



**MINISTRY OF ELECTRICITY AND ENERGY
REPUBLIC OF THE UNION OF MYANMAR**

CURRENT STATUS

AND

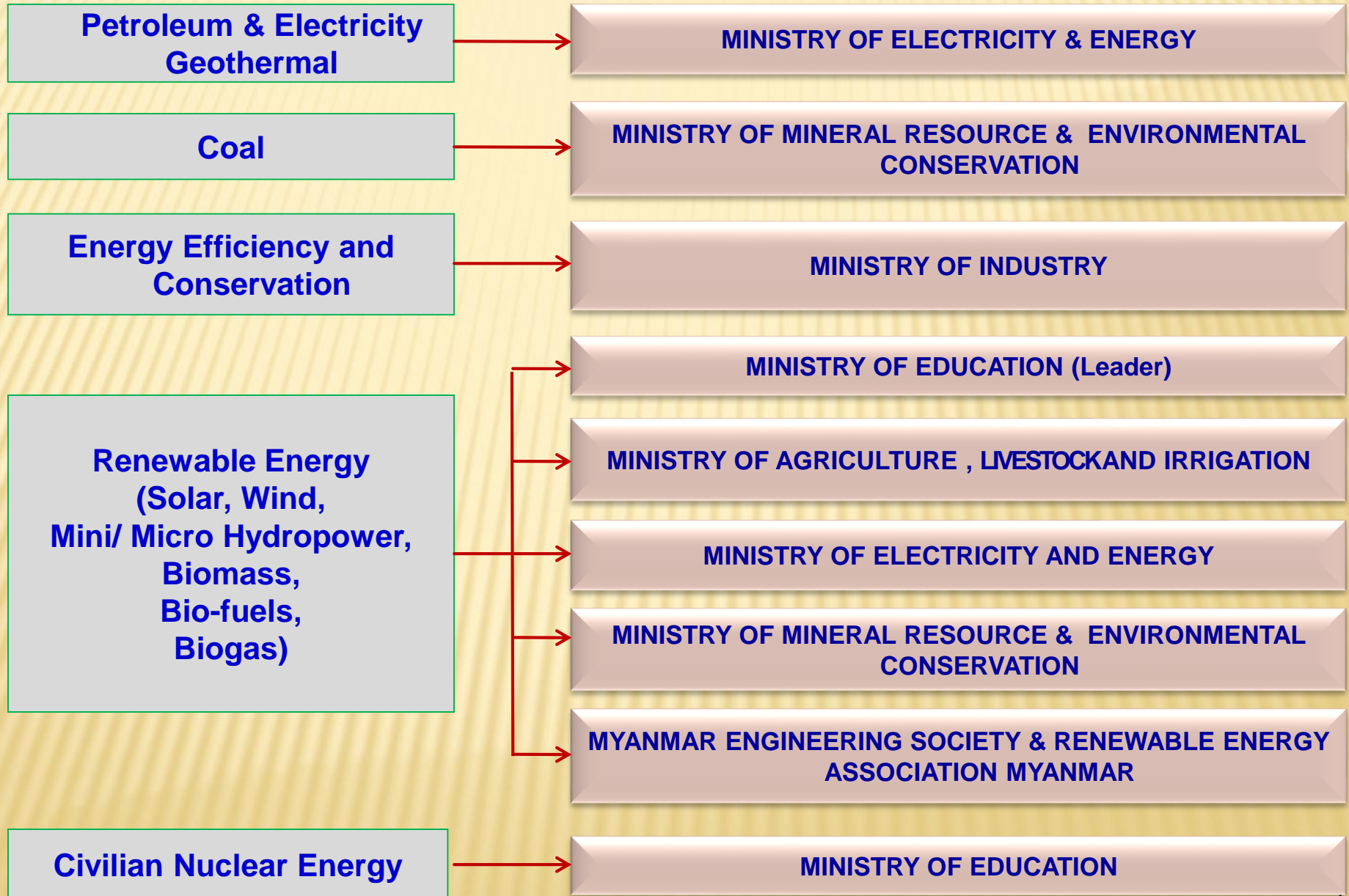
OPPORTUNITIES

IN

MYANMAR ELECTRICITY AND ENERGY

**U ZAW AUNG, DIRECTOR GENERAL,
OIL AND GAS PLANNING DEPARTMENT, MYANMAR**

Institutional Framework for Myanmar Electricity & Energy



National Energy Policy of Myanmar

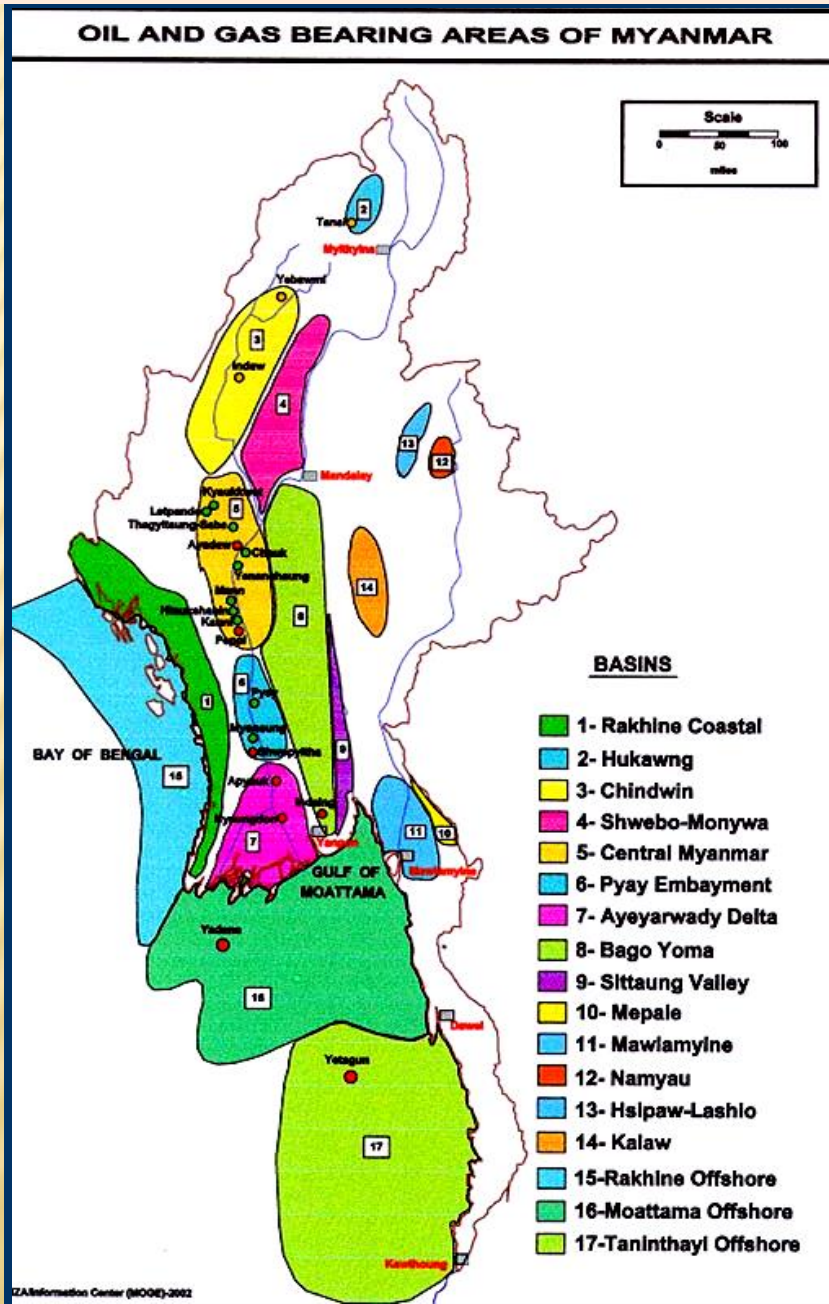
1. To invite foreign/local investment for the extraction of natural resources in order to fulfill the domestic energy demand
2. To reserve natural resources for the future generation while tapping energy
3. To formulate energy pricing policy and promulgate laws, rules and regulations based on the international and regional practices, with the intention of the stability of energy prices
4. To create energy business fund to prevent the instability of energy prices
5. To promote private participations in line with the national economic reforms, laws, rules and regulations
6. To enhance awareness raising the important role of renewable energy in the power generation development
7. To increase renewable energy up to 23% in power generation mix in 2020 in accordance with ASEAN target
8. To make short term and long term plans with available potential sources such as Renewable Energy, hydro, Liquefied Natural Gas (LNG) for the secure supply of power, sustainable economic growth and boosting the per capita GDP growth

National Energy Policy of Myanmar (cont;)

9. To expand power interconnection into regional and ASEAN Power Grid for trading
10. To upgrade of transmission lines, sub-stations, and old underground cables for the stability of power distribution
11. To develop power distribution using by Solar Photovoltaic System (SPV) in the electric power system in both Off-Grid and On- Grid so as to meet power demand in 2030
12. To make detail statistics annually for forecasting power demand
13. To promote Independent Power Producer (IPP), Joint Venture (JV) / BOT or Public Private Partnership (PPP) in the implementation of power development
14. To motivate Corporate Social Responsibility (CSR) in the extraction of energy resources with the minimizing impact of the environment, and to make public awareness for those activities, as well
15. To prioritize energy efficiency and conservation by aiming at public involvement and energy management technologies in accordance with ASEAN targets
16. To implement the energy standardization according to international and regional standards implement the energy standardization

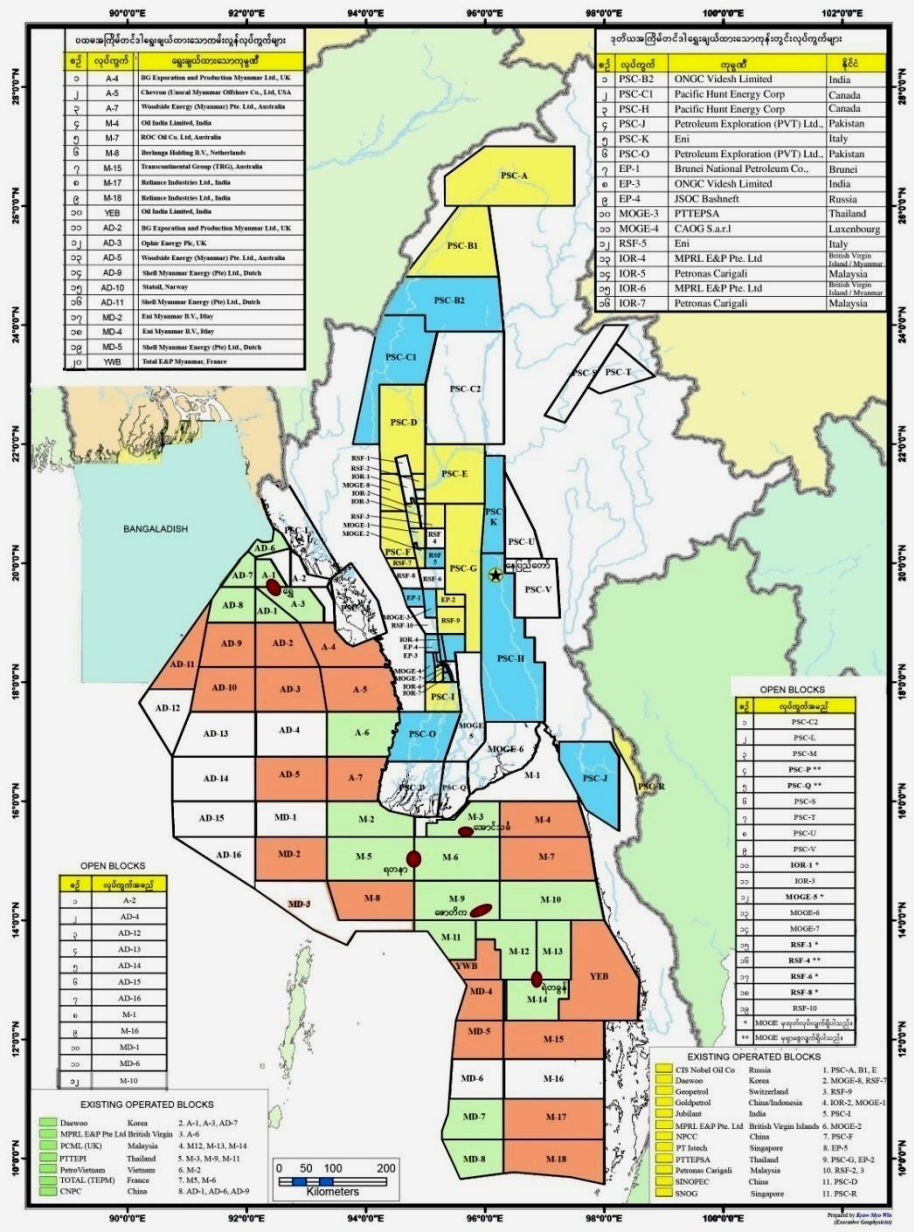
Petroleum Sector

Sedimentary Basins of Myanmar



- A total of **17 sedimentary** basins have been identified to date, of which;
- **3 Onshore Tertiary basins** (Central, Pyay & Ayeyarwady Delta) are producing oil and gas
- **3 Offshore Tertiary basins** (Moattama, Rakhine & Tanintharyi Offshore) are producing gas and condensate
- **8 onshore Tertiary frontier basins** need further exploration
- **3 onshore Pre-Tertiary basins** are secondary Targets.

Blocks on Production Sharing Basis



TYPES OF BLOCKS

- ❖ PSC BLOCKS (PSC)
- ❖ EXPLORATION / PRODUCTION BLOCKS (EP)
- ❖ IMPROVED PETROLEUM RECOVERY BLOCKS (IOR)
- ❖ REACTIVATION OF SUSPENDED FIELDS (RSF)
- ❖ MOGE RESERVED BLOCKS (MOGE)

Total 104 Blocks (Onshore + Offshore)
53 Blocks (Onshore)
51 Blocks (Offshore)

Type of Contract:
Mainly Production Sharing Contract (PSC)

အမှတ်	လုပ်ငန်းအမျိုးအမည်	ကုမ္ပဏီ	နိုင်ငံ
၁	PSC-B2	ONGC Videsh Limited	India
၂	PSC-C1	Pacific Hunt Energy Corp	Canada
၃	PSC-H	Pacific Hunt Energy Corp	Canada
၄	PSC-J	Petroleum Exploration (PVT) Ltd.	Pakistan
၅	PSC-K	Eni	Italy
၆	PSC-O	Petroleum Exploration (PVT) Ltd.	Pakistan
၇	EP-1	Brunei National Petroleum Co.,	Brunei
၈	EP-3	ONGC Videsh Limited	India
၉	EP-4	JSOC Bashneft	Russia
၁၀	MOGE-3	PTTEPSA	Thailand
၁၁	MOGE-4	CAOG S.a.r.l	Luxembourg
၁၂	RSF-5	Eni	Italy
၁၃	IOR-4	MPRI E&P Pte. Ltd	British Virgin Islands/Malaysia
၁၄	IOR-5	Petromas Carigali	Malaysia
၁၅	IOR-6	MPRI E&P Pte. Ltd	British Virgin Islands/Malaysia
၁၆	IOR-7	Petromas Carigali	Malaysia

အမှတ်	လုပ်ငန်းအမျိုးအမည်	ကုမ္ပဏီ	နိုင်ငံ
၁	A-4	BG Exploration and Production Myanmar Ltd., UK	
၂	A-5	Chevron (Burma) Myanmar Offshore Co., Ltd. USA	
၃	A-7	Woodside Energy (Myanmar) Pte. Ltd., Australia	
၄	M-4	Oil India Limited, India	
၅	M-7	ROC Oil Co. Ltd. Australia	
၆	M-8	Berlinga Holding B.V., Netherlands	
၇	M-15	Transcontinental Group (TRCO), Australia	
၈	M-17	Refinace Industries Ltd., India	
၉	M-18	Refinace Industries Ltd., India	
၁၀	YEB	Oil India Limited, India	
၁၁	AD-2	BG Exploration and Production Myanmar Ltd., UK	
၁၂	AD-3	Opus Energy Pte. Ltd.	
၁၃	AD-5	Woodside Energy (Myanmar) Pte. Ltd., Australia	
၁၄	AD-9	Shell Myanmar Energy (Pvt) Ltd., Dutch	
၁၅	AD-10	Statol, Norway	
၁၆	AD-11	Shell Myanmar Energy (Pvt) Ltd., Dutch	
၁၇	MD-2	Eni Myanmar B.V., Italy	
၁၈	MD-4	Eni Myanmar B.V., Italy	
၁၉	MD-5	Shell Myanmar Energy (Pvt) Ltd., Dutch	
၂၀	YWB	Total E&P Myanmar, France	

အမှတ်	လုပ်ငန်းအမျိုးအမည်	ကုမ္ပဏီ	နိုင်ငံ
၁	A-2		
၂	AD-4		
၃	AD-12		
၄	AD-13		
၅	AD-14		
၆	AD-15		
၇	AD-16		
၈	M-1		
၉	M-16		
၁၀	MD-1		
၁၁	MD-6		
၁၂	M-10		

ကုမ္ပဏီ	နိုင်ငံ	အမှတ်
Chevron	Korea	2, A-1, A-3, AD-7
MPRI E&P Pte Ltd	British Virgin	3, A-6
PCML (UK)	Malaysia	4, M12, M13, M14
PTTEPI	Thailand	5, M-3, M-9, M-11
Petrol-Vietnam	Vietnam	6, M-2
TOTAL (TEPM)	France	7, M5, M-6
CNPC	China	8, AD-1, AD-4, AD-9

အမှတ်	လုပ်ငန်းအမျိုးအမည်	ကုမ္ပဏီ	နိုင်ငံ
၁	PSC-G2		
၂	PSC-I		
၃	PSC-M		
၄	PSC-P **		
၅	PSC-Q **		
၆	PSC-R		
၇	PSC-T		
၈	PSC-V		
၉	IOR-1 *		
၁၀	IOR-3		
၁၁	MOGE 4 *		
၁၂	MOGE-6		
၁၃	MOGE-7		
၁၄	RSF 1 *		
၁၅	RSF 4 **		
၁၆	RSF 4 **		
၁၇	RSF 4 **		
၁၈	RSF-10		

ကုမ္ပဏီ	နိုင်ငံ	အမှတ်
CB Nabel Oil Co	Russia	1, PSC-A, B1, E
Daejeon	Korea	2, MOGE-8, RSF-7
Geopetrol	Switzerland	3, RSF-9
Goldcorp	Canada	4, IOR-2, MOGE-1
Jubant	India	5, PSC-1
MPRI E&P Pte. Ltd	British Virgin Islands	6, MOGE-2
NPCX	China	7, PSC-4
PT Intech	Singapore	8, EP-5
PTTEPSA	Thailand	9, PSC-G, EP-2
Petromas Carigali	Malaysia	10, RSF-2, 3
SINOPEC	China	11, PSC-D
SINOPEC	Singapore	11, PSC-R

Daily Oil and Gas Production, Exportation and Domestic use

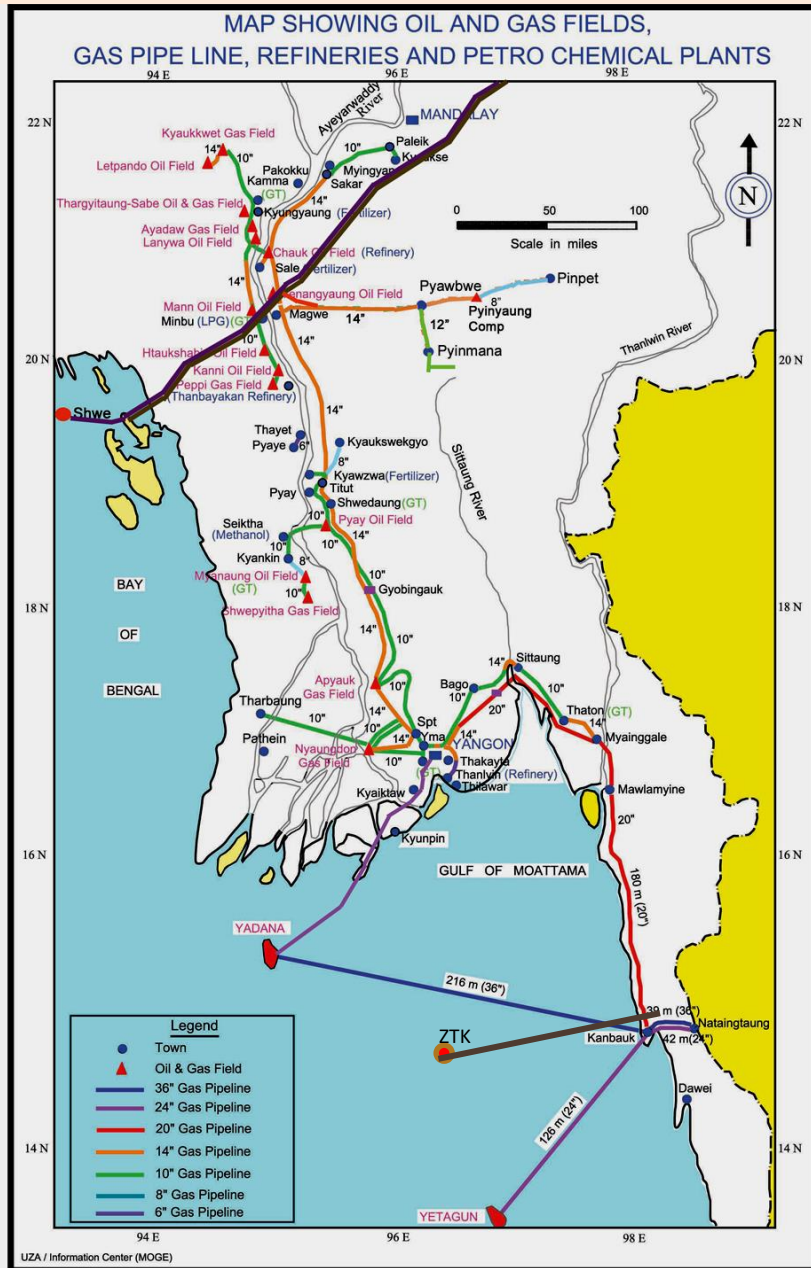
Oil

❖ Onland	- 7000 bbls
❖ Offshore	- 5000 bbls (Condensate)
Total	- 12,000 bbls

Gas

❖ Onland	- 50 MMscfd
❖ Offshore	- <u>1.75 Bscfd</u>
Total	- 1.80 Bscfd
❖ Export to Thailand	- 950 MMscfd
❖ Export to China	- 400 MMscfd
❖ Domestic use	- 400 MMscfd

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, Mawlamyine, Thalon, YGN)

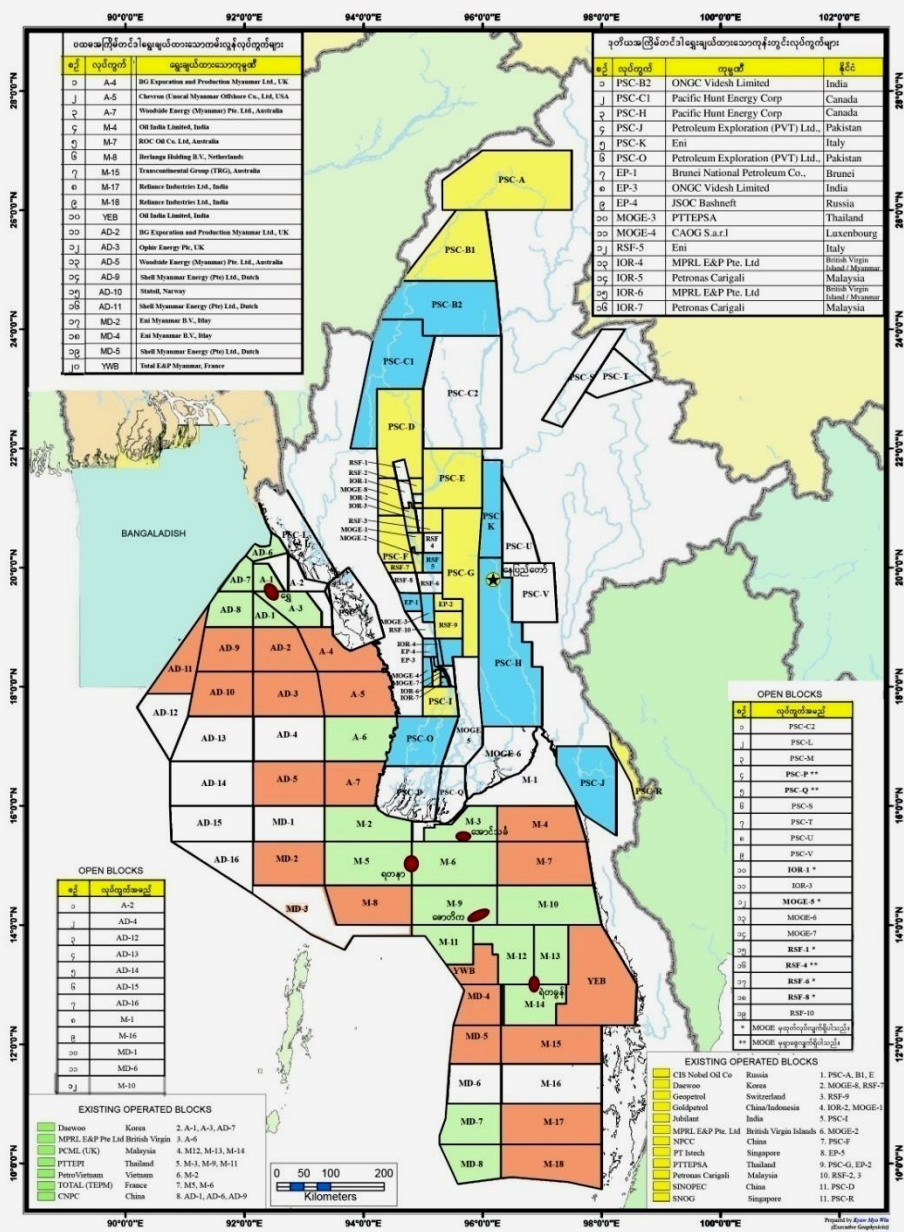
SHWE - 500 MMCFD

400 Export

100 Domestic

(KPU, YNG, Myingyan, KSE)

The operations currently in Petroleum Sector



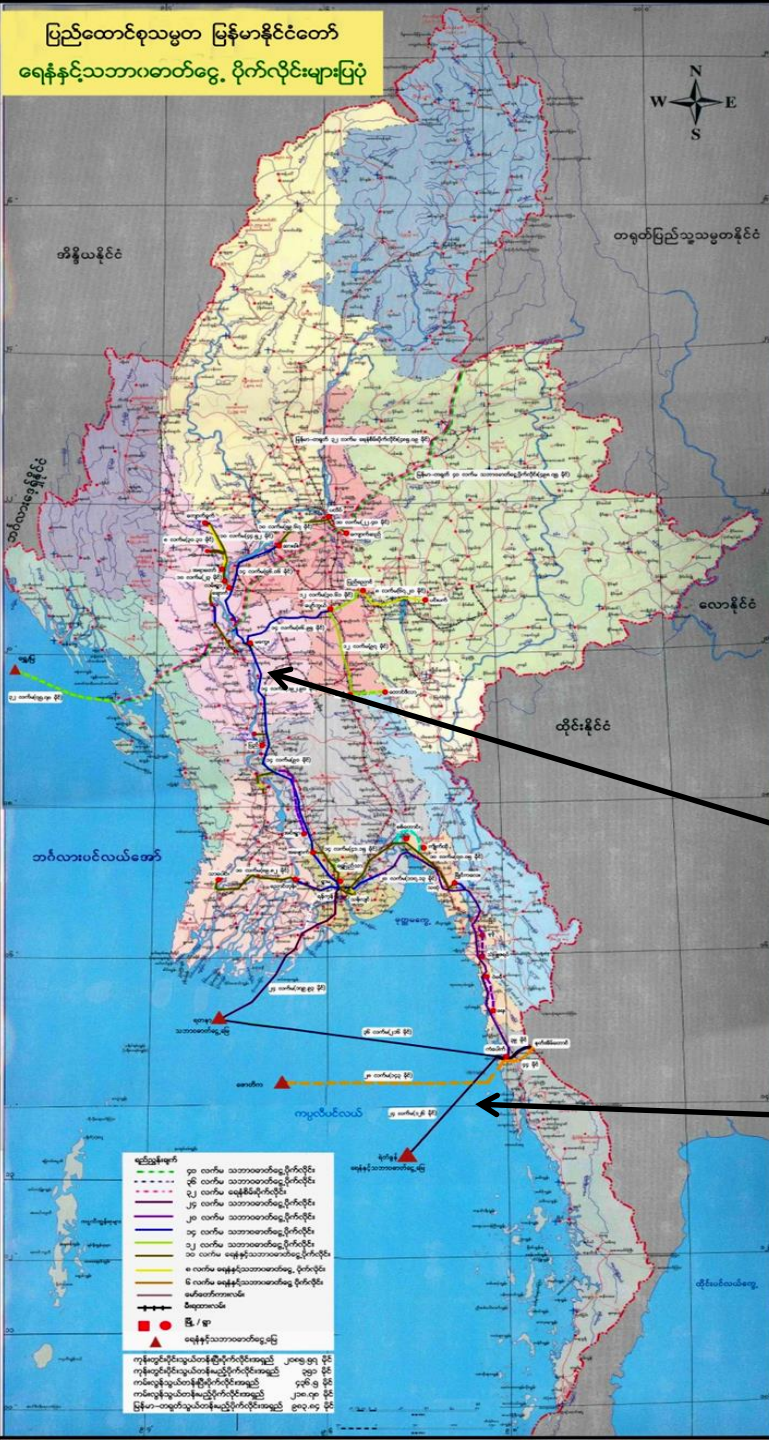
Onshore

- ❖ Operating - 37 Blocks
- ❖ Open - 16 Blocks
- ❖ Total - 53 Blocks

Offshore

- ❖ Operating - 38 Blocks
- ❖ Open - 13 Blocks
- ❖ Total - 51 Blocks

ပြည်ထောင်စုသမ္မတ မြန်မာနိုင်ငံတော်
 ရေနံနှင့်သဘာဝဓာတ်ငွေ့ ဝိုက်လှိုင်းများပြန့်



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

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 Chauk 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 Chauk Oil Field
 - About 28,299 NGVs

Existing Offshore Projects in Myanmar

YADANA PROJECT

TOTAL	31.24%
UNOCAL	28.26%
PTTEP	25.50%
MOGE	15.00%



Export 650 MMscfd
Domestic 200 MMscfd

YETAGUN PROJECT

PETRONAS	40.75%
NIPPON	19.40%
PTTEP	19.40%
MOGE	20.45%



Export 200 MMscfd
5,000 condensate

SHWE PROJECT

DAEWOO	51.00%
ONGC	17.00%
GAIL	8.50%
KOGAS	8.50%
MOGE	15.00%



Export 400 MMscfd
Domestic 100 MMscfd

ZAWTIKA PROJECT

PTTEP	80.00%
MOGE	20.00%

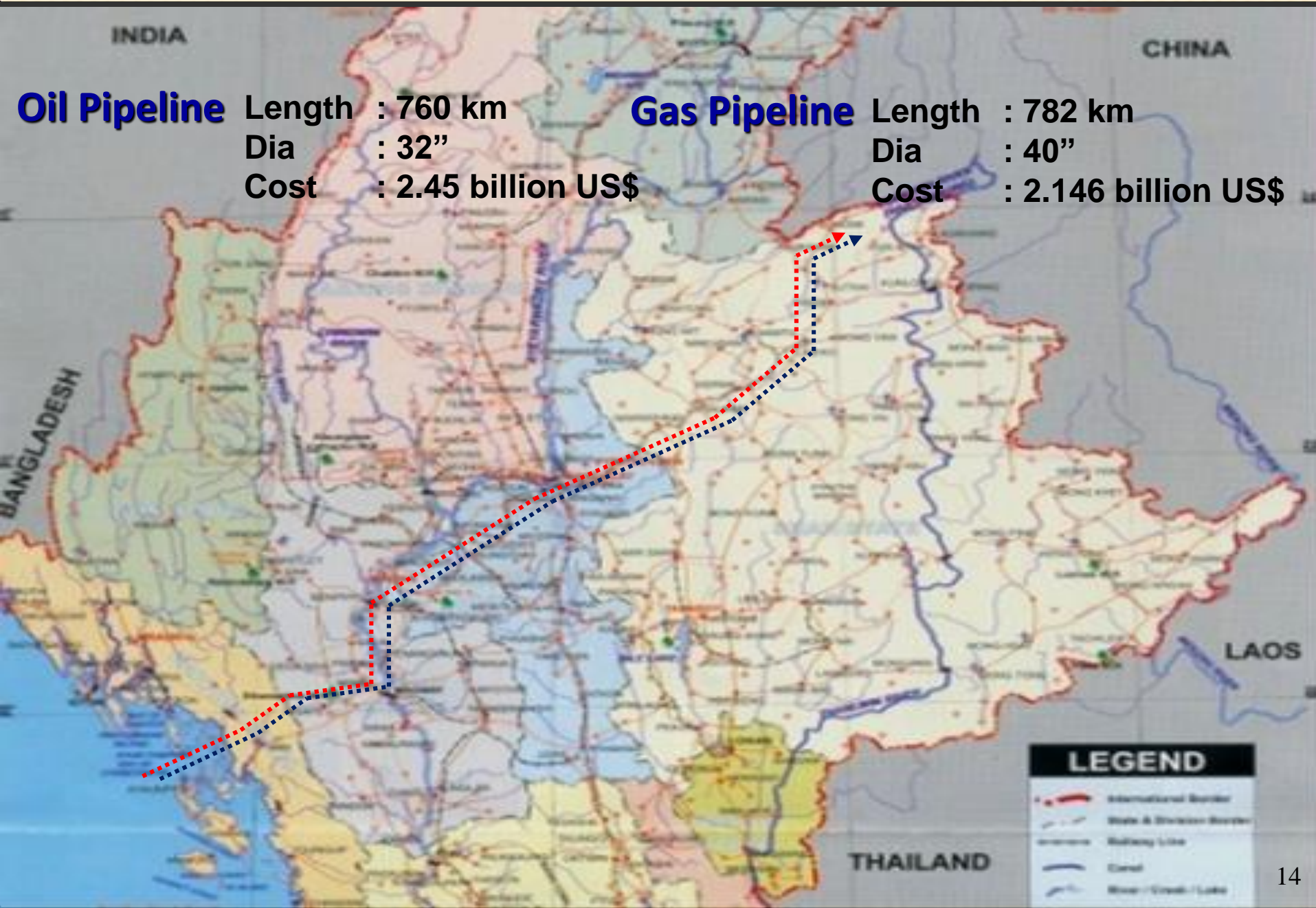


Export 200 MMscfd
Domestic 100 MMscfd

South East Asia Oil and Gas Pipeline Project

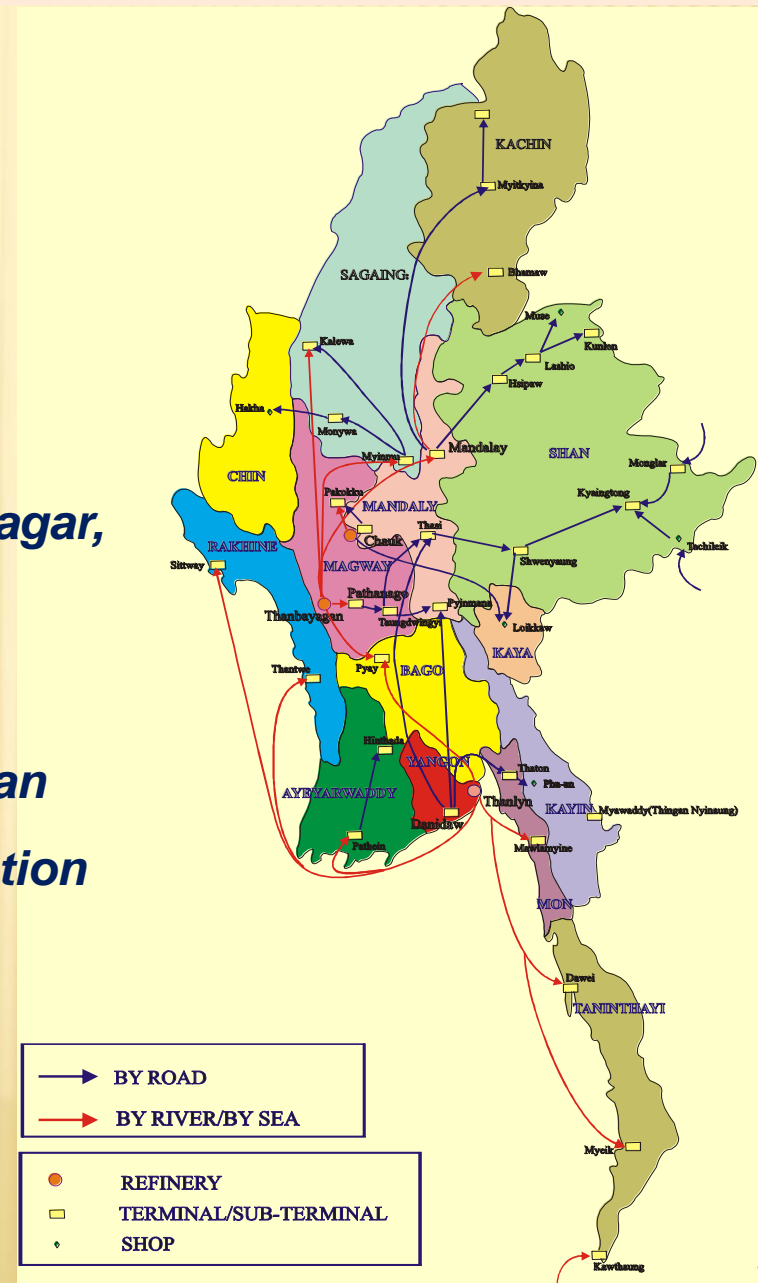
Oil Pipeline Length : 760 km
Dia : 32"
Cost : 2.45 billion US\$

Gas Pipeline Length : 782 km
Dia : 40"
Cost : 2.146 billion US\$

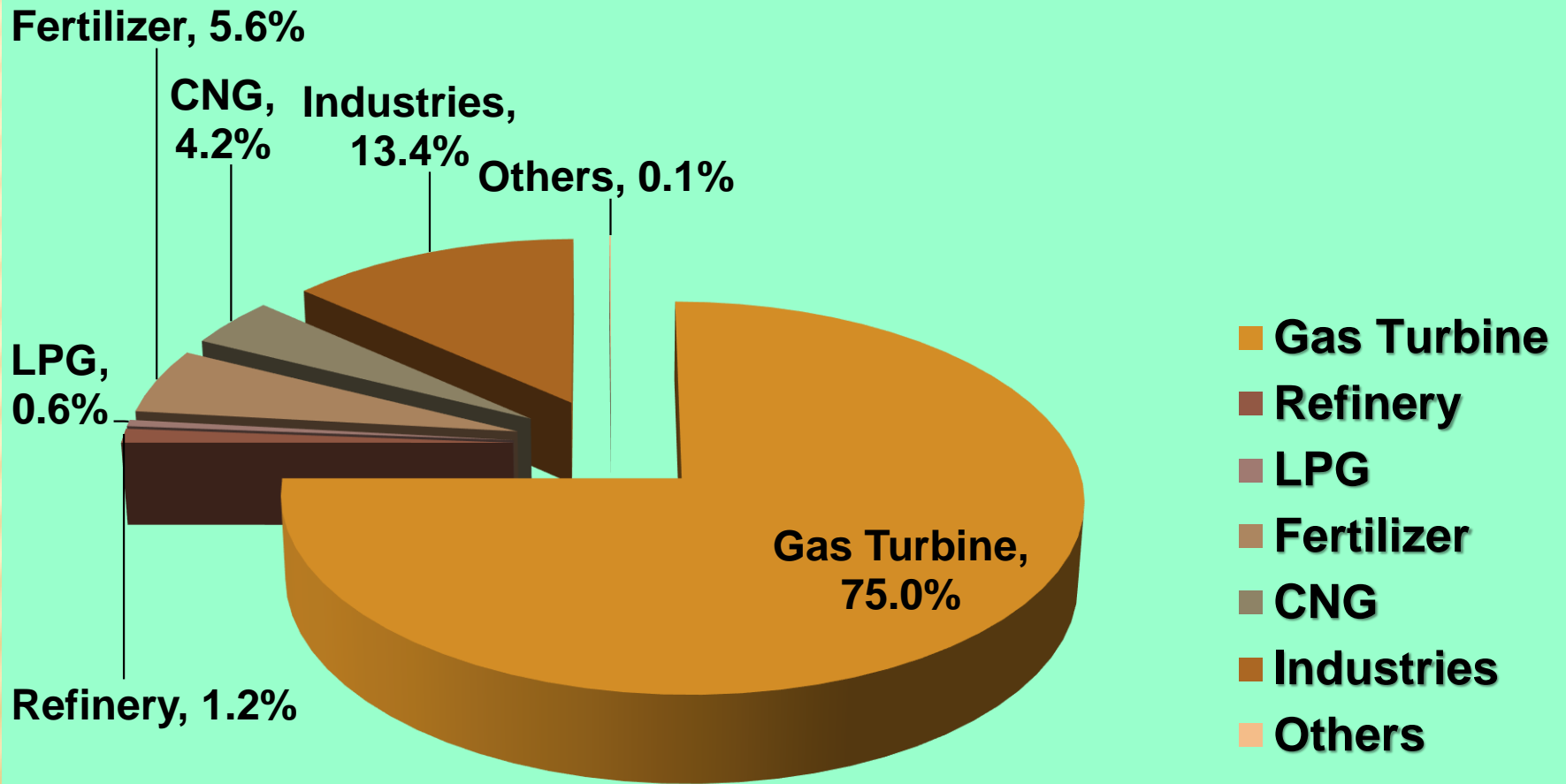


Petroleum Downstream Sector

- ✓ **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**

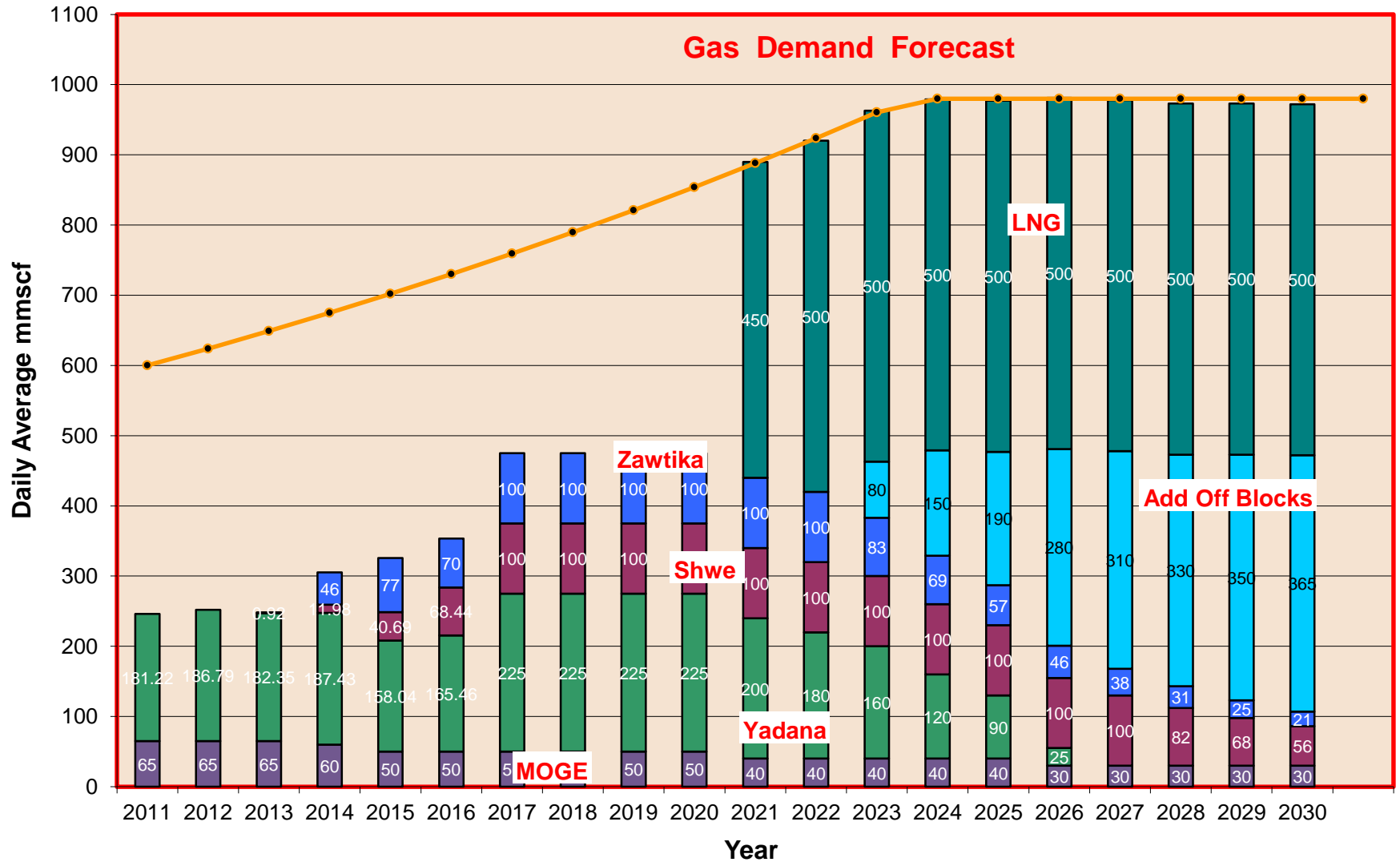


Sector wise Gas Utilization



Prediction for Gas Demand & Supply in Myanmar

GAS DEMAND AND SUPPLY FORECAST IN MYANMAR



LNG Business

- ❑ In Myanmar, LNG is one of the options for future gas supply to fulfill the domestic needs. Due to the gas shortage in power sector and industrial sector, LNG business is significantly feasible for short term and medium term period 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.

Corporatization Services

- ❑ Corporatization procedure for selected services of MOGE are as follow:-
 - Drilling Rig Services
 - Seismic Services
 - Pipe laying and Maintenance Services
- ❑ LOEI were declared for those services since June, 2014 and in order to establish 3 JVs' tendering process, Roland Berger Pte. Ltd. was awarded for consultancy service to make issuing and evaluation.
- ❑ On the other hand, to fulfill the logistic requirement of offshore petroleum operations, offshore supply base tender will be launched in very soon for JV with potential partner.
- ❑ All these are encouraging for corporatization purpose.

Way Forward for Petroleum Sector

- ❖ Unconventional and conventional prospects:
- ❖ Supply based for Petroleum operations
- ❖ Integrate Infrastructure: Pipeline, Plants and Refineries
- ❖ JV process for onshore drilling and seismic, pipe-laying, refinery, fertilizer, LPG plants and associated area
- ❖ JV process for LNG Business
- ❖ Natural gas basis industries are key role in future.
(mainly depends on newly discoveries in offshore)
- ❖ Trading, Marketing and Distribution of Petroleum Products
- ❖ Enhancing Capacity Building in the people of Myanmar

Electric Power Sector

Power usage progression in Myanmar (2016-2017)

Installed capacity (MW)	5402
Total electricity consumption (GWh)	13550
Per capita consumption (kWh)	263
Grid connected household (%)	37%
230 kV transmission line (mile)	2501.7
230 kV substation (MVA)	4800
132 kV transmission line (mile)	1361.6
132 kV substation (MVA)	1495.5
66 kV transmission line (mile)	2772.6
66 kV substation (MVA)	3555.4

Current Status of Electricity Supply in 2016-2017

Electrification in 2016-2017

Electrified Towns	Rural Electrification			Electrified Household		
	Total Nos. of Villages	Electrified Villages	%	Total Household (Million)	Electrified Household (Million)	%
467	63,860	31,742	49.7%	10.877	3.997	37%

Transmission Line and Substation in 2016-2017

Voltage (kV)	Transmission Line		Substation	
	Nos. of Line	Line Length (mile)	Nos. of Substation	Capacity (MVA)
230	60	2,501.72	37	4,800
132	41	1,361.648	23	1,495.5
66	109	2,772.638	214	3,555.35
Total	210	6,636.006	274	9850.85

Current Status of Electricity Supply in 2016-2017

Installed Capacity of Power Plant in 2016-2017

Type of Plant	Coal	Hydro	Gas	Diesel	Total
Capacity (MW)	120	3,215	1,973.595	92.965	5,401.734
Energy Mix by Capacity	2.2%	59.9%	36.5%	1.7%	100%

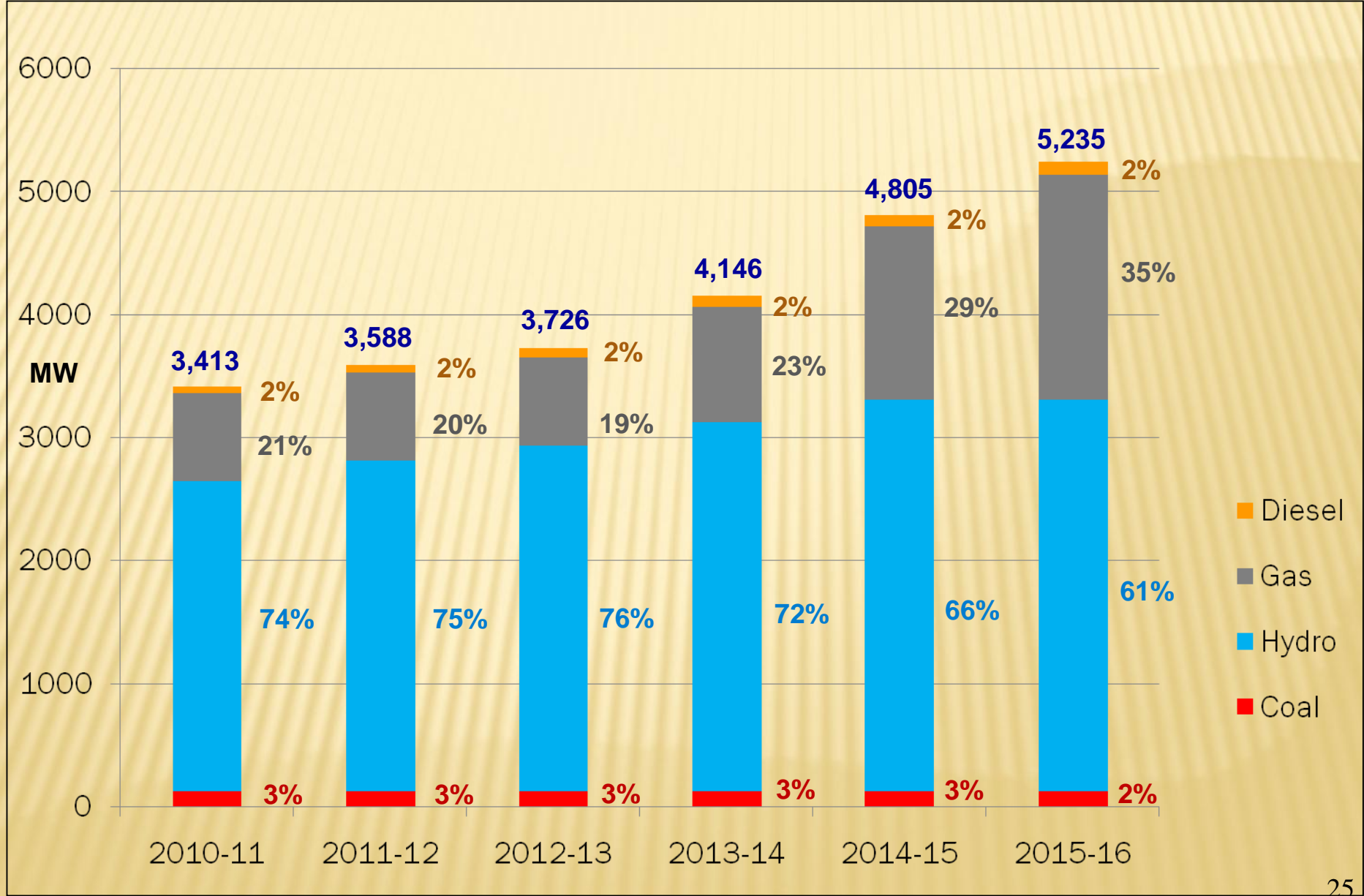
Power Generation in 2016-2017

Type of Plant	Coal	Hydro	Gas	Diesel	Total
Generation (GWh)	-	5969.17	4464.74	33.18	10,467.09
Energy Mix by Generation	-	57.02%	42.65%	0.32%	100%

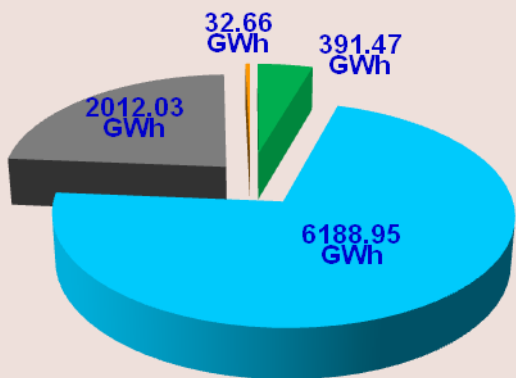
Electricity Consumption in 2016-2017

Type of Use	Industrial	Residential	Commercial	Others	Total	Per Capita Consumption
kWh Million	4,120.768	6,674.658	2,506.079	248.762	13,550.267	263kWh/year
Percentage	30.41%	49.26%	18.49%	1.84%	100%	

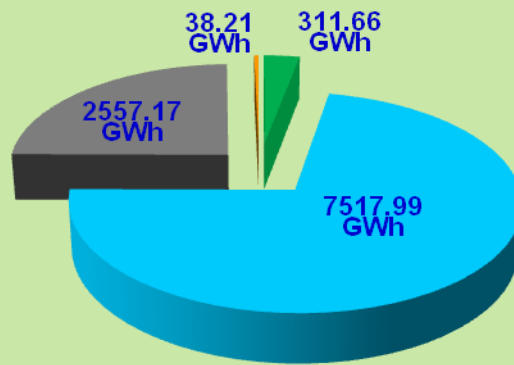
Changes of Energy Mix by Capacity of Power Plant (from year 2010-11 to 2015-16)



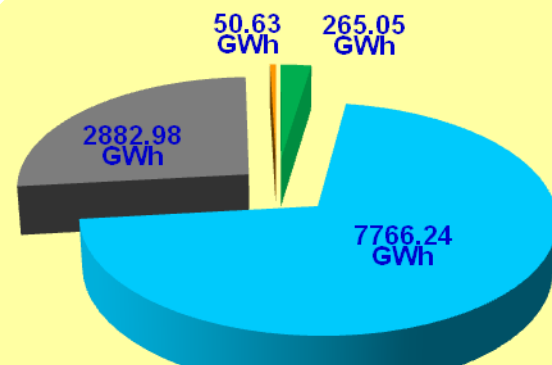
Changes of Energy Mix by Generation of Power Plant from year 2010-11 to 2015-16)



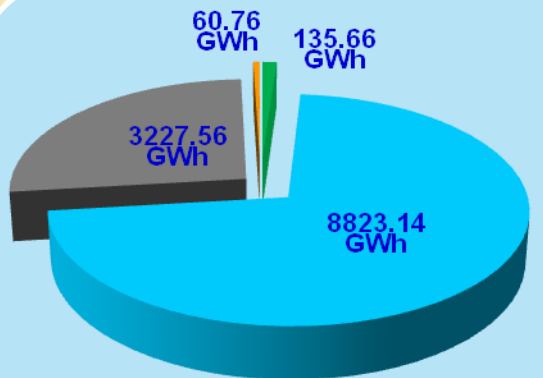
Year 2010-11 (8,625.11GWh)



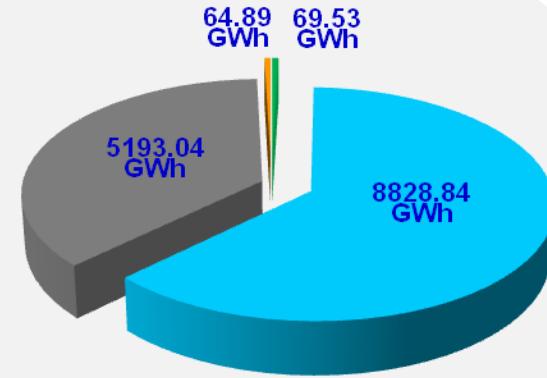
Year 2011-12 (10,425.03 GWh)



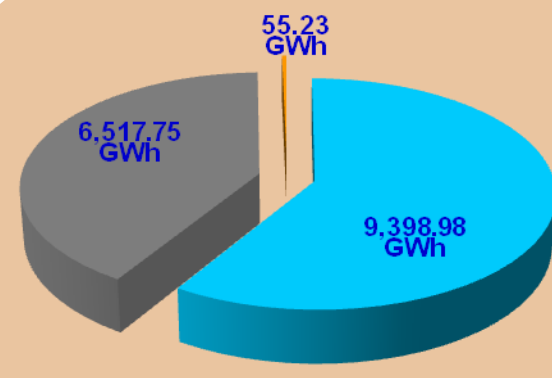
Year 2012-13 (10,964.90 GWh)



Year 2013-14 (12,247.12GWh)



Year 2014-15 (14,156.30GWh)

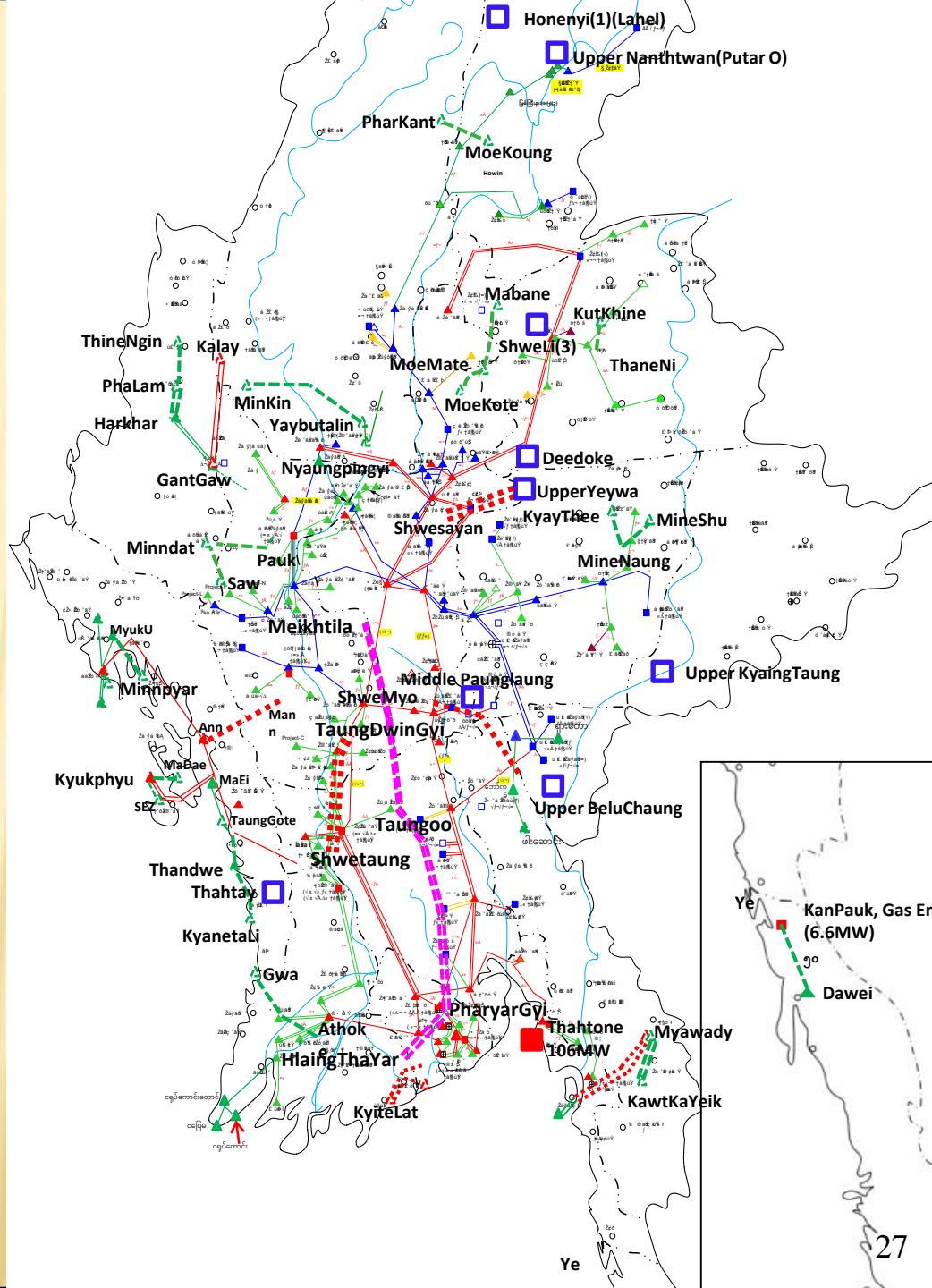


Year 2015-16 (15,971.96GWh)

Power Projects Under Construction

Sr.	Project	MW
1	Honeyyi (Hydro)	6
2	Upper Nanhtwan (Hydro)	3.2
3	Shweli (3) (Hydro)	1050
4	Deedoke (Hydro)	66
5	Upper Yweywa (Hydro)	280
6	Middle Paunglaung (Hydro)	100
7	Upper Kyaingtaung (Hydro)	51
8	Upper Beluchaung (Hydro)	30.4
9	Thahtay (Hydro)	111
10	Thahtone (Gas)	120

No.	Line	Nos of Line	Miles
(A)	500 kV	1	146
(B)	230 kV	6	452.423
(C)	66 kV	17	509



Electricity Tariff and Subsidies

Block Rate Tariff		Average Selling Price	Cost of Generation, Transmission & Distribution		Average Cost of Overall	Subsidies
Residential		71.10	Hydro Power Station		93.67	22.57
up to 100kWh	35		MOEE	18.51		
from 101kWh to 200kWh	40		Privates	52.84		
from 201kWh and above	50		Natural Gas Power Station			
Industrial & Commercial			MOEE	161.09		
up to 500kWh	75		Privates	142.27		
501kWh to 10,000kWh	100		Coal Fired Power Station			
10,001kWh to 50,000kWh	125		Privates	105.54		
50,001kWh to 200,000kWh	150		Transmission	3.00		
200,001kWh to 300,000kWh	125		Distribution	5.18		
300,001kWh and above	100					

Remarks; Above calculation is based upon the Revenue and Expenditure Budget Estimation for fiscal year 2016-2017.

Planned Target for Long Term till Year 2030-2031

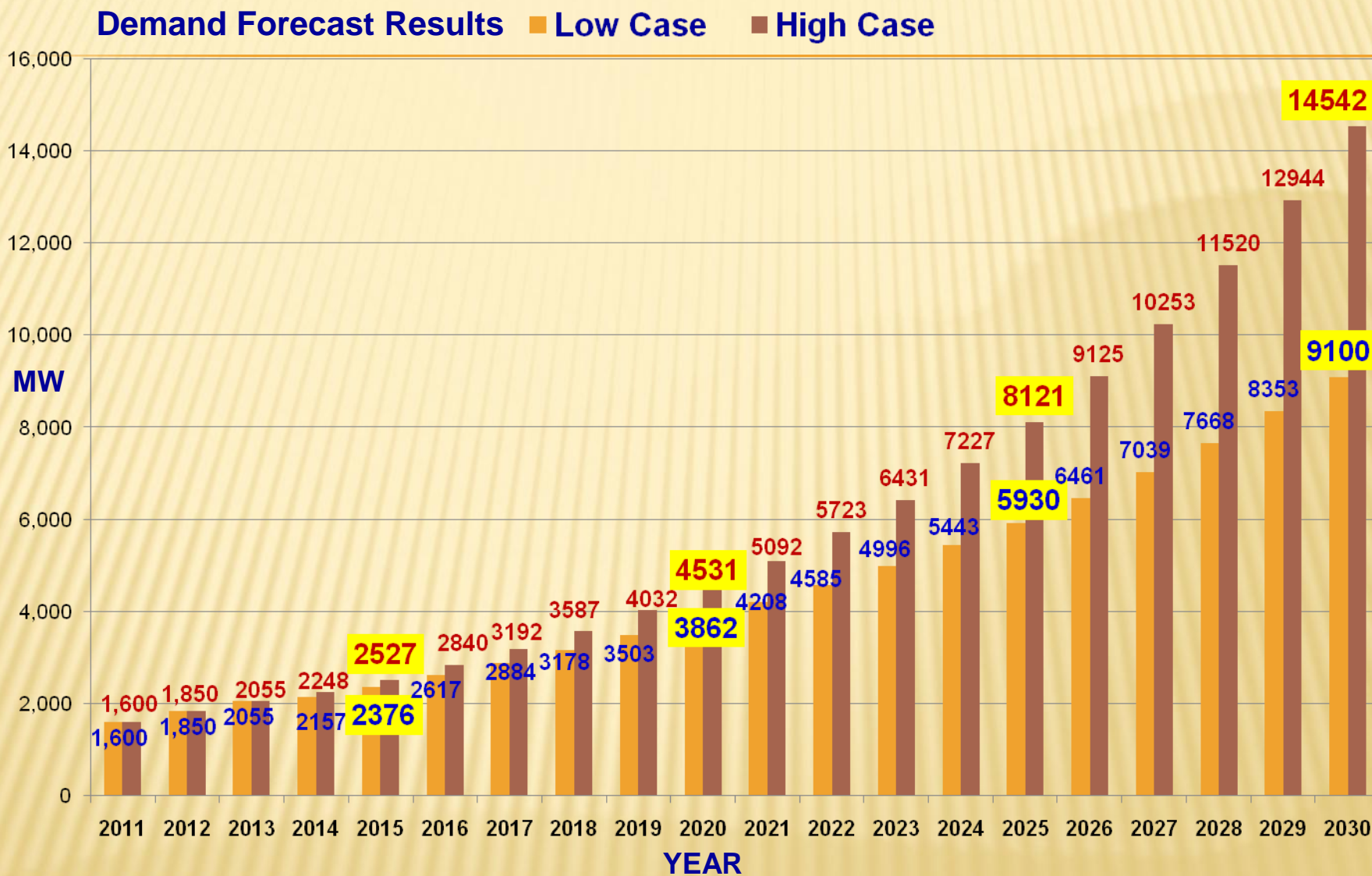
Project Term	Population Forecast (million)	Power Demand		Per Capita Consumption (kWh)	Electrified Household (%)
		Demand (MW)	Generation (GWh)		
Yr. 2011-12	60.44	1,806	10,444	173	27%
From Yr.(2012-13) to Yr.(2015-16)	63.14	3,078	17,797	282	34%
From Yr.(2016-17) to Yr.(2020-21)	66.69	5,686	32,874	493	45%
From Yr.(2021-22) to Yr.(2025-26)	70.45	10,400	60,132	854	60%
From Yr.(2026-27) to Yr.(2030-31)	74.42	19,216	111,100	1,493	80%

Generation Plan for (2016-2017) to (2030-31)

(MW)

Project Term	Demand Forecasting	Reserve Power	Installed Capacity	To be Implemented during (5) year plan
From Yr.(2012-13) to Yr.(2015 - 16)	3,236	765	4,001	1,740
From Yr. (2016-17) to Yr.(2020 -21)	5,686	1,706	7,392	3,391
From Yr. (2021-22) to Yr.(2025 -26)	10,400	3,120	13,520	6,128
From Yr.(2026-27) to Yr.(2030 - 31)	19,216	5,765	24,981	11,461

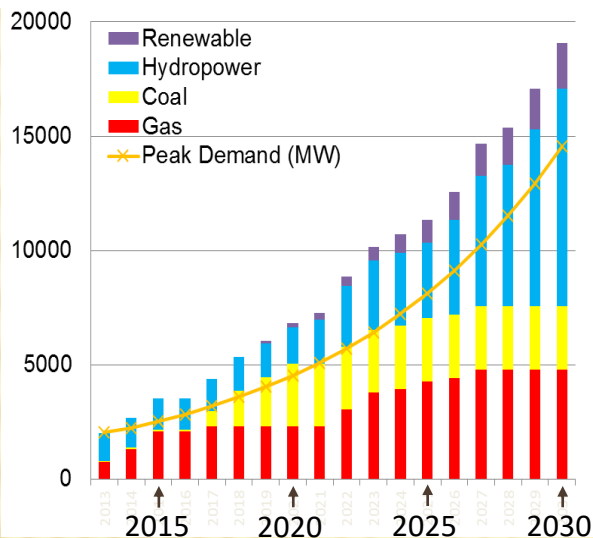
Demand Forecast for 20 years period (2011-2030)



Installed Capacity and Power Supply in Scenarios for 2030

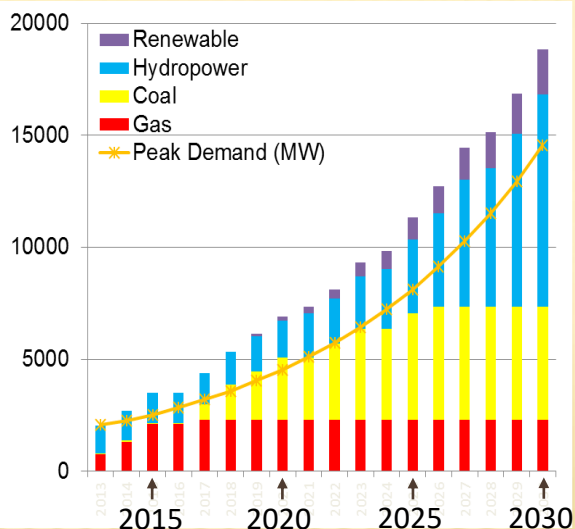
Scenario 1 (Domestic Energy Consumption)

Annual Transition of Power Supply for Peak Demand (MW)



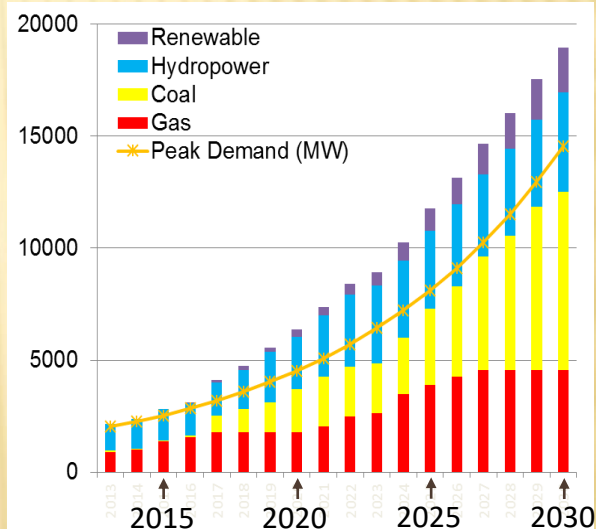
Scenario 2 (Least Cost)

Annual Transition of Power Supply for Peak Demand (MW)



Scenario 3 (Power Resources Balance)

Annual Transition of Power Supply for Peak Demand (MW)



Energy Resources	Installed Capacity	
	(MW)	%
(1) Hydro (large)	12,147	42%
(2) Hydro (Small & Medium)	6,891	24%
(3) Gas	4,986	17%
(4) Coal	2,760	10%
(5) Renewable	2,000	7%
	28,784	

Energy Resources	Installed Capacity	
	(MW)	%
(1) Hydro (large)	12,147	42%
(2) Hydro (Small & Medium)	6,891	24%
(3) Gas	2,484	9%
(4) Coal	5,030	18%
(5) Renewable	2,000	7%
	28,552	

Energy Resources	Installed Capacity	
	(MW)	%
(1) Hydro (large)	1,412	6%
(2) Hydro (Small & Medium)	7,484	32%
(3) Gas	4,758	20%
(4) Coal	7,940	33%
(5) Renewable	2,000	9%
	23,594	

Way Forward for Electricity Sector

- **To expand and construct more generation plants**
- **Public Awareness of Power Resource**
- **To expand the Thermal Plant**
- **To upgrade our transmission network**
- **To assist financing for Power Project.**
- **To review the Policy Framework for investment attraction**

Conclusion

- Natural gas demand is expected to remain high.
- Exploration focus on natural gas has become a must.
- Recent development in LNG import concept is an encouragement for offshore natural gas development including deepwater prospects.
- The supply eventually meets the demand at around 2021.
- Today's awareness for domestic requirement is escalating at an unprecedented great speed especially for power sector.
- "More Gas, More Industries, More Economic Development and More Wealth."

**THANK YOU
FOR YOUR KIND ATTENTION**