Comments to
"REVISION OF THE SYSTEM OF ENVIRONMENTAL-ECONOMIC ACCOUNTS (SEEA) Draft version for Second Round of Global Consultation October 2011"
Submitted by Statistics Norway

Chapter 5: Asset accounts

The treatment of renewable energy resources is not treated consistently in the current draft of the SEEA. On the one hand it is recommended that the resource rent stemming from renewable energy production (wind, solar, tidal, geothermal, hydro) is accruing to land but then hydropower is to be accruing to the water resources – so the treatment for hydropower is not clear.

The current treatment in the category of "mineral and energy resources assets" clearly excludes renewable energy resources so this category appears to include "energy resources" but then excludes major portions of some countries' energy resources – such as Norway, where over 98% of electricity production if from hydropower.

(a) Classification of renewable energy resources
There are two options in classifying renewable energy resources (in physical and monetary terms):

1) In the present version of SEEA renewable energy resources are categorized as land/water resources. As a consequence of this "Mineral and energy resources" should be named "Non-renewable resources", because renewables as hydropower, wind, solar etc. clearly are *energy* resources. The resource rent stemming from renewable energy production should be separated from other benefits accruing to the land/water resources (as the SEEA also recommends).
Or…
2) The resource rent stemming from renewable energy such as hydro, wind, solar etc. could be categorized as energy assets in the group "Mineral and energy resources". But then formulations as in 5.175 "Mineral and energy resources" … "cannot be renewed" must be changed.

Special comments to 5.231-5.237; *Treatment of energy from renewable sources*.

5.232 "…in an accounting sense there is no physical stock of these other renewable energy resources that can be used up or sold".

No country has infinite amounts of water resources that can be used for hydropower, so this resource is clearly scarce and can clearly be used up and sold. Wind, solar power, geothermal energy etc. are also in a way finite resources. The resource rent is maybe not so much connected to scarcity, but to diminishing marginal productivity of different locations (so-called differential rent). The best locations (of a very large physical stock) are built out first and will give rise to this Ricardian rent.

5.233 "…the measurement scope of SEEA in relation to these resources relates to the amount of energy that is produced".

It may be true that it is difficult to measure the actual *physical stock* of wind and solar energy in a region. (It may be possible to estimate *potential* deposits, but this is not in the scope of SEEA.) For these resources the actual *asset value* can be estimated. However, it is at least possible to measure the physical stock of water assets in cubic meters (and e.g. height of fall) that is behind the production of hydropower. This is also suggested in Table 5.11.2 Physical asset accounts for water resources, where it is emphasized that the amount of water used for hydropower should be separately estimated from other uses, cf. 5.485 i).

The value of a renewable energy assets is clearly connected to *the amount* of energy produced. However, the aim should be to estimate the *value* of the renewable energy assets. As with the non-renewable resources NPV is the appropriate method also for valuation of renewable energy (the NPV estimation method should be mentioned throughout the SEEA, e.g. 5.304, when calculating the energy value of renewable assets).

5.236 As commented above the present value of a renewable energy asset must be estimated. The value of energy has to be partitioned from other values of the land/waters where the resources are situated. Then NPV of e.g. hydropower energy assets can be a part of the water resources as the SEEA suggest (see 1 above). Another alternative is to make the renewable energy assets a part of the "Mineral and energy resources" (see 2 above) and let other asset values of the resource than energy be a part of the land/water value. Nevertheless, the NPV as the correct way of estimating hydropower assets should be clearly expressed in the monetary asset accounts for water resources, e.g. 5.486-5.489.

It is inconsistent that the SEEA mentions hydropower both with regards to the value of "inland water" in the monetary asset account for *land* (Table 5.6.7) and as a physical asset as part of the *water resources*, cf. 5.485i. As the water accounts deal with volumes of water (and not surface area), we prefer the asset value of hydropower to be categorized as water resources. This is also supported by the formulations in 5.470 in the SEEA. It is the volume of water and not the surface area of water that is the important dimension here in relation to hydropower generation (and of course elevation change or "fall").

(b) Measuring stocks and value of the mineral and energy resources

It is paramount to include so-called "undiscovered resources" in the stocks of "mineral and energy resources" (non-renewables). If not, the stock accounts in Table 5.5.2 will severely underestimate the amount of a non-renewable resource. Even if the SEEA says that it shall not evaluate potential deposits, this has to be done at least concerning the non-renewable assets.

With regards to asset account in Table 5.5.4 the recommendation is only to value the class A reserves (so-called proven reserves, often associated with 90 % probability of extraction). This will severely underestimate the true NPV of the resource, as new discoveries will be made, technological progress increases the recovery rate etc. We strongly recommend valuing all categories of the resource: Class A (proven), class B (probable), class C (possible) and also potential deposits (undiscovered resources).

In this respect it is important to emphasize that different sources give different estimates of the amount of even the proven reserves in class A, e.g. BP and EIA for different countries. Hence, even without including the more uncertain known reserves (class B and C in Table 5.5.1), there is still a great deal of *uncertainty*.

Many national agencies have estimates for undiscovered non-renewable resources, e.g. the Norwegian Petroleum Directorate on oil and gas. With respect to petroleum, the US Geological Survey has made estimates of undiscovered resources in different regions of the world. The USGS also has estimates of future reserve addition due to increased oil recovery (e.g. by increased technological progress).

It should be mentioned that the SEEA has other difficult measuring challenges as e.g. measuring the asset life of an aquatic resource with the aid of biological models (5.455-5.457).