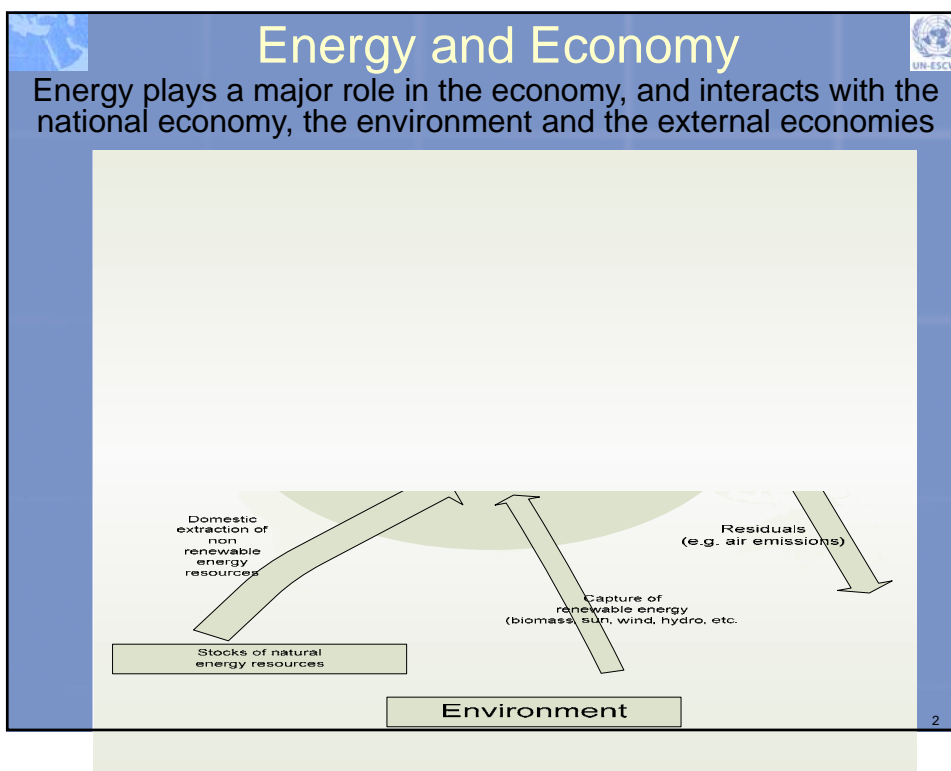



Energy Accounts for the ESCWA region


EGM on Environmental Economic Accounting
for the ESCWA Region
October 14-16, 2009
UN House, Beirut, Lebanon

Wafa Aboul Hosn, ESCWA
and
Ilaria DiMatteo, UNSD






Environmental-Economic Accounting




- The System of Integrated Environmental and Economic Accounting (SEEA) as a satellite system of the SNA systematically accounts for the stocks and flows of environmental resources
- UNCEEA identified energy accounts as an important domain of environmental-economic accounting and requested that energy accounts feature prominently in the revised SEEA.

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Basis for Energy Accounts



- The energy accounts are based on the same definitions and classifications as the national accounts.
- The energy accounts are compiled for each energy commodity in physical quantities and in monetary values.
- The system is based on the identity that the supply must equal the use.
- The supply is made up as the total of *production* and *imports*.
- The use is the total of *exports*, *losses*, *changes in inventories*, *input in industries*, and *private consumption*
- The monetary values are calculated at basic prices, trade margins, taxes, VAT and purchasers prices (market prices)

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Energy accounts Information

Energy accounts provide detailed physical information used in conjunction with corresponding monetary data on:

- energy resources,
- energy production,
- energy conversion
- energy consumption
- facilitate the development of a reliable set of air emission flow accounts

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Use of Energy accounts

- Changes in the energy requirements of particular industries in relation to their output.
- The macro level impacts of new technologies and of eco-efficiency measures and behavioural changes.
- They provide reliable estimates of air emissions related to energy consumption

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User needs



- Users interested in energy markets
- Economic statistics for non-energy sector
- Households as energy users
- National accounts
- Emission statistics (computations)
- Other environment statistics
- National wealth
- Sustainable development indicators
- Governmental use (energy planning)

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Process



- UNSD has embarked on the drafting of the SEEA-E as part of its regular work programme in beginning of 2008
- Work carried out in cooperation with London Group and Oslo Group and InterEnerStat
- Global Assessment of Energy Accounts asked for detailed country practices in compilation
- A consultant started drafting the SEEA-E
- A drafting group with experts on energy statistics and energy accounts has been established to assist UNSD in developing SEEA-E

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Oslo Group <http://og.ssb.no/>

The Oslo Group main objectives:

- address issues related to energy statistics
- contribute to improved international standards and improved methods for official energy statistics

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SEEA-E and the other publications

A suite of publications in support of energy-related information:

- **SEEA-E** : A standard for physical and monetary energy accounts will serve as an input in the revised **SEEA**
- **IRES** (International Recommendation on Energy Statistics)
The statistical foundation: Definitions, Classifications, agreed data items, data collection strategy, data quality.
- **ESCM** (*Energy Statistics Compilers Manual*)
Compilation guide: Best practices, examples of data collection methods

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Coverage of the SEEA-E

Agreed concepts, definitions, classifications, accounting rules and valuation principles

- Energy resource stocks: Physical and monetary accounts
- Flow accounts related to energy: Physical and monetary (Supply and Use Tables)
- Hybrid accounts juxtaposing physical and monetary accounts
- Bridge tables with energy balances and energy accounts
- Air emission accounts, including bridge tables with emission inventories

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Modules (1)

- *Physical and monetary asset accounts for energy resources (below ground)*
 - Record the opening and closing stocks as well as changes in stocks of energy resources in the accounting period due to extraction, discoveries, reclassification or natural causes etc.
 - Monetary asset accounts show the value of energy resources
 - Allow for the calculation of depletion of energy resources
 - When linked to income measures environmentally-adjusted aggregates (e.g. environmentally-adjusted value added and genuine savings) can be derived
 - Provide an indication of the contribution of energy resources to the wealth of a nation
- *Inventories of energy products (above ground)*

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Modules (2)

- *Physical flow accounts for energy*
 - Provide information by economic activity (i.e. ISIC) of the use of energy products for energy and non-energy purposes and the use of renewable resources for energy purposes (e.g. bio fuels) as input in production and consumption
 - Presented in the form of supply and use tables

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Modules (3)

- *Monetary flow accounts* separately identify energy-related transactions that are already part of the conventional economic accounts. These include for example:
 - Costs associated with the energy extraction and distribution
 - Costs and fees paid by the users
 - Energy-related taxes and subsidies
 - Leases and licenses for access to the energy resources etc.
- *Hybrid accounts* juxtapose physical information of the supply and use tables with the monetary supply and use tables of the conventional economic accounts. Useful for analytical purposes (e.g. energy efficiency indicators, etc.)

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Modules (4)

- *Applications of the accounts:*
 - Input-output modeling can be used to calculate embodied energy in imports and exports
 - Decomposition analysis can be done to analyze the driving forces of energy use over time
- *Glossary*

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Draft outline of SEEA-E

- Chapter 1: Introduction.
- Chapter 2: The SEEA-E framework
- Chapter 3: Physical asset accounts
- Chapter 4: Monetary asset accounts
- Chapter 5: Physical flow accounts
- Chapter 6: Monetary flow accounts
- Chapter 7: Air emission accounts for energy related emissions
- Chapter 8: Hybrid accounts
- Chapter 9: Applications of energy accounts

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SEEA-E and Energy Statistics



- Understanding the differences between energy balances and energy accounts:
 - Perspective: technology vs economy
 - Terminology (e.g. stocks)
 - Concepts: territory vs residence; use of sectors
 - Classifications
 - Transactions (e.g. supply)
 - Products
- Bridge tables as a way forward

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Global Assessment of Energy Accounts



- Compilation: 20 countries on a regular basis + 5 within next 2 years, 12 plan to expand
- Role of the NSO in integrating physical information in the accounts
- Lack of agreed methodology one of impeding factors:
 - Definition energy resources
 - Classifications of energy products
 - Valuation methods
- Development of SEEA-E and IRES is timely

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Coordination

- International and regional organizations and institutions, including ESCWA, are cooperating in that regards to unify methodologies, terminologies and definitions regarding energy statistics, balances and accounts (See http://www.iea.org/interenerstat_v2/index.asp for more details)

- In order to construct the physical energy accounts, the calorific energy content of the energy commodities must be converted to a common unit of energy. Gigajoules or petajoules are the common energy unit most often the used by statistical agencies.
- The unit of account adopted by the IEA is the tonne of oil equivalent (toe) which is equivalent to 107 kilocalories or 41.868 gigajoules. = net heat content of 1 tonne of crude oil.

Energy Accounts

1. None of member countries compiles energy accounts
2. Some have prepared energy balances with MEDSTAT Assistance: Egypt, Jordan, Palestine, Lebanon and Syria as per international standards
3. ESCWA organized EGM on energy balances and accounts and provided assistance to Sudan
4. In some member countries, like Kuwait, EB is not official but still as research paper
5. InterEnerStat to reconcile Energy Balances and accounts
6. Good Practice: Germany, [Norway](#), Denmark, New Zealand, [South Africa](#), South Korea

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Supply and use table for energy for Denmark, 1998

In 1974, the first energy accounts for Denmark were made as a reaction to the first oil crisis. The Danish Energy Agency and Statistics Denmark entered into a cooperation agreement concerning the extension and improved coordination of the Danish energy statistics.

	Crude oil	Natural gas extracted	Coal and lignite	Petroleum products	Gas to users	Electricity	Steam and hot water	Wood, straw and waste	Total energy supply	
	1000 tonnes	Million m ³	1000 tonnes	1000 tonnes	Million m ³	TWh	PJ	1000 tonnes	PJ	Billion DKK
a. Domestic production	11 513	7 314	-	8 007	6 714	42	122	4 557	1 716	53
b. Imports	4 605	-	8 416	6 015	-	3	-	38	654	10
c. Total supply (a+b)	16 118	7 314	8 416	14 022	6 714	45	122	4 595	2 370	64

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Supply and use table for energy for Denmark, 1998										
	Crude oil	Natural gas extracted	Coal and lignite	Petroleum products	Gas to users	Electricity	Steam and hot water	Wood, straw and waste	Total energy use	
	1000 tonnes	Million m ³	1000 tonnes	1000 tonnes	Million m ³	TWh	PJ	1000 tonnes	PJ	Billion DKK
a. Intermediate consumption by industries	7 819	7 138	9 283	6 463	3 283	25	35	3 934	1 408	33
Agriculture, fishing and quarrying	-	537	105	814	136	2	2	170	76	2
Manufacturing	7 819	-	446	1 153	940	10	6	358	478	11
Electricity, gas and water supply	-	6 601	8 732	1 569	1 890	3	0	3 405	653	9
Construction	-	-	-	331	5	0	-	-	15	0
Wholesale and retail traders	-	-	-	372	106	4	9	-	43	4
Transport, storage and communication	-	-	-	1 892	14	1	1	-	88	3
Financial intermediation	-	-	-	93	45	1	4	-	13	1
Public and personal services	-	-	-	240	147	4	13	-	41	4
b. Inventory changes	325	-	-1 100	331	-128	-	-	-	-8	0
c. Private consumption, total	-	-	10	2 739	768	10	63	599	256	19
Own account transportation by cars	-	-	-	1 842	-	-	-	-	81	2
Heating, use of electricity etc.	-	-	10	897	768	10	63	599	176	17
d. Exports	7 892	-	140	4 392	2 785	8	-	5	664	11
e. Losses in distribution etc.	82	176	83	96	6	2	24	57	49	-
f. Total use (a+b+c+d+e)	16 118	7 314	8 416	14 022	6 714	45	122	4 595	2 370	64

Source: Statistics Denmark.

Energy accounts in Norway . Extraction, conversion and use of energy goods. 2007.										
	Coal	Coke ²	Fuel wood, black liquor, waste	Crude oil	Natural gas	Other gases ³ and LPG	Petrol/Kerosene	Middle distillates	Heavy fuel oil ⁴	District heating
	1 000 tonnes	1 000 toe		1 000 tonnes	Million Sm ³	1 000 toe	1 000 tonnes			GWh
Coal mines										
Output	3 995	-	-	-	-	-	-	-	-	-
Input	-	-	-	-	-	-	-	-1	-	-41
Production of crude oil and natural gas										
Output	-	-	-	108 838	⁵ 92 623	⁶ 7 915	⁷ 3 285	-	-	-
Input	-	-	-	-	⁸ 5 543	-	-	⁹ 316	-	-2 925
Hydroelectric power plants										
Output	-	-	-	-	-	-	-	-	-	135 289
Input	-	-	-	-	-	-	-1	0	-3	-2 663
Primary production	3 995	-	-	108 838	87 080	7 915	3 284	0	-320	129 660
Imports	610	804	34	1 447	-	116	346	195	823	5 284
Exports	-3 371	-35	-1	-97 281	-85 865	-5 646	-7 437	-224	-2 956	-15 320
Direct purchases abroad	-	-	-	-	-	-	24	176	2 023	1 510
Foreign purchases in Norway	-	-	-	-	-	-	-24	-265	-220	-132
Stocks (+Decrease, -Increase)	-556	-1	-	872	-	16	0	-21	-7	-23
Primary supply	678	768	33	13 876	1 215	2 402	-3 807	-139	-656	983
Petroleum refineries										
Output	-	209	-	-	-	1 274	5 618	848	6 978	2 066
Input	-	-	-	-14 243	-	-751	-1 094	-47	-130	-579
Thermal power plants										
Output	-	-	-	-	-	-	-	-	-	1 368
Input	-	-	-26	-	-	-	-	-9	-	-11
Engelsk tekst										
Output	-	-	-	-	-	-	-	-	-	-
Input	-	-	-	-	0	-	-	-	-	-
Dual purpose power plants and district heating plants										
Output	-	-	-	-	-	-	-	-	-	152
Input	-27	-	-216	-	-15	-3	0	-	-20	-777
Other supply ¹⁰	-	-	1 223	-	-	354	44	1	64	901
Registered losses	-	-	-	-	¹¹ 17	¹² 44	-	-	-	-10 037
Statistical differences	-17	-214	-	367	-356	-1 554	683	56	-168	215
Use outside the energy sectors	635	763	1 013	-	827	1 678	1 444	719	5 995	2 000
Domestic consumption ¹³	635	763	1 013	-	827	1 678	1 420	543	3 800	354
Of which										
Non-energy purposes/reducing agents	519	737	-	-	511	1 130	-	0	11	23

	Coal	Coke ²	Fuel wood, wood waste, black liquor, waste	Gas ³ and LPG	Petrol	Kerosene	Middle distillates	Heavy fuel oil ⁴	Electricity	District heating
	1 000 tonnes		1 000 toe		1 000 tonnes				GWh	
Total	635	763	1 013	2 456	1 444	719	5 995	2 000	110 641	2 876
Agriculture and fishing	-	-	2	19	11	0	517	6	1 888	3
Agriculture	-	-	2	19	7	0	144	2	1 739	3
Fishing	-	-	-	-	4	0	374	4	149	-
Mining and quarrying	-	-	0	7	0	0	58	1	465	1
Manufacturing	634	762	424	2 312	7	0	289	225	48 381	320
Manufacture of paper and paper products	-	-	296	13	0	-	5	97	5 849	21
Energy-intensive manufacturing	434	557	12	2 125	0	0	41	40	34 170	141
Other manufacturing industries	200	205	116	173	6	0	242	88	8 363	158
Construction	-	-	4	19	18	0	207	0	792	-
Transport etc.	-	-	-	47	107	594	4 249	1 765	1 520	36
Rail transport, scheduled bus transport etc.	-	-	-	3	0	-	114	-	637	-
Other transport by road	-	-	-	2	32	-	1 525	-	-	-
International maritime transport	-	-	-	-	-	-	2 148	1 646	-	-
Coastal and inland water transport	-	-	-	42	-	-	424	119	10	-
Air transport	-	-	-	-	2	594	-	-	49	-
Services related to transport, post and telecommunication	-	-	-	-	74	0	40	-	823	36
Wholesale and retail trade, private and public services	-	-	8	33	155	46	286	3	22 183	1 948
Private households	0	0	576	19	1 147	78	389	-	35 411	568

Way Forward

- With further assistance and capacity building in the energy accounts to national statistical offices and concerned ministries, the development of pilot energy accounts could be compiled in one or two years (Jordan, Egypt and Oman, Bahrain).

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