



MINISTRY OF ELECTRICITY AND ENERGY
REPUBLIC OF THE UNION OF MYANMAR



Current status of Electricity and Energy Infrastructures in Myanmar

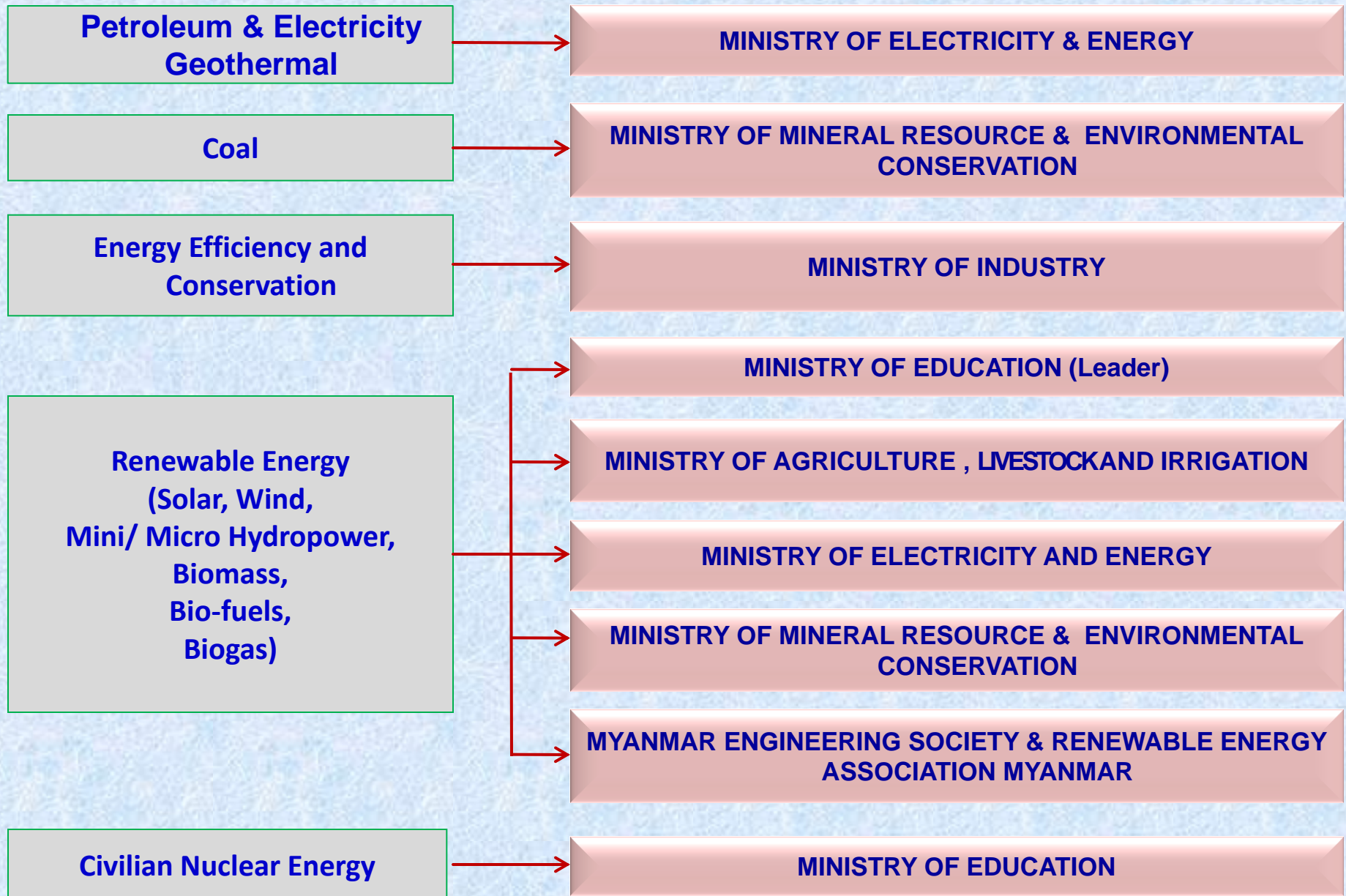
U NYAN TUN, DIRECTOR (EXPLORATION & DEVELOPMENT)

MYANMA OIL & GAS ENTERPRISE, MYANMAR

CONTENTS

- ☐ Framework for Myanmar Electricity & Energy
- ☐ Oil and gas activities and infrastructures
- ☐ Offshore Gas Prospects
- ☐ LNG Business
- ☐ Electric Power Sector
- ☐ Magwe-Shwe Daung 14" Pipeline Replacement Project
- ☐ Q & A

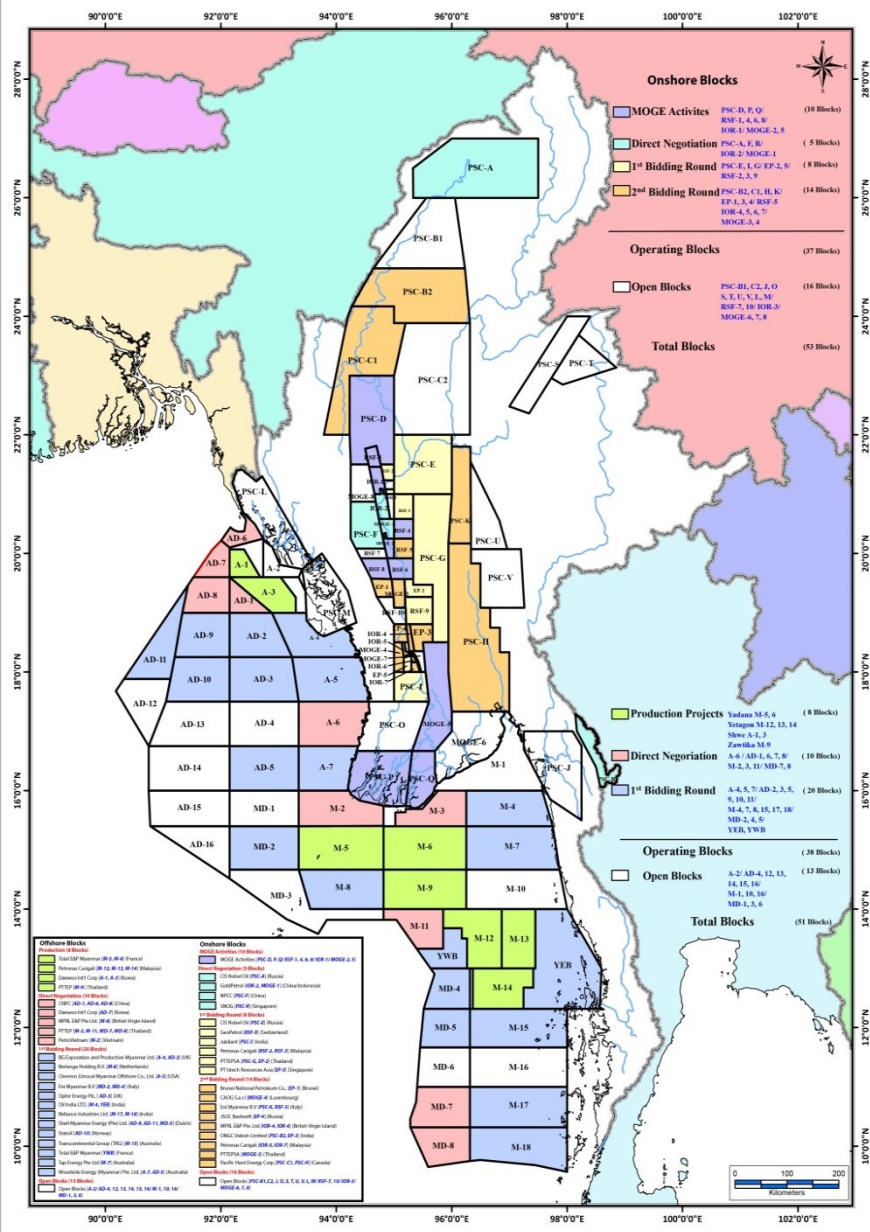
Institutional Framework for Myanmar Electricity & Energy



Oil and Gas Activities and Infrastructures

OIL AND GAS BLOCKS OF MYANMAR

OIL AND GAS BLOCK MAP OF MYANMAR



Onshore Blocks

Blocks operated by IOC	26 Blocks
Blocks operated by MOGE	10 Blocks
Open Blocks	17 Blocks
Total	53 Blocks

Offshore Blocks

PSC	38 Blocks
Open Block	13 Blocks
Total	51 Blocks

All Total onshore / Offshore - 104 Blocks

Onshore Oil and Gas Fields (Operated by MOGE)

Central Myanmar Basin

1. Kyaukkwet-LetpandoAyadaw (1995/1974/1893)
2. Thargyitaung-Sabe (2001)
3. Chauk-Lanywa(1902)
4. Yenangyaung (1887)
5. Mann (1970)
6. Htaukshabin-Kanni-Peppi (1978/1985/1976)
7. Tagaing-Yenanma-Dahatpin (1998)

Pyay Embayment

8. Pyi (1965)
9. Myanaung (1964)
10. Shwepyithar (1967)

Ayeyarwaddy Delta Basin

11. Nyaungdon-Maubin (1999/2007)
12. Apyauk(1991)



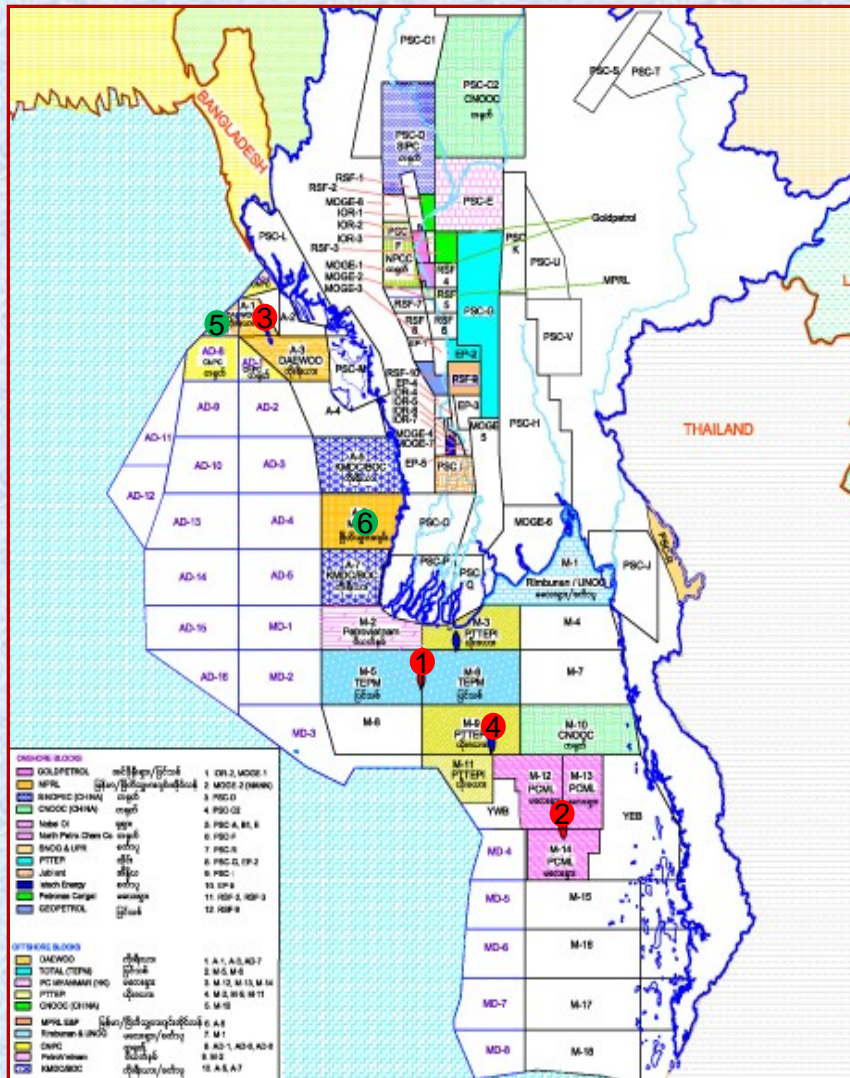
Operation Status of Offshore Projects

Current Offshore Development Projects

- 1 **Yadana Project** - Gas sale was commenced since 1998. Exported to Thailand and domestic use.
- 2 **Yetagun Project** - Gas sale was commenced on year 2000. Exported to Thailand.
- 3 **Shwe Project** - Gas sale was commenced since July 2013. Exported to China and domestic use.
- 4 **Zawtika Project** - Export Gas sale to Thailand was commenced since 5.8.2014 and domestic use on 14-3-2014.

Current Offshore Appraisal Projects

- 5 **AD-7 Block** - POSCO Daewoo and Woodside Energy (Myanmar) drilled appraisal wells.
- 6 **A-6 Block** - Appraisal wells are being drilled by MPRL and Woodside Energy(Myanmar).



Offshore Oil & Gas Projects



Project	- Yadana
Operator	- Total (French)
Commence Year	- 1998
Daily Production	- 880 mmcfd (Export 650 + Domestic 230)



Project	- Yetagun
Operator	- Petronas (Malaysia)
Commence Year	- 2000
Daily Production	- 240 mmcfd (Export Only)

Offshore Oil & Gas Projects



Project	-	Shwe
Operator	-	Posco Daewoo (South Korea)
Commence Year	-	2013
Daily Production	-	500 mmcf (Export 400 + Domestic 100)



Project	-	Zawtika
Operator	-	PTTEP (Thailand)
Commence Year	-	2014
Daily Production	-	345 mmcf (Export 245 + Domestic 100)

Whole Myanmar Daily Oil and Gas Production

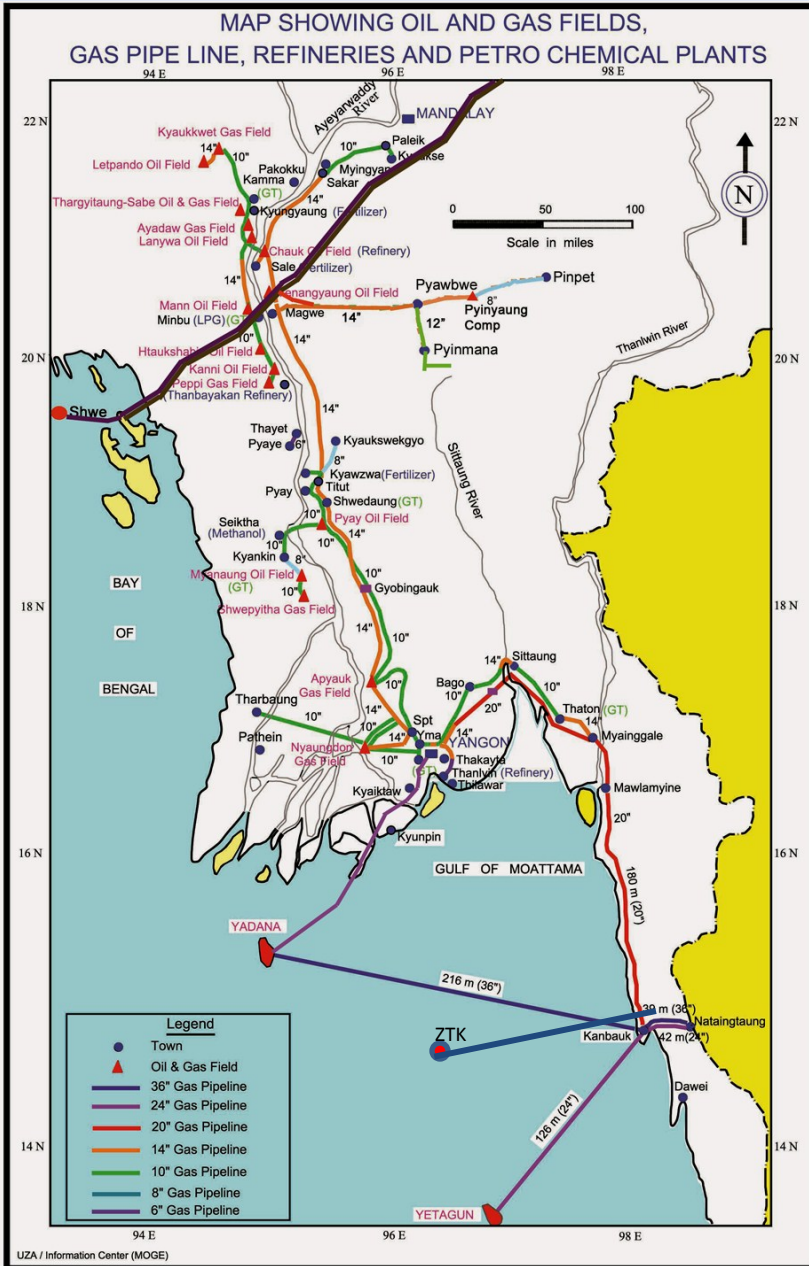
Oil Production

- | | |
|----------|-------------------------|
| Onland | - 6600 Bls |
| Offshore | - 5000 Bls (Condensate) |

Gas Production

- | | |
|-------------------------|------------|
| Onland Gas Production | - 50 mmcf |
| Offshore Gas Production | - 1.9 Bcf |
| Export Gas | - 1.5 Bcf |
| Domestic Gas | - 430 mmcf |

Gas Distribution



Onshore - 50 MMCFD

(CNG Stations, Petrochemical Plants)

Offshore - 1750 MMCF

YADANA - 750 MMCFD

550 MMCFD Export

200 MMCFD Domestic

(YGN area GT & GEG, Shwetaung Mag)

YETAGUN - 200 MMCFD Export

ZAWTIKA - 300 MMCFD

200 MMCFD Export

100 MMCFD Domestic

(KBK, Mawlamying, Thaton, YGN)

SHWE - 500 MMCFD

400 Export

100 Domestic

(KPU, YNG, Myingyan, KSE)

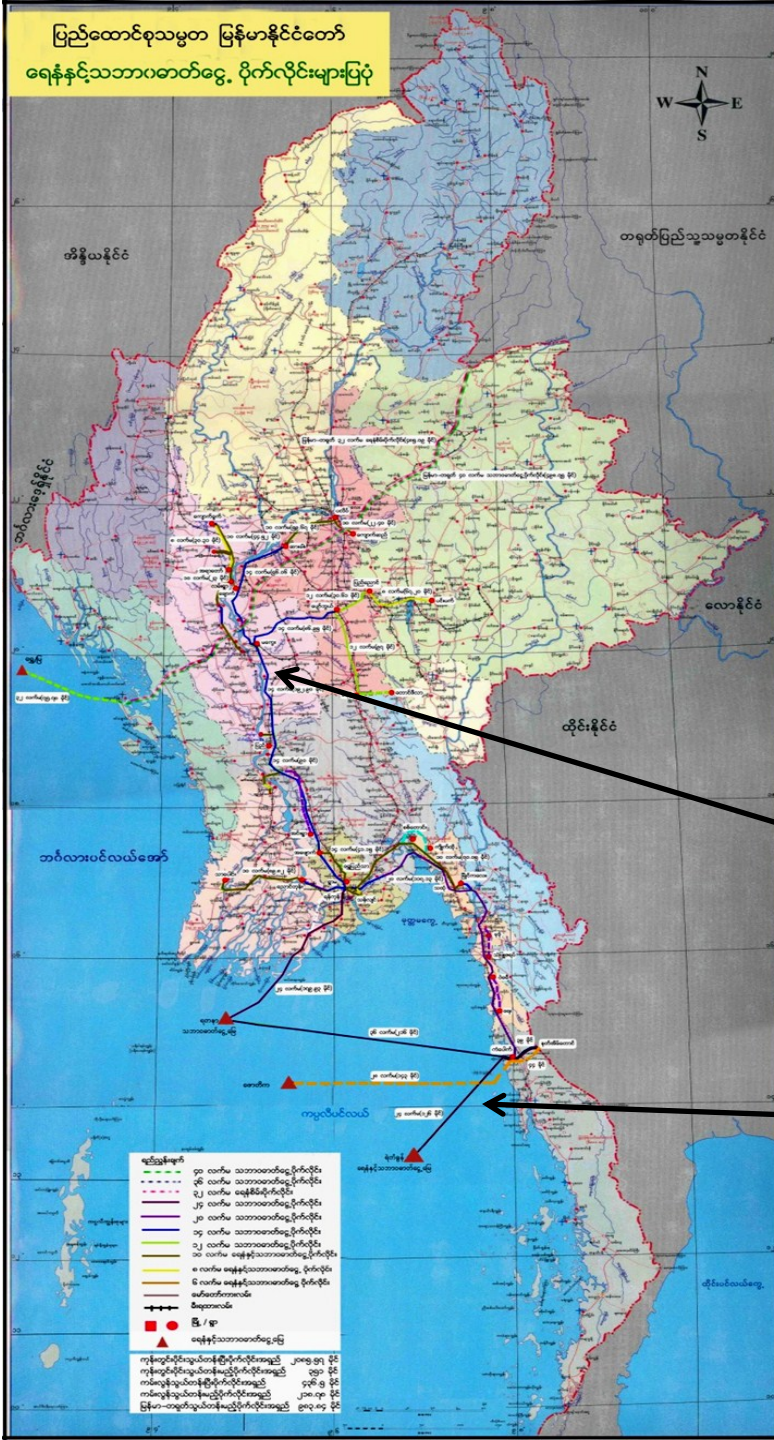
ပြည်ထောင်စုသမ္မတ မြန်မာနိုင်ငံတော်
ရေနံနှင့်သဘာဝဓာတ်ငွေ့ ဝိုက်လှိုင်းများပြပုံ

MOGE's Oil & Gas Pipeline Grid

- About 2549 miles of onshore gas pipeline were constructed by MOGE pipeline team.
- Pipeline sizes are varying from 6" to 30".
 - Main Trunk Line: 20" to 30"
 - Spur Lines: 6", 8", 10", 14"

Onshore Gas Pipeline

Offshore Gas Pipeline



South East Asia Oil and Gas Pipe Line



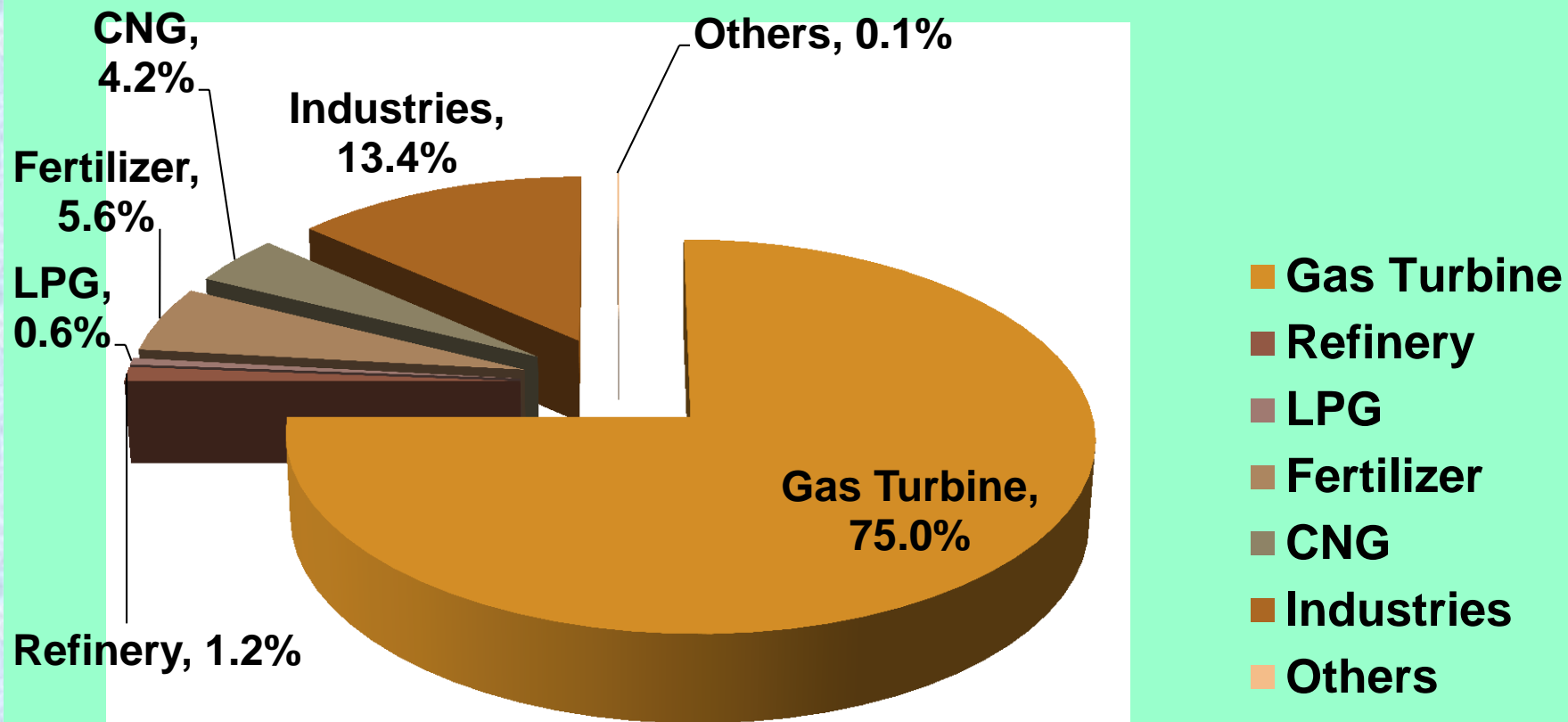
Oil Pipe Line

Length	: 760 km
Diameter	: 32 inches
Yearly Export	: Oil Ton 13 million
First Oil Export	: December.,2014
Cost for Project	: US \$ 2.45 billion

Gas Pipe Line

Length	: 782 Kilometer
Diameter	: 40 inches
Daily Production	: 500 mmcfd
First Gas Export	: July, 2013
Cost for Project	: US \$ 2.146 billion

Sector wise Gas Utilization



CNG / NGV Converting Program

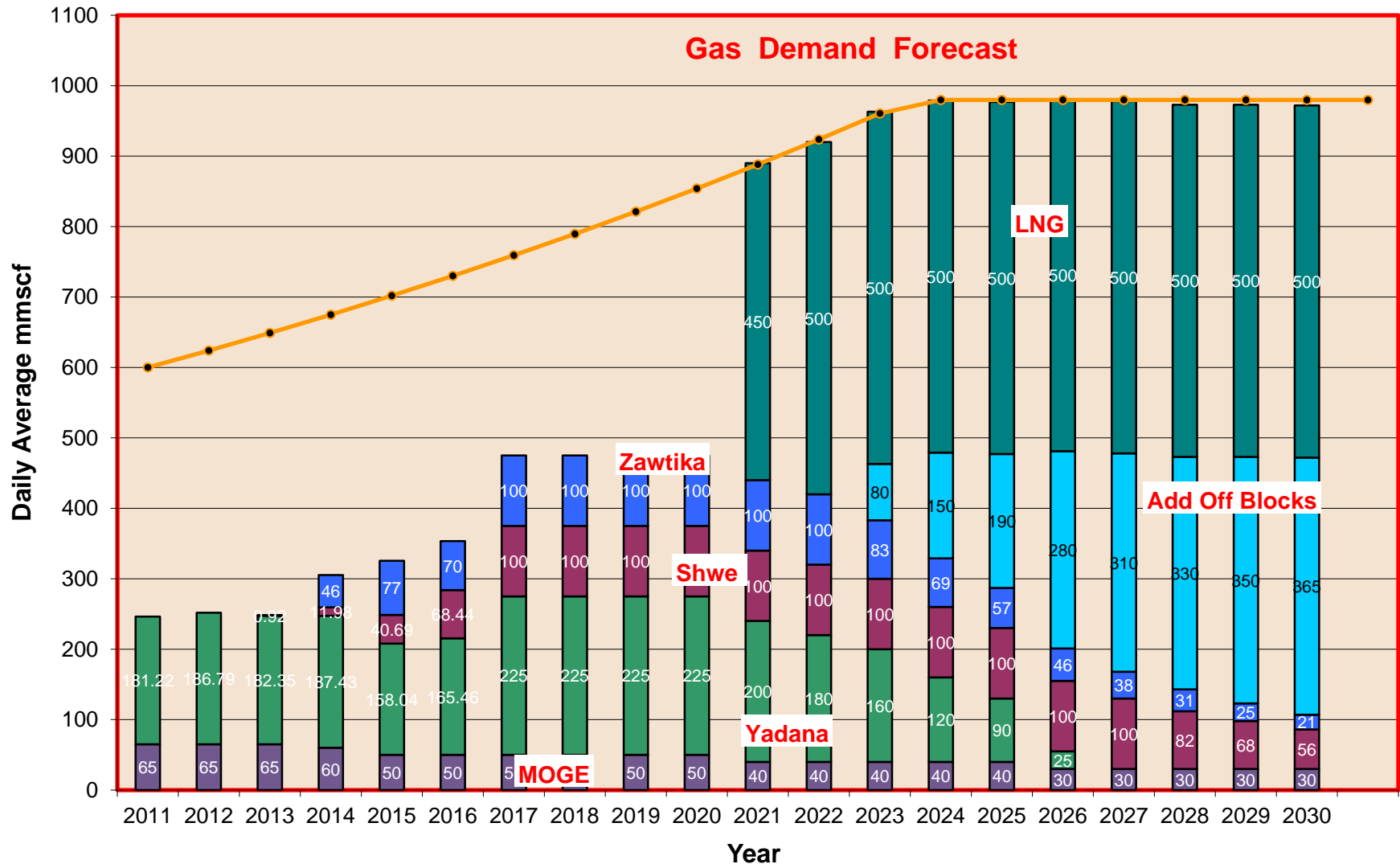
CNG FILLING STATION AND PIPELINE NETWORK IN MYANMAR



- ❖ Initiated in Myanmar since 1986.
- ❖ 1986 – August 2004 :
 - 5 CNG Refueling Stations -
 - 2 in Yangon City
 - 2 in Yenangyaung Field
 - 1 in Chaulk Field
 - 587 NGVs
- ❖ CNG / NGV Programme was reactivated in August 2004 and widely used in 2005.
- ❖ As at 2016 :
 - 46 CNG Refueling Stations in Myanmar-
 - 41 in Yangon City
 - 2 in Mandalay City
 - 2 in Yenangyaung Oil Field
 - 1 in Chaulk Oil Field
 - About 28,299 NGVs

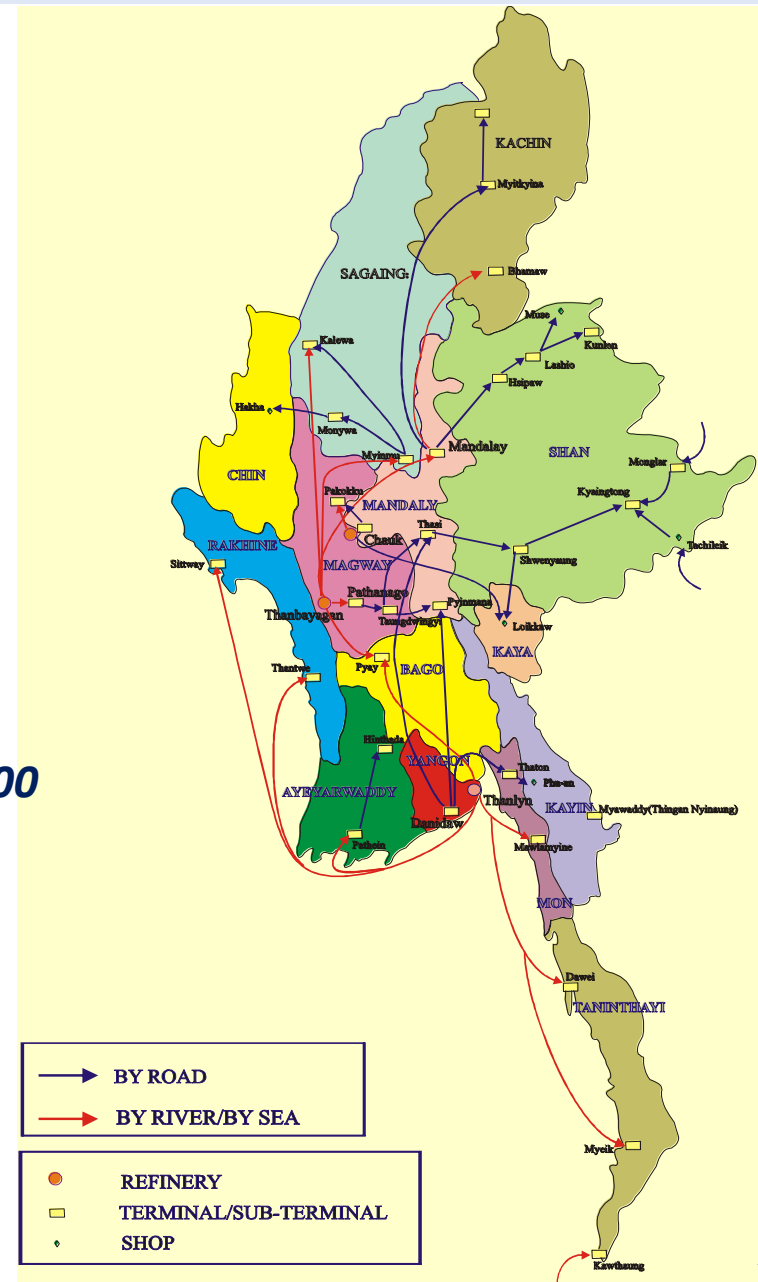
Prediction for Gas Demand & Supply in Myanmar

GAS DEMAND AND SUPPLY FORECAST IN MYANMAR



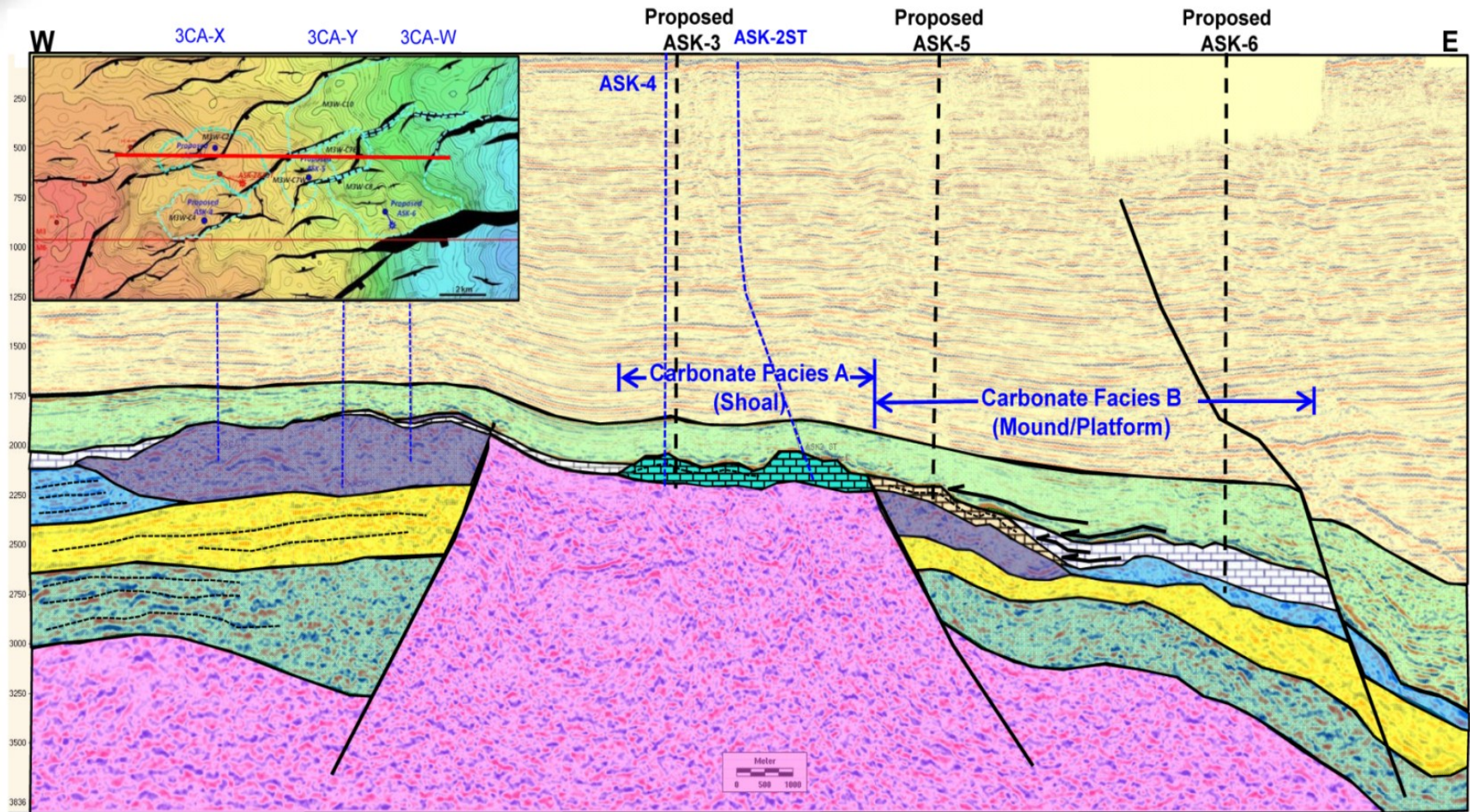
Petroleum Downstream Sector









- ✓ **3 Refineries: (51,000 BOPD)**
 - ❖ **Thanlyin, Thabayarkan and Chauk**
- ✓ **3 LPG Plants: (50 mmcfd)**
 - ❖ **Minbu, Kungchaung and Nyaungdon**
- ✓ **5 Fertilizer Plants: (2,012 MTD)**
 - ❖ **Sale, Kungchaung, Kyawzwa, Myaungtagar, Kangyidont**
- ✓ **Petroleum Products Distribution**
 - ❖ **fully privatized since 2010 and more than 2000 stations are permitted for distribution**
 - ❖ **12 fuel stations for government sector**
 - ❖ **Storage - 6 licenses**
 - ❖ **Transportation (Banker -15)**
 - ❖ **ATF - 13**



OFFSHORE GAS PROSPECTS

Offshore Aung Sin Kha Field, Block M-3 (Operator-PTTEPI)



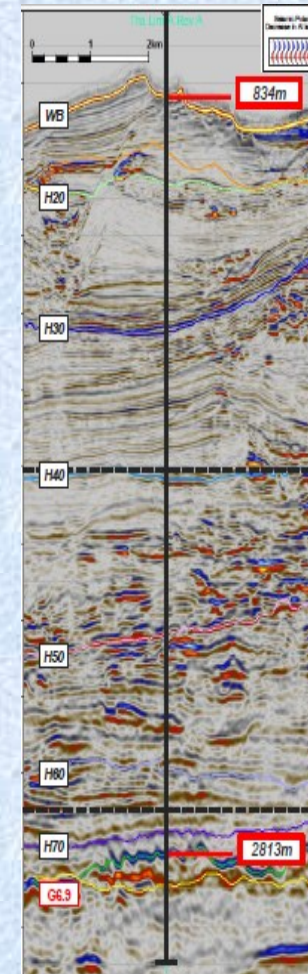
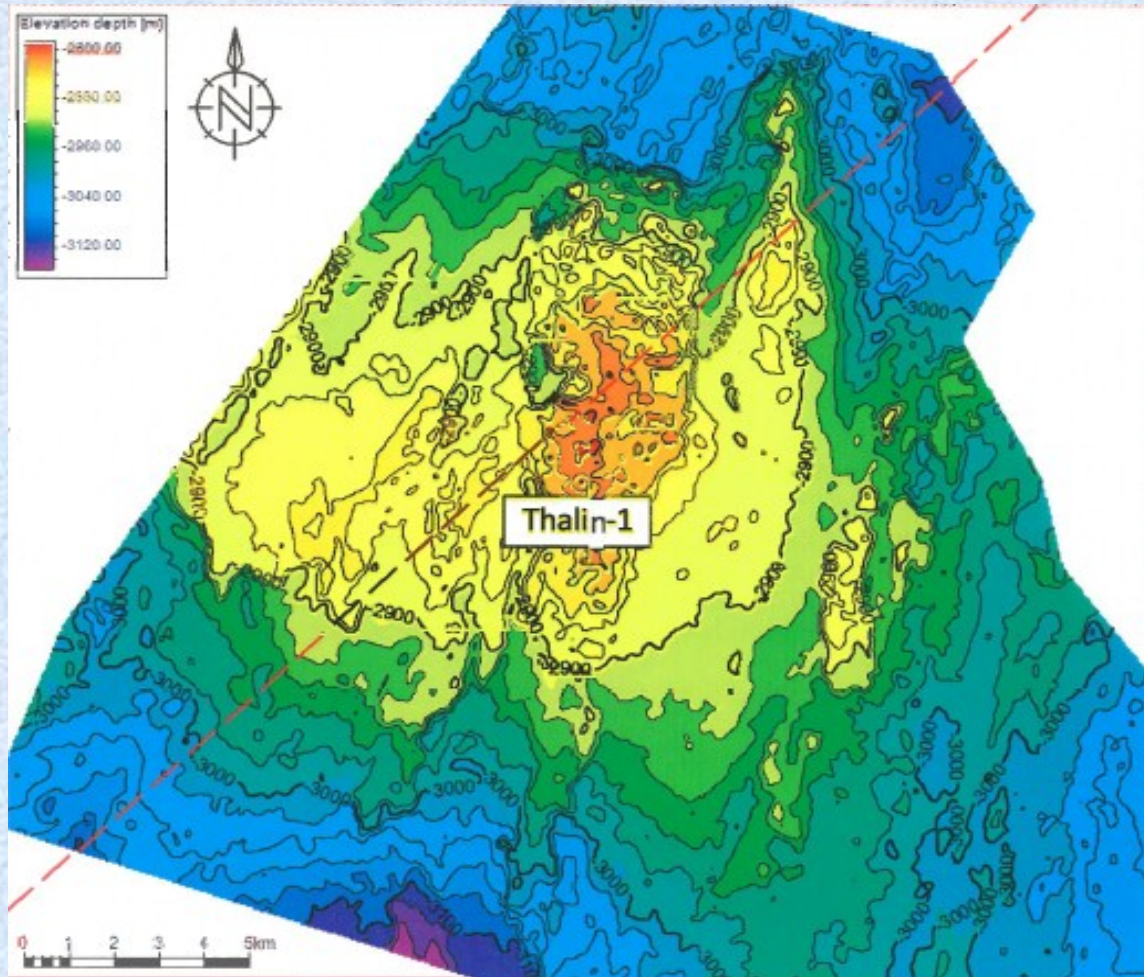
- | | | | |
|---|---|---|---|
|  | Volcanic basement |  | Volcanic clastic, Agglomerate, Tuffaceous |
|  | Late Oligocene Immediate post-rift sediment |  | Miocene carbonate (Different facies & Reservoir properties) |
|  | |  | Top Marine Shale |
|  | |  | Miocene & Plio-Pleistocene clastic |

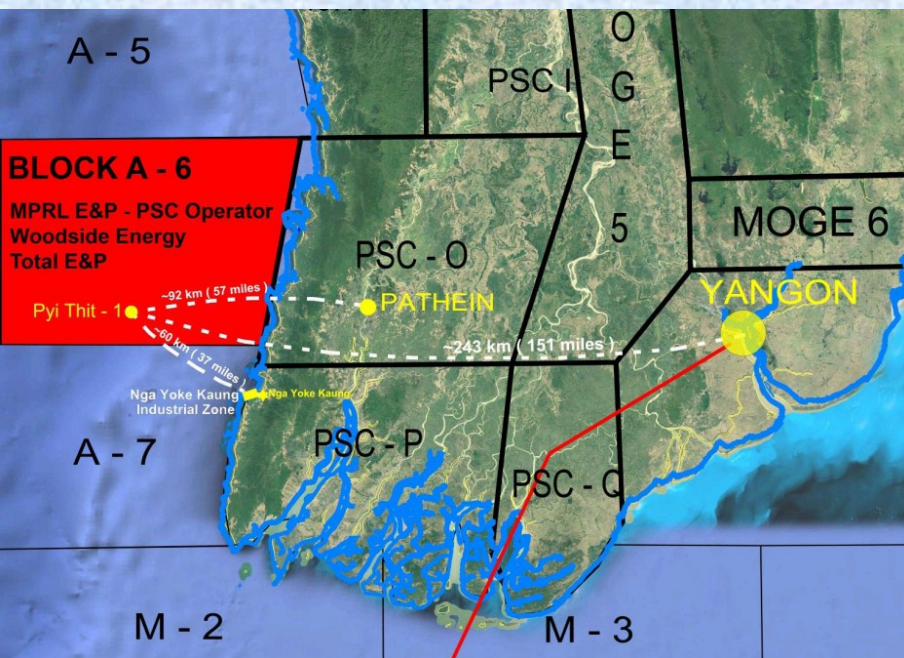
Tha Lin-1 Exploration Well, Block AD-7 (Operator-WOODSIDE)

Water Depth - 835.6 meter

Total Depth (TD) - 3034 meter MD

❖ Gas Discovery in G6.9 sand





Pyi Thit-1 Exploration Well, Block A-6 (Operator-MPRL & WOODSIDE)

The Joint Venture of MPRL E&P, Woodside and Total started PyiThit-1 on 10 June 2017

The well, reached a total depth of 14,993 feet (4,570 meters) measured from rotary table in some 6,565 ft(2,001 m) of water on 15 July.

This well is the first well entirely drilled in the Myanmar deep waters of Bay of Bengal during the monsoon.

The well intersected a gross gas column of 207 ft(63 m) including a minimum of 115 ft(35 m) of net gas pay, as confirmed through pressure measurements and gas sampling.

As of 5 August 2017, *PyiThit-1* has tested the main gas bearing sand, which flowed 50 million standard cubic feet per day of gas through a 44/64" choke; the Transocean DDKG2 drill-ship. The well is now being plugged and abandoned as planned. The DDKG2 will thereafter move to the location of *PyiTharyar-1* well in order to continue with the exploration drilling program in *Block A-6*.



Shwe Yee Htun Exploration Well, Block A-6 (Operator-MPRL & WOODSIDE)



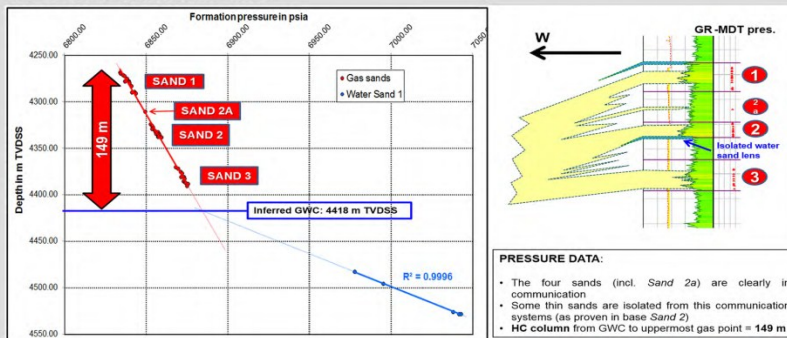
Shwe Yee Htun Well Montage

Second Gas Discovery Well

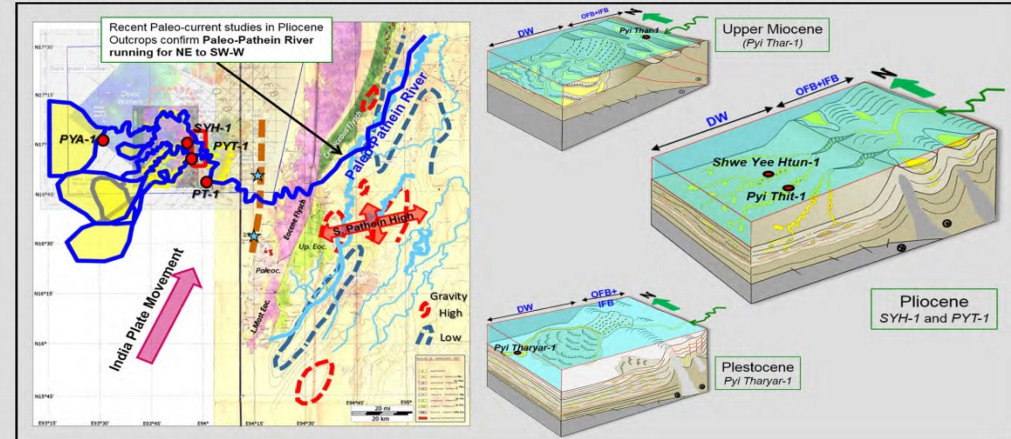


Well Type :	Vertical Exploration Well	
Surface Location :	X : 591621.39 mE	Y : 1871145.83 mN
Survey :	Padauk 3D	
Water Depth :	6673 feet	
Top Reservoir Depth :	LCC3-C : 13990 ft (TVDSS)	
Net Pay Thickness :	105 ft Cut-off (Phi > 0.1, Vsh < 0.5, Sw < 0.5)	
Total Depth :	17326 ft (TVDSS)	
Total Well Cost :	69 MMUSD	

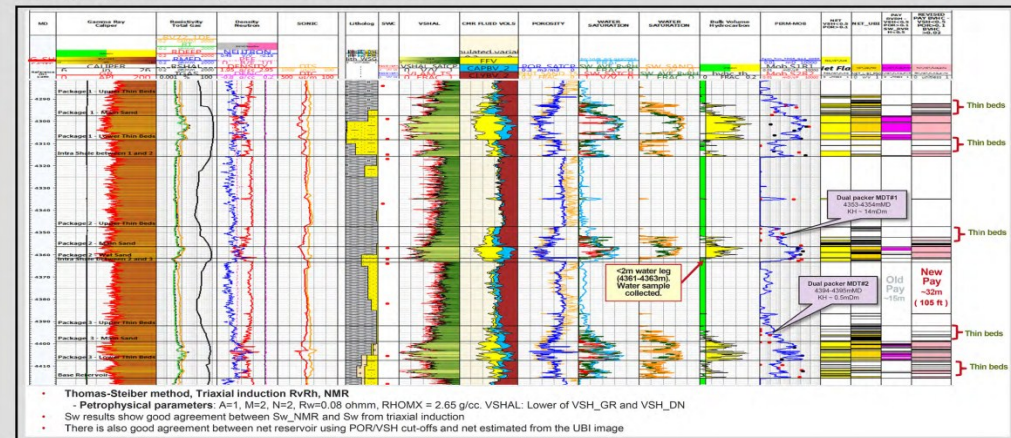
Pressure Measurements



MPRL E&P's Geological Model : The Mio-Pliocene Paleo-Pathein River System



Petrophysical Analysis LCC-3C Reservoir



LNG BUSINESS

LNG Business

- ❑ To fulfill the gap of gas demand.
- ❑ Currently, two existing out of 4 offshore projects are being declined, so we consider to encourage the domestic requirements using by LNG till to produce from new discoveries in Myanmar offshore region.
- ❑ Accordingly, we have invited LOEI for LNG import and selected appropriate location to proceed for LNG tender which will be launching very soon.
- ❑ All technical and commercial assistance are provided by World Bank.

LNG Business (continued)

- ❑ World Bank under Program of Energy Sector Management Assistance
- ❑ LNG Feasibility Study by WB
- ❑ Review of LNG import option Phase 1 , final report on 18-1-2017
- ❑ Interest companies about 100 submit EOI (Oct, 2016)

LNG Import Option Phase 1

- ❑ Medium Term (5 to 10 years) LNG supply plan
- ❑ Select site receiving LNG from FSRU
- ❑ To make Sitting Analysis
- ❑ To set up framework and select site
- ❑ To study LNG market and Gas Swap

Mid Scale Option (LNG)

- ❑ FSRU Mid-scale (80000m3) LNG Importing



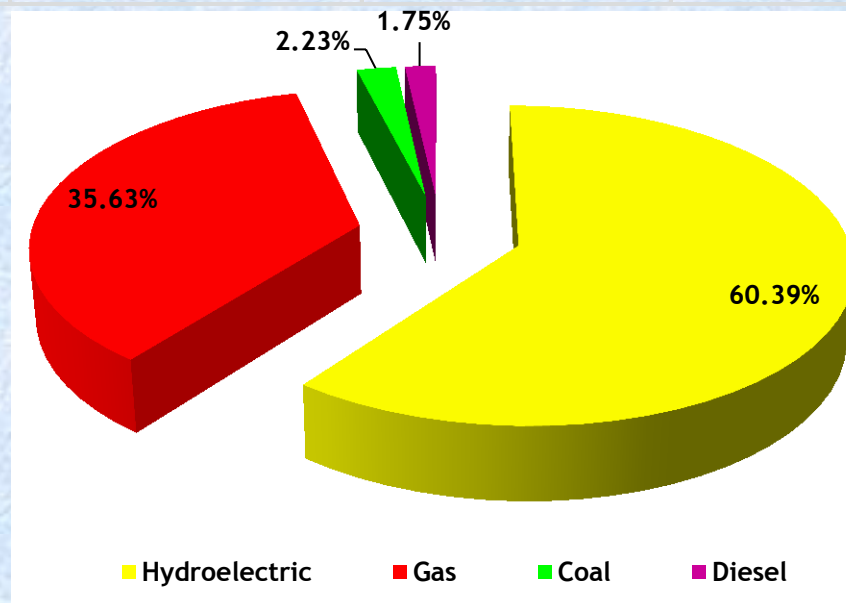
ELECTRIC POWER SECTOR

Current Situation in Electric Power Sector (March 2017)

Installed capacity (MW)	5389.97
Electricity Generation	17866.99
Total electricity consumption (GWh)	15355.09
Per capita consumption (kWh)	300.68
Grid connected household (%)	38%
230 kV transmission line (km)	4469.57
230 kV substation (MVA)	4900
132 kV transmission line (km)	2190.892
132 kV substation (MVA)	1692.5
66 kV transmission line (km)	6065.68
66 kV substation (MVA)	3590.35

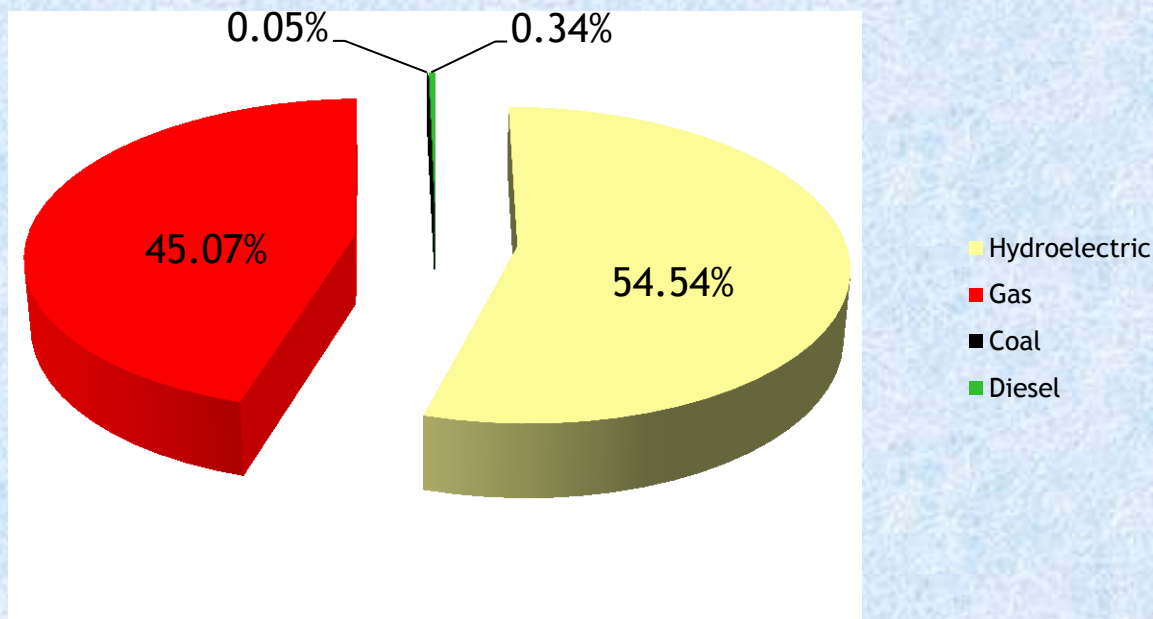
Installed Capacity (March 2017)

	<u>Grid System</u>	<u>Isolated</u>	<u>Total</u>	
	(MW)	(MW)	(MW)	(%)
Installed Capacity	5,254.9	135.069	5,389.97	100.00%
Hydroelectric	3,221	34.174	3,255.174	60.39%
Gas	1,913.9	6.60	1,920.50	35.63%
Coal	120	-	120	2.23%
Diesel	-	94.295	94.295	1.75%



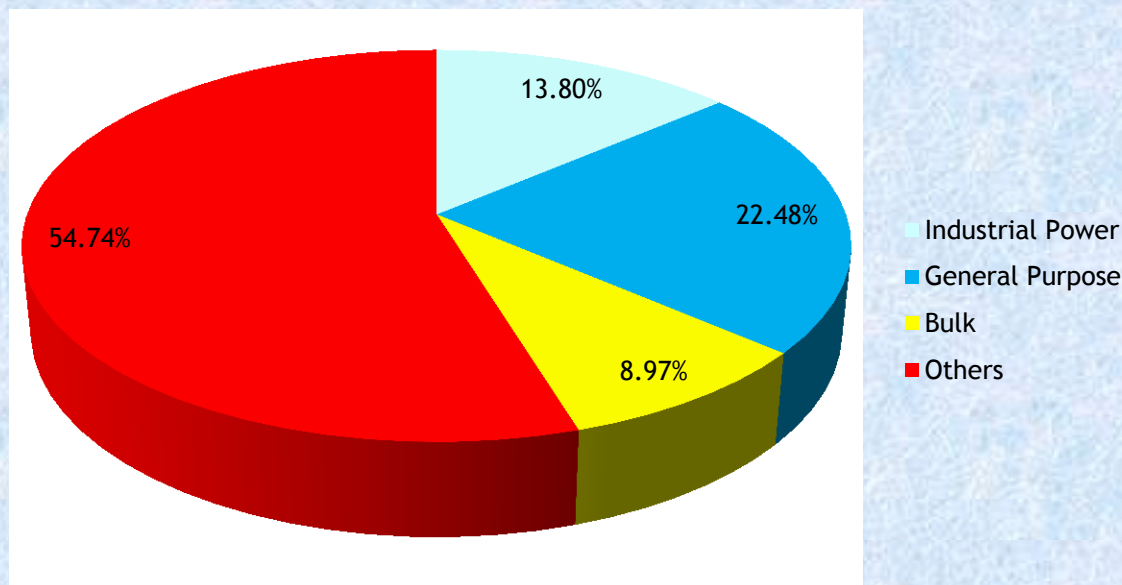
Electricity Generation for the Year(FY 2016-2017)

	<u>Generation</u>	<u>Energy Mix</u> <u>by Generation</u>
	(GWh)	(%)
Total	17,866.99	100%
Hydroelectric	9,743.85	54.54%
Gas	8,052.43	45.07%
Coal	9.59	0.05%
Diesel	61.12	0.34%

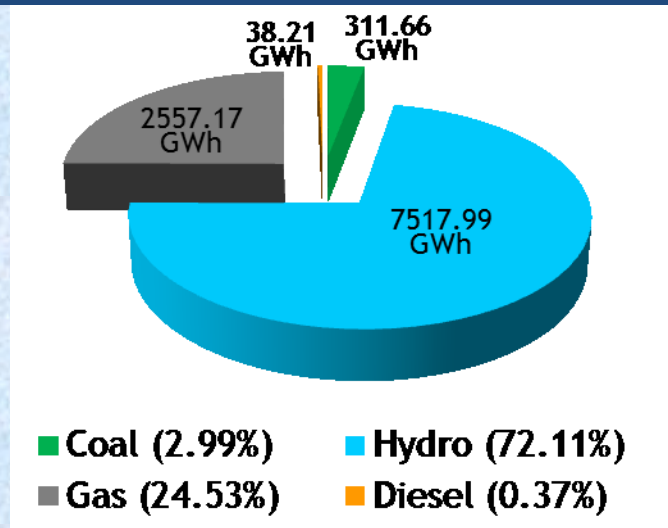


Electricity Consumption for the Year (FY 2016-2017)

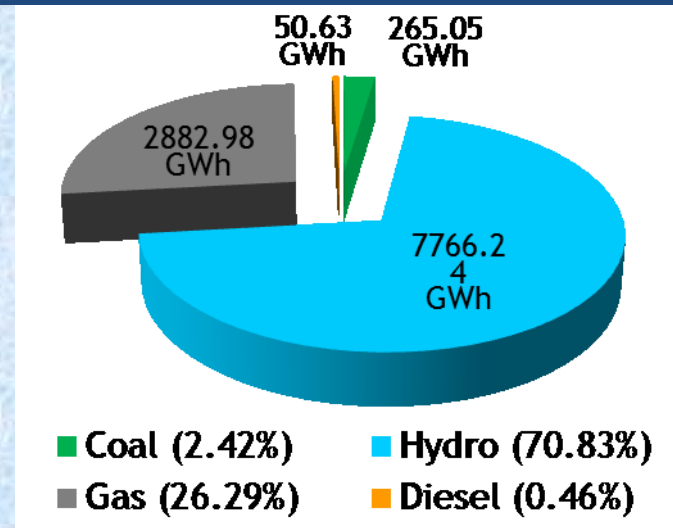
	<u>Generation</u>	<u>Energy Mix by Generation</u>
	(GWh)	(%)
Total	15,355.09	100%
Industrial Power	2,119.75	13.80%
General Purpose	3,451.38	22.48%
Bulk	1,377.92	8.97%
Others	8,406.04	54.74%



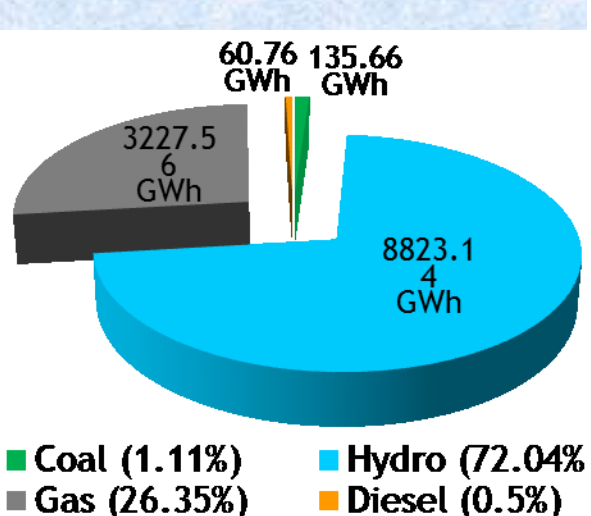
Energy Mixed Ratio for the Past 5 Years (Electricity Generation)



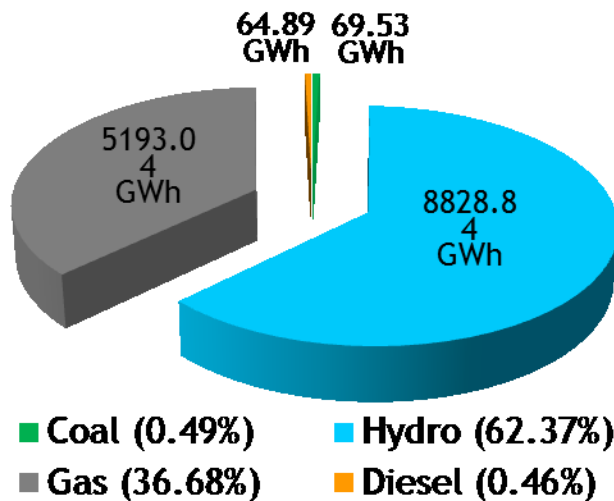
Year 2011-12
(10,425.03GWh)



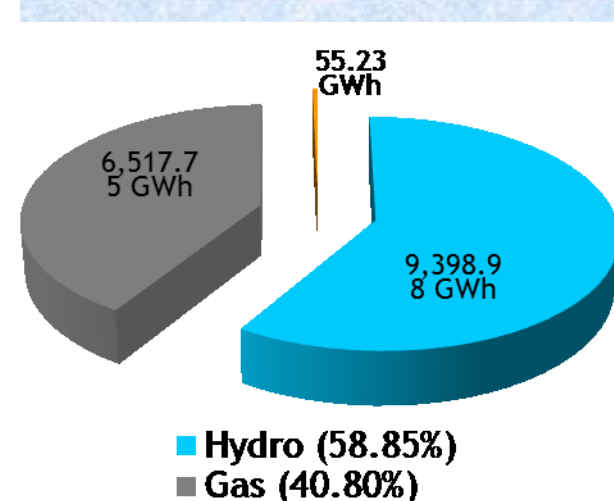
Year 2012-13
(10,964.90GWh)



Year 2013-14
(12,247.12GWh)

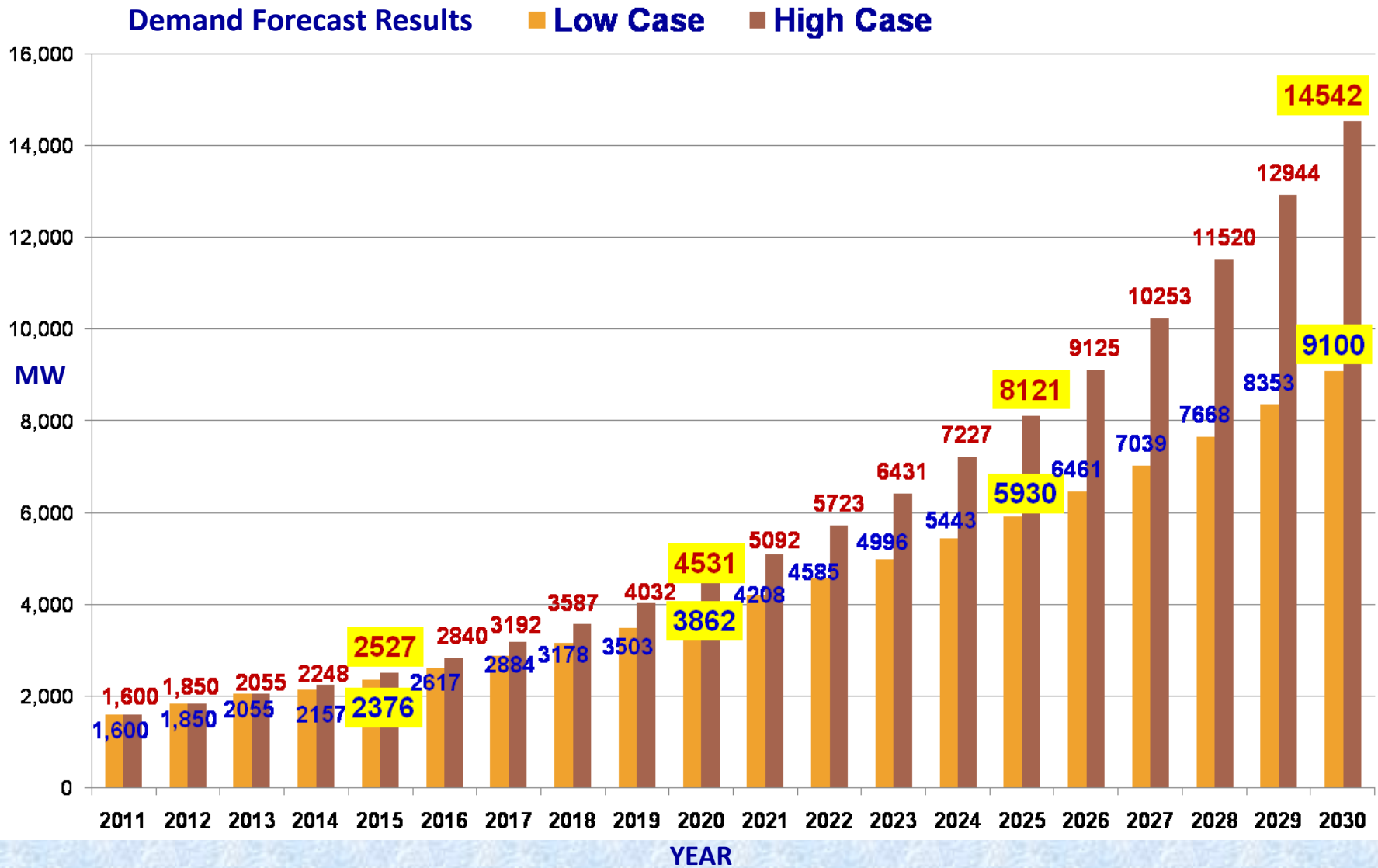


Year 2014-15
(14,156.30GWh)



Year 2015-16
(15,971.96GWh)

Demand Forecast for 20 years period (2011-2030)



Power Demand Forecast

Sr. No	Year	Power Demand MW, Low Case (GDP growth 6.4%)	Power Demand MW, High Case (GDP growth 8.7%)
1	2020	3862	4531
2	2025	5930	8121
3	2030	9100	14542

Power Development Plan

In order to meet the future power demand, the following projects will be completed for the year (2018-2019) to (2022-2023).

						MW
Sr.No	Project Name	2018	2019	2020	2021	2022
1	Thaketa Gas Turbine & Combined Cycle Power Project	106				
2	Thaton Gas Turbine & Combined Cycle Power Project	108				
3	Myingyan Gas Turbine & Combined Cycle Power Project	225				
4	Minbu Solar Power Project		40	40	40	50
5	Yangon (NIHC)(HFO) Rental		300			
6	Yangon (Karpower)(HFO) Rental		300			

Power Development Plan

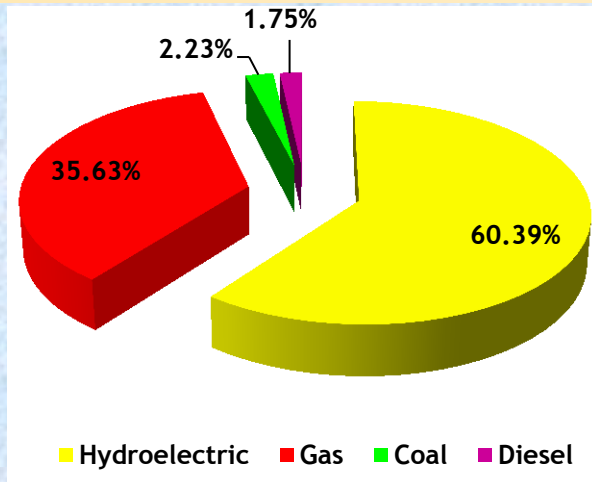
MW

Sr.No	Project Name	2018	2019	2020	2021	2022
7	Belin Gas Engine Project Rental		110			
8	Myanaung Gas Engine Project			20		
9	Ywarma Gas Turbine & Combined Cycle Power Project (W.B)				150	75
10	Alone Gas Turbine & Combined Cycle Power Project (TYT)			200		
11	Kanbauk Gas Turbine & Combined Cycle Power Project (Total + Siemens)				450	600
12	Upper Keng Taung Hydro - power Project				51	

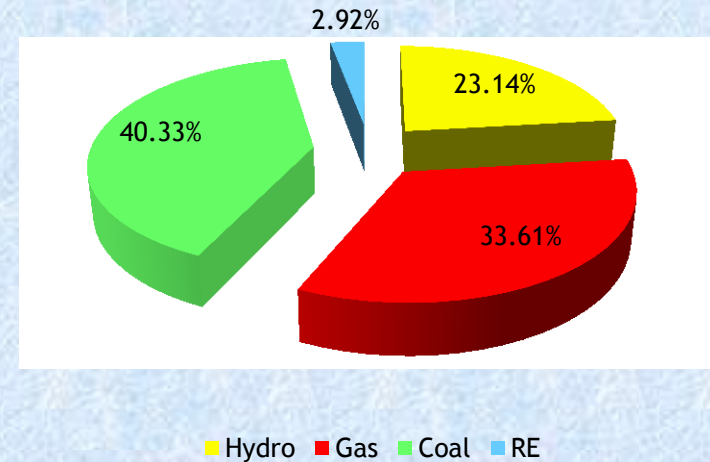
Power Development Plan

Sr.No	Project Name	2018	2019	2020	2021	2022
13	Upper Yeywa Hydro -power Project				280	
14	Middle Paung Long Hydro - power Project					100
15	Deedoke Hydro -power Project					66
Total		439	750	260	971	891

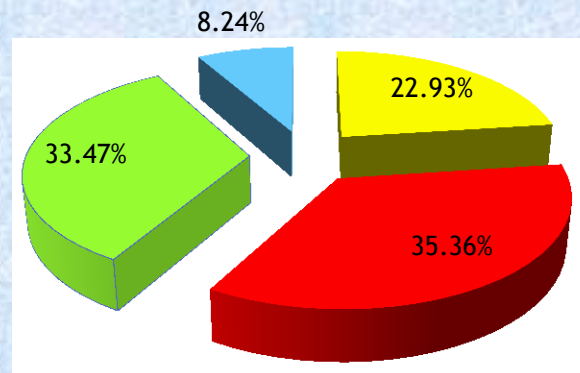
Energy Mixed Ratio for the Year 2016-17, 2020 -2021 and 2025-2026 (Installed Capacity)



Year 2016-17
(5389.97 MW)



Year 2020-21
(6844 MW)

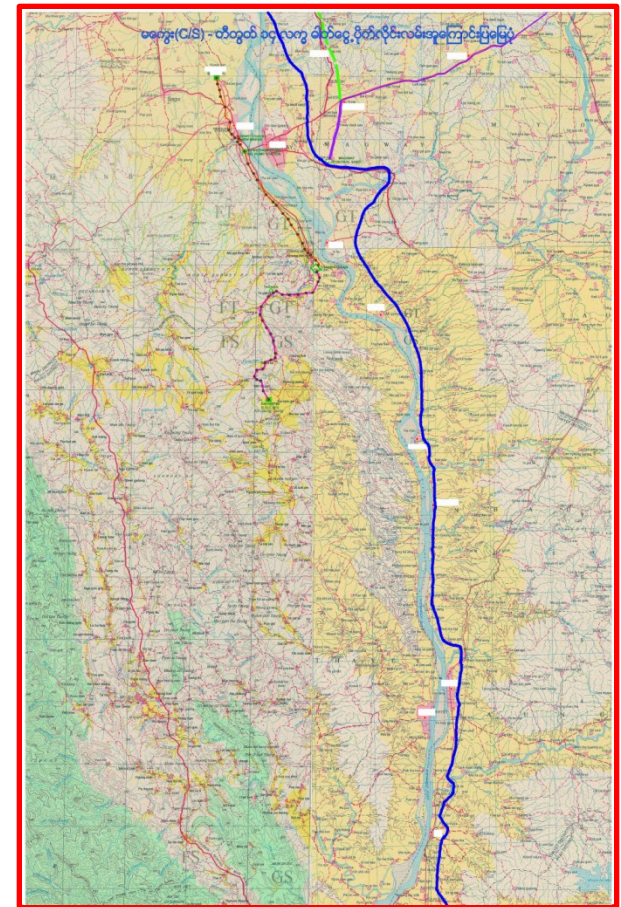


Year 2025-26
(12131 MW)

Magwe-Shwe Daung 14” Pipeline Replacement Project

Magwe-Shwe Daung 14" Pipeline Replacement Project.

- ❑ Korea Government intends to assist MOGE by providing 500 mm USD soft loan during 2014 to 2017 for the development of Myanmar Economy with “Economic Development Cooperation Fund” from “Korea EXIM Bank”.
- ❑ MOGE to replace the deteriorated old pipes with upgraded new pipes since early 2016 by the aids of “Korea Export-Import Bank (KEXIM)” in the place of 20” natural gas pipeline along KBK-MGLY-YGN and 14” natural gas pipeline along Magwe-Shwe Daung.
- ❑ To provide Shwe Gas to fulfill the natural gas to Shwe Daung Gas Turbine, Kyaw Swar Fertilizer Plant
- ❑ Kind of grant-Both Financial (Loan) and Technical Aids.



Magwe-Shwe Daung 14” Pipeline Replacement Project (continued)

- ☐ **Project Life- 2 years after loan received.**
- ☐ **Intended loan amount- 14” Pipeline Replacement = 79,750,000 US\$**
- 20” Pipeline Replacement = 146,211,700 US\$
- ☐ **Korea Export-Import Bank hired “Byucksan Construction and Engineering Co.”**
for FS be accomplished in coming September.
- ☐ **It is ongoing to get loan from “Korea Export-Import Bank”**
for 14: pipe replacement in Magwe – Shwedaund pipeline.
- ☐ **Korea Export-Import Bank intends to borrow the loan amount 100 mmUSD**
with low interest rate in condition if Magwe – Shwe Daung Pipeline Replacement
Project is really a important pile for country’s improvement.
- ☐ **MOGE recommend to discuss to gain loan for pipe replacement with 20”new pipe**
in Magwe-ShweDaung Pipeline if MOEE will expand construction of Gas Turbine
in Shwe Daung area.

Q & A

