# Main differences between EDGAR version v4.2 and v4.1

## Summary for GHG: scope, methods and data

The main aim of the EDGARv4.2 Fast Track 2008 dataset is providing an extended time series by adding emissions for 2006-2008 with a “fast track” approach (i.e. reduced efforts in updating the past time series from 1970-2000). For GHG the update needed to start accounting for the impact of CDM projects in developing countries to reduce GHG emissions from sources such as coal mines and landfills (CH4), nitric acid and adipid acid production (N2O) and the production of HCFC-22 (HFC-23), which now start to significantly influence global emission trends. In addition, a few errors found in the dataset have been repaired.

The level of detail remained for all sectors unchanged in the new version, but two extensions of sectors were calculated. The CO2 emissions from decomposition of drained peatlands have been added, which contribute 6% to the total CO2 emissions. And to provide a more comprehensive picture on the Land-Use. Land Use Change and Forestry sector, we added as a separate (memo) item the net annual carbon change of the biomass stock in forests as net source or sink expressed in CO2, which reaches 4% of the total CO2.

### Methods:

EDGARv4.2 provides an extended time series by adding for the main sources new statistics for 2006-2008 and updating the activity data for 2000-2008 (or by using the trend in the data, when a large discrepancy with the 1999 value would otherwise occur). For less important sources, such as for F-gas uses, we assumed a linear extrapolation of the past trend to 2006-2008. For key sources where significant trends in the technology mix or in the application rate of emission control technology occurred, we have added estimates for these trends, whereas in all other cases the mix and fraction of EOP technology applied has been left unchanged after 2005. Thus, except for a few sources or specific cases, no emissions prior to 2000 have been changed. Notable exceptions are:

**1B1. Charcoal production.** IEA statistics were in v4.1 supplemented by other sources to achieve a comprehensive dataset with production data for all significant countries. In v4.2 we improved the time series consistency of several countries significantly by using another gap filling method.

**1B2. Venting and flaring of unused gas.** CO2 emissions from *gas flaring* are now for most countries for 1994 onwards based on amounts of gas flared determined from the satellite observations of the intensity of flaring lights, which is much more accurate than the amounts determined indirectly from the difference of the total amount of gas produced and gas sold. Resulting global CO2 emissions have increased substantially. For industrialised countries the EFs for CH4 for *gas venting* were determined from reported emissions for 1990-2008 relative to the new, satellite based activity data. A refined estimate for gas flaring by the USA from reported data resulted in lower venting emissions, not only for the USA but also for developing countries for which the updated default factor has been decreased substantially, affecting global total emissions accordingly.

**2A, 2B, 2E.** Most sources for which only CRF data of industrialised countries were used v4.1, were fully updated, i.e. all data since 1990. For limestone and dolomite use, in particular, the activity data often shows very large changes. Smaller changes are seen for soda ash production and use and production of ethylene and HCFC-22.

**4F, 5A. Savannah burning and tropical forest fires.** For some countries an error correction was made in the whole time series in the allocation of total biomass burned to savannahs and tropical forests. Since these two sources generally have different emission factors, also total emissions have changed for these

countries. The emission factors for large scale biomass burning have been updated using the latest update of the emission factor table in Andreae and Merlet (2001) provided by Andreae (2011, pers. comm.).
Global total CO2 emissions from forest fires and post-burn decay changed only very little (+75 Mton or 1.4%). However, some large changes occurred at country level, with the largest changes in 2005 in Indonesia (+595 Mton) and Angola (-535 Mton), with smaller changes in four other countries (between +1 and +4 Mton). For in total 18 countries 2005 their emissions changed by more than 1 Mton.

**5D. Peat fires and decomposition of drained peatlands.** In v4.2 the amount of peat burned in Indonesia has been separated from the amount of tropical forest burned and different emission factors have been applied for most substances, resulting in different total emissions. For CO2 from drained peatlands we adopted the method, activity data for 1990 and 2008 and CO2 emission factors reported by Joosten (2009) for 174 countries. For years in between the activity data were linearly interpolated, except for Indonesia for which the trend in the area of palm oil plantations was used as proxy for the interpolation. For years before 1990 we generally assumed a linear decrease to 0 in 1970, with a few exceptions, where the area was assumed to remain constant prior to 1990 (Ireland, Netherlands, Russia and six other Eastern European Countries, Indonesia and Malaysia).
Total CO2 emissions from these sources are in 2005 about 1250 Mton. The largest additions in 2005 occurred in Indonesia (+620 Mton, including 170 Mton from peat fires), Russia (+190 Mton), China (+65 Mton), Finland (+50), Mongolia (+45), Malaysia (+40) and Belarus (+40 Mton), which account for 2/3 of the global total, Ten other countries that have additions between 10 and 35 Mton. In total 32 countries have peat additions larger than 4 Mton, which represent about 95% of total CO2 emissions from peat in 2005.

**7B, 7C. Indirect N2O from non-agricultural sources of NOx and NH3.** The activity data for the whole time series was updated using the latest draft NOx and NH3 emissions from v4.2(draft), which differ amongst others for biomass burning and also for stationary combustion for a number of countries.

**Data:**
To estimate emission reductions for non-CO2 gases, besides national emissions data reported by industrialised countries, we also used information from the CDM emission reduction projects in developing countries, which has been compiled by the UNFCCC (NIR/CRF reports) and the UNEP Risø centre (CDM pipeline database). The latter refers to CH4 recovery from coal mines and landfills, N2O abatement in adipic acid and nitric acid production processes, and HFC-23 abatement in HCFC-22 production.
For road transport, domestic air transport and rice production an error in the technology shares was corrected. For some countries an error correction was made in the whole time series in the allocation of total biomass burned to savannahs and tropical forests. Since these two sources generally have different emission factors, also total emissions have changed for these countries.
For large scale biomass burning, emission factors were updated using data from Andreae (2011, pers. comm.) and specific factors for peat fires from Cristian et al. (2003) and Weiss (2002).

## Summary of largest changes per greenhouse gas

### National emissions

#### Carbon dioxide ($CO_2$)

The largest changes in $CO_2$ emissions occurred in the following sources (numbers for 2005):

- +130 Tg venting and flaring due to new primary data source used (+75%)
- +70 Tg other industries due to updated energy statistics (+4%)
- +40 Tg limestone and dolomite use due to a large update (CRF) (+150%)
- +40 Tg CHP autoproducers reallocated from (-40%) electricity autoproducer

In total 250 Mton higher emissions in 2005 (0.9%); in 1990 and 1970 the changes were +0.8% and +0.5% for total excl. LULUCF. In the LULUCF sector, 1250 Tg from decomposition of peat was added in 2005. Reallocation between tropical fires and savannah burning resulted in about 250 Tg lower burning emissions and about 250 Tg lower postburn decay emissions in 2005 (both about -10%). Globally the net CO2 emissions from forest fires and postburn decay only changed by 75 Tg or +1.4%

#### Methane ($CH_4$)

The largest changes in $CH_4$ emissions occurred in the following sources (numbers for 2005):

- -9.3 Tg from venting and flaring due to a new estimate of the venting emission factor in the USA and the default applied to developing countries (-50%)
- +1.6 Tg from coal mining due to activity data update (+4%)
- +2.3 Tg from peat fires (new source with specific emission factors)
- +0.5 Tg from rice production due to an error correction (+1.4%)
- +0.2 Tg from landfills due to data update (+1%)

In total 5 Tg lower emissions in 2005 (-1%), including LUCF sources. In the LUCF sector, the reallocation between tropical fires, grassland fires and savannah burning resulted in about 12% and 8% higher emissions from tropical fires and grassland fires and 1% lower savannah burning emissions, with overall resulting in 1.4 Tg higher emissions.

#### Nitrous oxide ($N_2O$)

The largest changes in $N_2O$ emissions occurred in the following sources (numbers for 2005):

- +5 Gg from charcoal production due to an updated emission factor
- +9 Gg from nitric acid production
- -5 Gg from adipic acid production
- +22 Gg from peat fires
- +82 Gg from indirect NH3 emissions from non-agricultural sources.

Total emissions in 2005 did not change, including LUCF sources. In the LUCF sector, the reallocation between tropical fires/post-burn decay, grassland fires and savannah burning and updated emission factors resulted in about 14% emissions from tropical fires and 6% lower emissions from grassland fires and 13% lower savannah burning emissions, whereas post-burn emissions decreased by 10%. with overall resulting in 62 Gg lower LUCF emissions, including peat fires.

#### F-gases

The emissions from the use of HFCs and PFCs did not change, but SF6 emissions were revised for some sources (error correction for soundproof windows (90% decrease in 2005 or -500 Gg) and smaller error corrections for equipment manufacture and miscellaneous sources (each -60 Gg) and an increase of 60 Gg for SF6 use in aluminium foundries based on recent CRF data, causing total SF6 emissions in 2005 to

decrease by about 550 Gg (9%). For by-product emissions for HFC-23 from HCFC-22 manufacture, activity data and emission factors have been updated, resulting in an increase in 2005 of these HFC-23 emissions by 35% (4.4 Gg). HFC emissions from the use of HFCs and PFC emissions from production of aluminium, a source of CF4 and C2F6 by-product emissions were not changed for 2005.

## Gridded emissions

New maps that are used:

- Urban and rural population maps for other years than 2000 (for every 5 or 10 years and for 2008) (for industrial sources except for those with source specific maps, waste and wastewater) [CO2, NOx, PM]
- Inland waterways (rivers and canals) [NOx, SO2, PM]
- Coastal shipping (used for fisheries) [NOx, SO2, PM]
- Railways (used for rail transport) [NOx, CO, PM]
- Aviation (height subdivision: Landing & Take Off, Climbing & Descent, Cruise) [CO2, NOx]
- Peatlands (used for decay of drained peatland) [CO2]
- Peat fire maps for 2000 to 2008 [CO2, N2O, NH3, PM]
- Cement maps [CO2, CO, PM]
- Zinc maps [CO2, CO, NOx, SO2, PM]
- Cupper maps [CO2, CO, NOx, SO2, PM]
- Tree carbon density (for allocating net carbon stock changes) [CO2]

A few corrections and completions were made for:

- Power plants (correction of locations, mainly in China) [CO2, NOx, SO2]
- Metallic processes (primary and secondary Al,  Mg, Pb ) (gapfilling with urban population)
- Chemical processes (ammonia, caprolactam, nitric acid, sulphuric acid) (gapfilling with urban population)

**More detailed information is available upon request to greet.maenhout@jrc.ec.europa.eu**