Poti Natural Gas Pipeline Extension						
Indicator 2.1: Number of kilometers of pipeline constructed.	None	The entire 30 km pipeline was completed and was operational by spring of 2012.	Please see the response to the left	Please see the response to the left	Please see the response to the left	Please see the response to the left
Indicator 2.2: Increase in delivery capacity for natural gas (e.g., how much additional natural gas can be delivered based on design pressures)	None.	With the completion of this pipeline in the spring of 2012, the increase in delivery capacity was 2.3 million normal cubic meters per day. Currently, the operating pressure is not permitted to exceed seven bars, which determines the delivery capacity. The current capacity meets consump-tion needs.	Please see the response to the left	Please see the response to the left	Please see the response to the left	Please see the response to the left
Indicator 2.3: Actual delivery of natural gas through the newly built and rehabilitated pipeline system (million normal cubic meters per day)	None.	438,587 (thousand) in the 30 km of pipeline construct-ed from Senaki to Poti.	383,110 (thousand) in the 30 km of pipeline constructed from Senaki to Poti.	869,093 (thousand) in the 30 km of the pipeline constructed from Senaki to Poti.	688,561 (thousand) in the 30 km of the pipeline constructed from Senaki to Poti.	688,561 (thousand) in the 30 km of the pipeline constructed from Senaki to Poti

Performance Indicators	Baseline (Year Ending 10/01/2009)	Results (From 10/1/2012 to 03/31/2013)	Results (From 04/01/2013 to 09/30/2013)	Results (From 10/01/2013 to 03/31/2014)	Results (From 04/01/2013 to 9/30/2014)	Results (From 10/01/2014 to 12/31/2014)
ii. Task 2B: Abasha - Senaki Pipeline Replacement						
Indicator 2.4: Number of kilometers of pipeline replaced.	None	None.	29 km of replace-ment pipeline were construct-ed; the pipeline was not in operation at the end of this reporting period.	See response to the left. Projected in-service date for fourth quarter 2014.	See response to the left. Projected in-service date for fourth quarter 2014.	29 km of replacement pipeline were constructed; the pipeline was put in operation during this reporting period.
Indicator 2.5: Increase in delivery capacity for natural gas (e.g., how much additional natural gas can be delivered based on design pressures) (million normal cubic meters per day)	None	At the end of the reporting period, the increase in delivery capacity was zero as the line is not finished.	At the end of the reporting period, the increase in delivery capacity was zero as the line is finished but not operational.	Please see the response at the left. Projected in-service date for fourth quarter 2014.	Please see the response at the left. Projected in-service date for fourth quarter 2014.	Diameter changes (Dn500 to Dn700) caused increased gas flow capacity. Based on design and operational limits, around 2 M normal cubic meters of natural gas can be delivered per day instead of 0.9 M cubic meters (calculated on existing pressure levels)
Indicator 2.6: Actual delivery of natural gas through the newly built and rehabilitated pipeline system (million normal cubic meters per day)	Existing pipeline is carrying 500 million normal cubic meters per year of natural gas, which is the current customer consumption.	At the end of the reporting period, the actual delivery was zero as the line was not finished.	At the end of the reporting period, the actual delivery was zero as the line was finished but not operational.	Please see the response at the left. Projected in-service date for fourth quarter 2014.	Please see the response at the left. Projected in-service date for fourth quarter 2014.	Actual delivery of natural gas on Abasha-Senaki Section is 0. 3M normal cubic meters per day.

Performance Indicators	Baseline (Year Ending 10/01/2009)	Results (From 10/1/2012 to 03/31/2013)	Results (From 04/01/2013 to 09/30/2013)	Results (From 10/01/2013 to 03/31/2014)	Results (From 04/01/2013 to 9/30/2014)	Results (From 10/01/2014 to 12/31/2014)
iii. Task 2C: Kutaisi - Abasha Pipeline Rehabilitation						
Indicator 2.7: Number of kilometers of pipeline rehabilitated (for entire GOGC system)	None	Zero; the pipeline is not finished.	Please see response at the left.	At the end of the reporting period, 29 km of 700 DN pipeline were rehabilitated.	At the end of the reporting period, 29 km of 700 DN pipeline were rehabilitated.	At the end of the reporting period, 29 km of 700 DN pipeline were rehabilitated.
Indicator 2.8: Increase in delivery capacity for natural gas (e.g., how much additional natural gas can be delivered based on design pressures) (million normal cubic meters per day)	None	Zero; the pipeline is not finished.	Please see the response at the left.	At the end of the reporting period, 29 km of 700 DN pipeline were rehabilitated. However, the delivery capacity is zero as the line is not in-service. Projected in-service date is fourth quarter 2014.	At the end of the reporting period, 29 km of 700 DN pipeline were rehabilitated. However, the delivery capacity is zero as the line is not in-service. Projected in-service date is fourth quarter 2014.	At the end of the reporting period, 29 km of 700 DN pipeline were rehabilitated. However, the delivery capacity is zero as the line is not in-service. Projected in-service date is fourth quarter 2014.
Indicator 2.9: Actual delivery of natural gas through the newly built and rehabilitated pipeline system (million cubic meters per day)	None, since the line was not in service.	Zero; the pipeline is not finished.	Please see the response at the left.	At the end of the reporting period, 29 km of 700 DN pipeline were rehabilitated. However, the delivery capacity is zero as the line is not in-service. Projected in-service date is fourth quarter 2014.	At the end of the reporting period, 29 km of 700 DN pipeline were rehabilitated. However, the delivery capacity is zero as the line is not in-service. Projected in-service date is fourth quarter 2014.	Actual delivery of natural gas on Kutaisi-Abasha Section is 0,7million normal cubic meters per day.

Performance Indicators	Baseline (Year Ending 10/01/2009)	Results (From 10/1/2012 to 03/31/2013)	Results (From 04/01/2013 to 09/30/2013)	Results (From 10/01/2013 to 03/31/2014)	Results (From 04/01/2013 to 9/30/2014)	Results (From 10/01/2014 to 12/31/2014)
d. Capacity Building and Management Improvements: Activity / Task Level Indicators (Custom Indicators - Outcomes)						
i. Task 3A: GSE Capacity Building and Management Improvement						
Indicator 3.1: Percent of work effort for network construction and expansion GSE staff are able to perform in-house, with only minor oversight and guidance.	GSE reported that they have the capability to do minor construction up to 220 kV. However, GSE said it does not have the in-house staff and equipment to construct major 220 kV (for example, GIPTP) and 500 kV (for example, Alkhaltshikhe-Gardabani) transmission lines.	Please see the response at the left.	Please see the response at the left.	Please see the response at the left.	Please see the response at the left.	
Indicator 3.2: Number of GSE staff trained by program (including gender and age)	Zero; there was no program training in this fiscal year.	In November 2012, LumaSense provided training to 8 GSE employees in DGA related issues. In total, 6 men and 2 women attended this training. The participants ranged in age from 22 yrs to 49 yrs.	The following courses were provided to GSE employees: **EECS** (ICON TDM Network), 5 GSE participants(all men), ranging in age from 27-58 yrs. **EECS** (SEL Relays), 5 GSE participants(all men), ranging in age from 27-58 yrs. **EECS** (RTAC SEL 3530-4, HMI SEL -3354 Zenon), 5 GSE participants(all men), ranging in age from 22-58 yrs.	As related to the PGIOP task order, the following trainings occurred at GSE: 49[9] GSE employees received training in the operations and maintenance of the emergency enhanced control systems (EECS) and dissolved gas analyzers DGA). These trainings were held in November 2013 and March 2014.	As related to the PGIOP task order, no GSE personnel received trainings. However, through one-on-one professional relationships, PGIOP team members built capacity and technical skills and knowledge in the following areas: program management, data collection and strategic planning.	As related to the PGIOP task order, no GSE personnel received trainings. However, through one-on-one professional relationships, PGIOP team members built capacity and technical skills and knowledge in the following areas: program management, data collection and strategic planning.

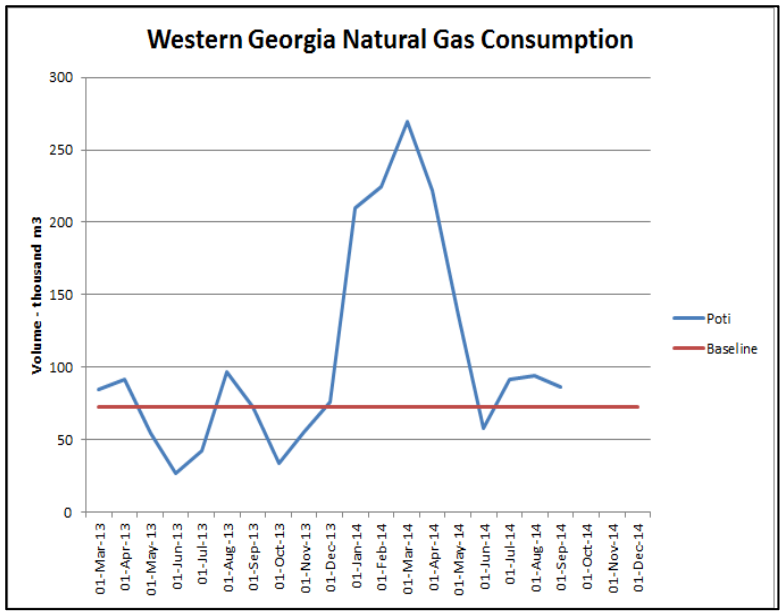
[9] 11 females and 38 males participated, with 37 employees ranging in age from 25-35 years, 9 employees ranging from 35-50 years of age, and 3 employees ranging in age from 50-75 years.

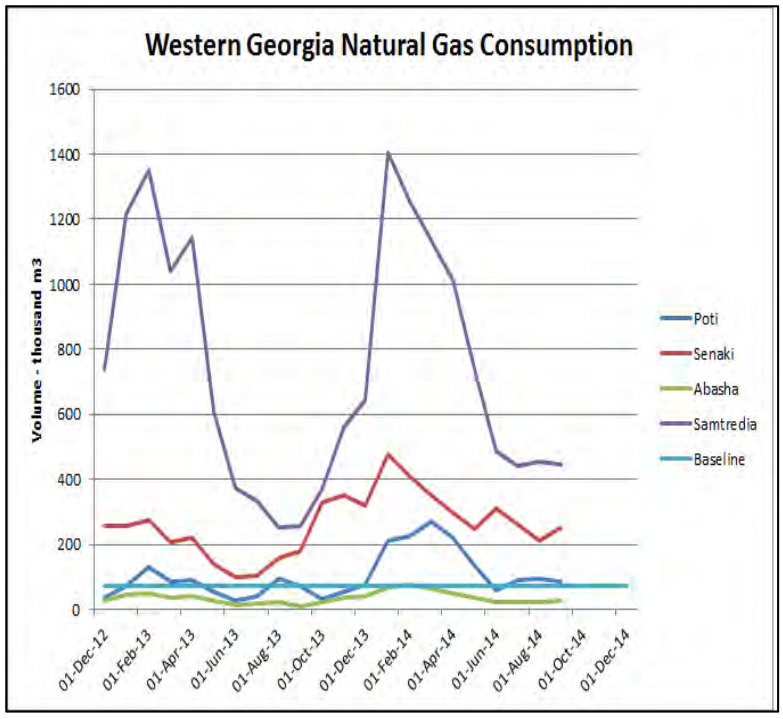
Performance Indicators	Baseline (Year Ending 10/01/2009)	Results (From 10/1/2012 to 03/31/2013)	Results (From 04/01/2013 to 09/30/2013)	Results (From 10/01/2013 to 03/31/2014)	Results (From 04/01/2013 to 9/30/2014)	Results (From 10/01/2014 to 12/31/2014)
Indicator 3.3: Number of lost time accidents in the GSE organization	Zero	Zero	Zero	Zero	Zero	Zero
Indicator 3.4: Number of loss time accidents in contractor organizations	Not available; GSE does not track this statistic.	Not available; GSE does not track this statistic.	Not available; GSE does not track this statistic.	Not available; GSE does not track this statistic.	Not available; GSE does not track this statistic.	Not available; GSE does not track this statistic.
ii. Task 3B: GOGC Capacity Building and Management Improvement						
Indicator 3.5: Percent of work effort for network rehabilitation and construction able to be performed in house, with only minor oversight and guidance	GOGC and GGTC are staffed and equipped to perform maintenance on existing gas pipelines and construction of up to 15 km length of DN700 pipeline. Longer sections of new gas pipelines are done by subcontractors	GOGC reports 80%	GOGC reports 80%	GOGC reports 80%.	GOGC reports 80%.	GOGC reports 80%.

Performance Indicators	Baseline (Year Ending 10/01/2009)	Results (From 10/1/2012 to 03/31/2013)	Results (From 04/01/2013 to 09/30/2013)	Results (From 10/01/2013 to 03/31/2014)	Results (From 04/01/2013 to 9/30/2014)	Results (From 10/01/2014 to 12/31/2014)
Indicator 3.6: Number of GOGC staff trained by program (including gender and age)	Zero; there was no program training in this fiscal year.	Zero as there were no PGIOP training programs held in this reporting period.	Zero as there were no PGIOP training programs held in this reporting period.	PGIOP provided cathodic protection training for 12 GOGC and GGTC personnel (all men) during January 2014.	Zero as there were no PGIOP training programs held in this reporting period. However, PGIOP team members provided capacity building and supported GOGC in the following areas: design, procurement, operations and maintenance and pipeline integrity. Please see the PGIOP Annual Report covering the period from October 1, 2013 through September 30, 2014 for further details.	PGIOP provided cathodic protection training for 8 GOGC and GGTC personnel (all men).
Indicator 3.7: Number of lost time accidents in the GOGC organization	Zero	Zero	Zero	Zero	Zero	Zero
Indicator 3.8: Number of lost time accidents in contractor organizations	Zero	Zero	Zero	Zero	Zero	Zero

Gas Consumption by Distribution Customers in Western Georgia

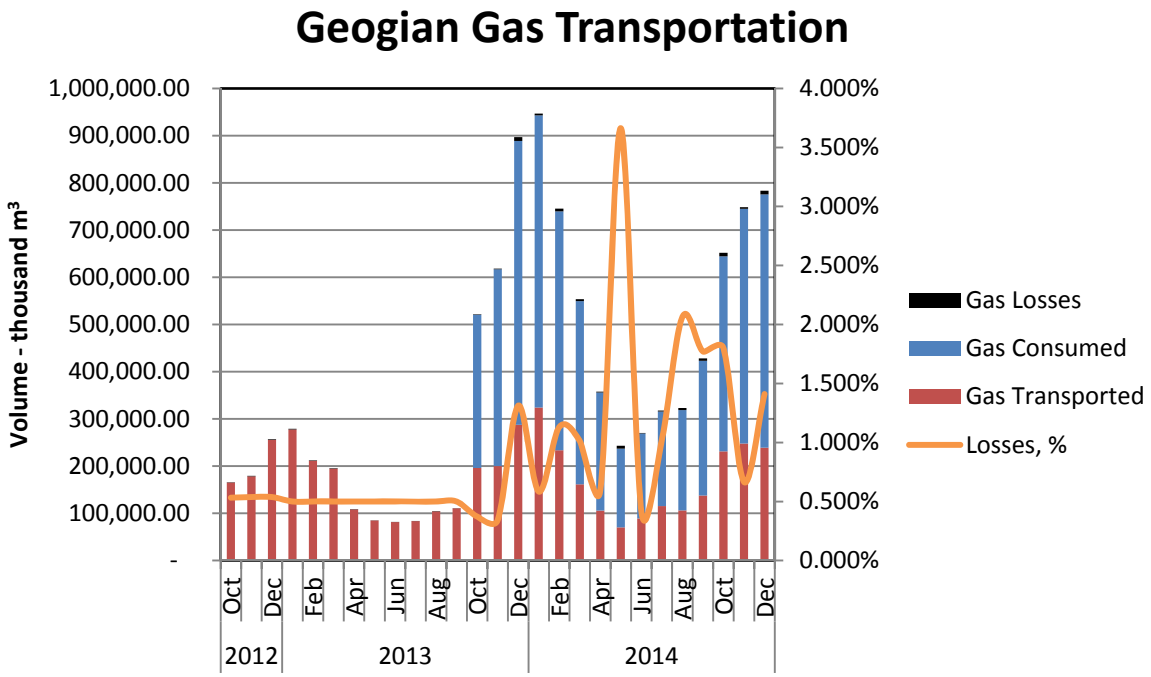
The graphics displayed below indicate the volume of of gas consumed by distrcibtion customers, who are serviced by the newly built and rehabilitated GOGC's pipeline segments, the construction of which was overseen by Tt. The baseline was fixed at the cumulative distribution volumes for FY 2012. The average gas distribution in FY 2012 was 72,818 m^3; PGIOP chose this figure as a baseline as the Senaki-Poti pipeline was not in service until January 2013.





Technical Loss Percentage

Based on Tt's standard calculation, GGTC's reported average technical loss for the period from October-December 2014 was 1.2921%. According to GGTC's calculation, the average technical loss for the period was 0.3001%. The graph below visually displays these figures.



Supplemental Indicators

Per USAID's request of March 28 and July 2, 2014, PGIOP gathered the following data points from GOGC and GSE:

I. Total public and private funds leveraged by the USG for energy projects
II. Number of people receiving USG-supported training in energy-related business management systems.

These indicators fall under the PGIOP capacity building component and are activity level indicators.

Performance Indicators	Base-line (Year Ending 10/01/2009)	Results (from 10/1/2012 to 03/31/2013)	Results (from 04/01/2013 to 09/30/2013)	Results (from 10/01/2013 to 03/31/2014)	Results (from 04/01/2013 to 9/30/2014)	Results (from 10/01/2014 to 12/31/2014)
Activity Level Indicators						
GOGC and GSE Capacity Building Improvement (Additional Indicators)						
Indicator 3.9: Total public and private funds leveraged by USG for energy projects, as measured by GOGC and GSE	Not known	Not known	Not known	GSE reported that it does not track private funds. As regards public funds, the following have been committed: • 48 m USD, Asian Development Bank, torehabilitate the Khorga Substation network, 2014 • 36 m euros, EBRD, to rehabilitate key transmission lines and replace transformers, 2014. GOGC reports that is does not track private funds. As regards public funds, please find below GOGC's **planned** efforts to improve and expand the East-West pipeline network: • $37.720 m 2014 • $40.525 m 2015 • $31.96 m 2016.	GSE reported that it does not track private funds. The following public funds were leveraged in FY 2014: • EBRD and KfW support for the reconstruction of the Jvari and Khorga Substations and associated transmission line, totaling 11.6 million euros. GSE is co-financing this project in the amount of 588,505 euros. • KfW is giving 160,000 euros for the rehabilitation of the Ksani-Stepantsminda Substation and GSE is co-financing this project in the amount of 40,000 eurod. • Asian Development Bank is committing 48 million USD to rehabilitate the Khorga and Marneuli Substations. GOGC reportrf that is does not track private funds. As regards public funds, please find below GOGC's planned efforts to improve and expand the East-West pipeline network: • $37.720 m 2014 • $40.525 m 2015 • $31.96 m 2016.	GSE reported that it does not track private funds. 1,698,203 GEL of public funds were leveraged in October 2014 for projects. GOGC reported that it does not track private funds. As regards public funds, please find below GOGC's planned efforts to improve and expand the East-West pipeline network: • $37.720 m 2014; • $40.525 m 2015; • $31.96 m 2016.

Performance Indicators	Base-line (Year Ending 10/01/2009)	Results (from 10/1/2012 to 03/31/2013)	Results (from 04/01/2013 to 09/30/2013)	Results (from 10/01/2013 to 03/31/2014)	Results (from 04/01/2013 to 9/30/2014)	Results (from 10/01/2014 to 12/31/2014)
Indicator 4.0: Number of people receiving USG supported training in energy related business management systems	Not known	Not known	Not known	As related to the PGIOP task order, the following trainings occurred at GSE and GOGC: • 49[10] GSE employees received training in the operations and maintenance of the emergency enhanced control systems (EECS) and dissolved gas analyzers DGA). These trainings were held in November 2013 and March 2014. • GOGC reported that 12 people were trained in cathodic protection (CP) methodologies and maintenance in January 2014.	As related to the PGIOP task order, no GSE personnel received official trainings. However, through one-on-one professional relationships, PGIOP team members built capacity and technical skills and knowledge in the following areas: program management, data collection, procurement and strategic planning. As related to GOGC, no official trainings took place but PGIOP team members provided capacity building and supported GOGC in the following areas: design, procurement, operations and maintenance and pipeline integrity. For further details, please see the PGIOP Annual Report covering the period from October 1, 2013 through September 30, 2014.	As related to the PGIOP task order, no GSE personnel received official trainings. However, through one-on-one professional relation-ships, PGIOP team members built capacity and technical skills and knowledge in the following areas: program manage-ment, data collection, procure-ment and strategic planning. GOGC reported that 8 personnel received training in CP systems.

[10] 11 females and 38 males participated, with 37 employees ranging in age from 25-35 years, 9 employees ranging in age from 35-50 years, and 3 employees ranging in age from 50-75 years.

The Georgia Power and Gas Infrastructure Oversight Project (PGIOP) provided in-country professional engineering oversight and other technical services to support power and gas transmission improvements being undertaken by USAID on behalf of the Government of Georgia. The activities performed under PGIOP complemented and reinforced the activities, project management, and engineering expertise of USAID/Caucasus.

PGIOP was implemented from 2012 to 2014 in collaboration with the Georgian Oil and Gas Corporation (GOGC) and the Georgian State Electrosystem (GSE) to upgrade, replace, and install critical selected gas and power transmission infrastructure. These companies are state-owned entities charged with the import and transit, and in the case of GSE, dispatch of electricity throughout the country.

PGIOP's activities supported USAID's objective of promoting energy security through increasing access to electricity and natural gas supplies to households in Western Georgia, promoting the development of the Poti Free Industrial Zone on the Black Sea, and securing power exports through in-country reliability-related infrastructure improvements. The activities were managed by Tetra Tech and supported USAID's objective of fostering sustainable development.

The PGIOP project included the following infrastructure projects:

- Construction of a new 76 kilometer, 700 mm gas pipeline from Kutaisi to Senaki.
- Replacement of 58 kilometers of 220 kV transmission lines (referred to as Senaki I and II), which were dismantled in 1992 during Georgia's civil war.
- Restoration of the power substations in Tskaltubo and Menji to support the Senaki I and II 220 kV transmission lines.
- Construction of 43 kilometers of new 700 mm gas pipelines from Gori to Kareli and from Zestaphoni to Kutaisi.