Greater Mekong Subregion

Second Meeting of the Subregional Energy Forum (SEF-2)

Ho Chi Minh City, Vietnam , 22 November 2008.

Developments in Myanmar Energy Sector

Energy Planning Department, Ministry of Energy
Union of Myanmar

Contents

- Emerging Challenges in Energy Sector
- Developments in Energy Sector
- Cooperation with GMS Neighbouring Countries
- Country Response to Climate Change

Emerging Challenges in Energy Sector

- **Volatile Energy Prices**
- **Secure & Sustainable Energy Supply**
- **Development of Alternative Energy Sources**

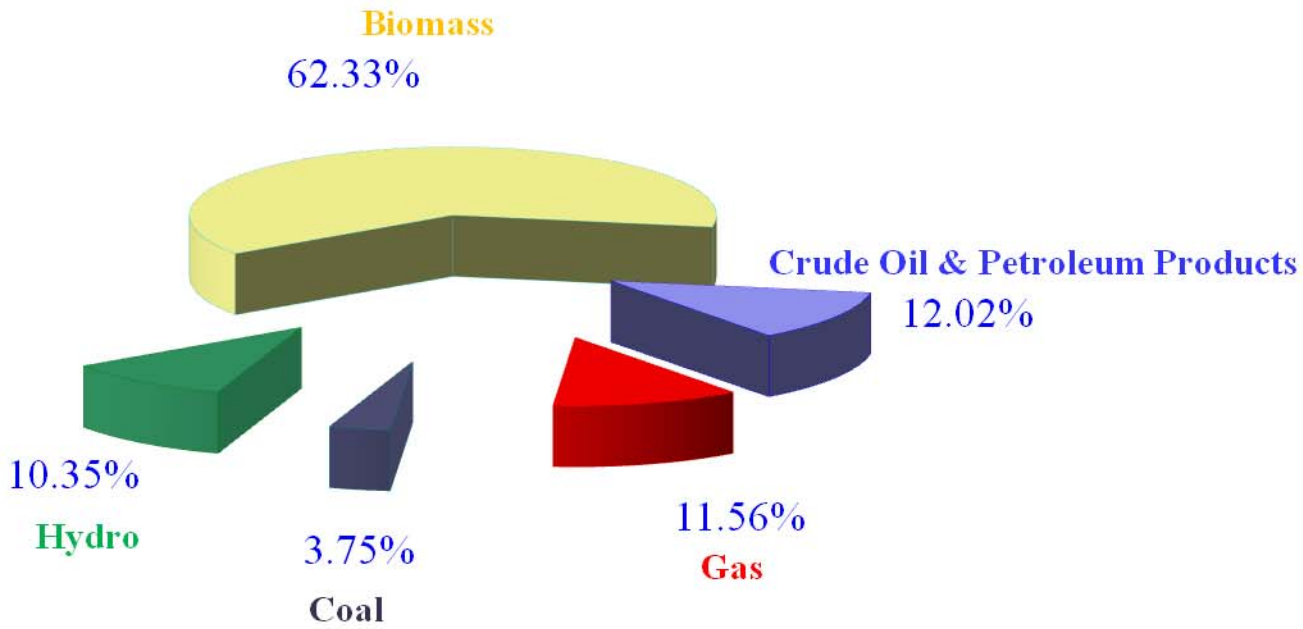
Primary Energy Consumption

KTOE

	1988-89	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Primary Energy Consumption	9897	11824	11904	12257	12878	13113	12705	14238	14889
Crude Oil and Petroleum Products	589	1983	1991	1924	1924	1957	1756	1904	1789
Natural Gas	885	1205	1033	1264	1428	1508	1305	1511	1721
Coal and Lignite	17	83	71	76	123	196	85	501	558
Hydro	360	728	772	743	788	926	988	1277	1541
Biomass (Wood)	8046	7825	8036	8249	8615	8526	8561	9045	9280

Total Primary Energy Supply by Type

(2007-08)



Policy Framework

- To maintain the Status of Energy Independence
- To promote wider use of New and Renewable Sources of Energy
- To promote Energy Efficiency and Conservation
- To promote use of Alternative Fuels in household

Institutional Framework

(1) Petroleum	**- Ministry of Energy**
(2) Electric Power	**- Ministry of Electric Power(1)**
(Hydropower)	
Thermal power	**- Ministry of Electric Power(2)**
Power transmission and distribution	
(3) Coal	**- Ministry of Mines**
(4) Biomass and	**- Ministry of Forestry**
Fuelwood	**- Ministry of Agriculture and Irrigation**
(5) Renewable	**- Ministry of Science & Technology**

* **Ministry of Energy is a Focal Point of the Myanmar Energy Sector Cooperations**

Developments in Energy Sector

- Petroleum Sub-Sector

Oil and Gas Bearing Areas of Myanmar

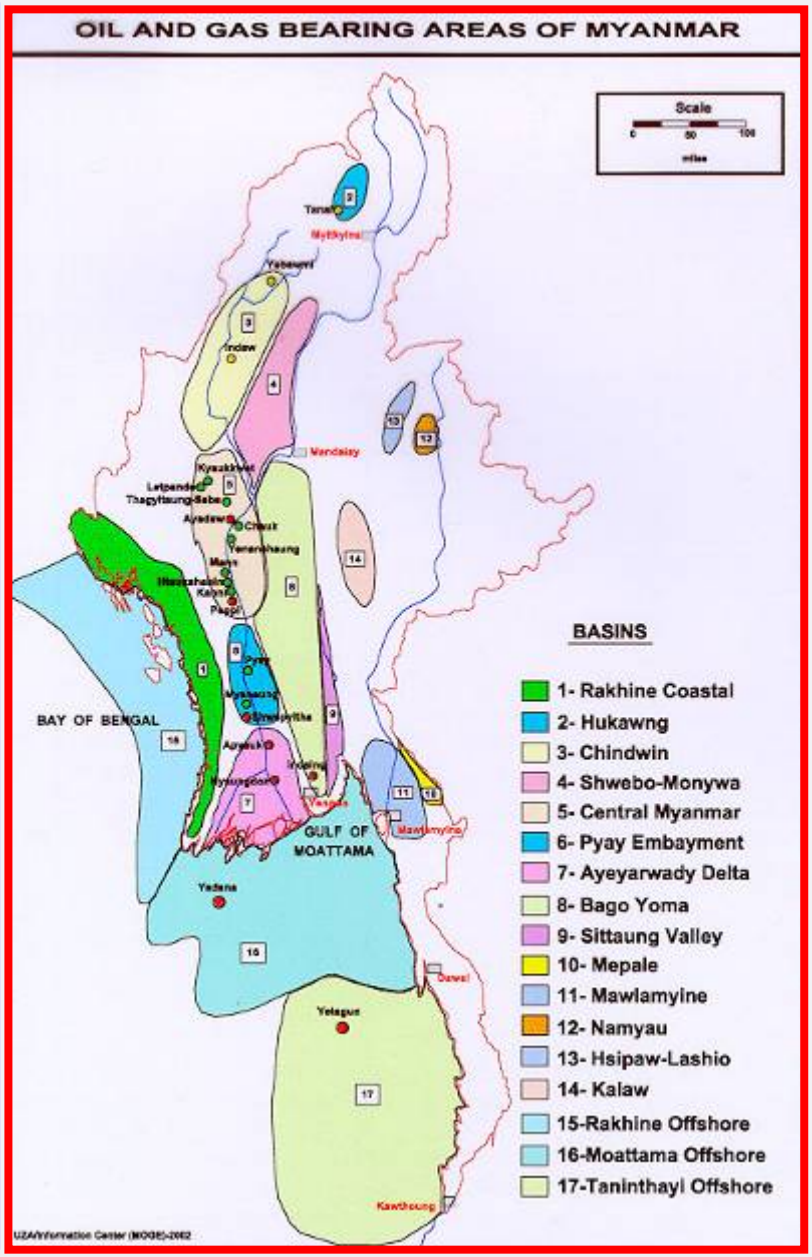
SEDIMENTARY BASINS

1. Rakhine Coastal
2. Hukaung
3. Chindwin
4. Shwebo-Monywa
5. Central Myanmar
6. Pyay Embayment
7. Ayeyarwady Delta
8. Bago Yoma Basin
9. Sittaung Valley
10. Mepale
11. Mawlamyine
12. Namyau
13. Hsipaw-Lashio
14. Kalaw
15. Rakhine offshore
16. Moattama offshore
17. Tanintharyi offshore

STATUS OF EXPLORATION (Offshore)

Thoroughly Explored Basins

- Rakhine Offshore
- Moattama Offshore
- Tanintharyi Offshore



STATUS OF EXPLORATION (Onshore)

A. Thoroughly Explored Basins
   1. Central Myanmar
   2. Pyay Embayment
   3. Ayeyarwady Delta

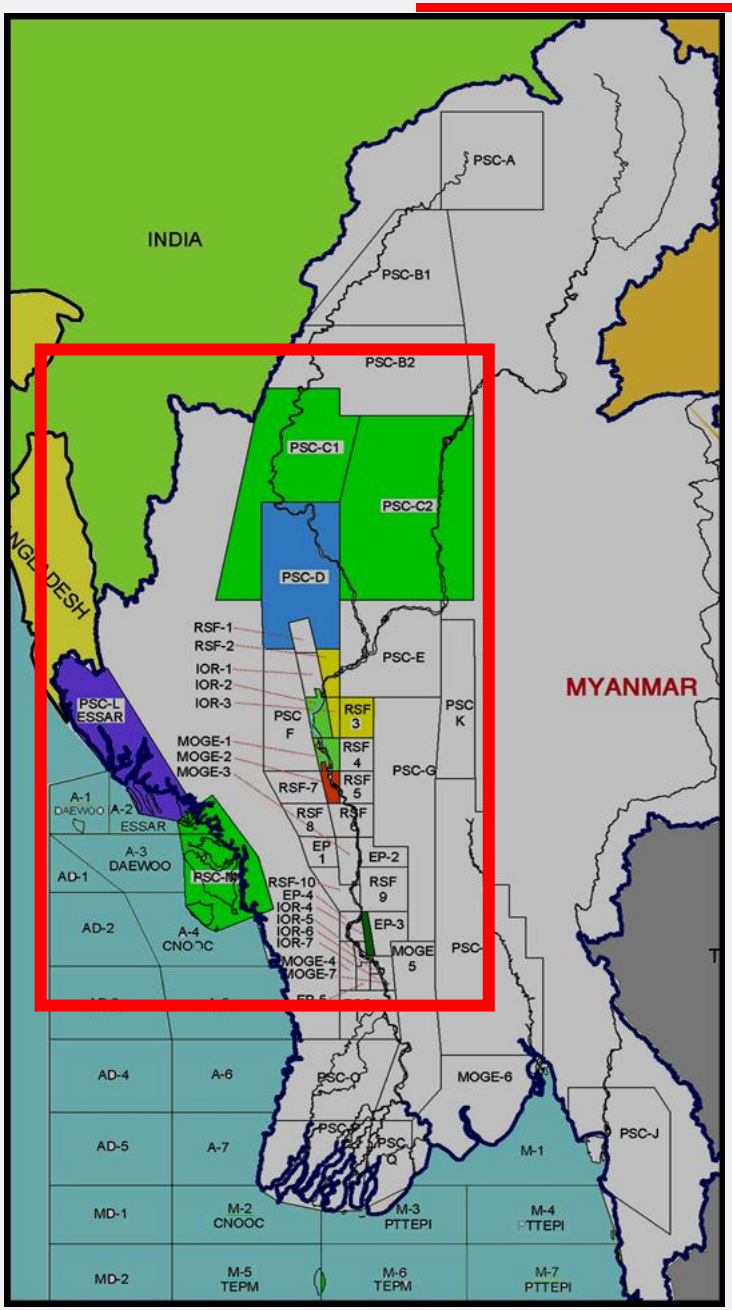
   (Only Part of the Basin)

B. Explored to Some Extent
   1. Chindwin
   2. Rakhine Coastal

C. Very Little Explored
   1. Hukaung
   2. Shwebo-Monywa
   3. Bago Yoma

D. Not Explored Yet
   1. Hsipaw-Lashio
   2. Namyau
   3. Kalaw
   4. Sittaung Valley
   5. Mawlamyine
   6. Mepale

Current Onshore Activities

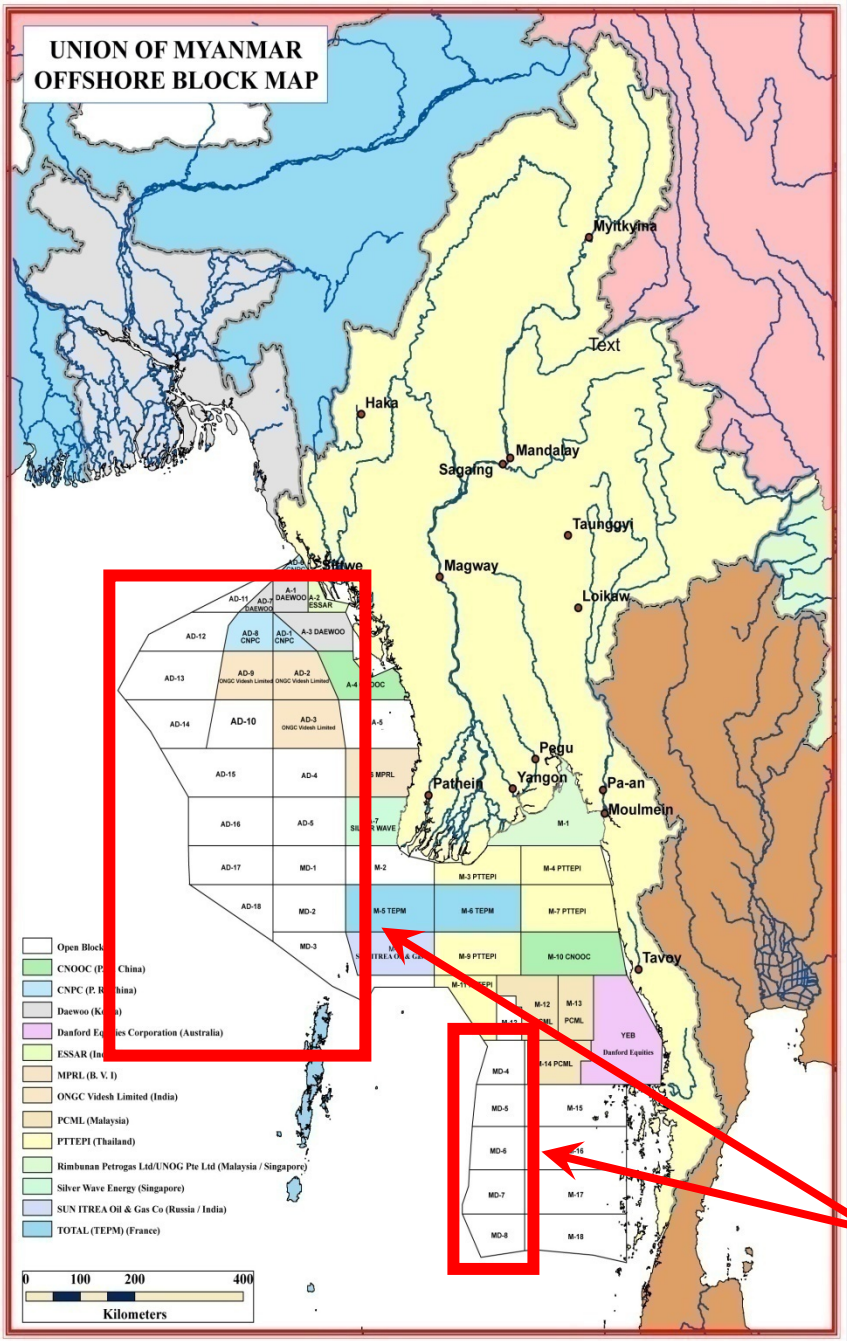


Company / Operator	Block	Area
MPRL E&P(British Virgin Island)	MOGE-2 (N)	(Mann Field)
GOLDPETROL (Indonesia)	MOGE-1	(Yenangyaung Field)
	IOR-2	(Chauk Field)
FOCUS ENERGY (Canada)	MOGE-2 (S)	(Htaukshabin / Kanni Field)
CHINNERY ASSETS (China)	IOR-4	(Pyay Field)
CNOOC (China)	PSC-M	(Kyaukphyu)
	PSC-C1	(Indaw-Yenan)
	PSC-C2	(Shwebo-Monywa)
SIPC Myanmar(China) (Mahudaung)	PSC-D	
ESSAR (India)	PSC-L	(Sittwe)
SILVER WAVE SPUTNIK (Russia)	PSC-B 2	(Zebyutaung-Nandaw)
Nobel Oil	PSC-A	(Hukaung)
Nobel Oil	PSC-B 1	(Uyu)

In onshore areas, 13 Contracts are active in 13 onshore blocks with 11 foreign companies.

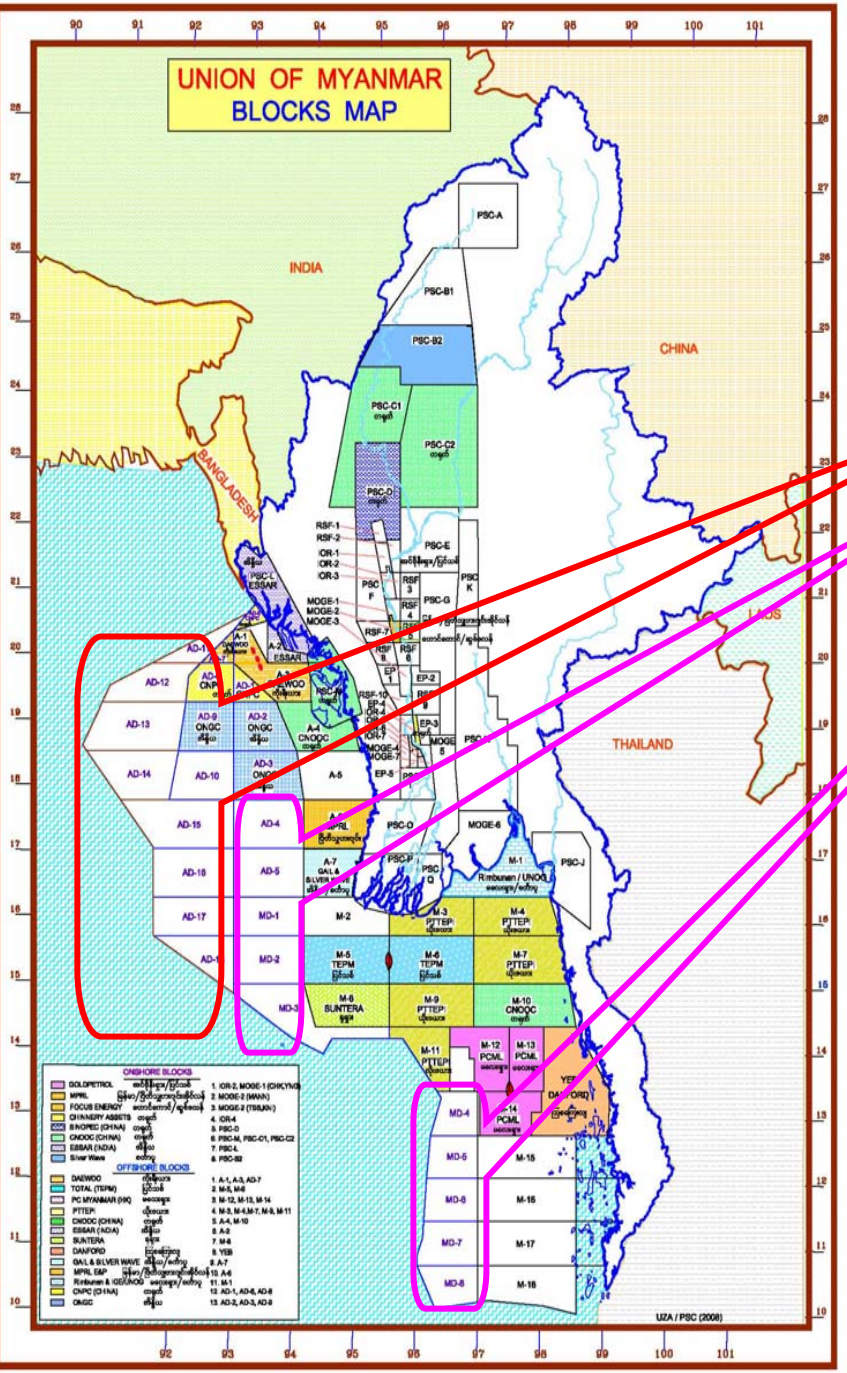
The other onshore blocks are reserved for MOGE operations.

Current Offshore Activities



Company / Operator	Block
TOTAL	M-5 , M-6 (Yadana Project)
PETRONAS Carigali	M-12 , M-13 , M-14 (Yetagun Project)
DAEWOO INTERNATIONAL	A-1 , A-3 (Shwe Project)
PTTEPI	M-3 , M-4 , M-7 , M-11 , M-9 (Zawtika Project)
CNOOC	A-4 , M-10
ESSAR	A-2
SUNTERA	M-8
DANFORD EQUITIES	YEB
GAIL + SILVER WAVE	A-7
CNPC INTERNATIONAL LTD	AD-1, AD-6 , AD-8
MPRL E & P	A-6
RIMBUNAN PETROGAS	M-1
PETROVIETNAM+VIETSOVPETRO	M-2
DAEWOO INTERNATIONAL	AD-7
ONGC VIDESH	AD-2 , AD-3 , AD-9

In offshore area, 27 Contracts are active in 28 offshore blocks with 22 foreign companies.
19 new deep water blocks are open for new investors.



Newly Demarcated Deep Water Blocks

- Rakhine Offshore Area
18 Blocks (AD-1 to AD-18)

- Moattama/Tanintharyi Offshore Area
8 Blocks (MD-1 to MD-8)

OPEN OFFSHORE BLOCKS

- Newly Open Deep Water Blocks : 19 Blocks

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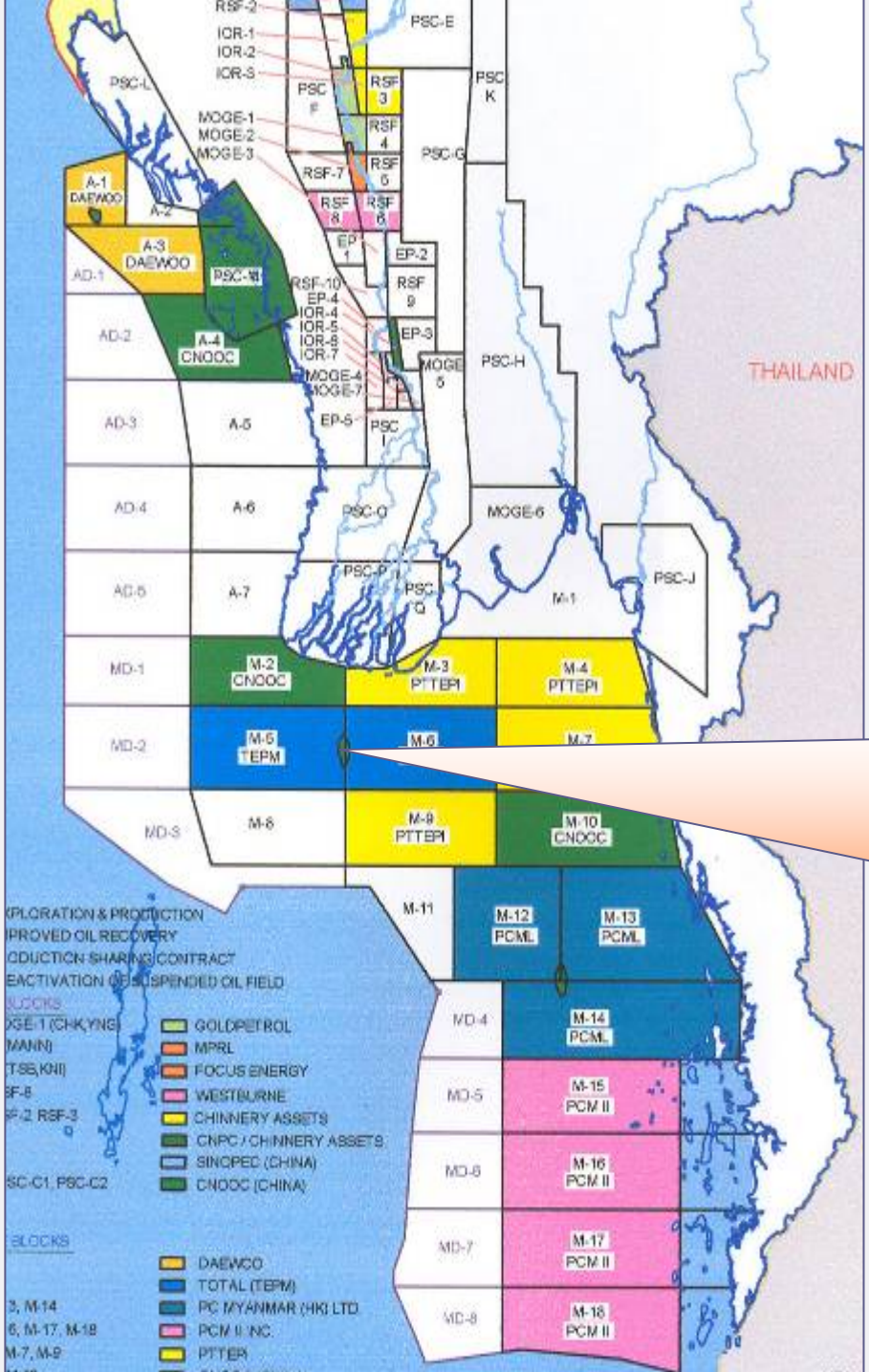
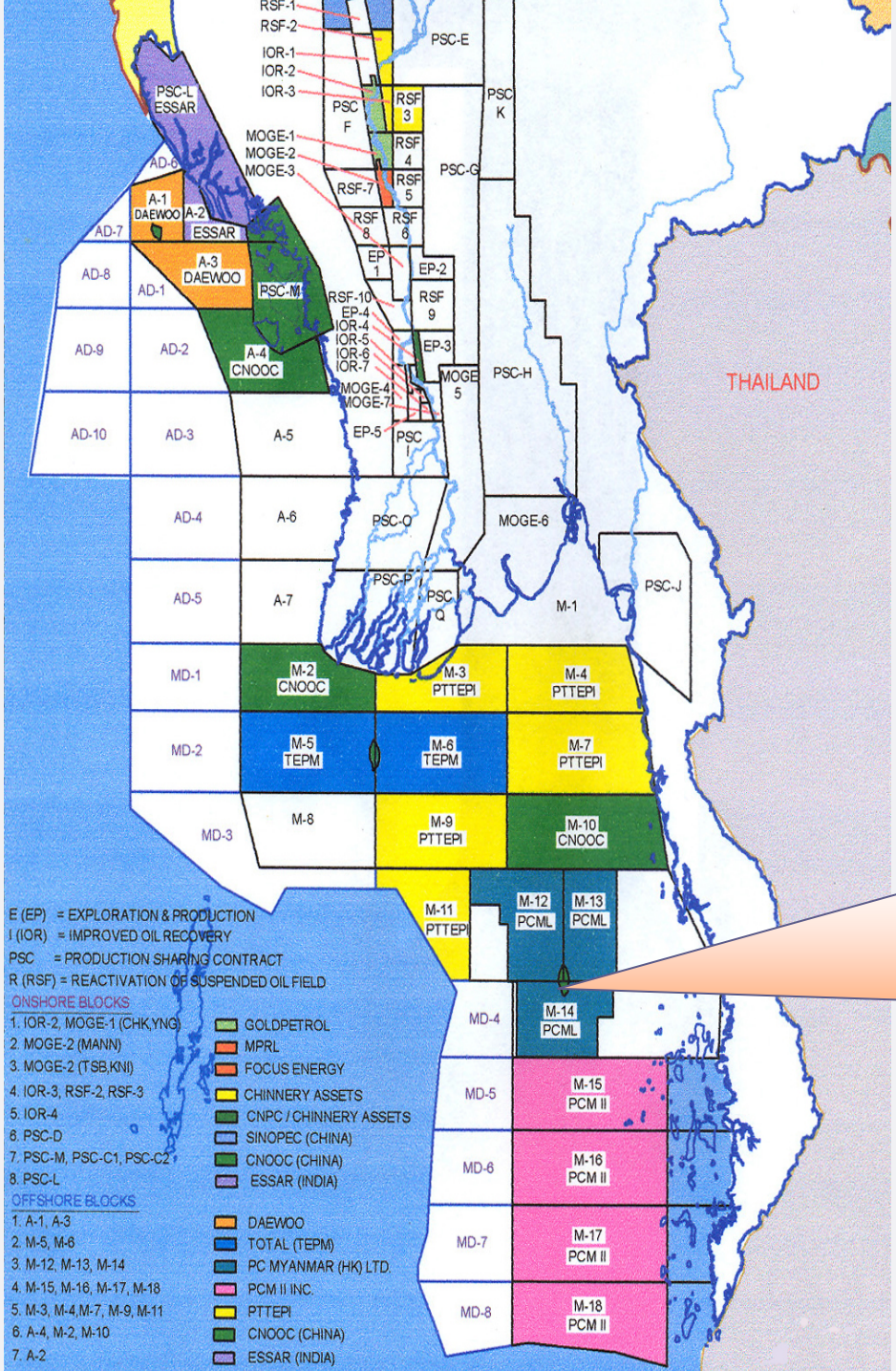


Yadana Natural Gas Project of Moattama Offshore Area



Yetagun Natural Gas Project of Tanintharyi Offshore Area

Gas Export (Myanmar)

(BSCF)

Sr. No.	YEAR	YADANA	YETAGUN	TOTAL
1.	1998-99	30.000	-	30.000
2.	1999 -2000	148.455	-	148.455
3.	2000-01	233.252	47.920	281.172
4.	2001-02	192.158	75.830	267.988
5.	2002-03	191.625	91.930	283.555
6.	2003-04	190.392	92.339	282.731
7.	2004-05	193.383	108.650	302.033
8.	2005-06	191.120	142.165	333.285
9.	2006-07	236.550	153.277	389.727
10.	2007-08	241.732	157.793	399.525

Natural Gas Trade Movement by Pipeline

(BP Statistical Review of World Energy June 2008)

Sr. No.	Country	Export Volume (BCM)
1.	Russian Federation	147.53
2.	Canada	107.30
3.	Norway	86.05
4.	Netherland	50.06
5.	Algeria	34.03
6.	USA	22.01
7.	Germany	16.38
8.	Other Europe & Eurasia	12.82
9.	Bolivia	11.73
10.	UK	10.36
11.	**Myanmar**	**9.89**
12	Libya	9.20

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Natural Gas Trade Movement by Pipeline (Cont.)

(BP Statistical Review of World Energy June 2008)

Sr. No.	Country	Export Volume (BCM)
13.	Iran	6.16
14.	Turkmenistan	6.10
15.	Indonesia	5.39
16.	Belgium	4.50
17.	Other Latin America	2.69
18.	Egypt	2.35
19.	Malaysia	1.78
20.	Mexico	1.60
21.	Oman	0.95
22.	Qatar	0.80
	T O T A L E X P O R T	**549.68**

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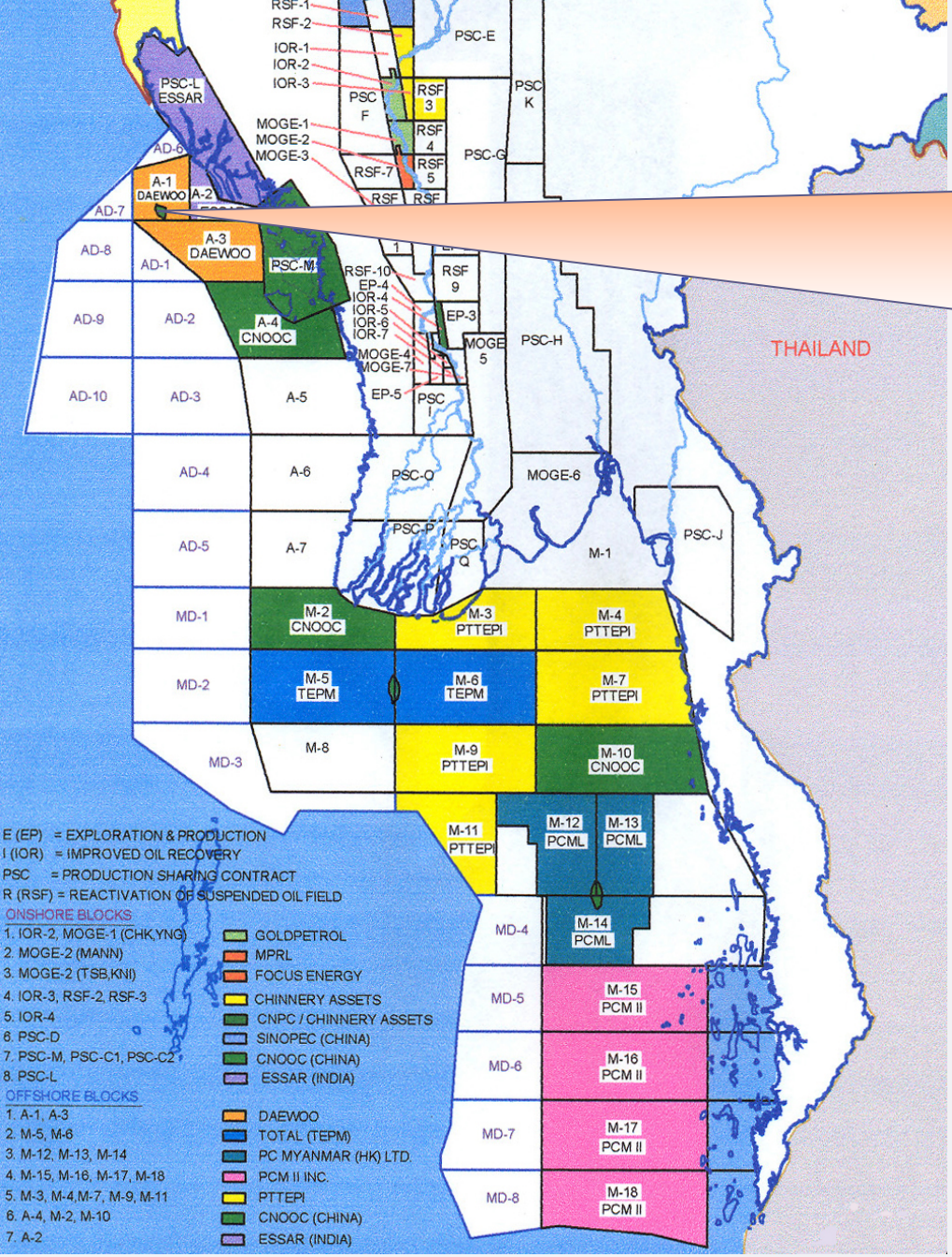
Asia Pacific Region Gas Trade Movement by Pipeline

(Billion Cubic Meters –BCM)

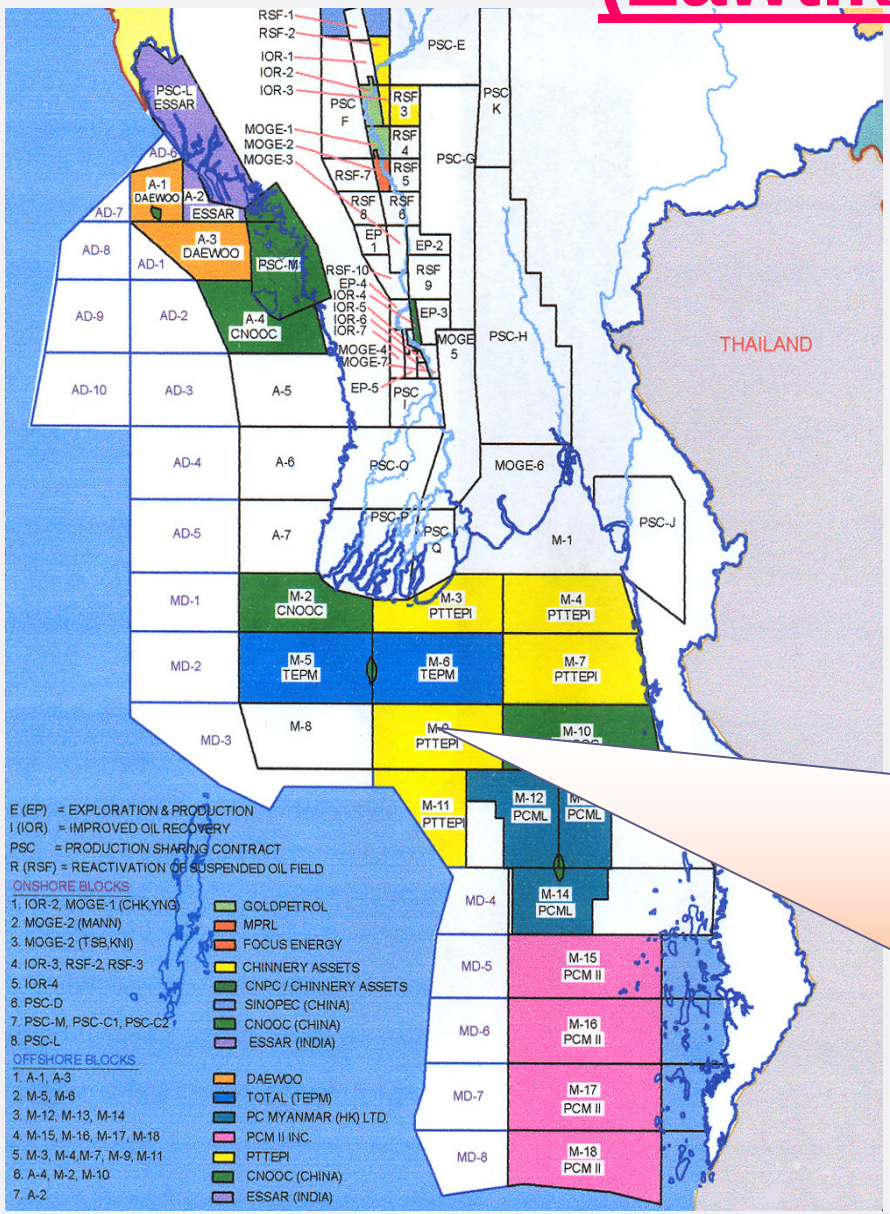
(BP Statistical Review of World Energy June 2008)

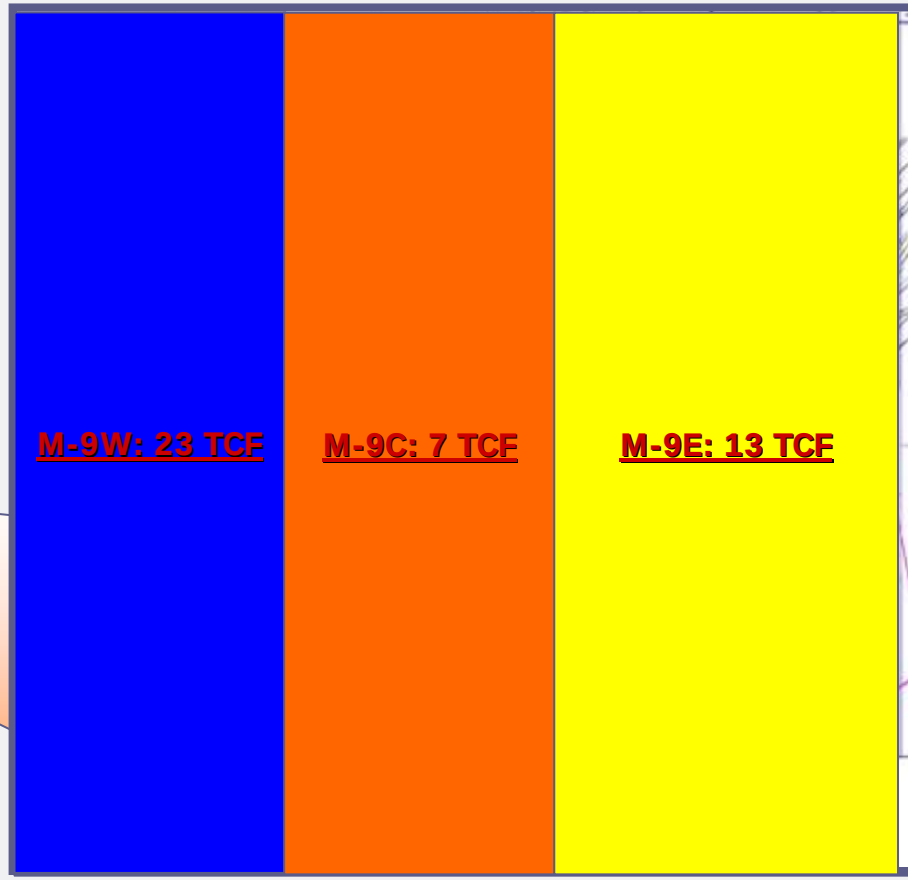
Sr. No.	Country	Year 2004	Year 2005	Year 2006	Year 2007
1.	*Myanmar*	*7.50*	*8.90*	*8.98*	*9.89*
2.	Indonesia	6.15	4.83	4.83	5.39
3.	Malaysia	1.60	1.78	1,78	1.78



Block A-1& A-3 in Rakhine Offshore Area (Shwe Project)

Moattama Offshore Block M-9 (Zawtika Project)

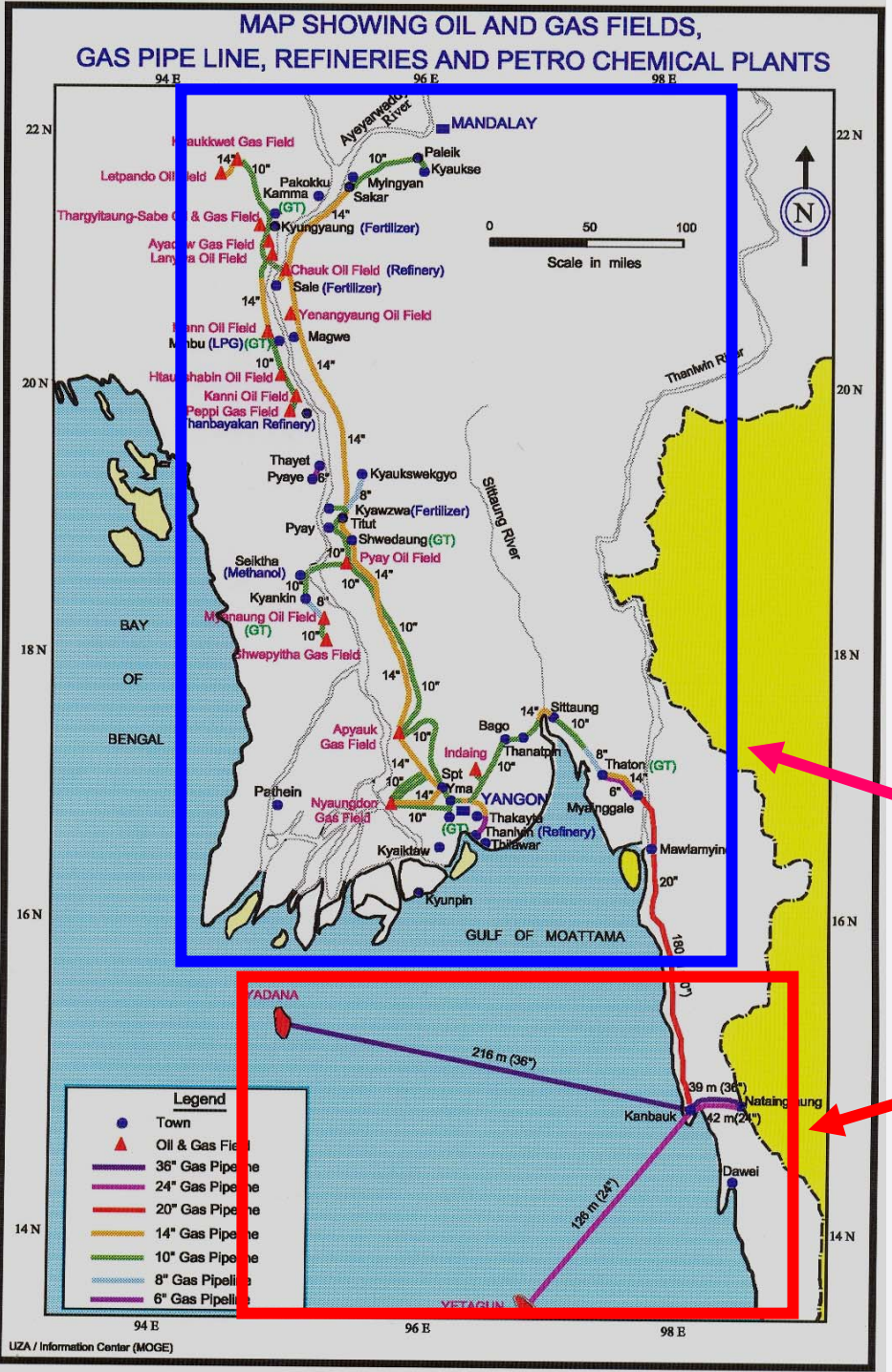




NATURAL GAS PIPELINE NETWORK

- About 1870 miles of gas pipeline were constructed in onshore and 431 miles in offshore

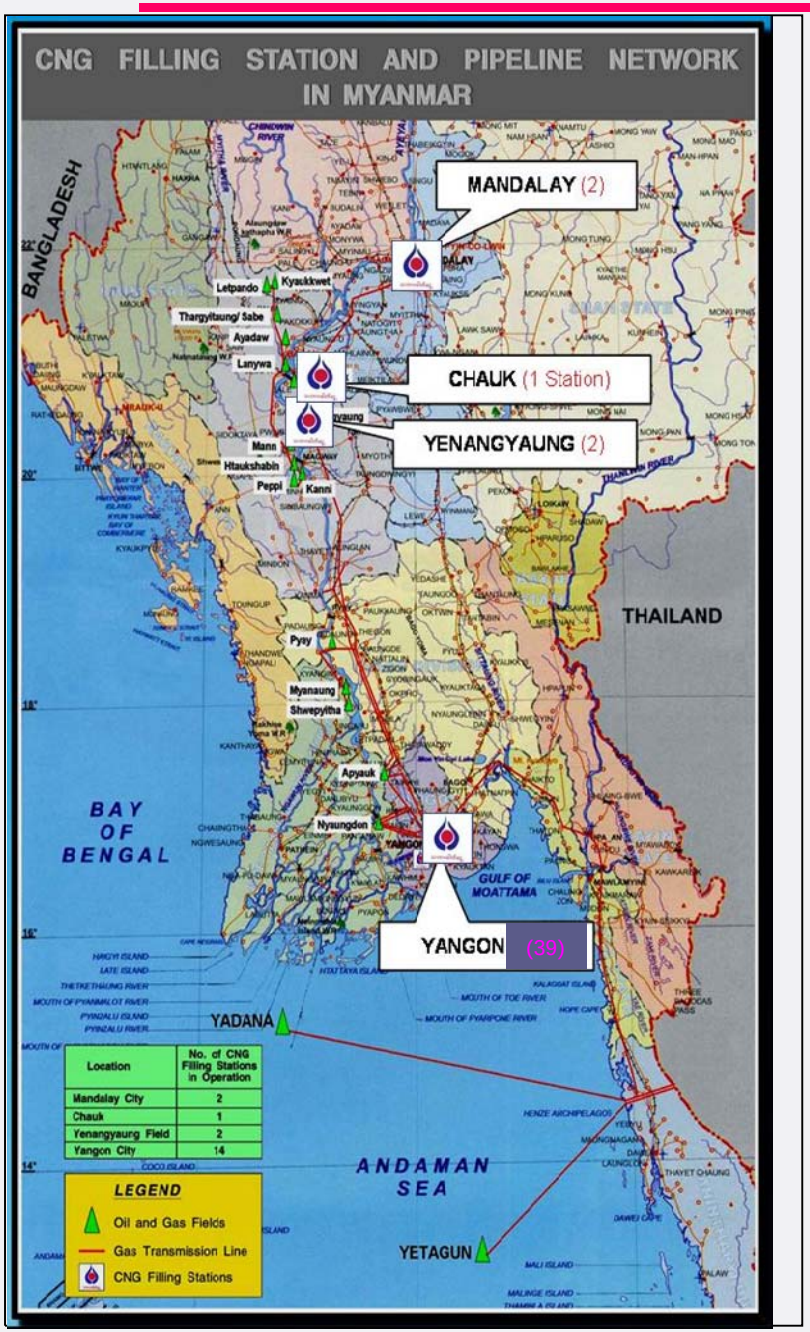
(Pipeline size varies from 6" to 20".)



Onshore Gas Pipeline

Offshore Gas Pipeline

CNG / NGV PROGRAMME 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 (Converted from petrol buses)
- CNG / NGV Programme was reactivated in August 2004.
- As at November 2008 :
  - 47 CNG Refueling Stations in Myanmar-
    - 42 in Yangon City
    - 2 in Mandalay City
    - 2 in Yenangyaung Field
    - 1 in Chauk Field
  - more than 24,000 NGVs (Converted from both petrol / diesel cars)
- Future : CNG Refueling Stations will be installed along the existing domestic pipeline corridor.

- Coal Sub-Sector

Coal Production and Consumption

Tons in Thousands

Year	Production	Consumption	Export
2000-01	571.14	132.71	401.88
2001-02	631.93	113.00	531.25
2002-03	550.20	120.40	439.87
2003-04	925.42	188.16	737.26
2004-05	992.00	192.12	799.88
2005-06	1182.50	559.20	623.30
2006-07	1313.62	798.41	515.21
2007-08	**1117.29**	**888.70**	**228.59**

Coal Mining Activities

Sr.No	Location	Enterprise / Company
1	Maw Daung	Myanmar Economic Corporation
2	Tigyit	Shan Yoma Nagar
3	Kalewa	No. (3) Mining Enterprise
4	Namma	No. (3) Mining Enterprise
5	Samlaung	Triple ‘‘ A ’’ Cement International Co., Ltd.
6	Makhaw	UE Export Import Mining Co., Ltd
7	Sagaing Division	Tun Thwin mining Co., Ltd
8	Manpon	Mine Htet Mining Co., Ltd
9	Narshan	Mine Htet Mining Co., Ltd
10	Narkun	Ngwe Ye Pearl Co., Ltd

Coal Production Forecast

Tons in Thousand

Year	Production	State Owned	JV Operation	Private
2010-2011	1734.80	48.80	761.00	925.00
2015-2016	2326.00	50.00	1086.00	1190.00
2020-2021	2761.00	50.00	1406.00	1305.00
2025-2026	4593.00	55.00	3218.00	1320.00
2030-2031	5654.00	55.00	4264.00	1335.00

- Renewable Sub-Sector

Electrification by Renewable in Myanmar

Type	*Installed Capacity (MW)*
Solar	= 0.1157
Wind	*= 0.5194*
Mini Hydro	*= 8.3530*
Biomass	*=18.1942*
Biogas	*= 1.5993*

More Renewables

- Rice husk Gasifier Plant
- Biogasifier Plant
- Jatropha Plantation

Biofuel Programme

Jatropha Curcas plants are grown in homesteads and cultivable land to use the oil as an alternate fuel. It is planned to plant 500,000 acres of Jatropha plants in every State and Division of the Country within 3 years, amounting to 7 million acres for the whole country. The programme is ongoing.

By the time the programme is fully onstream, Myanmar will produce 700 million gallons of jatropha oil annually.

Myanmar is also implementing programme to produce Bio-ethernol and Bio-diesel as alternative fuel in the transport sector.

Cooperation with GMS Neighbouring Countries

Cooperation with GMS Neighbouring Countries

China

Project	Company
IOR-4	CAL/CNPC (CNPC)
AD-1, AD-6, AD-8	CNPC
Block D	SIPC (SINOPEC)
Block C-1, C-2, M, A-4, M-10	CNOOC
MOU relating to the sale & transporting of Natural Gas from blocks A-1 & A-3 to P.R.China via pipeline signed between Sellers MOGE, Daewoo, ONGC Videsh, Gail, KOGAS and Buyer CNPC.	PetroChina (CNPC)
Gas Sales and Purchase Agreement (GSPA) for Natural Gas from blocks A-1 & A-3 to P.R. China via pipeline between Sellers and Buyer.	PetroChina (CNPC)

Vietnam

Project	Company
Block M-2	PVEP, VIETSOVPETRO

Cooperation with GMS Neighbouring Countries *(Contd.)*

Thailand

Project	Company
M-5, M-6 (Yadana Project)	PTTEPI (25.5%)
M-12, M-13, M-14 (Yetagun Project)	PTTEPI (19.32%)
M-3, M-4, M-7, M-11	PTTEPI (100%)
M-9 (Zawika Project)	PTTEPI (100%)

- Heads of Agreement signed between Sellers MOGE, PTTEPI and Buyer PTT.
- Gas Sales Agreement (GSA) negotiations between Sellers and Buyer is in progress.

Cooperation with GMS Neighbouring Countries *(Contd.)*

❖ Thailand

Project

➢ Study and Demonstration of Biomass Gasification for Electricity Project	DEDE / MOE
➢ Establishment of Annual Energy Statistics Report	DEDE / MOE
➢ Community based Biodiesel Demonstration Project	DEDE / MOE
➢ Study and Assessment of Solar Energy Potential	DEDE / MOE
➢ Energy Promotion for Rural Village	DEDE / MOE
➢ Energy Audit Training	DEDE /MOE

Department of Alternative Energy Development and Efficiency (DEDE) of the Ministry of Energy (MOE) of Thailand.

Country Response to Climate Change

Myanmar is a party to the following International Conventions and Agreements initiated to reduce the impacts on Global Climate Change:

(1) **United Nations Framework Convention on Climate Change (UNFCCC) - New York, 1992.**
(Ratified on 25th November 1994)

(2) **Vienna Convention for the Protection of the Ozone Layer – 1985.**
(Ratified on 28th November 1993)

(3) **Montreal Protocol on substances that Deplete the Ozone Layer - Montreal, 1987.**
(Ratified on 28th November 1993)

(4) **London Amendment to the Montreal Protocol on substances that Deplete the Ozone Layer - London 1990.**
(Ratified on 28th November1993)

(5) **Myanmar acceded to Kyoto Protocol on 13th August 2003.**

Institutional Arrangement

1990 : **Established "*National Commission for Environmental Affairs (NCEA)*"**

NCEA ***(1) Policy body for environmental protection***
(2) Focal point and coordinating agency for environmental matters

1994 December :
Promulgated " Myanmar National Environment Policy "

National Environment Policy of Myanmar

The Government of the Union of Myanmar promulgates Notification 26/94 dated 5th December 1994, to establish sound environment policies in the utilization of water, land, forests, mineral, marine resources and other natural resources in order to conserve the environment and prevent its degradation:-

"The wealth of a nation is its people, its cultural heritage, its environment and its natural resources. The objective of Myanmar's Environment Policy is aimed at achieving harmony and balance between these through the integration of environmental considerations into the development process to enhance the quality of the life of all its citizens. Every nation has the sovereign right to utilize its natural resources in accordance with its environmental policies; but great care must be taken not to exceed its jurisdiction or infringe upon the interests of other nations. It is the responsibility of the State and every citizen to preserve its natural resources in the interest of present and future generations. Environmental protection should always be the primary objective in seeking development. "

Response to Climate Change

- The Government is carrying out afforestation, reforestation and greening projects since 1994/1995.
- The greening projects are extended from initial 9 districts to 13 districts in the dry zone area of Central Myanmar.
- NCEA is implementing the project in order to enable Myanmar to fulfill its commitments and obligations as required by the UNFCCC.

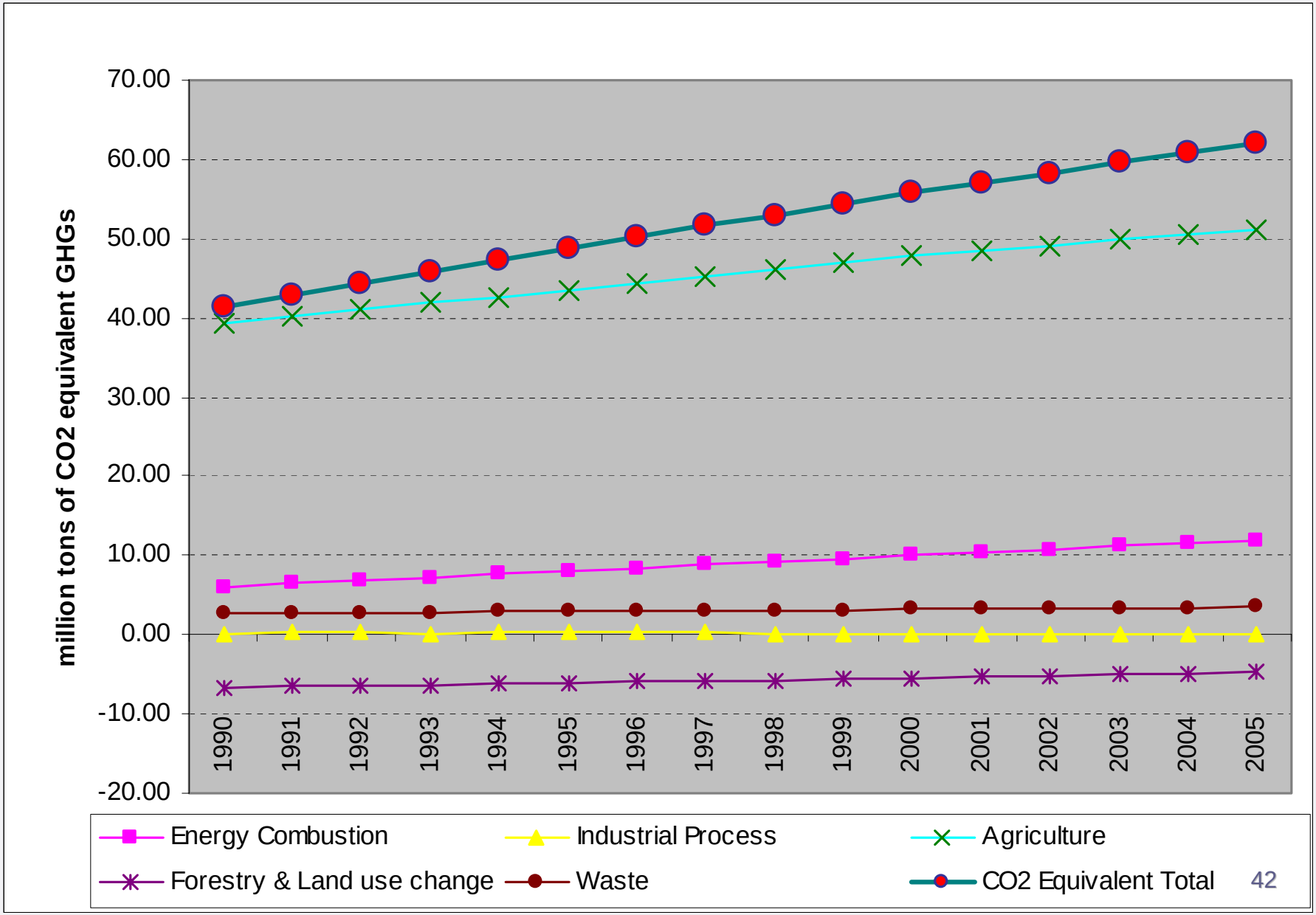
GHG Emission

- First GHG inventory with the assistance of ADB in 1997 through Asia Least-cost Greenhouse Gas Abatement Strategy (ALGAS) project.

- Base Year is 1990 and annual estimate of GHG emission to year 2005 and projection up to year 2020.

- ALGAS Project is to improve the understanding and estimate of resources and sinks of GHG emission, more effectively assess, based on common and verifiable methodologies, the option for reducing sources and enhancing sinks of GHGs.

GHG Emission in CO_2 Equivalent 1990 to 2005



Net GHG Emission in Co_2 Equivalent

- **Largest Emitter = Agriculture Sector (mainly from rice cultivation)**
  94% of overall emissions in 1990
  80% of overall emissions in 2005

- **2nd Largest Emitter = Energy Sector (Burning of fuelwood is the major contributor)**
  14.7% of overall emissions in 1990
  19.0% of overall emissions in 2005

THANK YOU FOR YOUR KIND ATTENTION