

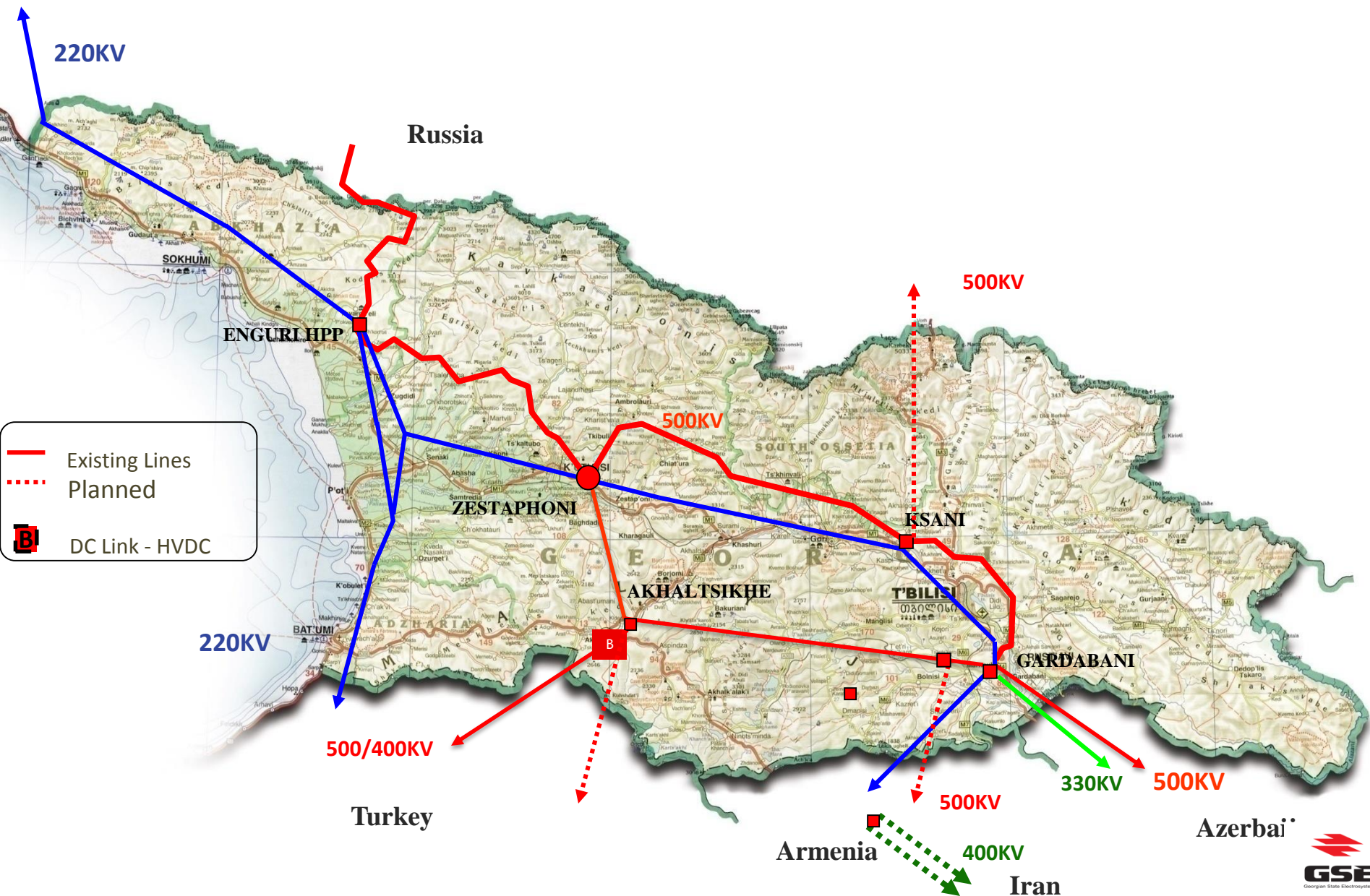
Hydropower: from the identification of the potential to the development of regional projects

June 2015

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**Operational Planning and Contract Registrations Service
Georgian State Electrosystem, JSC**

Interconnection and HV internal lines



Current Structure of Power System

Georgian State Electrosystem (TSO)

- System Control (Dispatching)
- 500/220/110 kV Substation
- 220/110 kV lines

Sakrusenergo

- 500/330/220 kV lines

Energotrans

- 500 kV Substation
- 500/400 kV lines
- 700 MW HVDC

Under Operation Agreement all HV equipment is transferred to GSE operational Control which makes GSE only TSO in Georgia

Electricity System Commercial Operator (ESCO)

- Role of Market Operator
- State owned Trader (import/Export, PPA)
- Settlement

Generation

- Thermal PP (695 MW)
- Hydro Power Plants (2795 MW)

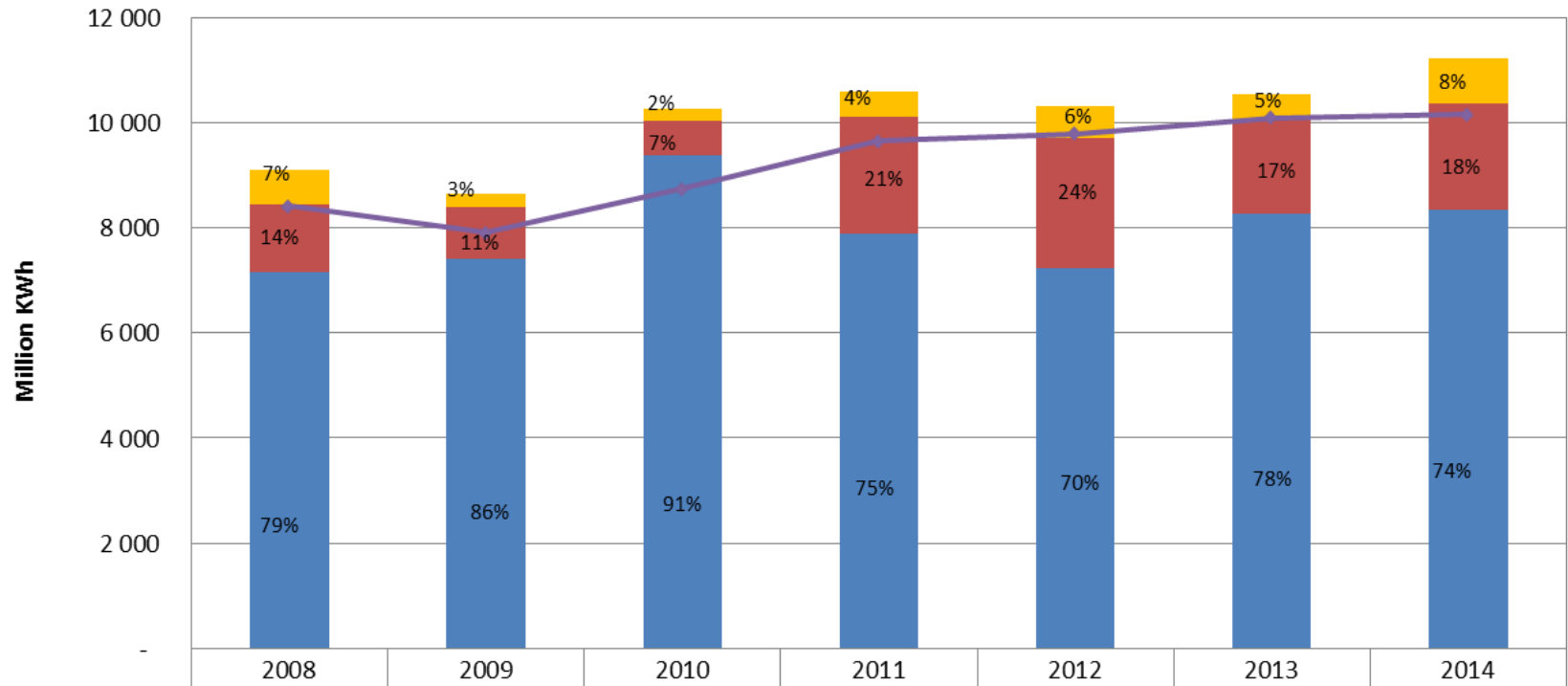
Consumption

- Distribution (4)
- Direct Customers (5)

Import/Export

- ESCO
- Private Companies (2/19)

Electricity Supply-Demand 2008-2014



Import	649	255	222	471	615	484	852
Thermal Power Plants	1 279	991	679	2 216	2 477	1 788	2 036
Hydro Power Plants	7 162	7 412	9 368	7 890	7 221	8 271	8 335
Consumption	8 411	7 908	8 744	9 647	9 784	10 093	10 155
Consumption Growth Rate	12%	-5%	19%	3%	-3%	2%	6%

HYDRO POWER Resources

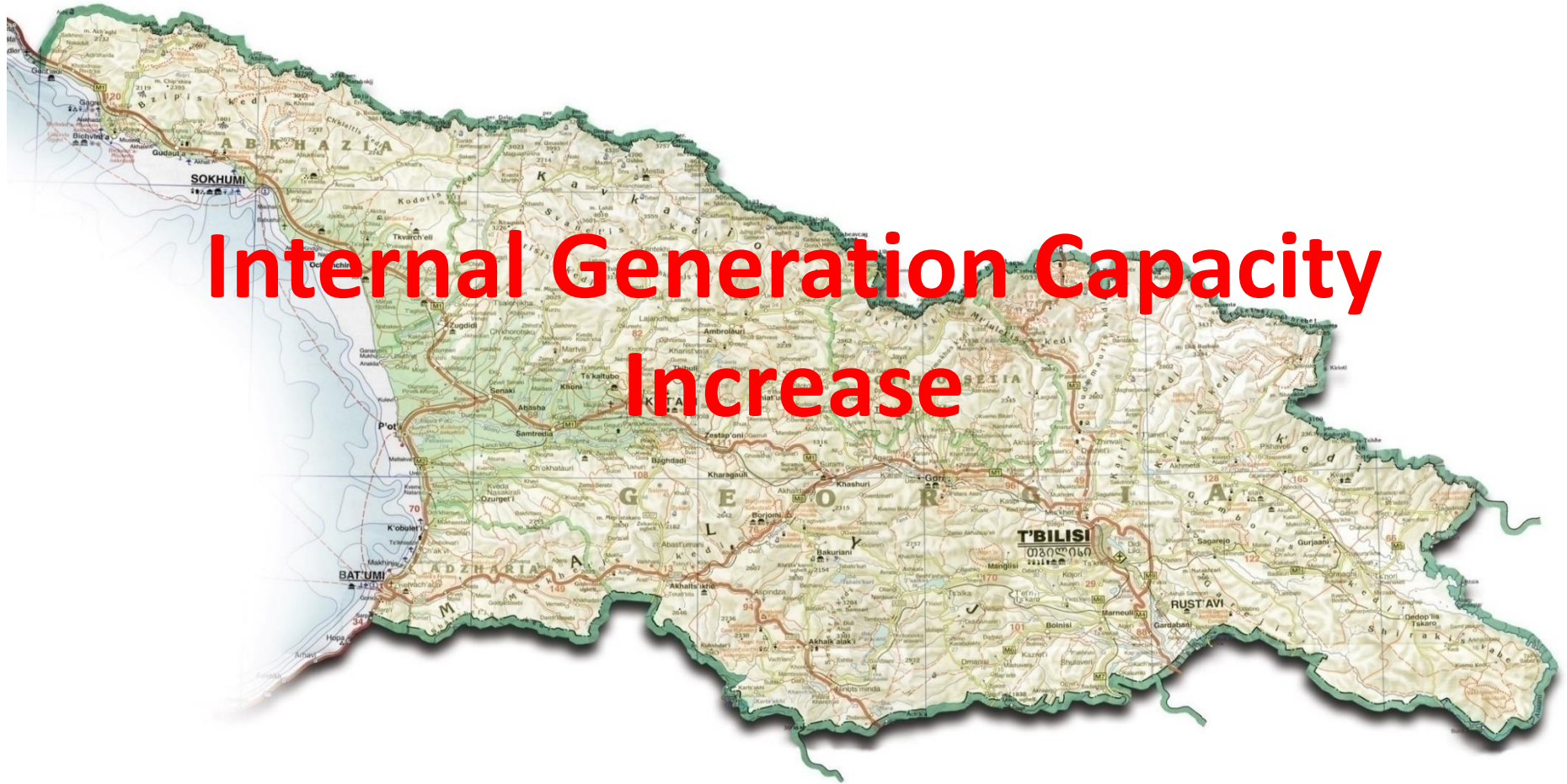
- Hydro power sources in Georgia has most potential and priority.
- There are more than 27000 rivers In Georgia.
- Economically effective technical potential of hydro resources of the country is 45-50 billion KWh from total up to 80-85 billion KWh
- At present from the existing resources only 10-15 % is used.
- Significant amount of hydro potential realization is anticipated, by building of HPPs, with various types, capacities and reservoirs in the next years.

Main steps to success

- **Internal Generation Capacity Increase – Increase power exchange potential**
- **Network Transfer capacity Increase – maximizing power flow and its reliability**
- **Implement Modern Power Trade Structure - gradually setting Hourly Markets**

Step 1

Internal Generation Capacity Increase



SAMEGRELO – ZEMO SVANETI REGION PROJECTED HPPs



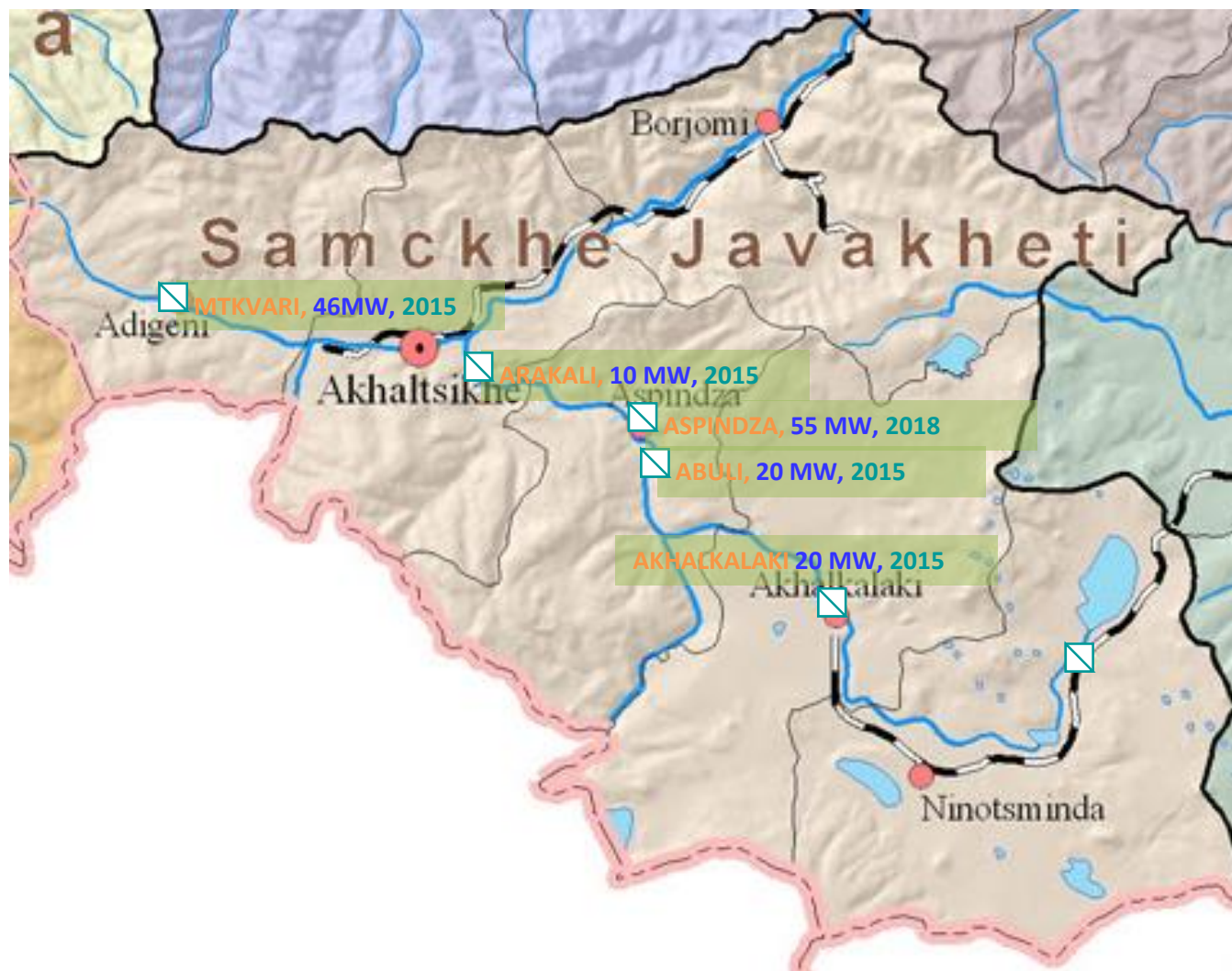
RACHA-LECKHUMI-KVEMO SVANETI REGION PROJECTED HPPs



GURIA REGION PROJECTED HPPs



SAMTCKHE JAVAKHETI REGION PROJECTED HPPs



Ongoing Investment Projects 2015-2025

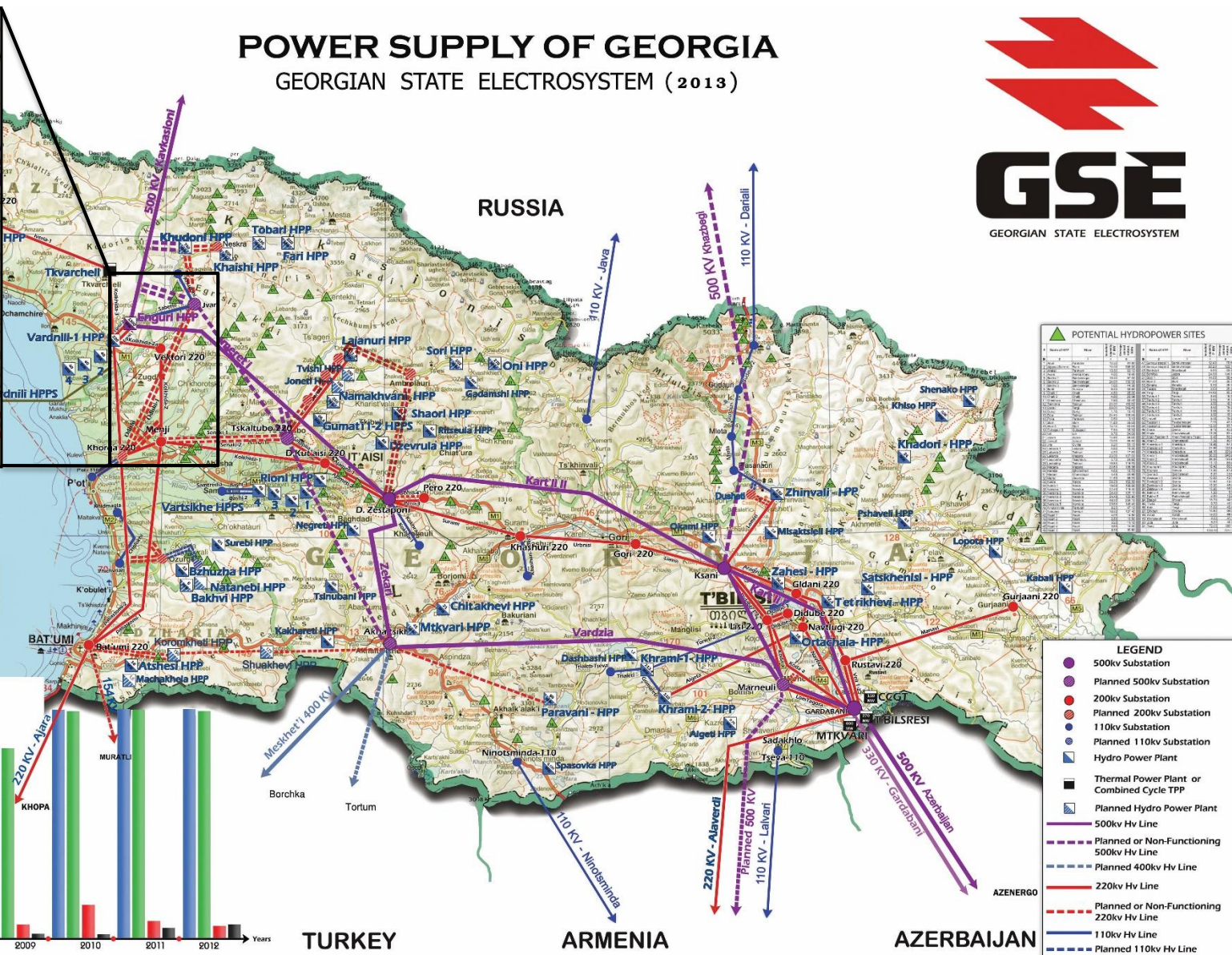
Categories		CAPACITY	POWER
		MW	GWh
K1	Power Plants on which MoU are signed and construction works started	873	3387
K2	Power plants on which interest is expressed and feasibility studies are started	1515	6497
K3	High state importance power plants and power plants which feasibility studies will start soon	1567	5466
Total		3955	15350

Step 2

**Network Transfer capacity
Increase**

Project: SS "Jvari-500", OHL "Odishi 1,2"

POWER SUPPLY OF GEORGIA GEORGIAN STATE ELECTROSYSTEM (2013)



POTENTIAL HYDROPOWER SITES

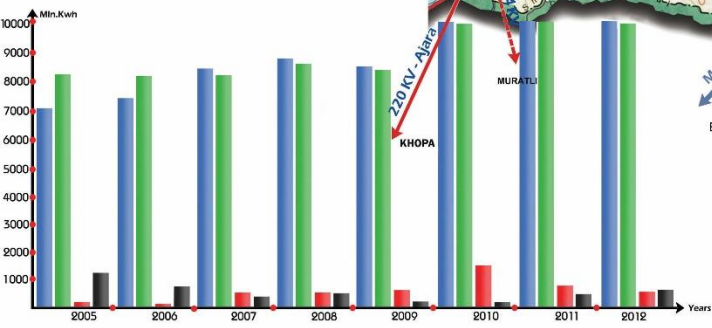
Site Name	Capacity (MW)	Location	Status
Enguri HPP	1600	Samtskhe-Mtskheta	Operating
Vardnisi-1 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-2 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-3 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-4 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-5 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-6 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-7 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-8 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-9 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-10 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-11 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-12 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-13 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-14 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-15 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-16 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-17 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-18 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-19 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-20 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-21 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-22 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-23 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-24 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-25 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-26 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-27 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-28 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-29 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-30 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-31 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-32 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-33 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-34 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-35 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-36 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-37 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-38 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-39 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-40 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-41 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-42 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-43 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-44 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-45 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-46 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-47 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-48 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-49 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-50 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-51 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-52 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-53 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-54 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-55 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-56 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-57 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-58 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-59 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-60 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-61 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-62 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-63 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-64 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-65 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-66 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-67 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-68 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-69 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-70 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-71 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-72 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-73 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-74 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-75 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-76 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-77 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-78 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-79 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-80 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-81 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-82 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-83 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-84 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-85 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-86 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-87 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-88 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-89 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-90 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-91 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-92 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-93 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-94 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-95 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-96 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-97 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-98 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-99 HPP	100	Samtskhe-Mtskheta	Operating
Vardnisi-100 HPP	100	Samtskhe-Mtskheta	Operating

BLACK SEA

Power Generation, Consumption, Export and Import Dynamics

Years	2005	2006	2007	2008	2009	2010	2011	2012
Power Generation	7961	7921.9	8605.53	8925.35	8533.05	10142.02	10363.39	10068.40
Consumption	8337.7	8302.9	8440.00	8755.40	8391.49	9968.21	10187.21	9907.53
Export	121.8	66.4	633.96	879.56	749.43	1524.28	935.59	526.15
Import	1385.9	777	436.60	649.93	254.97	223.40	471.22	616.47

■ Generation ■ Consumption ■ Export ■ Import



07/22/2015

TURKEY

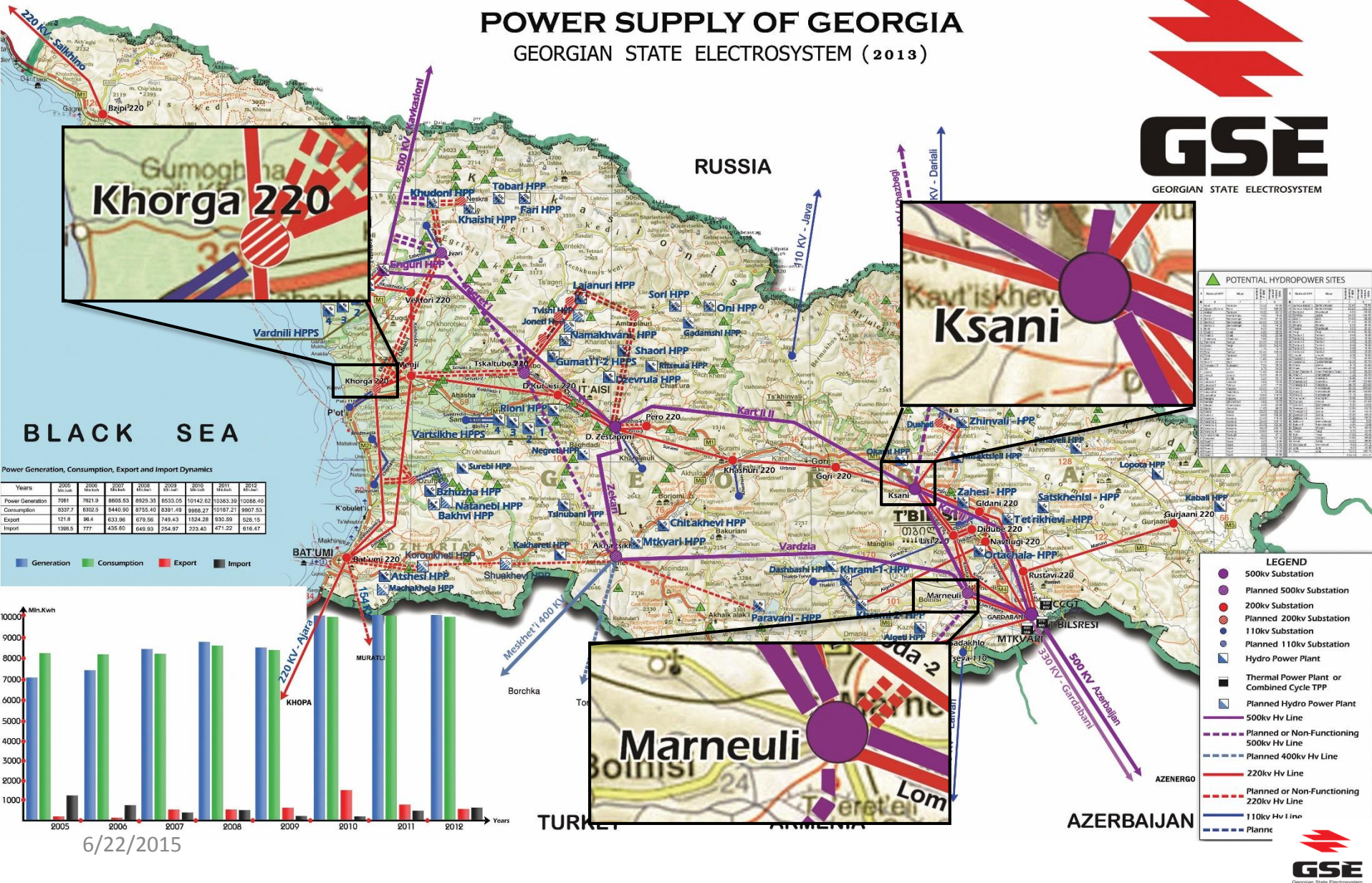
ARMENIA

AZERBAIJAN

ADB – Regional Power Transmission Enhancement Project

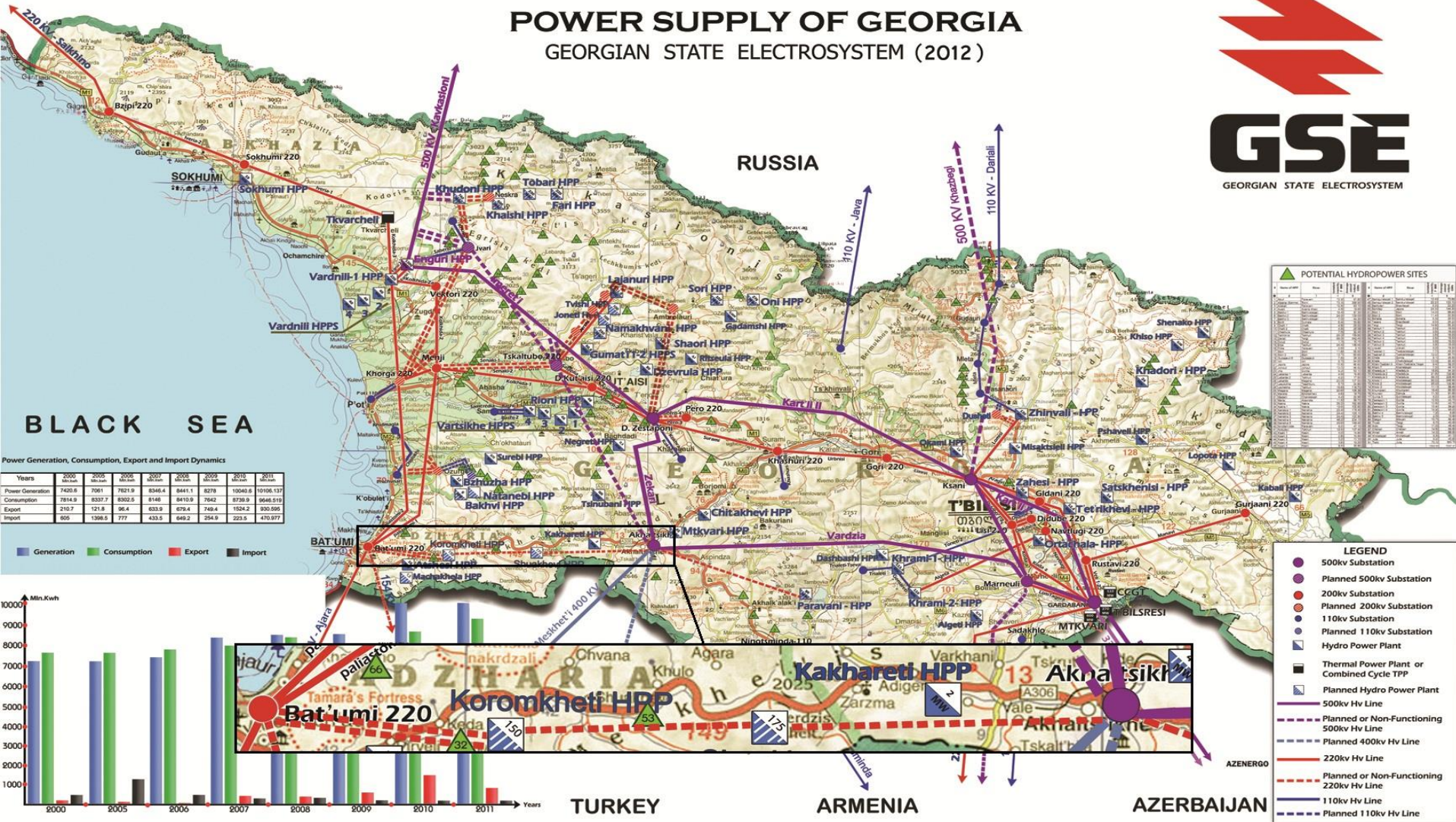
POWER SUPPLY OF GEORGIA

GEORGIAN STATE ELECTROSYSTEM (2013)



OHL "Akhaltsikhe-Batumi"

POWER SUPPLY OF GEORGIA GEORGIAN STATE ELECTROSYSTEM (2012)

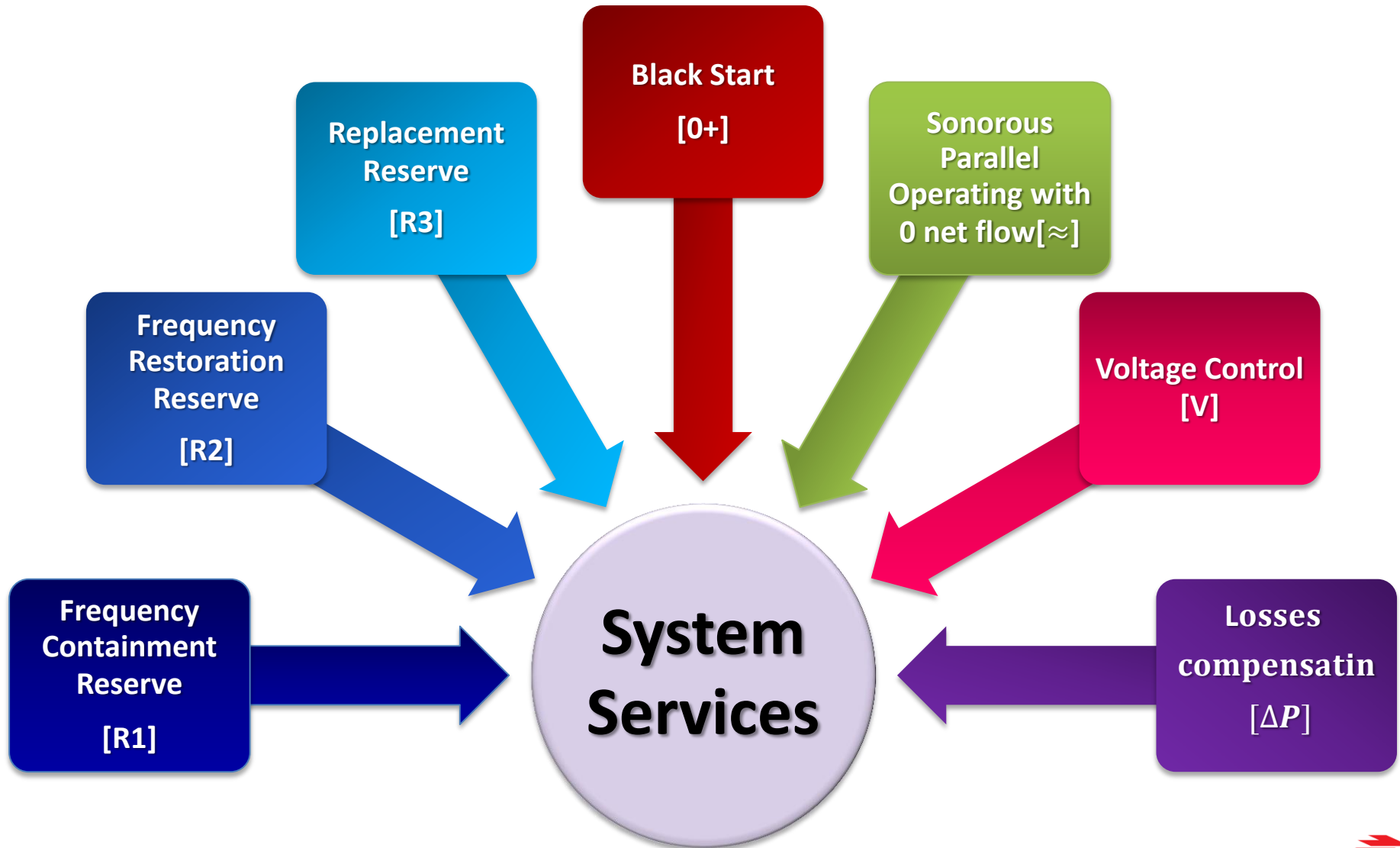


6/22/2015

HV Transmission Network and Interconnections after implementation 2015-2025 TYNDP



System services



Step 3

Implement Modern Power Trade Structure

Action to be taken for regional trade

- **Power Trade**
 - Set compatible Power trade mechanisms
 - Bringing together power markets as much as it possible
 - Market Coupling or power trade HUBB
- **Cross border Power trade**
 - Agree NTC for all cross border lines
 - Auctions for NTC
 - Implement NTC auctioning common tool for regional trade
- **Deepening of Inter-TSO cooperation**
 - Implement compensation mechanisms for deviation from schedules
 - Contracted flows' netting
- **Legal issues**
 - Improve and Harmonization taxation and custom legislation for Power cross-border flow
 - Harmonization of regulatory framework

Possibilities, Opportunities and Benefits

- Use Hydro Power Generation Capacities during Spring and Summer floods
- Use Reservoir Power plants flexibility to cover pick demand
- Increase share of renewable Hydro power plants in the region
- Increase level of reliability
- Decrease necessary reserve capacity for a single system
- Access to European power Markets
- Become ENTSO-e Members
- Increase investments in power and other industries

Thanks you for your Attention!

Head of Operational Planning and Contracts
Registration Service
Georgian State Electrosystem, JSC

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