



5th Danube Academies Conference (DAC)

**Power Engineering Institute
of Academy of Sciences of Moldova**

Key aspects in the sustainable development of energy sector of the Republic of Moldova

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April 7, 2014

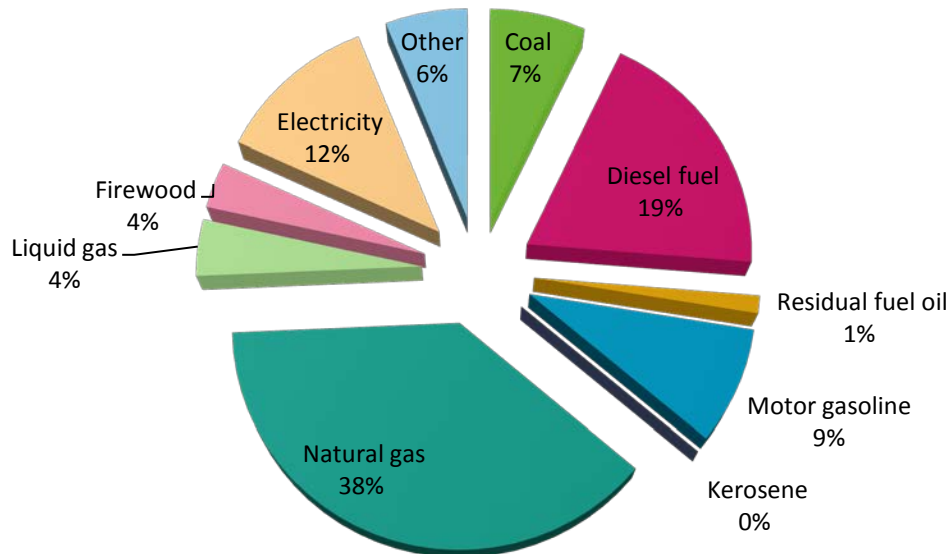
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General aspects of energy sector in Moldova

- ✓ Moldova lacks its own energy resources, which is why import more than **95%** of energy.
- ✓ Main types of energy consumed in the country are:

Type of fuel	Coal	Diesel fuel	Residual fuel oil	Motor gasoline	Kerosene	Natural gas	Liquid gas	Firewood	Electricity	Other	Total
Consumption, toe	168	454	31	202	0	898	98	79	284	145	2358

Structure of energy consumption in MD for 2012 %



Natural gas -> 38%



Diesel fuel -> 19%



Electricity ->12%



Gasoline -> 9%

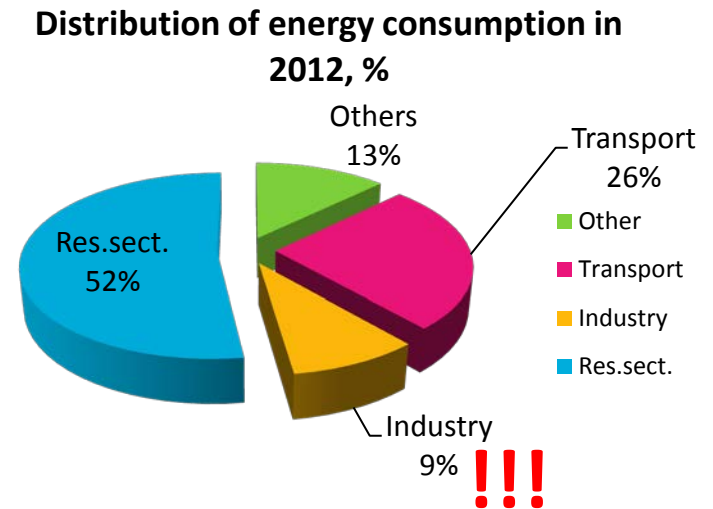
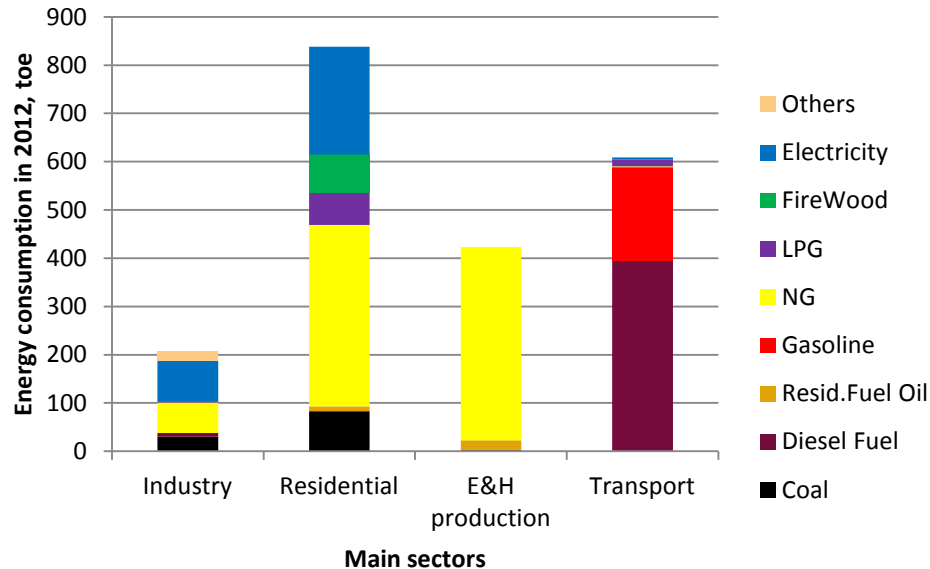
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General aspects of energy sector in Moldova



Distribution of consumed energy among main sectors

- These 4 sectors consuming > 87% of energy
- The residential sector consuming about 35% of energy, but...
- The energy used for E&H production is used 76% & 80% respectively also by residential sector.
- So, finally, we can consider, that residential sector consuming **52%** of total energy!!!

What is the future vector of energy sector development?

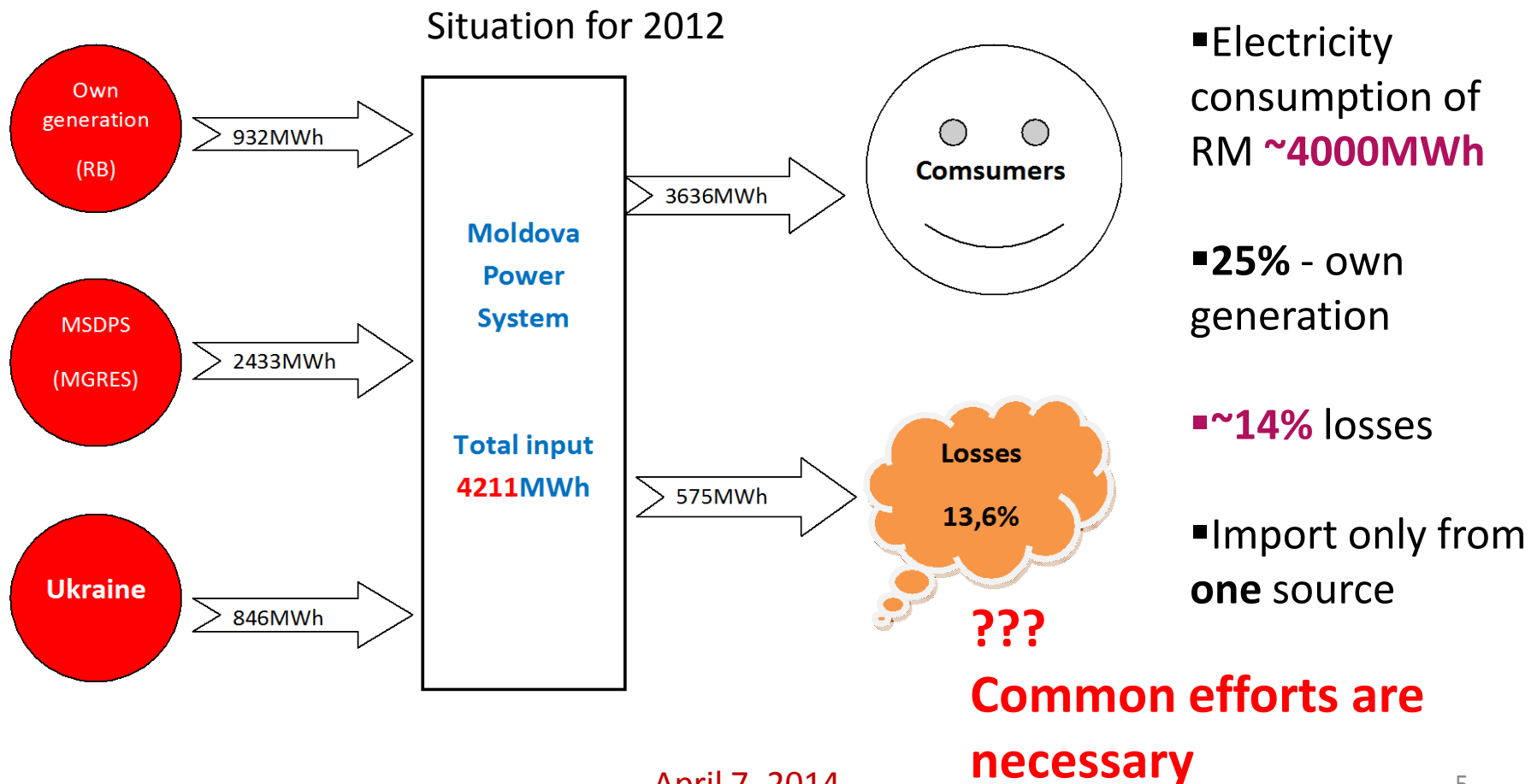
- In 2010 Republic of Moldova signed the Energy Community Treaty
- In 2011 the Government of Republic Moldova signed the Agreement for implementation of EU Directives and Regulations in electricity and gas sector until 2015 (Third Energy Package)
- In 2013 was adopted new document “Energy Strategy of Moldova till 2030”. This document describes main activities necessary to be implemented, in order to increase energy safety of the country and to have a sustainable development of the energy sector.
- During last years have changed the laws in the energy sector to be in line with European directives.

So, the future development vector of the energy sector is clearly oriented towards integration into European energy market.

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Activities have to be implemented for sustainable development of energy sector

POWER SECTOR



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POWER SECTOR

- ❑ There is no technical possibility to import electricity from other countries beside Ukraine
- ❑ SE 2030 provides several scenarios of joint ENTSO-E (European Network Transmission System Operators – Electricity).

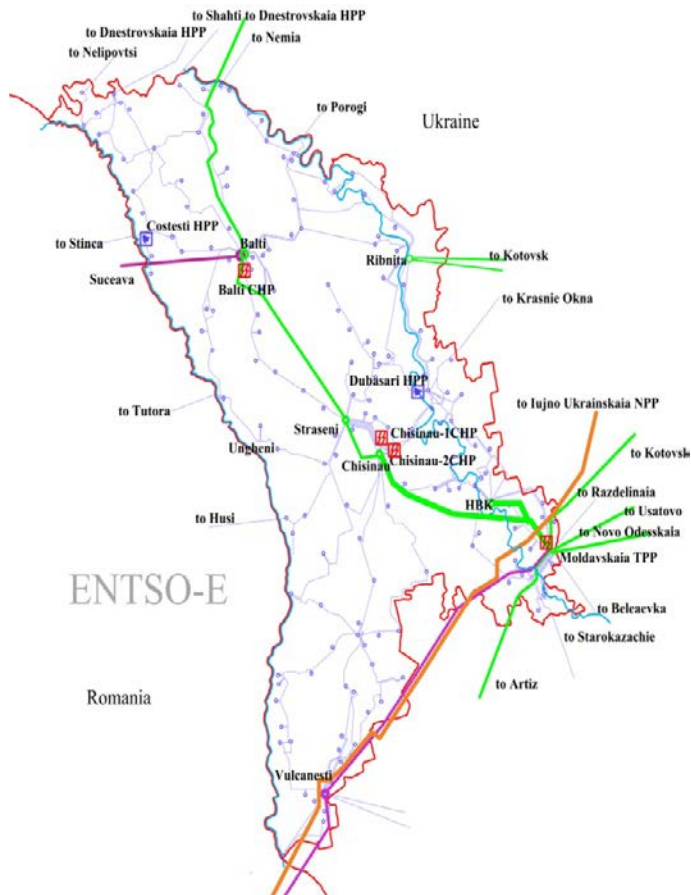


Main scenarios	Costs, mln.euro
1. <i>Synchronous with Romania and Ukraine</i>	132
2. <i>Synchronous with Romania without Ukraine</i>	189
3. <i>Asynchronous with Romania and synchronous with Ukraine</i>	342
4. <i>Asynchronous with Romania without Ukraine</i>	333

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POWER SECTOR



- ☐ Obviously, the cheapest scenario in terms of investment is the first one
- ☐ But most likely for the moment is **Scenario 3**, which involves 3 lines on 400kV interconnection with Romania (Balti-Suceava, Vulcănești - Isaccea and Strășeni-Ungheni-Iasi), each having a capacity of 500MW. Also including second line Balti – Novodnestrovsk on 330kV, and 3 back-to-back units each having cost 70 mln.euro.
- ☐ The investment cost can be reduced on 111 mln.euro if we exclude the line Strasen-Ungheni-Iasi

☐ In any case, exact scenario will be selected after implementation of feasibility study.

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POWER SECTOR – OWN GENERATION

- ❖ In this context, ES2030 envisage a construction of 650 MWe gas-fired combined-cycle gas turbine (CCGT) cogeneration plant, which need replace the old ones CHP-1 and CHP-2 with capacity above 300MW.
- ❖ Building of 400MW wind installations.
- By following this way and considering the existing plants like HPP Costesti, CHP-North etc. it is planned to cover the maximum load in winter period what is around 1200MW.
- ✓ **Very important!**
 1. For the plant to be competitive is necessary to ensure required thermal load.
 2. The electrical transport network need to be developed in order to have possibility to eject produced electricity with small losses.
 3. Also, it is necessary to develop gas network to provide sufficient quantity of gas.

Is it real for Moldova to have 400MW wind installations?

- In reality it is very difficult to answer this question from next reason:
 1. In summer period the maximum load can drop less than 500MW. How we will balance the power system if the wind installation will operate at rated capacity? Who will give us power in intermittent mode and how much will cost us?
 2. There are sufficient conditions in Moldova for operation of wind installations which are designed for wind speed higher then 7-8 m/s?
 3. Which will be the payback period of wind installations and how much will they affect the electricity tariff?

POWER SECTOR – CONCLUSIONS

1. Development of power system interconnection with Romania will provide access to European energy market and give possibility to select supplier on base of competitiveness criteria.
2. Reinforce and modernization of the power system of Moldova will enhance the efficiency and increase the transit capacity.
3. Optimal development of own generation sources, including modernization of existing ones.
4. First of all the development of renewable energy sources based on biomass and solar energy should be considered. The wind installations can be considered only after implementation of study “How balance the power system and which will be the influence on the tariff?”
5. Development of “Road Map” for implementation of mentioned activities.

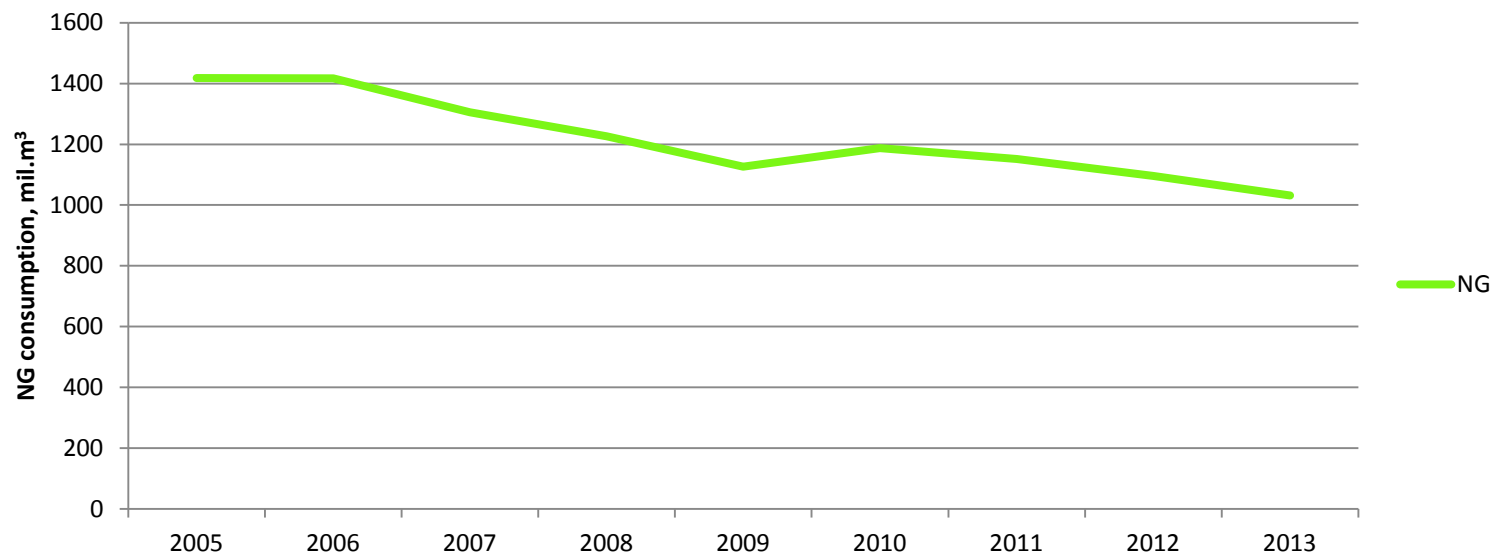
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GAS SECTOR

The Moldova gas grid is 22671km, of which 1560km are transport gas pipeline
During the last years the gas consumption in Moldova is decreasing

Consumption of Natural gas by Republic of Moldova									
Years	2005	2006	2007	2008	2009	2010	2011	2012	2013
NG, mil.m ³	1418,5	1417	1305,4	1226	1126,3	1187,8	1152,1	1095,5	1031,2

NG consumption of R.Moldova



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GAS SECTOR

❑ The consumption of NG decreased because the tariff was increased too much for last years, but consumers income remain the same.

❑ A lot of consumers (as result) changed the gas boilers with biomass boilers.

100% of NG are imported from one source (Russia).

- ❖ Technically, it is not possible diversification of gas suppliers due to missing of gas pipeline connection with Romania.
- ❖ ES2030 provides construction of gas pipeline Iasi-Ungheni with capacity of 1,5 mill.m³ per year and length of 43km that had to be done in 2013 (it is planned to be ready this summer). The cost of this gas pipeline is about €6,65m, including pump station.
- ❖ Another gas pipeline that is not in ES2030, but is already subject of discussion between Governments of Republic Moldova and Romania is the Ungheni-Chisinau with length of 130km and investment cost about €100m.

Sure that this is not enough, but it's still a step forward

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ENERGY EFFICIENCY

The Republic of Moldova has a big reserve to decrease energy consumption through energy efficiency, because actually the energy intensity is three times higher than in EU.

The Government of Moldova already started this process through creation of Agency for Energy Efficiency and Fond of Energy Efficiency

Also, there are some Programs which help enterprises to reduce their energy consumption like MoSEFF, MoREF and others.

In order to accelerate implementation of energy efficiency it is necessary to provide incentives and impose all enterprises make energy audit each one or two years and get out from use old equipment which has a high level of energy consumption

GENERAL CONCLUSIONS

Sustainable development of energy sector can be achieved through:

- 1. Development of interconnection with Romania and integration in EU energy market**
- 2. Development of own generation sources**
- 3. Implementation of advanced technologies in all processes**

THANKS FOR YOUR ATTENTION!

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