

# Energy Assessment review of Republic of Moldova

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# Short content of presentation

- ▶ Energy balance of Moldova and dependence on energy sources
- ▶ Main energy producers and actual situation of the sector
- ▶ Energy strategy and policy bases development
- ▶ Renewable energy, challenges and existing potential
- ▶ Energy efficiency in Moldova - steps made and way forward
- ▶ Climate impact of energy projects and mitigation aspects
- ▶ Final issues and conclusions

# General facts about Moldova

- ▶ The territory of Moldova is 33,8 thousand square kilometers
- ▶ Population of Moldova 3,55 million
- ▶ Length from north to south is 350 km
- ▶ Width from west to east is 150 km
- ▶ Average precipitation 540 mm/year
- ▶ Average sunlight hours 3200 h/year
- ▶ Biggest rivers: Nistru and Prut
- ▶ Biggest city: Chisinau the capital of Moldova
- ▶ Independence declared 27 August 1991
- ▶ Biggest sea port - Giurgiulesti, un the Danube

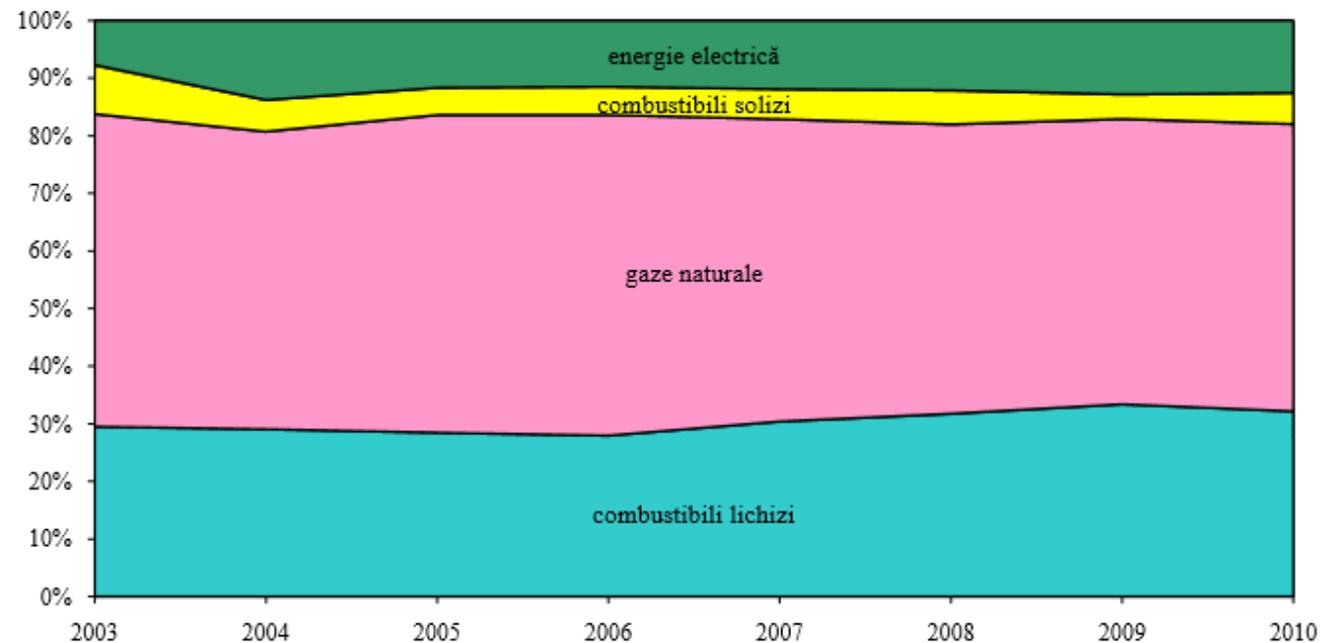


# Energy balance and sector issues in Moldova

Republic of Moldova is a net dependent on the energy import.

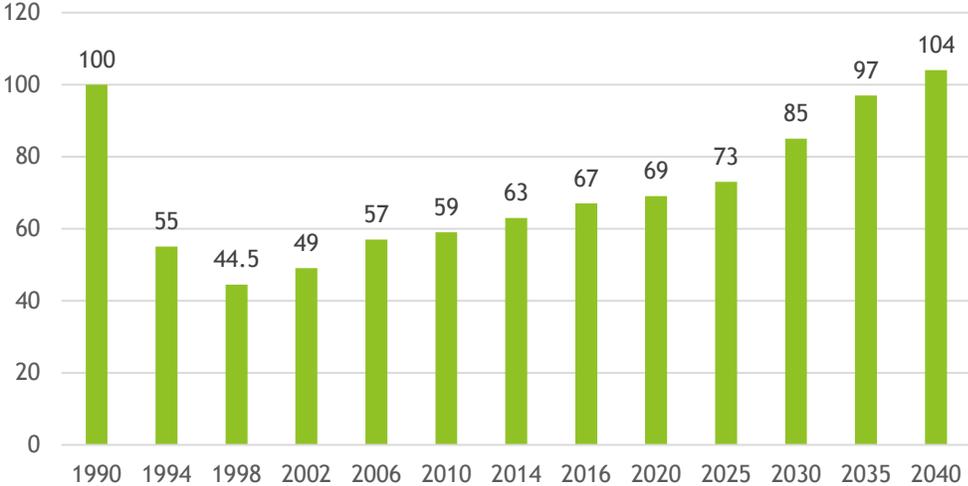
Moldova is importing 72-75% of all the electricity consumed and is importing almost all the fuels and natural gas that is consumed in Moldova.

Very few resources of natural gas are in the south part of the country and also some oil resources that can not cover an important part of the local consumptions

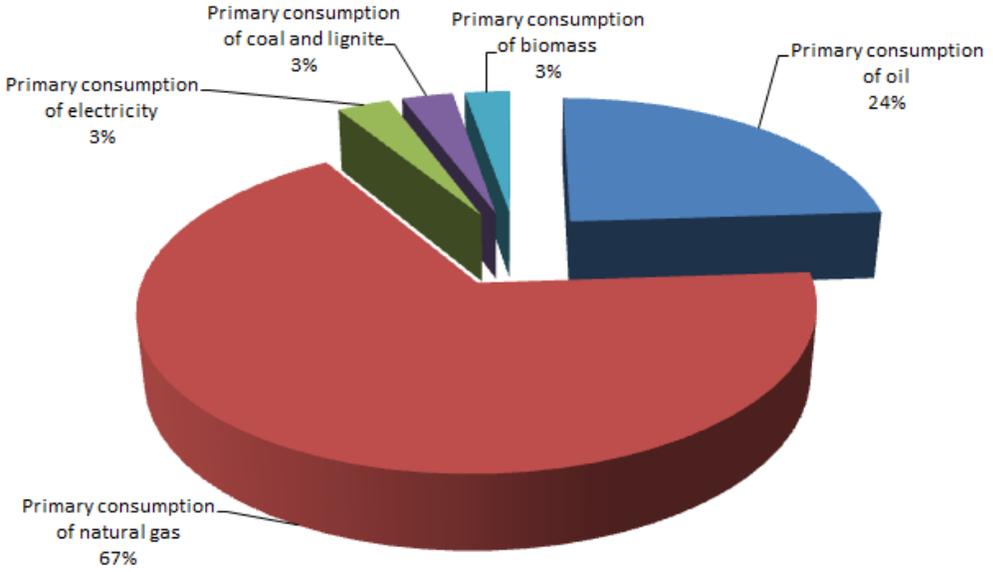


# Energy balance and shares

Energy consumption (relative figures base year 1990)



Primary Energy Consumption, 2012



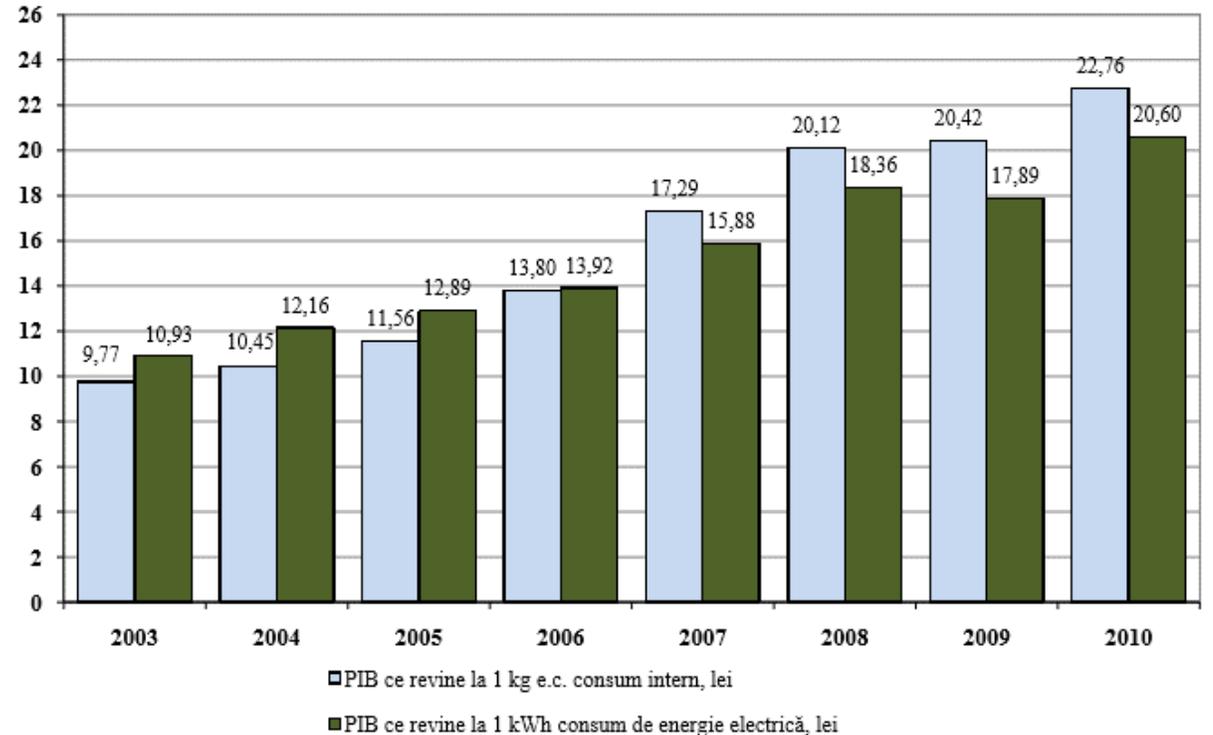
# Energy intensity of Moldova

Republic of Moldova has made real steps in increasing the energy efficiency and sustainable development.

Many enterprises were modernized and the equipment was changed.

In Moldova begins to act institutions like Energy Efficiency Agency and Energy efficiency facility like MoSEFF that is focused on renewable and efficiency for private sector

Energy efficiency grows in GDP (lei) per 1kg coal equivalent and GDP per 1kWh of consumed electricity



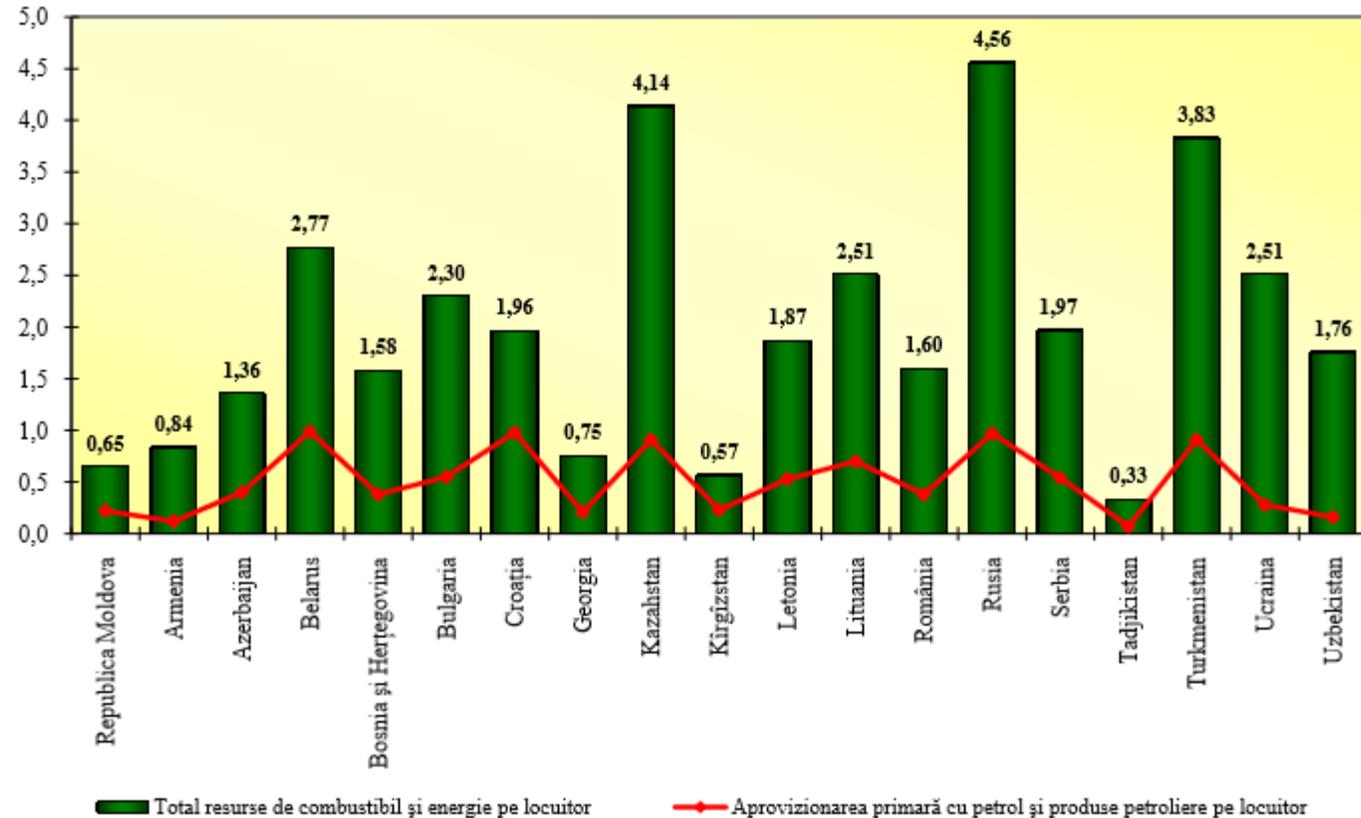
# Energy assurance of Moldova

Moldova is a net importer of energy.

The energy produced in Moldova is mainly produced on natural gas that is also imported.

The main task of the new energy strategy is to reduce the energy dependence of the country and to assess different possibilities to assure the energy needs of the country.

According to the statistical data Moldova has a dependence of 97% of imported energy.



# The main energy producers in Moldova

The main energy producers in Moldova are the following:

- CET1 in Chisinau; Installed power 64 MW
- CET2 in Chisinau; installed power 240MW
- CET Nord in Balti; Installed power 24MW
- Costesti-Stinca HPP; Installed power 16MW
- Dubasari HPP; Installed power 48 MW
- Moldavskaia GRES in Dnestrovsc; Installed power 2500MW

Also some small energy producing plants are functioning in Tirotext enterprise in Tiraspol 32MW

And Sugar factories of Moldova (a range of 3 to 10 MW)



# Renewable energy producers in Moldova Electricity

The renewable sector is still very low developed in Moldova.

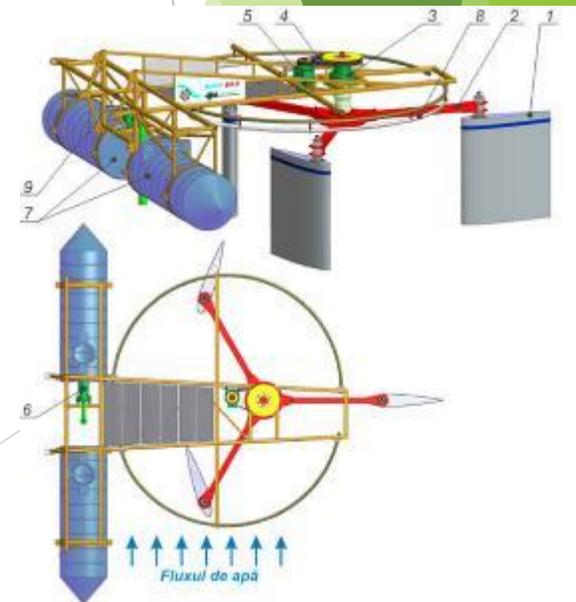
Some efforts were made on researching and innovation sector by Technical University of Moldova, especially in the field of wind energy and hydro energy.

MecAgro company also has concentrated on biomass utilization and producing technologies in pelleting and briquetting.

The existing examples of implemented technologies are mainly made from own sources and implemented on a study bases.

Some enterprises has also installed renewable energy systems for own production and for network selling of electricity.

The main developed examples are on photovoltaic energy and wind energy.



# Renewable energy installations in Moldova

Photovoltaic energy generation, GNG Solar park, location near Chisinau installed power 340kW



Elteprod company Wind farm installation, location: village of Bratuseni Edinet, installed power: 1200 kW

# Renewable heat energy in Moldova

The main effort and successes were obtained in developing the renewable heat energy.

With the help of different international donators Moldova has made big progress in this field.

The biggest program in this way is Energie si Biomasa in Moldova with a total budget of 14,56 mil euro that has installed more than 130 biomass based energy systems and about 35 MW of installed heat power.

Mainly this were installed in the rural areas of Moldova for heating purposes of schools, kinder gardens, hospitals, private houses.



# Renewable energy in Moldova heat

The main elements that contributed to the development of renewable heat energy in Moldova were:

- Abundance of biomass in the rural areas, especially agricultural biomass (mainly straw and husks)
- A relatively cheap technologies for implementing local heat generation
- Existence of internal heating systems and pipelines for the heated objects
- Existing of possibility to get the equipment as grand and not putting the effort of initial investments on the institutions.
- Development of technologies of converting of biomass to heat in Moldova (some local producers of pellets, ballots, briquettes and biomass boilers has appeared)

# The potential of renewable energy in Moldova

Tip de S.R.E.	Potențialul tehnic		
	PJ	T.e.p. (t.c.c.) x 10 <sup>6</sup>	
Solară	50,4	1,2 (1,8)	
Eoliană	29,4	0,7 (1,0)	
Biomasa	Deșeuri agricole	7,5	0,5 (0,8)
	Lemne de foc	4,3	
	Deșeuri de la procesarea lemnului, tescovină	4,7	
	Biogaz	2,9	
	Biocombustibil	2,1	
Hidro	12,1	0,3 (0,5)	
Total potențial S.R.E.		<b>113,4</b>	<b>2,7 (4,0)</b>
Consum resurse energetice fosile în anul 2002		<b>75,6</b>	<b>1,8 (2,8)</b>
<i>Surse de energie cu potențial termic redus, inclusiv geotermală</i>		>80,0*	1,9(2,8)*

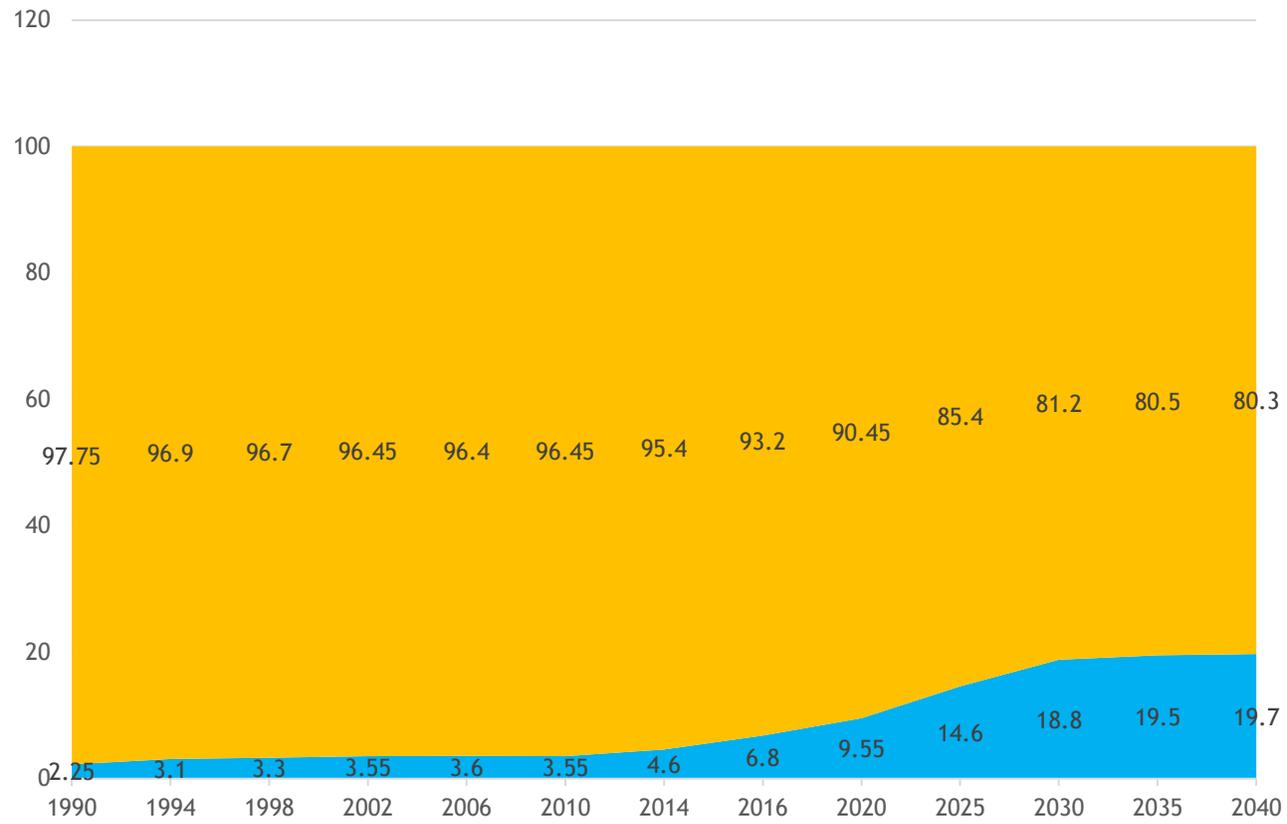
However the biggest potential has now the biomass energy that has also a quite attractive investments price for developing

# Assessing new energy technologies

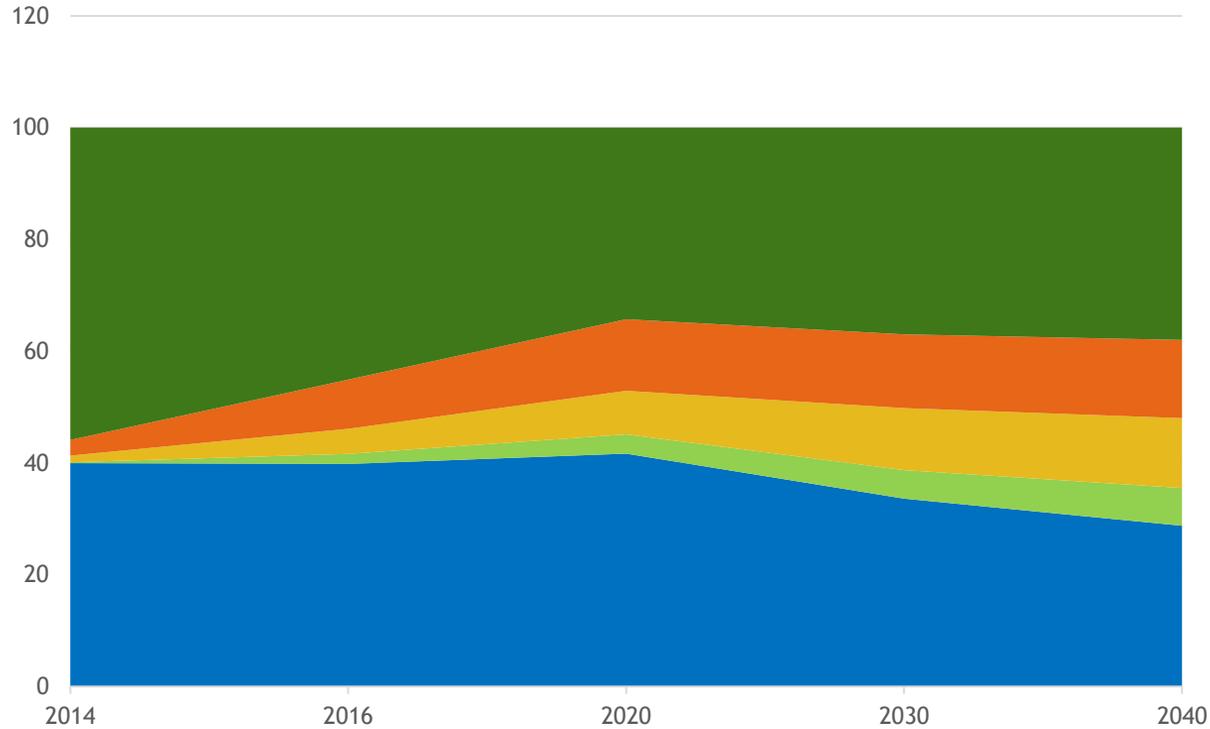
For new technologies implementation on site should be done the technico-economical assessment that should consider:

- The real needs that will be covered
- The initial investment effort
- The future OPEX of the system
- The evolution of prices and concurrent technologies
- The state policy and international sustaining of the technology
- Availability of resources and future development scenarios (biomass price)

# Fossil and Renewable energy evolution expectations



# Renewable energy share evolution



RES Share to future development  
Biomass energy,  
Solar PV systems,  
Solar heat production,  
Wind energy,  
Hydro Energy

# RE production costs estimation

1. Not yet a clear and commonly accepted methodology of calculation and estimation.
2. Should be considered in comparing with local energy prices

Technology	Specific investment in Euro/kW	Specific OPEX euro/kW	Specific fuel cost
Solar PV energy	600-800	42,5	No
Solar thermal	200-250	24	No
Cogeneration on NG	700	35	0,28 Eur/m <sup>3</sup>
Cogeneration on Biogas	900-1000	55	0,15-0,22 USD/m <sup>3</sup>
Biomass (solid) heat production	120-200	22	about 123Euro/t
Wind farms (big scale)	800-1000	38	No
Geothermal	1100-1300	55	Electricity price

# Energy policy and strategies in Moldova

Republic of Moldova is concentrating the efforts on developing the renewable energy sector and increasing the energy efficiency.

In line with this was created Agency for Energy Efficiency 2010

Fond for Energy Efficiency 2012

Was proposed and modified the law for renewable energy sources.

According to the law every producer of renewable electricity with installed power of higher than 10kW has the right to inject the energy in the network and the network is obliged to buy it to an established price by ANRE



# The main problems of the renewable sector development

However the efforts that were made are not enough to sustain the sector development in the needed ranges.

The main problems that face the renewable energy developers are:

- An unclear methodology for establishing the renewable energy price
- The inexistence of Feed In tariffs that would help the sector. The discussion about implementing the feed in tariffs are made in the ministries since 2008.
- The unclear regulatory bases of the financial relations that appear between the network and the renewable energy producer.
- Technical barriers that the network is creating to the new energy producers that would like to join the network.
- Inexistence of penalties on the big polluters and the principle polluters pay.



# Energy efficiency in Moldova, steps forward

The energy efficiency is one of the main concern in the industry, energy, transport and other sectors.

The biggest energy consumption of Moldova is now related to the buildings sector. The main consumption in the building sector is heat.

The buildings are mainly old, with not insulated walls and old windows type.

The first efforts of Energy Efficiency Agency and Energy Fond were concentrated on the buildings rehabilitation. In this field in the public buildings were invested 180 million leis (2011-2013).

Programs for energy efficiency in industry and transport sector has also financed about 25 million euros for industrial efficiency.

New technologies were developed in the agricultural sector, technologies that leads to a lower fuel consumption with more efficient technology.



# Climate impact of energy sector and the main efforts in climate policy

The aim of the energy efficiency and implementing of renewable sources of energy is to increase the energy independence but also to reduce the climate impact of the energy sector.

The fossil fuel burning should be changed with other energy sources.

The future efforts on the international scale will be to reduce the environment impact and to use renewable energy and adopt the technologies under humanity needs.

Every consumed kWh has an equivalent in CO<sub>2</sub> emission.

Here in Moldova among the other studies were made studies reflecting how much energy potential is to be considered in specific figures.

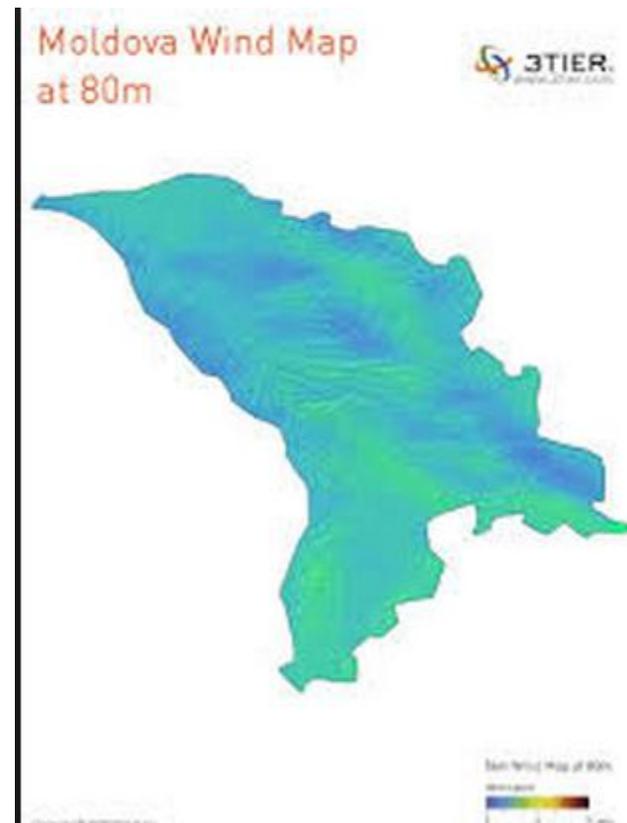
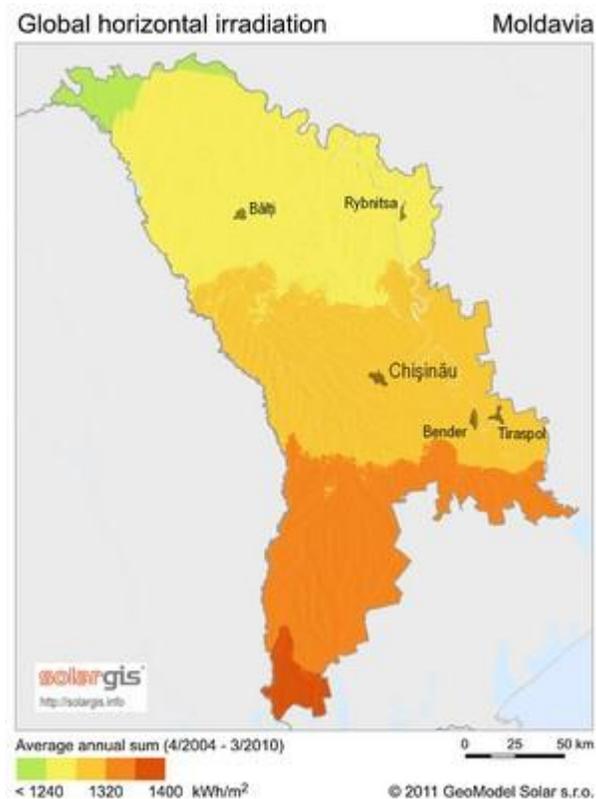
# Energy potential and climate impact Biomass

Material	Harvest in t/ha	Energy content in MJ/kg	Energy potential in MJ/a
Straw (wheat, barley other)	2,2	14,5	31 900
Corn straw	2,5	14,5	36 250
Sunflower straws	2,7	15,8	42 660
Vineyards rests	0,8	17	13 600
Forestry rests	0,7	17,5	12 250

Considering that the estimated energy will substitute the energy produced on natural gas (that has an emission factor for Moldova of 0,201t of CO<sub>2</sub> eq/MWh) this will result in significant reduction potential.

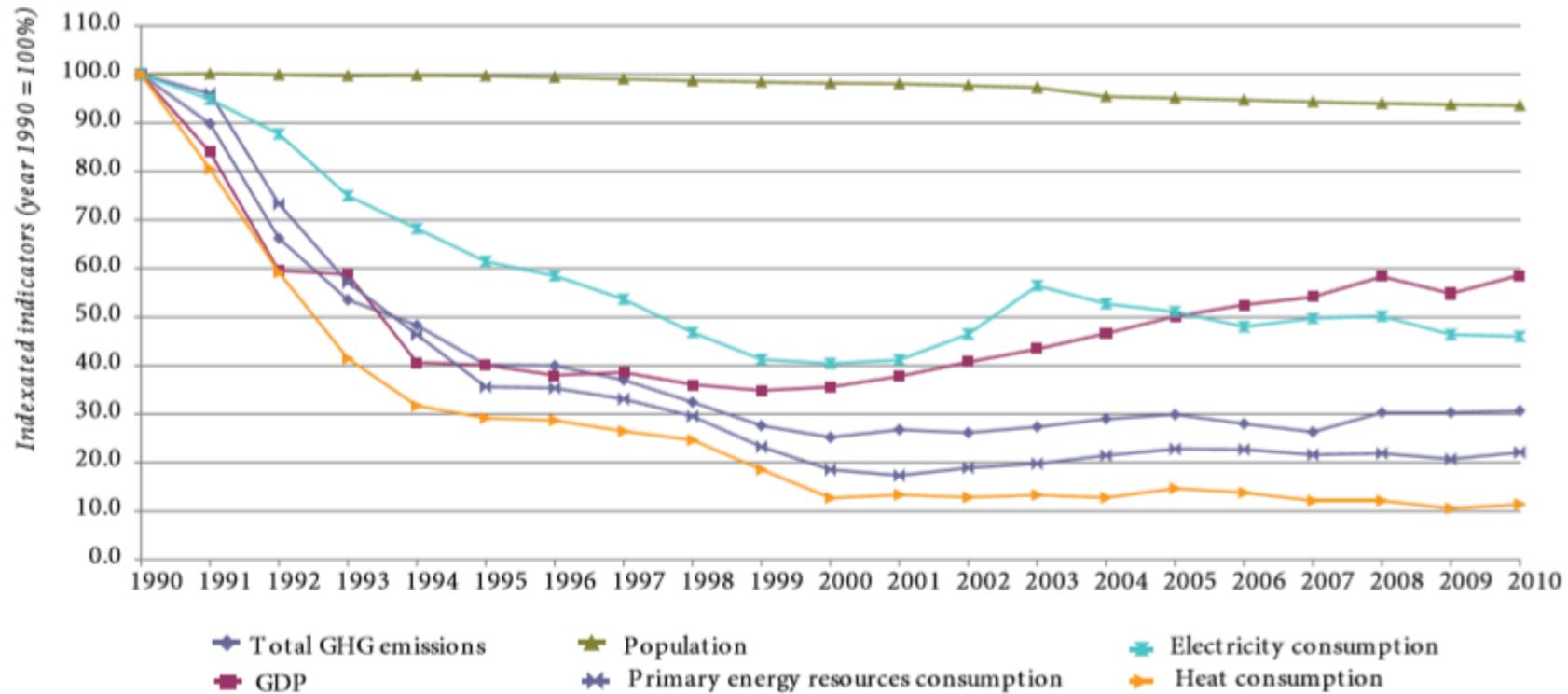
# Renewable energy uses and climate impact

The technical potential for biomass in Moldova is 19.4 PJ. This total includes agricultural wastes (7.5 PJ), fuel wood (4.3 PJ), wood processing wastes (4.7 PJ) and biogas (2.9 PJ)



# Climate impact of energy sector

## The emissions of Moldova



# The main efforts in RES and Climate issues in the future policy

The main efforts will be concentrated to:

- Developing legal and institutional framework to sustain the renewable energy and energy efficiency in Moldova
- Developing financial mechanisms for private and public sectors to sustain the energy efficiency and sustainability
- Developing capacities to assess the energy projects and to develop low emissions strategies for the future.
- Develop and adopt the technologies that are most suitable for Moldavian economy.
- Develop a scale of technologies in renewable sector and specific sectorial indicators that will be used to compare the RE projects and EE projects like Lei/saved kWh, lei/Renewable kWh produced (yearly), very important: lei/tonne of CO<sub>2</sub> equivalent reduced per year.

**Thank you for attention!**

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