

# BASE

Baselines for Accession States in Europe

## Hungary National Electricity Sector Baseline

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# Background in Hungary

- Hungary has signed and ratified the Kyoto Protocol, with a 6% commitment to the 1985-87 level
- UNFCCC Focal Point exists, but low level of financing and resources causes difficulties
- 3<sup>rd</sup> National Communication was published last year
- Development of the Nat. Climate Change Strategy
- To date JI projects have been evaluated on a case-by-case basis, the methodologies for baseline development are not yet ready.
- Comprehensive national baseline development under way
- National steering committee for JI evaluation is to be created

# Government Preferences

- Extensive project criteria have been established
- Early crediting would be supported to promote JI
- Government is looking for cross-sectoral, cost effective projects that have a wide impact socially and environmentally
- Indicators have been established to assess JI projects
- Government supports the use of national baselines
- The Hungarian BASE team supports fixed baselines that are valid to 2012

# Model Selection

- The Hungarian Country Team has chosen the ENPEP model system
- The objective of the ENPEP for Windows model is to simulate the energy market and to determine energy supply and demand balance over a long-term period of up to 75 years.
- ENPEP calculates energy & environment costs
- ENPEP has been used to:
  - Aid the tendering process of the Hungarian Power Companies
  - Determine the optimal capacity to be installed for the procurement process
  - Carry out system extension analysis of the Hungarian Power companies (including reduction of CO<sub>2</sub>)
  - Carry out a comparative assessment of energy options with regards to greenhouse gas emissions in the power sector, IAEA
  - Develop emission scenario development considering the extension plans of the Hungarian Power Companies for the third national communication

# Methodology Selection

The following approaches were assessed in our analysis:

- 1) *Average emissions rate (all plants)*
- 2) *Average emissions rate (excluding nuclear and hydro)*
- 3) *Average emissions for each load category*
- 4) *Marginal plant only (Least cost dispatch analysis)*
- 5) *Operating margin/build margin (IEA/OECD)*
- 6) *Direct Assessment of each JI project within the model*

All of these approaches are feasible under the ENPEP modeling environment.

There remains two plus one approaches basically for Hungary's electricity sector the average emissions rate, and the average rate excl. nuclear and hydro (the latter is ignorable). The first two approaches are acceptable for the government, the first approach is better for the host country the second approach gives more benefits for the investor. We think it is more realistic to apply the first approach, this also meets the governments informal position on the issue.

# Methodology Selection Cont.

- The calculation of average emissions for each load category and the approaches with marginal cost calculations assume knowledge and publishing of some highly confidential data from the power providers and MVM's side, which is used in price negotiations between the parties.
- The direct assessment of each JI project is possible in theory and practically also feasible in ENPEP, but this would require in each case the rebuilding and rerunning of the model, with setting up the necessary constraints so that the project stays in the final optimised system plan. This in fact requires in most cases an unnecessarily large work.
- The accuracy is the largest in the individual project assessment (the last case) but this depends also on the project's other features. The first approach nevertheless seems to give on average the least bias in estimation, since in general we cannot expect that a project only squeezes out only non-nuclear capacity from the grid.
- Since ENPEP by default requires the consideration of economic development in its system plan analysis process, all the applicable approaches involve this notion.

# Approach used in ENPEP-"Multi-project baseline"

1. Determination of national profile -expected GDP growth, expected growth of demand, expected import/export of electricity
2. Definition of major policies and requirements within the electricity sector:
  - System expansion plans (retirements, retrofits, fuel-switch)
  - National energy strategy (energy source diversification)
  - Climate change strategy
  - National environmental requirements-emission caps, pollutant intensities
  - European accession requirements, from 2004 every PP has to comply with those

# Approach used in ENPEP-"Multi-project baseline" cont.

3. Make projections for the energy mix each year, including:
  - Existing and new capacities in MW
  - Generation by plant in GWh
  - Generation capacity by plant in MW
  - Plant load factors
  - CO2 emissions by plant and by technology
4. Calculation of a project spec. baseline according can be done in any of the following approaches
  - Average emissions rate (all plants)
  - Average emissions rate (excluding nuclear and hydro)
  - Average emissions for each load category
  - Marginal plant only (Least cost dispatch analysis)
  - Operating margin/build margin (IEA/OECD)
  - Direct Assessment of each JI project within the model
5. Calculate emissions reduction using the top down emission rate(s)

# Overview of Electricity Sector

- Enormous (70%) dependence on primary imports
- Almost 100 % penetration of natural gas networks
- The cost of energy is still not market-based to all consumer groups.
- The share of electricity production is divided nearly evenly among three energy sources: nuclear energy, domestic coal and hydrocarbons.
- Cogeneration accounts for 9.2 %.
- The Renewable energy sector is mainly fuel wood and waste as well as significant quantity of geothermal and solar energy
- The energy policy concept includes an objective to increase the share of renewable energy sources in the primary energy balance to 5-6% in 2000
- The estimated total utilisation of the renewables may currently 3% of the total primary energy supply.

# Overview of Electricity Sector Cont.

- Government plans significant development in the renewable energy market (the objective is 50 PJ/year till 2010), but due to the different reasons this procedure has not started yet
- Government has pursued the partial privatisation in the gas and electricity industries
- The Energy Saving Action Plan consists of :four major set of measures: (i) penetration of renewables, (ii) energy efficiency improvement, (iii) energy efficiency labelling and (iv) education, information and encouraging technology innovation.
- There is no official energy planning carried out by Government
- Official energy statistics are available from the Central Institute of Statistics, or the Hungarian Energy Office, although they are not available directly to the public.

# Baseline Scenario

The baseline developed involved several factors as mentioned above and some additional factors.

Stemming from the nature of the ENPEP model the final scenario involved the least cost system extension and development plan complying with the environmental emission limits as set in the Hungarian regulation and to the additional limitations of modellers intention.

# Baseline Scenario cont.

- The national energy strategy (risk dispersion, fuel type diversification, etc.) was included in the model development together with the system extension plan. The model run was based exclusively on the extension plans of the MVM (Hungarian Power Companies Ltd.) which is the official plan for the power sector (and due to this, confidential). Since this quasi-official quality of the baseline is present, we can say that the accession to the European Union is also fully considered in the results.
- Furthermore the following aspects were considered in the development of baseline:
  - Proportion of imported electricity in total consumption
  - Average economic growth per annum
  - Replacement of outdated capacities - different fuel options

# Baseline Projections

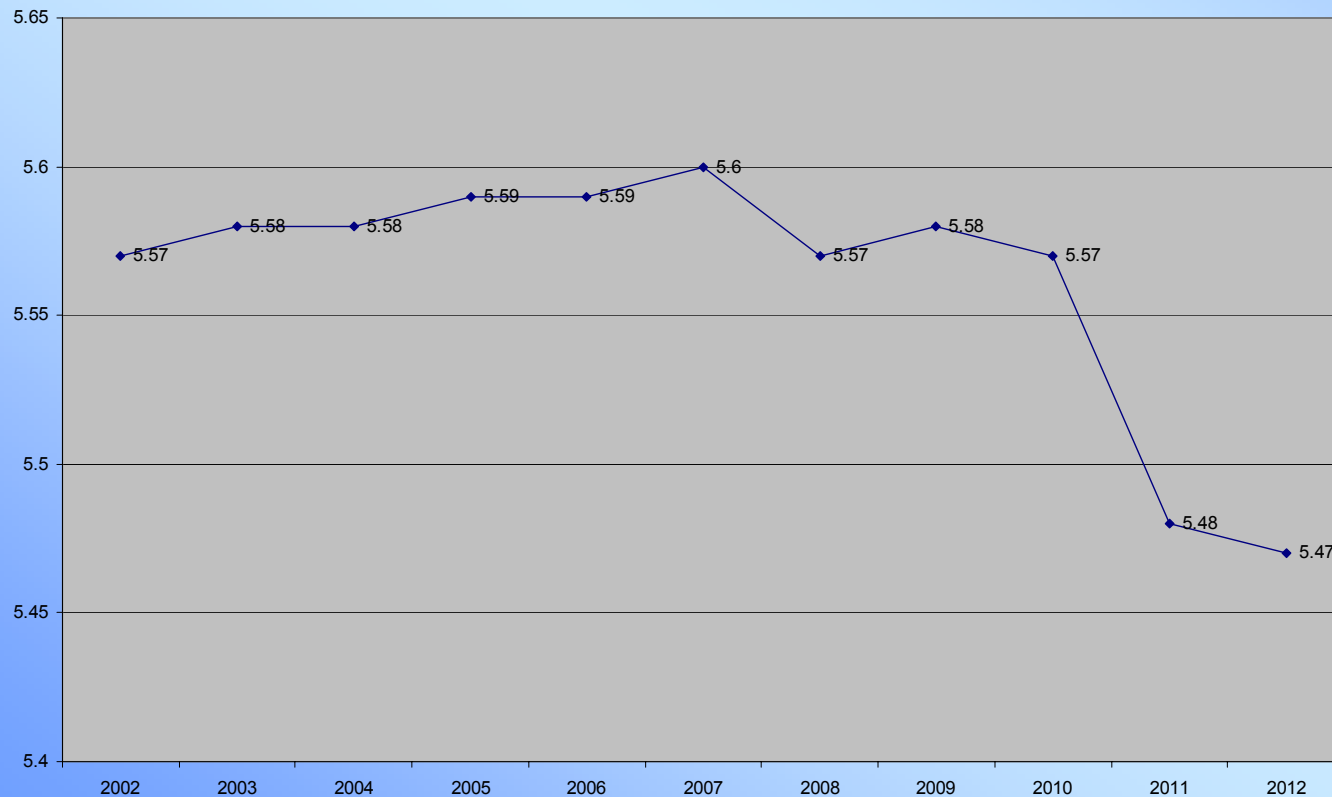
## Installed Capacity (MW)

[illegible]

# Baseline Projections

## Baseline Emissions Factors (ktCO<sub>2</sub>/MWh)

|                  | 2002     | 2003     | 2004     | 2005     | 2006     | 2007     | 2008     | 2009     | 2010     | 2011     | 2012     |
|------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Emissions Factor | 5.57E-04 | 5.58E-04 | 5.58E-04 | 5.59E-04 | 5.59E-04 | 5.60E-04 | 5.57E-04 | 5.58E-04 | 5.57E-04 | 5.48E-04 | 5.47E-04 |



# Validity and Update of Baseline

There is no reason for significant doubt on the validity of the baseline. However as the model considers among other economic growth, a proportion of electricity imported, a fuel structure, if any of these changes suddenly and significantly (due to a global crisis, a regional scarcity in generating capacity, or a fuel crisis) the reconsideration of the baseline becomes necessary. Disregarding these hopefully unlikely cases the baseline in general should be considered as valid. On the system level, the retrofit/replacement/extension scenario is the officially accepted one of Hungary, therefore there is only a very low chance that the emission baseline would become outdated from these reasons.

# Validity and Update of Baseline Cont.

- The national baseline is a relevant indicator of the progress towards the Kyoto commitments and the necessary measures to be implemented. In the case of Hungary the dynamically growing economy, the expected close-up to the Western per-capita consumption can result in fast increase of GHG emissions. Therefore the annual update of the baseline and the accompanying databases is a must and an obligation under the UNFCCC. If possible a more frequent update would be preferable, if this would be in accordance with the policymaking processes in Hungary.
- The most important information to be updated is the middle and long term strategical plans in the baseline. This depends always on the actual policy in force.
- This information comes partially from the ministries and partially from MVM, the Hungarian Power Companies.
- The updates should be consolidated and new model runs should be executed for an updated baseline.