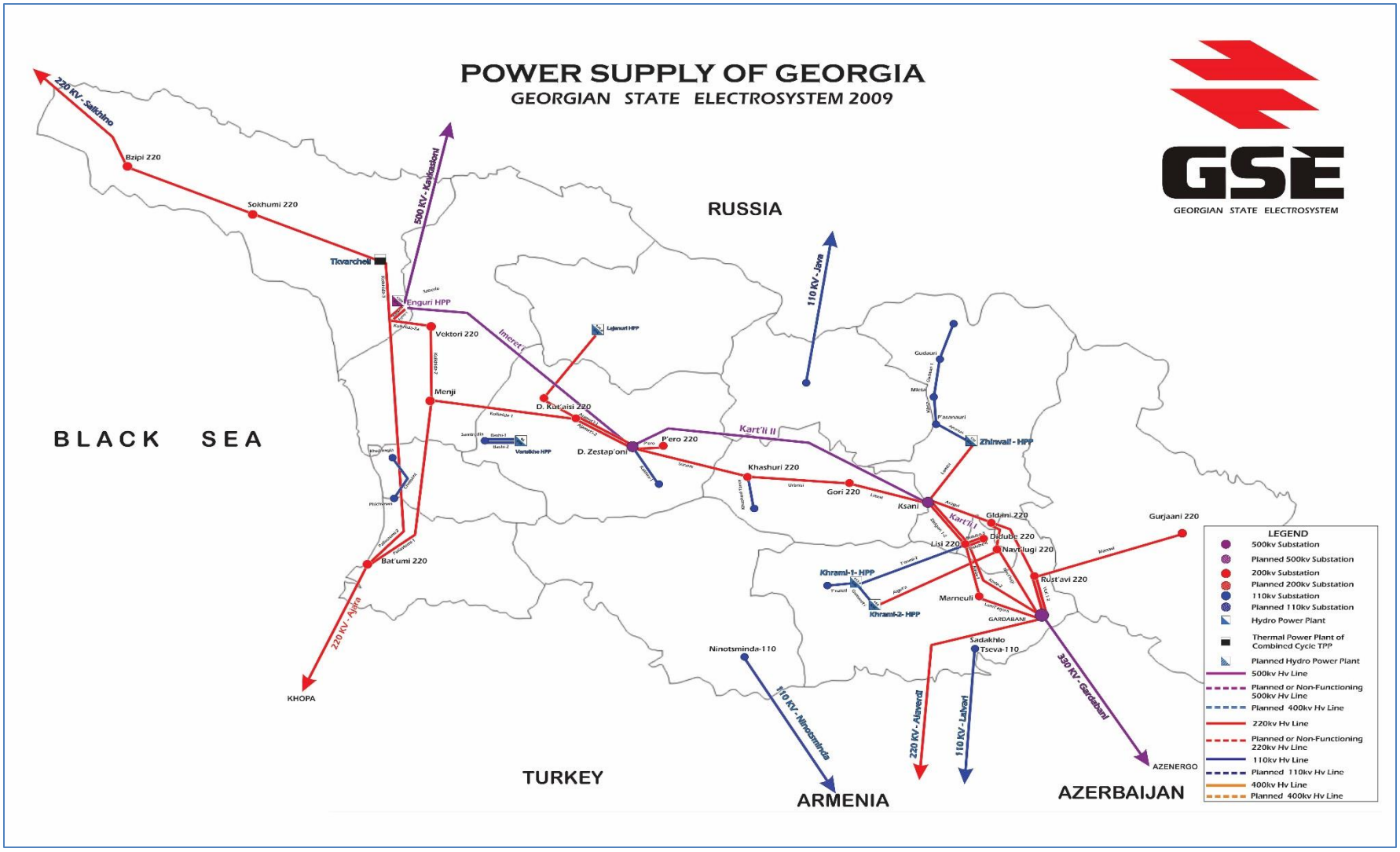
Enhancing Transmission Utility System Reliability Through Advanced Power Blackout Mitigation Measures: A Georgia Case Study

GSE
GEORGIAN STATE ELECTROSYSTEM

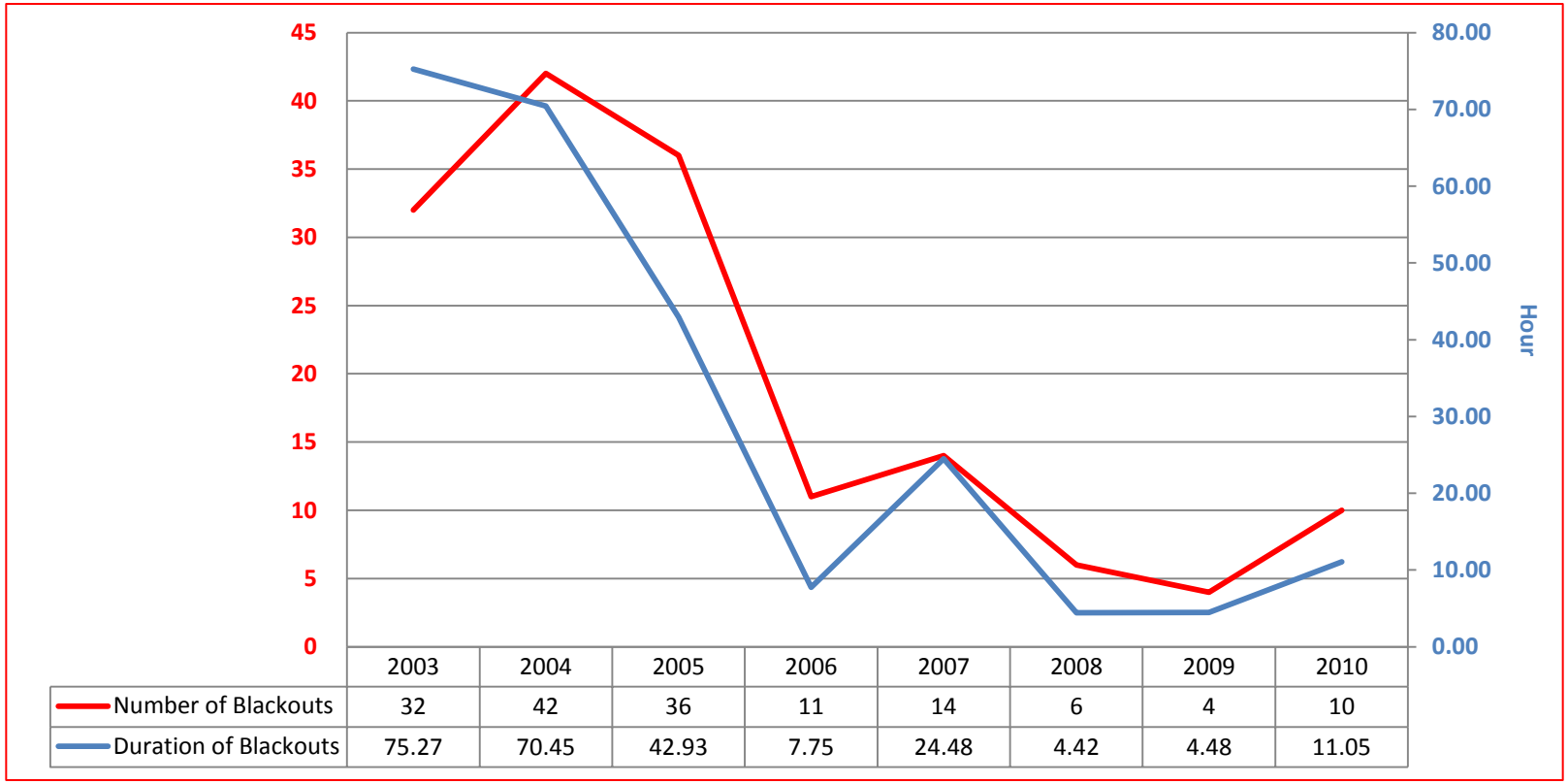
Georgian State Electrosystem
2010



GSE Customer Base

- Power Distribution Companies (DSOs)
  - Telasi, JSC
  - Energo-Pro Georgia, JSC
  - Kakhetis Energo Distributsia, JSC
- Georgian Railway (GR)
- Large Manufacturers
  - Georgian Manganese, LLC
- Other Utilities
  - Georgian Water and Power, LLC
  - Rustavi Water Company, LLC

Blackouts And Brownouts Before Implementation of New Technology

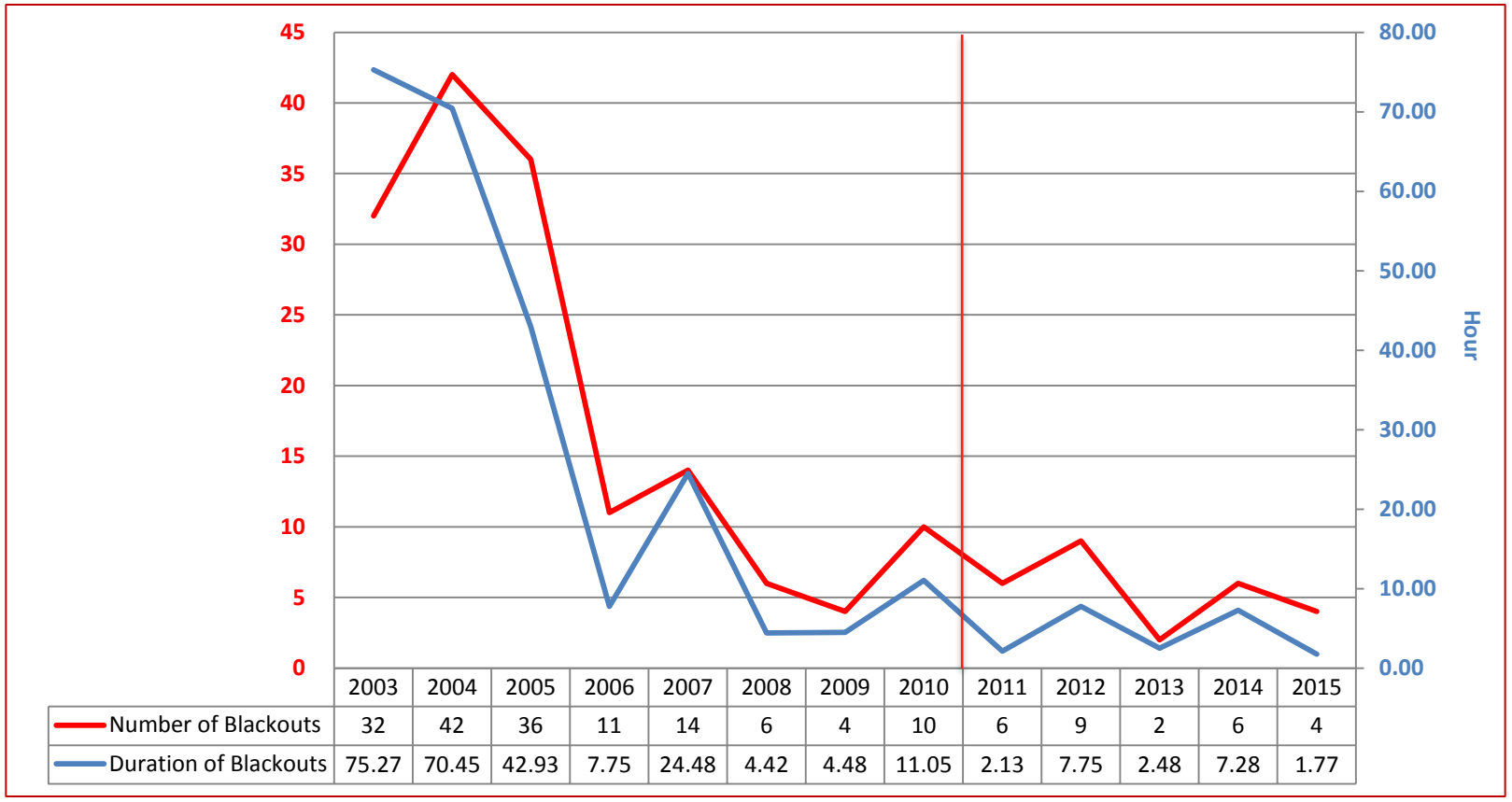


	2003	2004	2005	2006	2007	2008	2009	2010
Number of Blackouts	32	42	36	11	14	6	4	10
Duration of Blackouts	75.27	70.45	42.93	7.75	24.48	4.42	4.48	11.05

GSE's Approach to Resolve Blackouts and Power Outages

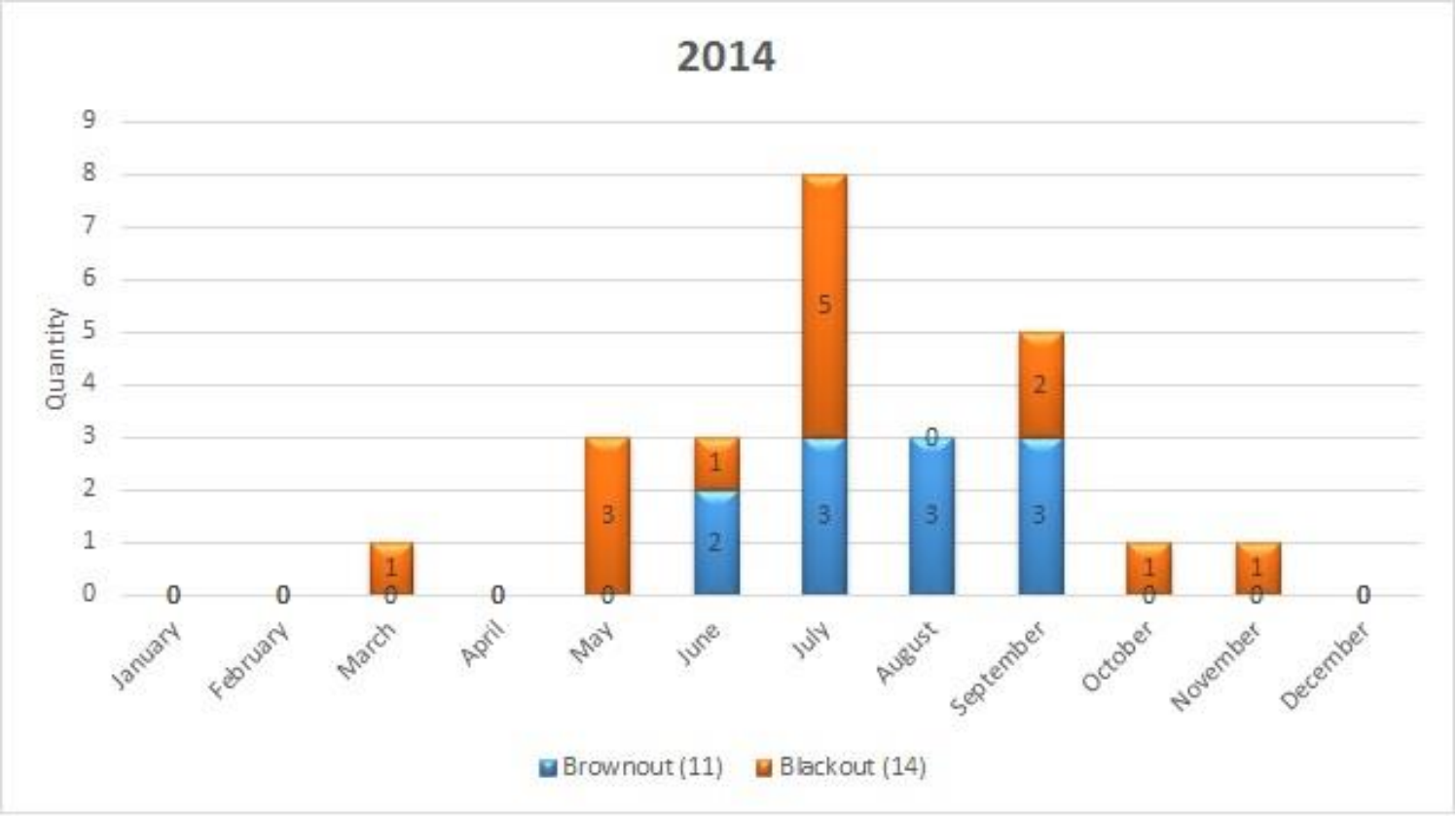
- Decided to determine the **Root Cause** of existing problems
- The major **Root Cause** was determined over months of research
- Looked for supplier with the latest technologies to solve the problem
- Specifications were written describing the root problem
- Supplier (SEL) was chosen
- Project was implemented
- New system has been operating for 4 years

Blackouts And Brownouts After Implementation of New Technology

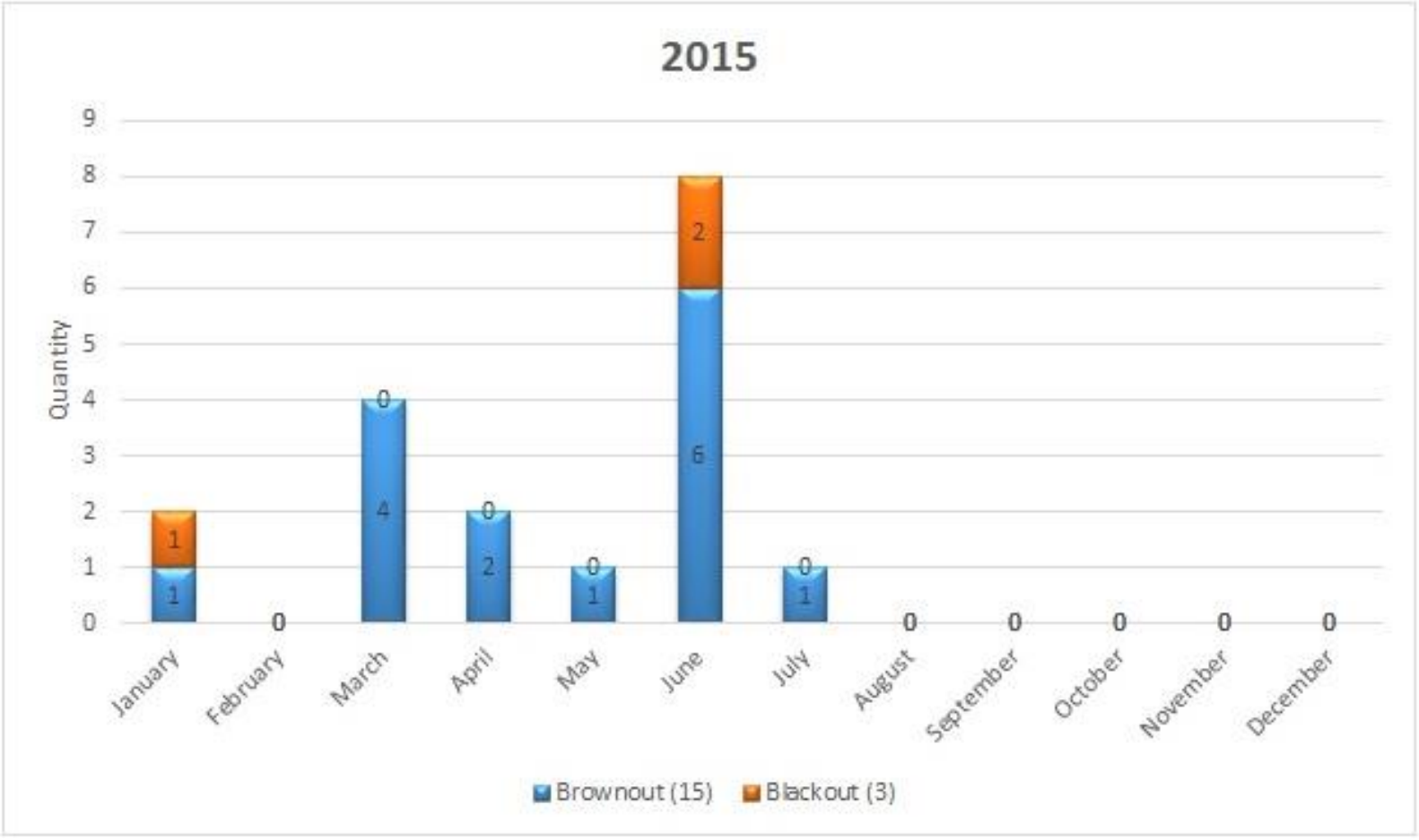


	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Number of Blackouts	32	42	36	11	14	6	4	10	6	9	2	6	4
Duration of Blackouts	75.27	70.45	42.93	7.75	24.48	4.42	4.48	11.05	2.13	7.75	2.48	7.28	1.77

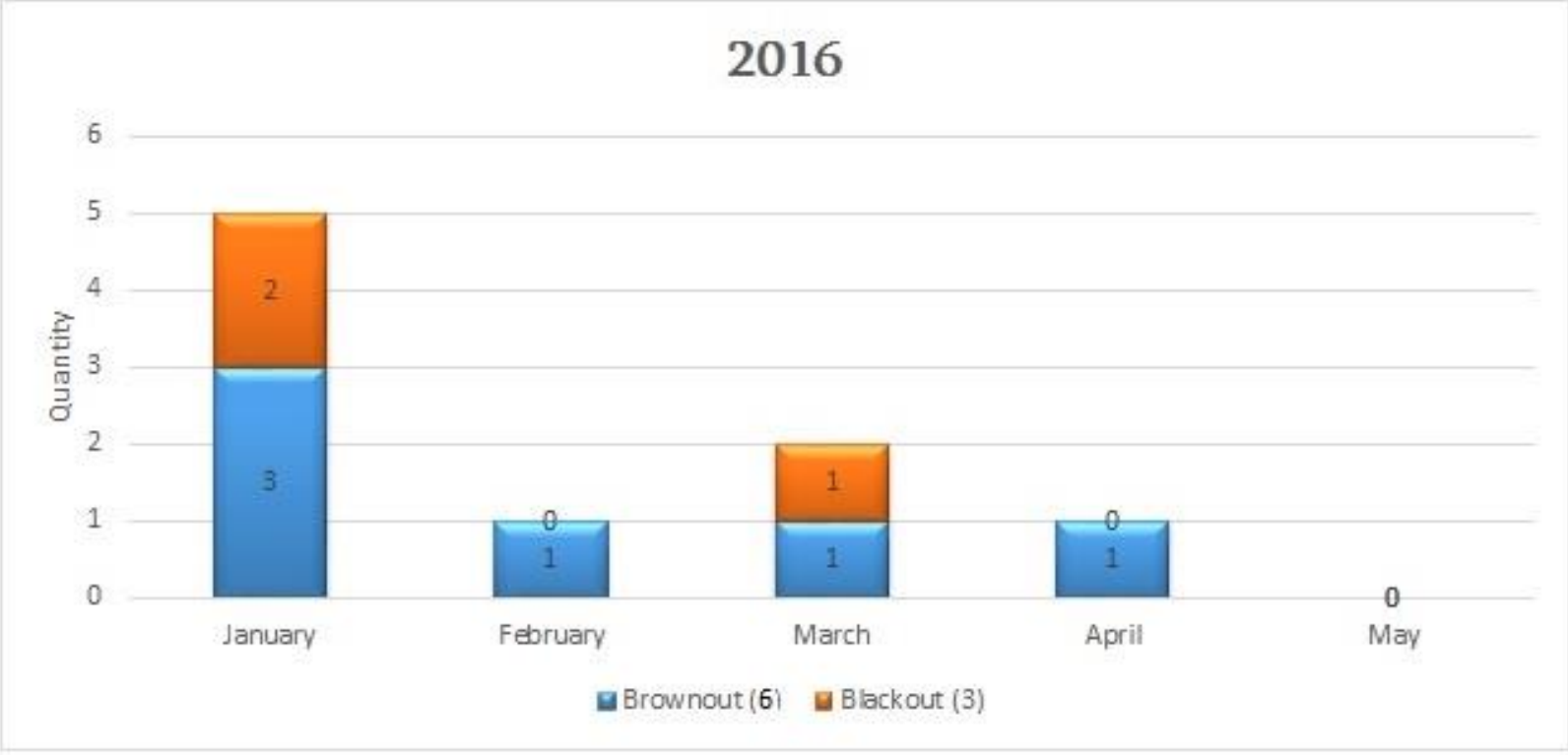
RAS Operations for 2014



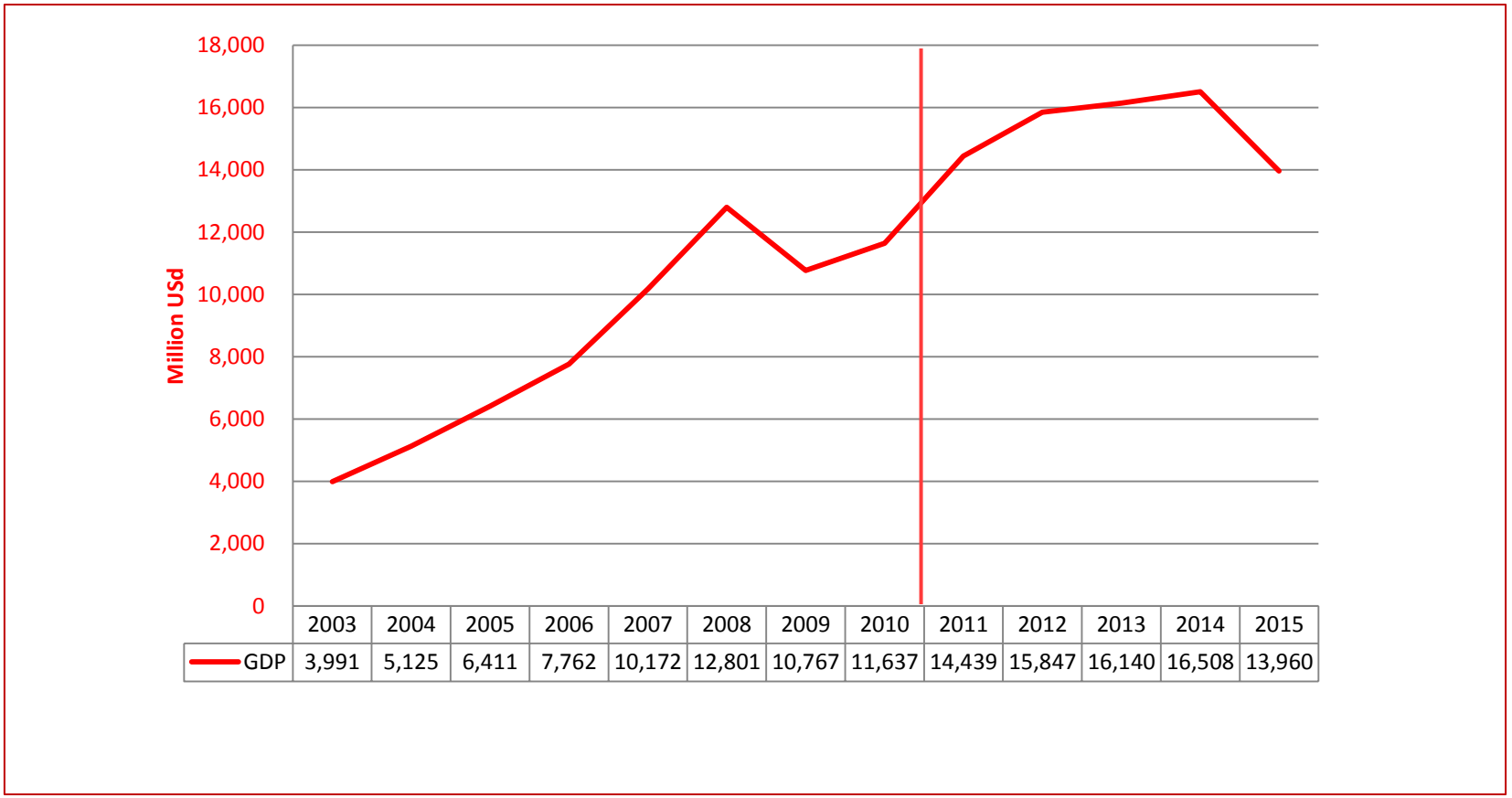
RAS Operations for 2015



RAS Operations for 2016



Financial Benefits From Implementation of New Technology



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GDP	3,991	5,125	6,411	7,762	10,172	12,801	10,767	11,637	14,439	15,847	16,140	16,508	13,960

GDP Georgia is $1.59M per hour
RAS cost today is $2M

Other Benefits to GSE

- New technology can be easily installed in existing installations
- This technology allows engineers and operators to know the interaction of all the components & devices in their power system – that was unknown before.
- This technology allows engineers to see the cascading effects after a contingency occurs.
- Create a separate communication network that is very reliable for emergency and protection
- Using PMU Technology not only for ECS and RAS, but also for SCADA
- GSE engineers are learning very quickly to understand data and information about their power system that was unknown before the new technology.

Future Benefits

- This new technology is based on relays that have not only the protection functionality but also have synchrophasor technology, control logic, and I/O (RTUs).
- These relays have eliminated the need to specify synchrophasor units, RTUs, and Controllers.
    - Savings in hardware
    - Savings in installation, maintenance and testing
- The new grid technology will provide savings for future budgets for EMS & SCADA
- EMS will use new data from this technology to predict what will happen in the power system

Definitions

- RAS – is the Remedial Action Scheme, in other places this is called Special Protection Systems and could also be called Wide Area Monitoring System (New technology by SEL Implemented for GSE.)
- ECS – Emergency Control System
- EMS – Energy Management System
- SCADA – Supervisory Control and Data Acquisition
- PMU – Phasor Measurement Unit
- Contingency – A Change in the Power System topology from normal operation

Definitions

- GDP – Gross Domestic Product
- Blackout - when the whole country is without electricity
- Brownout - a section of the country's power system without electricity

Thank you for your attention!