KOLOKIUM STATISTIK 2017
28-29 September 2017 | DOSM, Putrajaya

THE JOURNEY OF THE DEVELOPMENT OF SYSTEM OF ENVIRONMENTAL-ECONOMIC ACCOUNTING (SEEA) PHYSICAL SUPPLY AND USE TABLE (PSUT) – ENERGY ACCOUNT, 2010 IN MALAYSIA (MySEEA PSUT-ENERGY)

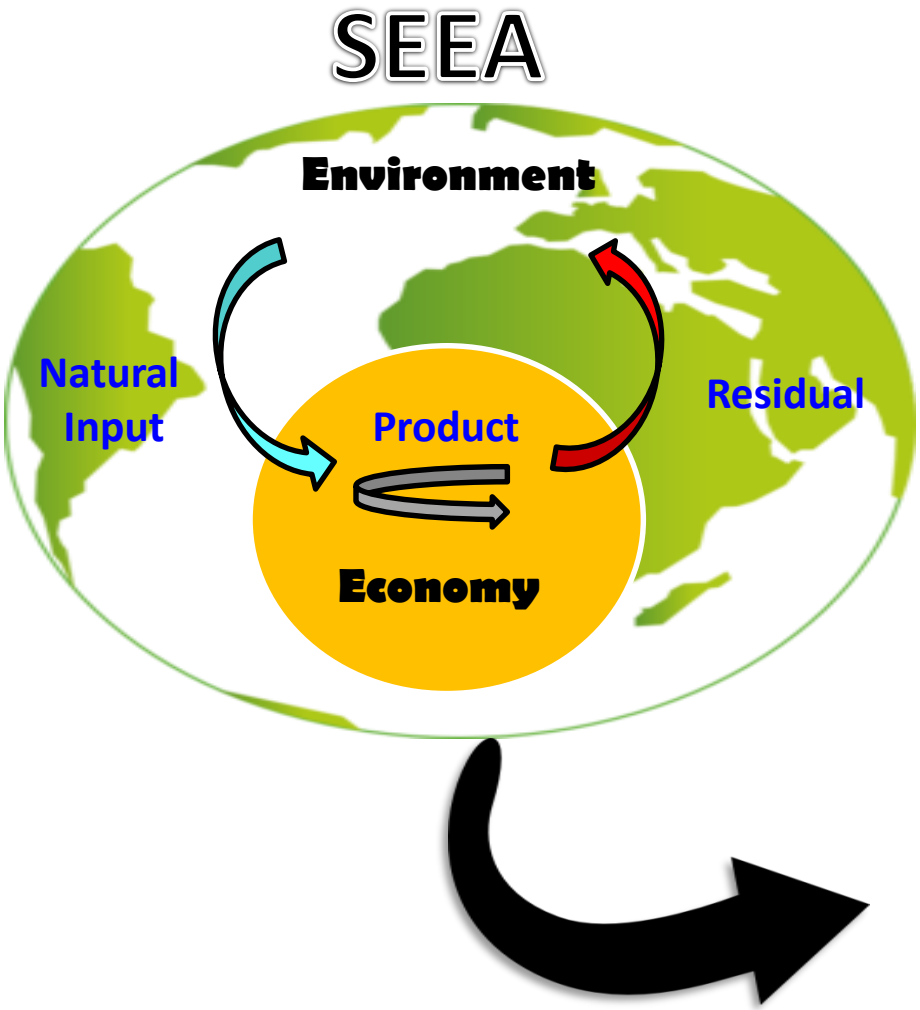
By:

Siti Salwaty Ab Kadir
Division of Agriculture & Environment Statistics
Department of Statistics Malaysia

OUTLINE

1. OVERVIEW SEEA
2. JOURNEY OF SEEA MALAYSIA
3. DEVELOPMENT OF MySEEA-ENERGY
4. FINDINGS
5. ISSUES & CHALLENGES
   CRITICAL SUCCESS FACTORS
6. CONCLUSION

OVERVIEW



Powerful statistical tool in providing a quantitative basis for policy design, including productivity analysis and natural resource management

Oosterhuis, 2016

Analyse the impact of economic policies on the environment and also with the social aspect of sustainable development

Eurostat, 2016

Benefits

Monitoring SDGs in an integrated way

UNSD, 2015

Assess the interrelationships between the economy and climate change as well as in identifying the driving forces, the pressures, the impacts and responses affecting the climate change

Schenau , 2009

SEEA CENTRAL FRAMEWORK

Physical & Monetary

1. Supply & Use Table (SUT)
- *i. Energy*
- *ii. Water*
- *iii. Emission (Air, water, waste)*

2. Asset Account
- *i. Mineral & energy resources*
- *ii. Land*
- *iii. Soil resources*
- *iv. Timber/forest resources*
- *v. Aquatic resources*
- *vi. Water*

3. Functional account
- *i. Environmental Protection Expenditure Account (EPEA)*
- *ii. Environmental Goods & Services Sector (EGSS)*

4. Sequence of economic account

- *Production Account (elaborated in SUT)*
- *Distribution and Use of Income Accounts*
- *Capital Account*
- *Financial Account*

Less depletion of natural resources

Add back depletion of natural resources

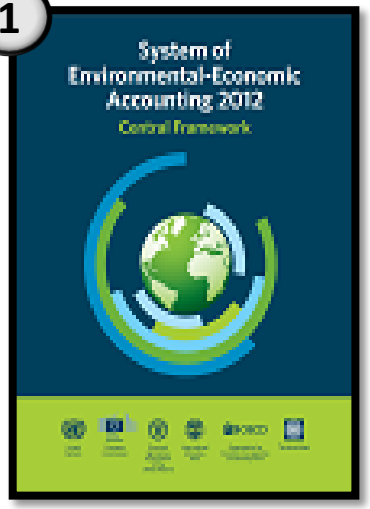
Monetary

SEEA CF 2012 was adopted by the United Nations Statistical Commission, at its 43rd Session in 2012, as the international standard for environmental-economic accounting.

Nota: SEEA applies **the accounting concepts, structures, rules and principles of the SNA (i.e. Production boundary, definition of products and territory/residential approach.)**

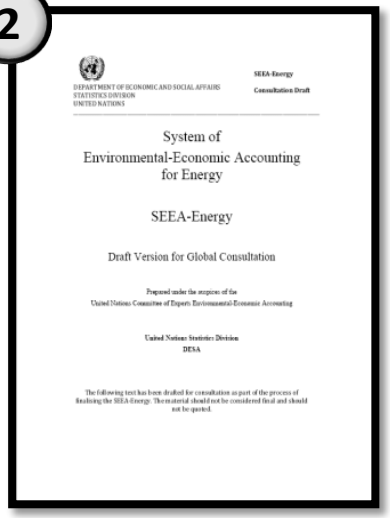
INTERNATIONAL MANUAL AND REFERENCE

1



SEEA – Central Framework

2

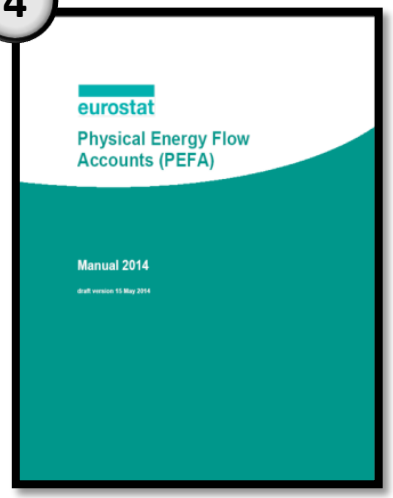


SEEA – Energy

3

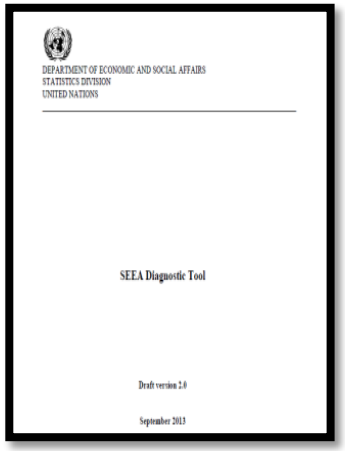
SEEA – Applications & Extensions

4

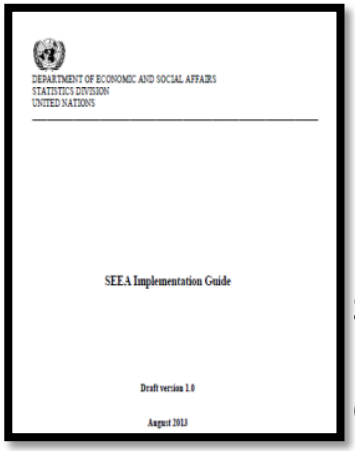


PEFA manual, Eurostats

Supporting Document



SEEA-Diagnostic Tool



SEEA-Implementation Guide

JOURNEY OF SEEA MALAYSIA

2010
Parliamentary Question related to Green GDP

2012*
Study the Handbook of SEEA 2003[1] & NAMEA[2]

23 – 27 Sept 2013
The 1st Sub-Regional Course on SEEA
- Collaboration with UNESCAP/UNSIAP/UNSD

30 Sept – 1 Oct 2013
Assessment Mission on SEEA by UNESCAP/ UNSIAP /UNSD

3 April 2014
SEEA Awareness Workshop with agencies

9 July 2014
Proposed to Main User Committee (MUC)
i. PSUT Energy (2014-2015)
ii. PSUT Water (2015-2016)

2015 – 2016
Compilation of MySEEA PSUT-Energy
- Set up Technical Working Group (inter DOSM & inter agency)

19 – 23 Sept 2016
Assessment Mission on SEEA by UNSD and UNESCAP

26 – 30 Sept 2017
Regional Course on SEEA Water by UNSD/ UNESCAP

24 – 27 Jan 2017
Technical Assistance from UNSD & Statistics Denmark
- Evaluation on MySEEA PSUT-Energy

22 Feb 2017
Present findings of MySEEA-Energy to MUC

Note:
- **SEEA CF 2012 was still draft document. It is adopted as a standard manual by UNSD at the 43rd UNSC session in 2013.**

1 Handbook of National Accounting: Integrated Environmental and Economic Accounting 2003
2 National Accounting Matrix with Environmental Accounts

MySEEA PSUT-ENERGY 2010

Scope, coverage & classification

Energy Resources[1]

NATURAL RECOURCES	RENEWABLE RESOURCES	ENERGY PRODUCTS FROM TRANSFORMATION
Natural gas	Hydro	LNG
Crude oil	Solar*	Petroleum products
Coal & coke	Bio Mass*	Electricity
	Bio Gas*	Others**

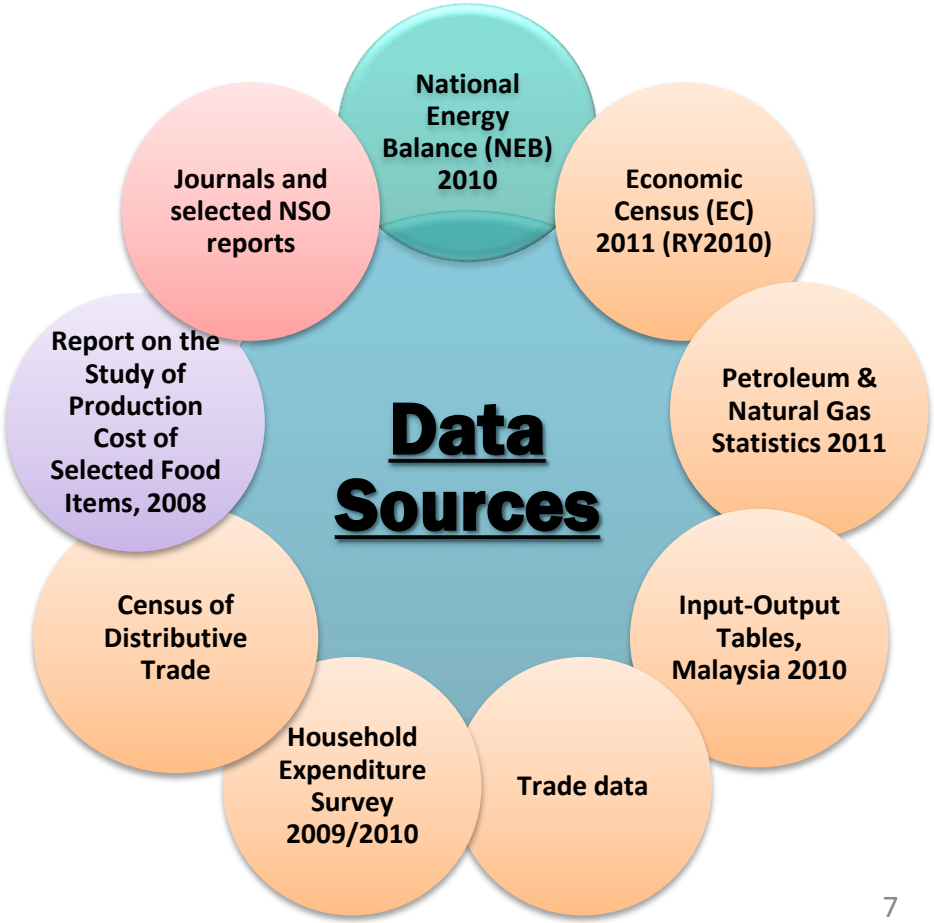
Note: [1] Excluding reserve of energy resources
* will be covered on MySEEA PSUT-Energy 2015
**Others refer to additive (which are used as refinery intake) e.g. imported Light Diesel, Crude Residuum & Middle East Residue.

Classification

Energy Products	• Standard International Energy Products Classification (SIEC)
Industry	• Malaysia Standard Industrial Classification 2008

Why 2010?

Data sources for the compilation i.e. Economic Census and Input-output Tables in 2010.



BASIC STRUCTURE

Energy Balance

Item code	Flows	Energy products				
		E1	E2	E3	... Total	*of which: Renewables*
1.1	Primary production					
1.2	Imports					
1.3	Exports					
1.4	International Bunkers					
1.5	Stock change (closing-opening)					
1	**Total energy supply**					
2	***Statistical difference***					
3	***Transfers***					
4	**Transformation processes**					
5	**Energy Industries own use**					
6	**Losses**					
7	**Final consumption**					
7.1	**Final energy consumption**					
7.1.1	Manufacturing, const. and non-fuel mining industries, Total					
	Iron and steel					
	Chemical and petrochemical					
	Other Industries					
7.1.2	Transport, total					
	Road					
	Rail					
	Domestic aviation					
	Domestic navigation					
	Other Transport					
7.1.3	Other, total					
	Of which: Agriculture, forestry and fishing					
	Households					
7.2	**Non energy use**					

Supply Use Losses

SEEA PSUT-Energy Account

Supply	Industries	Households	Accumulation	Rest of the World	Environment	Total
Energy from natural input					Energy inputs from the environment	Total supply of energy from natural inputs
Energy product	Output			Imports		Total supply of energy products
***Conversion losses**	Conversion losses generated by industry	Conversion losses generated by household consumption	Conversion losses from accumulation	Conversion losses received from the rest of the world	Conversion losses recovered from the environment	Total supply of conversion losses

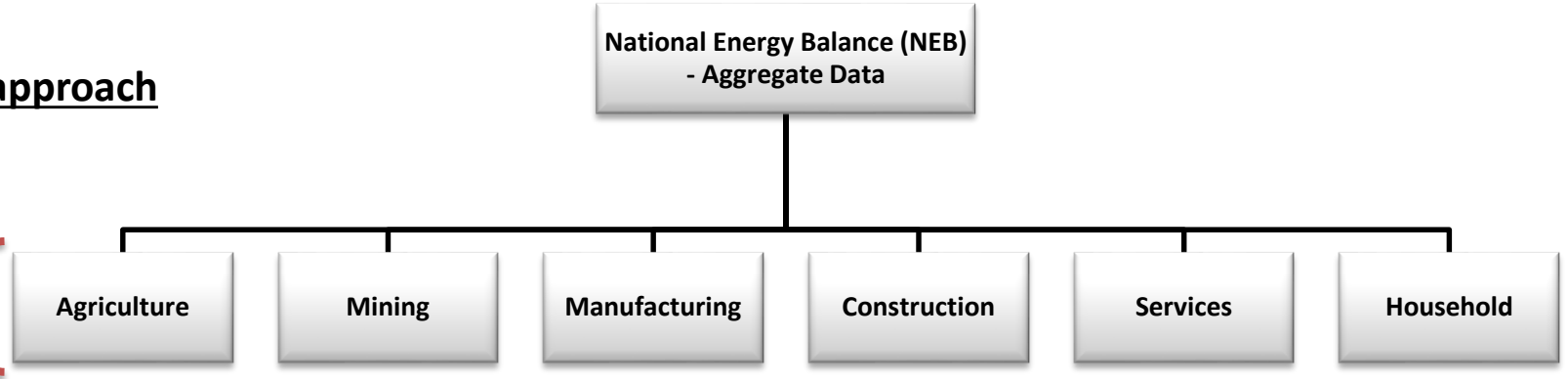
Use	Industries	Households	Accumulation	Rest of the World	Environment	Total
Energy from natural input	Extraction of energy from natural input					Total use of energy from natural inputs
Energy product	Intermediate consumption	Household consumption	Changes in inventories	Exports		Total use of energy products
***Conversion losses**	Collection & treatment of conversion losses		Accumulation of conversion losses	Conversion losses sent to the rest of the world	Conversion losses flows direct to environment	Total use of conversion losses

*Conversion losses: i) Natural resource losses are natural resource inputs that do not subsequently become incorporated into production processes and, instead, immediately return to the environment.(SEEA CF-3.98) ii) 4 types of losses i.e. losses during extraction, losses during distribution, losses during storage and losses during transformation. (SEEA CF-3.100)

METHODOLOGY

Top-down approach

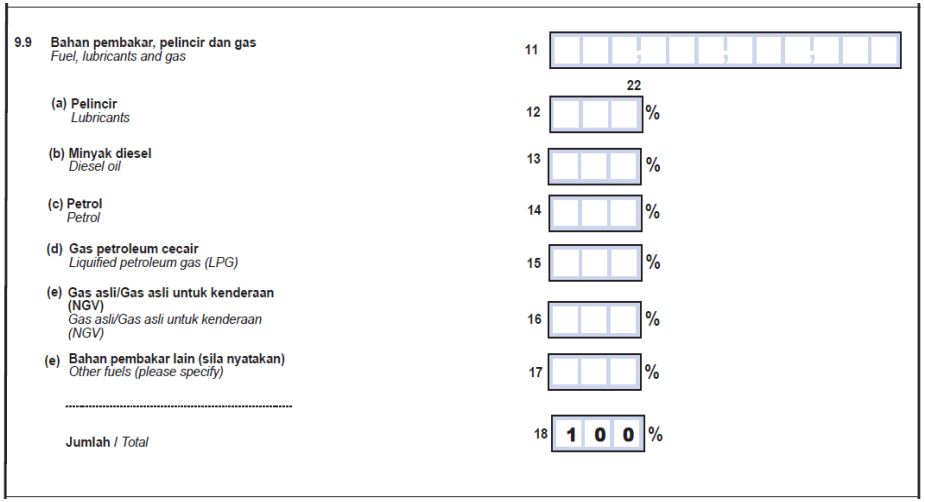
Structure:
- Economic Census
- I-O Table
- Household Expenditure Survey



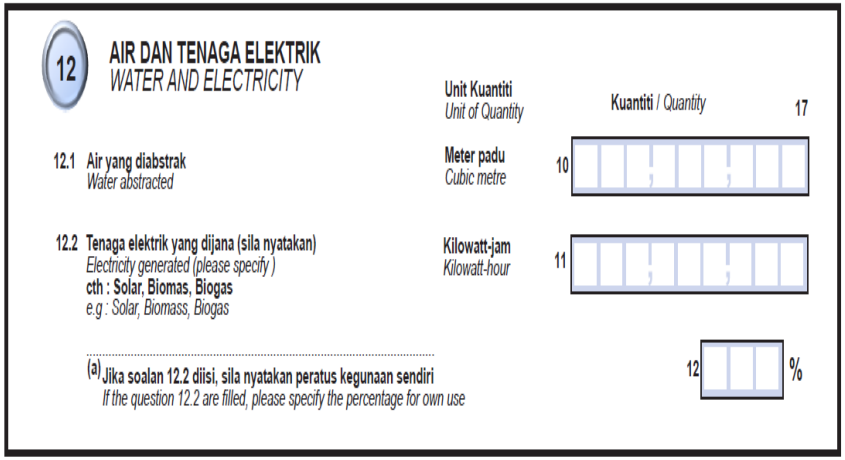
EXPENDITURE

A. Fuel, lubricants and gas consumed

B. Water and Electricity



9.9	**Bahan pembakar, pelincir dan gas** *Fuel, lubricants and gas*	11	
		22	
	(a) Pelincir *Lubricants*	12	%
	(b) Minyak diesel *Diesel oil*	13	%
	(c) Petrol *Petrol*	14	%
	(d) Gas petroleum cecair *Liquified petroleum gas (LPG)*	15	%
	(e) Gas asli/Gas asli untuk kenderaan (NGV) *Gas asli/Gas asli untuk kenderaan (NGV)*	16	%
	(e) Bahan pembakar lain (sila nyatakan) *Other fuels (please specify)*	17	%
	.....		
	Jumlah / *Total*	18	1 0 0 %



12 AIR DAN TENAGA ELEKTRIK
WATER AND ELECTRICITY

	Unit Kuantiti / *Unit of Quantity*	Kuantiti / *Quantity* 17
12.1 **Air yang diabstrak** *Water abstracted*	**Meter padu** *Cubic metre*	10
12.2 **Tenaga elektrik yang dijana (sila nyatakan)** *Electricity generated (please specify)* **cth : Solar, Biomas, Biogas** *e.g : Solar, Biomass, Biogas*	**Kilowatt-jam** *Kilowatt-hour*	11

(a) **Jika soalan 12.2 diisi, sila nyatakan peratus kegunaan sendiri**
If the question 12.2 are filled, please specify the percentage for own use 12 %

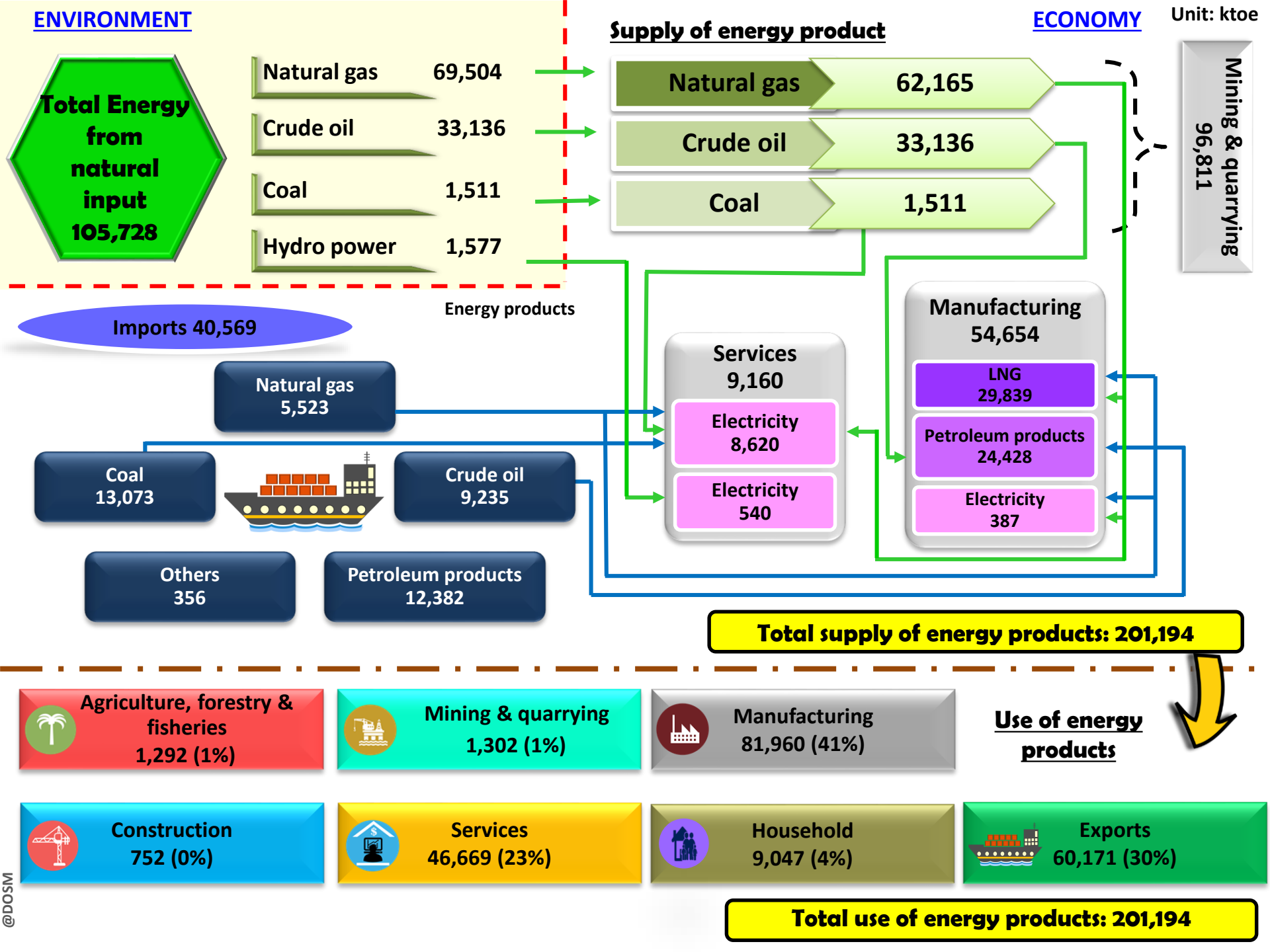

ENVIRONMENT
ECONOMY
Unit: ktoe
Total Energy from natural input 105,728
Natural gas 69,504
Crude oil 33,136
Coal 1,511
Hydro power 1,577
Energy products
Supply of energy product
Natural gas 62,165
Crude oil 33,136
Coal 1,511
Mining & quarrying 96,811
Imports 40,569
Natural gas 5,523
Coal 13,073
Crude oil 9,235
Others 356
Petroleum products 12,382
Services 9,160
Electricity 8,620
Electricity 540
Manufacturing 54,654
LNG 29,839
Petroleum products 24,428
Electricity 387
Total supply of energy products: 201,194
Agriculture, forestry & fisheries 1,292 (1%)
Mining & quarrying 1,302 (1%)
Manufacturing 81,960 (41%)
Use of energy products
Construction 752 (0%)
Services 46,669 (23%)
Household 9,047 (4%)
Exports 60,171 (30%)
Total use of energy products: 201,194
@DOSM

TABLE OF MySEEA PSUT – ENERGY 2010

KTOE

Item	Total Supply	Domestic Supply	Imports	Total Use	Industry	Household	Change in inventory *(Accumulation)*	Exports
Total	**201,194**	**160,625**	**40,569**	**201,194**	**132,333**	**9,047**	**(359)**	**60,171**
Crude Oil	**42,370**	33,136	9,235	**42,370**	25,358	-	337	16,676
Natural Gas	**67,688**	62,165	5,523	**67,688**	66,266	82	-	1,340
Coal & coke	**14,584**	1,511	13,073	**14,584**	14,777	-	(255)	62
Liquified Natural Gas	**29,839**	29,839	-	**29,839**	-	-	-	29,839
Petroleum Product	**36,810**	24,428	12,382	**36,810**	18,115	7,028	(441)	12,108
Hydropower	**540**	540	-	**540**	540	-	-	-
Electricity	**9,007**	9,007	-	**9,007**	7,056	1,937	-	13
Others	**356**	-	356	**356**	222	-	-	133

TABLE OF MySEEA PSUT-ENERGY MALAYSIA 2010

KTOE

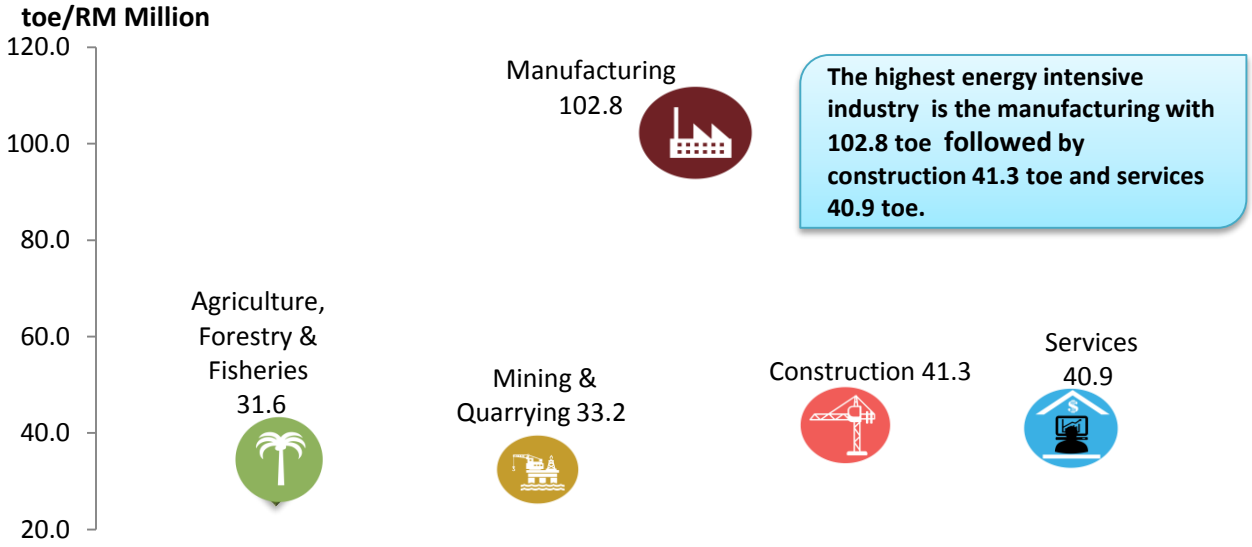
Supply	Agriculture	Mining	Manufacturing	Construction	Services	Households	Accumulation	Import	Flows from the environment	Total
Energy from	-	-	-	-	-	-	-	-	105,728	105,728
Energy products	-	96,811	54,654	-	9,160	-	-	40,569	-	201,194
Energy residuals	1,292	8,642	27,665	752	39,086	9,047				86,484
Total Supply	1,292	105,453	82,319	752	48,246	9,047	-	40,569	105,728	393,406

Use	Agriculture,	Mining	Manufacturing	Construction	Services	Households	Accumulation	Export	Flows from the environment	Total
Energy from	-	104,151	-	-	1,577	-	-	-	-	105,728
Energy products	1,292	1,302	82,319	752	46,669	9,047	(359)	60,171	-	201,194
Energy residuals	-	-	-	-	-	-	-	-	86,484	86,484
Total Use	1,292	105,453	82,319	752	48,246	9,047	(359)	60,171	86,484	393,404

Note: - Null/No cases

INTENSITY

MySEEA- Intensity of End Use Products by Sectors



NEB –Energy Intensity

Item	Energy Intensity
Final Energy Demand [toe/GDP at constant price 2000 (RM million)]	74.1

Item	Agriculture, Forestry & Fisheries	Mining & Quarrying	Manufacturing	Construction	Services
End use of energy products (toe)	1,291,549	1,302,102	15,898,917	752,205	13,182,751
GDP by kind of economic activity at constant price 2000 (RM million)	40,916	39,270	154,640	18,220	322,611
Energy intensity (toe/value added)	31.6	33.2	102.8	41.3	40.9

MySEEA – Energy Intensity

Total end use incl. household (toe)	41,475,000
GDP at constant price 2000 (RM million)	559,554
Energy intensity (toe/GDP)	74.1

MULTIPLIER EFFECT

Final Demand

Sector	Energy use (toe)	New energy use (toe) - by increasing of 10% Final Demand for the manufacturing sector	Growth rate (%)
Agriculture, Forestry & Fisheries	1,291,549	1,362,733	5.5
Mining & Quarrying	1,302,102	1,365,935	4.9
Manufacturing	**82,318,854**	**89,383,367**	**8.6**
Construction	752,205	757,348	0.7
Services	46,668,751	47,495,421	1.8

Increase of 10% in Final Demand in the **manufacturing sector *will give a direct effect on the growth rate of energy consumption in the* manufacturing sector 8.6%.** In addition, it also gives the indirect effect to the growth rate of energy consumption for **agriculture, forestry & fisheries (5.5%) and mining & quarrying sector (4.9%)**.

+10%

Injection 10% of Final Demand in manufacturing sector

+8.6% from manufacturing

Direct effect

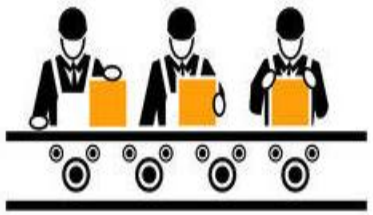
+5.5% from agriculture

+4.9% from mining

+0.7% from construction

+1.8% from services

Indirect effect



MySEEA PSUT-ENERGY INPUT TO GEI & SDGs

SEEA

SOCIAL DIMENSION

- Energy use per household
- Household income spent on fuel and electricity

ECONOMIC DIMENSION

- Energy use
- Energy intensities
- Household energy intensities
- Efficiency of energy
- Water use
- Water productivity
- Forest area
- Land cover

ENVIRONMENTAL DIMENSION

- Co2 emissions
- Air pollutant emissions
- Wastewater generated
- Municipal waste collected

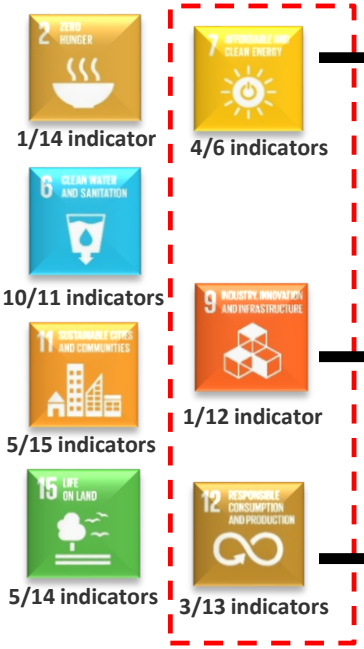
GEI

1 **The environmental and Resource Productivity**
- Carbon emissions
- Energy

2. **The natural asset base**
- The renewable resources
- Land & agriculture

3. **The environmental dimension of quality of life**
- Environmental health & risk
- Environmental services and amenities

Total indicators related to SEEA in each goals



2 Target Under Goal 7:
7.2.1Renewable energy share in the total final energy consumption

7.3.1Energy intensity measured in terms of primary energy and GDP

1 Target Under Goal 9:
9.4.1 CO2 emissions per unit of value added

1 Target Under Goal 12:
12.c.1 Amount of fossil-fuel subsidies per unit of GDP (production and consumption) and as a proportion of total national expenditure on fossil fuels

ISSUES & CHALLENGES

Knowledge

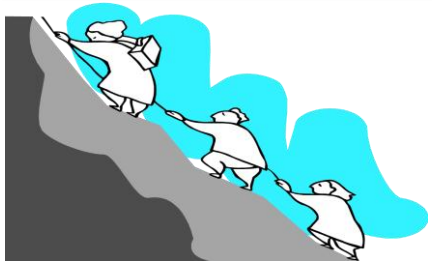
- System of National Account
- Biophysical/environmental subject

Data

- Physical energy data/information

Dissemination

- Promote the importance/usefulness of SEEA to stakeholders/agencies



CRITICAL SUCCESS FACTOR

- Commitment from agencies
- Capacity building
- Official agreement
- Involvement academia/NGOs

CONCLUSION

SEEA can measure the environment and its relationship with the economy & the society

SEEA as a useful tools in informing policy questions especially on the sustainable development

Needs of capacity building to enhance knowledge in developing SEEA

Thank you

salwaty.kadir@stats.gov.my

Website: https://www.dosm.gov.my  **/StatsMalaysia**  **/StatsMalaysia**

METHODOLOGY

NEB **SEEA ENERGY**

1. **Transportation** → 5 economic sectors, Household

2. **Industrial** → Mining, Manufacturing, Construction

3. **Electricity** → Agriculture, Mining, Manufacturing, Construction, Services

1. 5 economic sectors (Agriculture, mining, Manufacturing, Construction & Services) -Economic Cencus 2011 (– ; HES 2009/2010 – household expenditure
2. breakdown of 5 economic sector :
   a. *Correlation analysis* – asset vs fuel consumption (expenditure) to check the interrelationship of 2
   b. *Coefficient analysis –econometric model (regression)*
   c. Distribute using *modified* RAS
      - *by type of fuel* (Petrol, Diesel, *Fuel Oil etc..*)
      - by 5 economic sector

1. Mining, Manufacturing & Construction - based on the percentage of electricity purchases in the EC 2011
2. Allocation for agriculture and services sector - based on the data from the journal and report study by agency.
3. Allocation of electrical data for household in MySEEA PSUT-Energy is directly obtained from the final use in NEB.

Conversion from Mass Unit to Energy

(liter, barrel, tan ⟹ ktoe)

CONVERSION TABLES TO KTOE

Petroleum Products	Litres (million)	Barrels (million)	Kilotonnes	TJ	Ktoe
Crude Oil (Imported)	1	0.01	0.86	36.56	0.87
Crude Oil (Local)	1	0.01	0.83	35.83	0.86
Plant Condensate	1	0.01	0.83	36.67	0.88
Aviation Gasoline	1	0.01	0.69	30.55	0.73
LPG	1	0.01	0.53	24.36	0.58
Motor Gasoline	1	0.01	0.74	32.34	0.77

MySEEA PSUT ENERGY – QUALITY ASSURANCE

PROCESS

SCOPE & CONCEPT

i. Standard manual – SEEA CF, SEEA Energy, IRES, PEFA
ii. Discussion via online with Experts /LG members
iii. Attachment to other NSO

DATA

i. Data sources

a. National Energy Balance (as a benchmark)

b. DOSM (e.g. economic census, petroleum & natural gas statistics, trade)

ii. Data verification by Technical Working Group:

a. Internal DOSM

b. Inter agencies (Energy Commission, Economic Planning Unit, Ministry of Energy, Green Technology & Water)

iii. Cooperation:

a. Working closely with other agencies

b. Technical collaboration with local university (data estimation & analysis)

VERIFICATION

Structure comparison between SEEA Energy and IO

Use	Agriculture	Mining	Manufacturing	Constructions	Services
SEEA	1.0 %	1.0%	62.2%	0.6%	35.3%
IO	4.1%	2.8%	59.8%	2.0%	31.2%

Note: By ranking

FINDINGS

Technical assistance by UNSD/international consultant/experts : Valuation & verification

MySEEA PSUT-Energy vs NEB

	SEEA	NEB
Total Energy from natural inputs	26.9%	27.5%
Total Energy products	51.1%	47.6%
Total Conversion Losses	22.0%	24.9%

Note:

i. Other indicator: intensity/GDP

ii. Comparison with other countries (Netherlands, Finland & Lithuania)

Endorsement by Main User Committee

Provide statistics to support current policy/ programmes/ plan (e.g. National Policy on Environment, National Renewable Policy & Action Plan, Malaysia Plan)