

Poland's Energy Balance in a Long Term Perspective

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Energetická rovnováha dlhodobej perspektívy v Polsku

The basic task of economy is meeting the consumption and development needs of society. This process undergoes dynamic changes as the economical development evolves. This is definitely connected with energy deliveries in quality and quantity needed to cover the demands of the consumers. Therefore, it is crucial to undertake rational decisions for the power sector on the basis of the acquired knowledge, and shape the country's power demand in a perspective of at least dozen of years. The structure of energy consumption in Poland is assessed and the planned need for energy by the year 2025 is analysed in the paper.

Key words: energy balance

There exists a strict correlation between the social-economic development of a country and the state of energy-fuel complex. To account for the dependence, forecasts are made to enable formulating directions and tasks of energy policy as well as the ways of its realization. As a result, the following official documents have been worked out over the last five years:

- „Assumptions of Poland's energy by the year 2020” approved the Cabinet on 22 February 2000.
- „Evaluation of realization and correction of assumptions of Poland's energy policy by the year 2020” with attachments, approved by the Cabinet on 2 April 2002.
- „Poland's energy policy by the year 2025” approved by the Cabinet on 4 January 2005.

Three variants of economic development were presented in the „Assumptions of Poland's energy by the year 2020” [3]:

- *Survival Variant*, a warning scenario, realized in the conditions of weak World's development, hindered by political instabilities; the mineral economy structure stabilizes in Poland at that time, and the average annual increase of GNP is ca. 2.3 %.
- *Reference Variant*, in the condition of political stability and development of international environment, without rapid changes; concurrent deep structural changes take place in Poland, and the annual increase of GNP is ca. 4.0 %.
- *Progress Plus Variant*, realized in favorable conditions of international environment and deep restructuring of Polish economy, when the rate of GNP increase could be maintained at ca. 5.5 %

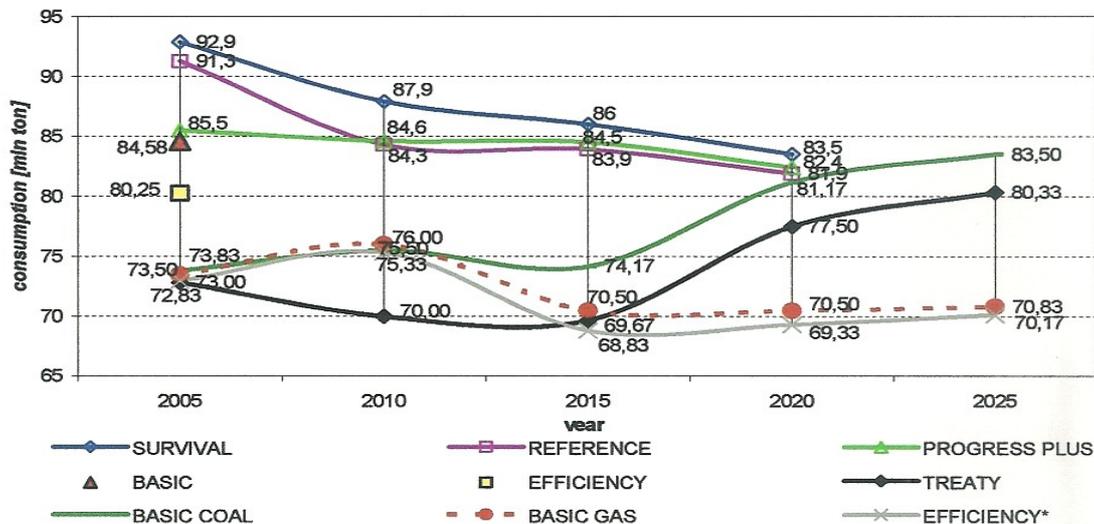
In compliance with the Power Energy Law of 2002, another document has been issued namely „Evaluation of realization and correction of assumptions of Poland's energy policy by the year 2020”, where the realization of assumptions in „Assumptions of Poland's energy by the year 2020” were evaluated and further strategic objectives and directions of changes were specified [6]. The „Short term forecast of development of Poland's energy balance” showed the Poland's energy balance by the year 2003 and 2005. The forecasts were made in the Basic and Efficiency variants [4].

The newest document „Poland's energy policy by the year 2025” assumes four variants of demand for fuel and energy [5]:

- *Treaty Variant*, taking into account the Accession Treaty, e.g. the 7.5 % electrical energy consumption from renewable energy sources in 2010 and a reduction of total emissions from large combustion objects to standards defined in the treaty.
- *Coal Basic Variant*, meeting requirements imposed on the reduction of emission from large objects from 2012 to the year 2020.
- *Gas Basic Variant*, assuming maintained coal deliveries to electrical power plants with a simultaneous increase of gas share in covering additional energy needs.
- *Efficiency Variant*, assuming an additional improvement of power efficiency in the energy generation, distribution and use areas, owing to the active policy of the State.

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The diversification of macroeconomic assumptions significantly influences the predicted amount and type of demand, thus generating the respective proportions of energy balance. By comparing forecasts presented in these documents (Fig. 1 to Fig. 6) gives an idea about the possible space to shape the differences of the predicted demand for fuel and energy in Poland by 2025 [2].



* scenario ref. to „Poland’s energy policy by the year 2025”.
Fig. 1. Comparison of the lignite consumption forecasts [2].

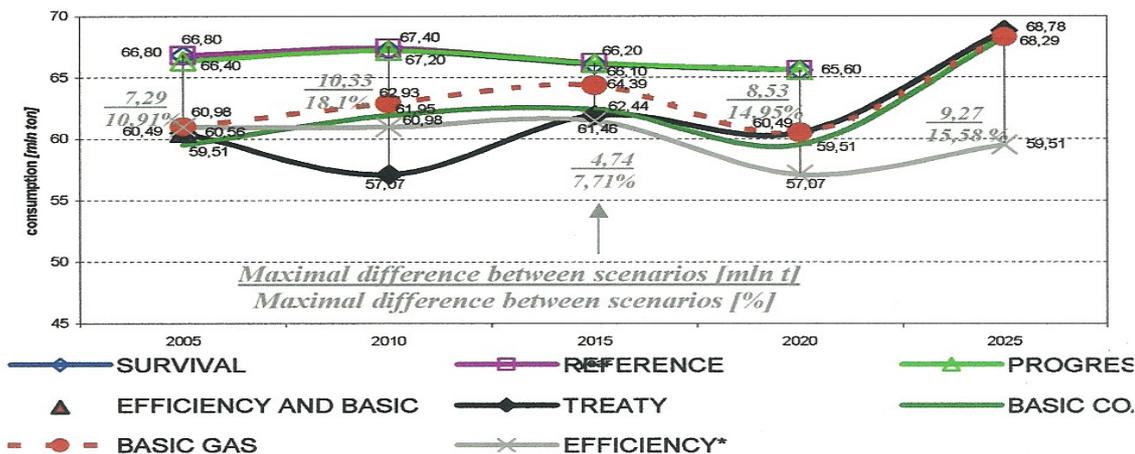


Fig. 2. Comparison of the predicted hard coal consumption (remaining denotations as in Fig. 1) [2]

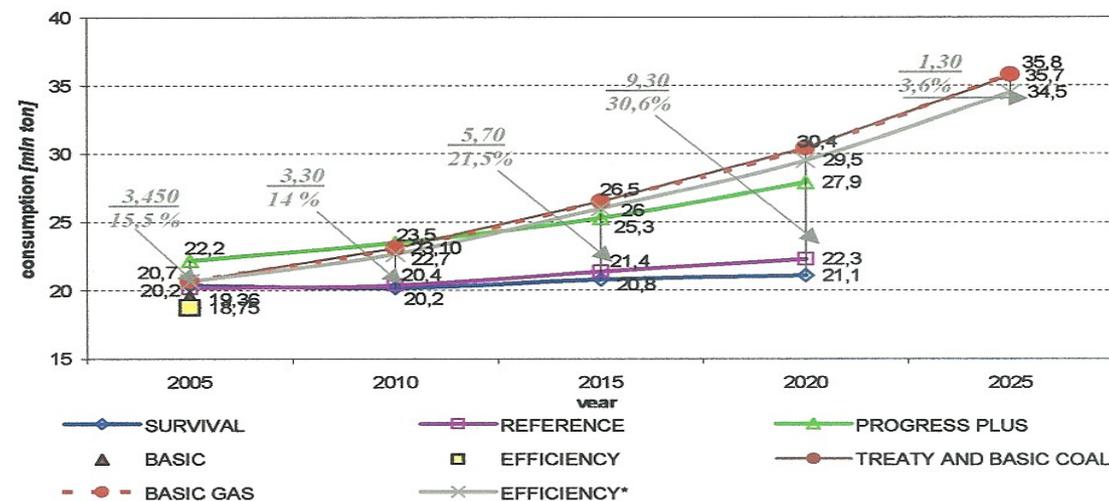


Fig. 3. Comparison of the oil consumption forecasts (remaining denotations as in Fig. 1) [2]

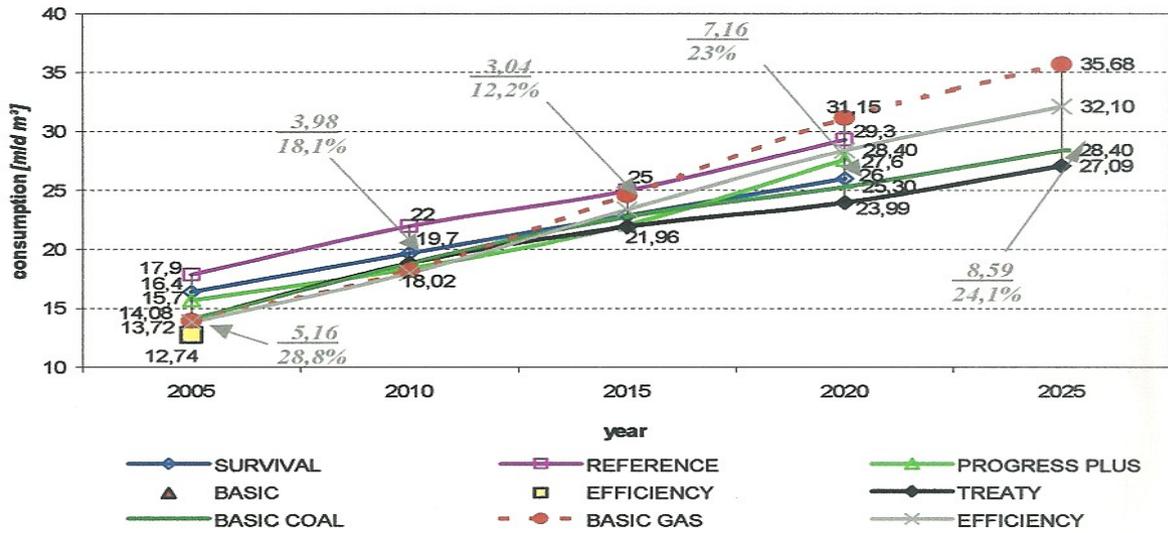


Fig. 4. Comparison of the predicted natural gas consumption (remaining denotations as in Fig. 1) [2]

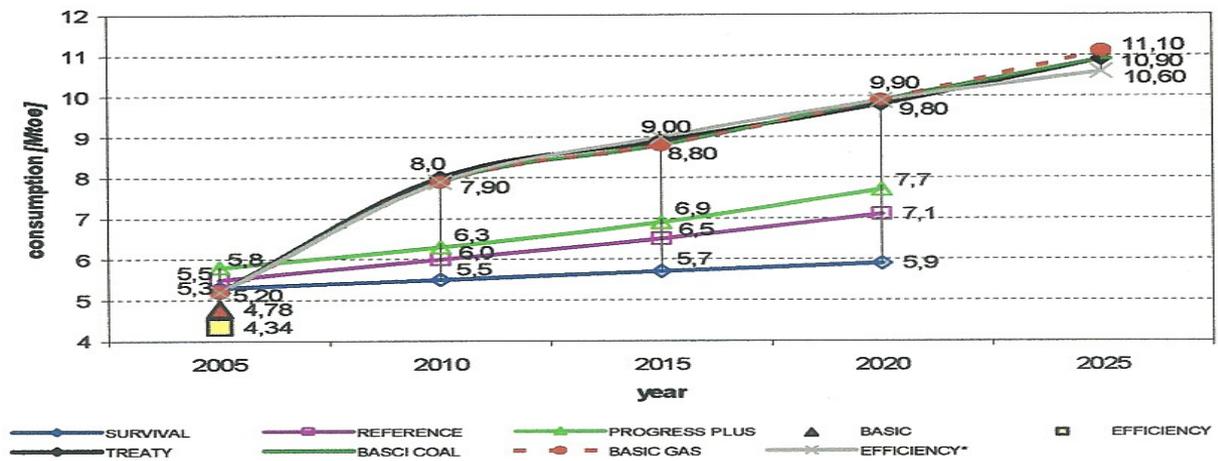


Fig. 5. Comparison of the predicted renewable energy and the consumption of other energy carriers (remaining denotations as in Fig. 1) [2]

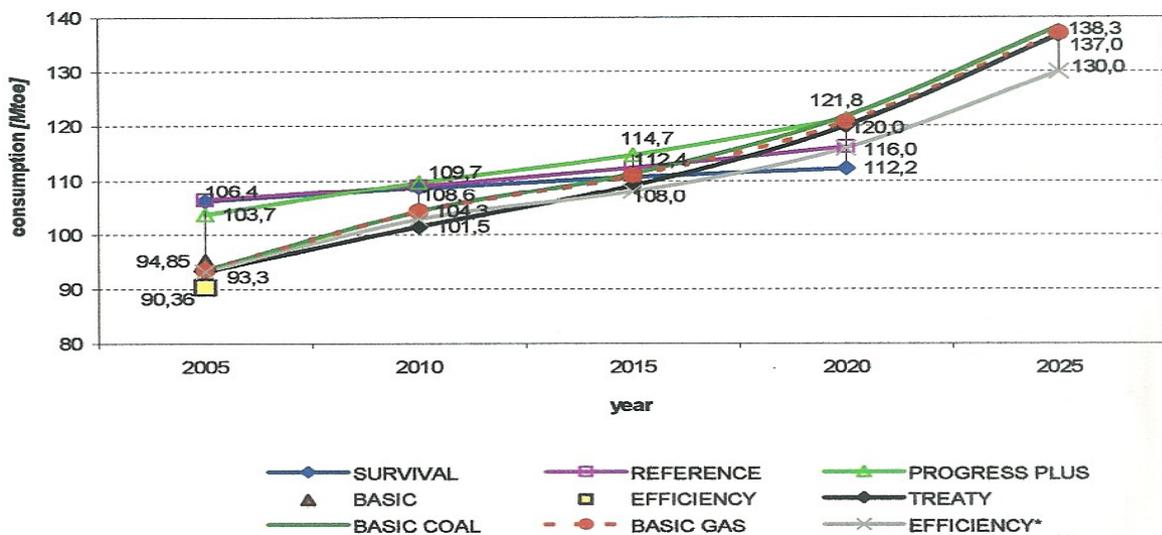


Fig. 6. Comparison of the primary energy consumption (remaining denotations as in Fig. 1) [2]

The comparisons of the consumption of predicted energy carriers presented in the figures prompt the following conclusions [1, 2]:

- Solid fuels – demand for hard coal and lignite will be on the present level. A significant difference can be observed between the predictions in „Assumptions of Poland’s energy by the year 2020” and the predictions of 2002 (Basic and Efficiency Scenarios). According to the newest forecast, the hard coal consumption in 2005-2015 may be 20% lower than assumed in the previous forecast (the assumed standard calorific value 25 GJ/ton, i.e. 0.6 toe). A significant increase of demand (for Treaty and Basic Coal Scenarios) is predicted for the years 2015-2020. The same applies to lignites (calorific value 8.56 GJ/ton, i.e. 0.205 toe), for which the demand shall increase most significantly by about 68 mln ton after the year 2020;
- Natural gas – a dynamic increase scenario is expected, judging from the predicted increase of natural gas consumption for the electrical energy generation. This should maintain the SO₂, NO_x and CO₂ emissions within admissible limits, as stated in the Treaty. Having assumed that the Poland’s annual production ranges between 5 and 6 mln m³, the gas import in the years 2005, 2010, 2015, 2020 and 2025 shall be 9 mld m³, 12.5 mld m³, 16 – 8.5 mld m³, 18 - 25 mld m³ and 21 – 29.5 mld m³, respectively;
- Liquid fuels – a much faster increase of Poland’s demands is observed in the newest forecast. This increase may result from a fast development of transport at a relatively slow advance in the energy efficiency of transport means;
- Renewables – forecasts in „Poland’s energy policy by the year 2025” assume that in the nearest 5 years the renewable energy shall double its share in the energy balance to the level established in the Treaty. To meet this requirement in the coming years, huge proecological investments should be made.
- Nuclear energy – scenarios assumed for the analysis assume its use only after the year 2020;
- Primary energy – the demand for this type of energy is expected to increase, and depending on the variant, it shall be 130 to 138 Mtoe in 2025, so slightly over 93 Mtoe in 2005. Owing to the expected decrease of population, the increase of the future energy demand will be considerably conditioned by the expected economic development.

Conclusions

The political and economic reality abounds in a variety of states it can assume. Therefore a prediction of energy consumption is burdened with some uncertainty which manifests in differences in the demand forecasts in the successive governmental documents. However, the above analysis indicates that regardless the assumed forecast and scenario, hydrocarbon fuels and renewable energy sources grow in significance [3,4]. This will require investments for new production powers and the respective level of import of mainly oil and natural gas.

References

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