Armenian Energy Sector Overview and Development Outlook

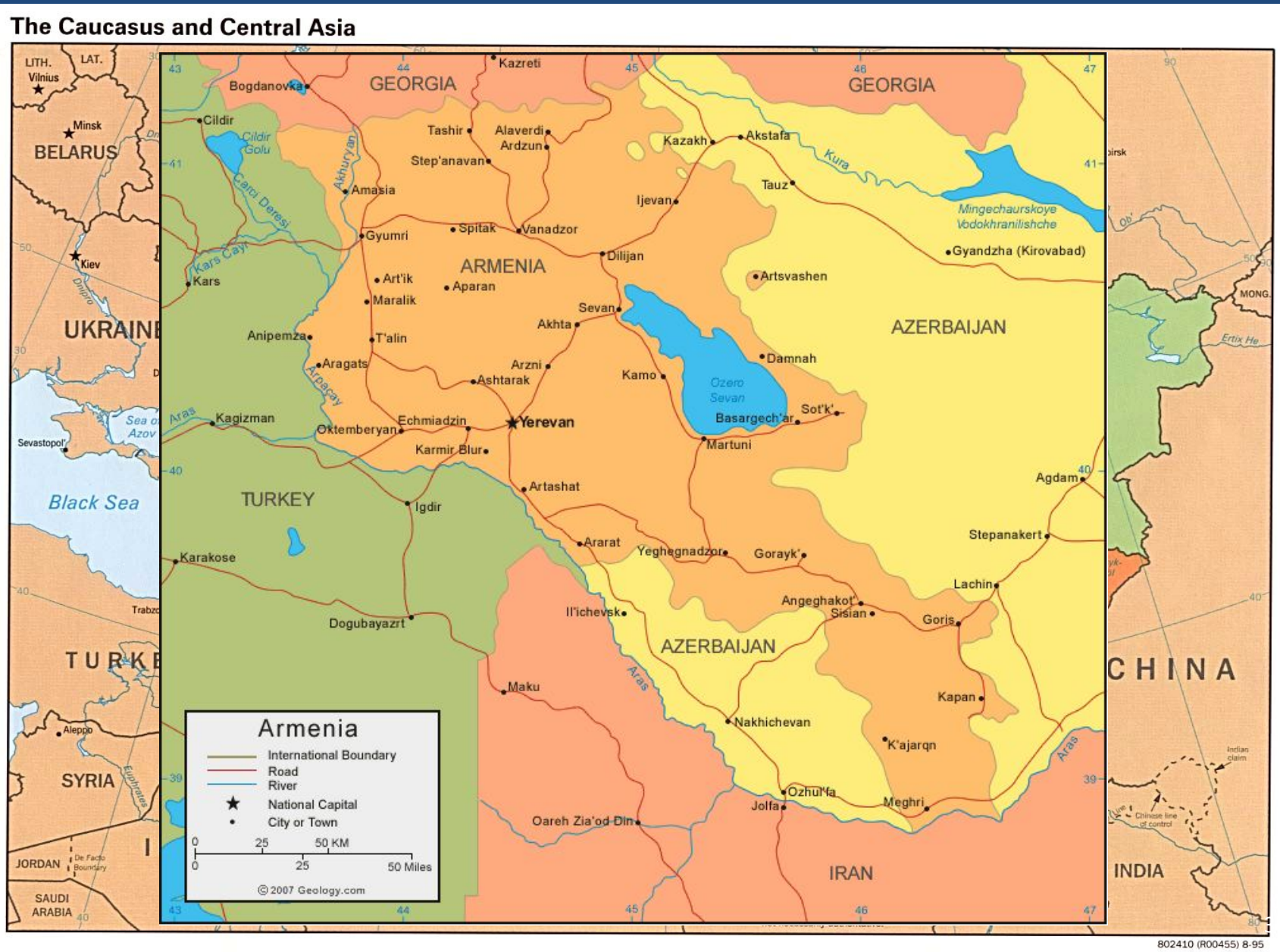
Vahan Sargsyan

Energy Strategy Center of
Scientific Research Institute of Energy
Ministry of Energy and Natural Resources
Armenia

Armenia:

Country Overview

Armenia: Regional Location



Armenia: Country Overview

Territory – 29.8 thousand km^2

~40 % – 2 500 m above the sea level

Population – 3.0046 million inhabitants

~ 63.6% – urban, including

1.07 million people in Yerevan

Armenia: Country Overview

Main macroeconomic indicators (2015 / 2014)

- GDP, million $ 10 530/ 10 893
- GDP per capita, $ 3 505/ 3 611
- GDP growth, % -3.0 / 5.9
- Unemployment rate, % 18.5 / 17.6

Armenia:

Energy System Overview

Main TPES Indicators
(as of 31.12.2015)

	1000 ktoe	mln kWh
Production	0.43	5 000
Energy import	2.93	34 075
Energy export	-0.12	-1 424
Total Primary Energy Supply	3.24	37 681
TPES per capita, toe per capita	1.08	12.6 MWh

1 toe = 11.63 megawatt-hour (MWh)

Tons of oil equivalent

1 toe = 41.868 Gigajoules

= 11.63 MWh

1 toe = 1.429 tce (tons of coal equivalent)

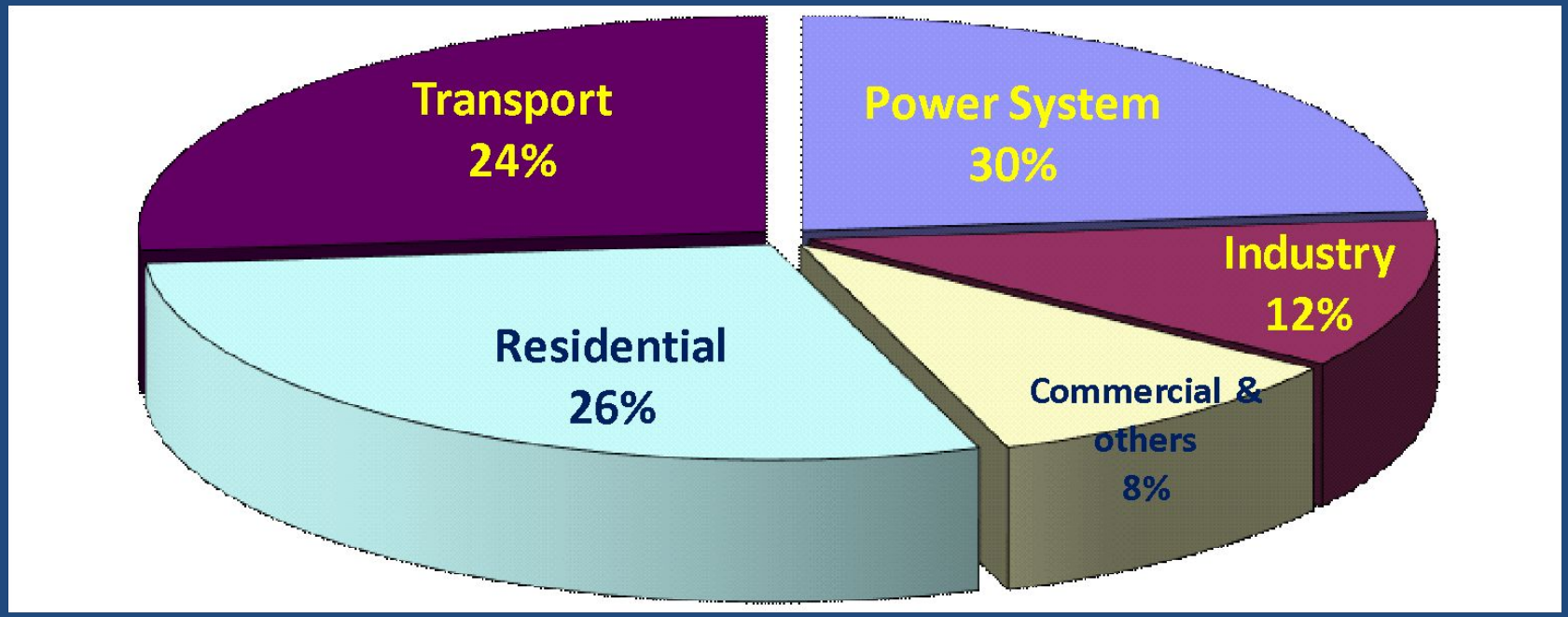
Natural Gas Supply System:
Main Indicators (as of 31.12.2015)

- RA gasification level~95%
- Length of the pipelines 16 088 km
- Number of gasified communities 611
- Number of consumers 673 837
- Import, mln. m^3 2372/2451_{2014}

Abovian Underground
Gas Storage Facility 135 mln.m^3

Natural Gas Supply System:
Main Indicators (as of 31.12.2015)

Gas consumption per sector



Natural Gas Supply System: Main Pipelines

Customers Gas Supply Tariffs:
(effective from 1st of July, 2016)

1 $ = 478 AMD
(average for 2015)

Connection Voltage/Sector	***Tariff without VAT, (VAT – 20%)***	
For customers consuming monthly up to 10 thousand m^3	AMD/m^3	122.25
For customers consuming monthly 10 thousand m^3 and more	USD equivalent in AMD/ 1000 m^3	214.63 (102.6 AMD/m^3)

Armenian Power System:

Main Indicators (as of 31.12.2015)

Installed / available capacities (MW)

Total installed/available capacity 3 152/2695

Armenian NPP (VVER-440) 440 / 385

Hrazdan TPP 810 / 370

Hrazdan unit 5 480 /440

Yerevan CCPP 242 /220

Sevan-Hrazdan Cascade of HPPs 561 / 561

Vorotan cascade of HPPs 404 / 404

Small HPPs (<30 MW) 312 / 312

Wind Farm 2.6 / 2.6

23 608 200 MWh

Armenian Power System:
Main Indicators (as of 31.12.2015)

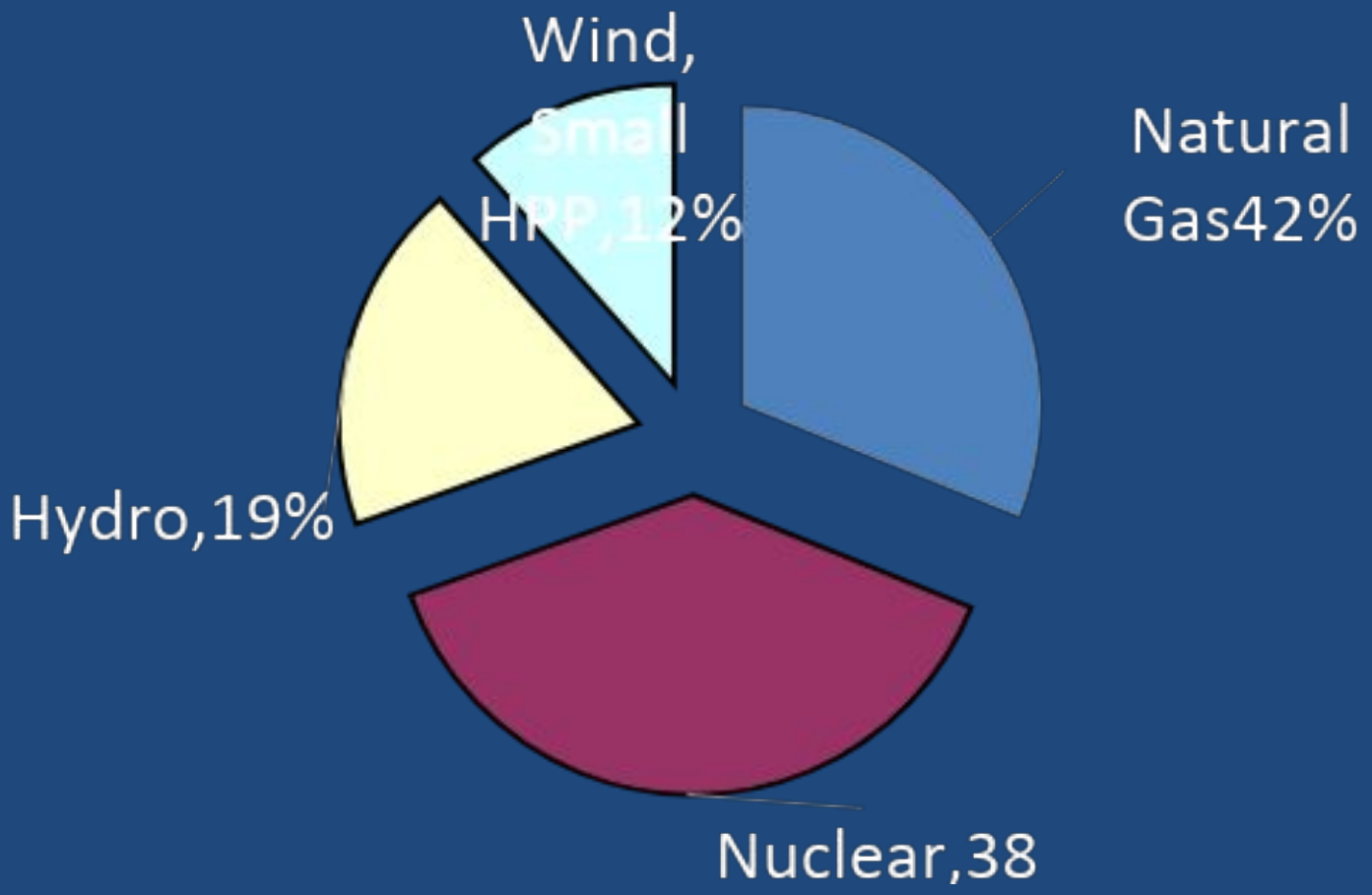
Electricity generation and consumption mln kWh

- ✔ 7 798 – annual production
- ✔ 365 (4.7%) – power plants own use (self-consumption)
- ✔ 816 (11.0%)– losses in all networks
- ✔ 1 424 – export
- ✔ 174 – import
- ✔ 5 367 – final consumption

- ✔ *~ 985 000 – consumers (meters)*

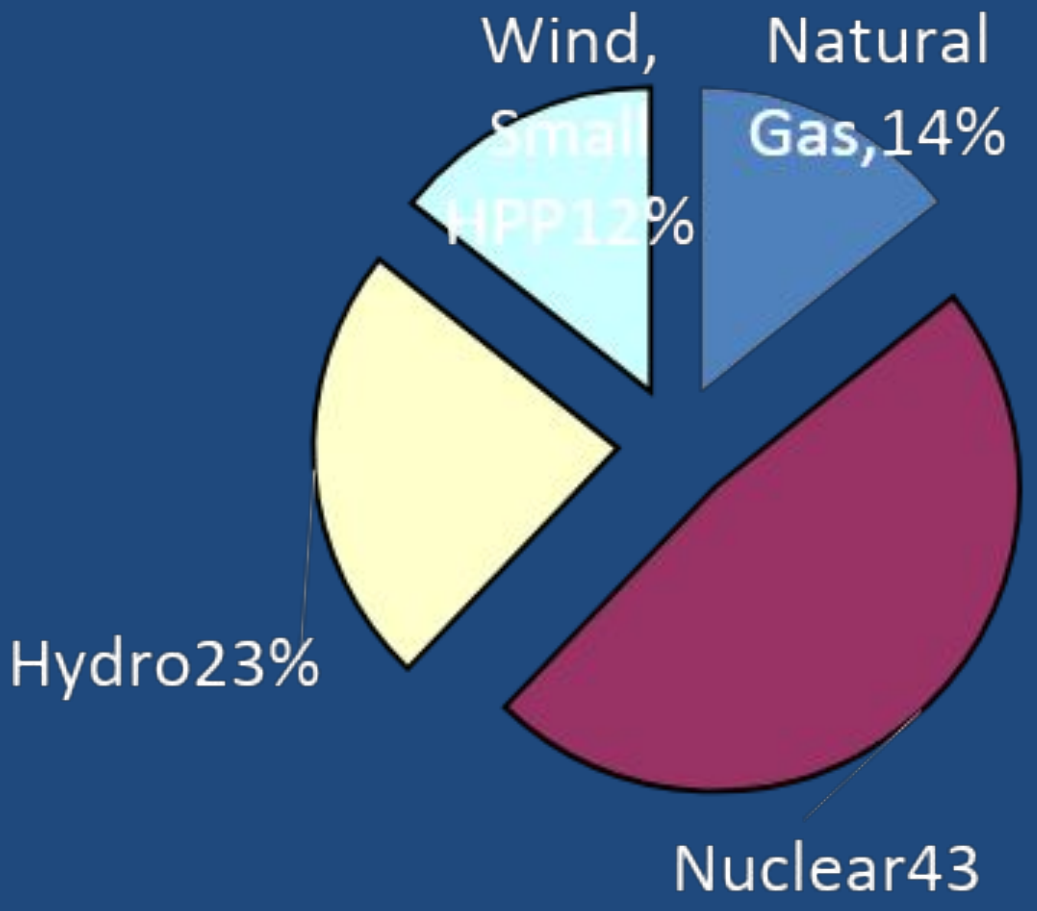
Armenian Power System:
Main Indicators (as of 31.12.2015)

Shares of electricity production (total)

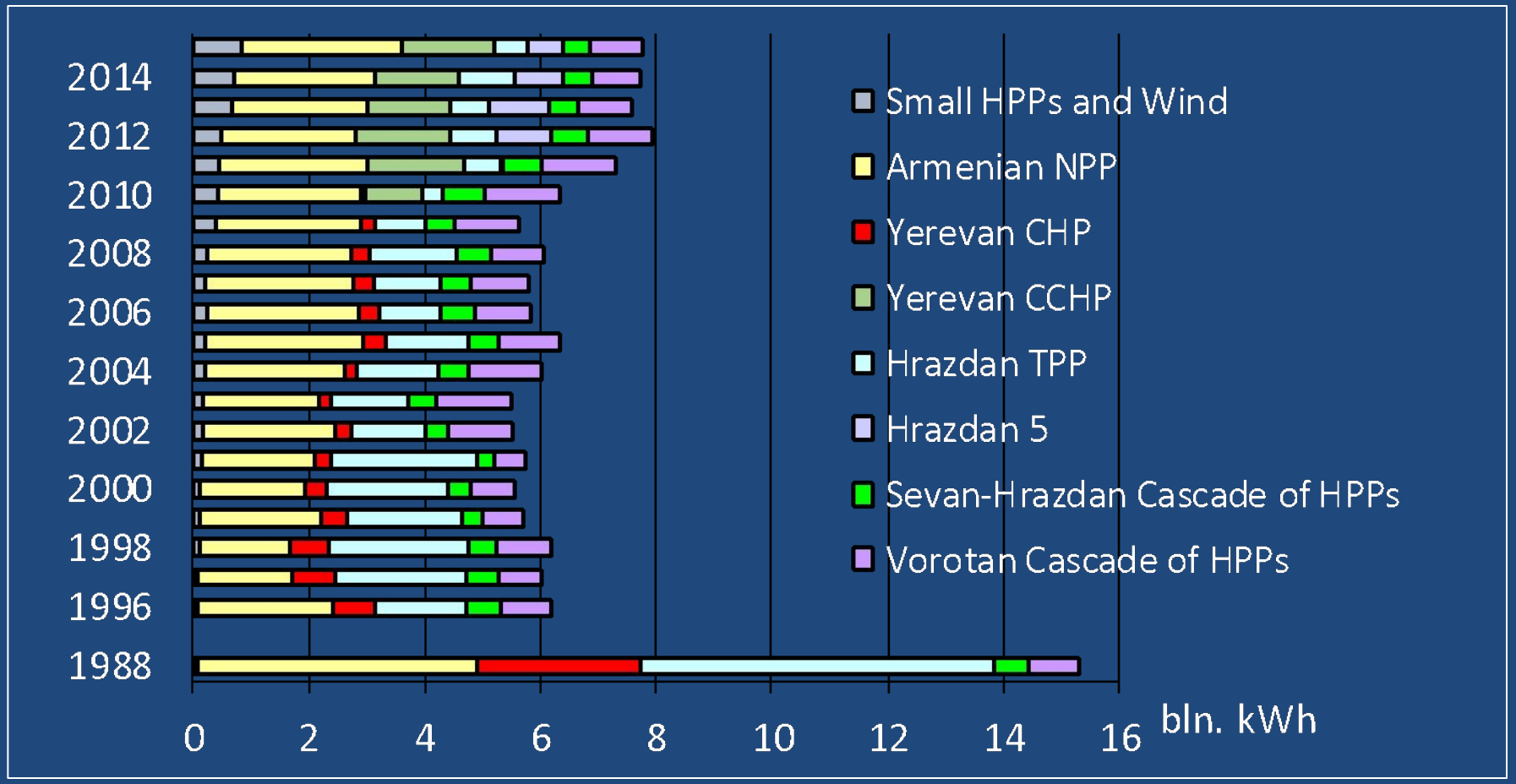


Armenian Power System:
Main Indicators (as of 31.12.2014)

Shares of electricity production (domestic)



Armenian Power System:
Main Indicators (as of 31.12.2015)



Armenian Power System: Main Interconnections

Customers Electricity Tariffs:
(effective from 1st of August, 2016)

1 $ = 478 AMD
(average for 2015)

Connection Voltage/Sector	*Tariff (with VAT – 20%), AMD (USc)/kWh*	
	Night-time	*Daytime*
110 kV and above	30.7 (6.4)	34.7 (7.3)
35 kV	33.2 (6.9)	37.2 (7.8)
6(10) kV	33.2 (6.9)	43.2 (9.0)
0.38 kV & Residential	36.2 (7.6)	46.2 (9.7)

Electricity Generation Tariffs: Main Power Plants

(without VAT – 20%, effective from 1st of August, 2016)

1 $ = 478 AMD
(average for 2015)

Power Plant	Unit	Tariff
Armenian NPP:		
Capacity Tariff	AMD(US$)/kW/month	4079.41 (8.53)
Electricity Tariff	AMD(USc)/kWh	6.418 (1.34)
Hrazdan TPP:		
Capacity Tariff	AMD(US$)/kW/month	932.72 (1.95)
Electricity Tariff	AMD(USc)/kWh	39.099 (8.18)
Hrazdan unit 5:		
Electricity Tariff	AMD(USc)/kWh	33.0 (6.90)
Yerevan CCPP:		
Capacity Tariff	AMD(US$)/kW/month	4707.83 (9.85)
Electricity Tariff	AMD(USc)/kWh	17.767 (3.72)

Electricity Generation Tariffs: Main Power Plants

(without VAT – 20%, effective from 1st of August, 2016)

1 $ = 478 AMD
(average for 2015)

Power Plant	*Unit*	*Tariff*
Sevan-Hrazdan HPP Cascade:		
Capacity Tariff	AMD(US$)/kW/month	581.19 (1.22)
Electricity Tariff	AMD(USc)/kWh	4.504 (0.94)
Vorotan HPP Cascade:		
Capacity Tariff	AMD(US$)/kW/month	1787.0 (3.74)
Electricity Tariff	AMD(USc)/kWh	7.0 (1.46)

Electricity Generation Tariffs: Main Power Plants

(without VAT – 20%, effective from 1st of July, 2016)

1 $ = 478 AMD
(average for 2015)

Power Plant	***Tariff,*** AMD(USc)/kWh
Small HPPs:	
Build on drinking water pipeline	10.556 (2.21)
Build on irrigation system	15.832 (3.31)
Build on natural water flow	23.753 (4.97)
Wind Power Plant	42.645 (8.92)
Power Generated from Biomass	42.645 (8.92)

HOMEWORK

Which is the percentage of the reject heat (energy loss) in Armenian electric power generation system. Remember that it is composed of around equal thirds of each of nuclear, thermal natural gas based and hydropower generating capacities, both nuclear and thermal plants have at large the same efficiency.

Thank you