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Energy Demand and Supply of the Republic of the Union of Myanmar 2010-2017

Prepared by

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Supported by

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1. Introduction

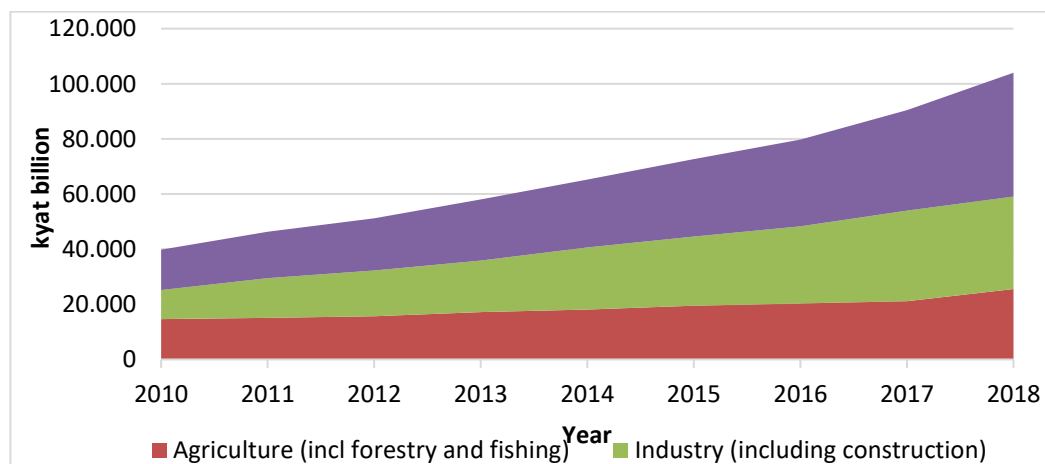
This paper on the Energy Demand and Supply for Myanmar in 2010–2017 was prepared as an update to the *Myanmar Energy Statistics 2017* publication, which covers the period between 2000 and 2016. The paper was produced by the staff of the Oil and Gas Planning Department, the Ministry of Electricity and Energy, Myanmar, through the energy internship programme of the Economic Research Institute of ASEAN and East Asia (ERIA). The Ministry of Electricity and Energy appreciates ERIA’s support in improving the energy data quality of Myanmar.

2. Social and Economic Situation

Myanmar’s gross domestic product (GDP) grew by 7.0% per year over the 2010–2018 periods (Figure 1). The service sector was the main contributor to the country’s economy with shares that grew from around 36.7% in 2010 to 43.2% in 2018. Although the service sector had the largest share, the industry sector was growing fastest over the same period. The average annual growth rate of the service sector was 9.1%, whilst the industry sector growth was 9.6% annually. The agriculture sector’s contribution was around 36.8% in 2010 and decreased to 24.6% in 2018 with an average growth rate of 1.6% per year.

The service sector consists of transport, communication, financial services, social and administrative services, rental and other services, whilst the industry sector consists of energy, mining, processing, and manufacturing and construction.

Figure 1. GDP by Sector in Current Local Currency Unit



GDP = gross domestic product.

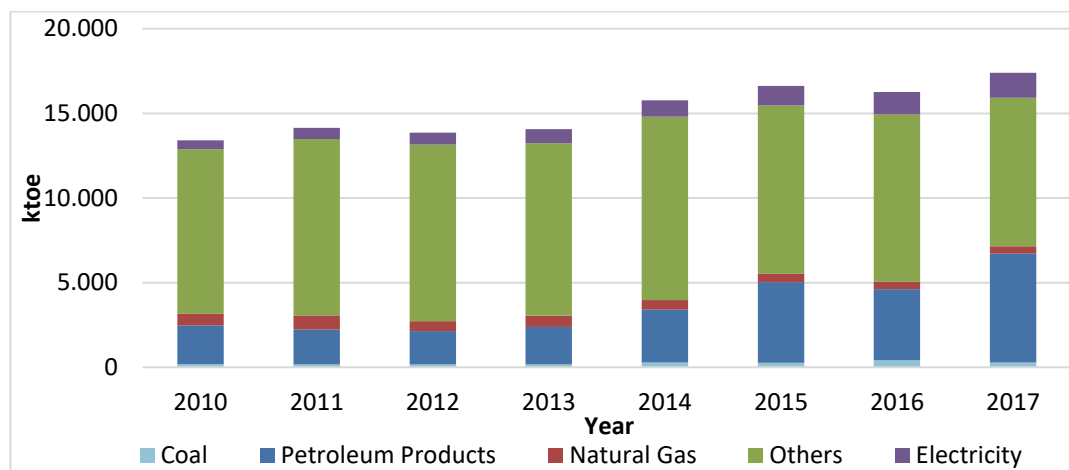
Source: World Bank (2018).

The population in Myanmar had been increasing steadily from 2010 to 2017 with an average growth rate of 0.8% per year. The population in the urban areas grew at an average growth rate of 1.5%, whilst the rural area grew at a rate of 0.5% per year. The population share in the rural areas in 2017 was around 69%, whilst that in the urban areas was 31%.

3. Final Energy Consumption

The average annual growth rate of the total final energy consumption (TFEC) of Myanmar was around 3.8% from 2010 to 2017 (Figure 2). Petroleum products grew the fastest at a rate of 15.8% per year, followed by electricity and coal, which grew respectively by 15.2% and 6.9% per year. Biomass consumption decreased at an average rate of 1.4% per year. Consequently, the share of biomass in the TFEC shrank from 72.4% in 2010 to 50.5% in 2017. The major consumer of biomass is the residential sector, whilst smaller amounts were consumed by some industry and commercial sectors. The reduction of biomass consumption was caused by the growing household use of liquefied petroleum gas (LPG) or electricity, as well as the increased use of more efficient biomass stoves, especially in the rural areas.

Figure 2. Total Final Energy Consumption by Fuel Type (ktoe)

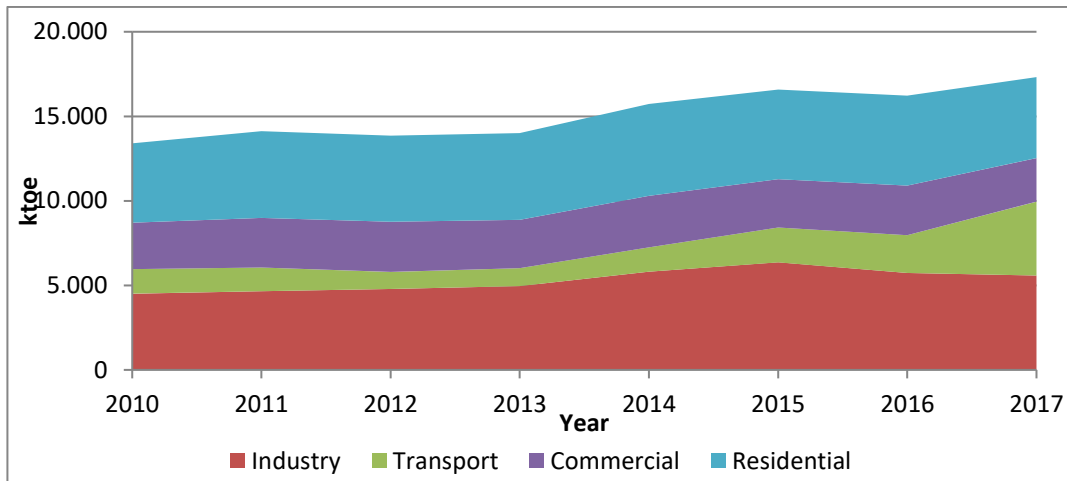


ktoe = kiloton of oil equivalent.

Source: Myanmar Energy Balance Tables (EBT) 2010–2017.

The industry sector had the largest share in the TFEC, at 32%, followed by the residential and transport sectors whose shares were 28% and 25%, respectively over the 2010–2017 period. Although the industry sector had the largest share, its growth rate (3.1% per year) was lower than the transport sector that grew by a rate of 17.2% per year. The main contributor to this growth was the road transport sector that experienced a rapid increase in the number of motor vehicles. The residential sector was the second largest contributor in terms of consumed biomass. The TFEC share of the commercial sector was around 15% in 2017 and its consumption decreased at a rate of 0.9% per year.

Figure 3. Total Final Energy Consumption by Sector (ktoe)

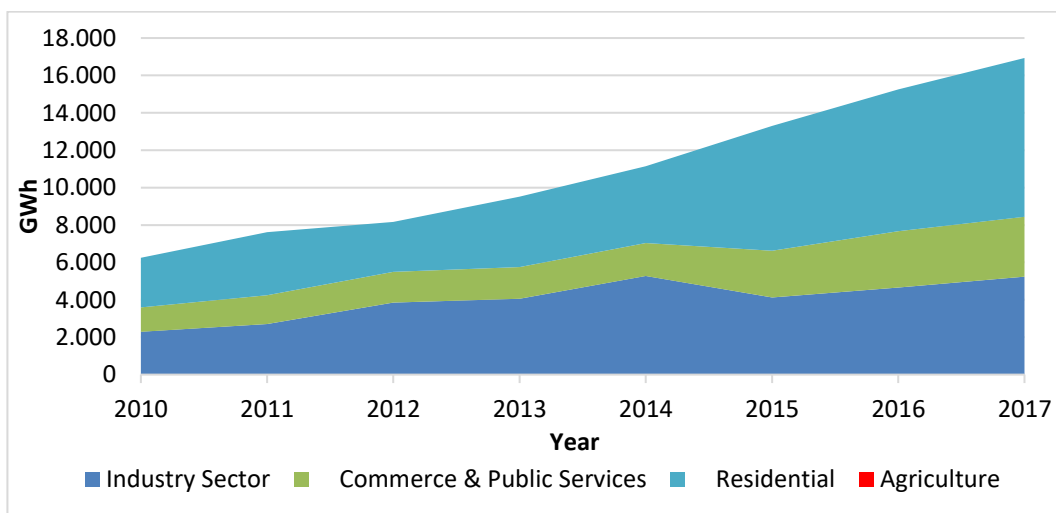


ktoe = kiloton of oil equivalent.
 Source: Myanmar EBT 2010–2017.

4. Power Generation

Electricity demand (Figure 4) increased at an average annual rate of 13.9% from 2010 to 2017. The annual growth rate of the residential and commercial sectors' electricity consumption increased by 18.1% and 13.7%, respectively from 2010 to 2017. In 2017, the share of electricity consumption in the residential sector was the largest (50%), which was followed by industry and commercial, at 31% and 19% respectively.

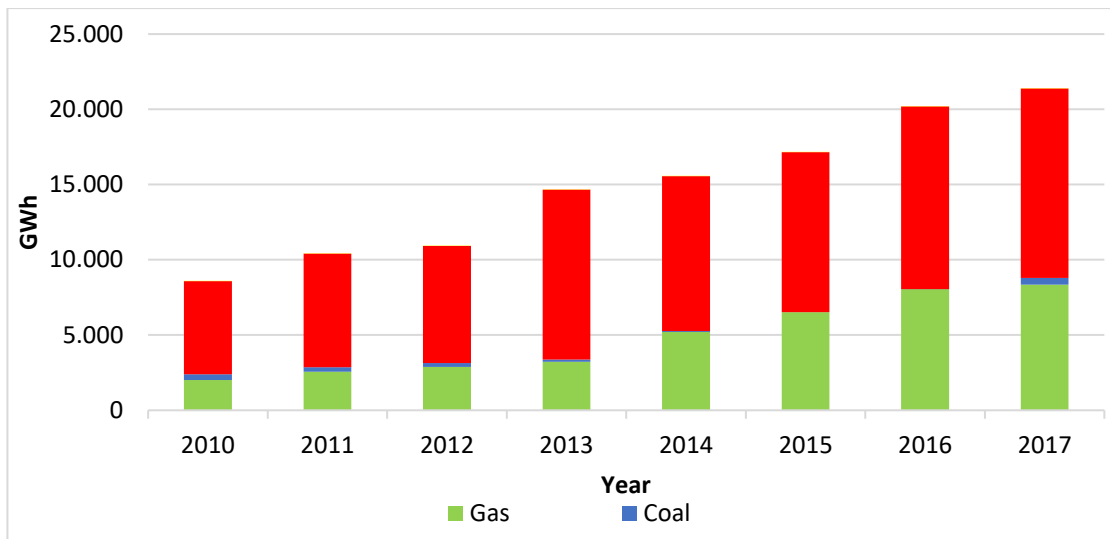
Figure 4. Electricity Demand by Sector (GWh)



GWh = gigawatt hour.
 Source: Myanmar EBT 2010–2017.

In 2017 (Figure 5) electricity in Myanmar was generated from hydropower, natural gas, solar, and coal-fired power plants. The total power generated in that year was 21457.8 gigawatt hours (GWh). It grew at an average rate of 13.9% per year from 2010 to 2017. Natural gas and hydropower were the main power sources of Myanmar’s electricity generation and they grew at an average annual rate of 22.5% and 10.7%, respectively. Hydropower had the biggest share of 67%, followed by gas and coal-fired plants, 31% and 2% respectively, in 2017.

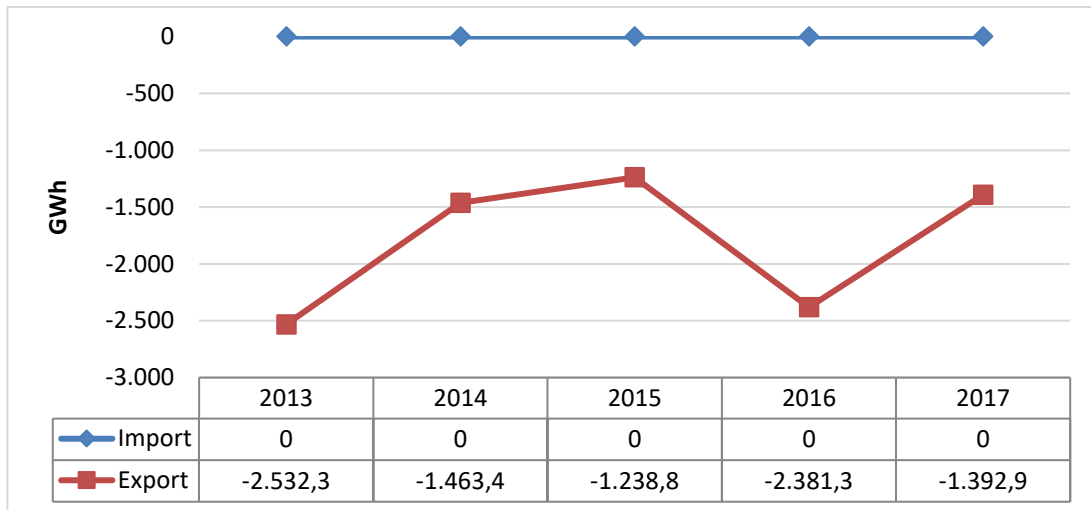
Figure 5. Electricity Generation by Fuel Type (GWh)



GWh = gigawatt hour.
 Source: Myanmar EBT 2010–2017.

In addition, the Shweli hydropower plant was exporting electricity to China from 2010 to 2017 as there is no national grid connecting the power plant to supply domestic demand. Figure 6 shows trends of electricity import and export from 2013-2017.

Figure 6. Electricity Import and Export (GWh)

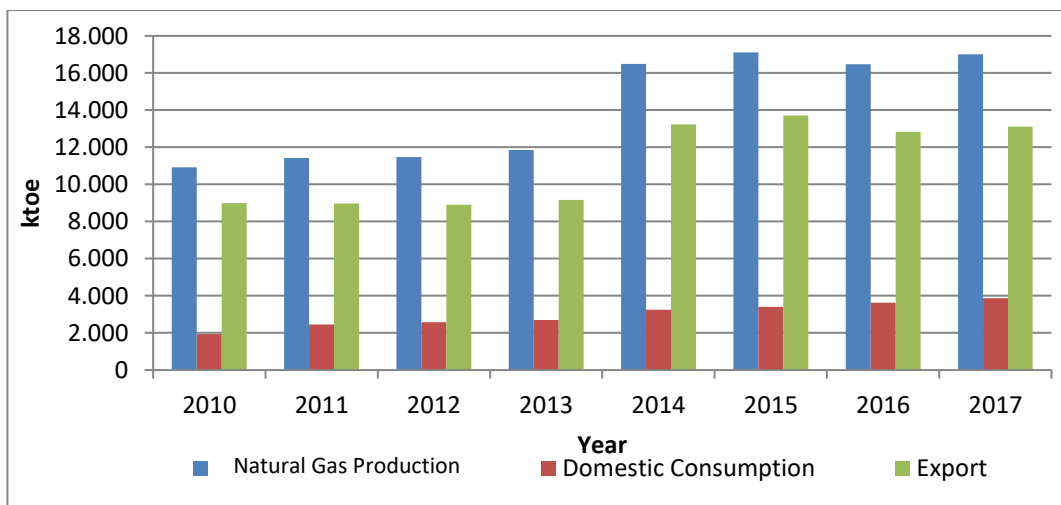


GWh = gigawatt hour.
 Source: Myanmar EBT 2010–2017.

5. Natural Gas

Natural gas produced from both onshore and offshore sites increased by 6.5% per year between 2010 and 2017. At the same time natural gas exports also increased by 5.5 % per year from 2010 to 2017. There are four offshore sites: Yadanar, Yetagun, Shwe, and Zawtika. Yadanar and Yetagun produced less natural gas, whilst the production of Shwe and Zawtika started to increase from 2013 up to 2017.

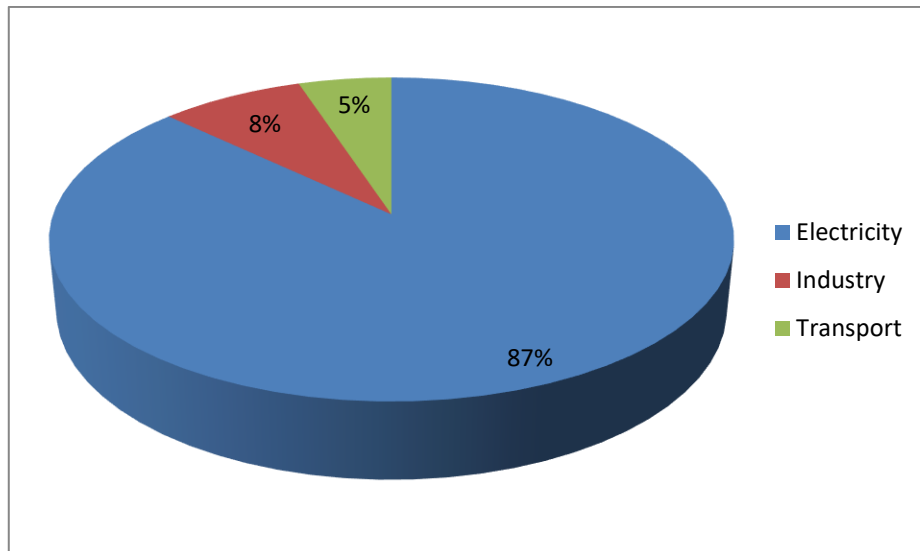
Figure 7. Natural Gas Production, Consumption, and Export (ktoe)



ktoe = kiloton of oil equivalent.
 Source: Myanmar EBT 2010–2017.

The natural gas supply in the TPES increased by 10.5% per year from 2010 to 2017, and this supply was mainly used in gas turbine power plants. The final energy consumption of natural gas declined by 6.2% per year between 2010 and 2017. In the period of 2010–2017, natural gas consumption for electricity generation increased annually by 16.3%, industry use decreased by 8.8% per year, and transport use increased annually by 0.3 %.

Figure 8. Natural Gas Consumption by Sector

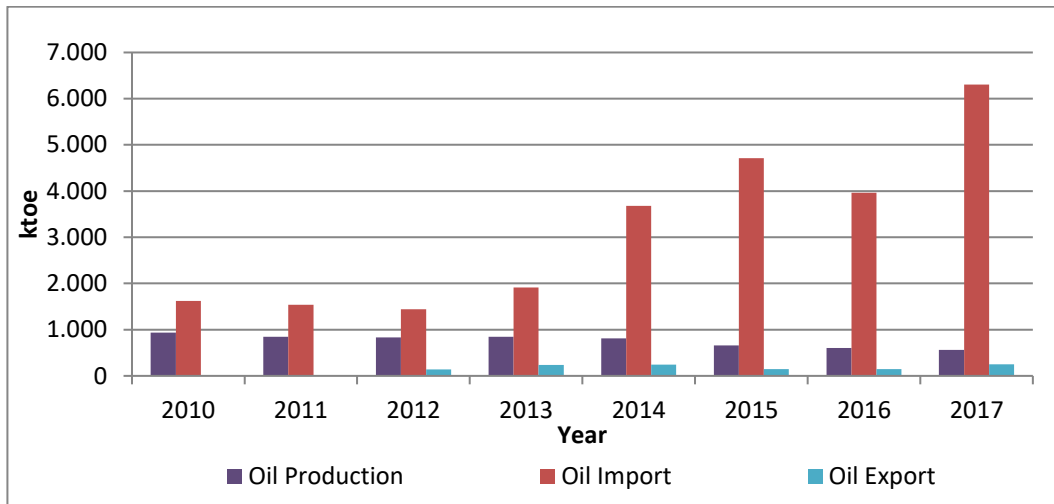


Source: Myanmar EBT 2010–2017.

6. Crude Oil

Myanmar's crude oil is produced from both onshore and offshore sites. Oil production declined by 7.1 % per year, whilst refinery output declined by 13% per year between 2010 and 2017. There are three refinery plants in Myanmar: Thanlyin, which is the biggest refinery, the Chauk refinery, and the Mann petrochemical complex. The refinery output decreased suddenly in 2017 due to the Thanlyin refinery shutting down at the end of 2016.

Figure 9. Oil Production, Import, and Export (ktoe)



ktoe = kiloton of oil equivalent.

Source: Myanmar EBT 2010–2017.

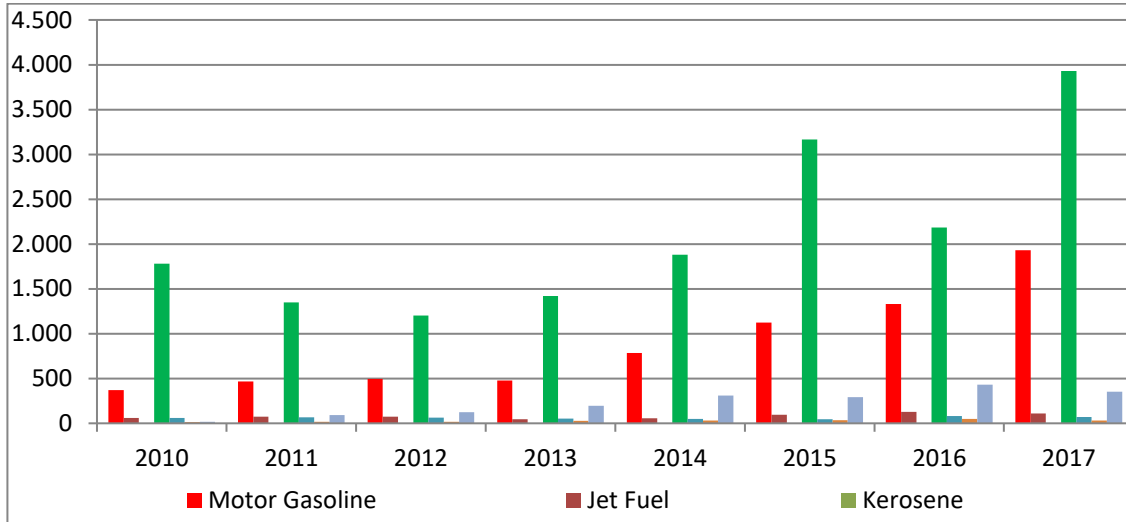
7. Petroleum Products

The total supply of Myanmar's petroleum products is the sum of domestic production and import. Petroleum products are used to meet domestic demand, international aviation, and marine bunkers.

Continuous demand for petroleum products resulted in a significant increase of imported petroleum products. In 2010, imported petroleum products reached 1619 ktoe. By 2017, this import reached almost 6302 ktoe, i.e. increasing at an average annual rate of 21%.

Some petroleum products were used to supply the need of international aviation and marine bunkers. Therefore, these products must be deducted to derive the supply for domestic consumption. Total petroleum supply was 2301 ktoe in 2010 and increased to 6427 ktoe in 2017, i.e. an average annual growth rate of 16%.

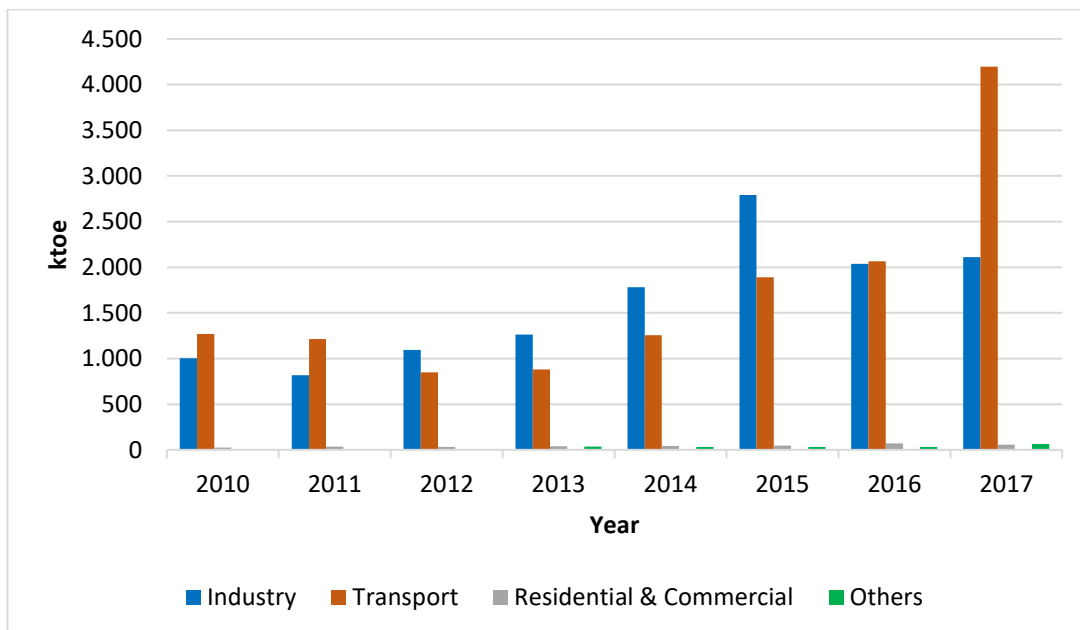
Figure 10. Petroleum Production Demand (ktoe)



ktoe = kiloton of oil equivalent.
Source: Myanmar EBT 2010–2017.

Petroleum products were mainly consumed by the final sector, i.e. industry, transport, residential and commercial, and ‘others’, as well as for power generation and own use. The total petroleum products in the final sector consumption annual growth rate increased from 17% in 2010 to 37% in 2017. The ‘others’ sector had the largest growth rate among all consuming sectors, i.e. 59% in 2010–2017 period. However, the transport sector’s consumption share was the highest and it reached an amount of 4196 ktoe in 2017. The transport sector increased by 19% per year, followed by the industry and residential sectors that grew by 11% each year from 2010 to 2017.

Figure 11. Petroleum Consumption by Sector (ktoe)



ktoe = kiloton of oil equivalent.
Source: Myanmar EBT 2010–2017.

8. Primary Energy Supply

The average annual growth rate of the total primary energy supply (TPES) was 4.6% between 2010 to 2017. Petroleum products had the highest average annual growth rate, i.e.21%, followed hydropower (11%). Oil decreased by 14% per year between 2010 and 2017. The average annual growth rate of natural gas was 10%, whilst that of coal increased only by 8% per year because more gas turbines were put into operation compared to coal-fired power plants. Despite decreasing biomass supply (1% per year), the primary supply of biomass share remained the biggest, namely 42.4%.

The share of petroleum products was the second biggest, i.e. 31.3% in 2017. The remaining supply mix in 2017 was composed of natural gas (18.5%), hydropower (5.7%), and coal (2.6%).

Figure 12a. Primary Energy Supply (%)

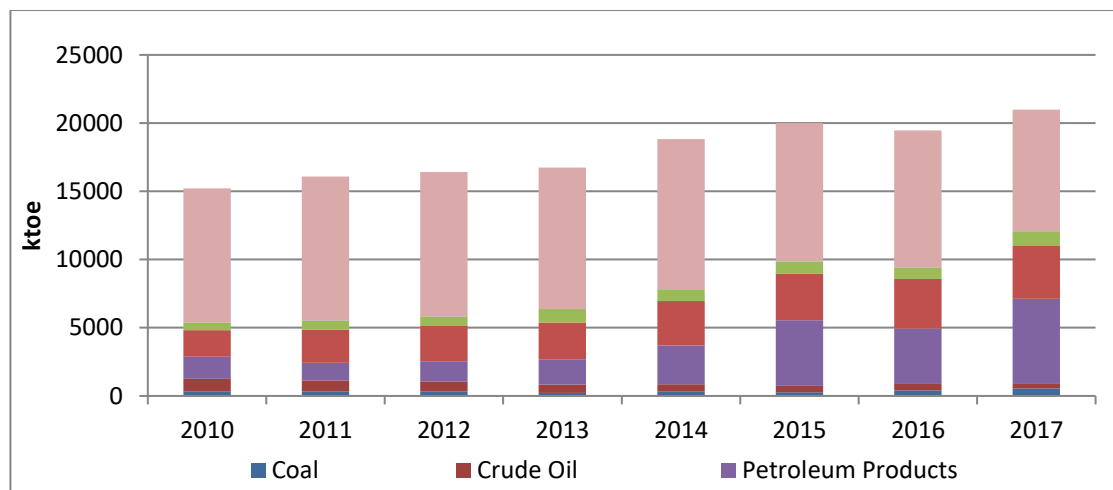
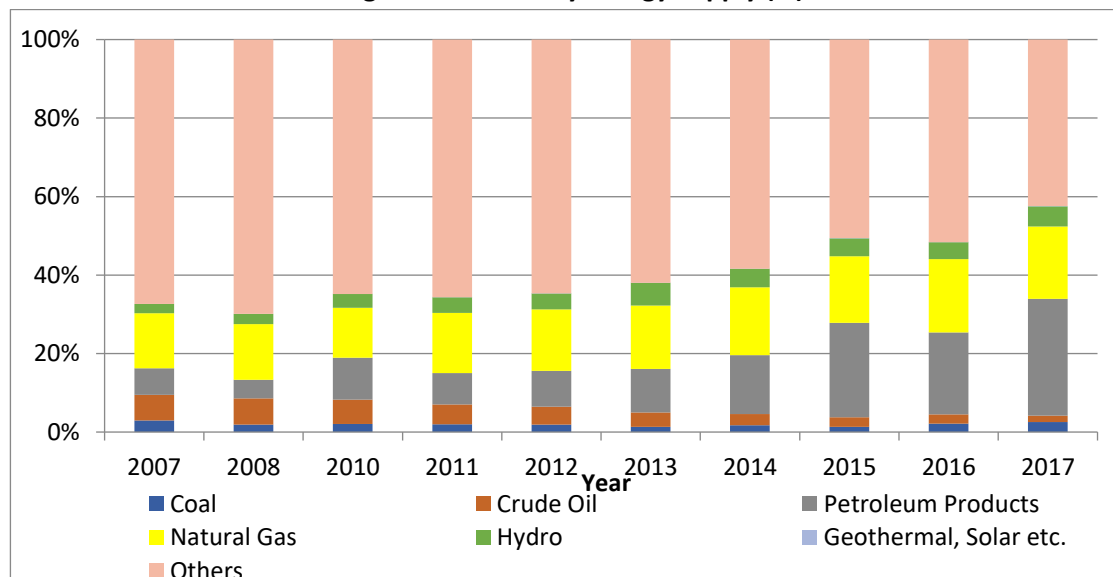


Figure 12b. Primary Energy Supply (%)

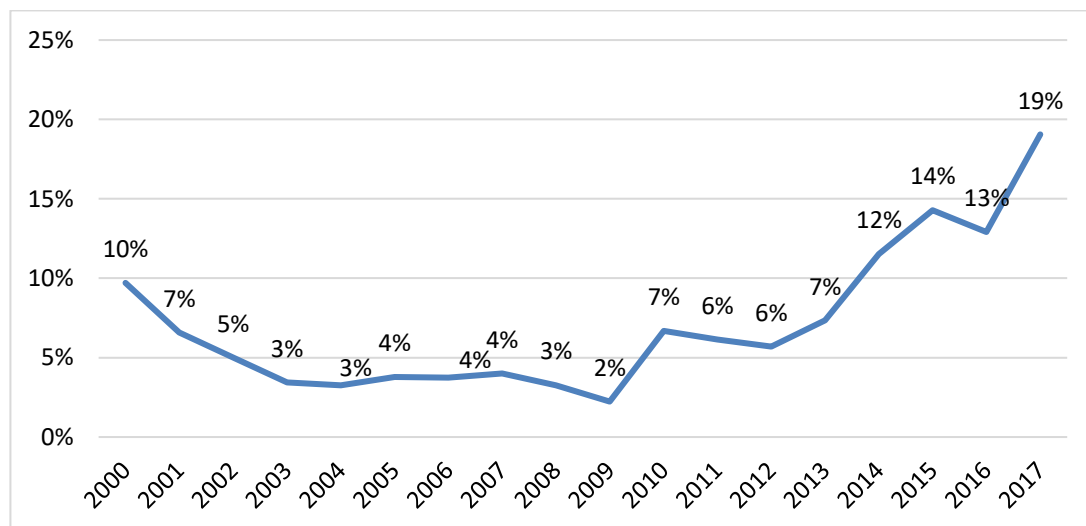


ktOE = kiloton of oil equivalent.
Source: Myanmar EBT 2010–2017.

9. Energy Indicators

The import dependency ratio (Figure 13) is defined as the ratio between the total energy import and the total energy production. The import dependency ratio increased gradually from 7% in 2010 to 19% in 2017. The average of this growth rate between 2010 and 2017 was 22%. Energy production showed a declining trend at 3% per year from 2010 to 2017.

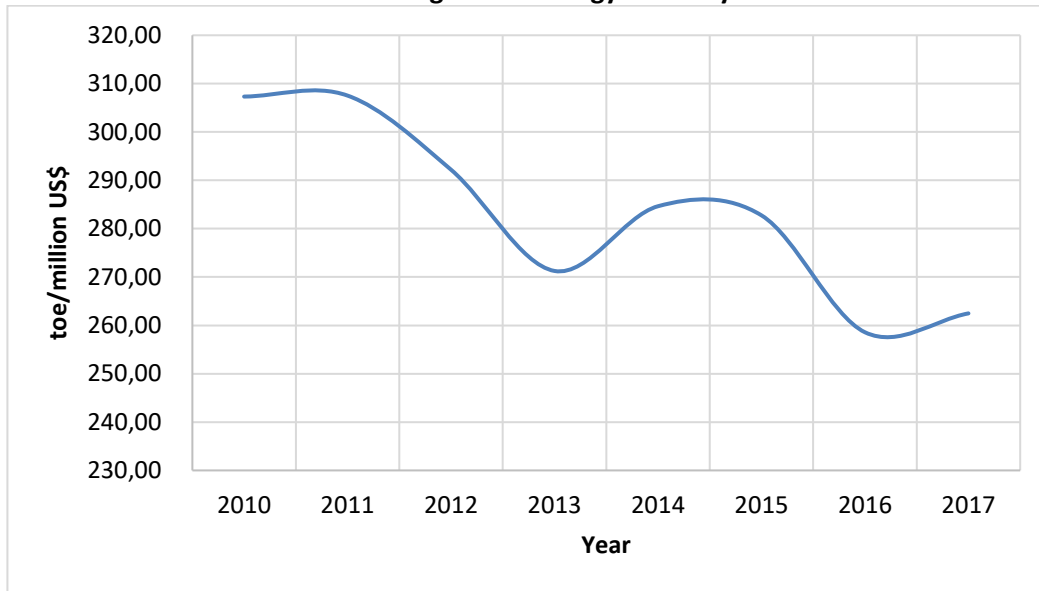
Figure 13. Import Dependency Ratio (%)



Source: Myanmar EBT 2010–2017.

Energy intensity is defined (Figure 14) as the total primary energy supply (TPES) divided by the GDP. Figure 14 shows that energy intensity decreased by 1.9% per year from 2010 to 2014. Between 2014 and 2017 it decreased by 2.2% per year. This result indicates that energy intensity decreased from 307.32 to 262.48 toe/million US\$ over the period of 2010–2017.

Figure 14. Energy Intensity



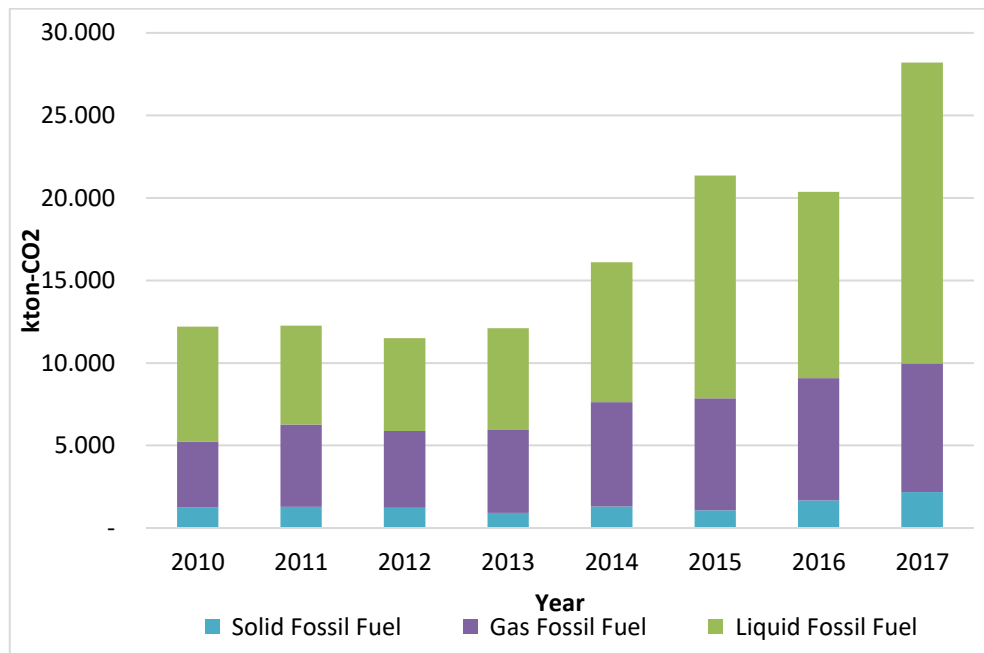
toe = ton of oil equivalent.

Source: Myanmar EBT 2010–2017.

10. CO₂ Emissions

Myanmar's CO₂ emissions have been increasing at an average rate of 13% per year from 2010 to 2017. The total amount of CO₂ emissions was 28,203.81 kiloton-CO₂ in 2017. There were three sources of emissions: solid, liquid, and gas energy sources. Emissions from liquid sources had the highest share of 65%, followed by the gas share, i.e. 28% and the rest of solid, i.e. 8% share. The petroleum products lead to a high share of liquid fuel emissions from the transport sector. In terms of average annual growth, liquid emissions grew by 15%, followed by gas and solid respectively, 10% and 8%. Between 2010 and 2014, the average annual growth rate of emissions from natural gas was 12%, followed by that of liquid (5%), and solid (1%). Between 2014 and 2017, emissions from liquid fuel increased 29%, followed by solid (18%), and gas (7%). This evolution can be explained by the increase of petroleum products consumption in the transport sector, and the increasing use of coal-fired power plants.

Figure 15. CO₂ Emissions from Fuel Combustion by Fuel Type



kton = kiloton.

Source: Myanmar EBT 2010–2017.

11. Conclusion

The key findings can be summarised as follows:

1. The total final energy consumption (TFEC) and the total primary energy supply (TPES) for the period 2010–2017 grew by 3.8% per year and 4.6% per year, respectively. Biomass was the dominant energy source in terms of the TFEC, followed by petroleum products and electricity. Nevertheless, petroleum products consumption grew the fastest, i.e. 15.8% per year, followed by electricity and coal. In term of the TPES, biomass was the dominating energy in 2017, followed by gas, petroleum products, and hydropower. Petroleum products grew the fastest at 21% per year, followed by hydropower, gas, and coal.
2. Natural gas produced from both onshore and offshore sites increased by 6.5% per year, whilst its export increased by 5.5 % per year from 2010 to 2017. Domestic gas supply increased over 80% per year for electricity generation. On the other hand, oil production declined by 7.1 % per year, whilst refinery output declined by 13% per year between 2010 and 2017.
3. Mainly used in the gas-fired turbines, the natural gas supply in the TPES increased by 10.5% per year from 2010 to 2017. The final energy consumption of natural gas declined annually by 6.2% from 2010 to 2017. Between 2010 and 2017, the consumption of natural gas in power generation increased by 16.3 % per year, whilst the use in industry decreased by 8.8% per year and the use in the transport sector grew by 0.3 % per year.
4. CO₂ emissions from combustion of fossil fuel energy largely increased to around 28 CO₂ million tons in 2017 from 12 CO₂ million tons in 2010, i.e. an average growth rate of 13%

per year. The major energy sources that emitted CO₂ in Myanmar were oil and gas. In the 2014–2017 period, oil and coal increased by 7.0% per year and 14% per year, respectively. Consequently, the growth rate of CO₂ emissions was higher than the TPES in the 2010–2017 period because of increasing electricity generation from the coal-fired power plants.

5. Hydropower generation is clean in terms of CO₂ emissions, but it faces seasonal fluctuation and environmental issues. Gas power generation can achieve stable electricity supply but emits CO₂.
6. Energy intensity, defined as TPES/GDP, increased by 85% in the 2010–2017 period. Elasticity defined as TPES growth rate divided by GDP growth rate was 0.66 (4.6/7.0) in the same period. The reason of this low elasticity is that primary energy demand, i.e. hydropower and petroleum increased rapidly, whilst the biggest demand share, i.e. biomass demand decreased. Biomass absorbed the increase of hydropower and petroleum products.

References

Government of the Republic of the Union of Myanmar (2019), *Myanmar Energy Balance Tables (EBT) Collection Historical Data 2010-2018*.¹ Naypyidaw: Government of Myanmar.

Ministry of Electricity and Energy (MoEE) Myanmar (2019), *Myanmar Energy Data Revision Final 24 July 2019*. Naypyidaw: MoEE.²

World Bank (2018), *World Development Indicators*. Washington, DC: World Bank. <https://data.worldbank.org/country/lao-pdr?view=chart> (accessed 28 August 2018).³

¹ Energy Balance Tables (EBT) are developed by ERIA.

² Energy data revisions are developed by ERIA and data support is from the Ministry of Electricity and Energy, including raw energy data, consisting of:

1. Coal Data
Coal data is maintained by the Ministry of Natural Resources and Environmental Conservation in Myanmar.
2. Petroleum Data
Petroleum data and the import of petroleum products data are collected by the Myanmar Oil and Gas Enterprise), Myanmar Petrochemical Enterprise, and Myanmar Customs.
3. Natural Gas Data
Natural gas data is collected by the Ministry of Electricity and Energy (MoEE).
4. Electricity Data
The MoEE collects the data on electricity generation, export, and final consumption
5. Biomass Data
Biomass data is collected by the MoEE.

³ Gross domestic product (GDP) (constant 2010 US\$), population, foreigner direct investment, labour force, and unemployment of Myanmar are collected from World Development Indicators.

Appendix 1
Energy Balance Tables of Myanmar 2010–2017
Year: 2010, Unit (ktoe)

	1.	2.	3.	4.								5.	6.	8.	9.	10.	11.	12.
	Coal	Coal Products	Crude Oil & NGL	Petroleum Products	4.1 Motor Gasoline	4.3 Jet Fuel	4.4 Kerosene	4.5 Gas/Diesel Oil	4.6 Fuel Oil	4.7 LPG	4.10 Other Petroleum	Gas	Hydro	Geothermal, Solar	Others	Electricity	Heat	Total
1. Indigenous Production	313		937									10.920	532	0	9.875			22.577
2. Imports				1.619	89	32		1.494			4							1.619
3. Exports																		-8.988
4. International Marine Bunkers				-2				-2										-2
13.1 International Aviation Bunkers				-19		-19												-19
5. Stock Changes			7	30	-28	2	0	51	-1	4	1							36
6. Total Primary Energy Supply	313		944	1.629	61	16	0	1.543	-1	8	1	1.933	532	0	9.875			15.225
7. Transfers																		
8. Total Transformation Sector	-131		-891	755	381	44	2	235	62	9	22	-1.013	-532	0	-166	742		-1.237
8.1 Main Activity Producer	-131			-10				-10				-1.013	-532	0		742		-945
8.2 Autoproducers																		
8.3 Gas Processing																		
8.4 Refineries			-891	765	381	44	2	245	62	9	22							-126
8.5 Coal Transformation																		
8.6 Petrochemical Industry																		
8.7 Biofuel Processing																		
8.8 Charcoal Processing																		-166
8.9 Non-specified Transformation																		
9. Loss & Own Use				-6							-6	-224				-199		-429
10. Discrepancy			-53	-77	-73	0	0	2	0	-5	0	-20				0		-150
11. Total Final Energy Consumption	182			2.301	370	60	2	1.779	61	12	18	675			9.708	543		13.409
12. Industry Sector	182			1.004				941	46		17	502			2.627	197		4.511
12.1 Iron and Steel												13						13
12.2 Chemical (incl. Petrochemical)												196						196
12.3 Non-ferrous Metals												2						2
12.4 Non-metallic Mineral Products	164											257						421
12.5 Transportation Equipment												2						2
12.6 Machinery												5						5
12.7 Mining and Quarrying																		
12.8 Food, Beverages and Tobacco													7					7
12.9 Pulp, Paper and Printing													13					13
12.10 Wood and Wood Products																		
12.11 Construction																		
12.12 Textiles and Leather													7					7
12.13 Non-specified Industry	18			1.004				941	46		17				2.627	197		3.846
13. Transport Sector				1.268	370	60		839					173					1.441
13.2 Domestic Air Transport				60		60												60
13.3 Road				1.172	370			802					173					1.345
13.4 Rail				36				36										36
13.5 Inland Waterways																		
13.6 Pipeline Transport																		
13.7 Non-specified Transport																		
14. Other Sector				29	0		2		15	12	1				7.081	346		7.456
14.1 Residential & Commercial				27					15	12					7.081	341		7.448
14.1.1 Commerce and Public Services				15					15						2.627	112		2.754
14.1.2 Residential				12						12					4.454	228		4.694
14.2 Agriculture																		
14.3 Fishing																		
14.4 Non-specified Others				3	0		2				1						6	8
of which Non-energy Use				1							1	176						177
16 Electricity Output in GWh	391		33									2.012	6.189	0	0			8.625
17 Heat Output in TJ	0		0									0		0	0			0

Year: 2011, Unit (ktoe)

	1.	2.	3.	4.								5.	6.	8.	9.	10.	11.	12.
	Coal	Coal Prod	Crude Oil	Petroleum	4.1 Motor Gas	4.3 Jet Fuel	4.4 Kerosene	4.5 Gas/Diesel	4.6 Fuel Oil	4.7 LPG	4.10 Other Pet	Gas	Hydro	Geotherm	Others	Electricity	Heat	Total
1. Indigenous Production	309		849									11.426	649	0	10.559			23.793
2. Imports	21			1.537	96	72		1.287			8	74						1.559
3. Exports	-11											-8.970						-8.981
4. International Marine Bunkers				-1				-1										-1
13.1 International Aviation Bunkers				-27		-27												-27
5. Stock Changes			-32	-223	-41	-18	0	-164	-3	-2	5							-255
6. Total Primary Energy Supply	320		817	1.286	55	27	0	1.121	-3	6	79	2.456	649	0	10.559			16.087
7. Transfers																		
8. Total Transformation Sector	-153		-835	781	453	44	1	189	68	8	17	-1.283	-649	0	-158	899		-1.398
8,1 Main Activity Producer	-153			-12				-12				-1.283	-649	0		899		-1.197
8,2 Autoproducers																		
8,3 Gas Processing																		
8,4 Refineries			-835	793	453	44	1	201	68	8	17							-42
8,5 Coal Transformation																		
8,6 Petrochemical Industry																		
8,7 Biofuel Processing																		
8,8 Charcoal Processing																		
8,9 Non-specified Transformation															-158			-158
9. Loss & Own Use				-5							-5	-197				-250		-452
10. Discrepancy			19	4	-41	2		39		4	0	-140			0	13		-104
11. Total Final Energy Consumption	167			2.066	468	74	1	1.348	66	18	91	836			10.401	662		14.133
12. Industry Sector	167			818				700	50		68	660			2.785	233		4.664
12,1 Iron and Steel	31											18						49
12,2 Chemical (incl. Petrochemical)												257						257
12,3 Non-ferrous Metals												3						3
12,4 Non-metallic Mineral Products	107											339						446
12,5 Transportation Equipment												2						2
12,6 Machinery												7						7
12,7 Mining and Quarrying																		
12,8 Food, Beverages and Tobacco												9						9
12,9 Pulp, Paper and Printing												17						17
12,10 Wood and Wood Products																		
12,11 Construction				52							52							52
12,12 Textiles and Leather												9						9
12,13 Non-specified Industry	28			766				700	50		16				2.785	233		3.813
13. Transport Sector				1.212	468	74		648			22	176						1.388
13,2 Domestic Air Transport				74		74												74
13,3 Road				1.100	468			610			22	176						1.276
13,4 Rail				38				38										38
13,5 Inland Waterways																		
13,6 Pipeline Transport																		
13,7 Non-specified Transport																		
14. Other Sector				36	0		1	16	18	1					7.616	429		8.081
14,1 Residential & Commercial				34				16	18						7.616	422		8.073
14.1.1 Commerce and Public Services				16				16							2.785	132		2.933
14.1.2 Residential				18						18					4.831	290		5.140
14,2 Agriculture																		
14,3 Fishing																		
14,4 Non-specified Others				2	0		1				1					7		9
of which Non-energy Use				75							75	232						307
16. Electricity Output in GWh	312		38									2.556	7.544	4	0			10.455
17. Heat Output in TJ	0		0									0		0	0			0

Year: 2012, Unit (ktoe)

	1.	2.	3.	4.	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.10	5.	6.	8.	9.	10.	11.	12.
	Coal	Coal Prod	Crude Oil	Petroleum	Motor Gas	Naphtha	Jet Fuel	Kerosene	Gas/Diesel	Fuel Oil	LPG	Other Pet	Gas	Hydro	Geotherm	Others	Electricity	Heat	Total
1. Indigenous Production	305		829	12								8	11.477	668	0	10.603			23.895
2. Imports	2			1.442	229		63		1.044			1	105						1.443
3. Exports			-141										-8.900						-9.041
4. International Marine Bunkers				-2					-2										-2
13.1 International Aviation Bunkers				-36			-36												-36
5. Stock Changes			62	84	23	0	15	-1	39	0	0	7							146
6. Total Primary Energy Supply	306		750	1.501	252	4	43	-1	1.081	0	9	112	2.577	668	0	10.603			16.406
7. Transfers					4	-4													
8. Total Transformation Sector	-131		-697	626	349		35	1	154	63	9	16	-1.430	-668	0	-170	943		-1.527
8,1 Main Activity Producer	-131			-16					-16				-1.409	-668	0		943		-1.281
8,2 Autoproducers																			
8,3 Gas Processing													-21						-21
8,4 Refineries			-697	642	349		35	1	169	63	9	16							-54
8,5 Coal Transformation																			
8,6 Petrochemical Industry																			
8,7 Biofuel Processing																			
8,8 Charcoal Processing																			
8,9 Non-specified Transformation																	-170		-170
9. Loss & Own Use				-5								-5	-238				-233		-476
10. Discrepancy	-5		-54	-148	-109		-5		-32	0	-1	-1	-336			0	0		-542
11. Total Final Energy Consumption	171			1.974	496		73		1.203	64	16	123	573			10.433	710		13.860
12. Industry Sector	171			1.094					951	48		95	393			2.795	331		4.784
12,1 Iron and Steel	27												15						42
12,2 Chemical (incl. Petrochemical)													197						197
12,3 Non-ferrous Metals													2						2
12,4 Non-metallic Mineral Products	142												150						292
12,5 Transportation Equipment													2						2
12,6 Machinery													4						4
12,7 Mining and Quarrying																			
12,8 Food, Beverages and Tobacco													6						6
12,9 Pulp, Paper and Printing													12						12
12,10 Wood and Wood Products																			
12,11 Construction				78								78							78
12,12 Textiles and Leather													5						5
12,13 Non-specified Industry	2			1.016					951	48		17				2.795	331		4.144
13. Transport Sector				847	496		73		251			27	165						1.013
13,2 Domestic Air Transport				73			73												73
13,3 Road				738	496				215			27	165						903
13,4 Rail				36					36										36
13,5 Inland Waterways																			
13,6 Pipeline Transport																			
13,7 Non-specified Transport																			
14. Other Sector				32						16	16	1	14			7.637	379		8.064
14,1 Residential & Commercial				32						16	16		14			7.637	372		8.056
14.1.1 Commerce and Public Services				16						16			14			2.795	141		2.967
14.1.2 Residential				16							16					4.842	231		5.089
14,2 Agriculture																			
14,3 Fishing																			
14,4 Non-specified Others				1								1					7		8
15. of which Non-energy Use				105								105	177						283
16. Electricity Output in GWh	265		51										2.883	7.766	4	0			10.969
17. Heat Output in TJ	0		0										0		0	0			0

Year: 2013, Unit (ktoe)

	1.	3.	4.	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.10	5.	6.	8.	9.	10.	11.	12.
	Coal	Crude Oil	Petroleum	Motor Gas	Naphtha	Jet Fuel	Kerosene	Gas/Diese	Fuel Oil	LPG	Other Pet	Gas	Hydro	Geotherm	Others	Electricity	Heat	Total
Indigenous Production	235	846	8								5	11.853	973	0	10.370			24.285
Imports	16		1,910	342		109		1,257			185							1,926
Exports	-24	-238										-9.159				-218		-9.639
International Marine Bunkers			-3					-3										-3
International Aviation Bunkers			-78			-78												-78
Stock Changes		3	19	2	0	-12	0	28	0	2	-2							22
Total Primary Energy Supply	227	611	1,856	344	3	20	0	1,281	0	24	183	2,694	973	0	10,370	-218		16,513
Transfers				3	-3													
Total Transformation Sector	-59	-557	477	243		22	0	135	53	7	16	-1,500	-973	0	-180	1,268		-1,525
8,1 Main Activity Producer	-59		-19					-19				-1,488	-973	0		1,268		-1,272
8,2 Autoproducers																		
8,3 Gas Processing												-12						-12
8,4 Refineries		-557	496	243		22	0	154	53	7	16							-61
8,5 Coal Transformation																		
8,6 Petrochemical Industry																		
8,7 Biofuel Processing																		
8,8 Charcoal Processing																-180		-180
8,9 Non-specified Transformation																		
Loss & Own Use			-5								-5	-268				-223		-496
Discrepancy	0	-54	-109	-113	0	5	0	3	0	-4	0	-271			0	0		-434
Total Final Energy Consumption	168		2,219	477		47	0	1,420	53	27	195	654			10,190	827		14,059
Industry Sector	168		1,261					1,103	40		119	475			2,704	349		4,958
12,1 Iron and Steel	25											9						34
12,2 Chemical (incl. Petrochemical)												153						153
12,3 Non-ferrous Metals												2						2
12,4 Non-metallic Mineral Products	90											280						370
12,5 Transportation Equipment												1						1
12,6 Machinery												5						5
12,7 Mining and Quarrying																		
12,8 Food, Beverages and Tobacco												5						5
12,9 Pulp, Paper and Printing												15						15
12,10 Wood and Wood Products																		
12,11 Construction			110								110							110
12,12 Textiles and Leather												6						6
12,13 Non-specified Industry	53		1,152					1,103	40		9				2,704	349		4,258
Transport Sector			881	477		47		317			39	178						1,060
13,2 Domestic Air Transport			47			47												47
13,3 Road			797	477				281			39	178						976
13,4 Rail			37					37										37
13,5 Inland Waterways																		
13,6 Pipeline Transport																		
13,7 Non-specified Transport																		
Other Sector			77	0			0		13	27	37	1			7,486	478		8,041
14,1 Residential & Commercial			40						13	27		1			7,486	469		7,996
14.1.1 Commerce and Public Services			13						13			1			2,704	146		2,863
14.1.2 Residential			27							27					4,782	324		5,132
14,2 Agriculture																		
14,3 Fishing											37						9	46
14,4 Non-specified Others			37	0			0											
of which Non-energy Use			186								186	138						324
Electricity Output in GWh	136	61										3,228	11,310	4	0			14,739
Heat Output in TJ	0	0										0		0	0			0

Year: 2014, Unit (ktoe)

	1.	3.	4.	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.10	5.	6.	8.	9.	10.	11.	12.
	Coal	Crude Oil & NGL	Petroleum Products	Motor Gasoline	Naphtha	Jet Fuel	Kerosene	Gas/Diesel Oil	Fuel Oil	LPG	Other Petroleum	Gas	Hydro	Geothermal, Solar etc.	Others	Electricity	Heat	Total
1. Indigenous Production	181	810	10		4						6	16.499	886		1	11.005		29.391
2. Imports	150		3.679	946		120		2.286		25	301							3.828
3. Exports	-6	-243										-13.238				-126		-13.613
4. International Marine Bunkers			0					0										0
13.1 International Aviation Bunkers			-84			-84												-84
5. Stock Changes		-31	-772	-229	0	-3		-523	-11	-3	-3	-7						-810
6. Total Primary Energy Supply	325	536	2.833	716	4	33		1.763	-11	28	298	3.254	886		1	11.005	-126	18.713
7. Transfers				4	-4													
8. Total Transformation Sector	-34	-561	489	248		18	0	145	59	4	15	-2.129	-886	-1	-182	1.345		-1.958
8.1 Main Activity Producer	-34		-20					-20				-2.116	-886	-1		1.345		-1.712
8.2 Autoproducers																		
8.3 Gas Processing												-13						-13
8.4 Refineries		-561	509	248		18	0	165	59	4	15							-52
8.5 Coal Transformation	-1																	
8.6 Petrochemical Industry																		
8.7 Biofuel Processing																		
8.8 Charcoal Processing															-182			-182
8.9 Non-specified Transformation																		
9. Loss & Own Use			-5								-5	-387				-250		-641
10. Discrepancy	-1	25	-208	-184	0	5		-26		-2	0	-164			0	0		-347
11. Total Final Energy Consumption	290		3.110	784		56	0	1.882	48	31	309	573			10.823	970		15.766
12. Industry Sector	290		1.782					1.525	36		221	391			2.886	454		5.803
12.1 Iron and Steel	51											10						61
12.2 Chemical (incl. Petrochemical)												140						140
12.3 Non-ferrous Metals												2						2
12.4 Non-metallic Mineral Products	53											217						269
12.5 Transportation Equipment												1						1
12.6 Machinery												5						5
12.7 Mining and Quarrying																		
12.8 Food, Beverages and Tobacco												5						5
12.9 Pulp, Paper and Printing												6						6
12.10 Wood and Wood Products																		
12.11 Construction			215								215							215
12.12 Textiles and Leather												6						6
12.13 Non-specified Industry	186		1.568					1.525	36		7				2.886	454		5.094
13. Transport Sector			1.254	784		56		358			57	181						1.436
13.2 Domestic Air Transport			56			56												56
13.3 Road			1.161	784				320			57	181						1.342
13.4 Rail			37					37										37
13.5 Inland Waterways																		
13.6 Pipeline Transport																		
13.7 Non-specified Transport																		
14. Other Sector			73	0			0		12	31	30	1			7.937	516		8.527
14.1 Residential & Commercial			43						12	31		1			7.937	505		8.486
14.1.1 Commerce and Public Services			12						12			1			2.886	151		3.049
14.1.2 Residential			31							31					5.051	354		5.436
14.2 Agriculture																		
14.3 Fishing																		
14.4 Non-specified Others			31	0			0				30					11		42
15. of which Non-energy Use			302								302							429
16. Electricity Output in GWh	70	65										5.193	10.298	14	0			15.639
17. Heat Output in TJ	0	0										0		0	0			0

Year: 2015, Unit (ktoe)

	1.	2.	3.	4.										5.	6.	8.	9.	10.	11.	12.
	Coal	Coal Products	Crude Oil & NGL	Petroleum Products	4.1 Motor Gasoline	4.2 Naphtha	4.3 Jet Fuel	4.4 Kerosene	4.5 Gas/Diesel Oil	4.6 Fuel Oil	4.7 LPG	4.10 Other Petroleum Products	Gas	Hydro	Geothermal, Solar etc.	Others	Electricity	Heat	Total	
1. Indigenous Production	159		659	14		4					9		17.110	915	1	10.117			28.976	
2. Imports	114			4.712	1.350				2.946		25	282							4.826	
3. Exports	-6		-150	-34					-34				-13.712					-107	-14.008	
4. International Marine Bunkers				-1					-1										-1	
13.1 International Aviation Bunkers				-41															-41	
5. Stock Changes			-29	163	-13	0	14		183	-18	-2	-2	4						138	
6. Total Primary Energy Supply	268		481	4.812	1.338	4	81		3.094	-18	32	279	3.402	915	1	10.117	-107		19.889	
7. Transfers					4	-4														
8. Total Transformation Sector	-2	2	-432	391	151		17	0	136	65	6	16	-2.402	-915	-1	-183	1.481		-2.061	
8,1 Main Activity Producer				-17					-17								1.481		-1.837	
8,2 Autoproducers																				
8,3 Gas Processing													-17						-17	
8,4 Refineries			-432	409	151		17	0	154	65	6	16							-24	
8,5 Coal Transformation	-2	2																		
8,6 Petrochemical Industry																				
8,7 Biofuel Processing																				
8,8 Charcoal Processing																		-183	-183	
8,9 Non-specified Transformation																				
9. Loss & Own Use				-5								-5	-470					-222	-697	
10. Discrepancy	0		-48	-437	-368	0	-1		-65	0	-3	0	-32				0		-518	
11. Total Final Energy Consumption	267	2		4.760	1.125		97	0	3.166	47	35	290	498			9.934	1.153		16.614	
12. Industry Sector	267			2.791					2.594	35		162	330			2.624	354		6.366	
12,1 Iron and Steel	28												5						33	
12,2 Chemical (incl. Petrochemical)													160						160	
12,3 Non-ferrous Metals													2						2	
12,4 Non-metallic Mineral Products	92												142						235	
12,5 Transportation Equipment													0						0	
12,6 Machinery													5						5	
12,7 Mining and Quarrying																				
12,8 Food, Beverages and Tobacco													5						5	
12,9 Pulp, Paper and Printing													3						3	
12,10 Wood and Wood Products																				
12,11 Construction				154								154							154	
12,12 Textiles and Leather													7						7	
12,13 Non-specified Industry	147			2.637					2.594	35		8	2						5.764	
13. Transport Sector				1.892	1.125		97		572			97	167			2.624	354		2.059	
13,2 Domestic Air Transport				97			97												97	
13,3 Road				1.758	1.125				536			97	167						1.925	
13,4 Rail				37					37										37	
13,5 Inland Waterways																				
13,6 Pipeline Transport																				
13,7 Non-specified Transport																				
14. Other Sector		2		78	0			0		12	35	31	1			7.310	799		8.188	
14,1 Residential & Commercial		2		47						12	35		1			7.310	790		8.148	
14,1.1 Commerce and Public Services				23						12	12					2.624	216		2.864	
14,1.2 Residential		2		23							23					4.685	574		5.284	
14,2 Agriculture																				
14,3 Fishing																				
14,4 Non-specified Others				31	0			0				31						9	41	
15. of which Non-energy Use				283								283	144						426	
16. Electricity Output in GWh	0		55										6.518	10.639	11	0			17.223	
17. Heat Output in Tj	0		0										0		0	0			0	

Year: 2016, Unit (ktoe)

	1.	2.	3.	4.									5.	6.	8.	9.	10.	11.	12.
	Coal	Coal Products	Crude Oil & NGL	Petroleum Products	4.1 Motor Gasoline	4.2 Naphtha	4.3 Jet Fuel	4.4 Kerosene	4.5 Gas/Diesel Oil	4.6 Fuel Oil	4.7 LPG	4.10 Other Petroleum Products	Gas	Hydro	Geothermal, Solar etc.	Others	Electricity	Heat	Total
1. Indigenous Production	209		607	11		4					7		16.466	838	1	10.044			28.176
2. Imports	208			3.966	1.154		201		2.151		35	424							4.174
3. Exports	-4		-146	-173					-173				-12.834				-205		-13.361
4. International Marine Bunkers				-1					-1										-1
13.1 International Aviation Bunkers				-89			-89												-89
5. Stock Changes			0	357	265	0	2		84	4	3	-2	-1						355
6. Total Primary Energy Supply	414		461	4.070	1.419	4	115		2.060	4	46	422	3.631	838	1	10.044	-205		19.254
7. Transfers					4	-4													
8. Total Transformation Sector	-7	2	-418	400	153		16	0	136	75	5	14	-2.747	-838	-1	-141	1.742		-2.008
8.1 Main Activity Producer	-5			-19					-19				-2.730	-838	-1		1.742		-1.851
8.2 Autoproducers																			
8.3 Gas Processing													-17						-17
8.4 Refineries			-418	419	153		16	0	155	75	5	14							0
8.5 Coal Transformation	-2	2																	0
8.6 Petrochemical Industry																			
8.7 Biofuel Processing																			
8.8 Charcoal Processing																			
8.9 Non-specified Transformation																-141			-141
9. Loss & Own Use				-5								-5	-431				-216		-652
10. Discrepancy	0		-43	-261	-245	0	-3		-13	0	-1	0	-23			0	0		-327
11. Total Final Energy Consumption	407	2		4.204	1.331		128	0	2.183	80	50	432	430			9.903	1.321		16.267
12. Industry Sector	407			2.037					1.754	60		223	265			2.633	400		5.743
12.1 Iron and Steel	37												7						44
12.2 Chemical (incl. Petrochemical)													117						117
12.3 Non-ferrous Metals													2						2
12.4 Non-metallic Mineral Products	123												119						242
12.5 Transportation Equipment													0						0
12.6 Machinery													5						5
12.7 Mining and Quarrying																			
12.8 Food, Beverages and Tobacco													6						6
12.9 Pulp, Paper and Printing													0						0
12.10 Wood and Wood Products																			
12.11 Construction				215								215							215
12.12 Textiles and Leather													8						8
12.13 Non-specified Industry	247			1.823					1.754	60		8	2			2.633	400		5.104
13. Transport Sector				2.065	1.331		128		429			177	164						2.230
13.2 Domestic Air Transport				128			128												128
13.3 Road				1.902	1.331				394			177	164						2.066
13.4 Rail				36					36										36
13.5 Inland Waterways																			
13.6 Pipeline Transport																			
13.7 Non-specified Transport																			
14. Other Sector		2		102	0			0		20	50	32	0			7.270	921		8.295
14.1 Residential & Commercial		2		70						20	50		0			7.270	911		8.253
14.1.1 Commerce and Public Services				34						20	14		0			2.633	260		2.928
14.1.2 Residential			2	35							35					4.636	651		5.325
14.2 Agriculture																			
14.3 Fishing																			
14.4 Non-specified Others				32	0			0				32						10	42
15. of which Non-energy Use				424								424	105						529
16. Electricity Output in GWh	10		61										8.052	12.125	9	0			20.258
17. Heat Output in TJ	0		0										0		0	0			0

Year: 2017, Unit (ktoe)

	1.	3.	4.	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.10	5.	6.	8.	9.	10.	11.	12.
	Coal	Crude Oil	Petroleum	Motor Gas	Naphtha	Jet Fuel	Kerosene	Gas/Diesel	Fuel Oil	LPG	Other Petroleum	Gas	Hydro	Geothermal	Others	Electricity	Heat	Total
1. Indigenous Production	287	560	3		3							17.003	1.082	1	8.907			27.844
2. Imports	254		6.302	1.915		154		3.879			28	326						6.556
3. Exports		-253														-120		-13.487
4. International Marine Bunkers			-1					-1										-1
13.1 International Aviation Bunkers			-75			-75												-75
5. Stock Changes		29	11	-32	0	17		5	23	0	-2	-12						28
6. Total Primary Energy Supply	540	337	6.242	1.883	3	97		3.883	23	28	324	3.877	1.082	1	8.907	-120		20.866
7. Transfers			7	3	3													7
8. Total Transformation Sector	-250	-288	263	69		11	0	116	47	6	14	-2.912	-1.082	-1	-130	1.845		-2.554
8,1 Main Activity Producer	-250		-19					-19				-2.890	-1.082	-1		1.845		-2.396
8,2 Autoproducers																		
8,3 Gas Processing												-21						-21
8,4 Refineries		-288	282	69		11	0	134	47	6	14							-6
8,5 Coal Transformation																		
8,6 Petrochemical Industry																		
8,7 Biofuel Processing																		
8,8 Charcoal Processing																		
8,9 Non-specified Transformation															-130			-130
9. Loss & Own Use			-5								-5	-511				-260		-776
10. Discrepancy	0	-50	-79	-24	-7	3	0	-69		-1	19	-22				0		-150
11. Total Final Energy Consumption	290		6.428	1.932		111	0	3.930	70	33	353	432			8.777	1.466		17.393
12. Industry Sector	290		2.112					1.843	16		253	262			2.469	451		5.585
12,1 Iron and Steel	37											10						47
12,2 Chemical (incl. Petrochemical)												136						136
12,3 Non-ferrous Metals												2						2
12,4 Non-metallic Mineral Products	240											89						329
12,5 Transportation Equipment												3						3
12,6 Machinery												5						5
12,7 Mining and Quarrying																		
12,8 Food, Beverages and Tobacco												9						9
12,9 Pulp, Paper and Printing												0						0
12,10 Wood and Wood Products																		
12,11 Construction			227								227					0		227
12,12 Textiles and Leather												8						8
12,13 Non-specified Industry	12		1.885					1.843	16		26				2.469	451		4.818
13. Transport Sector			4.196	1.931		111		2.087			67	169						4.365
13,2 Domestic Air Transport			111			111												111
13,3 Road			4.018	1.931				2.087				169						4.188
13,4 Rail																		
13,5 Inland Waterways																		
13,6 Pipeline Transport																		
13,7 Non-specified Transport			67								67							67
14. Other Sector			120	0			0		54	33	33	0			6.307	1.015		7.443
14,1 Residential & Commercial			55						54	1	1	0			6.307	1.005		7.368
14,1.1 Commerce and Public Services			55						54	1		0			2.246	275		2.577
14,1.2 Residential															4.061	730		4.791
14,2 Agriculture																		
14,3 Fishing																		
14,4 Non-specified Others			65	0			0			32	33					10		75
15. of which Non-energy Use																		
16. Electricity Output in GWh	451	69										8.345	12.584	9	0			21.458
17. Heat Output in TJ	0	0										0		0	0			0

GWh = gigawatt hour, ktoe = kiloton of oil equivalent, TJ = terajoule.

Appendix 2

List of Members, Myanmar and ERIA

Myanmar Government Official

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3	Ms. Aye Aye San	Oil and Gas Planning Department, Ministry of Electricity and Energy	
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