



**Expert Group Meeting on Carbon Dioxide Capture and Storage and
Sustainable Development**

**POTENTIAL FOR
CCS
in KAZAKHSTAN**

Sergey Katyshev, KEGOC

**UN, Department of Economics and Social Affairs
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REPUBLIC of KAZAKHSTAN

General Information



Territory - 2 717 300 square kilometers

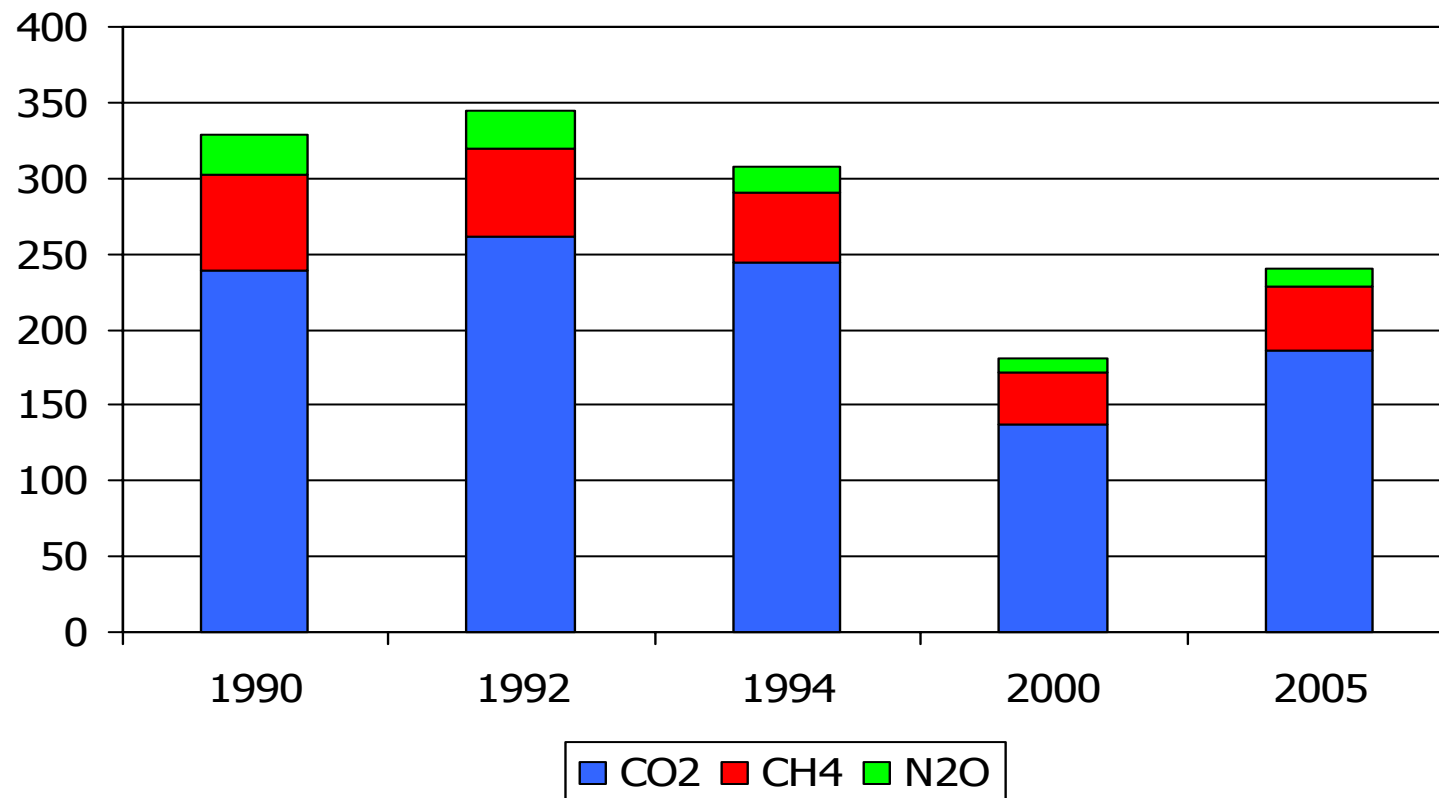
Capital - Astana, Biggest city - Almaty

Population - 14.88 million people (Urban-56%, Country-44%)

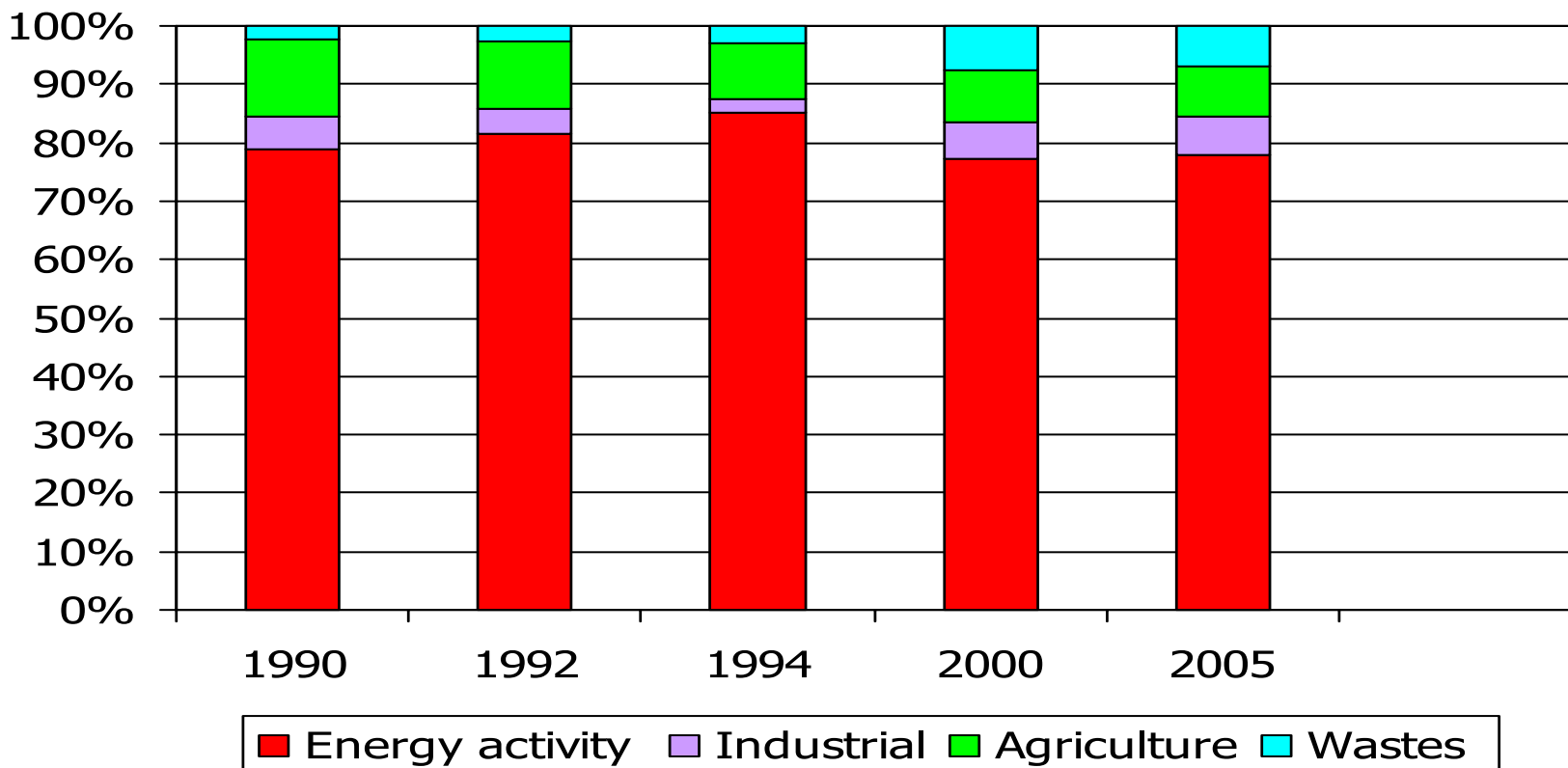
Total Emissions of Gases with Direct Greenhouse Effect,
mln. t CO₂ – equiv.

IPCC sources categories	1990	1992	1994	2000	2005
CO₂	238.4	261.2	243.7	137.3	186.3
Energy activity	220.1	246.3	236.5	126.6	170.2
Industrial processes	18.3	14.9	7.2	10.7	16.1
Land tenure change and forestry	-8.1	-7.1	-4.8	-7.1	-5.9
CH₄	64.0	57.8	46.3	33.9	42.7
Energy activity	39.0	32.8	23.9	13.1	17.0
Industrial processes	0.05	0.04	0.02	0.03	0.03
Agriculture	16.9	16.5	13.6	7.4	9.5
Wastes	8.0	8.5	8.7	13.4	16.2
N₂O	27.0	25.1	17.6	9.0	11.7
Energy activity	0.8	0.9	0.9	0.4	0.5
Agriculture	25.8	23.8	16.2	8.3	10.7
Wastes	0.4	0.4	0.5	0.3	0.4
Total emission	329.3	344.1	307.6	180.2	240.7
Net-emissions (sources and effluent)	321.2	336.9	302.7	173.1	234.8

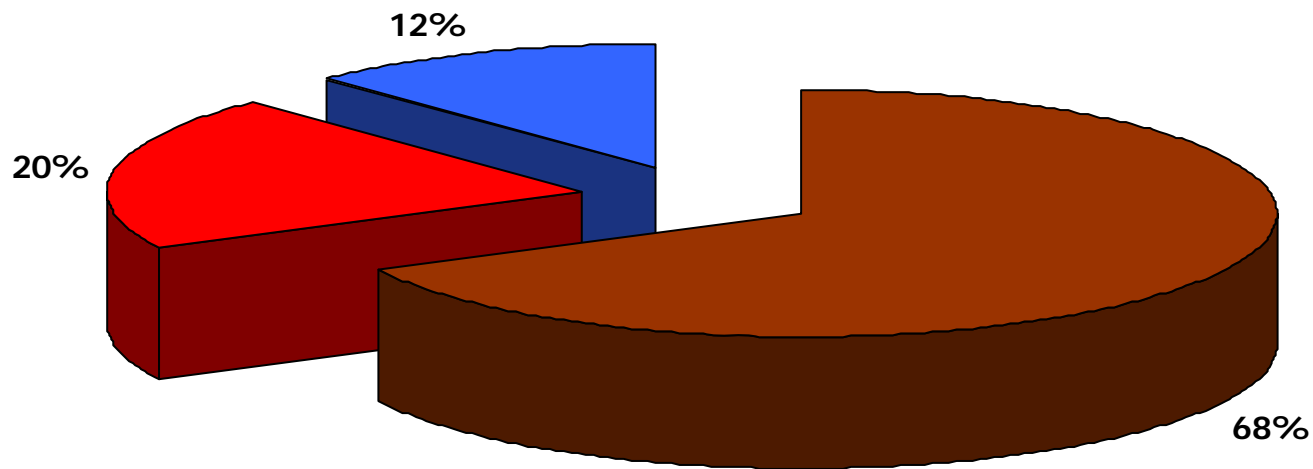
GHG EMISSIONS, Mln.t



The share of contribution of emissions sources categories to the total national GHG emissions



Structure of Installed Capacity of Power Plants



■ Coal Thermal Power Plants ■ Gas and Oil Thermal Power Plants ■ Hydro Power Plants

Power Sector

Structure of the installed capacity of Power Plants by energy type in 2003

Type of Power Plants	Capacity, MW	%
Coal Thermal Power Plants	12 440	67.4
Gas and Oil Thermal Power Plants	3 774	20.4
Hydro Power Plants	2 247	12.2
Total	18 461	100.0

Electricity Generation Structure, billion kWh

Types of Power Plants	1990	1995	1998	2000	2003
<i>Electricity generation, total:</i>	87.38	66.98	49.59	51.42	63.65
<i>Including:</i>					
Coal Power Plants	62.33	47.37	33.6	37.26	46.99
Gas and Oil Power Plants	17.7	10.8	7.99	6.65	8.05
Hydro Power Plants	7.35	8.31	7.7	7.51	8.61
Nuclear Power Plant	0.5	0.5	0.3	0.0	0.0

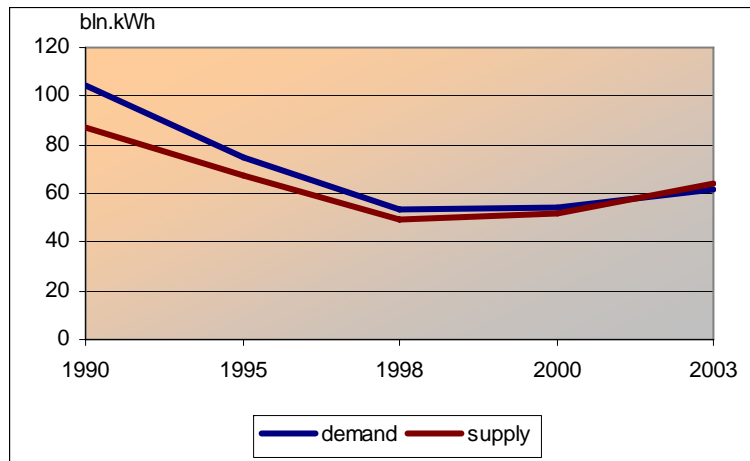
Main characteristics of power sector



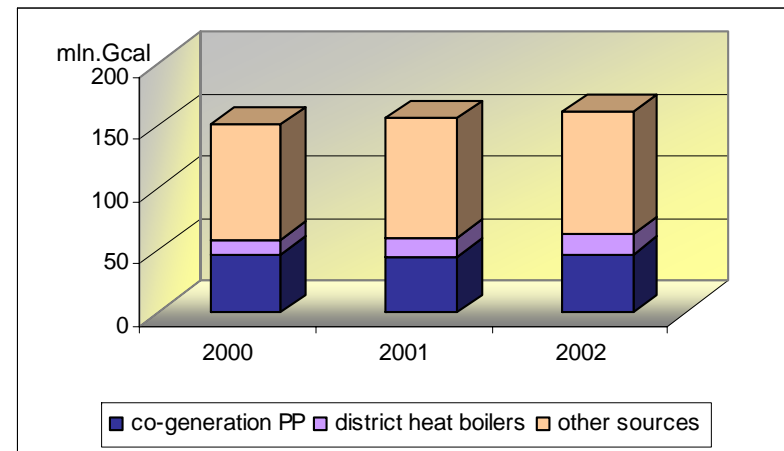
- high concentration of electricity generation (7 400 MW of thermal capacity at three sites only: Ekibastuz-1 (8 X 500 MW)/Ekibastuz-2 (2 X 500 MW) and Aksu (8 X 300 MW);
- location of large plants mostly close to fuel deposits;
- high share of co-generation of electricity and heat for industrial and community use
- insufficient share of hydropower plants
- developed network of 220 kV, 500 kV and 1150 kV transmission lines
- unified vertical system of operative supervisory management.

Electricity and Heat Demand and Supply

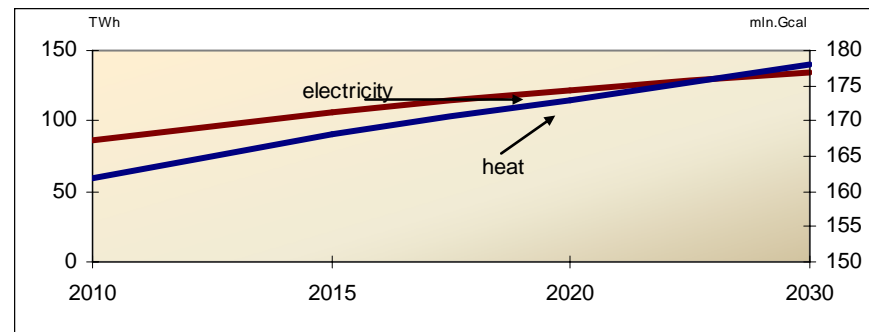
Electricity



Heat



Forecast of Electricity and Heat Demand

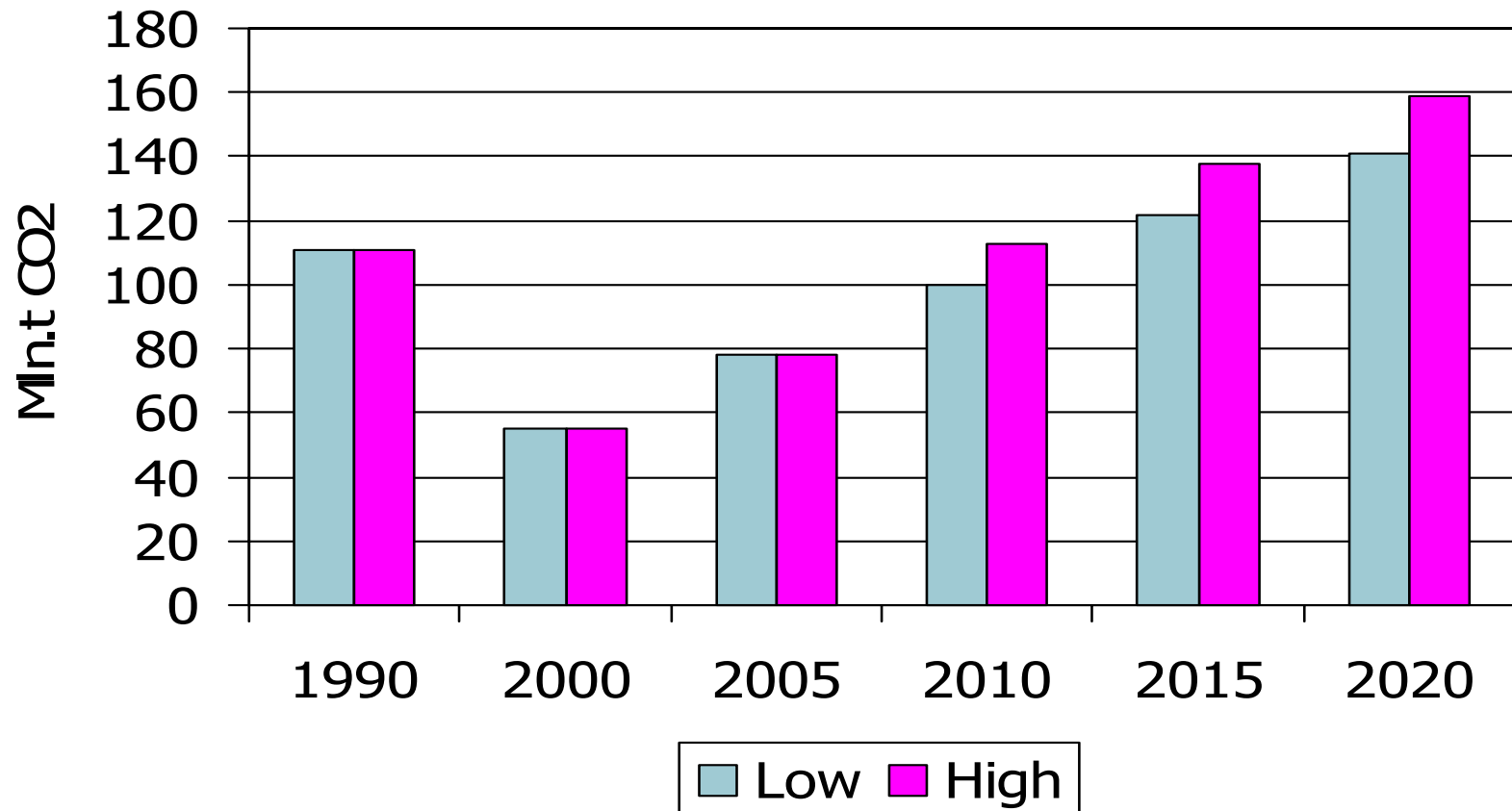




Coal-mining industry

- Total potential – 170 bln.t
- Production capacity – 162 mln.t
- 24 coal mines & 11 coal pits
- Major coal fields: Karaganda & Ekibastuz; located – Northern and Central regions

CO2 emission of power plants

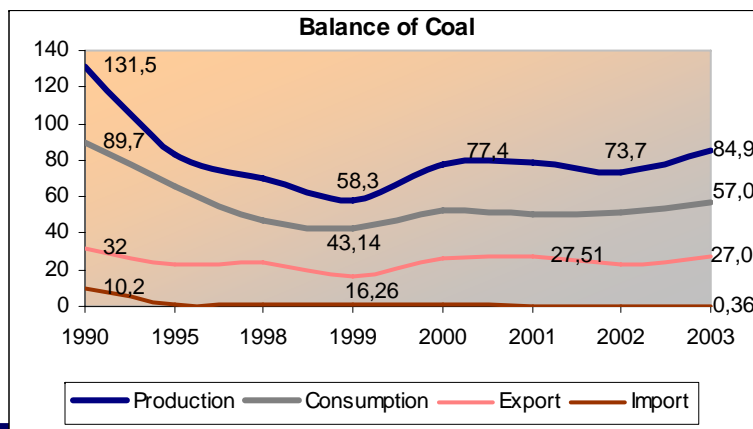
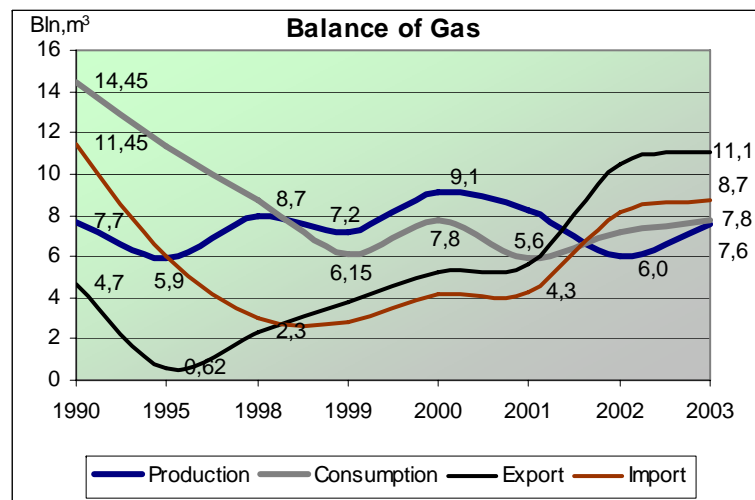
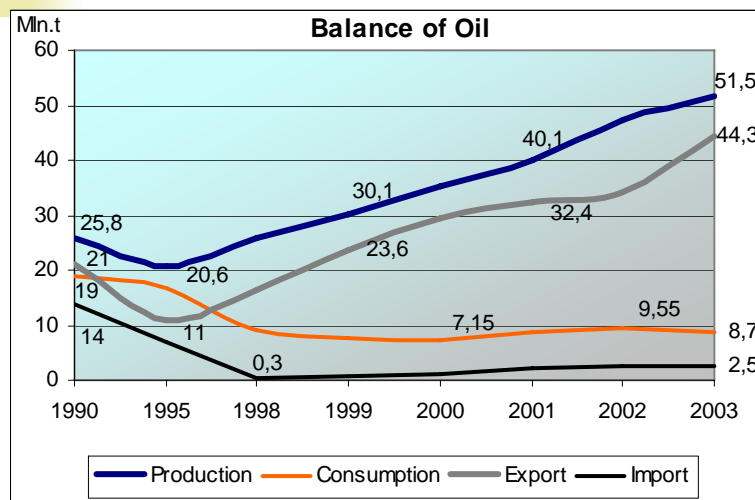




ENERGY POTENTIAL: OIL and GAS

- Prospective oil- and gas- bearing areas comprise 62% of the entire country's territory
- 197 oil and gas deposits with explored resources more than 2 bln.t of oil, 0.7 of oil condensate and 2 000 bln.m³ of natural gas
- Forecasted extractable resources of continental part –10 bln.t of oil and oil condensate and 7000 bln.m³ of natural gas; Caspian shelf – 13 bln.toe

Balance of Primary Energy Resources





MAIN GOALS OF ENERGY POLICY

- to ensure reliable power sources required for sustainable economic growth
- to meet the demand of the population for energy services at acceptable prices
- to develop reliable energy saving systems that would guarantee energy security
- to preserve a sound environment and prevent uncontrolled climatic changes.



Main objectives of the governmental policy in the energy sector

- to ensure fuel and electricity independence of Kazakhstan;
- to create fuel and electricity markets in Kazakhstan;
- to work out legislation that will encourage development of the energy sector;
- to implement energy saving policy;
- to improve the ecological situation in Kazakhstan;
- to involve renewable sources of energy into the energy balance of the Republic



Structural policy in the area of energy sector development

- growth in oil production, more efficient use of oil, increased domestic consumption and export of oil
- more efficient utilisation of natural gas, increased domestic consumption of natural gas
- priority of fine processing and complex utilisation of hydrocarbon raw materials
- as ecologically acceptable technologies will be introduced, improvement of quality of coal products through increased volumes of high calorific coals, and stabilization and further building up of coal production rates
- intensified development of local energy resources (hydro energy, minor deposits of hydrocarbons, etc.), greater use of non-conventional and, first of all, renewable resources (wind and solar energy, mine methane, biogas, etc.)



Technical policy in the area of energy sector development

- a fundamental increase in economics and energy efficiency at all stages of production, conversion, distribution and use of energy resources;
- ecological and emergency security of energy sources and reliable energy supplies to consumers;
- use and development of new quality technologies and techniques to ensure sustainable energy sector development, including environmentally friendly coal-fired power plants, as well as efficient technologies for the use of new energy sources, production and processing of hydrocarbon raw materials, etc.



Application of CCS technologies

- application of CCS technologies does not conflict with energy policy of the country
- availability and further development of coal-fired power plants
- significant number of oil and gas deposits – both continental and offshore ones
- possibility of other geological formations for CO₂ storage
- high level of population education and availability of highly qualified specialists in power, oil and gas industry, geology.



Developing CCS

- reduce the efficiency penalty arising from the capture process
- The institutions and national governments should as a priority ensure that an enabling regulatory framework is put in place as soon as necessary
- CCS technologies, when commercially viable, should be deployed rapidly by using market-based instruments, with a view to moving towards a largely carbon neutral production fleet



Work for a successful deployment of CCS technologies in Kazakhstan

- examine possible measures to stimulate the construction and operation of sustainable fossil fuels technologies in commercial power generation in the Kazakhstan
- determine availability of storage capacity in Kazakhstan
- develop an enabling framework for CCS in the Kazakhstan, regulatory questions surrounding CO₂ transport and storage
- provide a clear perspective when coal- and gas-fired plants will need to install CO₂ capture and storage
- promote public acceptance of storage.