Assigning air emissions and energy use to NACE L68 'Real estate activities'

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Problem description and content of this note

In air emissions accounts (AEA) and physical energy flow accounts (PEFA) physical variables\(^2\) are assigned to economic activities of production and consumption. Production activities are classified according to NACE Rev.2\(^3\). Consumption activities include solely those by private households, broken down by three purpose groups\(^4\).

In principle, AEA and PEFA employ the same grouping of NACE activities as ESA supply and use tables (SUTs): so-called breakdown level A*64. One particularity of this A*64 breakdown level relates to NACE division 68 for which the usual and systematic disaggregation\(^5\) is not applied in SUTs, AEA, and PEFA.

SUTs break NACE division 68 into the following two items:

- L68B  ‘Real estate activities excluding imputed rents’;
- L68A  ‘Imputed rents of owner-occupied dwellings’.

AEA and PEFA break NACE division 68 into\(^6\):

- L       ‘Real estate activities’ (encompassing whole NACE 68 division);
- L68A    ‘Imputed rents of owner-occupied dwellings’ (an ‘of which’ item of the previous).

The assignment of physical variables to above groupings of economic activities is particularly unclear when it comes to heating/cooling of residential houses, flats, apartments etc. (‘living space’) and the associated air emissions and use of energy products.

General rule in Eurostat’s physical accounts: physical recordings shall be conceptually and practically fully aligned to recordings in monetary supply and use tables (SUTs) – in order to use both in an integrated way.

In AEA and PEFA (Table B and C), under the heading of NACE 68, one should record only those emissions to air and intermediate consumption of energy products associated with the production of the output recorded under this column heading NACE 68 in the ESA supply table.

The monetary and physical transactions related to heating/cooling of residential houses, flats, apartments etc. (‘living space’) could be assigned to the provider of the renting service, i.e. NACE 68\(^7\), or to the user. The key question is whether the output produced by NACE 68.20 includes the provision of ‘cold’ living space or whether it includes the provision of ‘warm’ living space? In the latter case emissions and energy use are assignable to NACE 68 (because associated with NACE 68’s intermediate consumption). In the first case the air emissions and energy uses are assignable to the user of the living space, i.e. private households and other production activities.

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\(^2\) In AEA those are emissions of greenhouse gases and air pollutants [in megagram (tonnes)]; in PEFA those are the use of energy products and natural energy inputs [in terajoule].

\(^3\) *Statistical classification of economic activities in the European Community*

\(^4\) Private households’ consumption for: (1) heating and cooling, (2) transport, and (3) other purposes

\(^5\) The usual and systematic breakdown of NACE division 68 is: 68.10 ‘Buying and selling of own real estate’, 68.20 ‘Rental and operating of own or leased real estate’, 68.31 ‘Real estate agencies’, and 68.32 ‘Management of real estate on a fee or contract basis’

\(^6\) According to Regulation (EU) 691/2011

\(^7\) More specific: NACE 68.20 ‘Renting and operating of own or leased real estate’; Note that in national accounts the production output of NACE 68.20 also includes imputed rents for owner occupied dwellings.
This technical note investigates further this question by separating theoretical-conceptual aspects from practical aspects:

- First, we will review national accounts 'theory': How are inputs to and outputs from NACE 68 defined and how should those be recorded in SUTs according to the principles, concepts, and conventions in ESA. Towards this end it might as well be helpful to review how households' consumption activities are defined and should be recorded in SUTs.
- Secondly, we will try to assess how compilers of SUTs implement this 'theory' into practise, i.e. we will have a look on the SUTs.
- Thirdly, we will try to conclude and derive recommendations for the compilers of physical accounts (mainly AEA, PEFA).

**Concept/theory: renting and operating of own and leased real estate**

Renting services can be broadly distinguished depending on the user:

- Renting of *residential* real estate: it concerns houses, flats, apartment buildings used by households.
- Renting of *non-residential* real estate: it concerns industrial, commercial or other non-residential buildings, apartments etc.

**The ESA treatment of dwelling services** (see also Box 1)

Note: The ESA seems to use the term 'dwelling services' for both, renting services of residential real estate as well as renting services of non-residential real estate.

First of all, ESA considers any dwelling service as a production output (see ESA 3.07ff.); e.g. the provision of living space ('shelter') is a production process.

The production and use of dwelling services is recorded as a transaction between the producer of dwelling service (NACE 68.20, most often the owner) and the consumer (tenant). The consumer – purchaser of the dwelling service – can be another production activity (intermediate consumption) or private households (final consumption).

ESA also records own account production of dwelling services. This implies that also the living in owner occupied dwellings is considered a production and consumption of dwelling services. The production of the owner occupied dwelling service is recorded as output of production activity NACE 68.20. The consumption (use) of this owner occupied dwelling service is recorded as the final consumption by private households.

The value of this owner occupied dwelling service needs to be imputed by estimating the rental which the owner would usually pay on the market for a comparable dwelling service.

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**Box 1: Relevant paragraphs in ESA 2010**

ESA 1.32: If activities are regarded as production and their output is recorded, then the concomitant income, employment, final consumption, etc. are also recorded. For example, as the own-account

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8 In general, the term 'dwelling' denotes 'shelter to live' or 'place of residence'; and hence would usually not encompass non-residential real estate.
Production of housing services by owner-occupiers is recorded as production, so the income and final consumption expenditure it generates for these owner-occupiers are also recorded. As there is, by definition, no labour input to the production of the services of owner-occupied dwellings, no employment is recorded. This maintains consistency with the system of labour statistics, where no employment is recorded for ownership of dwellings.

ESA 3.75: The output of services of owner-occupied dwellings is valued at the estimated value of rental that a tenant would pay for the same accommodation...

ESA 4.73: Rentals of buildings and of dwellings … are treated as the payment for a market service provided by the owner to the tenant of the building or dwelling, and are recorded in the accounts as the intermediate or final consumption of the tenant.

NACE and CPA explanatory notes remain unclear

Yet, the above investigation of the ESA principles and concepts does not answer the question whether the dwelling service is 'cold' or 'warm'? Towards this end, we have a look into the explanatory notes of NACE Rev.2 and CPA 2008. Unfortunately, neither the NACE explanatory notes (Box 2) nor the CPA explanatory notes (Box 3) provide clear answers to this question.

Box 2: NACE Rev.2 explanatory notes

NACE division 68 (= section L) is entitled Real estate activities which includes ‘acting as lessors, agents, and/or brokers in one or more of the following: selling or buying real estate, renting real estate, providing other real estate services such as appraising real estate or acting as real estate escrow agents. Activities in this division may be carried out on own or leased property and may be done on a fee or contract basis’ (Eurostat 2008, p. 263).

On class 68.20 Renting and operating of own or leased real estate, the NACE explanatory notes mention:

Class 68.20 includes:

- renting and operating of self-owned or leased real estate:
  - apartment buildings and dwellings
  - non-residential buildings, including exhibition halls, self-storage facilities
  - land
- provision of homes and furnished or unfurnished flats or apartments for more permanent use, typically on a monthly or annual basis

Class 68.20 also includes:

- development of building projects for own operation
- operation of residential mobile home sites

Class 68.20 excludes:

- operation of hotels, suite hotels, holiday homes, rooming houses, campgrounds, trailer parks and other
- non-residential or short-stay accommodation places, see division 55

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9 Statistical classification of products by activity in the European Economic Community, 2008 version
Box 3: CPA 2008 explanatory notes

68.20 Rental and operating services of own or leased real estate

68.20.11 Rental and operating services of own or leased residential real estate

This subcategory includes:

- rental and operating services concerning residential real estate by owners or leaseholders:
  - houses, flats, apartment buildings
  - multiple-use buildings that are primarily residential
  - residential mobile home sites
  - space owned by time-share owners

This subcategory excludes:

- accommodation services provided by operating hotels, motels, rooming houses, school dormitories, camp sites and other lodging places, see division 55

68.20.12 Rental and operating services of own or leased non-residential real estate

This subcategory includes:

- rental and operating services concerning industrial, commercial or other non-residential buildings or property by owners or leaseholders:
  - factories, office buildings, warehouses
  - theatres, convention centres, exhibition halls and multiple-use buildings that are primarily non-residential
  - agricultural, forestry and similar properties
- rental or leasing by the month or year of caravan sites, lock-up garages or other places for parking vehicles

Source: Eurostat

COICOP suggests 'cold' service

The COICOP\(^\text{10}\) is a classification of private households' final consumption activities by purpose. It provides an answer to our question: COICOP clearly suggests that the dwelling or renting service includes the 'cold' service, i.e. excluding heating etc. Making the dwelling warm/cold/bright constitutes separate transactions, i.e. the consumption of energy products.

Box 4: COICOP explanatory notes

Group: 04.1 - Actual rentals for housing

Breakdown:

This Group is divided into the following Classes:

- 04.1.1 - Actual rentals paid by tenants (S)
- 04.1.2 - Other actual rentals (S)

\(^{10}\) Classification of individual consumption according to purpose
Explanatory note
Rentals normally include payment for the use of the land on which the property stands, the dwelling occupied, the fixtures and fittings for heating, plumbing, lighting, etc., and, in the case of a dwelling let furnished, the furniture.

Rentals do not include payment for the use of garages or parking spaces not providing parking in connection with the dwelling (07.2.4). Nor do they include charges for water supply (04.4.1), refuse collection (04.4.2) and sewage collection (04.4.3); co-proprietor charges for caretaking, gardening, stairwell cleaning, heating and lighting, maintenance of lifts and refuse disposal chutes, etc. in multi-occupied buildings (04.4.4); charges for electricity (04.5.1) and gas (04.5.2); charges for heating and hot water supplied by district heating plants (04.5.5).

Commission Regulation 1722/2005 on estimating dwelling services suggests 'cold' services
Even more clarity is provided by Regulation 1722/2005. This regulation\(^\text{11}\) sets out methods for the estimation of dwelling services for the purpose of harmonisation of gross national income at market prices – an important indicator. The Annex to this Regulation clearly specifies that dwelling services – output as well as intermediate consumption – should be 'cold' (see Box 5).

Box 5: Excerpts from Annex to Regulation 1722/2005 related to demarcation of output and intermediate consumption of dwelling services

Section 1 'Output of dwelling services': [...] In principle, the rental should exclude charges for heating, water, electricity etc. Where the data sources do not allow this, coherence between the rentals and intermediate consumption must be ensured (see section 2 for details). [...] Charges for heating, water, electricity etc. should be excluded from the rentals, although it may sometimes be difficult to separate them out in practice. To be in line with the valuation rules of the ESA, the output of dwelling services should be at basic prices.

Section 2 'Intermediate consumption': Intermediate consumption has to be consistent with output. In line with the classification of individual consumption according to purpose (COICOP), charges for heating, water, electricity, etc. as well as most of the maintenance and repair associated to housing should be recorded separately and hence excluded from output of dwelling services. [...] Principle 14: Intermediate consumption shall be established in line with the definition of output of dwelling services. In general both items should exclude charges for heating, water, electricity etc. [...] 

Section 3 'Transactions with the rest of the world': According to ESA95 (paragraphs 1.30 and 2.15) non-resident units are considered as notional resident units in their capacity as owners of land or buildings on the economic territory of the country, but only in respect of transactions affecting such land or buildings. This means that the service provided by a dwelling owned by a non-resident is included in the output of the economy where the dwelling is located. In the case of an owner-occupied dwelling of a non-resident, an export of dwelling services is then to be recorded, and the corresponding net operating surplus is recorded as primary income paid to the rest of the world (ESA95 paragraphs 3.142 and 4.60). [...] 

Regulation 1722/2005 also addresses the issue of repair and maintenance (see Box 6) which may involve air emissions (e.g. solvents from paint) and the use of energy products. Associated air emissions and energy use should be assigned to the producers of the maintenance and repair works. This will usually be construction companies classified in section F of NACE Rev. 2. Where maintenance and repair is undertaken on own account by owner-occupiers, associated air emissions and energy use should be recorded in NACE L68. To the extent that own account decoration and maintenance of dwellings constitutes final consumption of households (case 3 in Box 6), associated emissions and energy use should be assigned to private households.

**Box 6: Excerpts from Annex to Regulation 1722/2005 related to repair and maintenance**

Section 2 'Intermediate consumption': With respect to repair and maintenance, three categories should be distinguished.

First, improvements to existing fixed assets that go well beyond the requirements of ordinary maintenance and repairs are included in gross fixed capital formation (ESA95 paragraph 3.107).

Second, expenditure on ordinary maintenance and repairs that an owner-occupier incurs on the decoration, maintenance and repair of the dwelling not typically carried out by tenants is treated as intermediate consumption in producing dwelling services (ESA95 paragraph 3.77).

Finally, cleaning, decoration and maintenance of the dwelling as far as these activities are also common for tenants are excluded from production (ESA95 paragraph 3.09). Expenses related to these activities should be recorded directly as final consumption of households. ESA95 states in paragraph 3.76 that household final consumption expenditure includes the materials for small repairs to and interior decoration of dwellings of a kind typically carried out by tenants as well as owners.

This means that, for owner-occupied dwellings, intermediate consumption should cover the same types of ordinary maintenance and repairs as would normally be regarded as intermediate consumption by the landlord for similar rented dwellings. Expenditure on repairs and maintenance of a type typically undertaken by tenants rather than landlords should be treated as household final consumption expenditure for both tenants and owner-occupiers.

**Practice: how do compilers of SUTs record production and use of dwelling services?**

As concluded from previous ‘theory’ section, the dwelling or renting service should include the provision of the ‘cold’ real estate. In practise, this might be difficult to implement. In the following we have a look at the ESA use tables of EU Member States to find any evidence of how far the ‘theory’ is actually implemented. The comparison ‘theory versus practise’ is feasible for activity L68A ‘imputed rents of owner occupied dwellings’.

The imputed rents related to owner occupied dwelling services should be always ‘cold’ in national accounts. Hence, the L68A-column in the ESA use table should not include any intermediate inputs in form of heating fuels and/or electricity. The L68A-column in the ESA use table should include only significant entries for the intermediate use of financial services (mortgage and loan costs), next to capital consumption and operating surplus (in the value added part). Further, L68A-column may

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12 Note that columns L68A (in SUTs) and L (in AEA, PEFA) also include NACE classes 68.10, 68.31, and 68.32. For those activities intermediate use of fuels and associated emissions are most likely – as in other service industries – for e.g. heating/cooling offices, operating vehicles etc.).
include some minor intermediate use of products related to repair and maintenance as would normally be regarded as intermediate consumption by the landlord for similar rented dwellings. A look into the ESA use tables verifies this for most countries. However, one country\(^{13}\) (Finland) records remarkably high intermediate use of the products with CPA codes 19\(^{14}\) and 35\(^{15}\) for the L68A-column.

The non-imputed renting services, i.e. the actual renting and dwelling services provided from owners to tenants, are included – amongst others\(^{16}\) – in column L68B ‘Real estate activities excluding imputed rents’ in the ESA use table. Theoretically, those dwelling services should also be ‘cold’. This is impossible to verify in the ESA use table because the L68B-column includes additional services\(^{17}\). It is assumed that in practice it might be difficult for compilers of ESA supply and use tables to estimate the ‘cold’ renting service for those actual transactions between owners and tenants. Primary information might be available only for ‘warm’ rents (e.g. household surveys, corporate accounts from big companies renting and operating residential buildings). It might be that the big renting companies record in their books/accounts large amounts of intermediate use of heating fuel products which they use to warm the real estate they rent out. In theory column L68B should only include intermediate fuels use needed for the pure services (e.g. offices, vehicles, smaller repairing etc.). It might be that the big renting companies record in their books/accounts large amounts of intermediate use of heating fuel products which they use to warm the real estate they rent out.

Conclusions and recommendations

The supply of renting and dwelling services is the output of a production activity; it notably includes the renting out of owner occupied dwellings for which the rentals are estimated (imputed). The typical producer of renting and dwelling services is NACE class 68.20.

The typical users of residential dwelling services are private households; these transactions are recorded as final household consumption. The users of non-residential dwellings are other production activities (NACE divisions); these transactions are recorded as intermediate consumption of the respective production activities.

In ‘theory’\(^{18}\), the output of dwelling services should exclude any charges for water supply, sewage collection, heating and cooling, hot water etc. In other words, the dwelling service should be ‘cold’, i.e. just reflecting the right to use the property. Complementarily, the rentals paid for the renting services are also ‘cold’.

As a general rule, air emissions (recorded in AEA) and fuel use (recorded in PEFA) associated with the heating/cooling of residential houses, flats, apartments etc. (‘living space’) are to be assigned to the user.

In practise, deviations from above ‘theory’ may occur. In those cases compilers of AEA and PEFA should contact their colleagues in national accounts (i.e. compilers of SUTs) in order to find out the reasons and to adjust accordingly the physical accounts to the monetary SUTs (or vice versa).

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\(^{13}\) Note that data for column L68A are not available for 5 Member States and the aggregated EU.

\(^{14}\) Coke and refined petroleum products

\(^{15}\) Electricity, gas, steam and air conditioning

\(^{16}\) See footnote 12

\(^{17}\) See footnote 12

\(^{18}\) See above sections related to COICOP and Regulation 1722/2005