

GHG emissions from farm machinery

Direct emissions from

- combusting diesel fuel in engines

Indirect emissions from

- manufacturing
- repair & maintenance
- discarding/recycling

IPCC emission factors

<http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html>

Task Force on National Greenhouse Gas Inventories

INTERGOVERNMENTAL PANEL ON climate change

WMO UNEP

IPCC web sites

- Home IPCC
- IPCC-TFI Home
- Organization
- Technical Support Units
- Publications
- 2006 IPCC Guidelines
- GPG-LULUCF
- Degradation of Forest
- GPG2000
- Revised 1996 IPCC Guidelines
- Presentations
- Meetings
- Support to Inventory Compilers
- FAQs
- Links
- Emission Factor Database (EFDB)
- Electronic Discussion Group (EDG)

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IPCC honoured with the
2007 Nobel Peace Prize

Publications

2006 IPCC Guidelines for National Greenhouse Gas Inventories

- 2006 IPCC Guidelines Top
 - Vol.1 GGR
 - Vol.2 Energy
 - Vol.3 IPPU
 - Vol.4 AFOLU
 - Vol.5 Waste

2006 IPCC Guidelines for National Greenhouse Gas Inventories

Volume 2

Energy

Chapter	Chapter Name
-	Cover Page of Volume 2
1	Introduction
2	Stationary Combustion †
3	Mobile Combustion **
4	Fugitive Emissions ‡
5	Carbon Dioxide Transport, Injection and Geological Storage
6	Reference Approach
Annex 1	Worksheets

† : Corrected chapter(s) as of April 2007.
 ‡ : Corrected chapter(s) as of November 2008.
 ** : Corrected chapter(s) as of June 2010.

In addition the worksheets are provided here in MS Excel spreadsheet format as supporting material to assist users of the guidelines. They are simply the worksheets above translated into spreadsheets without any additional formulae.

[All Worksheets in Vol.2](#)
All Worksheets of 2006GL's (all in one file zipped 182KB)

Three tiers for direct emissions from engines

- Tier 1
 - Average emission factors are used.
- Tier 2
 - Country-specific emission factors are used.
- Tier 3
 - Detailed emission models or measurements and data at individual plant level are used where appropriate.

Tier 1 factors for stationary and mobile combustion of diesel oil

IPCC Tier 1 emission kg/TJ/Stationary combustion

	CO ₂	CH ₄	N ₂ O	
kg/TJ	74100	3	0,6	
CO ₂ conversion factor	1	25	298 Total	
CO ₂ -eq.	74100	75	179	74354
				74 g/MJ

IPCC Tier 1 emission kg/TJ/Mobile combustion - Road

	CO ₂	CH ₄	N ₂ O	
kg/TJ	74100	3,9	3,9	
CO ₂ conversion factor	1	25	298 Total	
CO ₂ -eq.	74100	98	1162	75360
				75 g/MJ

IPCC Tier 1 emission kg/TJ/Mobile combustion - Off-road/Agriculture

	CO ₂	CH ₄	N ₂ O	
kg/TJ	74100	4,15	28,6	
CO ₂ conversion factor	1	25	298 Total	
CO ₂ -eq.	74100	104	8523	82727
				83 g/MJ

National factors from VTT:

- Stationary 89 g/MJ
- Mobile 98 g/MJ

Emission factors, look: <http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html>

Conversion factors, look: <http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter2.pdf>

Indirect GHG emissions from agricultural machinery

- A detailed analysis for every machine is impossible due to the workload and missing data.
- The only practical way is to estimate GHG emissions on the basis of energy consumption in manufacturing .
- For example: 86.7 MJ is needed to produce 1 kg machinery → Emission is: $74 \text{ g/MJ} \times 86.7 \text{ MJ/kg} = 6.416 \text{ kg CO}_2/1 \text{ kg machine}$.

Questions to be answered:

- Which emissions factors do we apply for direct CO₂ emissions from stationary and mobile use of diesel oil?
 - Do we include indirect emissions from manufacturing, R&M of farm machinery into ENPOS project?
 - If the answer was YES, how do we do it?
-



This material has been produced in ENPOS project. ENPOS is acronym for *Energy Positive Farm*.

The project partners are

- University of Helsinki, department of Agricultural Sciences – Agrotechnology
- MTT Agrifood Research Finland - Agricultural Engineering
- Estonian University of Life Sciences

Project home page is at <http://enpos.weebly.com/>

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ENPOS Energy Positive Farm



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