

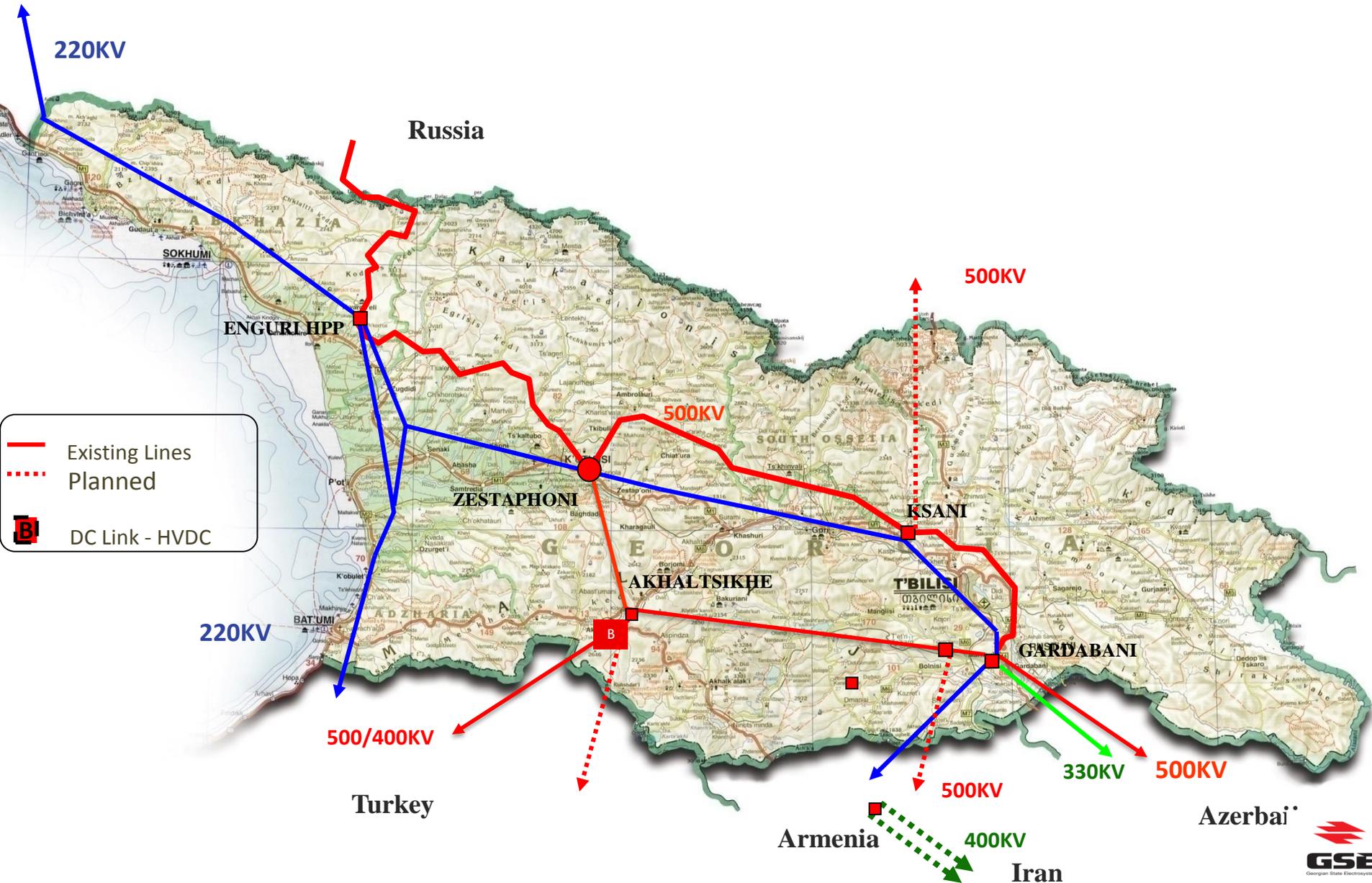
Hydropower: from the identification of the potential to the development of regional projects

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)

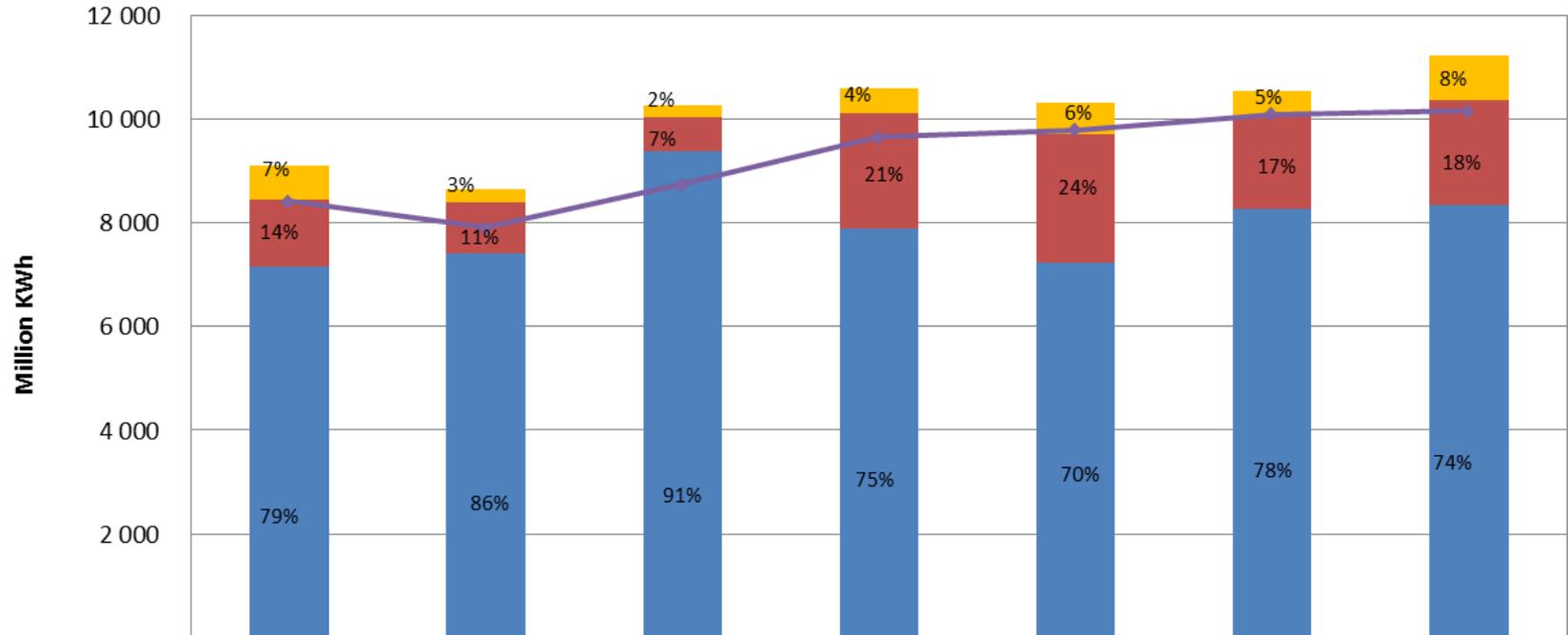
Consumption

- Distribution (4)
- Direct Customers (5)

Import/Export

- ESCO
- Private Companies (2/19)

Electricity Supply-Demand 2008-2014



2008	2009	2010	2011	2012	2013	2014	
649	255	222	471	615	484	852	
1 279	991	679	2 216	2 477	1 788	2 036	
7 162	7 412	9 368	7 890	7 221	8 271	8 335	
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

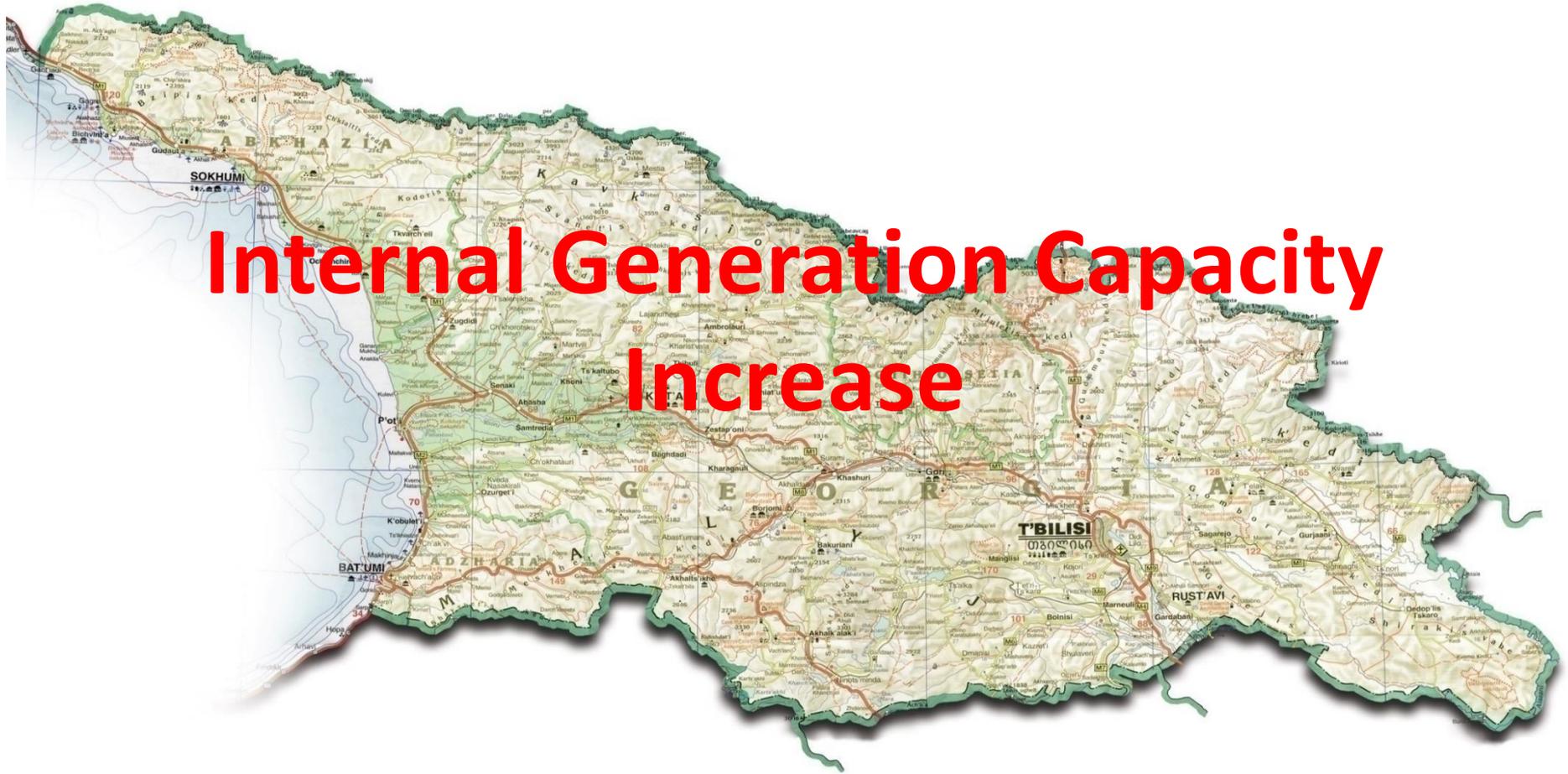
- Hydro power sources in Georgia has most potential and priority.
- There are more than 27000 rivers In Georgia.
- Economically effective technical potential of hydro resources of the country is 45-50 billion KWh from total up to 80-85 billion KWh
- At present from the existing resources only 10-15 % 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



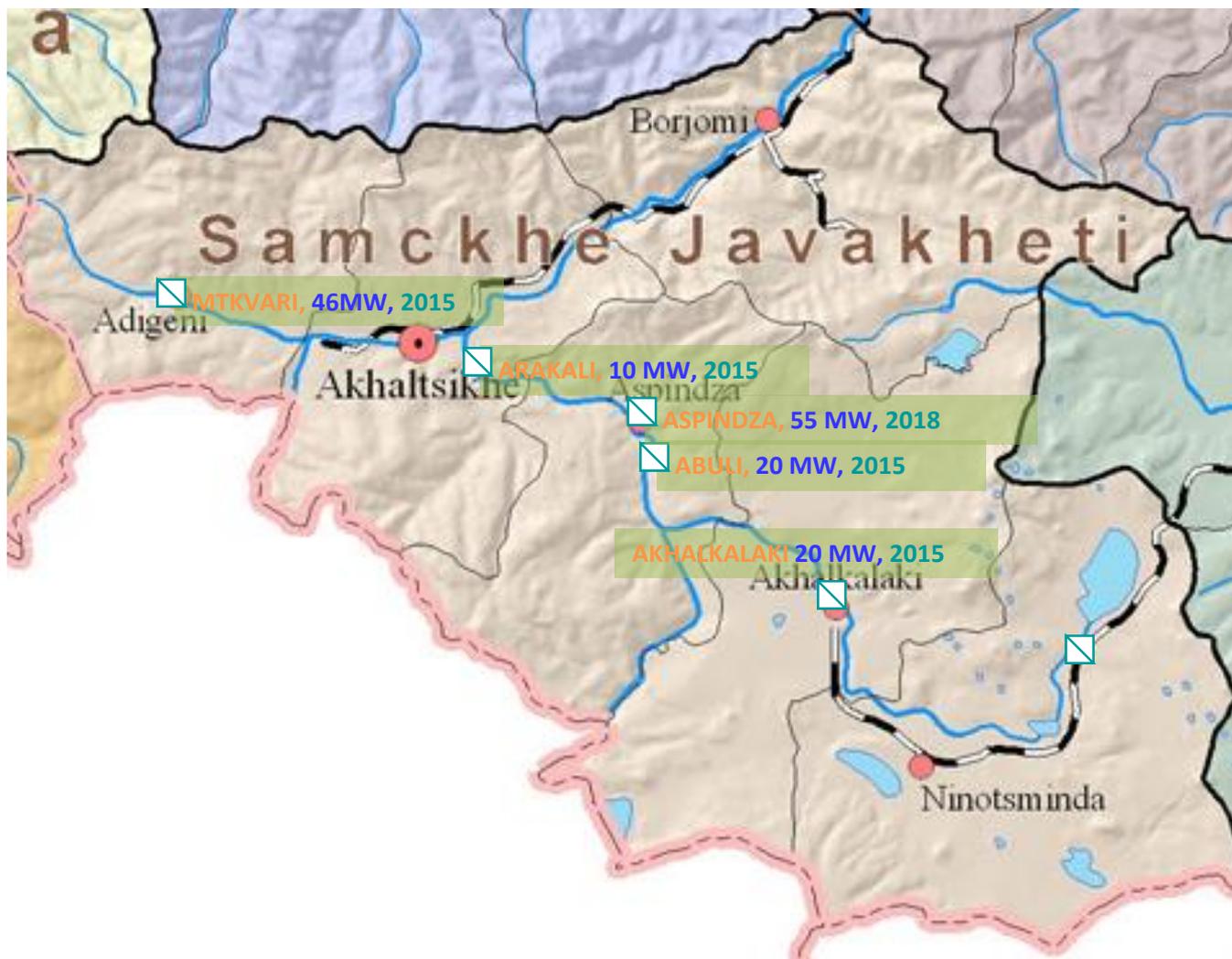
RACHA-LECKHUMI-KVEMO SVANETI REGION PROJECTED HPPs



GURIA REGION PROJECTED HPPs



SAMTCKHE JAVAKHETI REGION PROJECTED HPPs



Ongoing Investment Projects 2015-2025

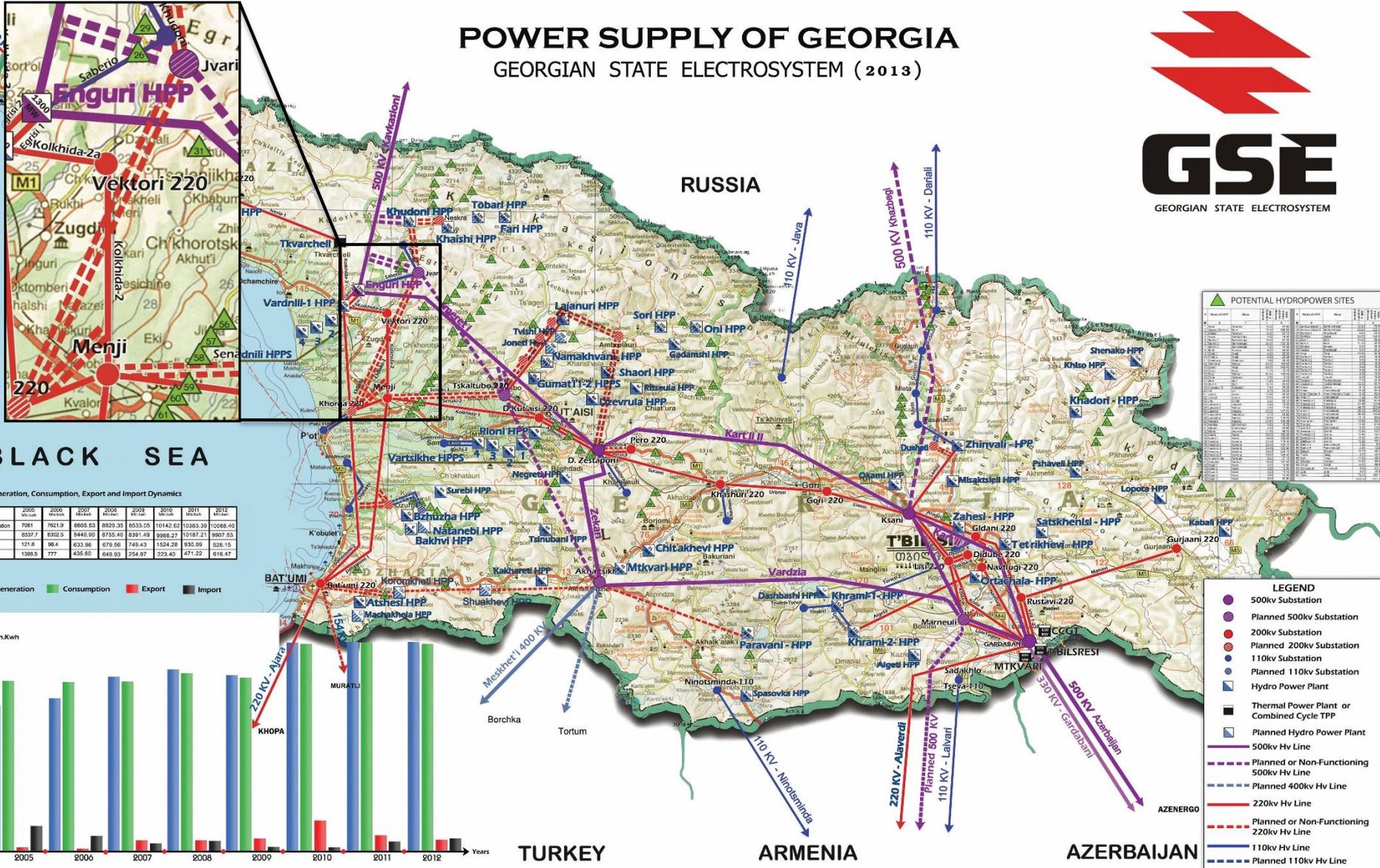
Categories		CAPACITY	POWER
		MW	GWh
K1	Power Plants on which MoU are signed and construction works started	873	3387
K2	Power plants on which interest is expressed and feasibility studies are started	1515	6497
K3	High state importance power plants and power plants which feasibility studies will start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

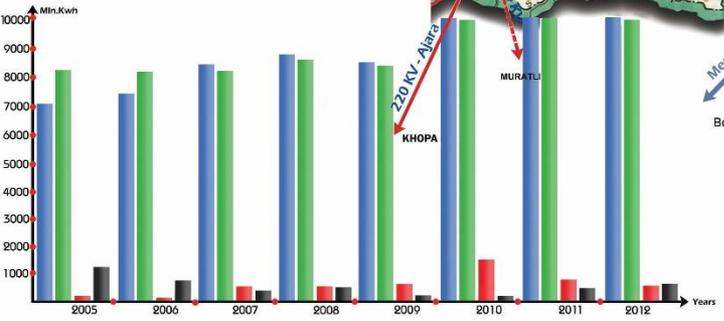


POTENTIAL HYDROPOWER SITES

Site Name	Power (MW)	Year	Status	Year	Status	Year	Status
1	10	2005	Planned	2006	Planned	2007	Planned
2	15	2005	Planned	2006	Planned	2007	Planned
3	20	2005	Planned	2006	Planned	2007	Planned
4	25	2005	Planned	2006	Planned	2007	Planned
5	30	2005	Planned	2006	Planned	2007	Planned
6	35	2005	Planned	2006	Planned	2007	Planned
7	40	2005	Planned	2006	Planned	2007	Planned
8	45	2005	Planned	2006	Planned	2007	Planned
9	50	2005	Planned	2006	Planned	2007	Planned
10	55	2005	Planned	2006	Planned	2007	Planned
11	60	2005	Planned	2006	Planned	2007	Planned
12	65	2005	Planned	2006	Planned	2007	Planned
13	70	2005	Planned	2006	Planned	2007	Planned
14	75	2005	Planned	2006	Planned	2007	Planned
15	80	2005	Planned	2006	Planned	2007	Planned
16	85	2005	Planned	2006	Planned	2007	Planned
17	90	2005	Planned	2006	Planned	2007	Planned
18	95	2005	Planned	2006	Planned	2007	Planned
19	100	2005	Planned	2006	Planned	2007	Planned
20	105	2005	Planned	2006	Planned	2007	Planned
21	110	2005	Planned	2006	Planned	2007	Planned
22	115	2005	Planned	2006	Planned	2007	Planned
23	120	2005	Planned	2006	Planned	2007	Planned
24	125	2005	Planned	2006	Planned	2007	Planned
25	130	2005	Planned	2006	Planned	2007	Planned
26	135	2005	Planned	2006	Planned	2007	Planned
27	140	2005	Planned	2006	Planned	2007	Planned
28	145	2005	Planned	2006	Planned	2007	Planned
29	150	2005	Planned	2006	Planned	2007	Planned
30	155	2005	Planned	2006	Planned	2007	Planned
31	160	2005	Planned	2006	Planned	2007	Planned
32	165	2005	Planned	2006	Planned	2007	Planned
33	170	2005	Planned	2006	Planned	2007	Planned
34	175	2005	Planned	2006	Planned	2007	Planned
35	180	2005	Planned	2006	Planned	2007	Planned
36	185	2005	Planned	2006	Planned	2007	Planned
37	190	2005	Planned	2006	Planned	2007	Planned
38	195	2005	Planned	2006	Planned	2007	Planned
39	200	2005	Planned	2006	Planned	2007	Planned
40	205	2005	Planned	2006	Planned	2007	Planned
41	210	2005	Planned	2006	Planned	2007	Planned
42	215	2005	Planned	2006	Planned	2007	Planned
43	220	2005	Planned	2006	Planned	2007	Planned
44	225	2005	Planned	2006	Planned	2007	Planned
45	230	2005	Planned	2006	Planned	2007	Planned
46	235	2005	Planned	2006	Planned	2007	Planned
47	240	2005	Planned	2006	Planned	2007	Planned
48	245	2005	Planned	2006	Planned	2007	Planned
49	250	2005	Planned	2006	Planned	2007	Planned
50	255	2005	Planned	2006	Planned	2007	Planned
51	260	2005	Planned	2006	Planned	2007	Planned
52	265	2005	Planned	2006	Planned	2007	Planned
53	270	2005	Planned	2006	Planned	2007	Planned
54	275	2005	Planned	2006	Planned	2007	Planned
55	280	2005	Planned	2006	Planned	2007	Planned
56	285	2005	Planned	2006	Planned	2007	Planned
57	290	2005	Planned	2006	Planned	2007	Planned
58	295	2005	Planned	2006	Planned	2007	Planned
59	300	2005	Planned	2006	Planned	2007	Planned
60	305	2005	Planned	2006	Planned	2007	Planned
61	310	2005	Planned	2006	Planned	2007	Planned
62	315	2005	Planned	2006	Planned	2007	Planned
63	320	2005	Planned	2006	Planned	2007	Planned
64	325	2005	Planned	2006	Planned	2007	Planned
65	330	2005	Planned	2006	Planned	2007	Planned
66	335	2005	Planned	2006	Planned	2007	Planned
67	340	2005	Planned	2006	Planned	2007	Planned
68	345	2005	Planned	2006	Planned	2007	Planned
69	350	2005	Planned	2006	Planned	2007	Planned
70	355	2005	Planned	2006	Planned	2007	Planned
71	360	2005	Planned	2006	Planned	2007	Planned
72	365	2005	Planned	2006	Planned	2007	Planned
73	370	2005	Planned	2006	Planned	2007	Planned
74	375	2005	Planned	2006	Planned	2007	Planned
75	380	2005	Planned	2006	Planned	2007	Planned
76	385	2005	Planned	2006	Planned	2007	Planned
77	390	2005	Planned	2006	Planned	2007	Planned
78	395	2005	Planned	2006	Planned	2007	Planned
79	400	2005	Planned	2006	Planned	2007	Planned
80	405	2005	Planned	2006	Planned	2007	Planned
81	410	2005	Planned	2006	Planned	2007	Planned
82	415	2005	Planned	2006	Planned	2007	Planned
83	420	2005	Planned	2006	Planned	2007	Planned
84	425	2005	Planned	2006	Planned	2007	Planned
85	430	2005	Planned	2006	Planned	2007	Planned
86	435	2005	Planned	2006	Planned	2007	Planned
87	440	2005	Planned	2006	Planned	2007	Planned
88	445	2005	Planned	2006	Planned	2007	Planned
89	450	2005	Planned	2006	Planned	2007	Planned
90	455	2005	Planned	2006	Planned	2007	Planned
91	460	2005	Planned	2006	Planned	2007	Planned
92	465	2005	Planned	2006	Planned	2007	Planned
93	470	2005	Planned	2006	Planned	2007	Planned
94	475	2005	Planned	2006	Planned	2007	Planned
95	480	2005	Planned	2006	Planned	2007	Planned
96	485	2005	Planned	2006	Planned	2007	Planned
97	490	2005	Planned	2006	Planned	2007	Planned
98	495	2005	Planned	2006	Planned	2007	Planned
99	500	2005	Planned	2006	Planned	2007	Planned

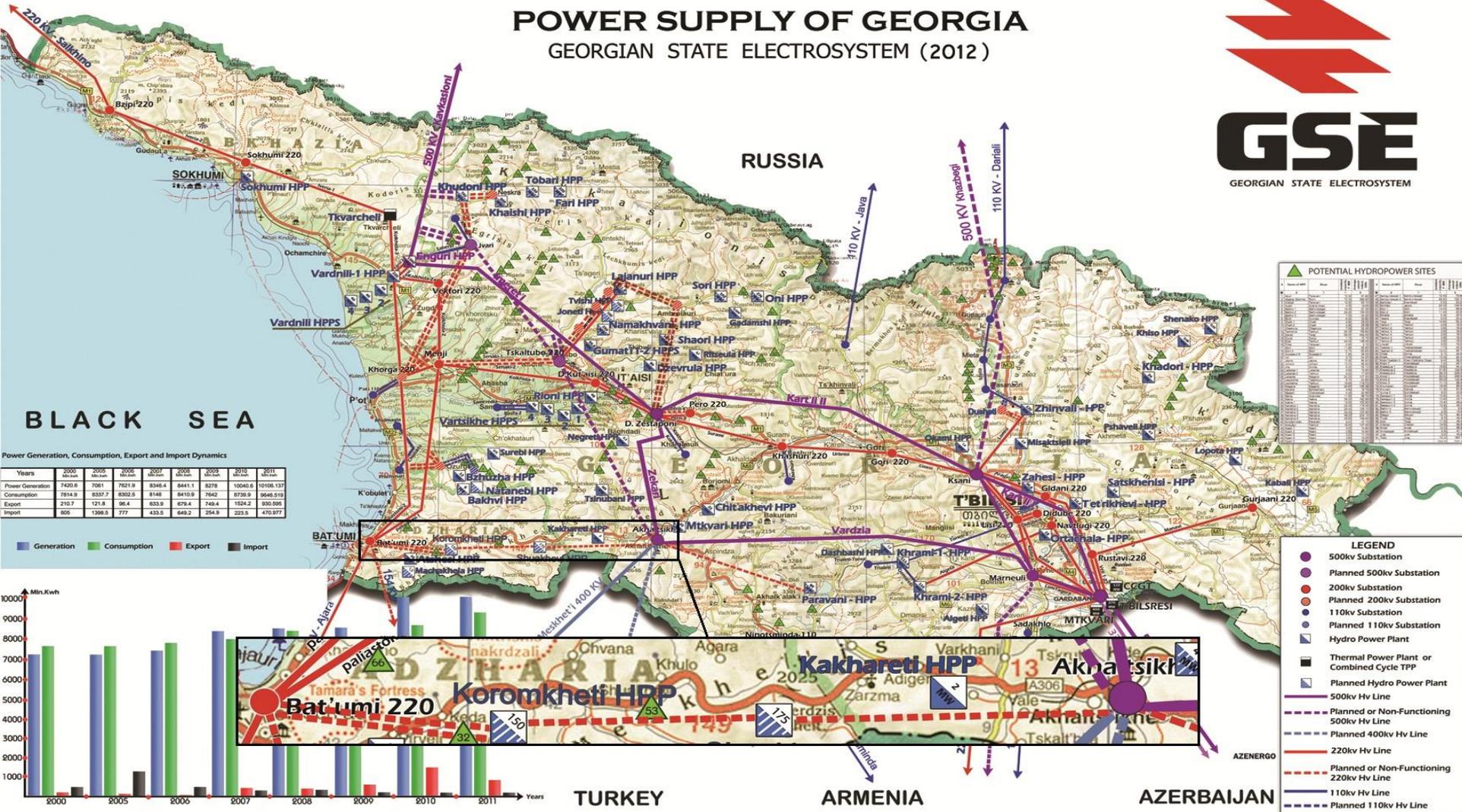
Power Generation, Consumption, Export and Import Dynamics

Years	2005	2006	2007	2008	2009	2010	2011	2012
Power Generation	7061	7921.9	9005.53	8925.35	8533.05	10142.62	10383.39	10068.40
Consumption	8377.7	8302.5	8440.90	8755.40	8391.49	9968.21	10187.21	9907.53
Export	121.8	66.4	633.96	679.56	749.43	1524.28	930.59	526.15
Import	1389.5	777	436.60	649.93	254.97	223.40	471.22	616.47



OHL "Akhaltsikhe-Batumi"

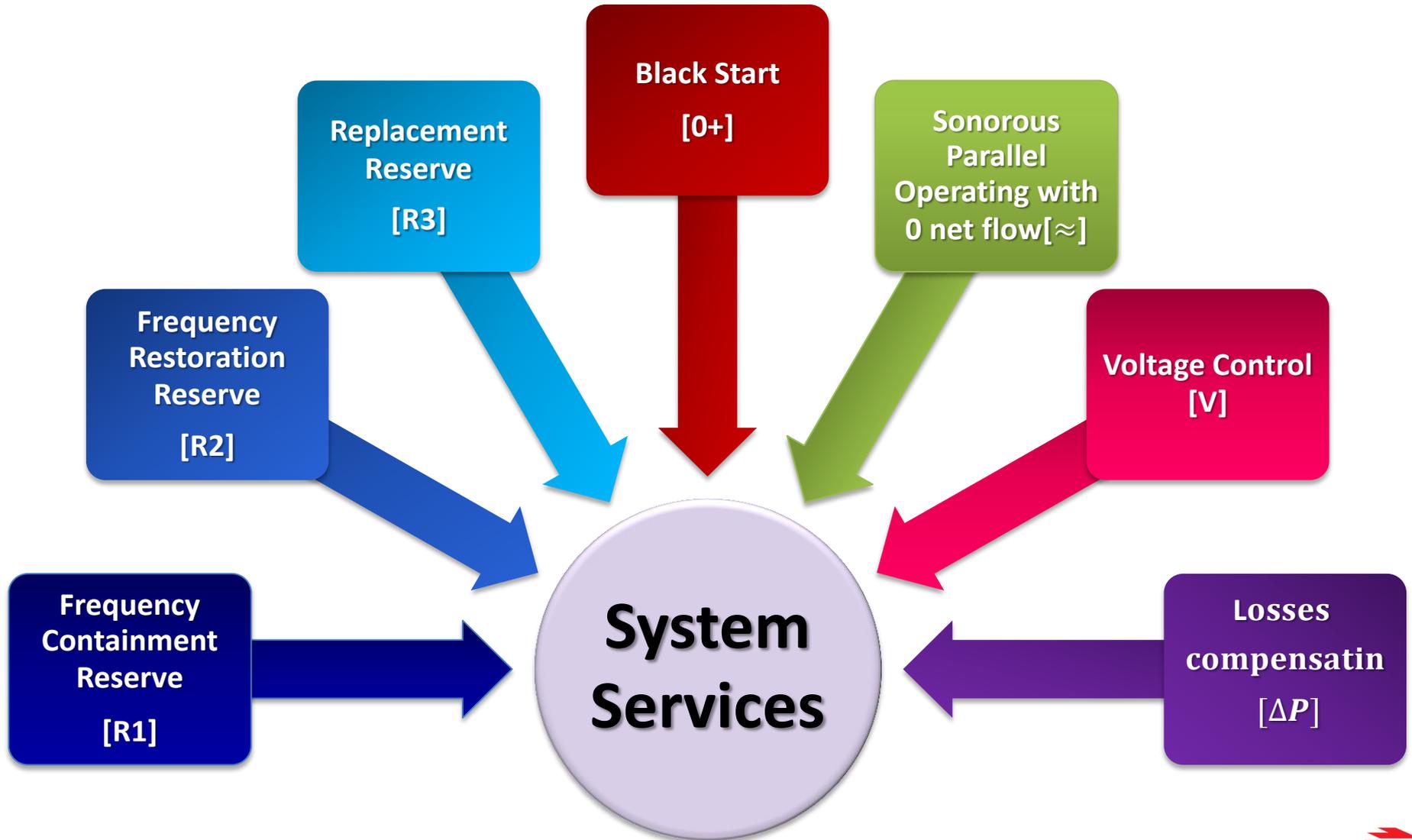
POWER SUPPLY OF GEORGIA GEORGIAN STATE ELECTROSYSTEM (2012)



6/22/2015



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!

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