ESA/STAT/AC.238
UNCEEA/6/19

DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS
STATISTICS DIVISION
UNITED NATIONS

Sixth Meeting of the UN Committee of Experts on Environmental-Economic Accounting
New York, 15-17 June 2011
North Lawn Building – Conference Room C

Initiating a SEEA Implementation Program – A First Investigation of Possibilities

Paper prepared by Bram Edens, Mark de Haan, and Sjoerd Shenau of Statistics Netherlands[1]

(for discussion)

[1] The views expressed in this paper are those of the authors and do not necessarily reflect the policies of Statistics Netherlands. We also acknowledge helpful comments and suggestions by UNSD.

Initiating a SEEA Implementation Program – A First Investigation of Possibilities

Paper prepared by Bram Edens, Mark de Haan, and Sjoerd Shenau

1. Introduction

With the drafting of the SEEA on track, the issue of how to go about its implementation becomes more urgent and takes prominence. The Statistical Commission at its forty second session in February 2011, requested the Committee to develop, in consultation with Member States and the regional commissions, an implementation plan for the System of Environmental-Economic Accounting and to set appropriate priorities for Member States to follow."[2]

This discussion paper is a first step towards the development of a more fully articulated international strategy for the implementation of the SEEA.

The paper is organized as follows. In Section 2 the policy demand for environmental accounting is described, focusing on various (inter)national policy and indicator initiatives. Section 3 presents an assessment of the present compilation practices for environmental accounts and supporting environment statistics (i.e. the supply side of environmental accounting), focusing on country experiences with the various types of SEEA accounts. Section 4 contains a brief discussion on issues related to data requirements, response burdens and capacity building inherent in compiling environmental accounts. Taking into account the policy demands and the availability of statistics from ongoing compilation practices, Section 5 categorises and prioritizes the national and international development of the different SEEA accounts into three datasets: minimum required, recommended and desirable. In Section 6 raises various discussion points with a focus on establishing a common international SEEA questionnaire.

2. Policy needs (*demand*)

Recent years have shown an increasing recognition that conventional measures of economic activity need to be broadened and complemented, in order to better inform society about the contribution of the environment and its capacity to render services to the present and future generations. This may result in a strong demand for the central framework and experimental ecosystem accounts of the SEEA. The availability of internationally comparable accounts is obviously an important precondition.

There are various important international policy and indicator developments in the context of SEEA:

- *Green Growth* and *Green Economy*. These recent policy strategies – although different in focus and in details – have in common that they integrate economic

[2] See Report on the Forty-second session of the Statistical Commission Decision 42/104 available on http://unstats.un.org/unsd/statcom/doc11/Report-Final-E.pdf

and environmental data. The green growth strategy pioneered by the OECD includes in addition a proposed indicator framework which is highly compatible with SEEA, in particular because of its focus on ratio or hybrid indicators. The indicators are structured into four themes, three of which draw upon different chapters of SEEA: resource efficiency, which can be derived from physical (and hybrid) flow accounts; natural asset base, which can be derived from asset accounts; economic opportunities and instruments, covered by the environmental goods and services accounts (EGSS) and the accounts for environmental taxes and subsidies.

- *EU2020*. A resource-efficient Europe is one of seven flagship initiatives as part of the Europe 2020 strategy aiming to deliver smart, sustainable and inclusive growth.[3] This initiative aims to create a framework for policies to support the shift towards a resource-efficient and low-carbon economy in order to: boost economic performance while reducing resource use; identify and create new opportunities for economic growth and greater innovation and boost the EU's competitiveness; ensure security of supply of essential resources; fight against climate change and limit the environmental impacts of resource use. Most of these issues could be measured by SEEA embedded indicators; in particular those derived from the physical flow accounts.

- *Beyond GDP*. The EU Parliament "Stresses the need to develop additional indicators for measuring medium- and long term economic and social progress; calls for the development of clear and measurable indicators that take account of climate change, biodiversity, resource efficiency and social inclusion; furthermore calls for the development of indicators that focus more closely on the household-level perspective, reflecting income, consumption and wealth; welcomes the Commission initiative to present an index for environmental pressure, to be submitted alongside GDP, which will initially comprise the following major strands of environmental policy: climate change and energy use, nature and biodiversity, pollution and health impacts, water use and pollution, waste generation and use of resources.[4] These indicators may be derived primarily from the physical flow and asset accounts.

- *Sustainable Development Indicators initiatives*. These kinds of indicator sets can be compiled either at the global level (UN CSD; regional level e.g. EU set or national level). These indicator sets typically have a wider focus than SEEA

[3] http://ec.europa.eu/resource-efficient-europe/pdf/resource_efficient_europe_en.pdf
[4] http://www.europarl.europa.eu/meetdocs/2009_2014/documents/envi/pr/858/858615/858615en.pdf

including for instance welfare and social issues, but SEEA based indicators – both stocks and flows - are usually included as well.

- *Wealth accounting (genuine savings)*. The World Bank has a long running program on wealth measurement that is broadening towards the valuation of natural resources and ecosystem (WAVES). The recent "The Changing Wealth of Nations" (2011) publication also provides time series.[5]

- *Ecosystem accounting* - The European Environmental Agency (EEA) has embarked on an ambitious program titled "Fast track implementation of simplified ecosystem capital accounts for Europe" which should have concrete results by 2012.

The initiatives listed above have in common that the indicators they aim to deliver could very well draw upon the SEEA. Some initiatives focus more on stocks (e.g. World Bank) other more on flows (e.g. EU2020) others on both (e.g. Green Growth). Data from monetary flow accounts is particularly relevant for measuring some of the green growth indicators. At the same time it must be acknowledged that some of the indicators, particularly those addressing the state of the environment or biodiversity, lie outside the scope of SEEA.
Other developments may equally be taken into consideration when devising an implementation strategy:

- *Consumption or footprint based accounting*. Due to increases in computational power and data availability several international datasets are being compiled by several research consortia (e.g. GTAP; WIOD; EXIOPOL). The common focus is on environmental externalities (e.g. those related to waste generation, energy, water and material use in relation to international production, trade and consumption). Linkage to a multi-region IO/SUT framework allows, among other things, for shifting the analysis of environmental externalities from production to consumption.

- *Advances in remote sensing and satellite data*. Especially land, but also water, asset accounts can arguably be easier compiled using these kinds of techniques. There are companies (e.g. AQUAWATCH) very active in this area.

These initiatives, although generated outside the official statistics community, are important sources of information. The increasing use of geospatial environmental statistics from remote sensing and satellite images is likely to change the mind set for the development and generation of environment statistics increasingly emphasizing the importance of spatially disaggregation of information. This leads to a number of issues such as the relationship between these (analytical) datasets and official statistics (SEEA), their maintenance etc. Equally important, these datasets could perhaps also be used to

[5] http://publications.worldbank.org/index.php?main_page=product_info&products_id=23895

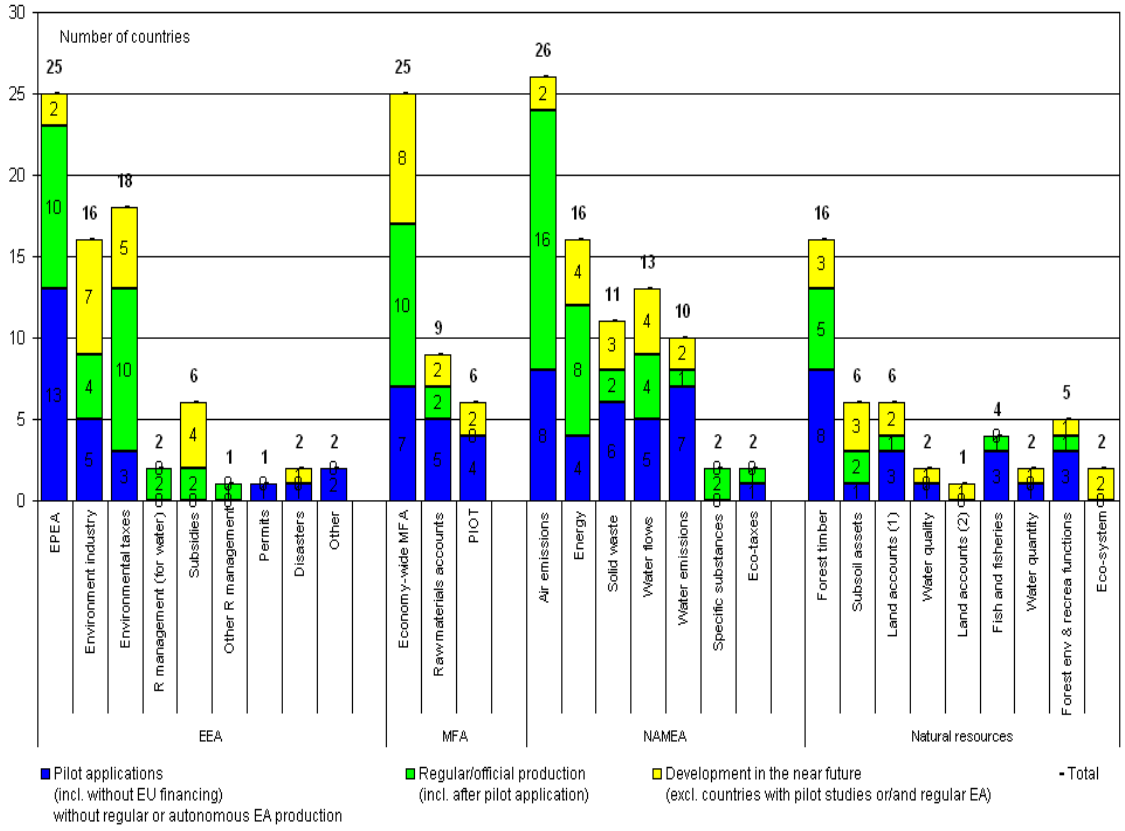
jumpstart the compilation of environmental accounts in countries with little experience making use of the wealth of up to date and quality data from remote sensing and satellite images.
Further consideration should be given to mainstream the use of these sources of geospatial information for compilation of official statistics, since their global and country level availability may contribute to an early compilation of some key national aggregates and statistics for particular environmental accounts such as land and water accounts. These considerations might be of particular importance for both developed and developing countries in meeting their policy needs for these accounts in a cost effective manner.

3. Current country practices (*supply*)

A recent comprehensive assessment of country practices within the EU is provided by Pasquier et al 2007 (see table 1). It shows that in the EU air emission accounts are compiled most often on a regular basis, followed by EW-MFA, EPEA and environmental taxes.
The EU is close to having a legal base on environmental accounting which will make statistical reporting obligatory for member countries. The initial proposal contained three priority modules: air emission accounts; Economy wide (input side) MFA and environmental taxes. These modules were selected based upon the assessment by Pasquier (i.e. supply based) as well as considerations of policy relevance. Recently, during the legislative procedures, an amendment was proposed[6], which states that "as a matter of priority, the Commission shall, in cooperation with the Member States, develop the following new environmental accounting modules for inclusion into the scope of this Regulation by the end of 2014: Environmental Protection Expenditure and Revenues (EPER)/Environmental Protection and Expenditure Accounts (EPEA), Environmental Goods and Services Sector (EGSS); Energy Accounts; Environmentally Related Transfers (subsidies) and Resource Use and Management Expenditure Accounts (RUMEA); Water Accounts (quantitative and qualitative) and Waste Accounts; Forest Accounts; and Ecosystem services Accounts."
Moving beyond the EU, table 2 shows results by the Global Assessment (UNSD, 2007) for various types of accounts as compiled by developed and developing countries. For the developed region, the same picture emerges. For the developing countries water accounts come out on top, followed by energy and emission accounts, mineral asset accounts, forest accounts.

[6]Amendment by the Committee on the Environment, Public Health and Food Safety http://www.europarl.europa.eu/oeil/file.jsp?id=5850442

Table 1
Involvement of EU member states in the different ESEA modules, including their short term plans for future development



Source: Pasquier et al (2007)

Table 2
Types of accounts compiled by region

All world			Developed Regions			Developing regions		
Module	*Number of countries*	*Percentage of countries*	*Module*	*Number of countries*	*Percentage of countries*	*Module*	*Number of countries*	*Percentage of countries*
Total countries - World	**44**	**100**	**Total countries - Developed regions**	**29**	**100**	**Total countries -Developing regions**	**15**	**100**
Energy and emission accounts	33	75	Energy and emission accounts	22	76	Water Accounts	13	87
EPEA	24	55	EPEA	18	62	Energy and emission accounts	11	73
Water Accounts	22	50	MFA/Waste accounts	16	55	Mineral Asset Accounts	9	60
Forest Account	22	50	Forest Account	13	45	Forest Account	9	60
MFA/Waste accounts	22	50	Water Accounts	9	31	Land and Ecosystem Accounts	6	40
Mineral Asset Accounts	14	32	Mineral Asset Accounts	5	17	MFA/Waste accounts	6	40
Land and Ecosystem Accounts	10	23	Fisheries Accounts	4	14	EPEA	6	40
Fisheries Accounts	9	20	Land and Ecosystem Accounts	4	14	Fisheries Accounts	5	33
PSUT	5	11	PSUT	3	10	PSUT	2	13
Other	9	20	Other	6	21	Other	3	20

Source: Global Assessment, UNSD 2007

Table 3 provides a very rough picture of environmental accounting experiences by non-EU countries cross-classified by the different chapters of SEEA. More detailed information on country practices is available through the results of the Global Assessment (UNSD 2008) and an assessment of wealth accounting (World Bank 2011). The countries listed here are known to have (had) environmental accounting programmes. Obviously, there are many more countries that have done work on environmental accounting, for example on a one-off basis or through academia. In addition, there are many more countries with an interest in, or in the process of compiling, environmental accounts.

Table 3
Experiences outside the EU with environmental accounting

	Ch3 Flows	Ch 4 Monetary	Ch5 Assets	Ch 6 Sequence
Australia	x	x	x	x
Botswana			x	
Brazil			x	
Canada	x	x	x	
China	x			x
Colombia		x	x	
India	x		x	x
Indonesia	x		x	x
Japan	x	x	x	x
Jordan	x		x	
Mexico	x		x	x
Namibia			x	
New Zealand	x	x	x	
Philippines	x		x	x
Korea			x	
South Africa	x		x	
USA	x		x	x
EU	x	x	x	x

Source: Author's characterisation

The overall picture that emerges from these tables is that whereas in the EU the focus has been to a large extent on physical flow accounts and monetary accounts (environmental taxes, subsidies and EGSS), outside the EU there seems to be a greater interest in asset accounting. This significant difference in compilation practices for flow based versus stock (natural resources) based accounting between developed (dominated by the European practice) and developing countries could be attributed in large part to the differences in environment related policy perspectives. The policy demand in developing countries should be understood from the need for resource management of their

endowments of natural resources and specific security issues related to water and energy. This developing country perspective differs from the developed world, where flow issues of expenditures, economic instruments, resource efficiency and environmental degradation related to economic production and consumption take prominence and preference. Also data availability issues may be a relevant factor in this context. Emission accounts require energy statistics and emission inventories which may be less readily available in developing countries.

4. Data requirements

A decision about the implementation of environmental accounts will usually be based on an assessment of related costs and benefits (answering the demands of data users). The costs represent among other things the collection of data required to feed the accounts. Data collections are costly in terms of resources but also in terms of respondent burdens. The data requirements of environmental accounts need to be carefully considered as many statistical offices face limitations in budgets and constraints in terms of maximum allowable respondent burdens.

Key objective of environmental accounting is the extension of the already existing economic accounts with information on the environmental aspects of economic production and consumption and natural resources management. For this purpose, the national accounts are usually the point of departure when developing environmental accounts. The national accounts, and particularly the supply-use tables, are by themselves a rich data source. The tables provide (in monetary terms) product transactions which are connected to specific environmental threats. For example purchases of fossil energy items are closely related to emissions to air. The supply-use framework may readily provide information on the characteristic production of service flows covered in environmental protection expenditure accounts.

The additional data requirements of newly developed environmental accounts strongly depend on the source statistics available for the country under consideration. Although perhaps not one country in the world has implemented the full SNA 1993 (or 2008), most countries in the world compile, at least on an annual basis, national accounts statistics. In addition, in a wide range of countries energy statistics are compiled which are subsequently used for the UNFCCC reporting on greenhouse gas emissions.

Countries with advanced statistical programs may face a limited need (if any) of additional data collections when developing environmental accounts. In such countries environmental accountants will mainly be occupied with adjusting the classifications and definitions of environmental statistics with the purpose of integrating them together with the adjacent economic data from the national accounts into the SEEA framework.

Of course the point of departure may completely differ in case an environmental account (for water, energy or another specific resource) is being developed without the availability of source statistics. According to the Global assessment, data availability ranked third after lack of human and financial resources in terms impeding factors. In cases of data limitations the recommended strategy would be to develop environmental statistics hand in hand with that of environmental accounts. Generally, the compilation of

environmental accounts will not require substantial additional efforts once the source statistics are put in place.

5. Recommended accounts for worldwide implementation

Based on the inventory of national and international policy needs (*demand*) and the current state of worldwide SEEA implementation (*supply*), the following stratified implementation strategy for SEEA can be identified, along the lines of the SNA implementation strategy (see the reports for the Statistical Commission E/CN.3/2011/6 and E/CN.3/2001/7). For this purpose the Working Group on National Accounts has developed a categorisation of three datasets to assess the scope of national accounts implementation, namely:

1. A *minimum requirement* dataset, which is the 'minimum requirement' for a country before it can claim implementation of the SEEA;
2. A *recommended* dataset comprise accounts recommended for compilation by all countries;
3. A *desired* dataset which comprises useful data that should be compiled, if possible.

The various SEEA accounts can equally be grouped into these three datasets. This is done in table 4. The first column in this table shows the subset of accounts as found in the SEEA2012. The last column lists the main aggregates that can be derived from these accounts (see also CBS 2008; 2009; 2010) which could serve as (the components of) environmental-economic indicators. The in between columns 1-3 indicate the minimum required (1), recommended (2) and desired (3) datasets.

5.1 Minimum required dataset

The proposed minimum required dataset covers air emission accounts (at least greenhouse gas emissions), water and energy accounts (with a key focus on the use table), mineral and energy resources (in physical and monetary units); environmental expenditure accounts (EPEA), environmental taxes and emission permits, land (forest)[7] accounts.

The outline of this minimum required dataset can be explained as follows. It must be admitted that on a global scale SEEA implementation is strongest in each of the areas identified in this set. This argumentation is clearly supply driven.

From the policy perspective side identified in Section 2 there is equally a strong user demand. First of all many of the proposed accounts and statistics have a direct link to the global policy theme of climate change (emissions, mineral and energy flows and stocks, protection expenditure, environmental taxes, emission permits). Water is a second theme that is expected to remain prominently present on the policy agenda's for the years to come. The third theme is forest and land accounts, which take prominence for land

[7] According to the most recent draft of SEEA, forest accounts are subsumed under land accounts.

management purposes and new data demands for climate change initiatives like Reducing Emissions from Deforestation and Forest Degradation, also known as REDD.

Table 4
Minimum required, recommended and desired SEEA datasets

	1	*2*	*3*	*Key aggregates*
Physical flow accounts				
Full set of supply and use tables for materials			X	
EW material flow accounts (materials use)		X		Domestic material consumption
PSUTs for water (water use)	X			Total water consumption
PSUTs for energy (energy use)	X			Total net energy consumption
Air emissions accounts	X			Net emissions to air
Water emissions accounts		X		Net emissions to water
Waste accounts		X		Net emissions
Asset accounts				
Mineral and energy resources	X			Depletion (in physical en monetary terms)
Land (forest)	X			Depletion (in physical en monetary terms)
Soil resources			X	Depletion (in physical en monetary terms)
Timber resources		X		Depletion (in physical en monetary terms)
Fish resources		X		Depletion (in physical en monetary terms)
Other biological resources			X	Depletion (in physical en monetary terms)
Water resources			X	Depletion (in physical en monetary terms)
Monetary flow acocunts				
EPEA	X			Total environmental protection expenditure
RUMEA		X		Total resource management expenditure
EGSS		X		EGSS: total value added and employment
Environmentally related payments to government	X			Total environmental taxes
Environmentally related payments by government		X		Total environmentally motivated subsidies
Emission permits	X			
Permits and licences to use environmental assets			X	
Costs related to termination of fixed assets			X	

1 = minimum required dataset
2 = recommended dataset
3 = desired dataset

With respect to physical flow accounting (water, energy, materials), it is suggested to focus the minimum required set on the use side of the supply-use framework. The concomitant industry-based vectors of natural resource inputs provide key information for the green growth agenda (enhancing resource productivity and efficiency), particularly in connection to information from the monetary supply-use tables (output, value added, employment, taxes etc.).
In addition to climate change, the emission accounts also link to the issue of (local) air quality. Lack of air quality is a serious health threat in many urban areas throughout the world.
The choice for EPEA seems warranted based on their availability (cf. table 2). But there is also a growing policy demand, especially in relation to the global green growth/green economy agenda as an expected outcome of Rio + 20. At this stage compiling accounts for emission permits (in terms of quantities owned and exchanged but also in monetary terms) is not widespread. However, their importance may be elevating in the context of future international climate change abatement agreements (following up on the Kyoto agreements).

The choice for mineral and energy asset accounts is based on current compilation practices (supply) as well as the improved methodological guidance that SEEA 2012 now provides. Although the implementation of asset accounts for other natural resources is perhaps less widespread, for rich resource endowed countries, it is recommendable to establish asset accounts in both physical and monetary terms for their most prominent natural resources. In these countries monitoring (weak) sustainability on the basis of changes in net wealth type of indicators has particular policy relevance.

5.2 The recommended and desirable dataset

For the recommended dataset, coverage is extended to the full-fledged supply-use tables for water and energy, water emissions accounts and waste accounts. The recommended set also includes economy wide material flow accounts (EW-MFA with focus on direct material input).
As already indicated asset accounts are not equally relevant for all countries. Countries should be given a certain level of flexibility in their implementation. Few countries have compiled asset accounts for soil and water (in terms of stocks, not flows), which are therefore allocated to the desirable set.
Resource use and management accounts (RUMEA) and EGSS as well as environmental subsidies are included in the recommended dataset. In recent years, at least in the EU a fair amount of experience has been gathered in these areas.

6. International harmonised data collection strategy

One of the key responsibilities of the UNCEEA is the global implementation of environmental accounts and promoting the development of international harmonised databases on environmental-economic accounting. The expected adoption of the SEEA central framework in 2012 is a significant first step in this direction.
An important subsequent step is the development of a harmonised data collection strategy. Clearly, the formulation of this strategy warrants an all inclusive collaborative effort of regional and international partners. Moreover, existing data collection programme should be reviewed whether they can be used as building blocks for more comprehensive and tailored collections. This collaborative approach should respect existing mandates and at the same time meet the constraints on response burden for countries and the objectives of resource efficiency and effectiveness.
A global strategy for this data collection framework could be build around the priorities of the minimum required dataset recommended in this paper and extend on the collaborative practices among regional and international agencies established for national accounts and other economic statistics.
It is important to note that with the increasing number of policy initiatives prescribing specific sets of indicators, countries and international organisations are at risk in responding to these emerging and often short term information demands in an ad-hoc manner. This may jeopardise the coherence and quality of those indicators. The UNCEEA, as the custodian of SEEA, should play an active role in demonstrating how and which indicators can be compiled through the use of the SEEA accounts and tables using the same source data. Conversely, these policy initiatives should work closely with

the national and international statistical community in using existing international agreed conceptual frameworks in determining the appropriate policy indicators for quality assurance purposes.

7. Questions to the UNCEEA

The UNCEEA may wish to discuss the following questions:

1. Is the proposed categorisation of sets of SEEA accounts as presented in table 4 a balanced assessment of demand for environmental accounts from policy needs and supply of environmental accounts from current country compilation practices?
2. Is the distinction between required, recommended and desired environmental accounts as proposed in this paper a critical component in the formulation of an implementation and data collection strategy for environmental accounts at international level?
3. Is a common SEEA data collection framework, based on the suggestions made in this paper, something to pursue? If so, within what timeframe?
4. Could the strategy of the implementation of the accounts of the SEEA be integrated with the implementation of the 2008 SNA and supporting statistics, because the SEEA accounts extend in a large part the SNA accounts and tables and use the same source data?
5. What specific efforts are needed to accomplish the strategy to implement the SEEA accounts (e.g. country assistance, regional workshops, training programs, compilation manuals)?
6. Which steps could be taken by the UNCEEA and its members to achieve this goal?

Literature

Pasquier et al (2009) *Environmental Accounting – state of play* Report to Eurostat.
UNSD (2007) *Global Assessment on Environment Statistics and Environmental-Economic accounting*.
CBS (2008) *Indicators in the SEEA: Identifying the main accounting aggregates in SEEA Volume I*. Paper presented at the London Group Meeting in Brussels