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Joint ICTP-IAEA Workshop on Sustainable Energy Development: Pathways and Strategies after Rio+20

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Energy strategy of Ukraine till 2030 in light of Rio+20 outcome. Nuclear energy role.

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Outcome Rio+20. Energy.

- Energy supply should be **reliable, affordable, economically viable, socially and environmentally acceptable**. (126)
- Improving energy efficiency, increasing the share of renewable energy and cleaner and energy-efficient technologies are important for sustainable development. (128)


Norwegian Sea
White Sea
SWEDEN
FINLAND
NORWAY
Gulf of Bothnia
Gulf of Finland
UNITED KINGDOM
ESTONIA
Baltic Sea
North Sea
RUSSIA
LATVIA
DENMARK
LITHUANIA
RUSSIA
NETHERLANDS
BELARUS
IRELAND
POLAND
GERMANY
Celtic Sea
English Channel
BELGIUM
LUX.
CZECH REP.
UKRAINE
SLOVAKIA
LIECH.
AUSTRIA
HUNGARY
MOLDOVA
FRANCE
SWITZERLAND
ROMANIA
Sea of Azov
Bay of Biscay
SLOVENIA
CROATIA
ITALY
BOS. & HER.
SERBIA
SAN MARINO
Black Sea
MONT.
KOS.
BULGARIA
MONACO

Ukraine

Population – 45.6 million

Territory – 603.5 thousand km²

Climate – moderate continental

Temperature 2011

January (medium/minimum) - -3 ^{0}C /-31 ^{0}C

July (medium/maximum) - +22 ^{0}C / +38 ^{0}C

Gross domestic product (PPP) per capita (2011) - 7199$

Electricity production per capita (2011) - 4 276 kWt•h

Energy strategy of Ukraine

- Energy strategy of Ukraine till 2030 was

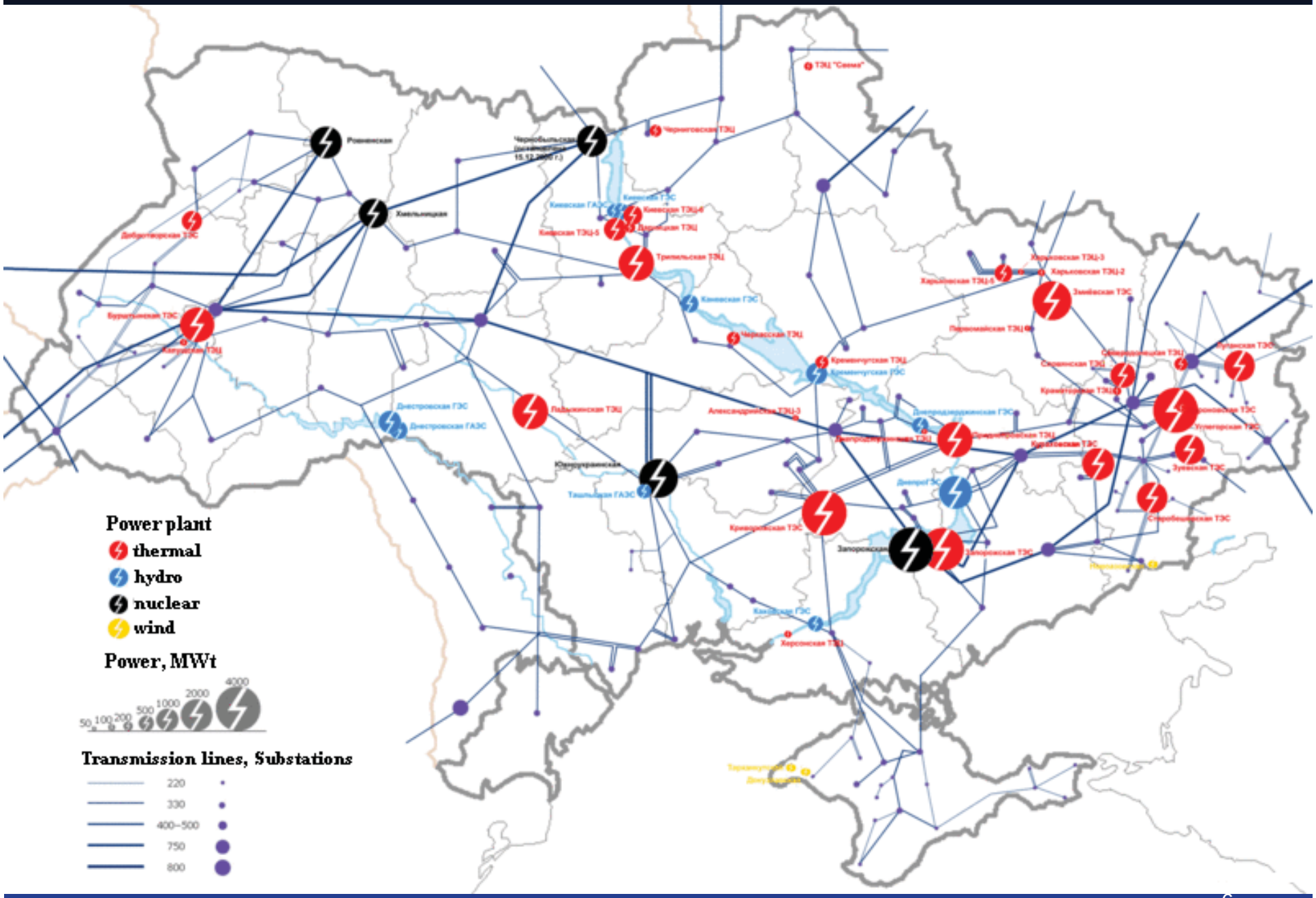
  approved in 2006

  reviewed in 2011

  under public discussion.
- In the Strategy considered 3 scenarios of economy development

		medium GDP increase per year
pessimistic	-	3.8 %
basic	-	5 %
optimistic	-	6.4%

- Total GDP will increase in 2,7 ones in 2030 in comparison with 2010 for basic scenario


Power plant
thermal
hydro
nuclear
wind
Power, MWt
50
100
200
500
1000
2000
4000
Transmission lines, Substations
220
330
400–500
750
800

Nuclear power plant

Name	Power, MWt	Building
Zaporozhye	6000	1981—1984, 1988-1995
Rivne	2880	1973—1980, 2004
Khmelnitsky	2000	1981—1987, 2004
South - Ukraine	3000	1975—1982

Hydro and hydro accumulated power plant

Name	River	Power, MWt	First stage building
Dniper HPP	Dniper	1538,20	1927—1932
Dneprodzerzhynsk HPP	Dniper	352,00	1963
Kanev HPP	Dniper	444,00	1972
Kahovsk HPP	Dniper	351,00	1955
Kiev HAPP	Dniper	235,50	1970
Kiev HPP	Dniper	388,80	1964
Kremenchug HPP	Dniper	625,00	1959
Dnister HAPP	Dnister	450,00	1983—2008
Dnister HPP-1	Dnister	702,00	1973—1981
Dnister HPP-2	Dnister	27,20	
Tashlyk HAPP	South Bug	302,00	1981—2006
Tereblya and Rika HPP	Tereblya and Rika	27,00	1949-1956

Thermal power plant

Name	Power, MWt	First stage building
Burshtyn TPP	1600	1965—1969
Uglegorsk TPP	3600	1972
Zaporozhye TPP	3600	1970—1973
Zmievsk TPP	2400	1956—1960
Zuevsk TPP	1200	1975—1982
Krivorozhye TPP	3000	1961—1965
Kurahovsk TPP	1460	1936—1937
Ladyzhynsk TPP	1800	1968—1972
Lugansk TPP	1425	1953—1956
Pridneprovsk THPP	1740	1954
Starobeshevsk TPP	1350	1954—1958
Trypilsk TPP	1800	1963—1969

Measurement for renewable energy sources development

- Green tariffs for:
  - wind power plant
  - solar power plant
  - small hydro power plant
  - bio-fuel power plant
- Zero profits tax for renewable energy equipment producers
- Customs facilities for import renewable energy equipment if no national analog

Wind power plant

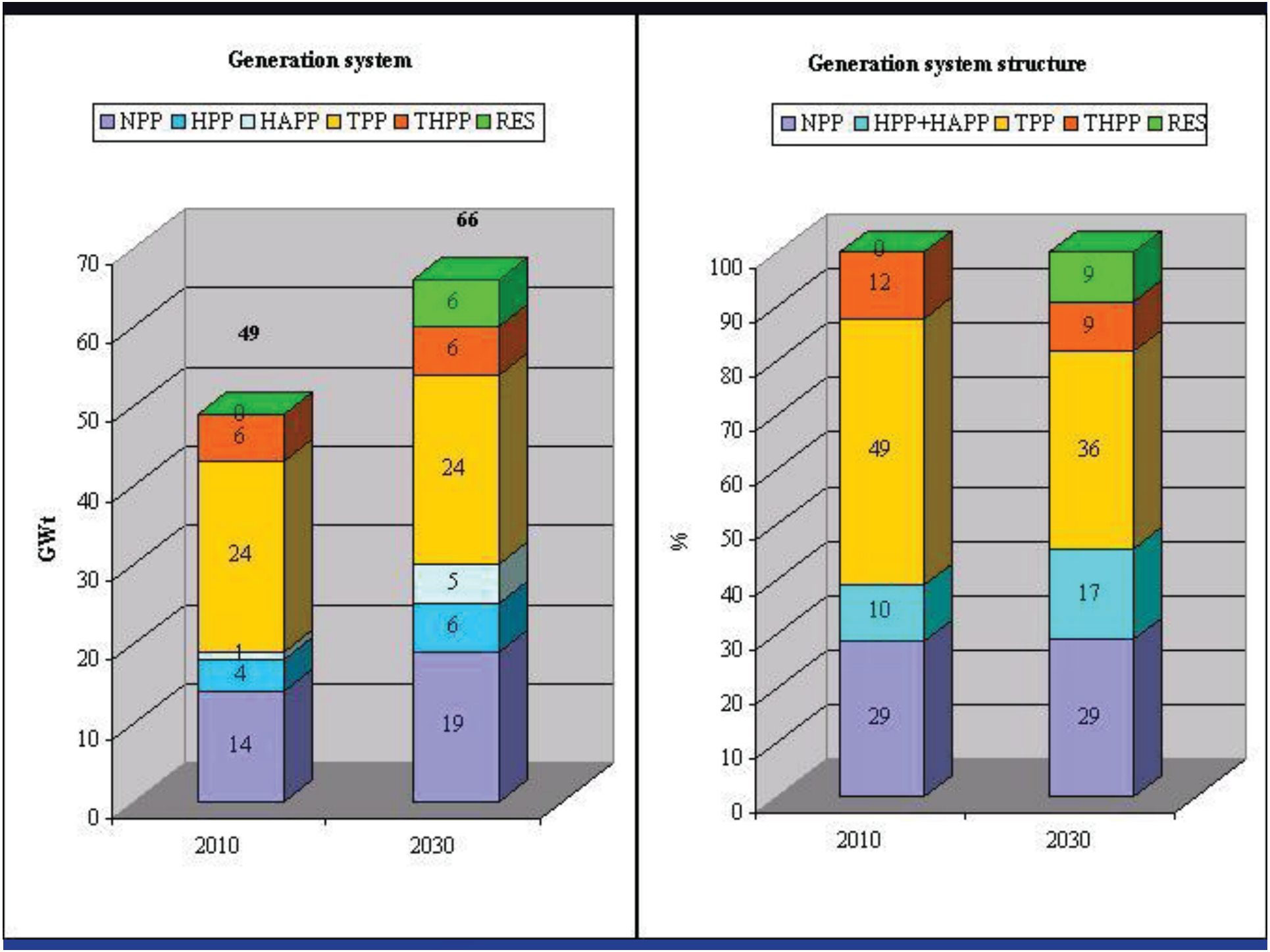
Name	Power, MWt	First stage building
Ochakov WPP	25	2011
Donuzlav WPP	10.9	1992
Novoazov WPP	20.4	1998
Tarhankut WPP	15.9	2005

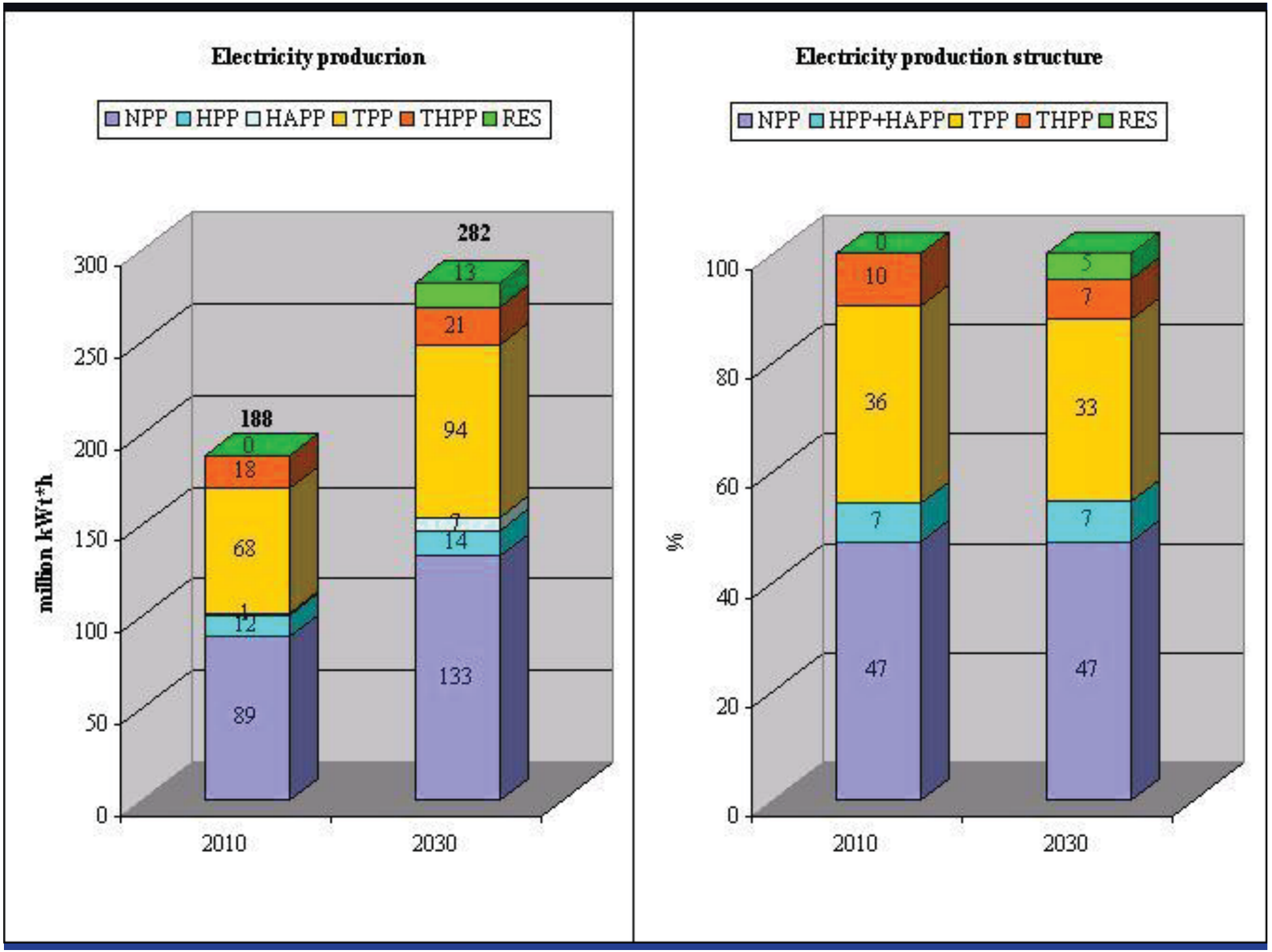
Solar power plant

Name	Power, MWt	Building
SPP “Mityaevo”	31.55	2012
SPP “Perovo”	100	2011
SPP “Ohotnikovo”	80	2011
SPP “Rodnikovoe”	7.5	2010

Basic development scenario

- GDP increase in 2.7 ones
- Electricity production increase in 1.5 ones
- Installed power increase in 1.3 ones


Generation system
NPP
HPP
HAPP
TPP
THPP
RES
GWt
70
60
50
40
30
20
10
0
49
66
0
6
24
1
4
14
6
24
5
6
19
2010
2030
Generation system structure
NPP
HPP+HAPP
TPP
THPP
RES
%
100
90
80
70
60
50
40
30
20
10
0
0
12
49
10
29
9
9
36
17
29
2010
2030


Electricity producrion
NPP
HPP
HAPP
TPP
THPP
RES
million kWt*h
300
250
200
150
100
50
0
188
0
18
68
1
12
89
282
13
21
94
7
14
133
2010
2030
Electricity production structure
NPP
HPP+HAPP
TPP
THPP
RES
%
100
80
60
40
20
0
0
10
36
7
47
5
7
33
7
47
2010
2030

Thermal generation

- Modernization and reconstruction existing TPP equipment (14 GWt) for:

  - Increase efficiency factor

  - Decrease discharges

- Commissioning new power units (10 GWt) by replacement of main equipment of existing ones and building new units instead of decommissioned

Hydro generation

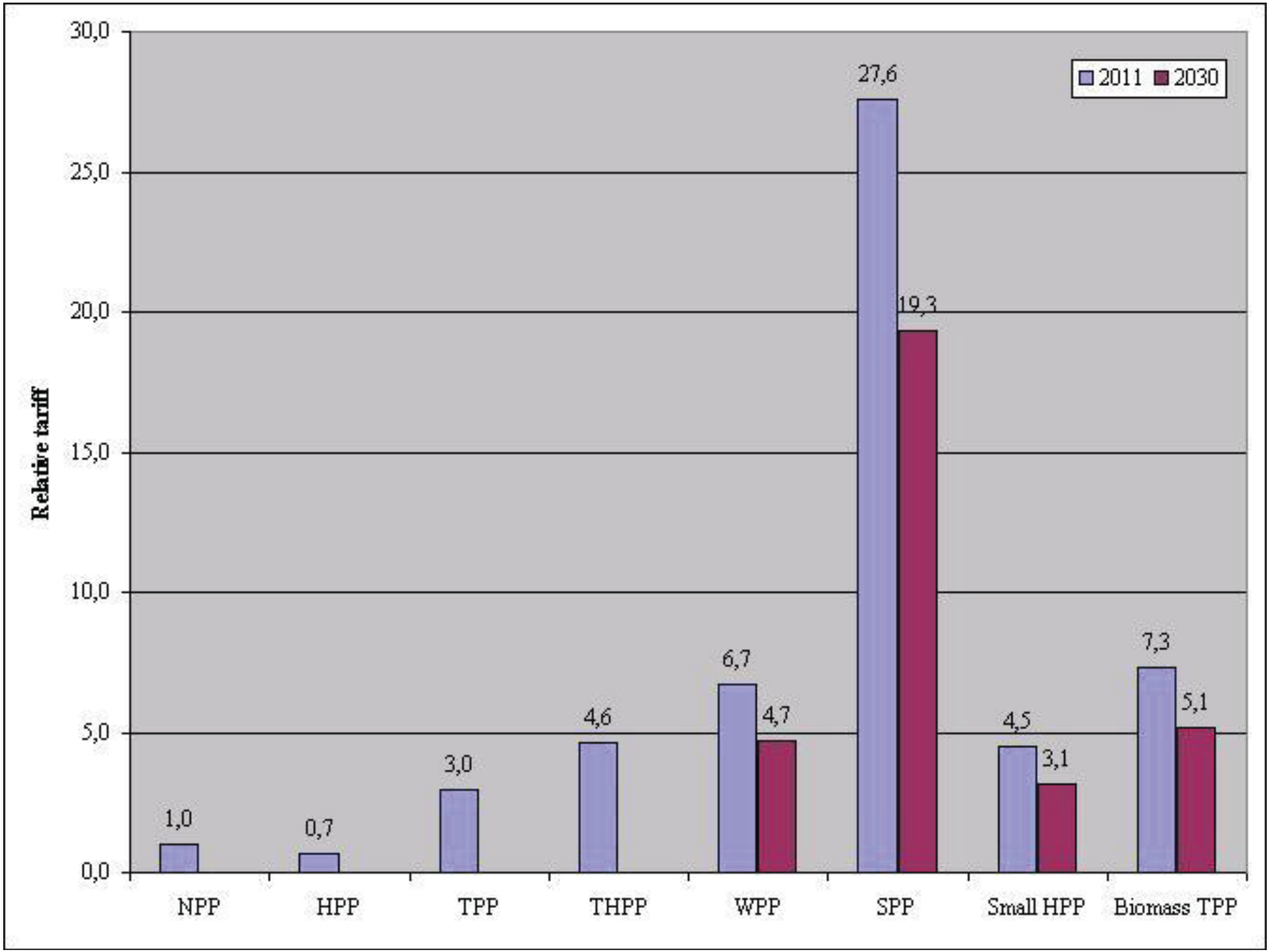
- Reconstruction of existing HPP
- Expansion of Kahovsk HPP
- Finishing first stages (till 2015) and building second stages (2015-2020) Tashlyk and Dnister HAPP
- Building Kanev HAPP (first hydro aggregates commissioning in 2015)
- Reconstruction and expansion Tereblya and Rika HPP
- Building new HPP (2020-2025) in the western part of country if needs in flexing generating plant will exist

Nuclear generation

- Increase NPP safety
- Life time prolongation (on 20 years) for 11 units
- Building 3 and 4 energy units for Khmennitskiy NPP
- Replacement energy units building start instead of to be decommissioned in 2031-2037 years
- National nuclear fuel fabrication development
- Building additionally 3 GWt new energy units

Renewable energy sources

- Wind energy potential is 10-15 GWt, task in Strategy – 3-4 GWt
- Solar energy potential 4 GWt, task in Strategy – 1,5-2,5 GWt (at the condition essential building cost decrease)
- Small hydro potential up to 4 GWt, task in Strategy - 0,4-0,8 GWt
- Bio energy potential is 1-1,5 GWt electricity


30,0
25,0
20,0
15,0
10,0
5,0
0,0
Relative tariff
2011
2030
1,0
0,7
3,0
4,6
6,7
4,7
27,6
19,3
4,5
3,1
7,3
5,1
NPP
HPP
TPP
THPP
WPP
SPP
Small HPP
Biomass TPP

Conclusion

- The Ukraine energy strategy fully in line with Outcome of Rio+20
- The energy efficiency generation and use increase foreseen
- The special attention paid to renewable energy development
- Till 2030 the nuclear energy will provide about half of energy production and this allow to provide energy supply in reliable, affordable and environmentally safe manner

In the nearest 20 year nuclear energy remains bases of electricity generation system of Ukraine

Questions