Global Trade Analysis Project

# A Revised Energy and Emissions Data for GTAP 11

**Maksym Chepeliev**

Center for Global Trade Analysis, Purdue University

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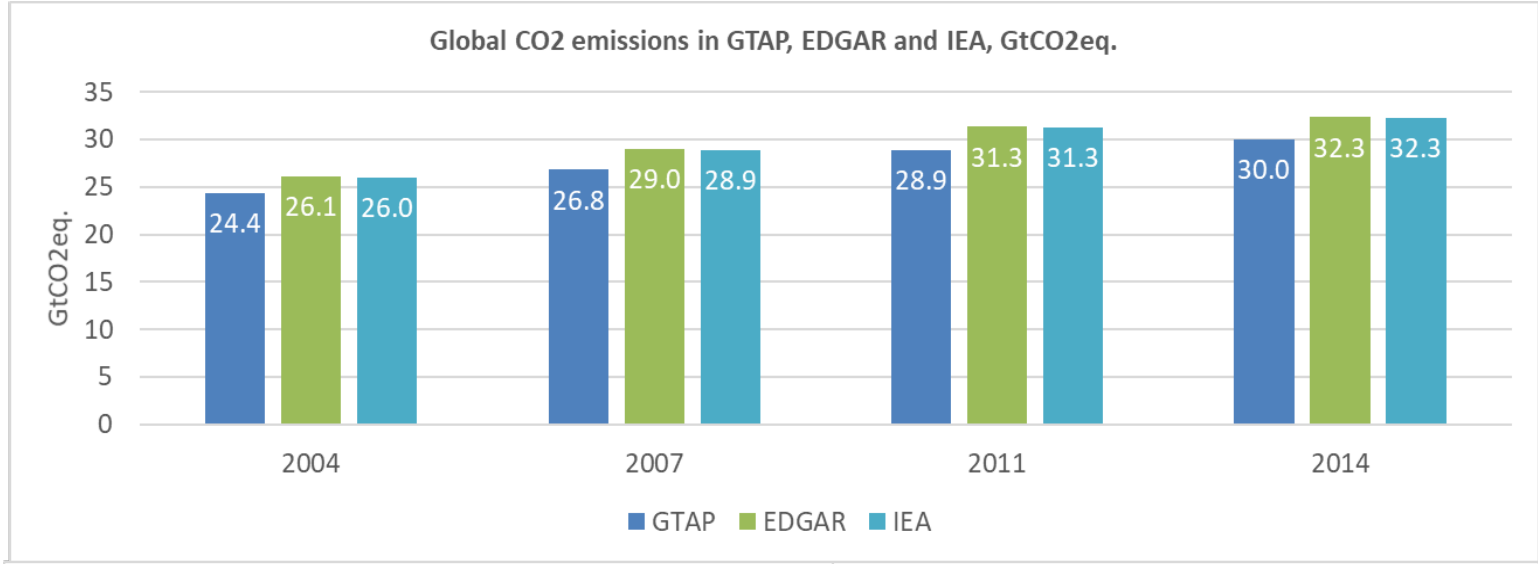
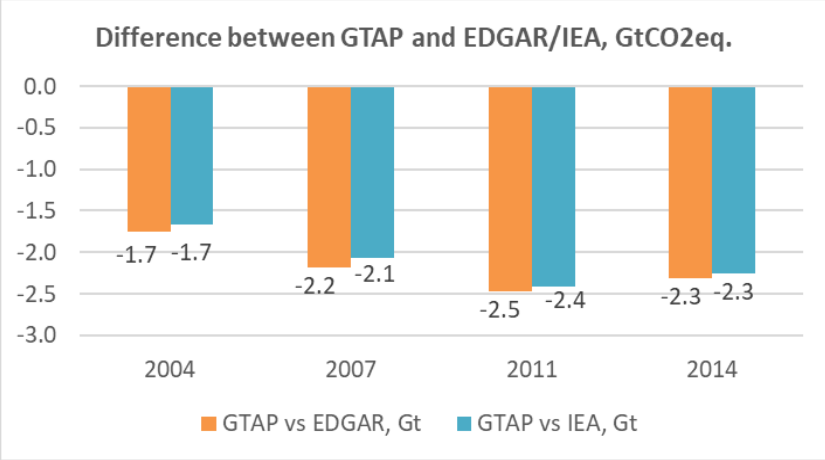
# Energy database for GTAP: new features

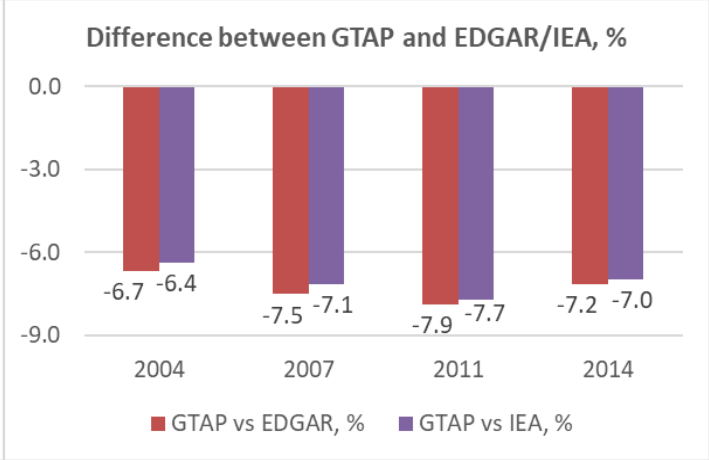
- **Key features of the GTAP energy database**
  - A special data set that overrides energy flows, prices, and taxes in GTAP.
  - Primarily relies on the extended energy balances from IEA as well as several other data sources (e.g. OLADE, COMTRADE, US DOE, China Energy Databook, etc.).
- **Updates for GTAP 11**
  - ➢ New bilateral energy flows data
    - Rely on British Petroleum and Eurostat to complement the COMTRADE bilateral data.
    - Primarily addresses the issue of bilateral trade in natural gas. Unilateral totals are taken from IEA.
  - ➢ UN energy balances are used to complement IEA for selected countries.
    - IEA explicitly reports data for 151 individual countries.
    - UN energy balances help to expand the coverage to 215 countries.
  - ➢ Fossil fuel consumption subsidies (based on IEA data) are now part of the standard GTAP Data Base.
  - ➢ Revised treatment of energy flows associated with flaring, blast furnace gas and other recovered gases.

# Updated accounting of combustion $CO_2$

- **Since GTAP 5 Data Base, $CO_2$ emissions from fossil fuel combustion are estimated**
  - Tier 1 method of the 1996 IPCC Guidelines and basic assumptions.
  - Moderate discrepancies between GTAP and other international data sources are observed.



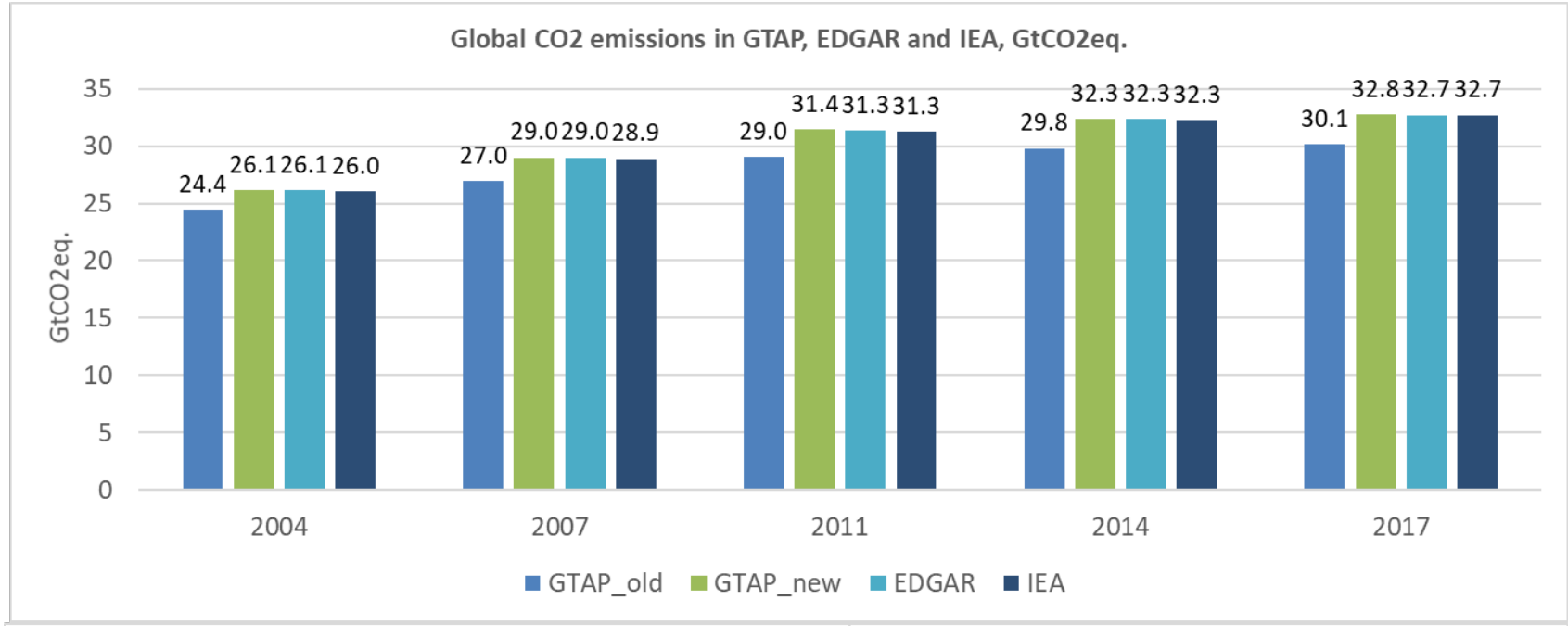
# A revised approach to calculating $CO_2$ emissions (1)

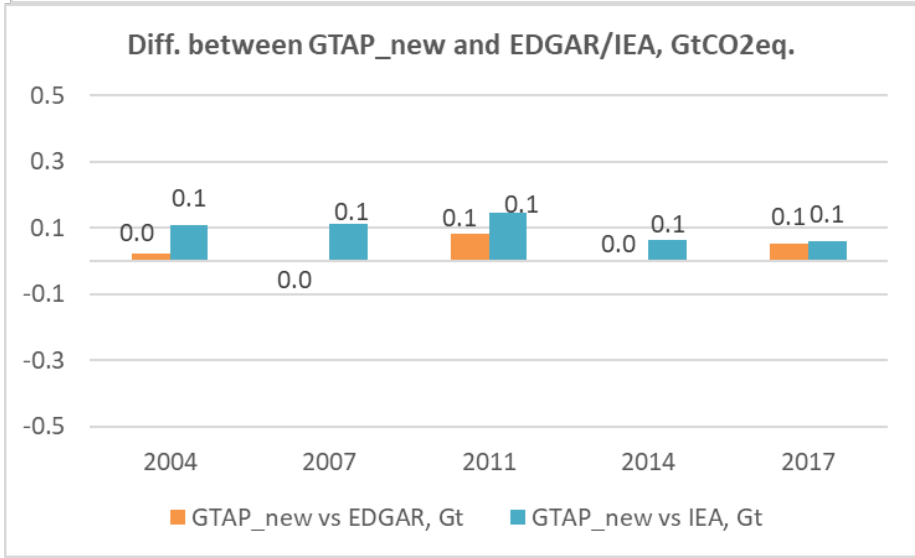
- **Transitioning from 1996 to 2006 IPCC Guidelines**
  - Updated carbon content values: from -13.7% (refinery gas) to +7.3% (blast furnace gas).
  - Implementation of the carbon content values at a detailed commodity level (42 items).
  - Updated value of the fraction of carbon that is not oxidized (using 2006 guidelines).
- **$CO_2$ emissions from flaring**
  - In the IPCC framework flaring emissions are treated as fugitive and are separated from fuel combustion activities.
  - GTAP energy database introduces additional energy flows that correspond to flaring (based on historical estimates) -> flaring emissions are accounted as combustion emissions in GTAP.
  - For consistency with IEA and IPCC, we discard flaring emissions and to report these in the GTAP complementary GHG accounts.

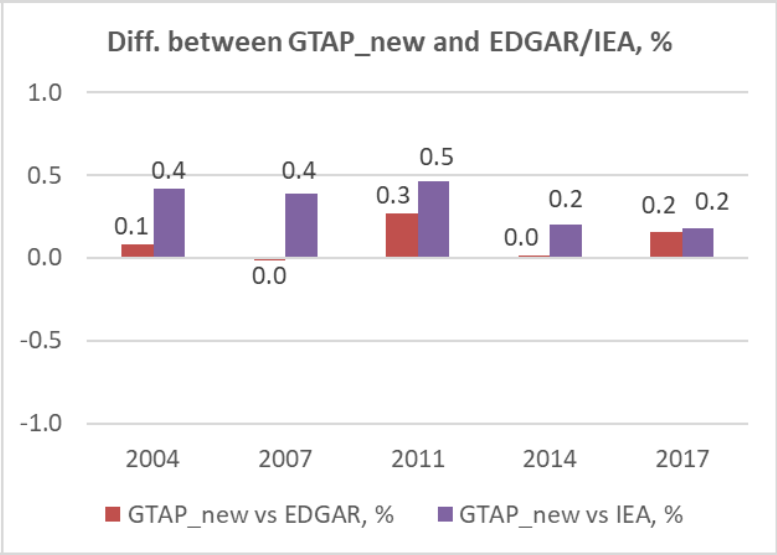
# A revised approach to calculating $CO_2$ emissions (2)

- **Accounting for emissions from blast furnace gas and other recovered gases**
  - GTAP energy database used to discard energy production from selected industries that predominantly produce non-energy goods
    - Two examples are blast furnace gas and recovered gases (by-products of metals production).
    - <1% of total energy flows, very sector-specific, carbon content values 2-3x > coking coal
  - Discarding these flows reduces global emissions by around 2%.

# Updated global $CO_2$ emissions well align with IEA and EDGAR



# Updates to the complementary emission accounts

- **Complementary GHG accounts (based on EDGAR and FAO data):**
  - Include process CO2 emissions (e.g. from cement and fertilizer production).
  - Explicitly represent various fluorinated gases – 25 types.
  - Include land use emissions (e.g. burning biomass – not mapped to activities) and emissions from drying pastureland and cropland (mapped to activities).
- **Complementary air pollution accounts (based on EDGAR data + additional estimates):**
  - Distinguish 9 types of air pollutants and include a more refined mapping differentiation between fossil- and bio-based emissions (larger share of emissions associated with burning wood - “frs” sectors in GTAP)
  - Include emissions associated with land use/biomass-burning activities – not explicitly mapped to GTAP drivers.
  - Can be directly mapped to the widely used atmospheric source-receptor models, such as TM5-FASST.

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# Thank you!
# Questions/Comments?

mchepeli@purdue.edu