

Guidance note on Accounting for the Economic Ownership and Depletion of Natural Resources

Introduction

This guidance note provides guidance on how to determine economic ownership of (non-renewable) natural resources and how to account for their depletion.

So far, accounting practice in several countries has shown that the default option offered by the 2008 SNA to assign ownership of natural resources to the legal owner (which in most countries concerns the government), is not satisfactory. In practice, the risks and rewards of natural resource ownership are often shared between private and public parties. In these cases, SEEA 2012 Central Framework (SEEA CF) favours a “partitioning” of the relevant assets. This apparent difference between the two international standards raises the question of how one should account for the economic ownership of natural resources.

A second issue concerns the recording of depletion. While SEEA CF recommends a recording of depletion as a cost of production, the 2008 SNA does not recognise these costs and accounts for depletion as an “other change in the volume of assets”. In this respect, it should be noted that depletion is often confined to the rundown of non-renewable mineral and energy resources, while an argument could be made to extend this notion of depletion to other natural resources as well.

Related to the previous point, one should also acknowledge the longstanding discussion on advocating net, instead of gross, income and saving as indicators deserving a much more prominent role, as compared to gross indicators, such as gross domestic product (GDP). This call for net indicators raises questions on the recommended net recording in the SNA and whether it should also address natural resource depletion. Given recent advancements in measurement and the imperative to recognise environmental costs in mainstream measures of economic activity, it's considered time for these question to be revisited.

Regarding the issues raised above, the guidance note puts forward the following recommendations:

- 1) It is recommended to apply the SNA principles of economic ownership to natural resources. Instead of assigning ownership of natural resources by convention to the legal owner (i.e. the 2008 SNA recommendation), it is proposed, when circumstances warrant such a treatment, to apply a split-asset approach and assign economic ownership to relevant institutional sectors in line with the actual distribution of resource rents and the sharing of operational risks.
- 2) In line with the SEEA CF, it is recommended to record depletion of natural resources as a cost of production in the next SNA.
- 3) It is proposed to extend the notion of depletion to non-cultivated biological resources, instead of restricting it to mineral and energy resources, as is currently the case in the 2008 SNA.
- 4) Finally, as a consequence of the proposed recording of depletion, the definition of core indicators, such as Net Domestic Product (NDP) and Net National Income (NNI), are directly affected. In this respect, it is strongly advocated to renew efforts to put greater emphasis on net indicators, as opposed to the current emphasis on gross measures. This would not only correct the most frequently used macro-economic aggregates for the consumption of fixed capital (depreciation), but also for the running down of non-renewable natural resources, and for the non-sustainable use of non/cultivated biological resources.

Guidance Note on Accounting for the Economic Ownership and Depletion of Natural Resources

Peter van de Ven (OECD) and Mark de Haan (Statistics Netherlands)

So far the accounting practice in several countries has shown that the default option offered by the 2008 SNA to assign ownership of natural resources to the legal owner, in most countries government, is not satisfactory, particularly not when breaking down the natural resource accounts by institutional sector. In practice the risk and rewards of natural resource ownership are often shared between private and public parties. SEEA 2012 Central Framework (SEEA CF) seems to advocate a “partitioning” of the relevant assets¹. This apparent difference between two international standards and other issues raise the question on how one should account for the ownership of natural resources.

A related issue concerns the recording of depletion. While SEEA CF recommends a recording of depletion as a cost of production, the 2008 SNA ignores these costs and accounts for depletion as a so-called “other change in the volume of assets”. In this respect, depletion is often confined to the run-down of non-renewable mineral and energy resources. One wonders though whether this notion of depletion (or degradation) should not be extended to other natural resources as well.

In respect of the latter, one should also acknowledge the longstanding discussion on advocating net instead of gross income and saving as indicators deserving a much more prominent role, certainly as compared to gross indicators, such as gross domestic product (GDP). This call for net indicators raises questions on the recommended net recording in the SNA and whether it should also address natural resource depletion. Given recent advancements in measurement and the imperative to recognise environmental costs in mainstream measures of economic activity, it’s considered time for these question to be revisited.

¹ Actually, SEEA CF is not entirely clear about the allocation of ownership of mineral and energy resources. However, from the guidance on partitioning the costs of depletion between the legal owner and the extractor, one can derive that a partitioning of the ownership is also advocated.

1. Introduction to the issue

1. Paragraph 13.50 of the 2008 SNA explains that *“it is frequently the case that the enterprise extracting a resource is different from the owner of the resource. In many countries, for example, oil resources are the property of the state. However, it is the extractor who determines how fast the resource will be depleted and since the resource is not renewable on a human time-scale, it appears as if there has been a change of economic ownership to the extractor even if this is not the legal position. Nor is it necessarily the case that the extractor will have the right to extract until the resource is exhausted. Because there is no wholly satisfactory way in which to show the value of the asset split between the legal owner and the extractor, the whole of the resource is shown on the balance sheet of the legal owner and the payments by the extractor to the owner shown as rent”*.

2. On the other hand, para. 5.217 of SEEA CF acknowledges that both the extractor and the government may have assets in the form of expected future incomes from resource extraction: *“Depending on the nature of the arrangements, often both the extractor and the government will have substantial assets in the form of expected future incomes from the extraction of the resources”*. In line with this guidance, SEEA CF advocates a partitioning of depletion costs between the legal owner and the extractor.

3. Recently De Haan and Haynes (2019) submitted a paper to the London Group on environmental accounting arguing that in their opinion natural gas resources in the Netherlands are in fact subject to joint economic ownership of the Dutch State and Shell/ExxonMobil. When drafting this paper they also consulted colleagues from e.g. Canada and Norway, and this confirmed that The Netherlands is probably not a unique case. This again calls for a reconsideration of the current guidance of the 2008 SNA.

4. From a conceptual point of view, one could also argue that the recommendation of the 2008 SNA on the recording of natural resources in the accounts of the legal owner contains an implicit misalignment, as the allocation of the natural resource assets does not match the recording of income from these assets. Typically, not all of the income related to the natural resources is appropriated by the legal owner (in the rest of this note assumed to be government). Part of the income, and often a substantial share of this income, is retained by the extractor of the natural resource.

5. Similarly, one would like to allocate the costs of depletion to the sector that receives the relevant (gross) income. Paragraph 5.218 of SEEA CF notes that *“... a specific objective is to show how the incomes earned from the extraction of natural resources are impacted by the cost of depletion. In particular, the SEEA aims to define depletion-adjusted estimates of operating surplus, value added and saving at both an economy-wide level and for institutional sectors. Since there is only one amount of depletion for a given mineral and energy resource, it must be allocated between the relevant units within the accounting framework”*. However, the accounting of depletion as costs of production is not compatible with the allocation of ownership to the legal owner, as recommended by the 2008 SNA. It would lead to an inconsistency with the allocation of (the changes in) the monetary value of the asset.

6. The Research Agenda of the 2008 SNA fully recognises these apparent inconsistencies. In this respect, paragraph A4.51 states the following: *“In the case of a natural resource that is not capable of replenishment on a human time-scale and the use in production eventually exhausts it, the owner may permit the resource to be used to extinction. In this case the SNA recommends that economic ownership of the natural resource remains with the lessor while the lessee pays royalties recorded as*

rent. Only the lessee and not the lessor undertakes production. This means that the reduction in the value of capital due to production is recorded in the balance sheet of the owner as an other change in volume of assets. The link between the rundown in the value of the assets and its use in production is lost. As in the previous case, the fact that part of the rent paid is compensation for the reduction in the value of the asset is not recognized”.

7. Closely linked to the above is the longstanding discussion on giving more prominence to net, instead of gross, measures of income and saving, including the most frequently used indicator of gross domestic product (GDP). As noted in paragraph 2.141 of the 2008 SNA, “..., *the concept of value added should exclude the allowance for consumption of fixed capital. The latter, in effect, is not newly created value, but a reduction in the value of previously created fixed assets when they are used up in the production process*”. This call for net indicators makes one also wonder whether the recommended net recording in the SNA should also address natural resource depletion, i.e. whether or not depletion (and depreciation) adjusted income and saving should be introduced in the system of national accounts. The latter has become even more relevant in view of the increasing attention to environmental issues, and the continuous progress in accounting for the environment. Paragraph 2.167 of the 2008 SNA already alludes to such a different treatment, albeit in the context of satellite accounting.

8. When discussing depletion of natural resources, this is often limited to mineral and energy resources, thus excluding renewable natural resources, predominantly biological resources. In the latter case, a distinction has to be made between cultivated resources and non-cultivated resources. Cultivated biological resources are considered produced assets, and recorded as either changes in inventories or as fixed assets, as a consequence of which the run-down of these assets are accounted for as decreases in inventories or as consumption of fixed capital (depreciation). Non-cultivated assets on the other hand are considered as non-produced assets, of which the non-sustainable use is often referred to as degradation, which according to the 2008 SNA is to be recorded as an *other change in the volume of assets*, similar to depletion of mineral and energy resources. Although the discussion in this guidance note is often restricted to the recording of (depletion of) mineral and energy resources, the recommendations apply to both non-renewable and renewable natural resources. In this respect, one should be aware of the issue that the 2008 SNA actually seems to recommend some kind of split-asset approach², for example in the case of rights or permits to exploit a resources, e.g. fishing quota, which are transferred to the exploiter. A separate guidance note on the accounting for biological resources will contain a more in-depth discussion of these related issues.

9. This guidance note is organized as follows. Section 2 discusses existing material, among which the current guidance according to the 2008 SNA and SEEA CF. This is followed, in Section 3, by a discussion of a possible alternative treatment. Section 4 and 5 cover the conceptual and practical aspects of the proposed treatment.

2. Existing material

Recording of (depletion of) natural resources

10. The 2008 SNA makes a distinction between produced assets and non-produced assets, whereby produced assets are resulting from a production process, as defined in the SNA, and broken

² Here, it should be noted that the guidance provided in the 2008 SNA is not entirely clear and satisfactory.

down into the following categories: fixed assets; inventories; and valuables (SNA 2008, paragraphs 10.10 – 10.13). Non-produced assets on the other hand “... consist of naturally occurring resources such land, water resources, uncultivated forests and deposits of minerals that have an economic value” (SNA 2008, paragraph 10.15). A further distinction is made into three categories: natural resources; contracts, leases and licenses; and purchased goodwill and marketing assets. To avoid complicating the discussion, this guidance note first and foremost focuses on natural resources.

10. Looking at the recording of natural resources, the most relevant paragraphs in the 2008 SNA are the following:

13.49 The value of subsoil mineral and energy resources is usually determined by the present value of the expected net returns resulting from the commercial exploitation of those resources, although such valuations are subject to uncertainty and revision. As the ownership of mineral and energy resources does not change frequently on markets, it may be difficult to obtain appropriate prices that can be used for valuation purposes. In practice, it may be necessary to use the valuations that the owners of the assets place on them in their own accounts.

13.50 It is frequently the case that the enterprise extracting a resource is different from the owner of the resource. In many countries, for example, oil resources are the property of the state. However, it is the extractor who determines how fast the resource will be depleted and since the resource is not renewable on a human time-scale, it appears as if there has been a change of economic ownership to the extractor even if this is not the legal position. Nor is it necessarily the case that the extractor will have the right to extract until the resource is exhausted. Because there is no wholly satisfactory way in which to show the value of the asset split between the legal owner and the extractor, the whole of the resource is shown on the balance sheet of the legal owner and the payments by the extractor to the owner shown as rent. (This is therefore an extension of the concept of a resource rent applied in this case to a depletable asset.)

17.340 Mineral resources differ from land, timber and fish in that although they also constitute a natural resource, there is no way of using them sustainably. All extraction necessarily reduces the amount of the resource available for the future. This consideration necessitates a slightly different set of recommendations for how transactions relating to their use should be recorded.

17.341 When a unit owning a mineral resource cedes all rights over it to another unit, this constitutes the sale of the resource. Like land, mineral resources can only be owned by resident units; if necessary a notional resident unit must be established to preserve this convention.

17.342 When a unit extracts a mineral resource under an agreement where the payments made each year are dependent on the amount extracted, the payments (sometimes described as royalties) are recorded as rent.

17.343 The owner (in many but not all circumstances government) does not have a productive activity associated with the extraction and yet the wealth represented by the resource declines as extraction takes place. In effect, the wealth is being liquidated with the rent payments covering both a return to the asset and compensation for the decline in wealth. Although the decline in wealth is caused by the extractor, even if the resource were shown on the balance sheet of the extractor, the rundown in wealth would not be reflected in the extractor's production account because it is a non-produced asset and thus not subject to consumption of fixed capital. ... For these reasons, simple recording of payments each year from the extractor

to the owner as rent and changes in the size and value of the resource as other changes in the asset accounts of the legal owner is recommended.

11. In addition, the following is stated in relation to the recording of depletion:

6.241 Consumption of fixed capital is calculated for all fixed assets owned by producers ... Fixed assets must have been produced as outputs from processes of production as defined in the SNA. Consumption of fixed capital does not, therefore, cover the depletion or degradation of natural assets such as land, mineral or other deposits, coal, oil, or natural gas, or contracts, leases and licenses".

Instead, as noted before, depletion is recorded as an *other change in the volume of assets*, more precisely *K21 Depletion of natural resources*.

12. In summary, a natural resource is recorded on the balance sheet of the legal owner (in many countries the government), depletion is recorded as an *other change in the volume of assets* in the accounts of the owner, and the receipts of the owner from the extractor for the permission to exploit the reserves are recorded as rent. A numerical example of this recording, for both the legal owner, i.e. government, and the extractor is presented in Annex 1 to this guidance note; see example A.

13. This recording poses a number of problems. First of all, part of the resource rent may be appropriated by the extractor, and this capital income is disconnected from the natural resource asset from which this income originates, as (the relevant part of) this asset is not shown in the balance sheet of the extractor. The case for recording such an asset in the accounts of the extractor becomes even stronger, if the permission to extract would be transferable. Another problem is that output, value added, and operating surplus, which includes the full value of the resource rent generated, is recorded in the accounts of the extractor, while the underlying asset, i.e. the natural resource that is being exploited, is recorded in the accounts of the legal owner³. Moreover, although not recorded as such in the central framework of the 2008 SNA⁴, it is evident that the use of the resource, i.e. its capital service, is an input into the production of goods and services, similar to labour inputs and capital services of fixed assets.

14. Chapter 5 of the SEEA CF provides much more extensive guidance on the measurement and recording of natural resources, both in physical terms and in monetary terms⁵. Instead of explicitly recommending to record the asset in the books of the legal owner, SEEA CF notes the following:

5.126 A general characteristic of mineral and energy resources is that the income earned from the extraction of the resources is shared between economic units. Most commonly, part of the income accrues to the extractor of the resources in the form of operating surplus and part of the income accrues to the government in the form of rent. The government earns this income, on behalf of the society, by allowing access to the resources.

³ At the end of a separate guidance note on the recording of biological resources (forthcoming), a discussion is included on a possible alternative recording of the income from natural resource leases, as output instead of property income (rent).

⁴ Please note that chapter 20 of the 2008 SNA deals with capital services and national accounts. This chapter also addresses the capital services derived from natural resources.

⁵ In this guidance note, only the paragraphs relevant for the discussion in this guidance note are included, as it would go too far to include all relevant texts. Readers who would like to learn know more about the recording and measurement of natural resources are referred to SEEA CF.

5.217 Depending on the nature of the arrangements, often both the extractor and the government will have substantial assets in the form of expected future incomes from the extraction of the resources. ... the expected incomes (which are equal in total to the resource rent) can be separated into two components: depletion and net return to environmental assets. Changes in the value of the assets for each unit will reflect declines due to depletion, while the return to environmental assets will be reflected in the generation and allocation of income accounts.

15. All in all, SEEA CF explicitly recommends to allocate the costs of depletion in line with the appropriation of expected incomes by the legal owner and the extractor. It is not entirely clear, but one could also interpret this recommendation as an implicit recognition of a split-asset approach. Based on this recommendation for depletion, SEEA CF subsequently recommends a treatment along the following lines, as presented in paragraph 5.220 and Table 5.10:

5.220 The following accounting treatment is recommended for the SEEA:

- a) Record the total cost of depletion in the production and generation of income accounts of the extractor as deductions from value added and operating surplus. This ensures that the analysis of extractive activity and economy-wide aggregates of operating surplus and value added fully account for the cost of depletion. Further, since the government has no operating surplus in regard to the extraction activity, not recording depletion in the production account of the government ensures that estimates of government output (which are calculated based on input costs) are not increased owing to depletion;
- b) Record the payment of rent from the extractor to the government in the allocation of primary income account. This entry is the standard national accounts entry;
- c) Record an entry, entitled "Depletion borne by government", in the allocation of primary income account to reflect (i) that the rent earned by the government includes the government's share of total depletion which must be deducted to measure the depletion-adjusted saving of government; and (ii) that the depletion adjusted saving of the extractor would be understated if the total amount of depletion were deducted in the extractor's accounts. Another way of viewing this entry is to consider that the rent earned by government must be recorded net of depletion (i.e., depletion-adjusted rent is derived) in the derivation of depletion adjusted saving for government.

Table 5.10
Entries for allocating the income and depletion of mineral and energy resources

Transaction	Government		Extractor	
	Resources	Uses	Resources	Uses
Production account				
Output—sales from extraction			100	
Intermediate consumption				50
Gross value added			50	
Consumption of fixed capital			-15	
Net value added			35	
Depletion			-6	
Depletion-adjusted net value added			29	
Generation of income account				
Compensation of employees				20
Gross operating surplus			30	
Consumption of fixed capital			-15	
Net operating surplus			15	
Depletion			-6	
Depletion-adjusted operating surplus			9	
Allocation of primary income account				
Depletion-adjusted operating surplus				
Rent		5		5
Depletion borne by government		3	3	
Depletion-adjusted saving		2		7

16. When it comes to defining depletion, paragraph 12.26 of the 2008 SNA puts depletion equal to *“the reduction in the value of deposits of subsoil assets as a result of the physical removal and using up of assets”*. A more precise definition is provided by SEEA CF, in paragraphs 5.75 ff. Paragraph 5.76 defines depletion (in physical terms) as *“the decrease in the quantity of the stock of a natural resource over an accounting period that is due to the extraction of the natural resource by economic units occurring at a level greater than that of regeneration”*. This latter definition differs from depletion according to the 2008 SNA, in that it goes beyond non-renewable resources, and also includes the decrease in the quantity of renewable natural biological resources, whereby depletion is defined as the amount of extraction that is above the level of regeneration.

17. The value of fossil energy resources is closely linked to that of renewable energy resources (separate guidance note forthcoming). The commercial success of renewable energy resources and concerns about climate change are expected to have a declining effect on the value of fossil energy resources. This phenomenon is by some addressed as ‘stranded assets’ which are assets that have suffered from unanticipated or premature write-downs, devaluations or conversion to liabilities.⁶ In the future this notion of stranded assets may also apply to fixed assets such as oil rigs, other mining equipment and fossil fuel powered transport equipment. Section 5.1 of the OECD Manual on Measuring Capital, Second Edition explains that *“abnormal” or unexpected obsolescence is (...) excluded from consumption of fixed capital. Abnormal obsolescence here means unforeseen obsolescence and it may occur either because of unexpected technological breakthroughs or changes in the relative prices of inputs. Relative prices can change following events on product or factor markets, for example shifts in consumer taste. Other reasons are of a technological nature: the introduction of electronic calculators in the 1960s is an example of an unforeseen development, which resulted in a sudden and sharp fall in the value of the existing stock of electromechanical calculators. The 1973 oil-shock is an example of a drastic shift in relative input prices, which may have led to premature replacement in some countries of inefficient oil-using equipment by more efficient models or by assets using other energy sources. Premature scrapping of assets, which arises from unforeseen obsolescence, is treated in the same way as losses of assets due to wars or natural calamities and is shown in the account for “Other changes in the volume of assets”*. Although the SEEA CF framework does not provide guidance on this matter, based on this guidance in the OECD Handbook one may argue that unexpected obsolescence of fossil energy resources must not be accounted for as depletion but instead requires a recording as an other change in the volume of assets.

18. In addition to the above consideration, there is a clear link between the notions of depletion and degradation, the latter being defined, in paragraph 5.89 of SEEA CF, as *“changes in the capacity of environmental assets to deliver a broad range of contributions known as ecosystem services (e.g., air filtration services from forests) and the extent to which this capacity may be reduced through the action of economic units, including households. In this sense, since depletion relates to one type of ecosystem service, it can be considered a specific form of degradation”*.

19. Obst and Edens (2019) note the following: *“For ecosystem assets, depletion constitutes a subset of degradation, since depletion refers only to the capital cost associated with provisioning services from an ecosystem, in cases where the provisioning services are being generated unsustainably. Degradation encompasses capital costs associated with provisioning and other ecosystem services. An important requirement is that there is a consistency of treatment within the*

⁶ https://en.wikipedia.org/wiki/Stranded_asset.

accounting framework with respect to consumption of fixed capital (depreciation of produced assets), depletion and degradation”.

20. In this guidance, depletion excludes the depletion of cultivated biological resources, as these assets are recorded either as fixed assets (for resources yielding repeat products), or as inventories (for single-use resources), for which the decline in value by using them in the production process is recorded as depreciation or as withdrawals from inventories. On the other hand, different from the definition of the 2008 SNA, it also refers to non-cultivated biological resources⁷, in addition to mineral and energy reserves.

Valuation issues around (the depletion of) natural resources

21. Issues around valuation of natural resource assets and their depletion is covered in a separate guidance note. Nevertheless, it is good to mention a couple of particularities, which are relevant in the context of understanding the relationships between the value of these assets, the resource rent they generate, and the valuation of depletion of these assets.

22. The 2008 SNA actually does not say much about the valuation of natural resources. It is only shortly addressed in paragraph 20.47, as follows: *“Suppose that a mining company knows the size of the deposit being mined, the average rate of extraction and the costs of extraction of one unit. After allowing for all intermediate costs, labour and the cost of fixed assets used, what is left must represent the economic rent of the natural resource. By applying this to the expected future extractions, a stream of future income can be estimated and from this, using the techniques already described, a figure for the value of the stock of the resource at any point in time”.*

23. SEEA CF again provides much more detailed guidance on the valuation of (the depletion of) natural resources, especially in annex A5.1, regarding the application of the net present value method, and in annex A5.2, on the choice of the discount rate. Moreover, in the recent past, research and discussions on the application of the recommended methodologies have raised concerns, both regarding the interpretation of the 2008 SNA and SEEA CF, and regarding their practical implementation in an internationally comparable way. All of this resulted in a paper with more detailed recommendations requiring changes to both the SNA and the SEEA CF, on which the Advisory Expert Group (AEG) on National Accounts was consulted, in its tenth meeting in April 2016; see AEG (2016a).

24. In addition to that, there is a vast literature on valuing natural resources. Here, the references are limited to a separate guidance note (forthcoming), including Pionnier et al (2018), which nicely summarise the main issues regarding the current guidance in the 2008 SNA and SEEA CF, and provide recommendations for improving the guidance. AEG (2016b) includes a summary of the main conclusions of the deliberations on the delineation of the physical stocks, the granularity of the estimation procedures, and the application of the resource rent in compiling the net present value of the resources, as follows:

⁷ Note that there is a thin line between cultivated and non-cultivated biological resources, something that is being dealt with in guidance note EA.02.

49. Agreed that the SEEA classification⁸, which is aligned to the United Nations Framework Classification – 2009, is also suitable for the national accounts.

50. Expressed concerns about the practicalities to estimate the values of mineral and energy resources for classes B and C, and agreed to focus on the valuation of class A.

51. In valuing mineral and energy resources, noted that it is important to pay particular attention to the discount rate, heterogeneity of extraction costs, production constraints imposed by initial investments and commodity price volatility.

25. Without having knowledge of the contents of AEG (2016a), the above conclusions are slightly cryptic, especially the last one related to the valuation of natural resources. For the purpose of this guidance note, it is important to realise that the AEG agreed on not letting the volatility of commodity prices directly feed into the valuation of the underlying assets. As stated before, natural resources are typically valued on the basis of the net present value of future resource rents. Often, the resource rents of the current year have been and are applied one-on-one as an indicator for the future pattern of resource rents. This practice leads to highly volatile asset prices; if applied in full, it could even lead to negative prices. The method was however advocated, because actual market prices were being used. Although one can indeed argue that in this case market prices are used for the commodity prices and the resulting resource rents, the result of applying this to the future pattern does not reflect the actual market prices of the underlying assets. The latter are based on the expectations of the pattern of future resource rents, and using the current resource rent for this pattern is to be considered as a quite simple and naïve method. Probably a forecast based on the past trend in commodity price developments, or a longer-term average of resource rents, trying to take into account the impact of future energy transitions, would provide a closer approximation of expectations, and therefore the market price of the asset.

26. Using the latter methodology for valuing natural resources has also an impact on the valuation of depletion costs. As noted before, depletion in physical terms is defined as the decrease in the quantity of the stock of a natural resource over an accounting period that is due to the extraction of the natural resource by economic units occurring at a level greater than that of regeneration. In the case of non-renewable resources, this comes down to the extraction during an accounting period, whereas in the case of renewable resources, it concerns the non-sustainable use of a resource, by having extraction levels which surpass natural growth⁹.

27. If one disregards new discoveries, enhancements, catastrophic losses, reclassifications, etc., the change in the value of a natural resource asset from one point in time to another point in time can be broken down into depletion and revaluations, as follows¹⁰:

Depletion = change in physical stocks multiplied with the average “price in situ” (i.e. the average resource rent) during the accounting period

⁸ Class A: Commercially recoverable resources, Class B: Potentially commercially recoverable resources, Class C: Non-commercial and other known deposits.

⁹ This is a simplification. In practice, the linear relationship between on the one hand extraction and other threats (external shocks) and on the other hand changes in biological resource stocks is slightly more complicated.

¹⁰ With thanks to Bram Edens for his valuable comments on an earlier version of this guidance note. See also annex A5.1 of SEEA CF, for a more detailed explanation, e.g. on average in-situ prices.

Revaluation = change in the “price in situ” multiplied with the average stock during the accounting period

28. The resulting depletion value may lead, in certain periods of low commodity prices, and thus low resource rents, to negative values of operating surplus adjusted for depreciation and depletion. Some may find this an unacceptable result. Here, it is argued that this is not that different from arriving at negative (net) operating surplus for other economic activities in periods of downturn.

29. Having said all of this on the valuation of natural resources, including depletion, it is clear that the SNA could substantially gain from more precise recommendations on these issues, either by introducing text from, or referencing to, relevant parts of SEEA CF. Furthermore, the SNA as well as SEEA CF could be further enhanced by adding more text on the measurement of natural resources in physical and monetary units. See, for further information, the forthcoming guidance note on the valuation of natural resources.

List of references

AEG (2016a), “Classification and valuation of natural resources”, Paper presented at the 10th Meeting of the Advisory Expert Group on National Accounts (13-15 April 2016, Paris), No. SNA/M1.16/13. Available at:

https://unstats.un.org/unsd/nationalaccount/aeg/2016/13_Natural_Resource_Valuation.pdf

AEG (2016b), “Conclusions of the 10th Meeting of the Advisory Expert Group on National Accounts (13-15 April 2016, Paris)”.

Available at: <https://unstats.un.org/unsd/nationalaccount/aeg/2016/Conclusions.pdf>

De Haan and Haynes (2019), “About natural gas and dwellings in Groningen”, Paper presented at the 25th meeting of the London Group on environmental accounting (7-10 October 2019, Melbourne).

OECD (2009), “OECD Manual on Measuring Capital, Second Edition”, OECD Publishing, Paris.

Available at: <https://www.oecd.org/sdd/productivity-stats/43734711.pdf>

Obst and Edens (2019), “Discussion Paper 5.4: Recording Degradation in Ecosystem Accounts”, Paper prepared in the context of the revision of SEEA Experimental Ecosystem Accounting, Working Group 5: Valuation and Accounting Treatments”. Available at:

https://seea.un.org/sites/seea.un.org/files/dp5.4_recording_degradation_v3_oct2019.pdf

Pionnier, P. and S. Yamaguchi (2018), “Compiling mineral and energy resource accounts according to the System of Environmental-Economic Accounting (SEEA) 2012: A contribution to the calculation of Green Growth Indicators”, OECD Green Growth Papers, No. 2018/03, OECD Publishing, Paris.

Available at: <https://doi.org/10.1787/3fcfd7f-en>

Statistics Canada (2015), “Natural resource wealth statistics in the National Balance Sheet Accounts”.

Available at: <https://www150.statcan.gc.ca/n1/pub/13-605-x/2015009/article/14239-eng.htm>

United Nations, European Commission, International Monetary Fund, Organisation for Economic Cooperation and Development, World Bank (2003), “Integrated Environmental and Economic Accounting 2003”, New York, United States.

Available at: <https://unstats.un.org/unsd/environment/seea2003.pdf>

United Nations, European Commission, International Monetary Fund, Organisation for Economic Cooperation and Development, World Bank (2009), “System of National Accounts 2008”, New York, United States. Available at: <https://unstats.un.org/unsd/nationalaccount/docs/SNA2008.pdf>

United Nations, European Commission, Food and Agriculture Organization of the United Nations, International Monetary Fund, Organisation for Economic Cooperation and Development, World Bank (2014a), “System of Environmental-Economic Accounting 2012 — Central Framework”, New York, United States. Available at: https://seea.un.org/sites/seea.un.org/files/seea_cf_final_en.pdf

United Nations, European Commission, Food and Agriculture Organization of the United Nations, International Monetary Fund, Organisation for Economic Cooperation and Development, World Bank (2014b), System of Environmental-Economic Accounting 2012 — Experimental Ecosystem Accounting, New York, United States.

Available at: https://seea.un.org/sites/seea.un.org/files/seea_eea_final_en_1.pdf

UNCEEAA (2007), “Treatment of Depletion in the Updated SEEA”, Outcomes paper presented at the Second Meeting of the UN Committee of Experts on Environmental-Economic Accounting (5-6 July 2007, New York), No. ESA/STAT/AC.131 and UNCEEAA/2/9.

Available at: https://unstats.un.org/unsd/envaccounting/ceea/meetings/UNCEEAA_2_9.pdf

3. Options considered

The allocation of ownership of natural resources

30. The 2008 SNA and SEEA CF explain how economic ownership must be assigned to the entity obtaining the rewards and bearing the risks associated with the asset’s economic use. This does not align very well with the actual practice of sharing risks and rewards in the case of natural resource extraction in many countries, in which the income generated by this activity is shared between the legal owner and the extractor.

31. An assessment of such a practice of sharing rewards and risks associated with Dutch gas exploration is presented in Annex 2 to this guidance note. In this example, it is important to stress that the Dutch mining law, similar to practices in many other countries, identifies the government as the *legal owner* of all natural resources in the ground. As explained in paragraph 10.6 of the SNA 2008, legal and economic ownership are not always the same thing. Paragraph 10.7 of the SNA 2008 continues explaining: “... *when government claims legal ownership of an entity on behalf of the community at large, the benefits also accrue to the government on behalf of the community at large. Thus government is regarded as both the legal and economic owner of these entities*”. However, this reasoning is inconsistent with many cases of ownership of natural resources. In this respect, paragraph 13.2 of the 2008 SNA also states that in the case of a natural resource lease the asset continues to appear in the balance sheet of the lessor even though most of the economic risks and rewards of using the asset in production are assumed by the lessee.

32. Chapter 17 of the 2008 SNA, more specifically paragraphs 17.313 – 17.315, put much emphasis on the length of natural resource extraction contracts (covering the asset’s full service life or only parts of it). The entanglement between public and private parties in extraction arrangements is given less thought. So, a key question is whether or not a split-asset recording is compatible with the 2008 SNA.

While paragraph 5.217 of SEEA CF is somewhat clearer on the possibility of such a recording, paragraph 17.347 of the SNA argues that *“sharing the risks and rewards of an asset between different units at a point in time is unusual”*.

33. The existence of sharing assets is however less unusual than a pure national accounting point of view advocates. Paragraph 17.347 of the 2008 SNA introduces, for example, the concept of unincorporated joint ventures (UJV), where members share assets equally and ownership of the assets is shared in proportion to ownership shares of the UJV. One possible way of avoiding the recognition of this type of sharing assets could be to consider such an unincorporated joint venture as a separate institutional unit between the government and private oil companies, record an asset transfer of the natural resource from government to the UJV, and record the combined ownership of the assets including the natural resource on the basis of shares in the UJV. In the Dutch case, applying the UJV accounting option would probably be within scope of the current SNA. A perhaps undesirable consequence would be that natural resource ownership is now fully assigned to the non-financial corporations sector. And in the context of SEEA CF, such a routing still does not support the proper breakdown of natural resource depletion by sector.

34. Canada has been confronted with similar accounting challenges; see Statistics Canada (2015). In the Canadian situation, the lease arrangement as proposed by the 2008 SNA does not align very well to economic reality, and would lead to a significant distortion of the government net worth. Although Statistics Canada hesitates to split the ownership of natural resources by sector in physical and monetary terms, they instead suggest the introduction of a supplementary asset category “intangible assets related to natural resources”, which allows for a breakdown of resource ownership between the mining companies and the government in the Canadian accounts for natural resources by institutional sector.

35. In this context, it can also be noted that the 2008 SNA implicitly seems to favour a split-asset approach for non-cultivated biological resources. In the case of e.g. fishing quota, which are directly connected to the use of natural resources, rights or permits to exploit a resources are transferred to the exploiter. For a more in-depth discussion, reference is again made to the separate guidance note on accounting for biological resources (forthcoming).

36. A final argument in favour of a split-asset approach is the problematic nature of recording the natural resources in the balance sheets of the legal owner, while the operating surplus and resulting resource rents ends up in the books of the extractor. As a consequence, accounting for depletion, as costs of capital, in the accounts of the extractor leads to an inconsistency with the accounting for the underlying asset that is being affected by the extraction in the balance sheets of the legal owner. Example B in Annex 1 shows this inconsistency, when one would record depletion in line with the guidance provided by SEEA CF. It shows that allocating depletion costs in line with the share in capturing the resource rent leads to a recording of depletion in the capital account of the extractor, without a concomitant asset being available in the balance sheets of the extractor.

37. A possible way-out of this apparent inconsistency would be the attribution of all depletion costs to the legal owner, via the item “depletion/degradation of natural resources”, which acts as an adjustment to the rent, in the distribution of income account. This way of recording is presented in Example C of Annex 1. This would indeed lead to an alignment of the allocation of the assets in question and the allocation of depletion costs. However, one is still confronted with a misalignment of the actual allocation of the assets and related gross income derived from these assets.

The recording of depletion

38. Natural resources have substantial value, generating a future stream of income in the form of resource rents. Furthermore, it goes without saying that in the production of oil, gas and minerals, the relevant non-renewable assets are being depleted. The same holds for non-sustainable use of renewable resources. One could even argue that the relationship between the activity of mining and quarrying and the use of the relevant deposits is more direct and unambiguous than the use of fixed assets in the production of other goods and services. Yet the use of these assets is not treated as an input into the production process, with the effect that net operating surplus does not provide an appropriate reflection of the (implicit) return on invested capital. Currently, only depreciation of produced (fixed) assets is deducted, as a consequence of which net operating surplus also includes a remuneration for the depletion of natural resources¹¹.

39. SEEA 2003, paragraph 10.27, also states that not accounting for depletion implies the notion that natural resources are infinitely abundant, a view which is evidently not true for a great number of natural resources. Furthermore, as noted in UNCEEA (2007): *“The relevant economic characteristic of both fixed and natural assets is that they are typically not used up in a single year but instead deliver services to their owners over a long period of time. This suggests that while natural resources are neither fixed assets nor inventories, they have more in common with the former and their treatment should follow that of fixed assets rather than inventories.”*

40. The current recommendation for recording natural resources, as included in the 2008 SNA, does not allow for an appropriate accounting for depletion. SEEA CF outlines this in a very clear and comprehensive way, in para. 5.129: *“... accounting for these incomes (earned from the extraction of natural resources; addition by the authors) and the associated depletion is problematic in the standard national accounts framework for two main reasons. First, the income flows are recorded in different accounts with the value added and operating surplus of the extractor recorded in the production and generation of income accounts, and the rent earned by the government recorded in the allocation of primary income account. Second, no cost of depletion is recorded against the income earned in the structure of the standard accounts (in contrast with the cost of produced assets, which is recorded as consumption of fixed capital). Instead, in the SNA, depletion is recorded in the other changes in the volume of assets account”*.¹²

4. Recommended approach – conceptual aspects

41. All in all, it is proposed here to change the allocation of natural resources to institutional sectors. Instead of simply assigning ownership of natural resources to the legal owner, it is proposed to apply a split-asset approach, in line with the actual distribution of resource rents.

42. In addition, it is proposed to record depletion of natural resources in the central framework of the SNA, not only as part of extended or satellite accounts, according to the recommendations of SEEA CF.

¹¹ Cf. foot-note 5.

¹² See para. 12.26 of the 2008 SNA.

43. Finally, it is proposed to extend the notion of depletion to non-cultivated biological resources, instead of restricting it to mineral and energy resources, as is currently the case in the 2008 SNA.

44. As a consequence of the proposed recording of depletion, the definition of core indicators, such as Net Domestic Product (NDP) and Net National Income (NNI), are directly affected. In this respect, it is strongly advocated to do yet another effort in putting far greater emphasis on net indicators, as opposed to the current use of gross indicators. This would not only justifiably correct the most frequently used macro-economic aggregates for the consumption of fixed capital (depreciation), but also for the running down of non-renewable natural resources, and the non-sustainable use of biological resources.

45. The main argument against net measures is the complexity of measuring capital. For fixed assets, time series of investment data are needed to obtain, via the perpetual inventory method (PIM), numbers for the capital stocks and their depreciation over time. For countries with less developed national accounting systems, this may be demanding. However, particularly for natural resource dependent economies, net income and measures for natural resource depletion are critical, as asset stripping is not a sustainable path to economic prosperity. So, it is crucially important to complement recommendations on using net income measures with an exchange of knowledge programme to get this job done. The Task Team on Communication will provide separate guidance on this issue of net versus gross measures.

46. An example of the proposed recording is provided in Example D of Annex 1, in which the impact of introducing a split-asset approach is combined with an accounting for depletion as costs of production, including an allocation of these costs in line with the allocation of income generated by the extraction of natural resources.

47. In the example, it is assumed that the resource rents (45) from exploiting the natural resources (750 at the beginning of the period) are split between government (2/3) and the extractor (1/3). Effectively, this means that government is giving up 1/3 of the natural resources. The latter is recorded, in the accounts of the legal owner, as a negative acquisition of non-produced assets with a concomitant capital transfer, both with a value of (minus) 250. While slightly awkward at first sight, this is actually in line with economic reality, with government foregoing part of the future resource rents. Especially in the case of developing countries, where governments may be triggered by the assurance of receiving a steady flow of future rents, which actually only represents part of the potential gains from natural resources, the recording of a loss (capital transfer) would make evident that government is redistributing wealth from the society at large to private companies exploiting nation's resource wealth. The negative acquisition of non-produced assets is also fully consistent with the changes in natural resource assets on the balance sheets.

48. Furthermore, although net lending/net borrowing of government is not affected, there is a negative impact on *net saving* and changes in *net worth due to saving and net capital transfers*, consistent with the amount of depletion (30) that has been allocated to government. This again reflects the economic reality that not all receipts of rents can be considered as income. Part of the rents, in the presented examples 100%, simply represents a compensation for the rundown of assets due to depletion.

5. Recommended approach – practical aspects

49. Currently, the accounting for natural resources is not that well developed. Not many countries compile and disseminate estimates for natural resources, and if they do, it shows that international comparability is seriously hampered by differences in (the granularity of) sources and the methodologies applied. In this respect, more detailed guidance has been developed, to improve the current lack of statistics on natural resources. It is clear however that countries would need to step up their efforts, if one would like to arrive at a depletion adjusted NDP/NNI. Here it is proposed that a number of resource rich countries, with a broad worldwide representation, closely co-operate in further establishing an agreed methodology for compiling internationally comparable estimates for stocks and flows of natural resources, both in current prices and in constant prices.

50. Concerning the feasibility of fully accounting for depletion, and its impact on NDP/NNI, it should be acknowledged that many countries already now face major issues in compiling estimates for these netted macro-economic indicators, not being able to arrive at high-quality estimates for consumption of fixed capital (depreciation). One could thus argue that, although accounting for depletion further complicates the estimation of NDP/NNI, it does not necessarily lead to additional countries not being able to compile estimates for the relevant macro-economic indicators. On the other hand, as noted before, it is considered of paramount importance for developing countries to appropriately reflect in how far their growth of income is realised with a running down of their natural resource base, thus hampering future income growth potential. As such, one would have to balance the policy relevance and the impact of an improved accounting for depletion-adjusted numbers against the additional compilation issues.

51. It is clear that in valuing natural resources one has to deal with a number of uncertainties, especially when it comes to the assessment of the future stream of resource rents. The application of a split-asset approach adds another layer of complexity to these estimates, as the distribution of resource rents between the legal owner and the extractor is not always that straightforward. Certainly at the start of a deal between the legal owner and the extracting company, it may still be rather obscure how the arrangements will work out in practice. In some cases, where a fixed percentage or a fixed amount of rent per quantity of natural resources extracted, a high quality estimate of the appropriation shares seems feasible. However, in the case of more complex arrangements, such as shown in the annex for The Netherlands, an *ex ante* assessment at the start of the deal may be more problematic.

52. The above makes one wonder how to deal with various changes in the distribution of (future) resource rents. A couple of examples are provided here. In the case of a reassessment of the physical stocks, including the extraction period of the resource, it looks most logical to first allocate the additional natural resources to the legal owner, and then impute a disposal of assets from the owner to the extractor, with a concomitant capital transfer, in line with the example presented in the spreadsheet. A similar recording seems warranted in the case of renegotiations of the arrangements leading to a change in the appropriation shares. It may also be the case that the appropriation share of government is dependent on commodity prices and resulting resource rents, in which case the changes may be recorded as revaluations. However, what to do in the case that circumstances have not changed, and actual practice in later years shows that the initial assessment of the distribution keys was simply inappropriate? If this is related to a misinterpretation of the arrangements, a revision of the time series seems to be the logical choice. However, if it is related to other issues, recording other changes in the volume of assets could be considered.

Annex 1: Recording of mineral and energy resources in the system of national accounts

This annex presents various options for the recording of mineral and energy resources. In doing so, a simplified set of assumptions is made, as follows.

Accounts of the extractor:

1. Output	100
2. Compensation of employees	35
3. Consumption of fixed capital	20
4. Resource rent (= 1 – 2 – 3)	45
5. Rents paid to government	30
6. Stock of fixed assets (at T = 0)	200
7. Stock of fixed assets (at T = 1)	180
8. Cash flow (= 1 – 2 – 5)	35

Accounts of the legal owner (i.e., government):

1. Rents received from extractor	30
2. Depletion of natural resources	45
3. Stock of natural resources (at T = 0)	750
4. Stock of natural resources (at T = 1)	705
5. Cash flow (= 1)	30

As can be derived from the numbers in the above, for reasons of keeping the example simple, the return on capital, including natural resources, is set equal to zero. Furthermore, it shows that the legal owner appropriates 2/3 of the resource rent derived from extracting the resources, while the extractor appropriates 1/3 of the related resource rent.

In the elaboration of the recordings below, both the accounts of the extractor and those of the legal owner (i.e., government) are shown.

Example A

Recording of natural resources according to the 2008 SNA: allocation of natural resources to legal owner, and depletion recorded as an other change in the volume of assets

Accounts for the extractor of natural resources

Production and generation of income account			
Compensation of employees	35	Output	100
Consumption of fixed capital	20		
Net operating surplus	45		

Distribution of income account			
Rent on natural resources	30	Net operating surplus	45
Net saving	15		

Capital account			
Acquisition of assets	0	Net saving	15
Consumption of fixed capital	-20	Net capital transfers received	0
Net lending/borrowing	35	Changes in NW due to saving and CT	15

Financial account			
Cash	35	Net lending/net borrowing	35

Other changes in the volume of assets account			
Depletion/Degradation of natural resources	0	Changes in NW due to other changes in assets	0

Balance sheet					
Cash	0	35	Net worth	200	215
Fixed assets	200	180			
Natural resources	0	0			
Total	200	215	Total	200	215

Example A (continued)

Recording of natural resources according to the 2008 SNA: allocation of natural resources to legal owner, and depletion recorded as an other change in the volume of assets

Accounts for the government

Production and generation of income account			
Compensation of employees	0	Output	0
Consumption of fixed capital	0		
Net operating surplus	0		

Distribution of income account			
		Net operating surplus	0
		Rent on natural resources	30
Net saving	30		

Capital account			
Acquisition of assets	0	Net saving	30
Consumption of fixed capital	0	Net capital transfers received	0
Net lending/borrowing	30	Changes in NW due to saving and CT	30

Financial account			
Cash	30	Net lending/net borrowing	30

Other changes in the volume of assets account			
Depletion/Degradation of natural resources	-45	Changes in NW due to other changes in assets	-45

Balance sheet					
Cash	0	30	Net worth	750	735
Fixed assets	0	0			
Natural resources	750	705			
Total	750	735	Total	750	735

Example B

Alternative recording of natural resources: allocation of natural resources to legal owner, and depletion recorded as a cost of production (in line with SEEA CF)

Accounts for the extractor of natural resources

Production and generation of income account					
Compensation of employees	35	Output	100		
Consumption of fixed capital	20				
Depletion/degradation of natural resources	45				
Net operating surplus	0				
Distribution of income account					
Rent on natural resources	30	Net operating surplus	0		
Depletion/degradation borne by government	-30				
Net saving	0				
Capital account					
Acquisition of assets	0	Net saving	0		
Consumption of fixed capital	-20	Net capital transfers received	0		
Depletion/Degradation of natural resources	-15				
Net lending/borrowing	35	Changes in NW due to saving and CT	0		
Financial account					
Cash	35	Net lending/net borrowing	35		
Other changes in the volume of assets account					
Depletion/Degradation of natural resources	0	Changes in NW due to other changes in assets	0		
Balance sheet					
Cash	0	35	Net worth	200	200
Fixed assets	200	180			
Natural resources	0	-15			
Total	200	200	Total	200	200

Example B (continued)

Alternative recording of natural resources: allocation of natural resources to legal owner, and depletion recorded as a cost of production (in line with SEEA CF)

Accounts for the government

Production and generation of income account			
Compensation of employees	0	Output	0
Consumption of fixed capital	0		
Net operating surplus	0		

Distribution of income account			
		Net operating surplus	0
		Rent on natural resources	30
		Depletion/degradation borne by government	-30
Net saving	0		

Capital account			
Acquisition of assets	0	Net saving	0
Consumption of fixed capital	0	Net capital transfers received	0
Depletion/Degradation of natural resources	-30		
Net lending/borrowing	30	Changes in NW due to saving and CT	0

Financial account			
Cash	30	Net lending/net borrowing	30

Other changes in the volume of assets account			
Depletion/Degradation of natural resources	0	Changes in NW due to other changes in assets	0

Balance sheet					
Cash	0	30	Net worth	750	750
Fixed assets	0	0			
Natural resources	750	720			
Total	750	750	Total	750	750

Example C

Alternative recording of natural resources: allocation of natural resources, including the full costs of depletion, to legal owner

Accounts for the extractor of natural resources

Production and generation of income account				
Compensation of employees	35	Output	100	
Consumption of fixed capital	20			
Depletion/degradation of natural resources	45			
Net operating surplus	0			
Distribution of income account				
Rent on natural resources	30	Net operating surplus	0	
Depletion/degradation of natural resources	-45			
Net saving	15			
Capital account				
Acquisition of assets (including natural resources)	0	Net saving	15	
Consumption of fixed capital	-20	Net capital transfers received	0	
Depletion/degradation of natural resources	0			
Net lending/borrowing	35	Changes in NW due to saving and CT	15	
Financial account				
Cash	35	Net lending/net borrowing	35	
Other changes in the volume of assets account				
Depletion/Degradation of natural resources	0	Changes in NW due to other changes in assets	0	
Balance sheet				
Cash	0	35	Net worth	200 215
Fixed assets	200	180		
Natural resources	0	0		
Total	200	215	Total	200 215

Example C (continued)

Alternative recording of natural resources: allocation of natural resources, including the full costs of depletion, to legal owner

Accounts for the government

Production and generation of income account			
Compensation of employees	0	Output	0
Consumption of fixed capital	0		
Net operating surplus	0		

Distribution of income account			
		Net operating surplus	0
		Rent on natural resources	30
		Depletion/degradation borne by government	-45
Net saving	-15		

Capital account			
Acquisition of assets (including natural resources)	0	Net saving	-15
Consumption of fixed capital	0	Net capital transfers received	0
Depletion/degradation of natural resources	-45		
Net lending/borrowing	30	Changes in NW due to saving and CT	-15

Financial account			
Cash	30	Net lending/net borrowing from capital account	30

Other changes in the volume of assets account			
Depletion/Degradation of natural resources		Changes in NW due to other changes in assets	0

Balance sheet					
Cash	0	30	Net worth	750	735
Fixed assets	0	0			
Natural resources	750	705			
Total	750	735	Total	750	735

Example D

Recommended recording: Allocation of natural resources to legal owner and exploiter, in line with the share of gross returns (split-asset approach), and depletion recorded as a cost of production

Accounts for the extractor of natural resources

Production and generation of income account			
Compensation of employees	35	Output	100
Consumption of fixed capital	20		
Depletion/degradation of natural resources	45		
Net operating surplus	0		

Distribution of income account			
Rent on natural resources	30	Net operating surplus	0
Depletion/degradation borne by government	-30		
Net saving	0		

Capital account			
Acquisition of assets	250	Net saving	0
Consumption of fixed capital	-20	Net capital transfers received	250
Depletion/degradation of natural resources	-15		
Net lending/borrowing	35	Changes in NW due to saving and CT	250

Financial account			
Cash	35	Net lending/net borrowing	35

Other changes in the volume of assets account			
Depletion/Degradation of natural resources	0	Changes in NW due to other changes in assets	0

Balance sheet					
Cash	0	35	Net worth	200	450
Fixed assets	200	180			
Natural resources (or permits)	0	235			
Total	200	450	Total	200	450

Example D (continued)

Recommended recording: Allocation of natural resources to legal owner and exploiter, in line with the share of gross returns (split-asset approach), and depletion recorded as a cost of production

Accounts for the government

Production and generation of income account					
Compensation of employees	0		Output		0
Consumption of fixed capital	0				
Net operating surplus	0				
Distribution of income account					
			Net operating surplus		0
			Rent on natural resources		30
			Depletion/degradation borne by government		-30
Net saving	0				
Capital account					
Acquisition of assets	-250		Net saving		0
Consumption of fixed capital	0		Net capital transfers received		-250
Depletion/degradation of natural resources	-30				
Net lending/borrowing	30		Changes in NW due to saving and CT		-250
Financial account					
Cash	30		Net lending/net borrowing		30
Other changes in the volume of assets account					
Depletion/Degradation of natural resources	0		Changes in NW due to other changes in assets		0
Balance sheet					
Cash	0	30	Net worth	750	500
Fixed assets	0	0			
Natural resources	750	470			
Total	750	500	Total	750	500

Annex 2: The Dutch example

Introduction

53. In accordance with legal ownership principles laid down in the Dutch Mining Law, the government has been identified as the sole owner of all energy resources in the Dutch national accounts. Notwithstanding this treatment, the risks and rewards of energy extraction appear to be shared between the government and private companies in the non-financial corporations' sector. A full assignment of (economic) ownership of energy resources to the Dutch government thus leads to an overstatement of the government's net worth.

54. Het Gasgebouw (Gas Building) is not a piece of real estate, but represents the cooperation between the Dutch government, the Nederlandse Aardolie Maatschappij (NAM, Dutch Oil Company; see www.nam.nl) and GasTerra in the extraction and distribution of natural gas in Groningen. The NAM is a joint venture between Shell and ExxonMobil. GasTerra is a wholesaler in natural gas which is owned by Shell (25%), ExxonMobil (25%) and the Dutch government (50%). Its share owners have agreed to set the annual profits of GasTerra to approximately € 40 million, irrespective of realized trade volumes or trade margins. The Gasgebouw is not a unique Dutch phenomenon. A similar kind of arrangement between government entities, public and private companies is found in the Norwegian oil and gas mining industry and may exist in other countries as well.

55. The Maatschap Groningen (Partnership Groningen) is a partnership, in which the NAM participates for 60%, and Energie Beheer Nederland (EBN, Energy Management Netherlands) for 40%. It was established for the purpose of co-managing the natural gas field in Groningen. The partners share a common interest, by putting labour and capital to the disposal of a joint operation. The Maatschap Groningen assures that for the Groningen gas field specific arrangements apply, also with respect to the resource revenue allocation.

56. As a government owned incorporated enterprise, EBN is overseeing the state's interest in all Dutch oil and gas mining operations. As a non-operating partner, EBN is participating in virtually all oil and gas projects in the Netherlands. EBN's interest in these activities varies from 40% to 50% (www.ebn.nl). The 2018 annual report mentions that the joint arrangement for each gas field between EBN and private partners takes the form of a non-operated venture (NOV). This implies EBN is a partner in all Dutch mining projects, however without being responsible for daily operations. In a joint operation, the operators have (both) rights to the assets and obligations for the liabilities (in line with the International Financial Reporting Standards (IFRS) 11).

57. EBN's annual report for 2018 reports sales from business operations of €3.0 and €2.7 billion in 2017 and 2018, respectively. EBN is a company with a staff of 110 high-skilled employees. Its annual report mentions being active in the following areas: mineral exploration, reuse and decommissioning of old pipelines, developing and deploying know-how and managing participations in oil and gas companies.

58. In the Dutch national accounts, EBN is currently classified as an administrative body in the government sector. Its output is valued at the sum of production costs. The key point under consideration is EBN's lack of autonomy of decision. Government involvement in the entity's operations appears to go beyond a shareholder's capacity to determine general corporate policy. For

example, EBN is not allowed to enter into certain contracts without authorization from the Dutch government. Furthermore, EBN was not involved in the recent agreement between the NAM and the government to lower future gas extractions. As a consequence, EBN's identification as a self-standing institutional unit would be problematic. Together with the partners Shell and ExxonMobil, EBN co-participates in Dutch mining operations and shares (on behalf of the government) part of the risks and rewards.

Assessing economic ownership, rewards

59. Table 1 shows how in the case of the Netherlands the rewards of gas mining, i.e. the resource rents, are shared between the government and the mining corporations. After subtracting current and capital costs, the combined gas/oil resource rents equalled €3.6 billion in 2017. The table shows oil mining is only a minor activity in the Netherlands relative to gas mining. Based on the indicated 40% involvement, EBN would directly obtain a resource rent of €1.5 billion. This amount is remarkably close to EBN's dividend payments in 2017 to the government. EBN's share in total sales (€3 billion) is 27%, which is below the 40%. This may be due to non-operational profits/losses. Anyhow, the income generated by EBN, including the resource rent, accrues to government. The "meeropbrengsten regeling" (surplus revenue regulation) guarantees that so-called "surplus revenues" of the NAM, for example due to rising gas prices, are appropriated by the government. In 2017, this regulation, which specifically applied to the Groningen gas field, led to an additional allocation of €1.2 billion of resource income to the Dutch government. In 2018, the "meeropbrengsten regeling" was replaced by another agreement between the government and the NAM, leading in the coming years to smaller shares of revenues going to the government¹³. But the most important outcome of this new agreement was that in Groningen €70 billion worth of natural gas will remain in the ground. All in all, before corporate taxes the total appropriation of the resource rent by government equals 73%, and after taxes almost 80%.

Table EA01.1
Resource rent allocation in the Netherlands, 2017

	<i>mln €</i>	
Output, extracted oil and gas	11232	
Intermediate consumption	4243	
Compensation of employees	769	
User costs of capital	2579	
Resource rent*	3641	
o.w. Gas	3533	
o.w. Oil	108	
Share EBN**	1456	
Share NAM	2185	
o.w. 'Meeropbrengstregeling'***	1202	
Share Dutch State (S.13)	2658	73%
Share non-financial corporations (S.11)	983	27%
Share Dutch State after corporate taxes	2876	79%

*National accounts, detailed calculations

**Based on a 40% share as obtained from the EBN annual statement (2017)

***NAM annual statement (2017)

¹³ <https://www.rijksoverheid.nl/documenten/kamerstukken/2018/06/25/kamerbrief-akkoord-op-hoofdpijnen-met-shell-en-exxonmobil>.

Assessing economic ownership, risks and rewards

60. The risks of gas mining operations are diverse. The volatility of natural gas market prices will affect the government and the mining companies proportionally. Furthermore, both the NAM and the EBN have allocated provisions to their balance sheets, to cover future obligations for decommissioning the facilities on depleted gas fields. However, in the case of the Netherlands, probably the most apparent form of risk is related to the damages on dwellings and buildings from earthquakes resulting from gas mining in Groningen. The NAM's balance sheet shows provisions for the expected costs of these damages too. This refers to an agreement that both the government and the NAM will continue taking the responsibility for covering future compensation of damages.

A tentative conclusion

61. In the case of the Netherlands, a large part of the government's appropriation of the resource rents is being enforced by the government's participation in all gas mining activities via the EBN. The allocation of resource rents presented in table 1 show that a smaller, but still a significant, share of the revenues are appropriated by the private mining companies. This indicates de facto a shared economic ownership.

62. It has been argued that the Dutch government has strong decision power in setting extraction levels. This hints at the Dutch government having ultimate control over the gas resources. However, the decision in 2018 not to extract a substantive part of remaining gas reserves in Groningen could only be the outcome of intensive negotiations between the government and the NAM. In fact, a letter from the Minister of Economic Affairs to Dutch Parliament explicitly mentions that, under the former regime, the NAM was to be considered as the owner, while according to the new agreement the government takes over control of the Groningen gas field. As a consequence, government also takes full responsibility for possible future prosecutions¹⁴.

63. A tentative conclusion is that given this assessment of risks and awards, there is a strong case to assign economic ownership of Dutch natural gas resources partly to government and partly to the non-financial corporation involved, i.e. the NAM.

64. The situation in other countries may be quite comparable to the Dutch one, although the specificities of the arrangements may differ. For each public-private extraction arrangement, a thorough assessment of the risks and awards should precede a proper resource partitioning. The case of the Netherlands shows this can be done in a reasonably satisfactory way. As such, this may ease the concerns raised in the paragraph 13.50 of the 2008 SNA that there is no wholly satisfactory way to tackle the issue.

¹⁴ <https://www.nrc.nl/nieuws/2018/06/25/gaswinning-groningen-de-staat-wikkelt-af-de-nam-moet-blijven-betalen-a1607856>.