Bundesverband Erneuerbare Energie e.V.

# Comment on JRC's scientific and policy report "Assessing GHG default emissions from biofuels in EU legislation" - Review of the input database to calculate 'Default GHG emissions', following expert consultation on the 22–23 November 2011 in Ispra (Italy)

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Berlin, 14.06.2013

**General comment:** We think that the GHG emission factors for natural gas, diesel and gasoline, published in the JRC's scientific and policy report "Assessing GHG default emissions from biofuels in EU legislation" (2013) are too low. We have the following questions regarding the calculation of the emission factors.

## 1. Assumptions for the calculation of the emission factor of natural gas (12.76 gCO2 eq/MJ)

### Which assumptions are made for the following parameters?

- Share of the domestic production and imports
- Average transport distance
- Share of different regions for imports
- Share of pipeline and LNG imports
- Methane leakage in the different production steps (production, transport, liquefaction, regasification)
- Energy intensity MJ/MJ of the whole production chain in the different regions (mature gas fields in the North sea, arctic fields etc.)

### How does the calculation of the emission factor of natural gas consider the following developments?

- Growing imports: the EU is now importing 70% of its gas consumption. Ten years ago the import share was 50%.[1]
- Growing liquefied natural gas (LNG) imports: Already 30% of the gas imports are LNG[2].
- Large LNG capacity: The EU is currently using only about half of its LNG capacity and could double its LNG imports. The capacity will further grow by 20% in the next years. Up to 2020 a doubling of the current capacity is expected[3].
- The EU will get access to US shale gas via LNG in the future[4].
- 70 % of EU imports have a high GHG-value (e.g. Russia up to 25 g/MJ, Qatar (LNG) 27 g/MJ, Nigeria up to 38 g/MJ)[5].
- Energy and carbon intensity of natural gas from Norway will rise due to the growing depth of fields and because of artic production (incl. LNG production in the arctic region).
- The methane leakage of gas from imported gas can be considerably higher than the assumed average value of 0,2 g/MJ (=1% leakage), e.g. 2% leakage value of gas from Russia[6].
- The development of the entire natural gas sector is very dynamic, therefore a sensitivity analysis of the influence of the main parameters on the GHG balance is necessary.

[1] BP 2012: Statistical Review of World Energy June 2012.
[2] Ibid.
[3] US Congressional Research Service 2013: Europe's Energy Security: Options and Challenges to Natural Gas Supply Diversification. Puka, L 2012: Liquefied Natural Gas Development in the EU. In: Natural Gas Europe. 21.09.2012. www.naturalgaseurope.com
[4] IEA 2012: World Energy Outlook 2012.
[5] JRC 2009: Liquefied Natural Gas for Europe – Some Important Issues for Consideration.
[6] IEA 2006: Optimizing Russian Natural Gas.

## 2. Assumptions for the calculation of the emission factor of diesel and gasoline (15.4 gCO2 eq/MJ)

### Which assumptions are made for the following parameters?

- Share of the domestic production and imports
- Average transport distance
- Share of different regions for imports
- Energy intensity MJ/MJ of the whole production chain in the different regions (mature gas fields in the North sea, arctic fields etc.)
- Oil field depth
- Water to oil ratio (WOR): Proportion of water in extracted oil
- Use of improved production technologies (Enhanced oil recovery)
- Flaring and venting of accompanying gas and other Methane leakage in the different production steps (average value and range)
- Viscosity of petroleum
- Sulphur content of petroleum

### How does the calculation of the emission factor of natural gas consider the following developments?

- Nearly half of EU's consumption is imported from Russia, with very high flaring and venting emissions. Another 5 % are coming from Nigeria, which flares the second-largest quantity of accompanying gas after Russia[7].
- The energy intensity of oil and gas production is increasing: Several studies show a clear decline in the EROI (Energy Return of Investment) of the oil production in different regions and worldwide[8]. According to Gagnon et al (2009), the EROI of the global oil and gas production decreased between 1992 and 2006 at about 70% from 26:1 to 18:1. The reasons for the declining EROI are[9]:
    - Growing oil field depth
    - Growing water to oil ratio (increasing age of oil fields)
    - Improved and new production technologies
    - Increasing production of unconventional fossil fuels and New Frontier oil (e.g. arctic)
- The EROI is an important indicator for the development of the carbon intensity of the oil and gas production especially in regard to mature production and new oil resources: One example: The greenhouse gas intensity of the BP North Sea oil fields increased by aprox. 400% from 2004 to 2011. BP is currently producing less than ¼ of what it

[7] BP 2012: Statistical Review of World Energy June 2012; Pieprzyk, B, Kortlüke, N and Rojas Hilje, P, The impact of fossil fuels 2009: Greenhouse gas emissions, environmental consequences and socio-economic effects; Pieprzyk, B, Kortlüke, N and Rojas Hilje, P, The Substitution of Marginal Oil with Biofuels In: DOI: Biofuels, Bioprod. Bioref. (2013) 10.1002/bbb.1411.

[8] Murphy, DJ and Hall, CAS, 2010: EROI or energy return on (energy) invested. In: Ann. N.Y. Acad. Sci. 1185**:** 102–118 (2010); Gagnon, N, Hall, CAS and Brinker, L, A 2009: Preliminary Investigation of Energy Return on Energy Investment for Global Oil and Gas Production. In: Energies 2**:** 490-503 (2009); Guilford, MC, Hall, CAS, O'Connor, P and Cleveland, CJ, A 2011: New Long Term Assessment of Energy Return on Investment (EROI) for U.S. Oil and Gas Discovery and Production. In: Sustainability 3**:** 1866-1887 (2011)

[9] Pieprzyk, B, Kortlüke, N and Rojas Hilje, P, The impact of fossil fuels 2009: Greenhouse gas emissions, environmental consequences and socio-economic effects.

was producing in 2004, while the GHG emissions from oil production (excl. emissions from natural gas production) remain stable[10].

- The GHG value for natural gas used for oil production in the UK has to consider the increasing LNG imports (mainly from Quatar) with a GHG value of about 27 g/MJ (2011 nearly 1/3 of total consumption in the UK[11]). As an indirect effect of these increased imports, the natural gas is consumed on the platforms and can no longer be fed into the British natural gas grid. It must therefore be replaced with imported LNG. A sensitivity analysis is thus necessary to calculate the influence of LNG emission on the GHG balance of UK oil production.

[10] Own calculations based on British Petroleum North SEA 2009: Environment Statement 2008 and 2011.
[11] BP 2012: Statistical Review of World Energy.