Towards global air emission accounts

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Joint work (in progress)

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BETTER POLICIES FOR BETTER LIVES

Objective and rationale

Objective:

- Be able to provide first estimates of air emission accounts according to SEEA for countries that do not yet compile them.
- Contribute to global efforts to compile and disseminate SEEA accounts.

Rationale:

- Contrary to UNFCCC inventories, air emission accounts can be linked to national accounts and inter-country input-output (ICIO) tables, thus allowing to compute air intensity by industry and demand-based air emissions.
- Up to now, only few, mostly European, countries compile air emission accounts (24 European countries, plus Australia and Canada: available on OECD.Stat).
- Draft air emission accounts could be used (1) by countries as a starting point for improved estimates, and (2) by international organisations for computing demand-based air emissions.
- Some publicly available data on air emissions with a wide geographical coverage can be mobilized: UNFCCC inventories and IEA estimates of CO_2 emissions from fuel combustion.

Existing data sources

- UNFCCC inventories
  - Data covering 42 Annex-I countries at annual frequency and 160 non-Annex-I countries more irregularly and with (far) less detail.
  - Air emissions from all sources (fuel combustion, fugitive emissions, industrial processes, other sources).
  - All GHGs (CO_2, CH_4, N_2O, HFCs, PFCs, SF_6), CO, NO_2, SO_2 and NMVOC are covered.
  - Breakdown of emissions by technical process (e.g. combustion processes, production processes, …): SNAP classification.
  - Territory principle

- IEA estimates of CO_2 emissions from fuel combustion
  - Data covering 110 countries at annual frequency.
  - Breakdown of emissions by 'flows', i.e. by ISIC industries at a detailed level for some parts of the economy and at an aggregated level for some others.
  - Based on IEA energy data and default (Tier 1) emission factors provided in the 2006 IPCC Guidelines for national GHG inventories.
  - Territory principle

Breakdown by ISIC industry
General Methodology

- To devise and compare possible methodologies, already available air emission accounts are used as benchmarks.
- Link between available data sources and the ISIC classification of industries:
  - Eurostat's correspondence table between process-oriented classifications (UNFCCC inventories) and economic activities (ISIC rev. 4)
  - IEA definition of 'flows'
- In cases of one-to-many connections, allocation based on the relative output share of target industries:
  - UNdata (Table 2.6): gross output of 19 industries in 87 countries, typically available until 2012.
  - UNIDO INDSTAT4 database: gross output of manufacturing industries (4-digit level of the ISIC rev. 4), typically available until 2015.

Breakdown by ISIC industry

Allocation of road transport emissions (1/2)

- Air emissions related to road transport, which are aggregated in the UNFCCC inventories, need to be allocated to nearly all ISIC industries, and households.

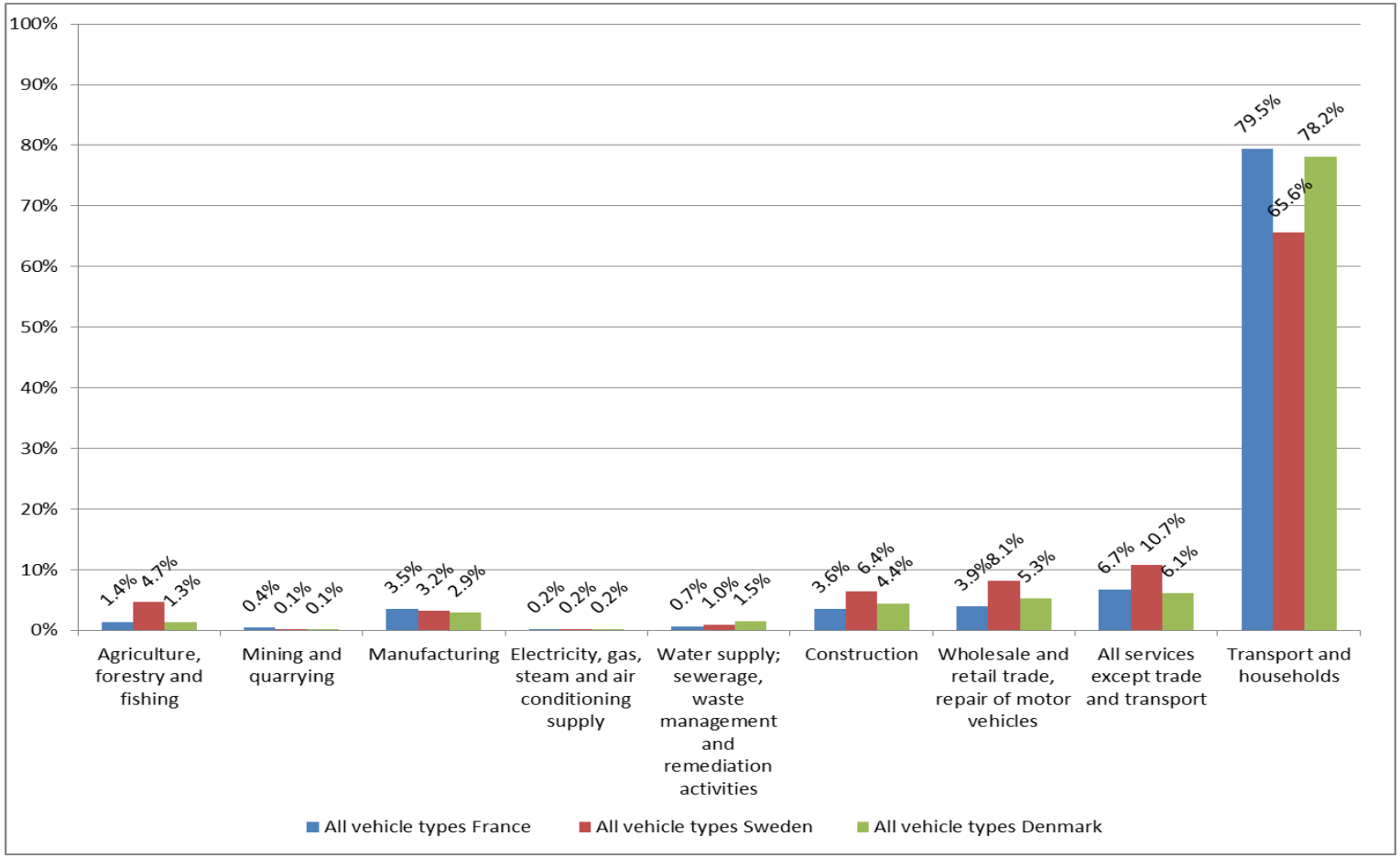
- Proposed methodology: use an average of available national allocation keys, which is justified if countries are relatively homogeneous (see next slide).

- Main drawback: mainly relevant for advanced countries, for which the average can be computed.

Breakdown by ISIC industry

Allocation of road transport emissions (2/2)

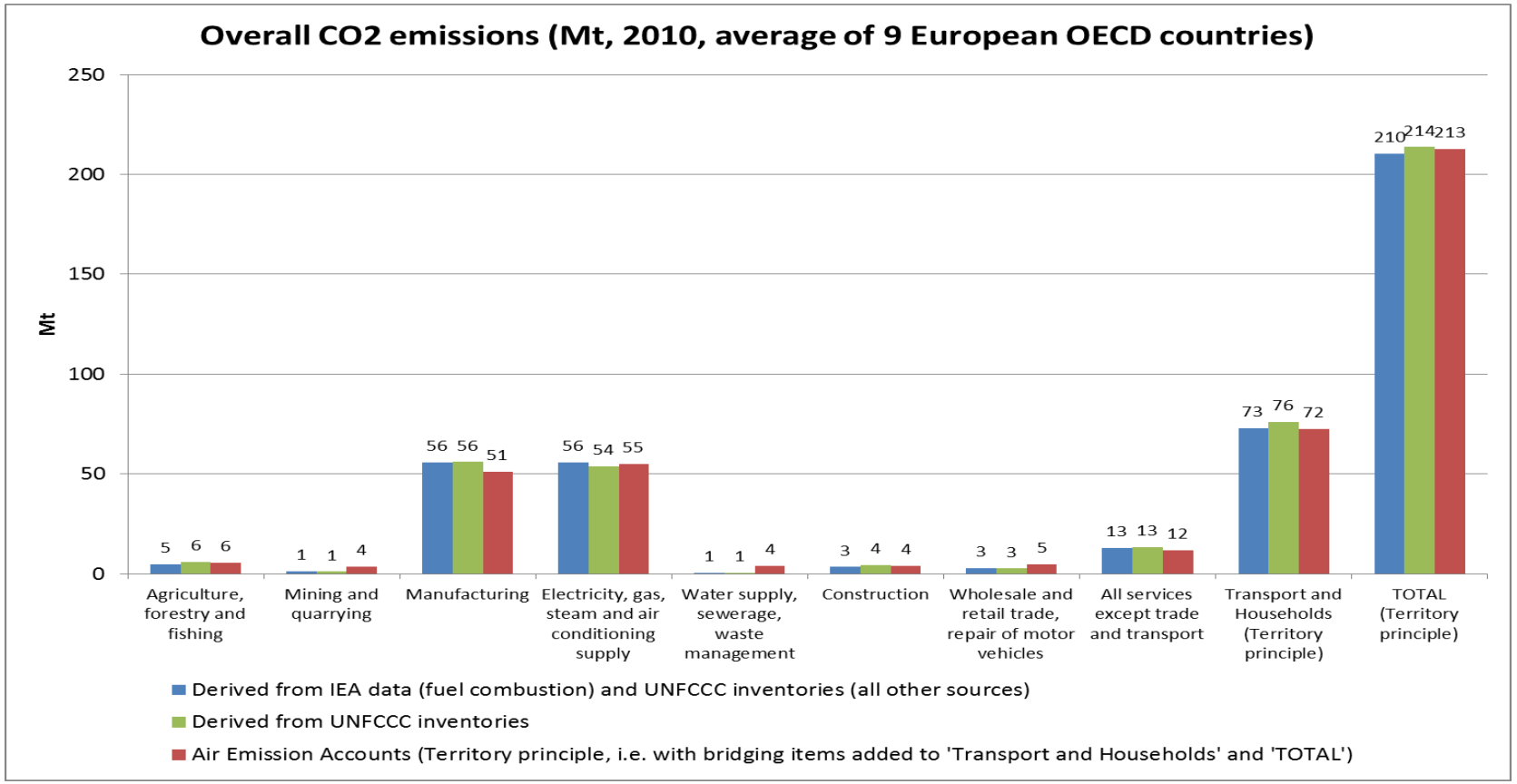
Allocation of road transport emissions to ISIC industries (average over all vehicle types)



Source: French Ministry of environment, Statistics Denmark, Statistics Sweden, UNFCCC inventories, authors' computations

Results for CO_2

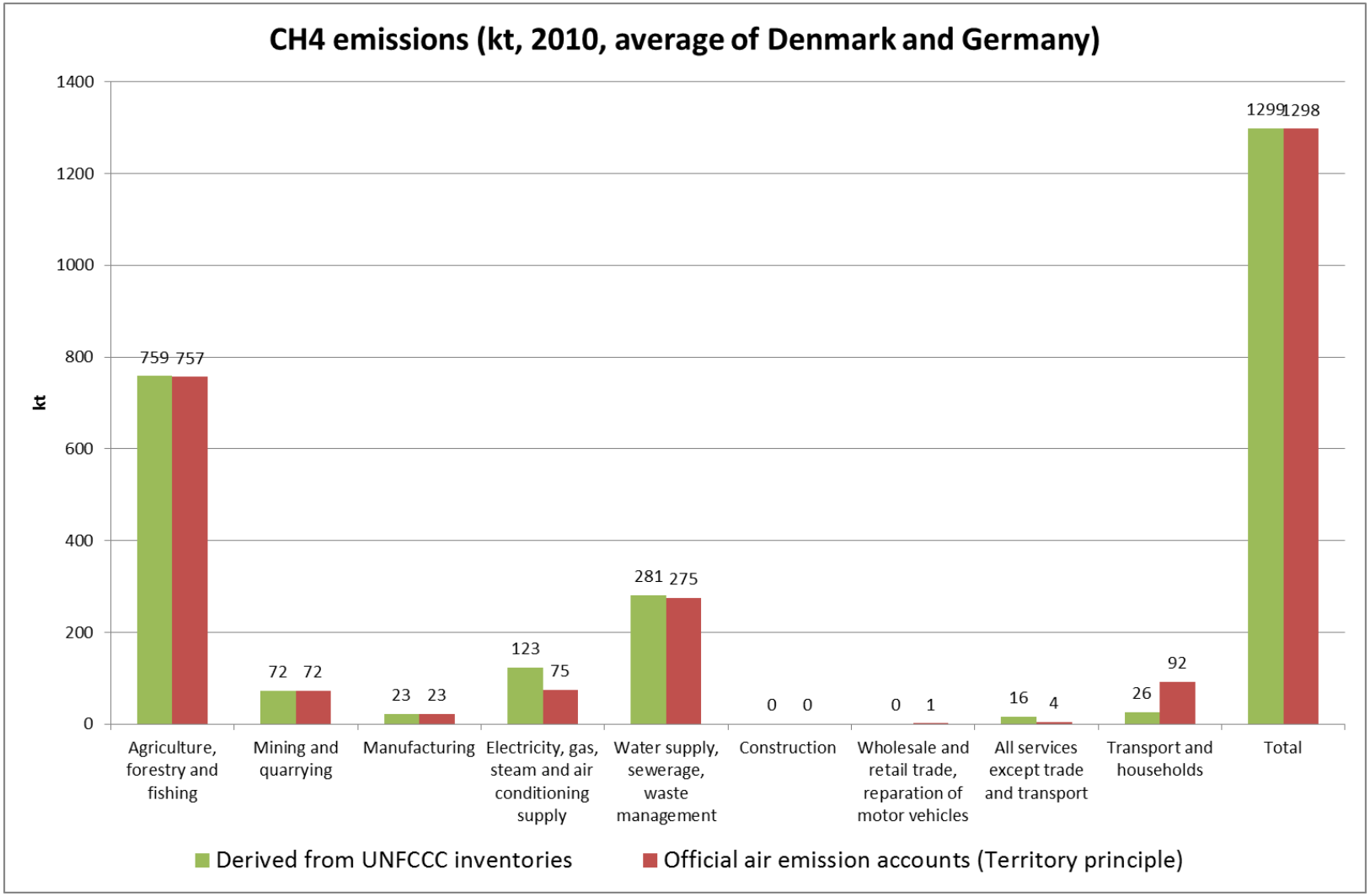
Average of 9 European OECD countries



Estimated accounts derived from IEA data and UNFCCC inventories are consistent with each other and with official air emission accounts (true on average and for the 9 countries individually).

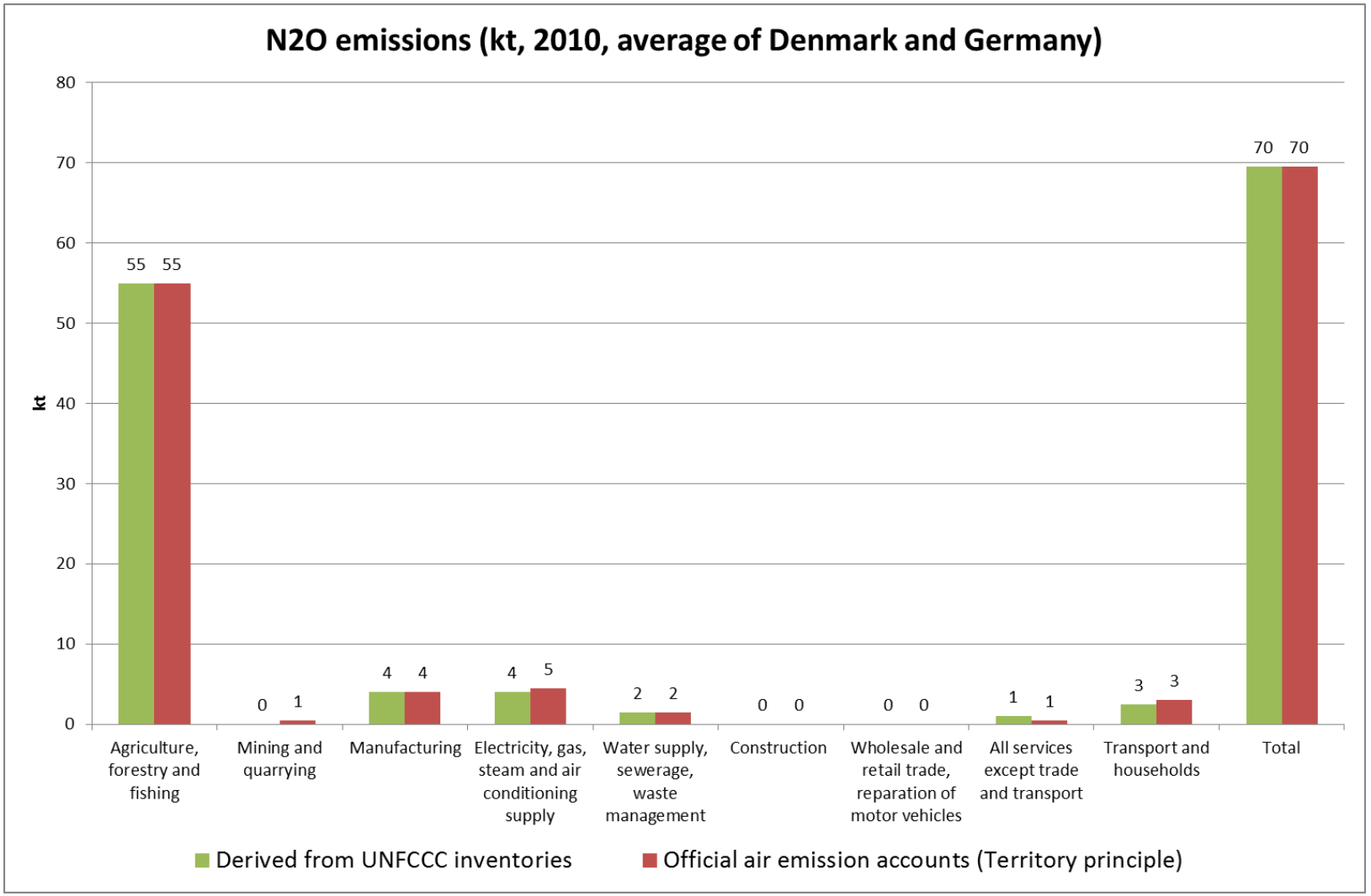
Results for CH_4

Average of Denmark and Germany



Results for N_2O

Average of Denmark and Germany



Allocation of F-GHGs (HFCs, PFCs, SF_6) to ISIC industries: *Are countries or statistical conventions different? (1/2)*

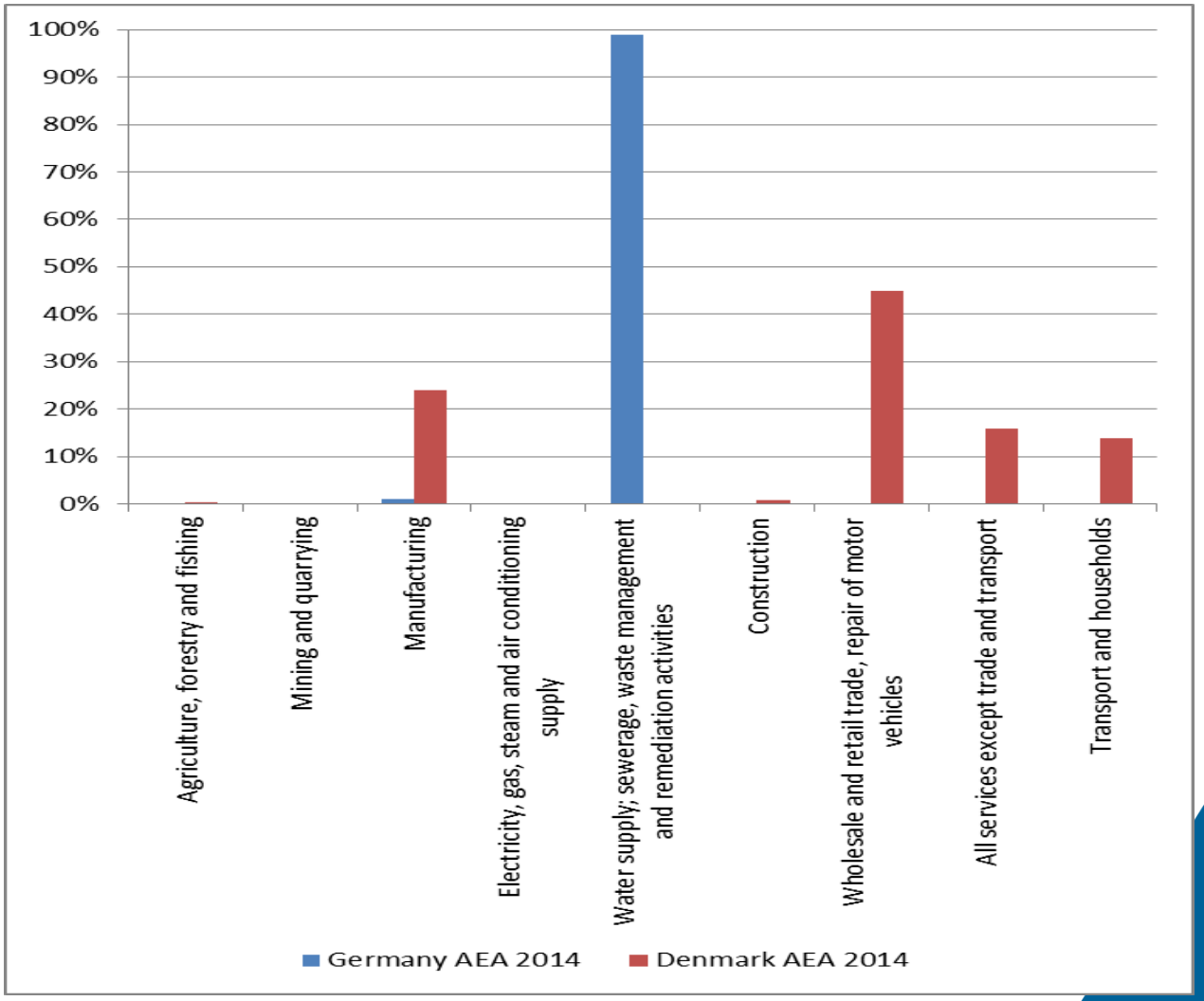
- In some countries (e.g. Denmark, France, the Netherlands, Sweden), AEAs contain no, or very little, F-GHG emissions related to waste management.

- In other countries (e.g. Belgium, Germany, Norway, the UK), waste management accounts for the bulk of F-GHG emissions (see next slide).

- If these differences mainly reflect different statistical conventions, which one should be made for estimating global air emission accounts?

Allocation of F-GHGs (HFCs, PFCs, SF_6) to ISIC industries:
Are countries or statistical conventions different? (2/2)

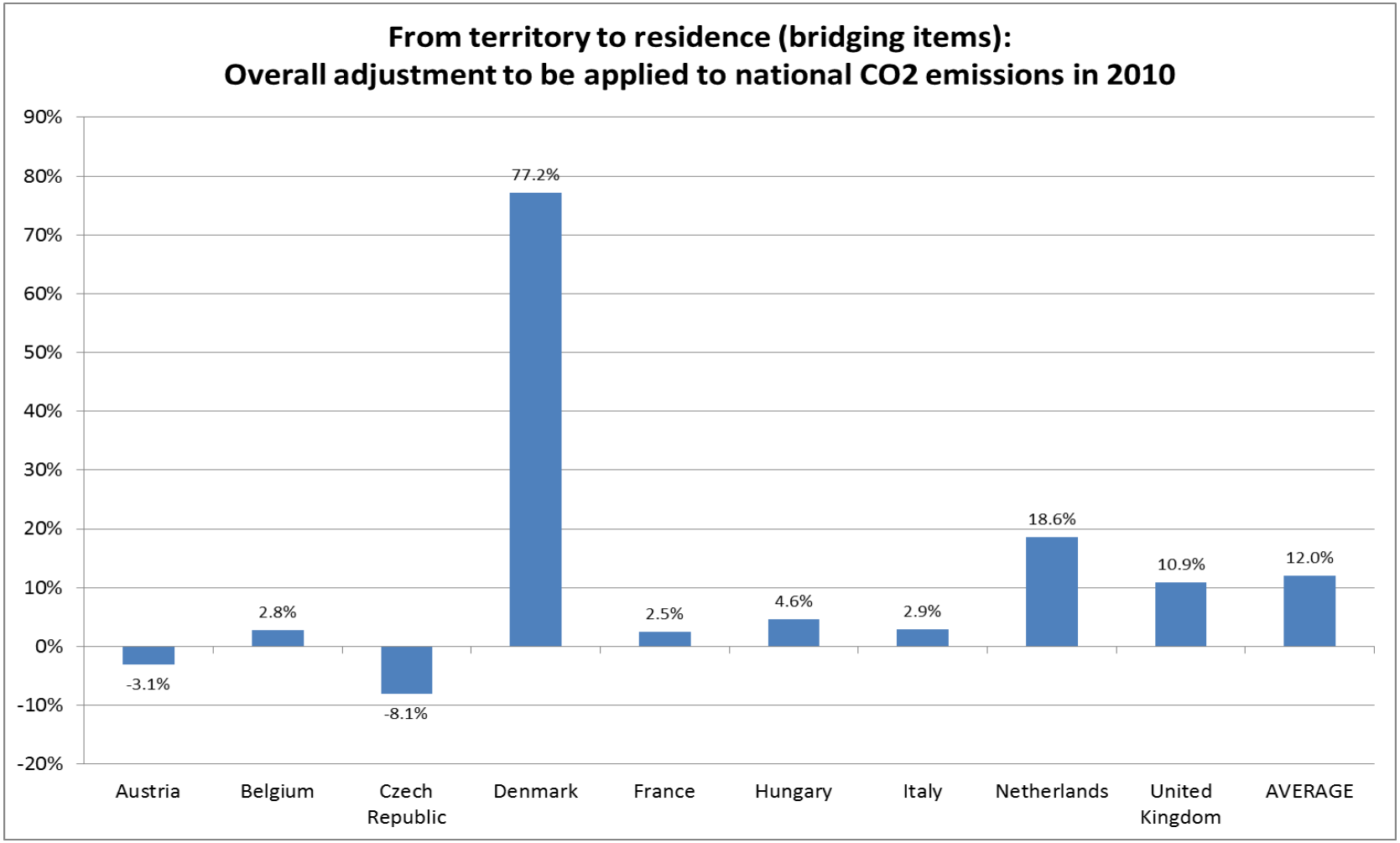
Example: Allocation of Emissions related to HFCs in Denmark and Germany (2014 AEAs)



Source: Eurostat/OECD

Territory-residence adjustment

A limited issue in general, but with significant exceptions



Source: Eurostat/OECD

Territory-residence adjustment

Some attempts made, but still an issue

Attempts made:

- Rely on the average structure of available AEAs to allocate total emissions in UNFCCC inventories across industries, households and bridging items.

  Advantage: all difficult issues (e.g. bridging items, road transport emissions) are addressed at the same time.

  Drawback: less accurate method than the preferred one to deal with the other issues.

- Rely on international trade data on transportation services (COMTRADE database).

  Drawback: the link with air emissions in the bridging items of the available AEAs seems to be weak.

Conclusions

- Good results for CO_2, CH_4 and N_2O on pilot countries.
- For CO_2 related to fuel combustion, starting with IEA data or UNFCCC inventories does not make much of a difference for Annex-I countries.
- The current allocation method of road transport emissions is questionnable, and at the same time impossible to check, for developing / non-Annex-I countries (no available AEAs to be used as benchmarks).
- The adjustment to the residence principle (i.e. the estimation of the bridging items) is still an unsolved issue.
- A statistical convention needs to be made for the allocation of F-GHGs (HFCs, PFCs, SF_6) in the estimated AEAs.

Questions to the UNCEEA

- What should be the targeted level of detail in the estimated AEAs: 6 industries + HHs, as in the SEEA Technical Note, or more?
- Is there a statistical convention to recommend for the allocation of F-GHGs?
- Would estimated CO_2 emission accounts only related to fuel combustion be enough for non-Annex-I countries? (This would allow to only rely on IEA data, covering 110 countries.)
- Would estimated AEAs based on the territory principle be enough?