Some thoughts on Chapter 3 of the revised SEEA

General

The new Chapter 3 of SEEA on Physical Flow Accounts is a very important and relevant part of classic Environmental Economic Accounts. It represents the concepts to compile the physical measurable pressures on the environment in a single coherent system. Moreover, this system connects in a consistent way the data on the pressures with economic data, which are provided by National Accounts.

In this context, the Physical Supply and Use Tables (PSUT) constitute the conceptual overarching system that gives the framework, definitions, boundaries and general classifications. PSUT are based on the concepts of monetary SUT / IOT and are therefore directly compatible to monetary Supply and Use Tables. All the different physical sub-systems

- Materials - EW MFA, Product Flow Accounts, Emission Accounts, Waste Accounts,
- Energy (including non-material energy like solar energy)
- Water

have to fit in the overarching framework of PSUT. As a consequence that means:

- Physical inputs and outputs have to fit together. For example all inputs of energy use for combustion and waste incineration have to fit to outputs like CO2 emissions. Moreover, relations between the different "sub-systems" have to be taken into account.
- Physical Flow Accounts have to be coherent to SNA and, at a specific aggregation level, have to fit to national accounts data by industries.

That is important for descriptive analyses on combined physical and monetary data. For example economic data like value added or employees by industries from National Accounts are fully compatible with resource use and air emissions by industries. Furthermore it allows a wide range of input-output analyses in respect of the interrelations between the economy and pressures on the environment.

Beyond that, specific classifications are possible which allow considering specific aspects of the different sub-systems.

All in all, Chapter 3 is a very good piece of work and gives a good basis for countries to construct Physical Flow Accounts.

However, for compiling detailed accounts more information will be necessary by way of handbooks, compilation guides or the like. As far as compilation guides already exist (e.g. Eurostat Manual for Air Emission Accounts, Nov 2008) these could be mentioned and used.

Apart from these general comments, it seems helpful for the further process of finalisation of SEEA chapter 3 to get more clarification especially on the following issues:

- The proposed classes of Natural Inputs,
- How to deal with accumulation and residual flows from accumulation?
- The proposal of net and gross emissions.

Another important and controversial issue that has not been mentioned above is the definition of waste. Actually my feeling is that the proposal made in chapter 3 gives a good general guideline. Perhaps some clarification would be helpful in respect of the differentiation between wastes and by-products. Probably the proposal could be improved by supplementing some parts of the European definition of waste. Actually this could be checked by waste specialists.

Of course there are more points that could be discussed but we suppose these above-mentioned three issues could reveal some new aspects or have not been discussed until now.

Classes of Natural Inputs

The proposal for Classes of Natural Inputs is presented in chapter 3, page 9, table 3.2.2:

Natural resource inputs	Mineral and energy resources **Soil resources** Timber resources Fish resources Other biological resources Water
Ecosystem inputs	Nitrogen Oxygen Carbon dioxide Other atmospheric inputs Soil nutrients
Non-fuel energy inputs	Solar energy Hydro energy …

1. Differentiating Natural Inputs into natural **resource inputs and ecosystem inputs** does not convince. On the one hand the term ecosystem inputs overlaps or is very close to the terminology in experimental accounts on ecosystem services. On the other hand one can argue that all natural inputs are ecosystem inputs.

   Therefore the term ecosystem inputs should not be used for atmospheric gases and soil nutrients in physical Flow Accounts. Classes of Natural Inputs in Physical Flow Accounts could for example be as follows:

   Natural resource inputs
   - Mineral and energy
   - Biological resources
   - Soil nutrients
   - Atmospheric inputs
   - Water

   Non-fuel energy /non-material inputs

2. In Table 3.2.2, **soil resources** and soil nutrients are listed as Natural Resource Inputs. The question is what is the content of soil resources in Physical Flow Accounts? According to asset accounts (chapter 5.7, especially §§ 289, 296) soil resources provide the physical base to support the growth of biological resources, are the

source of soil nutrients and provide an essential store of water. Flows of soil resources are described as different kinds of erosion (by wind, by floods or a landslip). That is not a physical **input** flow in the economy but a loss of the asset of soil and an output flow. Flows like basement excavation or unused extraction from mining seems not really to fit to soil resources.

Are there other flows of soil resources that could be seen as physical inputs from the environment to the economy? If not flows of soil resources would not be a part of Natural Inputs.

How to deal with accumulation?

In PSUT, capital formation and accumulation in controlled landfills is shown in the use table in a column for accumulation (page 6, table 3.2.1). However, emissions from landfills are reported in the corresponding industry, e.g. waste management, and not as emissions from accumulation.

The question arises, how to record residuals from demolition of buildings or scrapping of machineries? According emissions from landfill residuals from demolition or scrapping would probably be reported by different industries. The advantage is that residuals are shown by industries. A disadvantage is that input and output in these industries do not fit together. Residuals from demolition and scrapping will be shown as output of the different industries but input was reported years ago in accumulation column. Furthermore it is not possible directly to differentiate between residuals from accumulation like emissions from landfills or residuals from demolition on one side and other residuals from this industry on the other side. If, on the use side there is the physical input (capital formation), then it seems to be consequent to have the physical output from accumulation on supply side, too.

Residuals and recycling from accumulation are very relevant for example in construction, urban mining, and in metal producing industries and there are also discussions on the "exploitation" of older landfills. Such data are important for analyses of resource efficiency and the potential of recycling. There is, at least in Germany, a strong demand for data on recycling activities. If accumulation were introduced as a column also in supply tables, such intra-economy recycling flows could be reported explicitly.

In global consultation, Eurostat made a proposal on how to deal with this fact and shows some recording alternatives. One alternative is to introduce a column on accumulation in the Supply Table (as in the Use Table) and record there demolition residuals and scrapping as well as air emissions from landfill. That seems to us to be a preferable alternative.

The basic question that should be answered is this: Should an accumulation column be introduced in the Supply Table and should such output flows from accumulation explicitly be reported in PSUT?

Gross and net recording of air emissions

The air emissions account (see table 3.6.1, page 43) differentiates between (gross) generation of air emissions, capture, transfer and storage by industries and net air emissions to the environment. There arise several questions: What is gross, what is net and are there relevant facts that make it necessary to introduce these different categories?

Net emissions are the amounts which are emitted to the environment. But what are gross emissions? For carbon dioxide there is a relevant example. Gross CO_2 emissions are before CO_2 capture and storage, net emissions are after. Here the most relevant aspect is the storage and safeguarding of CO_2. This could become a relevant scale. Another example could be SO_2 emissions before and after flue gas desulphurisation. Or, more in general, does it make sense and is it measurable to show emissions before and after end of the pipe technologies? Are there other relevant examples?

From our point of view, it seems not to be a helpful figure and it seems difficult to compile gross emissions before end of the pipe technologies like flue gas desulphurisation for SO_2 emissions. Therefore our proposal is to show only net emissions and to introduce a row "for information: carbon capture". If such things should become more relevant, the proposal on gross and net air emissions could be introduced later in time.

Conclusion

Chapter 3 is a well developed and adequate chapter that serves the purpose very well. As mentioned above, some more practical guidelines would be helpful. However, supplementing some more practical guidelines is something that could be done in the future.