

The economic impact of South Stream on Hungarian energy consumption

Budapest
 November 18th, 2013

Global energy background

Every country is trying to guarantee uninterrupted physical availability of energy resources at an affordable price in an environmentally sustainable manner, or, in other words, its own **energy security**.

At the same time by diversifying supply routes countries that export natural resources try to guarantee their **transportation security**.

The North American shale energy revolution has encouraged a number of countries to start its own shale gas and/or tight oil (layers of fine-grain clay and siltstone rocks, rich in organic carbon and characterized by ultra-low permeability) R&D and production. As a result, oil world proven reserves have grown 1.11x, gas world proven reserves – 1.5x.

- Lane Energy Poland, controlled by ConocoPhillips, has been extracting about 8 tcm of shale gas per day since July 21st, 2013;
- India's Oil Minister Veerappa Moily has allowed exploration firms to immediately start O&G production following discovery without spending time to get the field development plan approved;
- Japan works on deep-sea methane hydrates R&D;
- At the same time 2012 was the second highest year ever for investments in renewable energy with worldwide investments totaling \$ 244 bln USD.

US EIA states that world energy demand is due to grow 35% by 2035.

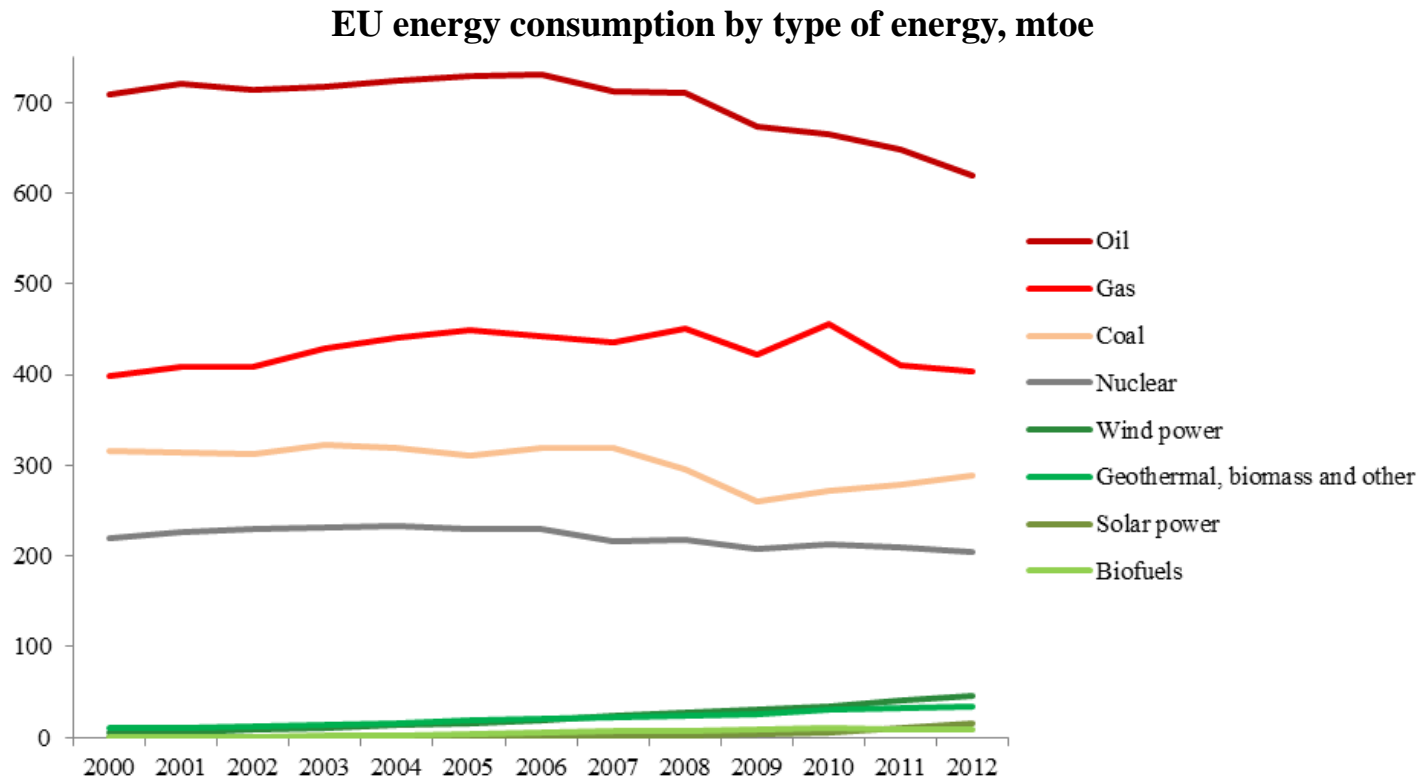
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Part 1

Economic impact of global shale gas exploration and production on energy consumption in the EU

Energy consumption trends in the EU

- Development of shale and other tight rock formations resources depends on **cost of technological equipment** for horizontal drilling and fracturing, **employment costs** and on whether governments and industry can develop and apply rules that effectively provide the industry with a 'social license to operate' within each jurisdiction, its environmental and social aspects;
- Natural gas (NG) **contracts linked to spot prices** (NG futures and options contracts, other derivatives) through Europe's gas trading hubs UK NBP and Dutch TTF NGF are generally lower once compared with those that are indicated in Gazprom's and Statoil's oil-indexed contracts;
- The UN Environment Program: Much higher rates of **global emission reductions** in the medium term.



The EU – Russia hydrocarbon trade

- In 2009 Russia was the EU largest energy resources importer:
 - **36%** of EU's total gas imports came from Russia;
 - **31%** of EU's total crude oil imports originated from Russia;
 - **30%** of EU's coal imports originated from Russia.

The EU was Russia's largest trade partner for energy goods:

- **80%** of Russian oil exports went to the EU;
 - **70%** of Russian gas exports went to the EU;
 - **50%** of Russian coal exports went to the EU.
- In order to guarantee supply security and meet oil production rate at or above the level of **10.4 mbd** and gas production – **600 bcm**, the Russian government will have to improve internal energy efficiency and show more flexibility in the tax arrangements and regulatory arrangements.

- The EU, with half a billion energy consumers in a unified internal market, is heading towards a low-carbon energy system that will limit high carbon emissions fossil fuels use growth. In 2009 the ambitious goal of achieving a **20%** share of renewable energy and a 10% share of renewable energy in transport by 2020 was set.

It is expected that the EU will account for a shrinking share of global fossil fuel markets, which doesn't necessarily mean that Russian gas supplies that in 2012 equaled **34%** of European imports by pipeline will be decreasing.

Emerging economies in APR will become more prominent in Russian exports with the region expected to consume more than half the world's energy supply by 2035 with an annual growth rate of **2.1%**.

Implementations for Russian gas trade

- Stimulation of in-country gas consumption is in contrast with an expected general energy price increase;
- By 2030, about a third of Russian natural gas exports might be destined to Asia, and by 2050 this share could reach more than 50% - investments for large capacity LNG terminals and in-country pipeline network;
- **Gazprom's diversification strategy for gas supply:** Blue, North and South streams network + 20% of Gazprom's gas exports to Europe in 2012 were spot-market deals, and the remainder were fixed.

Gas trade in 2011 and 2012, bcm

| | 2011 | | | | 2012 | | | |
|---------------------------|------------------|--------------|------------------|--------------|------------------|--------------|------------------|--------------|
| | Pipeline imports | LNG imports | Pipeline exports | LNG exports | Pipeline imports | LNG imports | Pipeline exports | LNG exports |
| US | 88,3 | 10,0 | 40,7 | 1,7 | 83,8 | 4,9 | 45,1 | 0,8 |
| Canada | 26,6 | 3,3 | 88,2 | - | 27,5 | 1,8 | 83,8 | - |
| Mexico | 14,1 | 4,0 | 0,1 | - | 17,6 | 4,8 | 0,0 | - |
| Trinidad & Tobago | - | - | - | 18,5 | - | - | - | 19,1 |
| Other S. & Cent. America | 14,8 | 10,6 | 14,8 | 5,2 | 16,9 | 15,2 | 16,9 | 5,8 |
| France | 32,3 | 15,5 | 2,2 | - | 35,0 | 10,3 | 1,2 | 0,22 |
| Germany | 84,0 | - | 11,7 | - | 86,8 | - | 12,5 | - |
| Italy | 60,8 | 8,7 | 0,1 | - | 59,7 | 7,1 | 0,1 | - |
| Netherlands | 15,6 | 0,78 | 50,4 | - | 14,5 | 0,8 | 54,5 | - |
| Norway | - | - | 95,0 | 4,46 | - | - | 106,6 | 4,7 |
| Spain | 12,5 | 24,2 | 0,5 | 0,76 | 13,3 | 21,4 | 0,7 | 1,2 |
| Turkey | 35,6 | 6,2 | 0,7 | - | 34,9 | 7,7 | 0,6 | - |
| United Kingdom | 28,0 | 24,8 | 16,0 | 0,08 | 35,4 | 13,7 | 12,0 | - |
| Other Europe | 100,8 | 10,9 | 10,1 | 0,6 | 97,6 | 8,2 | 9,3 | 1,7 |
| Russian Federation | 30,1 | - | 207,0 | 14,2 | 29,8 | - | 185,9 | 14,8 |
| Ukraine | 40,5 | - | - | - | 29,8 | - | - | - |
| Other Former Soviet Union | 35,3 | - | 63,0 | - | 32,3 | - | 68,8 | - |
| Qatar | - | - | 19,2 | 100,4 | - | - | 19,2 | 105,4 |
| Other Middle East | 32,1 | 4,6 | 9,1 | 28,2 | 29,2 | 4,6 | 8,4 | 25,9 |
| Algeria | - | - | 34,4 | 17,8 | - | - | 34,8 | 15,3 |
| Other Africa | 5,7 | - | 8,3 | 40,0 | 6,0 | - | 11,0 | 38,8 |
| China | 14,25 | 16,6 | 3,05 | - | 21,44 | 20,0 | 2,81 | - |
| Japan | - | 106,95 | - | - | - | 118,79 | - | - |
| Indonesia | - | - | 9,32 | 29,29 | - | - | 10,22 | 25,04 |
| South Korea | - | 50,6 | - | - | - | 49,7 | - | - |
| Other Asia Pacific | 28,6 | 32,1 | 16,3 | 68,7 | 34,1 | 38,8 | 21,0 | 69,0 |
| Total World | 700,0 | 329,8 | 700,0 | 329,8 | 705,5 | 327,9 | 705,5 | 327,9 |

South Stream countries

Offshore section South Stream Transport B.V. (Gazprom (50%), Eni (20%), Wintershall Holding (15%), EDF (15%))

Onshore section South Stream Austria Gmbh (Gazprom (50%), OMV (50%))

South Stream Bulgaria AD (Gazprom (50%), Bulgarian Energy Holding (50%))

Joint venture between Gazprom and Plinacro, Croatia

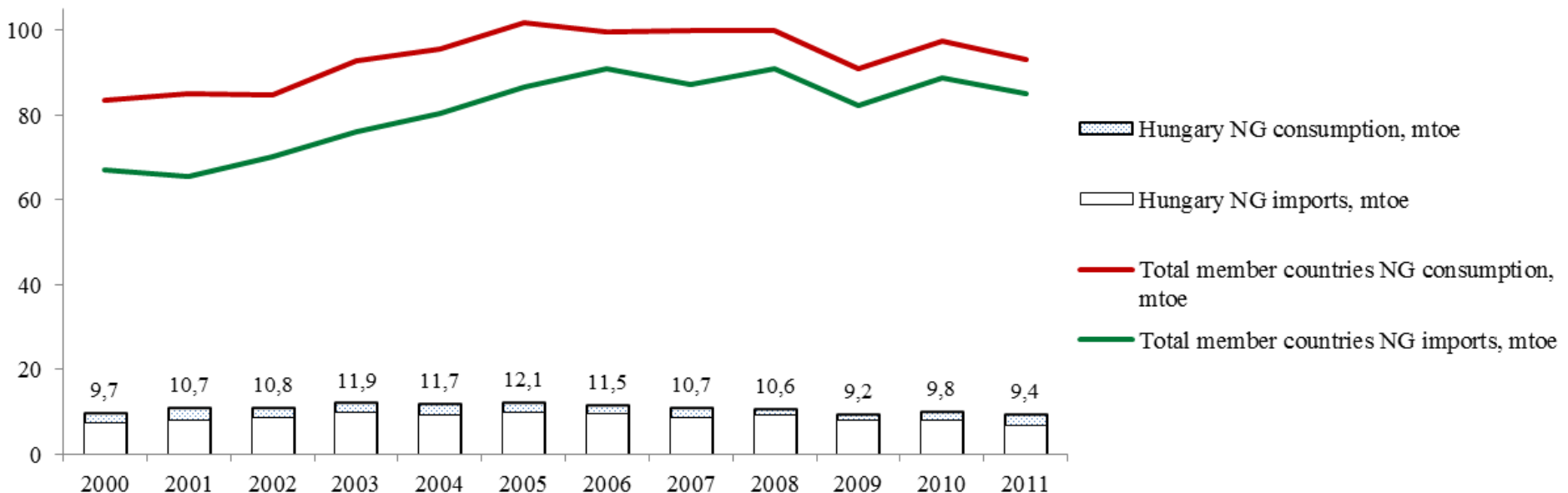
South Stream Greece S.A. (Gazprom (50%), DESFA (50%))

South Stream Hungary Zrt (Gazprom (50%), Magyar Villamos Művek (MVM) (50%))

South Stream Serbia AG (Gazprom (51%), Srbijagas (49%))

South Stream Slovenia LLC (Gazprom (50%), Plinovodi (50%))

Inland NG consumption and imports in Hungary and all South Stream countries*, mtoe



* South Stream countries include states that have signed intergovernmental agreements with Russia

Source: Eurostat, U.S. Energy Information Administration (EIA)

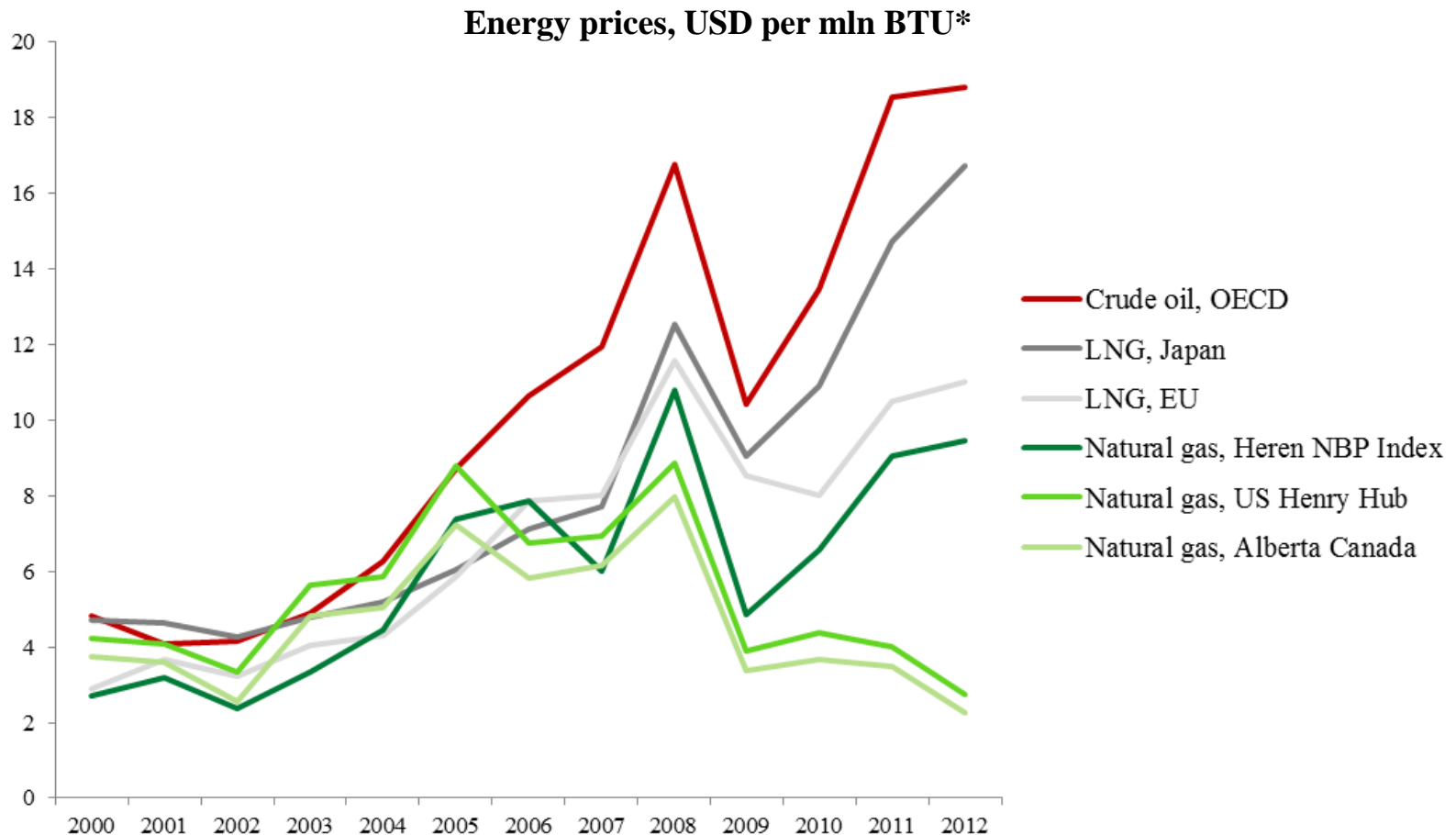
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Part 2

Energy pricing

Global energy prices

- Gas share in world primary energy consumption is expected to grow from 21% in 2010 to 25% in 2040;
- Gas prices in the US industry sector reduced by 66% between 2005-2012, primarily due to America's shale gas revolution, but they rose by 35% over the same time in the EU. That proves that LNG market volatility is still high.



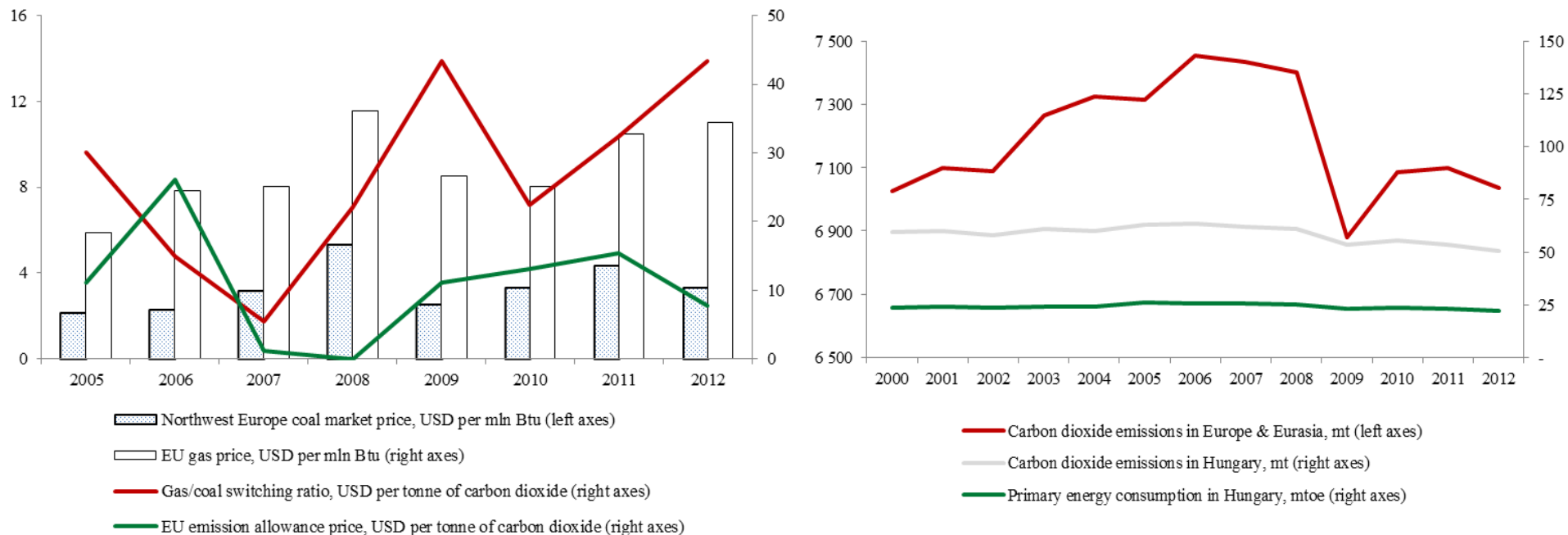
* BTU - British thermal unit and is from 1.054 to 1.060 kJ

Source: BP Statistical Review of World Energy, 06.2013

CO₂ emissions and their impact on gas consumption

Hungary has improved the security and flexibility of its energy supply and as a result is now playing a leading role in regional energy market integration.

EU emission allowance price and price of gas/coal switching | CO₂ emission and primary energy consumption



One kWh of gas produces about 400 grams of CO₂, while one kWh of coal that is cheaper produces about 1000 grams of CO₂. To make the costs of gas and coal equal the carbon price would have to equal 35-48 EUR/tonne of CO₂.

Hungarian final consumers

- Residential sector is the largest in total energy consumption; at the same time energy prices for households are generally higher than for industrial consumers;
- Out of all renewable sources for electricity generation, biomass has the leading role and the largest potential. Subsidies of direct and non-refundable funds aren't enough to increase energy production from renewables. The feed-in tariff is low and isn't functional enough;
- 60% of total emissions result from oil and coal consumption. In order to meet the Kyoto Protocol GHG emissions target, while at the same time taking into consideration climate change objectives, electricity and heat generation has to be kept under control.

Cost of energy goods for Hungarian final consumers

| | EURO 95 petrol, EUR/1L | LPG, EUR/1L | Natural gas, EUR/kWh electricity | | Electricity, EUR/kWh electricity | | Feed-in tariffs for electricity generated from renewable sources | |
|---|---------------------------|-------------|----------------------------------|-------------|----------------------------------|-------------|---|-------------------|
| | | | Households | Industry | Households | Industry | Solar PV, EUR/kWh | Hydro, EUR/kWh |
| Primary energy source | 0,49 | 0,19 | | | | | | |
| Margin | 0,13 | 0,36 | | | | | | |
| Excise duties (incl. environment related taxes) | 0,43 | 0,14 | | | | | | |
| VAT | 0,28 | 0,19 | | | | | | |
| Total - | 1,33 | 0,87 | 0,06 | 0,05 | 0,16 | 0,10 | 0,097 | 0,052 |
| Annual number | | | 1 725,60 | 454 800,00 | 546,46 | 207 660,00 | 97 265,78 | 12 012 000,00 |

- **Gas price formulas:** Gazprom gas LTC is based on a price formula that accounts oil prices for the previous 6-9 months, and resulted in \$ 420 USD for 1 tcm in June 2013.

Spot prices apply capacity, demand and supply trends to the energy goods production chain (producer, pipeline, storage / liquefaction, transmission by pipeline or tankers, storage / regasification, consumption). TTF LNG price was almost \$ 400 USD for 1 tcm in June 2013, and \$ 450 USD in spring 2013.



Thank you for your attention

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