Nuclear Energy: Prospects for Development in Poland
Executive summary

Present situation in Polish energy sector and its perspectives of development

- Gross annual electric energy consumption in Poland is 3900 kWh per capita, whereas the average for the old EU countries is 8500 kWh per capita.
- Forecasts of Polish Ministry of Economy state, that up to 2030 annual demand for electric energy will reach 270 TWh, power in the national energy system should be about 45 GWe, however forecasted power installed will be about 20 GWe.
- 93% of electric energy in Poland comes from coal power plants.
- The two main sources of electric energy in the EU are coal and nuclear energy (30% share each)
- From 2016 a large cuts in brown coal mining in Poland are planned.

The advantages of introducing nuclear power into Poland

- Nuclear energy will increase energy security of Poland.
- The cost of generating electric energy from nuclear sources is lowest from the methods available.
- External costs related to generating electricity of nuclear energy is similarly small to those from renewable energy.
- Uranium can be attained from regions of political stability
- Fuel for nuclear power plants is not a subject of such price fluctuations, as seen in gas and oil, which allows predictable economic forecasts.
- Because of its large energy value, transportation of nuclear fuel is not capital intensive.
- Nuclear energy will be helpful in fulfilling obligations of the EU, like Climate and Energy Package.
- Nuclear energy will create new levels of foreign cooperation
- Nuclear energy will accelerate Poland's development.
- Nuclear energy beside generating electricity can be used to produce hydrogen and in coal conversion for liquid and gas fuels.

Essential aspects of introducing nuclear energy into Poland

- The period between taking actions first actions to build a nuclear power plant and full operation is approximately 15 years.
- An average cost of building a nuclear power plant with a modern reactor with initial power of 1600 MW sums up to about EUR 3,5 bln.
- In the EU countries, private companies build nuclear power plants, taking bank loans, with payments even up to 30 lat.
- After the initial investment, the exploitation costs are much lower than in plants powered by fossil fuels, which results in lower costs of generated electrical energy.
- Currently the percentage of population being against the idea of building a nuclear power plant is declining, at the same time the percentage of people being in favor is increasing, however still the number of opponents is larger than supporters (In 2008 on average, 45% was "for", "against" was 46%).
- Along with the launch of nuclear energy program , it is crucial to conduct educational campaigns in order to acquaint society with the aspects of nuclear energy.

- Every nuclear power plant, in order to operate, has to fulfill a number of recommendations set by international organizations and commonly accepted by national nuclear safety commissions.
- Since the time of the Chernobyl accident (1986) there was no serious breakdown of a nuclear power plant anywhere in the world – three mile island
- The threat of a serious breakdown resulting in a contamination of environment is minimal, thanks to multiphase security systems, consequences of a possible breakdown are limited to the area of a power plant.
- In modern nuclear power plants, with the power of 1000 MWe, annually is created approximately about 20 tones of burnt out fuel with the capacity of about 10m^3 and about 150 tones (capacity of about 100 m^3)low-active nuclear
- Participation of Poland in the building of Ignalina nuclear power plant in Lithuania, will have a positive effect on the number of professionals specializing in nuclear energy.

Other sources of generating energy

- Fossil fuels because of CO_2 emission and their invasiveness on the natural environment should not be the only source of electrical energy in Poland.
- The adoption of the EU Climate and Energy Package, means that from 2013 on, all the EU countries will have to buy all CO_2 emission permits. This might cost Poland almost 5 bln Euro annually.
- Renewable sources of energy should how as big share in the overall energy mix as possible, however because of their characteristic they can be only treated as a complementary source of energy, not predominant.

Characteristics of nuclear energy sector in the world

- Nuclear reactors have been used to produce electrical energy since 1954. Currently there are 439 reactors operating in 31 countries, with a total power of 372,2 GWe, which supply about 16% of total electric energy generated in the world annually. 39 nuclear reactors with the total power of 33 GWe is currently under construction.
- For few years now, nuclear energy has been perceived as a strategic element of energy security policy in many countries. This is a result of a combination of several factors:
    - rapid fluctuations in the oil and gas prices;
    - unstable political situation in countries crucial for energetic resources trade;
    - more frequent usage of energetic resources as a tool of exerting pressure in international relations;
    - Increasing dependence of the biggest consumers (EU, USA, Japan, China, India) on the imports of energy carriers.

Characteristics of nuclear energy sector in countries bordering Poland

- In the distance of 300 km (approximately 190 miles) from Polish borders there are 26 nuclear reactors operating in 10 nuclear energy plants.
- The only country, bordering Poland, that doesn't have an operating nuclear reactor is Belarus, which at the beginning of 2009 has actually started building one of its own. Even in the Kaliningrad Oblast, which is bordering Poland, building of a nuclear power plant is planned.

Legal conditioning for the development of a nuclear energy program in Poland

- Currently Atomic Law (passed on November 29, 2000) is in force.
- Building, activation and operation of a nuclear power plant will be connected to many legal regulation areas, which are at present normalized by several types of legal acts (Atomic Law, Energy Law, Construction Law, Environmental Law).
- A natural consequence of scattered legal regulations, which has to be applied when investing in nuclear energy is a large number of authorities relevant in different aspects of such an investment.
- Changes in the national legislation are required in order to regulate the aspects of localizing, designing, building and operating nuclear power plants in an unambiguous, coherent and complete manner.
- It seems, that the best solution would be to pass an Act of a "special character", which main part along with adaptation of regulations from other Acts, would regulate all the aspects completely.
- Worth considering is a possibility of implementing a so-called "comprehensive permission", which is functioning in the US, and embraces all phases of an investment – from designing to full operation of a finished nuclear power plant. Such a solution, results in a situation in which execution of an investment according to the conditions of all permissions, would prevent any potential refusal of putting it into operation.