



DRAFT STRATEGIC ENERGY ROAD MAPS FOR KEY STAKEHOLDERS IN THE ENERGY SECTOR

GOVERNING FOR GROWTH (G4G) IN GEORGIA

16 November 2014

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DATA

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ACRONYMS

AMR	Automatic Meter Reading
BM	Balancing Market
CSO	Civil Society Organization
CBM	Coal Bed Methane
DAM	Day-Ahead Market
DSM	Demand-Side Management
EC	European Community
EC-LEDS	Enhancing Capacity for Low Emission Development Strategies
EE	Energy Efficiency
ENTSO-E	European Network of Transmission System Operators for Electricity
ENTSO-G	European Network of Transmission System Operators for Gas
EPIAS/PMUM	Energy Exchange in Turkey/Market Financial Reconciliation Center
ESCO	Electricity System Commercial Operator
ETM	Electricity Trading Mechanism
EU	European Union
GDP	Gross Domestic Product
GEMM 2015	Georgia Electricity Market Model 2015
GGTC	Georgian Gas Transportation Company
GMO	Gas Market Operator
GNERC	Georgian National Energy and Water Supply Regulatory Commission
GoG	Government of Georgia
GOGC	Georgian Oil and Gas Corporation
GPA	Gas Purchase Agreement
GSE	Georgian State Electrosystem
G4G	Governing for Growth in Georgia Project
HICD	Human and Institutional Capacity Development
HPEP	Hydropower and Energy Planning Project
HPP	Hydro Power Plant
IEA	International Energy Agency
MARKAL	Market Allocation software model
MO	Market Operator
MoE	Ministry of Energy
MW	Megawatt
NEEAP	National Energy Efficiency Action Plan
NREAP	National Renewable Energy Action Plan
Px	Power Exchange
RD&D	Research, Development & Demonstration
RES	Renewable Energy Sources
SOLR	Supplier of Last Resort
TPA	Third Party Access

TSO

Transmission System Operator

USAID

United States Agency for International Development

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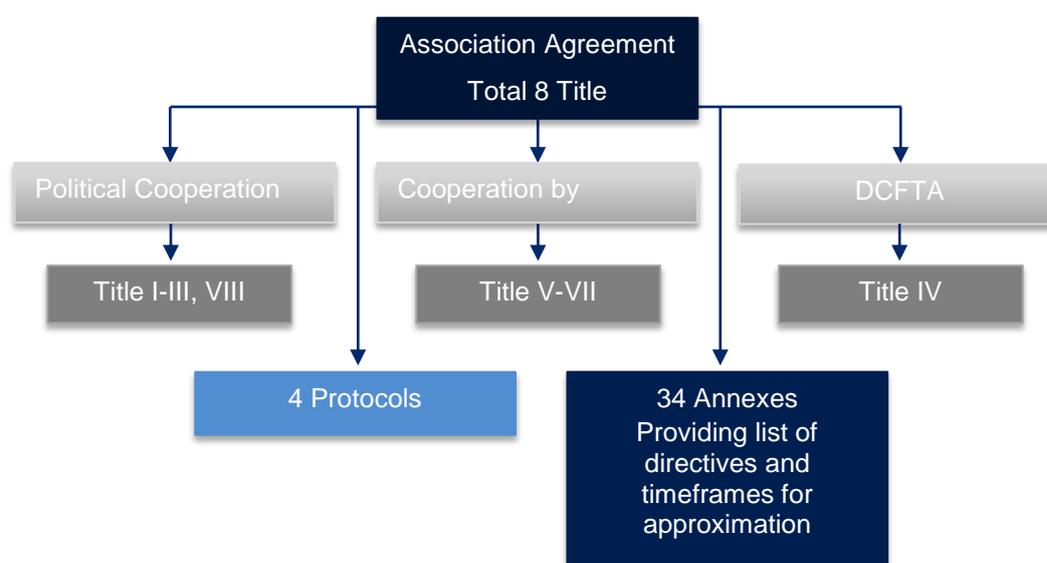
INTRODUCTION

The strategic energy road map of Georgia comprises eleven major areas for key stakeholders in the energy sector. The strategic road map for each area is summarized in the following tables that identify important topics, plans of action, key persons and entities, and possible timelines. The eleven areas are: Energy Security, Legislative and Regulatory Framework, Electricity Sector, Natural Gas Sector, Oil and Oil Byproduct Sector, Demand Side Management, Renewable Energy Sources, Biomass Sector, Coal And Peat Sector, Institutional Development, Public Services Obligations, Environmental Protection, and Technology and Innovation.

This document takes into account existing international commitments Georgia has made in the energy sector and the draft legal documents and strategies developed and adopted by the government of Georgia for implementation. Namely, Georgia's commitments and aspirations for European integration and undertaken obligations after signing of the Association Agreement and the corresponding Deep and Comprehensive Free Trade Area (DCFTA) (Figure 1) and the requirements and Directives Georgia is obliged to fulfill under the third energy package to be able to join the European Energy Community.

The roadmap in the renewable energy source (RES) sector presented below includes hydropower and new renewables like solar, wind and geothermal. Biomass and coal are presented in separate tables due to high relevance of these sectors and particularly adverse circumstances in terms of inefficient wood use in the household sector.

Figure 1: Georgia's obligations under Association Agreement



ENERGY SECURITY					
Area	Topic	Actions	Responsible person	Supporting Entity	Deadline
Electricity	<ul style="list-style-type: none"> Commercialization 	<ul style="list-style-type: none"> Developing planning process Developing financial planning Developing budgeting process 	Minister of Energy Minister of Economy	Ministry of Economy Ministry of Energy	December 2017
	<ul style="list-style-type: none"> Evaluation of Internal Generation 	<ul style="list-style-type: none"> Cost-Benefit Analysis (CBA) for the rehabilitation of old HPPs Analyze potential of renewables CBA and development of demand and supply model to base decisions on 	Minister of Energy	Owners of HPPs	December 2016
	<ul style="list-style-type: none"> Reliability Assessments Initial 10-year Network Development Plan (TYNDP) 	<ul style="list-style-type: none"> Develop process TYNDP Analyze domestic electricity grid in the context of new generation capacity expansion Analyze domestic electricity grid in the context of load increase Human and Institutional Capacity Development (HICD) Software 	Director of GSE	Sakrusenergo/ Energotrans/ Energo-Pro Georgia	December 2015
	<ul style="list-style-type: none"> International Interconnection & Trading 	<ul style="list-style-type: none"> Analyze regional electricity market developments and power flows 	Director of GSE	Sakrusenergo/ Energotrans/ Energo-Pro Georgia	On-going
Government Owned Entities	<ul style="list-style-type: none"> Financial viability 	<ul style="list-style-type: none"> Competition in all aspects of procurement and service delivery 	Director of MO Director of GSE Director of GOGC Director of GGTC Director of Enguri HPP	Ministry of Energy	December 2016
		<ul style="list-style-type: none"> Increase capacity of government-owned entities to create & deliver services to the market 	Director of MO Director of GSE Director of GOGC Director of GGTC Director of Enguri HPP	Ministry of Energy	December 2015
	<ul style="list-style-type: none"> Improving technical and commercial service quality 	<ul style="list-style-type: none"> Develop standards for network performance Develop investment programs consistent with the performance standards Monitor progress of meeting these standards Develop standards to harmonize with ENTSO-E and ENTSO-G 	Director of GSE Director of GGTC	Ministry of Energy	September 2015
Natural Gas	<ul style="list-style-type: none"> Gas Storage Options 	<ul style="list-style-type: none"> Analyze and provide recommendations on developing a gas storage facility in Georgia in Samgori South Dome Engineering studies of the gas storage project Fundraising works and attracting investment for 	Director of GOGC	MoE	June 2015

		development of the project			
	<ul style="list-style-type: none"> Long-term GPAs 	<ul style="list-style-type: none"> Review all existing long-term GPAs and provide a recommendation for additional similar arrangements Review of previous gas strategy developed by USAID in the context of energy security Analyze EU energy community standards for new GPAs 	Minister of Energy	GOGC	January 2016
	<ul style="list-style-type: none"> Diversity of sources and pipelines Emergency Planning 	<ul style="list-style-type: none"> Complete a study on the various sources and pipelines of natural gas to examine the risk of supply interruptions to Georgia and propose mitigation measures to reduce the possibility of such risks 	Minister of Energy	GOGC	May 2015
	<ul style="list-style-type: none"> Reliability Assessments Initial 10-year Network Development Plan 	<ul style="list-style-type: none"> Develop process TYNDP Analyze gas pipelines in the context of new capacity expansion Analyze gas pipelines in the context of gas demand increase Human and Institutional Capacity Development (HICD) Software 	Director of GSE	MoE	July 2015
Oil	Strategic Oil Reserve (SOR)	Analyze and recommend a plan for ensuring a non-military SOR for Georgia	Minister of Energy	GOGC	June 2015
	Downstream regulator to oversee SOR and other oil related issues	Analyze and propose establishment of oil downstream regulator to cover at least the issue mandated by the EU Third Energy Package	Minister of Energy	MoE	September 2016
Research and Development	R&D of local oil reserves	<ul style="list-style-type: none"> Seek financing for R&D Tender for a cost benefit analysis on oil exploration and extraction in Georgia 	Minister of Energy	GOGC	December 2015
	R&D of local natural gas reserves	<ul style="list-style-type: none"> Seek financing for R&D Tender for a cost benefit analysis on natural gas exploration and extraction in Georgia 	Minister of Energy	GOGC	October 2015
	R&D of local shale gas and other unconventional gas reserves	<ul style="list-style-type: none"> Seek financing for R&D Develop and implement relevant legal framework in line with EU standards Tender for a cost benefit analysis on shale gas exploration and extraction in Georgia 	Minister of Energy	GOGC	April 2016
	R&D of local shale oil reserves	<ul style="list-style-type: none"> Seek financing for R&D Develop and implement relevant legal framework in line with EU standards Tender for a cost benefit analysis on shale oil exploration and extraction in Georgia 	Minister of Energy	GOGC	May 2016

COAL AND PEAT SECTOR					
Coal and peat	Evaluation Potential for Clean Coal Technologies	<ul style="list-style-type: none"> Assessment of clean coal technologies and their applicability for Georgia 	Minister of Energy	Ministry of Economy and Sustainable Development Ministry of Environment and Natural Resources Protection	December 2016
	Market Development	<ul style="list-style-type: none"> Coal and peat sector development strategy 	Minister of Energy	Ministry of Economy and Sustainable Development Ministry of Environment and Natural Resources Protection	December 2016
Research and Development	R&D of local coal and peat reserves	<ul style="list-style-type: none"> Seek financing for R&D Tender for a cost benefit analysis on coal exploration and extraction in Georgia 	Minister of Energy	GOGC	December 2015

LEGISLATIVE AND REGULATORY FRAMEWORK					
Area	Topic	Actions	Responsible Person	Supporting Entity	Deadline
Energy <i>acquis</i>	Legal Basis for Electricity Market Competition	Draft Primary and secondary Legislation for competitive market development to include requirements consistent with the Association Agreement and DCFTA Roadmap for:	Minister of Energy	Ministry of Foreign Affairs / The	November 2015

	Legal Basis for Natural Gas Market Competition	<ul style="list-style-type: none"> ➤ Monitoring ➤ Sanctions ➤ Grid Codes ➤ Market Rules ➤ Regional Harmonization ➤ Switching Rules ➤ SOLR Rules ➤ Customer Protection ➤ Public Service Obligations ➤ Transparency and confidentiality ➤ Tendering procedures 		<p>Department of European and Euro-Atlantic Integration</p> <p>Georgian National Energy and Water Supply Regulatory Commission (GNERC)</p>	
Energy Statistics	<ul style="list-style-type: none"> • Data creation, collection and analysis • Energy balance (historical and long-term forecast) • Reporting (IEA) 	Comply with regulation (EC) No 1099/2008 on energy statistics. GEOSTAT should develop methodologies in line with EUROSTAT	Director of GEOSTAT	Minister of Energy, Energy Sector entities	December 2016

ELECTRICITY SECTOR					
Area	Topic	Actions	Responsible Person	Supporting Entity	Deadline
Transmission System Operations	<ul style="list-style-type: none"> • Creation of a single TSO for electricity 	<ul style="list-style-type: none"> • TOs to sign agreement with GSE dispatch to be the designated TSO 	Director of GSE	MoE TOs	July 2015
Cross border harmonization with regional electricity markets	<ul style="list-style-type: none"> • Continue to improve process for capacity auctions • Evaluate increased interconnection capacity • PX price zone with Turkey • Synchronization of technical standards 	<ul style="list-style-type: none"> • Capacity building • Software development • Procedures 	Director of GSE Director of MO	Ministry of Energy	January 2016
Competitive Electricity	<ul style="list-style-type: none"> • Develop Hourly Day-ahead planning • Finalize and maintain state of the 	<ul style="list-style-type: none"> • Train market participants • Adopt procedures required for different market types 	Minister of Energy	MO	March 2016

Market Development	<ul style="list-style-type: none"> art AMR Develop Balancing Market Develop ancillary services market Establishment of Public Trader and Market Operator Legislative amendments during transition of the market Introduction of Day-ahead Market Development of clearing mechanism 	<ul style="list-style-type: none"> Develop and implement IT platforms required for different market types Sell virtual trading rights to each generator of Enguri and Vardnili HPPs Release increasing small amounts of Enguri and Vardnili HPPs to the market 		GSE Market participants	
Market Opening	<ul style="list-style-type: none"> Compliance with EU Directive 2009/72/EC 	<ul style="list-style-type: none"> Development of plan to open the market by 2018 	Minister of Energy	Electricity Distribution Companies	December 2017
Distribution system operations	<ul style="list-style-type: none"> Unbundling of the distribution companies 	Amend the legal framework to allow for competitive retail public suppliers	Minister of Energy	Electricity Distribution Companies	December 2017

NATURAL GAS SECTOR					
Area	Topic	Actions	Responsible Person	Supporting Entity	Deadline
Develop Competitive Market	<ul style="list-style-type: none"> Accounting unbundling Managerial unbundling Legal Unbundling 	<ul style="list-style-type: none"> Develop a plan for unbundling of the natural gas sector through stages 	Director of GOGC	Ministry of Energy	December 2017
	<ul style="list-style-type: none"> TPA <ul style="list-style-type: none"> Transparent rules Market operation 	<ul style="list-style-type: none"> Develop specific rules and procedures for creation of TPA for all non-household consumers 	Minister of Energy	Ministry of Energy Ministry of Economy	September 2015
	<ul style="list-style-type: none"> Natural gas storage for competitive market development 	Review previous studies and recommend a plan for attracting investment in natural gas storage facilities to support natural gas trading, system security and system balancing	Director of GOGC	Ministry of Energy	March 2015
Regulation	Upstream regulator	<ul style="list-style-type: none"> Study, develop and implement a report on analysis of an upstream regulator for natural gas sector Develop a regulatory framework to allow sale of unconventional gas in local market 	Minister of Energy	Ministry of Energy	March 2017

OIL AND OIL-BYPRODUCTS SECTOR					
Area	Topic	Actions	Responsible Person	Supporting Entity	Deadline
Oil transit	Potential to increase flows	Facilitate transit of oil and oil products through Georgia and the establishment of the country as a regional energy-trading hub	Director of GOGC	GOGC	On-going
Oil Sector Development	Oil refinery inside Georgian territory	Evaluate possibility of developing local oil processing facilities and develop a plan for attracting investment into a domestic oil refinery facility	Minister of Energy	Ministry of Economy and Sustainable Development Ministry of Infrastructure and Regional Development	December 2017
Regulation	Upstream regulator	Study and develop a report on analysis of an upstream regulator for oil sector	Minister of Energy	Ministry of Energy	November 2016
Shale Oil	Research and Development	Tender for a cost benefit analysis on shale oil exploration and extraction in Georgia	Minister of Energy	Ministry of Energy	December 2015

DEMAND-SIDE MANAGEMENT					
Area	Topic	Actions	Responsible Person	Supporting Entity	Deadline
Energy Efficiency	Lack of data	Data collection and analysis	LEDS Committee	Ministry of Energy GEOSTAT	October 2015
	Definition of potential EE programs Analysis of alternative programs	Using Georgia MARKAL, fully examine a wide range of potential EE programs for Georgia and report on the results of the examination	Minister of Energy	LEDS Committee	March 215

	Developing energy efficiency indicators	Research and analysis of international and EU best practices	Minister of Energy	LEDS Committee	November 2015
	Legal Basis	Develop a draft Law on EE, consistent with EU <i>acquis</i>	Minister of Energy	Ministry of Economy and Sustainable Development LEDS Committee	December 2015
	Regulatory Basis	Develop and adopt regulations, consistent with EE Law	Minister of Energy	Ministry of Economy and Sustainable Development	January 2017
	Government EE Programs Lead by example – Government building EE improvement program	<ul style="list-style-type: none"> • Draft a Government EE program implementation plan including proposals for financing the programs • Create certification procedures for Energy Auditing 	Minister of Energy Chairman of GNERC	LEDS Committee	August 2015
	Competency within the GoG	Create capabilities within MoE to monitor State EE program implementation	Minister of Energy	MoE	July 2015
	EE Implementation	<ul style="list-style-type: none"> • Support EU's Covenant of Mayors Activities in Georgia • Finalizing a SEAP • Development of National Energy Efficiency Action Plan (NEEAP) 	Tbilisi and other municipalities	EBRD	September 2016
Fuel Switching	Price elasticity of different fuels	<ul style="list-style-type: none"> • Research and analysis of price elasticity of different fuels in Georgia • Analyze the impact of gasification on wood consumption • Evaluate fuel switching magnitude and timing 	Minister of Energy/ Head of Analytical Department	MoE/AD	October 2016
Peak Shaving	System reliability and reserve margins	<ul style="list-style-type: none"> • Analyze peak shaving potential in different energy intensive sectors • CBA analysis of peak shaving 	GSE	MoE/AD	August 2016

RENEWABLE ENERGY SOURCES					
Area	Topic	Actions	Responsible Person	Supporting Entity	Deadline
Legal	<ul style="list-style-type: none"> • Law on RES • R&D on new RES • Off Grid evaluations • Energy <i>acquis</i> Compliance 	<ul style="list-style-type: none"> • Implement Directive 2009/28/EC • Guarantee of origin • Evaluation of promotional incentives for RES development • Development of National Renewable Energy Sources Action Plan (NREAP) 	Minister of Energy	LEDS Committee	December 2017
Integration	Integration of renewable energy into the electricity system	Develop a strategy on how to develop this intermittent and highly seasonal RES potential (regional cooperation, matching consumption, storage, etc.)	Minister of Energy	Ministry of Energy	May 2017
Regulatory	Feed in tariffs	Examine and make recommendations for the need, if any, for feed-in tariffs to encourage the development of non-hydro, non-biomass renewable energy sources	Chairman of GNERC	GNERC/ Ministry of Energy/LEDS Committee	April 2017
Resources	Renewable energy sources	<ul style="list-style-type: none"> • Study and analyze potential for renewable energy sources (off-shore wind, solar, geothermal, tidal energy) • Introduce solar technology as an off-grid solution for remote villages 	Minister of Energy	LEDS Committee	March 2017
	Solar/wind/geothermal	<ul style="list-style-type: none"> • Increase public awareness on availability of these renewable technologies 	Minister of Environment	LEDS Committee	May 2015

BIOMASS SECTOR					
Biomass	Assessment and analysis	<ul style="list-style-type: none"> Study and analyze potential of this resource Assessment of firewood consumption and recommendations for future 	Minister of Energy	LEDS Committee	March 2017
	Augmenting efficiency in wood use	<ul style="list-style-type: none"> Efficient wood burning technologies Develop forest management practices Increase public awareness Modify existing wood stoves to achieve higher efficiency 	Minister of Environment	Ministry of Environment and Natural Resources Protection / LEDS Committee	May 2015

INSTITUTIONAL DEVELOPMENT					
Area	Topic	Actions	Responsible Person	Supporting Entity	Deadline
Capacity building	Reorganization of MoE	<ul style="list-style-type: none"> Develop an action plan Develop new organizational structure, job descriptions, department functions 	Minister of Energy	Governance for Growth (G4G)	June 2015
Reorganization of GSE/TSO	<ul style="list-style-type: none"> Unbundling options: choose from 4 models / structures of TSO HICD Development of asset management program Increase capacity in load forecasting / planning 	<ul style="list-style-type: none"> Develop an action plan Develop various training programs on related issues 	Director of GSE	G4G MoE	September 2015
Reorganization of MO	<ul style="list-style-type: none"> Development of new organizational structure Develop clear vision and mission HICD 	<ul style="list-style-type: none"> Establishment of new “market development” department Establishment of new IT department with additional tasks Reorganization of settlement department Develop responsibilities for departments and job descriptions for the staff 	Director of MO	G4G MoE	August 2015

PUBLIC SERVICE OBLIGATIONS					
Area	Topic	Actions	Responsible Person	Supporting Entity	Deadline
Customer Protection	Compliance with Energy <i>acquis</i>	<ul style="list-style-type: none"> Analyze existing social programs Develop new social programs in compliance with EU Energy <i>acquis</i> 	Minister of Energy Chairman of GNERC	Ministry of Labor, Health and Social Affairs of Georgia LEDS Committee GEOSTAT	February 2017

ENVIRONMENTAL PROTECTION					
Area	Topic	Actions	Responsible Person	Supporting Entity	Deadline
Resources	Biomass	<ul style="list-style-type: none"> Poplar tree plantations 	Minister of Environment	Ministry of Environment and Natural Resources Protection LEDS Committee	June 2016
	Biofuels	<ul style="list-style-type: none"> Encourage establishment of green cities 	Municipalities of signatory cities of the Covenant of Mayors	Ministry of Environment and Natural Resources Protection City Halls of signatory cities of the Covenant of Mayors LEDS Committee	May 2016

TECHNOLOGY AND INNOVATION					
Area	Topic	Actions	Responsible Person	Supporting Entity	Deadline
Education	Support educational institutions	<ul style="list-style-type: none"> • Provide support to educational institutions and universities for research and development • Encourage technology and innovation in the energy sector 	Minister of Education Minister of Economy / Chairman of the Innovation and Technology Agency	Ministry of Education Ministry of Economy / Innovation and Technology Agency	On-going
Innovation & Technology	Suggestions for use of innovation and technology	<ul style="list-style-type: none"> • Smart grid solutions for integrating the renewables and increasing efficiency • Use of hydropower reservoirs as energy storage and integrating large scale wind and solar power • Exploration and development of unconventional resources • Use of low grade coal and developing the full cycle of utilization, including the coal bed methane • Innovative Energy management solutions in industry and buildings for higher efficiency of energy use • Integrated resource management - for example fresh water management for energy production, agricultural (irrigation) and consumption use 	Minister of Economy / Chairman of the Innovation and Technology Agency	Ministry of Economy / Innovation and Technology Agency G4G	December 2016

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