### 4.9 The project total sector

### (1) Income statements

In the income statements of the project total, **sales value** includes the power sales value and natural gas sales value to non-power sectors (Industry, commercial, transportation, and residential).

Variable costs include natural gas cost from LNG sector and Camago/Malampaya.

**Production fixed costs** include depreciation cost, property tax, insurance cost, maintenance cost, and labor cost in LNG, pipeline, and power sectors.

**Non-operating expenses** account for sales cost, administration cost, business tax, value added tax, long-term and short-term loans, and pre-operation amortization in LNG, pipeline, and power sectors.

Finally we can calculate **profit before tax and after tax**. Current profit after tax is delivered to shareholders with a dividend rate of 15% when the profit is greater than the total dividend value. Although an accumulative deficit remained in the current year, the dividend is delivered under previous conditions.

Items 1	Items 2	Item 3	Unit	Value	2006	2007	2008	2009	2010
ncome Stat	Sales	Power sales	1000US\$		421,845	757,771	878,713	1,088,684	1,229,443
· .		Gas sales for small lot users	1000US\$		21,526	30,714	41,732	54,676	71,575
		Total	1000US\$		443,371	798,484	920,445	1,143,359	1,301,018
· · · · ·	Variable cos	NG cost at Batangas	1000US\$	-	89,005	251,474	317,875	322,168	318,556
		LNG Import cost	1000US\$		104,903	109,615	113,480	208,986	278,096
		Totai	1000US\$		193,908	361,090	431,355	531,154	596,653
		the second second	the species						
	Fixed cost	Depreciation	1000US\$		51,900	75,600	84,797	120,250	134,479
		Assets tax	1000US\$		11,802	17,129	19,143	27,233	30,409
		Insurance	1000US\$		11,802	17,129	19,143	27,233	30,409
		Maintenance cost	1000US\$		41,153	66,933	76,219	101,706	116,779
:		Wages	1000US\$		3,041	4,805	5,576	7,513	8,766
		Total	1000US\$		119,698	181,795	204,877	283,935	320,843
	Supply cost	Direct supply cost	1000US\$	<u> </u>	313,606	542,885	636,232	815,088	917,496
		Gross profit on sales	1000US\$	-	129,765	255,599	284,213	328,271	383,523
. '	Non-operati	Sales cost & administration	1000US\$		22,169	39,924	46,022	57,168	65,051
		Business tax	1000US\$	·····	2,217	3,992	4,602	5,717	6,505
		Value added tax	1000US\$		20,831	37,046	41,287	51,050	58,759
		Interest of L.T.L	1000US\$		69,241	74,351	104,442	112,463	108,699
		interest of S.T.L	1000US\$	1	10,327	20,383	22,612	28,852	33,303
		Amortization	1000US\$		4,172	4,172	4,172	4,172	4,172
		Total	1000US\$		128,956	179,869	223,138	259,422	276,488
	Profit before	Full cost	1000US\$		442,563	722,754	859,370	1,074,510	1,193,983
		Profit before tax	1000US\$		809	75,730	61,075	68,850	107,035
· · ·	Profit after t	Corporate tax	1000US\$		259	24,234	19,544	22,032	34,251
		Profit after tax	1000US\$		550	51,497	41,531	46,818	72 784
	[	Dividend	1000US\$	-	0	7,581	8,576	, o	0
	1	Retained earnings	1000US\$	· · · · ·	550	43,916	32,955	46,818	72,784
		(Accumulatice)	1000US\$	1	550	44,466	77,420	124,238	197,022

Table 4.34 Capital plan block for pipeline sector

#### (2) Cash flow

In the following formula, the cash flow tables of the project total are calculated.

Capital sources include sales, equity, long-term loans and short-term loans in all sectors.

**Capital applications** include investment, working capital, direct operating cost, indirect operating cost in all sectors. Direct operating costs consist of natural gas cost from Camago/Malampaya and LNG sector, asset tax, insurance fee, maintenance cost, and wages in all sectors. Indirect operating costs consist of sales cost and administration cost, business tax, VAT, interest payable, repayment of L.T.L., and dividend in all sectors.

Items 1	Items 2	Item 3	Unit	Value	2006	2007	2008	2009	2010
Cash flow	Sources	Cash in total	1000 US\$		820,561	987,950	1,355,440	1,357,932	1,365,454
		(+) Power Sales value	1000 US\$		421,845	767,771	878,713	1,088,684	1,229,443
		(+) NG Sales value for small	1000 US\$		21,526	30,714	41,732	54,676	71,575
		(+) Equity	1000 US\$	1	133,173	50,344	202,252	79,422	12,511
		(+) Long Term Loan	1000 US\$		133,173	50,344	202,252	79,422	12,511
		(+) Short term loan for W/C	1000 US\$		110,843	88,778	30,490	55,729	39,415
	Application	Investment	1000 US\$	+ }	532,693	201,376	809,010	317,688	50,042
		(+) LNG terminal	1000 US\$		0	0	354,179	0	0
		(+) Gas pipeline to Luson	1000 US\$		28,507	26,082	26,552	27,029	33,768
		(+) Power station	1000 US\$	-	480,177	166,947	407,884	276,817	15,499
		(+) Power transmission	1000 US\$		24,009	8,347	20,394	13,841	775
		Working capital	1000 US\$		110,843	88,778	30,490	55,729	39,415
		(Accumulate W/C)	1000 US\$		110,843	199,621	230,111	285,840	325,255
		Direct operating cost	1000 US\$		261,706	467,085	551,436	694,838	783,017
		(+) Fuel cost	1000 US\$	-	193,908	361,090	431,355	531,154	596,653
		(+) Assets tax	1000 US\$		11,802	17,129	19,143	27,233	30,409
		(+) Insurance	1000 US\$		11,802	17,129	19,143	27,233	30,409
	-1	(+) Maintenance cost	1000 US\$		41,153	66,933	76,219	101,706	116,779
		(+) Wages	1000 US\$		3,041	4,805	5,576	7,513	8,766
		Indirect operating cost	1000 US\$		391,390	308,200	651,591	436,125	331,588
		(+) Sales cost & administra	1000 US\$	-	22,169	39,924	46,022	57,168	65,051
	···	(+) Business tax	1000 US\$		2,217	3,992	4,602	5,717	6,505
·····		(+)Value added tax	1000 US\$		20,831	37,046	41,287	51,050	58,759
		(+) Coporate tax	1000 US\$		259	24,234	19,544	22,032	34,251
		(+) Interest of L.T.L.	1000 US\$		69,241	74,351	104,442	112,463	108,699
		(+) Interest of S.T.L.	1000 US\$		10,327	20,383	22,612	28,852	33,303
		(+) Repayment of L.T.L.	1000 US\$		266,346	100,688	404,505	158,844	25,021
		(+) Dividend	1000 US\$	• • • • • • • • • • • • • • • • • • •	0	7,581	8,576	0	i i i i i i i i i i i i i i i i i i i
		Cash out total	1000 US\$		1,296,632	1,065,439	2,042,527	1,504,380	1,204,062
	Cash surplu	Cash surplus	1000 US\$	-	-476,071	-77,488	-687,086	-146,448	161,392
	-	Accumulative	1000 US\$		-1,656,254	-1,733,742	-2,420,829	-2,567,277	-2,405,885

Table 4.35 Cash flow block of the LNG sector

#### (3) FIRR Calculation

**FIRR** (Financial internal rate of return) is calculated by the method shown in the following table.

Investment and working capital fund are summed up as **Capex** (Capital cost accounts). All working capital is returned to the income category at the end of calculation term.

As **Opex** (Operation cost accounts), natural gas costs are summed up, in addition, other costs including property tax, insurance fee, maintenance cost, labor cost, sales and administration cost, business tax, value added tax, and corporate tax are summed up.

Sales revenues are pipeline sector's natural gas sales to non-power sectors and power

sector's power sales to distribution companies.

Benefit of the sectors is expressed as "Sales revenue - Capex - Opex".

FIRR is calculated by "=IRR(Xm : Xn $_{\sim}$  0)" in EXCEL functions. Xm: the starting year of the cash flow, Xn : the final year of the cash flow

Items 1	Items 2	item 3	Unit	Value	2006	2007	2008	2009	2010
FIRIA	Capex	LNG terminal	1000 US\$		0	0	354,179	0	0
•••	1	Gas pipeline to Luson	1000 US\$		28,507	26,082	26,552	27,029	33,768
		Power station	1000 US\$		480,177	166,947	407,884	276,817	15,499
		Power transmission	1000 US\$		24,009	8,347	20,394	13,841	775
		Working capital	1000 US\$	-1 1	110,843	88,778	30,490	55,729	39,415
		Total			643,536	290,154	839,500	373,416	89,457
	Opex	NG & LNG cost	1000 US\$		193,908	361,090	431,355	531,154	596,653
		LNG terminal	1000 US\$	-	10,350	10,358	10,367	21,305	21,323
	1	Gas pipeline	1000 US\$		6,459	7,673	8,795	9,939	11,106
		Power station	1000 US\$	-	48,466	83,607	95,916	125,869	146,290
		Power transmission	1000 US\$		2,524	4,357	5,004	6,571	7,645
		Sales cost & administration	1000 US\$	-	22,169	39,924	46,022	57,168	65,051
		Business tax	1000 US\$		2,217	3,992	4,602	5,717	6,505
	1	Value added tax	1000 US\$		20,831	37,046	41,287	51,050	58,759
		Coporate tax	1000 US\$		259	24,234	19,544	22,032	34,251
		Total	1000 US\$		307,182	572,281	662,891	830,805	947,583
	Income	Power sales	1000US\$		421,845	767,771	878,713	1,088,684	1,229,443
		Gas sales for small lot users	1000US\$		21,526	30,714	41,732	54,676	71,575
		Total	1000 US\$		443,371	798,484	920,445	1,143,359	1,301,018
	Benefit	Cash flow	1000 US\$		-507,346	-63,952	-581,946	-60,862	263,978
		FIRA	%	12.3%					
			1	$   M  _{\mathcal{C}}  _{\mathcal{C}}$					

 Table 4.36
 FIRR calculation block

# (4) DCR Calculation

.

**DCR** (Debt coverage ratio) is calculated as shown in the following table. The total principal loan contains long-term and short-term loans.

The capability of repayment is shown by the summation of capital surplus, interest payable, and repayment of long-term loans.

Capability of repayment = capital surplus + interest payable+ repayment of long-term loans

DCR means repayment capability(it is the present value) divided by total principal loans(it is the present value). Banks and International development facilities check DCR of the project. Usually DCR is expected a value more than 1.0.

Capability for loan repayment DCR = -----Principal loan

Items 1	Items 2	Item 3	Unit	Value	2006	2007	2006	2009	2010
DCR	Income	Sales	1000 US\$	T	443,371	796,484	920,445	1,143,359	1,301,018
1000000		Equity	1000 US\$		133,173	50,344	202,252	79,422	12,511
ana kanya i		Long term lown	1000 US\$		133,173	50,344	202,252	79,422	12,511
		Short term loen for W/C			110,843	88,778	30,490	55,729	39,415
		Total	1000 US\$		820,561	967,950	1,355,440	1,357,932	1,365,454
	10000000		1999 - Sec. 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1						
	Expenditure	Opex	1000 US\$		307,182	572,281	662,891	830,805	947,583
1999,000	an a	Interest	1000 US\$		79,568	94,734	127,054	141,315	142,001
daring bei	and the late	Equipment	1000 US\$		532,693	201,376	809,010	317,688	50,042
it who appear		Working capital	1000 US\$		110,843	66,778	30,490	55,729	39,415
41 - <u>19</u> - 19 - 19 - 19 - 19 - 19 - 19 - 19 -	Sections.	Repayment	1000 US\$		266,346	100,688	404,505	158,844	25,021
ia di si	( A Providence	Total	1000 US\$		1,296,632	1,057,858	2,033,950	1,504,380	1,204,062
11/10/07	5.68.2.2.63		3000000000						
Statistics of the	Coltal surp		1000 US\$		-476,071	-69,908	-678,510	-146,448	161,392
326			5057694743-1%						
	Capability of	Capital surplus(PV)	1000 US\$	843,320	-270,135	-35,417	-306,924	-59,148	58,200
	10.188-5842	Interest(PV)	1000 US\$	791,853	45,149	47,995	57,473	57,075	51,207
		Preparyment (PV)	1000 US\$	1,281,573	151,132	51,012	182,977	64,154	9,023
		Total(PV)	1000 US\$	1,230,106	73,854	63,590	-66,473	62,081	118,430
89605526					·				
	Principal Ic	xen(PV)	1000 US\$	640,787	75,566	25,506	91,489	32,077	4,511
Ver 1977 - 297	New Street Street	िविद्यां हैं। स्वीयक के स्वीय के स्वीय के स्वीय	1.5.1.5.5.1.1.6631						
a de la companya de l	DCR			1,9					
N. States	STATISTICS	The second second states and the	and the second states	2013. See 1992					

Table 4.37 Debt Coverage Ratio(DCR) table

## (5) EIRR Calculation

**Capex in EIRR** is calculated from capex in FIRR. Capex in FIRR is assumed that 60% of the investment is for importing machines and materials, on which are levied 5% customs. In the EIRR analysis, all taxes and customs are treated as income to the government. Therefore, 5% customs on imported machines and materials should be eliminated from the cost items of the sectors.

Table 4.38 EIRR calculation of pipeline sector

items 1	Items 2	item 3	Unit	Value	2006	2007	2008	2009	2010
arr	Сарех	LNG terminal	1000 US\$		0	0	0	0	Û
		- Import duty to 60% of investi	1000 US\$	60%	0	0	0	0	0
	1	Gas pipeline to Luson	1000 US\$		27,107	24,727	25,098	25,475	31,732
		- Import duty to 60% of Investi	1000 US\$	60%	-813	-742	-753	-764	-952
		Power station	1000 US\$		0	210,191	385,561	195,672	595,821
		- Import duty to 60% of investi	1000 US\$	60%	0	-6,306	11,567	-5,870	-17,875
		Power transmission	1000 US\$		0	10,510	19,278	9,784	29,791
		- Import duty to 60% of Invest	1000 US\$	60%	0	-315	-578	-294	-894
		Working capital	1000 US\$		2,731	1,634	16,335	27,886	16,847
		Total			29,024	239,699	433,374	251,889	654,471
	Opex	DNG cost	1000 US\$		69,166	75,910	153,789	235,695	311,174
	-	- others	1000 US\$	0%	0	0	0	0	0
		LNG import cost	1000 US\$		12,063	17,410	23,927	95,688	106,685
		- Import duty	1000 US\$	100%	-362	-522	-718	-2,871	-3,201
		LNG terminal	1000 US\$		9,861	9,867	9,874	9,881	9,888
		- Asset tax	1000 US\$	100%	-32	-32	-32	-32	-32
		Gas pipeline	1000 US\$	ii-	6,307	7,435	8,471	9,523	10,621
		- Asset tax	1000 US\$	100%	-15	-18	-20	-23	-25
		Power station	1000 US\$		13,366	13,379	28,731	56,908	71,258
		- Asset tax	1000 US\$	100%	-18	-18	-39	-78	-97
		Power transmission	1000 US\$	r i i i i i i i i i i i i i i i i i i i	695	697	1,496	2,964	3,714
		- Asset tax	1000 US\$	100%	-1	-1	-2	-4	-5
		Sales cost & administration	1000US\$		9,337	10,317	20,118	36,850	46,958
		Total	1000 US\$		120,366	134,424	245,594	444,502	556,938
	Income	Power sales	1000 US\$	<u> </u>	163,692	173,099	356,687	676,488	859,056
		- others	1000 US\$	0%	0	Û	0	0	Q
		Gas sales for gas users	1000 US\$		23,039	33,240	45,671	60,507	80,096
		- others	1000 US\$	0%	0	0	0	0	0
		Total	1000 US\$		186,731	206,339	402,357	736,995	939,153
	Benefit	Cash flow	1000 US\$		37,340	-167,784	-276,610	40,605	-272,255
		EIRR	%	22.8%					

Investment (FIRR) = Equipment investment (FIRR) + Working capital (FIRR) Investment (EIRR) = Equipment investment (FIRR)\*(0.6\*0.95+0.4) + Working capital(FIRR)

0.6: 60% of equipment investment is levied by customs tax

0.95: Decreased by 5% customs tax rate

0.4: 40% of equipment investment are procured in domestic markets.

**Opex in EIRR** is defined by subtracting property tax, business tax, withholding tax, value added tax, and corporate tax from opex in FIRR.

**Income** (Sales revenues) is natural gas sales value from non-power sector and power distribution companies.

Benefit of the sectors is expressed as "Income - Capex - Opex".

EIRR is calculated by "=IRR (Xm : Xn, 0) " in EXCEL functions.

Xm: the starting year of the cash flow, Xn: the ending year of the cash flow

### 4.10 Effects on Macro-Economic Indicators

#### (1) Effects on GDP

Ş

1

ALC: N

GDP between with-the project (LNG, pipeline and power sectors) and without-project are compared for analyzing effects on the Philippine economy

It is considered that nominal GDP is changed by creating value added from the projects.

GDP without-project

GDP forecast in Macro-economic model

GDP with-project

GDP+The total sales value of the projects - Import value of LNG

items 1	Items 2	item 3	Unit	Value	2006	2007	2006	2009	2010
Contant	Items	Operation	Unit	Value	2006	2007	2008	2009	2010
Without	Private con	sumption	Billion pesos		8,974	9,994	11,085	12,249	13,490
	Governmen	t consumption	Elilion pesos		1,622	1,810	2,009	2,222	2,450
	Gross fixed	formation	Billion pesos		2,477	2,765	3,069	3,394	3,744
	Exports		<b>Billon pesos</b>		6,712	7,479	8,297	9,170	10,102
	Imports		<b>Billion pesos</b>		7,165	7,964	8,857	9,789	10,784
	Stock		<b>Billion pesos</b>		-1,237	-1,355	-1,496	-1,645	-1,791
	GDP		Eillion pesos		11,383	12,709	14,107	15,601	17,211
With	Value adde	+GDP			11,383	12,709	14,107	15,601	17,211
		+Sales Value	Billion pesos		26	47	54	67	76
		-LNG imported	<b>Billion pesos</b>	{	6	6	7	12	16
		Net	Billion pesos		11,403	12,749	14,154	15,655	17,271
Changes	PV GDP w	thout	Billion pesos	139,272	6,459	6,439	6,381	6,301	6,206
<del>_</del>	PV GDE w	th .	Ellion pesos	139,644	6,470	6,459	6,403	6,323	6,228
	With / With	out on GDE	%	0.3	0.2	0.3	0.3	0.4	0.3

# Table 4.39 Effects on GDP

The additional GDP with-project accounts for only the additional value added from each sector in business as usual. If mentioned strictly, it has happened that some types of energy are not consumed due to the use of natural gas in residential and industry sectors. But, in the study, it is assumed that the un-used energies are consumed in new sectors or it is not imported.

#### (2) Effects on Government Revenues

The utilization of natural gas will bring tax income to the government budgets. The government revenue will increase in the following ways:

1

#### Government revenue without- project

Government revenue forecasted in the macro-economic model

#### Government revenue with-project

# <u>Government revenue + Tax revenue from project sectors</u> (Custom tax, property tax, corporate tax, business tax and VAT)

In the above expressions, royalty revenues from Camago/Malampaya natural gas project are excluded.

Items 1	items 2	item 3	Unit	Value	2006	2007	2008	2009	2010
Contant	Items	Operation	Unit	Value	2006	2007	2008	2009	2010
Without	Governmen	t revenue	Billion pesos		2,038	2,275	2,525	2,792	3,079
With	Governmen	t revenue	<b>Billion pesos</b>		2,040	2,280	2,530	2,798	3,086
Changes	Without gov	ernment revenue	Billion pesos	24,878	1,157	1,152	1,142	1,127	1,110
	With govern	iment revenue	Billion pesos	24,942	1,158	1,155	1,144	1,130	1,113
	With/ Witho	ut	*	0.3	0.1	0.2	0.2	0.2	0.2

### Table 4.40 Effects on Government Revenues

#### (3) Effects on un-employment rate

GDP of the Philippines will increase with introducing natural gas. When the labor productivity is constant, the number of employees will increase. As a result, the un-employment rate will decrease. Then, the following expressions are considered.

### Un-employment rate without-project

Forecast in the macro-economic model

### Un-employment rate with-project

Additional employee =additional VAT / labor productivity

1- (Number of employee + Additional employee ) / number of labor forces

Items 2	them 3	Unit	Value	2006	2007	2006	2009	2010
Home	Operation	Unit	Value	2006	2007	2008	2009	2010
Labor product	Mity	Million Peeo/		343	376	410	445	482
Number of La	bor Force	Million perso	1,026	37	37	38	38	39
Employees		Million perso	948	33	34	34	35	36
Unemploymen	t rate	%	8.2	10.3	10.0	9.9	9.8	9.6
Labor product	Mty	Million Peso/(		343	376	410	445	482
Number of La	bor Force	Millon persor	1,026	37	37	38	38	39
Employees		Million perso	950	33	34	35	35	36
Unemploymen	t rate	%	7.9	9.2	8.8	8.7	8.6	8.5
With - without	on unemployment	~~~	-0.3	-1,1	-12	.1.2	-1.2	-1.2
	Items Labor product Number of La Employees Labor product Number of La Employees Unemployees Unemployees Unemployees Unemploymen	Items         Operation           Labor productivity         Number of Labor Force           Employees	Items         Operation         Unit           Labor productivity         Million Peeo/s         Million persoi           Employees         Million persoi         Million persoi           Unemployment rate         %	Items         Operation         Unit         Value           Labor productivity         Million Peeo/         Million persor         1,026           Employees         Million persor         948           Unemployment rate         %         8.2           Labor productivity         Million Peeo/           Labor productivity         Million Peeo/           Number of Labor Force         Million persor           Labor productivity         Million persor           Unemployees         Million persor           1,025         Employees           Million persor         950           Unemployment rate         %	Items         Operation         Unit         Value         2006           Labor productivity         Million Peeo/         343         343           Number of Labor Force         Million persol         1,026         37           Employees         Million persol         948         33           Unemployment rate         %         8.2         10.3           Labor productivity         Million Peeo/         343           Number of Labor Force         Million persol         950           Employees         Million persol         343           Unemployment rate         %         7.9         9.2	Items         Operation         Unit         Value         2006         2007           Labor productivity         Million Peeo/         343         376           Number of Labor Force         Million perso         1,026         37         37           Employees         Million perso         948         33         34           Unemployment rate         %         8.2         10.3         10.0           Labor productivity         Million Peeo/         343         376           Number of Labor Force         Million Peeo/         343         376           Labor productivity         Million Peeo/         343         376           Labor productivity         Million Peeo/         343         376           Number of Labor Force         Million persor         1,026         37         37           Employees         Million persor         950         33         34           Unemployment rate         %         7.9         9.2         8.8	ItemsOperationUnitValue200620072008Labor productivityMillion Pesor343376410Number of Labor ForceMillion perso1,026373738EmployeesMillion perso948333434Unemployment rate%8.210.310.09.9Labor productivityMillion Pesor1,025373738Labor productivityMillion Pesor1,025373738EmployeesMillion perso950333435Unemployment rate%7.99.28.88.7	Items         Operation         Unit         Value         2006         2007         2008         2009           Labor productivity         Million Peeo/         343         376         410         445           Number of Labor Force         Million persol         1,026         37         37         38         38           Employees         Million persol         948         33         34         34         35           Unemployment rate         %         8.2         10.3         10.0         9.9         9.8           Labor productivity         Million persol         343         376         410         446           Number of Labor Force         Million persol         948         33         376         410         446           Number of Labor Force         Million persol         1,025         37         37         38         38           Employees         Million persol         950         33         34         35         35           Unemployment rate         %         7.9         9.2         8.8         8.7         8.6

# Table 4.41 Effects on government revenues and un-employment rate

---

4 1 . . .

# Appendix F

þ

5

# Economic Evaluation (Pay Back Period)

# For

# Absorption Chiller, Cogeneration

and Gas Heat Pump

# (1) Absorption Chiller

Economic Evaluation				Evaluation	Year 2010
Absorption Chiller ve	s. Turbo Chi	ller			,
()) ()				Absorption Tu	
(1) Conditions/Assun	nptions		an the	chiller chi	iller
<case> High</case>	Lan 8		<power price=""></power>		
<scenario>Gas Use &amp;</scenario>		tion	Source	Meralco Mode	
0 01	Hotel		Туре	Non industria	
Floor area			Facility peak load	441	636 kW
Operation	24	hr/day	Power charge	6.65	6.65 Peso/kWl
		day/year	<fuel gas="" price=""></fuel>	21.8	Peso/Nm
Avr. Load	20.5	kcal/m²/hr	<motor capacity=""></motor>	4	200 kW/unit
	68	RT	<gas consumption=""></gas>	163,000	• Nm <sup>3</sup> /year
Avr./Max.	0,301	•	<equipment cost=""></equipment>	6.3	5.7 Mill. Pes
< Chiller> Design load	68.0	kcal/m²/hr			
Capacity/unit	225				
No. of operation		unit			
No. of stand by	0	unit			
(2) Economic Analys					
	Absorption				
	chiller	chiller	<economic evaluati<="" td=""><td>on&gt;</td><td></td></economic>	on>	
<annual co<="" running="" td=""><td>st&gt; 1,000Pe</td><td>90</td><td>Pay-back period (N</td><td>ew facility)</td><td>0.9 years</td></annual>	st> 1,000Pe	90	Pay-back period (N	ew facility)	0.9 years
Variable cost	11 A.		Pay back period (R	eplacement	9.5 years
Fuel cost	3,553.8				-
Power cost	15,654.1	19,937.7			
Sub-total	19,207.9	19,937.7			
Fixed cost					
Depreciation	378.6	342.2	]		
Maintenance cost	189.3	171.1			
Interest	504.8	456,2			
Subtotal	1,072.7	969.5	]		
Total	20,280.6	20,907.2			

Economic Evaluation			· .	Evaluatio	n Year	2010
Absorption Chiller va	s. Turbo Chil	ller				-
				Absorption		
(1) Conditions/Assun	nptions	•		chiller	chiller	
<case> High</case>			<power price=""></power>	· · ·		_
<scenario>Gas Use &amp;</scenario>	Gas Promot	ion	Source	Meralco M	odel	]
<facility>Type</facility>	Hotel		Туре	Non indust	trial Servi	ce
Floor area	48,000	m <sup>2</sup>	Facility peak load	2,113	3,054	kW
Operation		hr/day	Power charge	6,65	6,65	Peso/kWh
	365	day/year	<fuel gas="" price=""></fuel>	21.8		Peso/Nm <sup>3</sup>
Avr. Load	20.5	kcal/m²/hr	<motor capacity=""></motor>	18	959	kW/unit
	325	RT	<gas consumption=""></gas>	782,399		Nm <sup>3</sup> /year
Avr./Max.	0.301	•	<equipment cost=""></equipment>	19.5	17.3	Mill. Peso
< Chiller> Design load	68,0	kcal/m²/hr				
Capacity/unit	1,079	RT				
No. of operation		unit				
No. of stand by	0	unit				
(2) Economic Analysi						
100 A.	Absorption '	Turbo-	4			
	chiller	chiller	<economic evaluati<="" td=""><td>on&gt;</td><td></td><td>_</td></economic>	on>		_
Annual running cos	st> 1,000Pes	10	Pay back period (N	ew facility)	0.7	years
Variable cost			Pay back period (R	eplacement	5.9	years
Fuel cost	17,058.2					-
Power cost	74,965.9	95,576.8				
Sub-total	92,024.1	95,576.8				
Fixed cost						
Depreciation	1,168.9	1,037.9				
Maintenance cost	584.4	518.9				
Interest	1,558.5	1,383.8				
Sub-total	3,311.8	2,940.6				
Total	95,335.9	98,517.4	<u> </u>			

F'-1

Economic Evaluation	(Air Conditioning)	···· · · · · · · · · · · · · · · · · ·	Evaluation Year	0010
Absorption Chiller vs	· · · · · •		Evaluation lear	2010
Absorption Chiller vs	, Turbo-Chiller		Absorption Turb	
(1) Conditions/Assum	ntiona		chiller chill	
<case> High</case>	ptions	<power price=""></power>	chiller chill	ler
<scenario>Gas Use &amp;</scenario>	Gas Promotion	Source	Meralco Model	j
	Hospital	Туре	Non industrial	Sorrison
		-		
Floor area		Facility peak load	523	732 kW
Operation	24 hr/day	Power charge	6.65	6.65 Peso/kWh
	364 day/year	<fuel gas="" price=""></fuel>	21.8	Peso/Nm <sup>3</sup>
Avr. Load	33.6 kcal/m²/hr	<motor capacity=""></motor>	5	213 kW/unit
	111 RT	<gas consumption=""></gas>	266.955	- Nm <sup>3</sup> /year
Avr./Max.	0.463	<equipment cost=""></equipment>	6.5	5.9 Mill, Peso
< Chiller> Design load	72.6 kcal/m <sup>2</sup> /hr	•••		
Capacity/unit	240 RT			
No. of operation	1 Junit			
No. of stand by	0 unit			
(2) Economic Analysi	18			
	Absorption Turbo			
	chiller chiller	<economic evaluati<="" td=""><td>ion&gt;</td><td></td></economic>	ion>	
Annual running cos	at> 1,000Peso	Pay-back period (N	lew facility)	0.6 years
Variable cost		Pay-back period (R	leplacement	5.8 years
Fuel cost	5,820.3			
Power cost	7,837.4 14,854.3			
_Sub-total	13,657.7 14,854.3			
Fixed cost		-		
Depreciation	392.7 354.5			
Maintenance cost	196.3 177.3	}		
Interest	523.5 472.7			
Subtotal	1,112.5 1,004.6			
Total	14,770.2 15,858.9	J		

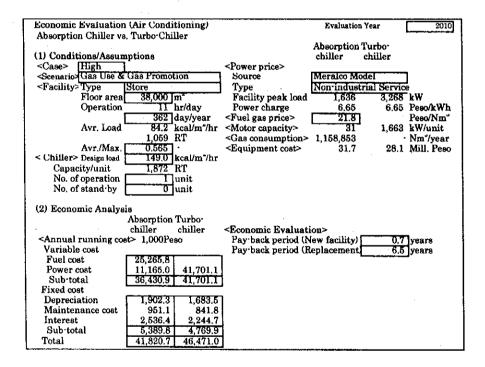
Economic Evaluation	ı <b>(Air Condi</b>	tioning)		Evaluation	Year	2010
Absorption Chiller vs	). Turbo Chi	ller	÷			[
				Absorption	Turbo-	
(1) Conditions/Assum	optiona			chiller	chiller	
<case> High</case>			<power price=""></power>		•	
<scenario>Gas Use &amp;</scenario>	Gas Promo	tion	Source	Meralco M	odel	·
<facility>Type</facility>	Hospital		Туре	Non-indust	rial Servic	e }
Floor area	45,000	m²	Facility peak load	2,352	3,293	kW .
Operation		hr/day	Power charge	6,65	6.65	Peso/kWh
	364	day/year	<fuel gas="" price=""></fuel>	21.8	1	Peso/Nm <sup>3</sup>
Avr. Load	33.6	kcal/m²/hr	<motor capacity=""></motor>	18	960	kW/unit
	500	RT	<gas consumption=""></gas>	1.201.296		Nm <sup>3</sup> /year
Avr./Max.	0.463	-	<equipment cost=""></equipment>	19.5		Mill, Peso
< Chiller> Design load	72.6	kcal/m <sup>2</sup> /hr				
Capacity/unit	1,080	RT				
No. of operation	i	unit				
No. of stand by	0	unit				
(2) Economic Analys	ia					
	Absorption					
	chiller	chiller	<economic evaluat<="" td=""><td>ion&gt;</td><td></td><td></td></economic>	ion>		
<annual cos<="" p="" running=""></annual>	st> 1,000Pe	80	Pay-back period (N	lew facility)	0.4	years
Variable cost			Pay back period (F	Replacement	3.7	years
Fuel cost	26,191.2					
Power cost	35,133.2					
Sub-total	61,324.5	66,779.2				
Fixed cost						
Depreciation	1,169.8	1,038.7				
Maintenance cost	584,9	519.3				1
Interest	1,559.7	1,384.9	1			
Sub-total	3,314.4	2,942.9				
Total	64,638.9	69,722.2				

Economic Evaluation	ı (Air' Cond	litioning)		Evaluation Yea	ar 2010
Absorption Chiller va	, Turbo Ch	iller			<b>F</b>
-				Absorption Turi	bo-
(1) Conditions/Assur	nptions			chiller chil	
<case> High</case>			<power price=""></power>		
<scenario>Gas Use &amp;</scenario>	Gas Prom	otion	Source	Meralco Model	
<facility>Type</facility>	Office Buil	ding	Туре	Non-industrial	Service
Floor area			Facility peak load	833	607 kW
Operation		hr/day	Power charge	6.65	6.65 Peso/kWh
Operation		•	0		
		day/year	<fuel gas="" price=""></fuel>	21.8	Peso/Nm <sup>3</sup>
Avr. Load	56.6	kcal/m²/hr	<motor capacity=""></motor>	17	291 kW/unit
	169	RT	<gas consumption=""></gas>	132,884	· Nm <sup>3</sup> /year
Avr./Max.	0.515	-	<equipment cost=""></equipment>	7.9	7.1 Mill. Peso
< Chiller> Design load	110.0	kcal/m <sup>2</sup> /hr			
Capacity/unit	327				
No. of operation	<u> </u>				
No. of stand by	0	unit			
	· · · · ·				
(2) Economic Analys	is				
	Absorption	Turbo-			
	chiller	chiller	<economic evaluati<="" td=""><td>ion&gt;</td><td></td></economic>	ion>	
<annual cos<="" running="" td=""><td>st&gt; 1,000P</td><td>eso</td><td>Pay-back period (N</td><td>lew facility)</td><td>2.1 years</td></annual>	st> 1,000P	eso	Pay-back period (N	lew facility)	2.1 years
Variable cost			Pay back period (R		21.0 years
Fuel cost	2,897.2			· -	
Power cost	2,158,3	5,519.3			
Sub-total	5,055.5	5,519.3			
Fixed cost					
Depreciation	473.4	425.6			
Maintenance cost	236.7	212.8			
Interest	631.2	567.5			
Sub total	1,341,3	1,205.9			
Total	6,396.8	6,725.3	· ·		

Economic Evaluation (Air Conditioning)	Evaluation Year 2010
Absorption Chiller vs. Turbo Chiller	
	Absorption Turbo
(1) Conditions/Assumptions	chiller chiller
<case> High</case>	<power price=""></power>
<scenario>Gas Use &amp; Gas Promotion</scenario>	Source Meralco Model
<facility>Type Office Building</facility>	Type Non industrial Service
Floor area 38,000 m <sup>*</sup>	Facility peak load 1,351 2,562 kW
Operation 11 hr/day	Power charge 6.65 6.65 Peso/kWh
261 day/year	<fuel gas="" price=""> 21.8 Peso/Nm<sup>*</sup></fuel>
Avr. Load 56,6 kcal/m*/hr	<motor capacity=""> 17 1,228 kW/unit</motor>
<u>712_</u> RT	<gas consumption=""> 561,064 · Nm<sup>*</sup>/year</gas>
Avr./Max. 0.515	<equipment cost=""> 24.2 21.4 Mill. Peso</equipment>
< Chiller> Design load 110.0 kcal/m*/hr	
Capacity/unit	
No. of operation I unit	
No. of stand by 0 unit	
(2) Economic Analysis	
(2) Economic Analysis Absorption Turbo	
chiller chiller	<economic evaluation=""></economic>
Annual running cost> 1,000Peso	Pay back period (New facility) 1.2 years
Variable cost	Pay back period (Replacement 10.4 years
Fuel cost 12.232.6	1 ay back period (deplacement 10.4 ) years
Power cost 8.120.2 22.975.0	
Sub-total 20,352.7 22,975.0	
Fixed cost	1
Depreciation 1,449.0 1,284.5	1
Maintenance cost 724.5 642.2	
Interest 1,932.0 1,712,7	
Sub-total 4,105.6 3,639.4	
Total 24,458.3 26,614.4	

F-3

Economic Evaluation (Air Conditioning	) Evaluation Year 2010
Absorption Chiller vs. Turbo Chiller	
	Absorption Turbo
(1) Conditions/Assumptions	chiller chiller
<case> [High]</case>	<power price=""></power>
<scenario>Gas Use &amp; Gas Promotion</scenario>	Source Meralco Model
<facility>Type Store</facility>	Type Non-industrial Service
Floor area 7,500 m <sup>*</sup>	Facility peak load 324 645 kW
Operation II hr/day	Power charge 6.65 6.65 Peso/kWh
362 day/year	
Avr. Load 84.2 kcal/m <sup>+</sup> /	
209 RT	<gas consumption=""> 228,721 · Nm<sup>*</sup>/year</gas>
Avr./Max. 0.565	<equipment cost=""> 8.5 7.7 Mill. Peso</equipment>
< Chiller> Design load 149.0 kcal/m <sup>*</sup> /	hr
Capacity/unit 370 RT	
No. of operation1 unit	
No. of stand by 0 unit	
(2) Economic Analysis	
Absorption Turbo	
chiller chiller	<economic evaluation=""></economic>
<annual cost="" running=""> 1,000Peso</annual>	Pay back period (New facility) 0.9 years
Variable cost	Pay back period (Replacement 9.1 years
Fuel cost 4,986.7	
Power cost 2,219.8 8,237.	
Sub-total 7,206.5 8,237.	
Fixed cost	
Depreciation 512.4 460.	
Maintenance cost 256.2 230.	
Interest 683.2 613	
Sub-total 1,451.8 1,303	
Total 8,658.3 9,540	9



Gas Price	21.8	Ps/Nm3	l I					
Case:	High							
Scenario:	Gaa Use & G	as Promotio	n				1	(2010 Base)
Pay-back	Hotel	10,000	Hotel	48,000	Hospital	10,000	Hospital	45,000
Period	Required Gas I	Price Ps/Nm3	Required Gas F	rice Ps/Nm3	Required Gas F	rice Ps/Nm3	Required Gas I	rice Ps/Nm3
(Year)	New	Replace	New	Replace	New	Replace	New	Replace
1	22.1	-12.8	23,2	1.1	23.6	1.5	24,3	9,9
2	24.0	6.5	24.6	13.6	24.8	13.8	25.2	18.0
3	24.6	13.0	25.1	17.7	25.2	17.9	25,5	20,7
4	24.9	16.2	25.3	19.8	25.4	19, <b>9</b>	25,7	22,1
Pay-back	Office Building	9,000	Office Building	38,000	Store	7,500	Store	38,000
Period	Required Gas	Price Ps/Nm3	Required Gas I	rice Ps/Nm3	Required Gas F	rice Ps/Nm3	Required Gas I	Price Pa/Nm3
(Year)	New	Replace	New	Replace	New	Replace	New	Replace
1	18.6	-34.7	21.1	-17.1	22.1	·11.4	22.9	•1.4
2	21.6	-5.1	23.5	4.4	24.0	7.2	24.4	12.3
3	22.6	4.8	24.3	11,6	24.6	13,4	25.0	16.9
4	23.1	9.8	24.7	15.2	24,9	16,6	25,2	19.2

Gas Price:		18.3	Ps/Nm3						
Case:	Low								
Scenario:	Gas Us	e & Ga	s Promotion						(2010 Base)
Pay back	Hotel		10,000	Hotel	48,000	Hospital	10,000	Hospital	45,000
Period	Require	ed Gas	Price Ps/Nm3	Required Gas I	rice Ps/Nm3	Required Gas	Price Ps/Nm3	Required Gas I	Price Pa/Nm3
(Year)	Ne	W	Replace	New	Replace	New	Replace	New	Replace
1	[	17.6	-14.2	18.4	-3.0	18.7	2.7	19.4	5.4
2		19.2	3,4	19,7	9.0	19.9	9,2	20.3	13,3
3		19.8	9.2	20.2	13.0	20.3	13,1	20,6	15.9
4		20.1	12.2	20.4	15.0	20.5	15.1	20.7	17.2
Pay back	Office B	uilding	9,000	Office Building	38,000	Store	7,500	Store	38,000
Period	Require	ed Gas	Price Ps/Nm3	Required Cas I	Price Ps/Nm3	Required Gas	Price Ps/Nm3	Required Gas I	Price Ps/Nm3
(Year)	Ne	W	Replace	New	Replace	New	Replace	New	Replace
1		14.1	-37.6	16.2	20.7	17.2	-15,2	18.0	-5.5
2	1	17.0	-8.9	18.6	0.1	19.1	2.8	19.5	7.8
3		17.9	0.7	19.4	7.1	1.9.7	8.9	20.0	12.2
4		18.4	5,5	19.8	10,5	20.0	11.9	20.3	14.4

# (2) Cogeneration

Economic Evaluation	10				· · ·	Evaluatio	- Y	8010	1
(Gas Engine Cogene	-		hallow CC	C)		Evaluated	a Year	2010	
		upply Elect			Chiller (	Sonr )			
(1) Conditions/Assur		пћија глест	ricity + Co	INCULIONA	I CHIEF (	лич./			
<case> High</case>	1 perona		Cononem	tion Mar	Efficiency>				
<scenario>Gas Use &amp;</scenario>	Close Prom	tion		Power	Sinclericy>				
<facility>Type</facility>	Hotel			Steam	28.0				
Floor Area		_9		Hot Water					
<pre><capacity></capacity></pre>	10,000			Total	80.0				
<no, of="" unit=""></no,>	130	A.11	<boiler ef<="" td=""><td></td><td>85.0</td><td></td><td></td><td></td><td></td></boiler>		85.0				
Stand by	ő		<power pr<="" td=""><td></td><td></td><td>Conv.</td><td></td><td></td><td></td></power>			Conv.			
<equipment cost=""></equipment>			Source	1	Meralco M				
CGS Unit Cost	0.043	Mill, Pa/kW				trial Servic	 %a		
Eq. Cost		Mill. Ps	Facility p	ook lood	130	536	-		
Others		Mill. Ps	Power ch		7.02		Peso/kWh		
Total		Mill. Ps		ng Conditi		0.01	1.000.011		
Absorption Chiller		Mill, Ps	Labor Co	•		Mill, Ps/O	nerator		
Conv. Chiller		Mill. Ps	No. of Op		0.5		PCIMUL		
H-water boiler (CGS		Mill, Ps	Deprecial			vears			
H-water boiler (Conv.)		Mill, Ps	Salvage \		10				
<pre><fuel> Gas Price</fuel></pre>		Ps/Nm <sup>3</sup>	Interest	unqu	8.0				
<ruel> Gas Price</ruel>	21.0	rsvinn	Maintena	neo cost		≫ Ps/kWh			
(2) Result			Maintene.		Calculatio		/veat)>		
<amount (·="" y)=""></amount>	CGS	Conv.	CGS Bene			CGS	-	CGS Bene	fit
Power Demand MWh	2,318	2,846	527	Power Ch	arge	2,1	19.8	17.6	1
CGS Power MWh	2,018	•	-2,018	CGS Fuel		12.5	-	-12.5	
Purchased Power MW	301	2,846	2,545	Boiler Fu	el	1.1	2.4	1.2	
Steam Demand Gcal	1,790	•	·1,790	Subtota	1	15.7	22.1	6.4	
H-water Demand Geal	1,003	1,003	0	Labor & I	nterest	1.0		-1,0	
CGS Steam Util'd Gca	1,301	-	-1,301	Maintena	nce	0.8	-	-0.8	
CGS H-water Util'd Gcal	1,003	-	-1,003	Sub-total		1.8	-	-1.8	
CGS Purged Gcal	72	-	-72	Total		17.6	22.1	4.5	
CGS Fuel Nm3/1,000	572	•	·572	Depreciat	ion	0.4		•0.4	
Boiler Fuel Nm3/1,000	53		55						-
<cgs operation=""></cgs>			at (Ps/kWh			c Evaluati			
Power Self-generated %		Variable		5.6		-	ew facility)		year
Heat Self supplied %		Fixed Cos		1.1	Pay-bacl	k period (R	eplacement	3.6	year
Heat Utilized %	97.0		-	6.7					
Operation time %		Purchase		7.0					
Average Load %		Average (		6.7					
<b>Operating Efficiency</b> 9		Conventi		6.9	]				
**Remarks H·w	ater/Hot W	ater, Utilz'e	l/Utilized,	CGS/Coger	peration Sy	stem, Conv	Conventio	onal Syster	n

				·				
Economic Evaluation	(Cogeners	tion)				Evaluation	n Year	2010
(Gas Engine Cogener		-						
		upply Elect	ricity + Co	nventions	l Chiller: (	lonv.)		
(1) Conditions/Assum	ptions							
<case> High</case>			<cogenera< td=""><td>tion Max.</td><td>Efficiency&gt;</td><td></td><td></td><td></td></cogenera<>	tion Max.	Efficiency>			
<scenario>Gas Use &amp; (</scenario>	Gas Promo	otion		Power	35.0	%		
<facility>Type I</facility>	lospital			Steam	28.0	%		
Floor Area	10,000	m2		Hot Water	17.0	%		
<capacity></capacity>	180	kW		Total	80.0	%		
<no, of="" unit=""></no,>	1		<boiler ef<="" td=""><td>ficiency&gt;</td><td>85.0</td><td>%</td><td></td><td></td></boiler>	ficiency>	85.0	%		
Stand by	0		<power pr<="" td=""><td>ice&gt;</td><td>CGS</td><td>Conv.</td><td></td><td></td></power>	ice>	CGS	Conv.		
<equipment cost=""></equipment>			Source		Meralco M	odel		
CGS Unit Cost	0.043	Mill, Ps/kW	Туре		Non-indus	trial Servic	e	
Eq. Cost	7.8	Mill, Ps	Facility p	eak load	91	488	kW	
Others	0.4	Mill, Ps	Power cha	arge	7,02	6.94	Peso/kWh	
Total	8.2	Mill, Ps	<accounti< td=""><td>ng Conditi</td><td>ons&gt;</td><td>**</td><td></td><td></td></accounti<>	ng Conditi	ons>	**		
Absorption Chiller	5.5	Mill, Ps	Labor Cos	st	0.20	Mill, Ps/Op	erator	
Conv. Chiller	5.0	Mill, Ps	No. of Op	erator	0.5			
H-water boiler (CGS	0.0	Mill. Ps	Depreciat	ion Year	14	years		
H-water boiler (Con	0.2	Mill, Ps	Salvage V	alue	10	%		
<fuel> Gas Price</fuel>	21.8	Ps/Nm <sup>3</sup>	Interest		8.0	%		
-			Maintena	nce cost	0.4	Ps/kWh		
(2) Result				<economi< td=""><td>Calculatio</td><td>n (Mill, Ps</td><td>year)&gt;</td><td></td></economi<>	Calculatio	n (Mill, Ps	year)>	
<amount (-="" y)="">.</amount>	CGS	Conv.	CGS Benei	<u>fit</u>		COS	Conv. C	GS Benefit
Power Demand MWh	1,148	2,016	869	Power Ch	arge	1.2	14.0	12.8
CGS Power MWh	982	•	-982	CGS Fuel		6.5	. •	·6.5
Purchased Power MW	165	2,016	1,851	Boiler Fu	el	5.2	1.3	-3.9
Steam Demand Gcal	2,952	•	·2,952	Sub-tots	1	12,8	15.3	2.5
H-water Demand Gcal	548	548	-	Labor & I		0.8	•	-0.8
CGS Steam Util'd Gca	751	•		Maintena		0.4	•	-0.4
CGS H-water Util'd Gcal	548	-		Sub tota	l	1.1	. •	-1,1
CGS Purged Gcal	0	-	0	Total		13.9	15,3	1.3
CGS Fuel Nm3/1,000	297	•	-297	Depreciat	ion	0.3	•	-0,3
Boiler Fuel Nm3/1,000	237	59	178					
<cgs operation=""></cgs>			st (Ps/kWh)	)>	<economi< td=""><td>c Evaluatio</td><td>- <a< td=""><td><u> </u></td></a<></td></economi<>	c Evaluatio	- <a< td=""><td><u> </u></td></a<>	<u> </u>
Power Self-generated %		Variable		10.5	Pay bac	r period (N	ew facility)	6.4 yea
Heat Self-supplied %		Fixed Coe		1,4	Pay bac	k period (Re	placement	10.2 yea
Heat Utilized %		Sub-tota	-	12.0	]	:	_	
Operation time %		Purchase		7,0				
Average Load %	65.6	Average	Cost	11.3	]		• •	
Operating Efficiency %	74.8		onal Cost	6.9	J			
**Remarks: H-wa	ter/Hot W	ater, Utilz'o	d/Utilized.	CGS/Coge	neration Sy	stem. Conv	/Convention	al System

.

Economic Evaluation	•		n.n	0		Evaluatio	on tear	2010
(Gas Engine Cogene					10111	· ·		
1		upply Elect	cricity + Co	onventions	l Chiller: C	:onv.)		
(1) Conditions/Assum	ptions							
<case> High</case>	~		-		Efficiency>			
<scenario>Gas Use &amp;</scenario>		otion		Power	35.0			
	Hospital	_		Steam	28.0			
Floor Area	45,000			Hot Water				
<capacity></capacity>	400	kW		Total	80,0			
<no. of="" unit=""></no.>	2		<boiler ef<="" td=""><td></td><td>85.0</td><td></td><td></td><td></td></boiler>		85.0			
Stand-by	0	-	<power pr<="" td=""><td>rice&gt;</td><td>CGS</td><td>Conv.</td><td></td><td></td></power>	rice>	CGS	Conv.		
<equipment cost=""></equipment>			Source		Meralco M	odel		
CGS Unit Cost	0.043	Mill, Ps/kW	Туре		Non·indus	trial Servi	œ.	
Eq. Cost	34.5	Mill, Ps	Facility p	eak load	418	2,192	kW	
Others	1.7	Mill. Ps	Power ch	arge	6.94	6.65	Peso/kWh	
Total	36,2	Mill, Ps	<accounti< td=""><td>ng Conditi</td><td>ons&gt;</td><td></td><td></td><td></td></accounti<>	ng Conditi	ons>			
Absorption Chiller	15.0	Mill. Pe	Labor Co	st	0,20	Mill, Ps/O	perator	
Conv. Chiller	13.3	Mill, Ps	No. of Op	erator	0.5			
H <sup>+</sup> water boiler (CGS	0.0	Mill, Ps	Depreciat	tion Year	14	years	•	
H-water boiler (Con	0.5	Mill. Ps	Salvage V	/alue	10	%		
<fuel> Gas Price</fuel>	21.8	Ps/Nm <sup>3</sup>	Interest		8.0	%		
			Maintena	ince cost		Ps/kWh		
(2) Result				<economic< td=""><td>Calculatio</td><td></td><td>/veaz)&gt;</td><td></td></economic<>	Calculatio		/veaz)>	
<amount (-="" y)=""></amount>	CGS	Conv.	CGS Bene	fit		CGS	Conv.	CGS Benef
Power Demand MWh	5,155	9,059	3,904	Power Ch	arge	5,3	60.2	54.9
CGS Power MWh	4,392	•	•4,392	CGS Fuel		28.9	) -	-28.9
Purchased Power MW	764	9,059	8,296	Boiler Fu	el	23.3	5.8	-17.5
Steam Demand Gcal	13,289	•	13,289	Subtota	1	57,5	66.0	8.5
H-water Demand Gcal	2,464	2,464	0	Labor & I	nterest	3.0	) .	-3.0
CGS Steam Util'd Gca	3,354	•	-3,354	Maintena	nce	1.8	; .	-1.8
CGS II-water Util'd Gcal	2,464	•	2,464	Sub-total		4.8	; .	-4.8
CGS Purged Gcal	0	· •	0	Total		62.3	66.0	3.7
CGS Fuel Nm3/1,000	1,328		-1,328	Depreciat	ion	1,2		1.2
Boiler Fuel Nm3/1,000	1,068	265	-803					
<cgs operation=""></cgs>		<power co<="" td=""><td>st (Ps/kWh</td><td>&gt; .</td><td><economi< td=""><td>c Evaluati</td><td>ion&gt;</td><td></td></economi<></td></power>	st (Ps/kWh	> .	<economi< td=""><td>c Evaluati</td><td>ion&gt;</td><td></td></economi<>	c Evaluati	ion>	
Power Self-generated %	85.2	Variable	Cost	10.6	Pay-bacl	s period (N	lew facility)	10.1
Heat Self-supplied %	36.9	Fixed Cos	st	1.3	Pay bacl	period (R	eplacemen	13.8
Heat Utilized %	100.0	Sub-tota	1 .	11.9	-	-	-	·
Operation time %	100.0	Purchase	d Power C	6.9				
Average Load %	66.0	Average	Cost	11.2				
Operating Efficiency 9		Conventi		6.6				
**Remarks: H-wa					onation Du	tom Con	. 10	

F-7

Economic	Evaluation	(Cogener	ation)				Evaluatio	n Year	2010
			haorption (	hiller: CG	S) vs.			1	
			upply Elect			l Chiller: (	Conv.)		
(1) Condit	ions/Assun	nptions		•					
<case></case>	High			<cogenera< td=""><td>tion Max.</td><td>Efficiency&gt;</td><td></td><td></td><td></td></cogenera<>	tion Max.	Efficiency>			
<scenario></scenario>	Gas Use &	Gas Prom	otion	-	Power	35.0	%		
<facility></facility>	Туре	Office Buil	iding	•	Steam	28.0	%		
	Floor Area	60,000			Hot Water	17.0	%		
<capacity< td=""><td>&gt;</td><td>700</td><td>kW</td><td></td><td>Total</td><td>80.0</td><td>%</td><td></td><td></td></capacity<>	>	700	kW		Total	80.0	%		
<no. of="" td="" u<=""><td></td><td>2</td><td></td><td><boiler ef<="" td=""><td>ficiency&gt;</td><td>85.0</td><td>%</td><td></td><td></td></boiler></td></no.>		2		<boiler ef<="" td=""><td>ficiency&gt;</td><td>85.0</td><td>%</td><td></td><td></td></boiler>	ficiency>	85.0	%		
	Stand-by	0		<power pr<="" td=""><td>rice&gt;</td><td>CGS</td><td>Conv.</td><td></td><td></td></power>	rice>	CGS	Conv.		
<equipme< td=""><td>ent Cost&gt;</td><td></td><td>•</td><td>Source</td><td></td><td>Meralco M</td><td>odel</td><td></td><td></td></equipme<>	ent Cost>		•	Source		Meralco M	odel		
CGS	Unit Cost	0.043	Mill, Ps/kW	Type		Non-indus	trial Servio	æ	
	Eq. Cost	60.4	Mill, Ps	Facility p	eak load	1,474	4,121	kΨ	
	Others	3,0	Mill, Ps	Power cha	arge	6.94	6.65	Peso/kWh	
	Total	63.4	МШ, Ря	<accounti< td=""><td>ng Conditi</td><td>ons&gt;</td><td></td><td>-</td><td></td></accounti<>	ng Conditi	ons>		-	
Absorptio	on Chiller	17.7	Mill, Ps	Labor Cos	st	0.20	Mill, Ps/O	perator	
Conv. Ch	iller	15.7	Mill. Ps	No. of Op	erator	0.5			
H water	boiler (CGS	0.0	Mill, Ps	Depreciat	ion Year	14	years		
H water	boiler (Con	0.1	Mill. Ps	Salvage V	alue	10	%		
<fuel></fuel>	Gas Price	21.8	Ps/Nm <sup>3</sup>	Interest		8.0	%		
			•	Maintena			Ps/kWh		
(2) Result						c Calculatio	on (Mill. Ps		
<amount< td=""><td></td><td>CGS</td><td></td><td>CGS Benei</td><td></td><td></td><td>CGS</td><td>Conv.</td><td>CGS Benefit</td></amount<>		CGS		CGS Benei			CGS	Conv.	CGS Benefit
	mand MWh	10,811	-		Power Ch	-	28.4		
CGS Pow		6,727			CGS Fue		42.8		-42.8
Purchase	l Power MW	.,			Boiler Fu		16.5		
	mand Gcal	11,081			Sub-tota		87.7		
,	Demand Gca	1	•	-	Labor & l		5.2		-5.2
• • • • • • • • • •	m Util'd Ges	1 .		-,	Maintens		2.7		-2.7
	er Util d Gcal			0		l	7.9		•7.9
CGS Pun	•	4,027			Total		95.6		
	Nm3/1,000	1,965			Depreciat	tion	2.0	) · · · ·	-2.0
	el Nm3/1,00	757							
-	eration>			st (Ps/kWh			ic Evaluati		
	generated %		Variable		8.8		•	lew facility	1 F
	supplied %		Fixed Co		1.5	1 7	k period (R	eplacemen	• <u>-39.6</u> y
Heat Uti		50.1		_	10.3	-			
Operation			B Purchase						
Average	Load %	57.3	Average	Cost	9.0	l			
	g Efficiency	73.1	da o	onal Cost	6.6	4			

Gas Price:		21.8	Ps/Nm3	ł							
Case:	Hi		1011000								
Scenario:	Gas	Use & Gas	Promotion							(	2010 Base)
Payback	Ho	tel	10,000	Hotel	48,000	Hospital	10,000	Hospital	45,000	Office Buildi	60,000
Period	Re	quired Gas	Price Ps/Nm3	Required Gas I	Price Ps/Nm3	Required Gas	Price Ps/Nm3	Required Gas F	rice Ps/Nm3	Required Gas P	rice Ps/Nm3
(Year)		New	Replace	New	Replace	New	Replace	New	Replace	New	Replace
	1	7.5	·0.7	6.3	2.3	6.7	•4.2	6.0	-0,5	-2.9	-8,7
	2	19.0	14.9	17.7	15.7	15.7	10.2	14.8	11.5	9.1	6,2
	3	22,9	20.1	21.5	20,2	18.6	15.0	17.7	15.5	13.1	11.1
	4	24.8	22.7	23.5	22.4	20.1	17.4	19.2	17.5	15.1	13.6

Gas Price: Case: Scenario:	Low Gas Us	18.3 e & Gas	Ps/Nm3 Promotion								(2010 Base)
Pay back	Hotel		10,000	Hotel	48,000	Hospital	10,000	Hospital	45,000	Office Build	li 60,000
Period	Requi	red Gas I	Price Ps/Nm3	Required Gas	Price Ps/Nm3	Required Gas	Price Ps/Nm3	Required Gas	Price Ps/Nm3	Required Gas	Price Pa/Nm3
(Year)	New		Replace	New	Replace	New	Replace	New	Replace	New	Replace
	1	1.8	6,1	0.9	·3.0	2.2	-8,4	1.7	-4.6	-6,7	-12.3
} :	2	13.0	9.0	12.0	10.0	10.9	5.6	10.2	7.1	5.0	2.2
:	3	16.7	14.1	15.7	14.4	13.8	10.2	13.0	11.0	8.8	7.0
	4	18.6	16.6	17.5	16.5	15.2	12.6	14.5	12.9	10.8	9.4

# (3) GHP (Gas Heat Pump)

Economic Evaluation (Air Conditionin GHP vs. Package	ng)	Evaluation Year	2010
GHP vs. Package (1) Conditions/Assumptions <case> [High <scenario:] &="" gas="" promotion<br="" use=""><facility> Type Office Building Floor area 1,000 m<sup>2</sup> Operation 11 hr/day 261 day/ye</facility></scenario:]></case>	<power price=""> Source Type Facility peak load Power charge</power>	GHP Package Meralco Model Non-industrial Servic 1 35 78 7.09 7.02 21.8	
Avr. Ibau 30.0 Kcabn 19 RT Avr. Max. 0.515 <chiller> Design load 110.0 kcabn Capacity/unit 36 RT No. of operation 1 unit No. of stand by 0 unit</chiller>	<gas consumption<br=""><equipment cost=""></equipment></gas>	> 49,216 •	Nm <sup>3</sup> /year Mill. Peso
<annual cost="" running=""> 1,000Peso Variable cost       Fuel cost     1,073.0       Power cost     367.6       Sub-total     1,440.7       Fixed cost</annual>	kage <economic evalua<br="">Pay-back period ( Pay-back period ( [5.9]</economic>	(New facility) 1.1	years years
Maintenance cost49.7Interest132.4Sub-total281.4	29.3 78.2 36.1 32.0	New         Replace           3         4.0         9.4           5         12.6         29.8	
Economic Evaluation (Air Conditioni GHP vs. Package	ng)	Evaluation Year	2010
(1) Conditions/Assumptions <case> High <scenario &="" gas="" promotion<="" td="" use=""><td><power price=""></power></td><td>GHP Package Meralco Model</td><td>]</td></scenario></case>	<power price=""></power>	GHP Package Meralco Model	]

(1) Conditions/Assur	nptions			GHP	Package
<case> High</case>			<power price=""></power>		-
<scenario>Gas Use &amp;</scenario>	Gas Prom	otion	Source	Meralco Mo	del
<facility> Type</facility>	Restauran		Туре	Non-indust	rial Service
Floor area	1,100	m²	Facility peak load	243	306 kW
Operation	12	hr/day	Power charge	6,65	6.65 Peso/kWh
	292	day/year	<fuel gas="" price=""></fuel>	21.8	Peso/Nm <sup>3</sup>
Avr. Load	84.2	kcal/m²/hr	<motor capacity=""></motor>	· ·	64 kW/unit
	31	RT	<gas consumption=""></gas>	98,396	- Nm <sup>3</sup> /year
Avr./Max.	0.565	] •	<equipment cost=""></equipment>	2.4	1.4 Mill, Peso
<chiller> Design load</chiller>	149.0	kcal/m²/hr			
Capacity/unit	54	RT			
No. of operation	1	unit			
No. of stand by		unit			
•					
(2) Economic Analys	is				
(2) Economic Analys	is GHP		<economic evaluati<="" td=""><td>on&gt;</td><td></td></economic>	on>	
(2) Economic Analys	GHP	Package			-0.8 vears
	GHP	Package	<economic evaluati<br="">Pay back period (N Pay back period (R</economic>	ew facility)	0.8 years
<annual cos<="" running="" td=""><td>GHP</td><td>Package</td><td>Pay back period (N</td><td>ew facility)</td><td></td></annual>	GHP	Package	Pay back period (N	ew facility)	
<annual co<br="" running="">Variable cost</annual>	GHP st> 1,000P	Package	Pay back period (N	ew facility)	
<annual cos<br="" running="">Variable cost Fuel cost</annual>	GHP st> 1,000P	Package eso	Pay back period (N	ew facility)	
<annual coo<br="" running="">Variable cost Fuel cost Power cost</annual>	GHP st> 1,000P 2,145.3 1,382.4	Package e80 2,428.3	Pay back period (N	ew facility)	
<annual co<br="" running="">Variable cost Fuel cost Power cost Sub-total</annual>	GHP st> 1,000P 2,145.3 1,382.4	Package e80 2,428.3	Pay back period (N	ew facility)	
<annual cost<br="" running="">Variable cost Fuel cost Power cost Sub-total Fixed cost</annual>	GHP st> 1,000P 2,145.3 1,382.4 3,527.7	Package e80 2,428.3 2,428.3	Pay back period (N	ew facility)	
<annual cos<br="" running="">Variable cost Fuel cost Power cost Sub-total Fixed cost Depreciation</annual>	GHP st> 1,000P 2,145.3 1,382.4 3,527.7 143.3	Package eso 2,428.3 2,428.3 83.8	Pay back period (N	ew facility)	
<annual coc<br="" running="">Variable cost Fuel cost Power cost Sub-total Fixed cost Depreciation Maintenance cost</annual>	GHP st> 1,000P 2,145.3 1,382.4 3,527.7 143.3 71.6	Package eso 2,428.3 2,428.3 83.8 41.9	Pay back period (N	ew facility)	

Economic Evaluation	(Air Conditioning)	·····	Evaluation	Year 2010
GHP vs. Package	(in conditioning)		Standtion	
(1) Conditions/Assum	ptions		GHP	Package
<case> High</case>	-	<power price=""></power>		
<scenario>Gas Use &amp;</scenario>		Source	Meralco Mo	lel
<facility> Type</facility>	Store	Туре	Non-industr	ial Service
Floor area	1,000 m <sup>2</sup>	Facility peak load	42	100 kW
Operation	11 hr/day	Power charge	7.02	7.02 Peso/kWh
· · [	362 day/year	<fuel gas="" price=""></fuel>	21.8	Peso/Nm <sup>3</sup>
Avr. Load	84.2 kcal/m²/hr	Motor capacity>	•	58 kW/unit
	28 RT	<gas consumption=""></gas>	101,654	· Nm <sup>3</sup> /year
Avr./Max.	0.565	<equipment cost=""></equipment>	2.2	1.3 Mill. Peso
<chiller> Design load</chiller>	149.0 kcal/m <sup>2</sup> /h			
Capacity/unit	49 RT			
No. of operation	1 Junit			
No. of stand by	0 unit			
(2) Economic Analysi	8			
	GHP Package	< - Economic Evaluat	ion>	1
<annual cos<="" running="" td=""><td>arres researchs</td><td>Pay-back period ()</td><td></td><td>0.8 veara</td></annual>	arres researchs	Pay-back period ()		0.8 veara
Variable cost	1,0001000	Pay back period (F		·1.9 years
Fuel cost	2,216,3	]		
Power cost	288.6 1,429.0			
Sub-total	2,504.9 1,429.0	]		
Fixed cost				
Depreciation	131,1 76.9		Pay Bac	
Maintenance cost	65.6 38.4		New	Replace
Interest	174.8 102.5		5 5.6	13.1
Sub total	371.5 217.8		6 20.6	
Total	2,876.4 1,646.8	1		

Gas Price:	21.8	Ps/Nm3	]			
Case:	High					
Scenario	Gas Use & Ga	s Promotion				(2010 Base)
Pay-back	Restaurant	1,100	Office Building	1,000	Store	1,000
Period	Required Gas l	Price Ps/Nm3	Required Gas H	rice Ps/Nm3	Required Gas I	rice Ps/Nm3
(Year)	New	Replace	New	Replace	New	Replace
1.0	0.5	-14.7	-4.2	-24.0	1.3	11.3
2.0	4.5	-2.6	2.7	-7.2	5.8	-0.5
3.0	6.2	1.4	5.0	-1.6	7.3	3.1
4.0	7.0	3.5	6.2	1.2	8.0	4.9

Gas Price:	18.3	Ps/Nm3	1			
Case:	Low					
Scenario:	Gas Use & Ga	s Promotion	j			(2010 Base)
Pay back	Restaurant	1,100	Office Building	1,000	Store	1,000
Period	Required Gas 1	Price Ps/Nm3	Required Gas I	Price Ps/Nm3	Required Gas	Price Ps/Nm3
(Year)	New	Replace	New	Replace	New	Replace
1	•0.2	-13.9	•3.7	·22.9	1.7	-10.5
2	4.7	-2.2	3.0	-6.6	6.0	-0.1
3	6.3	1.7	5.2	-1.2	7.4	3.3
4	7.1	3.7	6.3	1.5	8.1	5.1

•

.

· ·

# Appendix G

# LNG System Configuration

# And

# **Construction Schedule**

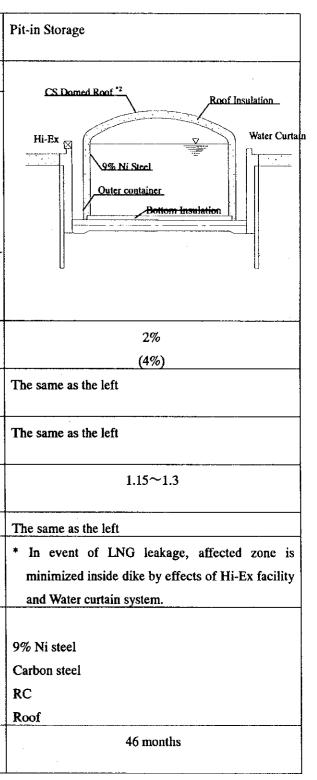
	······································	1	1
	Aboveground Storage	Aboveground Storage	Inground Storage
ITEMS	Double Shell Metal Type	Integral Type of Outer Container and PC Dike	
1.Sketch of Construction	CS Damed Roof <sup>*2</sup> Roof Insulation Water Curtain CS Damed Roof <sup>*2</sup> Roof Insulation Water Curtain Hi-Ex Bottom Insulation Foundation Pile	CS Domed Roof "Roof Insulation PC wall 9% Ni Steel Inner Liner Place Bottom Insulation PC Bottom S Roof Insulation	lab Insulation Material Side Heater.
2.Installation *1	50%	16%	25%
Experience	(24%)	(39%)	(31%)
3.Design	Well established with respect to design, field work and inspection procedures	The same as the left	Subject to soil condition
4.Operation & Maintenance	Good operability and maintainability	The same as the left	Inferior operability and maintainability
5.Construction Cost Index	1.05	1.0	1.1~1.25
6.Appearance	_	-	Less coercive appearance
7.Safety Aspect	* In event of LNG leakage, affected zone is minimized inside dike by effects of Hi-Ex facility and Water curtain system.	<ul> <li>* Extremely small affected zone even in event of LNG leakage of slight possibility.</li> <li>* Effective for protection against flying object.</li> </ul>	* Low possibility of LNG flooding onto the ground
8.Specification			
Inner Shell	9% Ni steel	9% Ni steel	Membrane
Outer Container	Carbon steel	Carbon steel	RC, Carbon steel (roof)
Dike	PC	PC	Not required
Nozzle Location	Side and roof	Roof	Roof
9.Construction Period	38 months	36 months	41 months

# Appendix A Comparison of LNG Storage Type (140,000kl Capacity Case)

\*1 Total 314 Units(as of August 2001, including projects under construction) Another type 6% (Since 1990, 3%)

.

\*2 Suspended Deck Type Roof is appeared.



G-1

.

Appendix B		ree LNG Vaporiser Types	
	ORV	STV	SMV
General	<ol> <li>Stable heat exchange.</li> <li>For base load.</li> </ol>	<ol> <li>For base load.</li> <li>Excellent in the heat transfer characteristic of the heat medium.</li> </ol>	<ol> <li>High heat changing performance.</li> <li>Low NOx.</li> <li>As a countermeasure against peak gas demand.</li> <li>Great pressure loss due to heat transfer tubes with multi-step bends</li> </ol>
Con-struct ion	1. Module construction permits capacity increase in application.	1. Comparatively small size.	1. Possible to make the size smaller in application. (because of its high heat exchanging performance).
Operabilit y	<ol> <li>Easy to operate (due to simple construction)</li> <li>Rapid start/stop possible.</li> </ol>	<ol> <li>Easy to operate</li> <li>Starting speed restricted a little.</li> </ol>	<ol> <li>Easy to operate</li> <li>Water quality control needed.</li> </ol>
Main-tena nce	<ol> <li>Easy maintenance (due to simple construction)</li> <li>Panel appearance check is allowed even while running.</li> <li>No maintenance is required for tube inner.</li> </ol>	<ol> <li>Sea water tube is corrosion free, because of its high corrosion resistance. (But periodic cleaning is needed.)</li> </ol>	1. Used as a temporary countermeasure against peak gas demand. Hence, less running hours and simple functional check only.
Cost	<ol> <li>Construction cost: Middle level (smaller capacity type cheaper than STV)</li> <li>Maintenance cost: Low</li> <li>Running cost: Middle level</li> </ol>	<ol> <li>Construction cost: Low</li> <li>Maintenance cost: Middle level</li> <li>Running cost: Middle level</li> </ol>	<ol> <li>Construction cost: Middle level</li> <li>Maintenance cost: Middle level</li> <li>Running cost: High</li> </ol>
Required installatio n area (for 150t/h)	Vaporiser + piping : 630m <sup>2</sup> Maintenance area : 220m <sup>2</sup> Total : 850m <sup>2</sup> (New type ORV See *1) Vaporiser + piping : 380m <sup>2</sup> Maintenance area : 150m <sup>2</sup>	Vaporiser + piping 315m <sup>2</sup> Maintenance area 315m <sup>2</sup> Total 630m <sup>2</sup>	Vaporiser + piping 260m <sup>2</sup> Maintenance area 130m <sup>2</sup> Total 30m <sup>2</sup> 490m <sup>2</sup>

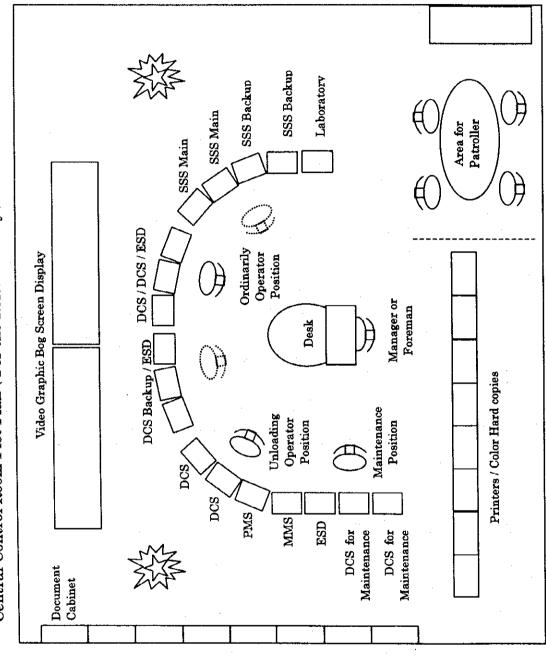
\*1: This is a space-saving, new type of ORV developed which improves the heat transfer characteristic of the conventional ORV and reduces the required sea water quantity, lowers equipment and running costs, and has a compact construction. (Developed in 1996).

Appendix	C C	omparison of Compressor Types	
		RECIPROCATING	CENTRIFUGAL
Capa-	Perfor-	1. Pressure does not depend	1. Pressure varies
city	mance	so much on air rate, but	depending on air rate, bu
		rises when the discharge	pressure rise is limited
		pipe is throttled. Hence, a	even when air blow is
		safety device is needed.	shut off.
		2. Pressure rise is hardly	2. Pressure rises in
		affected by the kind and	proportion to specific
		composition of fluid gas.	gravity of gas.
•		3. No surging	3. Surging
		4. Suited to small volume.	4. Suited to large volume.
	Efficiency	1. Good	1. High loss in impeller and
			passage due to high flow
			velocity. Efficiency drop
			with increase in stage
			number.
Const-	Required	1. Large (in case of 15t/h →	1. Medium installation
ruction	installati	approx. 330m <sup>2</sup> )	space is enough, due to
	on space		compactness.
			(In case of 15t/h, $\rightarrow$
			approx. 260m <sup>2</sup> )
	Drive	1. Because of its low	1. Because of its high
		revolutions, the compressor	revolutions, the
		must be direct-coupled to a	compressor must be dire
		synchronous motor with	coupled to an induction
		many poles or otherwise be	motor or otherwise
		equipped with a speed	equipped with speed
		reducer.	increaser (increasing
		2. Motor capacity $\rightarrow$ medium	gear).
		class	2. Motor capacity $\rightarrow$ large
		(in case of 15t/h $\rightarrow$ 2700kw)	(in case of15t/h→4000kV
	Pulsation,	1. Discharged gas pulsates.	1. Discharged gas is
	vibration		pulsation free, with less
			vibration.
	Receiver	1. Needed.	1. Not needed.

G-4

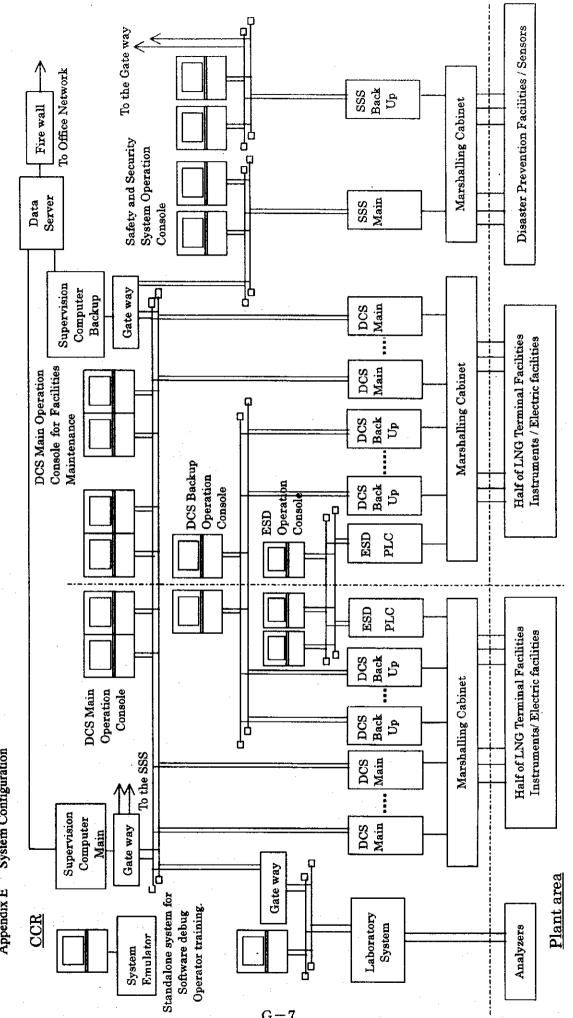
		RECIPROCATING	CENTRIFUGAL
Const <sup>.</sup> ruction	Others	1. Many mechanical contact parts. Wear in these portions causes reduced efficiency.	<ol> <li>No contact parts, except the bearing units. No reduced efficiency due to wear.</li> <li>Comparatively simple construction.</li> </ol>
Operabilit	y	<ol> <li>Quick start (starts up in approx. 2 minutes.)</li> <li>Capacity adjustable range → 5-stepped adjust (0 ~100%)</li> </ol>	<ol> <li>Bypass start (starts up in approx. 15 minutes)</li> <li>Capacity adjustable range → stepless (0~100%)</li> <li>Narrow operating range</li> <li>High running noise</li> </ol>
Maintenar	ice	1. Remarkable wear in piston ring, subject to periodic replacement.	1. Fewer wearable parts, almost no maintenance.
Economy	Initial cost	1. High	1. Medium (Almost the same level, if accessory piping cost is included.)
	Running Cost	1. Low power cost (due to high efficiency)	1. Power cost … high (Large capacity type: approximate to
		2. Other costs (lubricant, consumables, personnel, etc.) high	RECIPRO) 2. Others (lubricant, consumables, personnel, etc.) low

G-5



Central Control Room Plot Plan (For the Reference only)

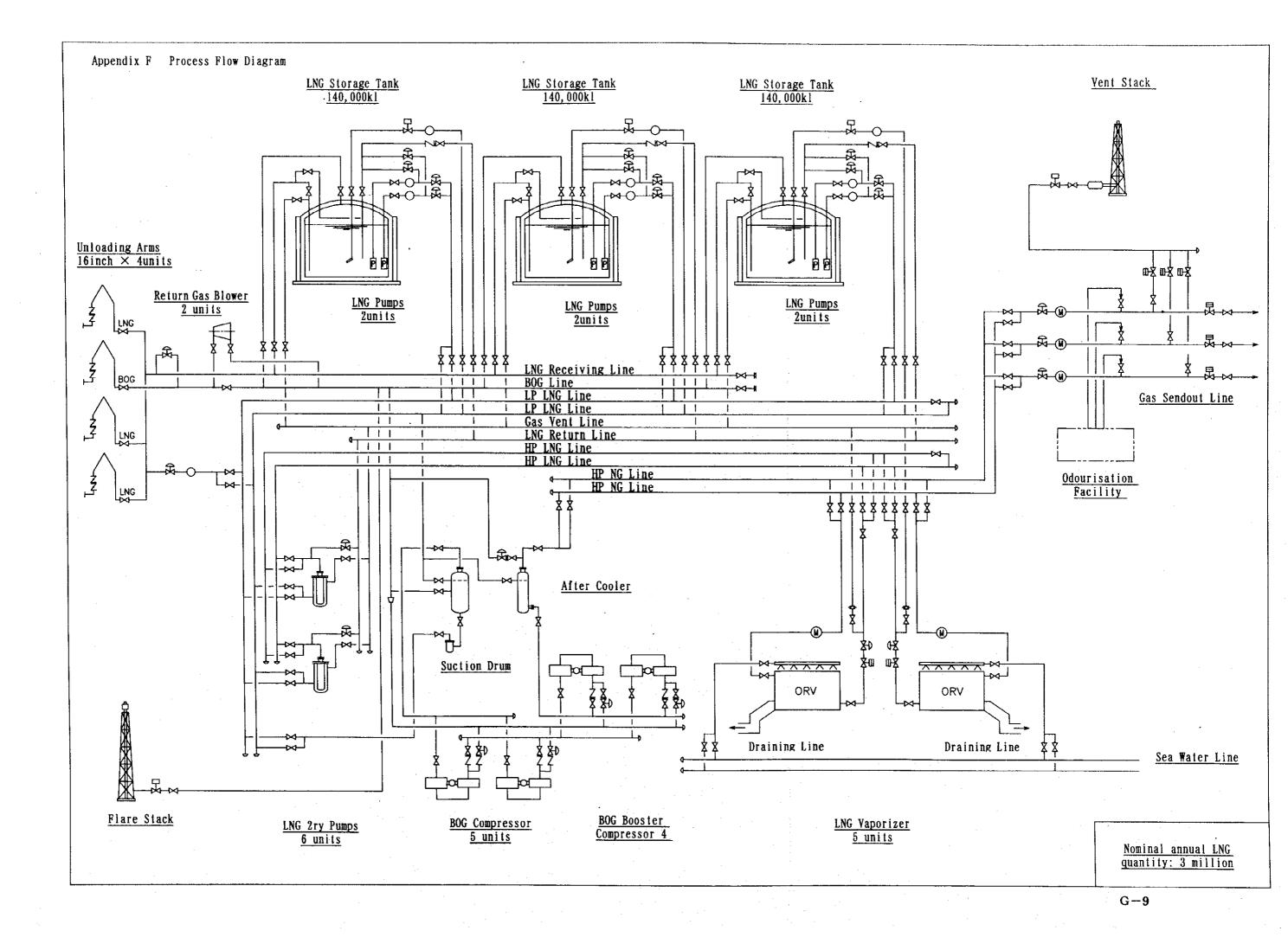
Appendix D



Appendix E System Configuration

1

G-7



# Appendix G Construction Schedule

						st		_	_				I						nd			_				L		_				yea			,		,			, _ ,				yea								5tl	h ye	əar			<b>.</b>		
	1	2	3	4	б	6	1					-		4	2	3	4	5	6	1	8	9	10	11	1 1	2	1 2		1 4	5	6	1	8	ġ	10	11	12	l	2	3	4	5	6	1	8	9							3 4			41	8	9	
Administrative measure	H								me				Ŷ.													c	ons	tiu	tion	36	nor	ths																.NG					nths				-		
Construction work		-		_						-	╀	╈	╞	Ŧ	T	-	-	-		_	-	F	F	-	Ŧ	ł	F	+	+	F	-					F	F	-	-	$\square$		-		F	-			$\left  \right $	Ŧ	╇	┽	+	┿	╀	╀	+		+	
1. Order, Authorization and Permission						Qr	der	7																																																			
1) Basic Design, Order										ĺ																						ĺ																											
2) Detail Design									1.0	Ι.	Ι.,		Î	-																																													
3) Application of Authorization			_					L.		Ļ	1		+	-1									.	-	+	╀	-	+	-	-	-	-		<u> </u>		-	ļ	-				_		-		_	-	ļ	+	+	+	+	_	_	┿	-		_	•
2. Civil Work and Building												ion:		icti	ioh		0.1		Ira	na	e)																Ga	e/F	enc						Gre	en	Be	. It											
1) Road, Drainage Construction									;	Ē	F	Ι															,   f   i			ati		In ía	en		Bu	4	L DZ	Ē	Γ				ſ	F				Γ	7										
2) Office, Control Center Building											ľ		Ţ		ĺ		Se		ter	In	t a k					ľ		F	a i (na	<b>—</b>		T		[				Ļ	Fa		tie Z	s/F	ixi	lure															
3) Seawater Intake, Drainage Const.									bri				Ī												Ì		1	97 -	a ijna		 	1 T					L	L_							L	L													
3. Berth Facilities																																			ļ																								
1) Berth/Dolphin Construction							P	re f	br	i ca	tii	12	ŧ	+	-		<u>isti</u>	-																																									
2) Jetty/Bridge								F	et	<b>b</b>	c	<b>•</b>	n	f	Cal	ns tj	ruc	tioj	<u>ի</u> —	1	ttı	1											ĺ																										
3) Berth Facilities																						Ł				+	i Ili I	tik:														P.	e in	ițin L_	<u>ŧ</u> 1														
4. LNG Storage Tank																	F	100	ati							_		-	June																							Ţ	T						
1) Civil Work									'	la i	eri 		Ŧ	1	1	-			I	1	<b>F</b> .			P	d											ŀ					Ta	• •	Ļ																
2) Mechanical Work													4				iita 1	eri	<b>a</b> 1	-		<u>+</u> _			<u>.</u>	0	ule	r t		<u>.</u>	1	1	nine I	t	unk r	[ 	<u> </u>	<u> </u>		1	Tei						F	n i le	1	f		<u>d</u> /	믜						
3) Insulation						ļ																																				1	F	<u>Fins</u> i	<u>      </u>		n] 		-   P	ain	tin	E							
5. Mechanical Facilities									Γ		T		T												Τ	T				Ţ								Γ							<u> </u>				T			Τ		Ţ			Ţ	Ţ	
1) Civil Work													ŧ			F	DUN	lat	on	;8u !		ing	1			s	ieaw	1 1e	, li r fi	1ci	iti	. 																									Ì		
2) Installment									-		1	1	nlo	Puse	. 1	ork	•				-		+	E		Ŧ	T	Ę											U	t Te	t V			150	u i p	er	1	[#51	t   ۹	ž									
6. Pipe																	E.		dat																		Γ																						
1) Rack, Foundation						ļ						1	ľ					-		<u>four</u> j	1	T													ļ					ļ																			
2) Rack, Assembling						Ì		ł	ļ										<u> </u>	L. T		<u> </u>	<u></u> _	T	-1	. <u> </u> T	 	╡		ŀ		C	unst.	-	lio		ork	,	ļ					Į					1.00						ļ				
3) Low-temperature Pipe					ľ					┝	┽	┦	-		1.	ta	hou	ie -	Por	<u>k</u>	┝	┿	-	+	╉	╉	-	Ť	T	1	1	T	†	Ì.	T-	<b></b>	<u> </u>	T <sup></sup>	F	1		i	1	<u>,</u> 1	qui I	ati 1	<u>eh</u> T	ľ	7	╪	Sta	er (							
4) NG、Utilities Pipe						l	1							•			,			Ļ	1	Late	<u>e ( i i</u>	4		_	$\downarrow$	ł	<u> </u>	1	<u> </u>		n st	duc.	tio	ni 🖡	ork	<u> </u>	1_																				
7. Electric/Instrument Work	Τ					Γ		T	T	T	Ţ			• •				[			Γ					T		T		T	Τ	Ī						Γ	T											T					Τ				
1) Building, Pipe Work																	L	L				+		1		1	1	4										ŀ		1					ļ										Ì				
2) Facilties/Wiring												ł	1	De	si	EU L	 			ļ		1111	teri					4		:+	<u> </u>	1	<u>_</u>	<u> </u>	<u> </u>			ter ye	et i (	on 1	rk		 	1	equ r					¥									
8. Operation Starting	T	T	T	T	T		I	Ť	1	t	1	-†	Ţ						T	İ	ł		Ť			1		1	+	1	T	T	1					ſ	T		Γ	<b>_</b>	T		Ť	T	Ţ	1		1	1	1	1	1	1			Ť	
1) LNG Receiving Starting																		ļ																																ł	Rete		ing Ink (	c/þ					
2) Trial Run									1								ļ									I											ľ						00	Nri	tio	<u>n 1</u>		inir	ng		Ē	Ţ	est						



G-11

. .

.

·

	L				_	1s	t ye	ear			_		L				_2	nd	ye	ar	<u> </u>		<del></del>	_					3rd	<u>1 y</u>	ear					┢	<b>.</b>			4	ith.	yea	I <b>r</b>						<u>5t</u>	th y	1
	1	2	3	4	4	5 (	5 7			10	- í	<u> </u>	<b>.</b>	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4 !	5 1	5 7	7 8	8 9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	_	_		3 4	
Administrative measure	F								1200	onth	<u></u>	1	Ŷ																	ļ					ĺ.												Ŀ			aivin	п
					1	load	<b>i þ</b> r	nd D	r <u>ai</u>	nage	WO	rks			1									ļ						1	C	orst	truc	tiòr	n wa	orks	3	36mc	hth	\$						ļ		4	mor	nths	
Construction works													-			r	T		!	ц	<u></u>	, 					-1			Ť		Ţ				Ť.			1		Ţ										
Average		1.1								ļ						1			ĺ																																
umber of workers	1																6			~	+	-	-	₊	+	+						_  _		-	<b> </b> _		0			~		0	0	ام	~	~	ا م		0 10		.
									Ĩ		ji T	Ŭ,	4	20	480	20	28	65	59	56	50	56	47	È	5	<b>8</b>	22	25						ß	53	59	59	82	48	48	4	350	36	37	44	<b>4</b> 0	Ñ,	<u>ڳ</u>	Ĩ ₽	105	
700			<u> </u>																														_								<u> </u>										
	-						1									1									1												ļ									1		Ì	İ		
650	ļ							_							-	+		8	<b> </b>			<u> </u>	$\left  - \right $						+				_			-	-	-	+		-				_		-			_ _	-
			-			1												$\langle \rangle$	Ĺ															1				1													
600			+-	╞		+	1	+	-	+	+	╞	╞	+	+	-	1	+	┝		-	$\vdash$		╡					+	+		9	H•	+	+	+	-	$\square$	1-	+	+					+				+	$\dagger$
550																					►	ł								$\mathbf{H}$		1							Y												
550					T		•								1	T	Τ	Γ		Τ								•																							
500		_	- <u> </u>	-	+	_	-	_		-	1-		-			4		-	<u> </u>	-	╞	<u> </u> _'		_		_	$\square$		-	+	_	-			_	-	1.				-										-
•														K	¥								V	◀															•										ĺ		
450	-	┼		+-		+	+	╉	╉		┼	+	╢	+	-	┢	+-	+	-	┼	╞	+	$\left  \right $	ľ		┨		+	+	╉	+	┢	+	┢	+-	+-	+	+		+	┞						-	-+-			╉
400																										┛│					ļ								1		X				$\langle \rangle$						
400	T	-		Ť	1		1	1			1	1	1	+	-	1		+	1	-	T	+	1							1		1	-	+	+-	1	1	+			1	K		Z		T	1	+	╈		t
350													L		<u> </u>				<u> </u> _														_	_	1	_		_			1										
												ĺ				ļ																														N					
300				+						-		+	┢			+	+		-	-				_		-		-	_	-				+	-	+	+	-								- \					-
· .													l		ļ																			ļ						1											
250				-		-+	-		-				<b>f</b> ]	+	-+	+	+	+-	1-	+	+	1.														~†	+	+	-	+	╞	<u>†</u>					ł	+			+
200																																															<u> </u>				
200											Į																							ļ													N				
150				_	_	4	-		_	┝┿	4	4	4	+					-	-	_	-							_						-				+	+-	_						_				
· · · · ·						1					ł									ĺ																															
100	1	+	+	╈	-	-	-		-		+-		╋	+	╞	┢	+	+	1	┼	+-	-	┢						-+	-ŀ	-				-	╋		┾		+-	+						ť	•+	-	7	<u>د</u>
50		ļ			ļ	ĺ					ļ																					1				1												ļ			
50	ſ													-		1																					1				T										
0.	Ļ	-	-	_			_	_	_	_	_		4			-			-	-	-								$\downarrow$	4		_			_					-		-	-	-		╞┈┤	-		_	$\downarrow$	_
				ł										1																													1								
		Ì																																																	
					_								1	i	1				1	1		ļ		1		Ļ	ι	Ļ			1		ļ	1		1				1		1	Į	ţ	L	1		L			

### Appendix H Required Construction Workers for an LNG Receiving Terminal



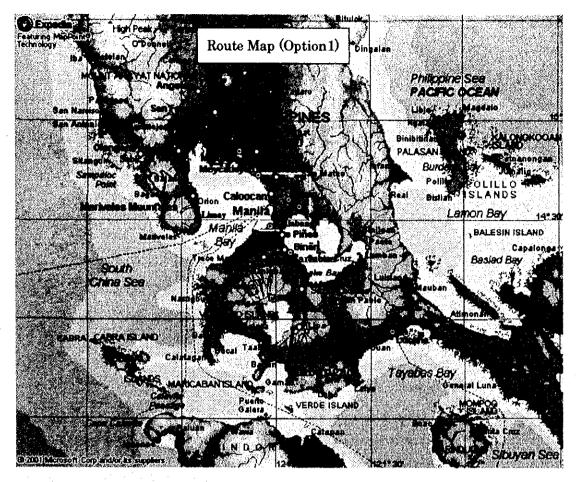
•

# Appendix H

## Gas Pipeline Route Map

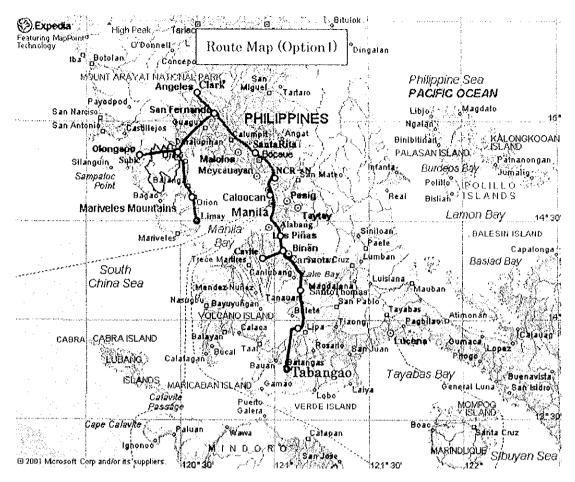
## and

## Gas Distribution Plan



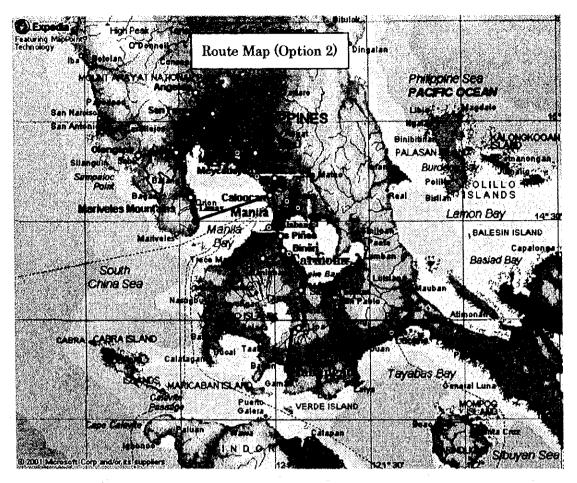
Outline of Transmission Pipeline

From	То	Length	Pipe Diam	eter (Inch)
		(m)	High Case	Low Case
Tabangao	Santo Thomas	50,000	16	12
Santo Thomas	Carmona	24,000	16	12
Carmona	Alabang	11,000	16	12
Alabang	NCR-N	· 44,000	12	8
Alabang	Subic	5,000	12	12
Carmona	Cavite	14,500	6	6
NCR-N	Santa Rita	25,000	12	12
Santa Rita	San Fernando	28,000	16	12
San Fernando	Dinalupihan	35,000	16	12
Dinalupihan	Limay	41,300	16	12
San Fernando	Clark	20,000	6	6
Dinalupihan	Subic	25,000	6	6



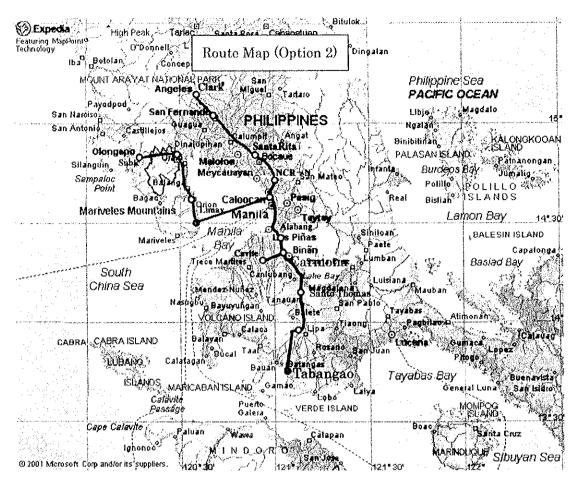
Outline	of Ti	ransmission	Pi	peline
---------	-------	-------------	----	--------

From	То	Length	Pipe Diam	eter (Inch)
		(m)	High Case	Low Case
Tabangao	Santo Thomas	50,000	16	12
Santo Thomas	Carmona	24,000	16	12
Carmona	Alabang	11,000	16	12
Alabang	NCR-N	• 44,000	12	8
Alabang	Subic	5,000	12	12
Carmona	Cavite	14,500	6	6
NCR-N	Santa Rita	25,000	12	12
Santa Rita	San Fernando	28,000	16	12
San Fernando	Dinalupihan	35,000	16	12
Dinalupihan	Limay	41,300	16	12
San Fernando	Clark	20,000	6	6
Dinalupihan	Subic	25,000	6	6



**Outline of transmission Pipeline** 

From	То	Length	Pipe Diam	eter (Inch)
· · · ·		(m)	High Case	Low Case
Tabangao	Santo Thomas	50,000	16	12
Santo Thomas	Carmona	24,000	16	12
Carmona	Alabang	11,000	16	12
Alabang	NCR-N	44,000	12	8
Alabang	Subic	5,000	12	8
Carmona	Cavite	14,500	6	6
Manila	Limay	38,000	12	12
NCR-N	Santa Rita	25,000	12	6
Santa Rita	San Fernando	28,000	12	6
San Fernando	Clark	20,000	6	6
Limay	Subic	66,300	6	6



Outline of transmission Pipelir	ıe
---------------------------------	----

From	То	Length	Pipe Diame	eter (Inch)
		(m)	High Case	Low Case
Tabangao	Santo Thomas	50,000	16	12
Santo Thomas	Carmona	24,000	16	12
Carmona	Alabang	11,000	16	12
Alabang	NCR-N	44,000	12	8
Alabang	Subic	5,000	12	8
Carmona	Cavite	14,500	6	6
Manila	Limay	38,000	12	12
NCR-N	Santa Rita	25,000	12	6
Santa Rita	San Fernando	28,000	12	6
San Fernando	Clark	20,000	6	6
Limay	Subic	66,300	6	6

lemand of Nat	uri pu		2000	2001	2002	2003	2004	2005	2006	2007	2803	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	20:9	2020	2021	2022	2023	2024	2
	Total		12.189	4.524	3.670	5,045	5,406	£149	10,455	15,306	\$2,972	151,321	161,723	176,006	193,043	296,199	219,818	231.917	249,783	256,021	282,892	300,338	318,301	335,855	353,739	372,052	390,809	409,6
	Tabangan	Nan3/h							0				0	0	1990 1990 1990				0	1.11. 0	0 . C	•	0	0	0		0	
	2 Lina City	Nalia																	0		0	٥	٥	0	0	0	0	
	3 Santo Tomas	Nm3/h	412	LSI	148	200	113	314	356	567	6,770	7,336	7,619	8,044	12,308	13,261	13,729	14,213	14,753	15,311	15,56	36,481	17,095	17,686	18,285	18.907	19.539	30
										1.1		1.082	10.000	1,177	2,28	1,763	3,137	3.585	4,086	4,603	5,136	5,987		6304	7,363		3,522	
	4 Cabayac	Nm3/h	410	167	137	135	197	291	367	536	<u>8</u>	1000	1,465	<u> </u>		1,/03	اقىرد			•,•0			، <u>تعرف</u>				••••	
	5 Carmona	Nm37a	0				0	0	6				0													16 898	** ***	
	6 Alabang	NmJA	1,305	471	301	517	565	857	1,104	1,625	2,195	3,467	4,501	6,124	7,6%	\$912	10,101	11,902	13,405	15,967	17,189	19,073		22,912	24,847		22,159	
	7 Bacoor	Nm3/A	0		Û	0	0	0	0		0	•	0	0	0	0	0	0	0	0	0		0	0	0	0		
	8 Pasay	Nm3/h	0	- 0	0	0	0	Û	0	0	0	•	0	0	0	0	0	0	0	0	0	0	0	. 0		0	0	
	9 Marih	Nm3/h	3,920	1,417	1,145	1,584	1,699	2,5%	3,317	4,88).	6,565	10,416	14,03	18,399	22,514		31,122	35,757					63,157	6,1%	74,649		¥,699	
	10 North NCR	Nm¥h	4,687	1,695	1,369	1,254	2,031	3,080	3,966	5,836	7,850	11,455	17,246	22,000	26,921	32,916	37,291	42,755	48,875	55,203	61,747	<b>61,</b> 514	75,518	82,347	59,258		103,667	110
	11 Cavite	Nm3/h	<b>41</b> 7	183	150	202	<u>35</u>	318	401	574	760	<b>1,18</b> 1	1,619	1,049	2,492	2,950	3,634	3913	4,460	5,024	5,607	6,208	6,830	7,427	8,037	3,662	9,302	
	12 Sucat	Nash	396	162	133	· 179	191	282	355	508	57,098	113,8%	114,284	1]4,564	115,057	115,463	115,582	116,316	116,200	117,300	117,815	1 <b>11,349</b>	118,899	119,627	119,968	129,522	121,086	121
_	13 Santa Rita	NmM	304	129	107	144	153	225	226	412	548	854	1,173	1,489	1,813	2,150	2,498	2,259	3,362	3,678	4,109	4,554	5,014	5,458	5,913	6379	6,856	
	14 San Fernande	Nm3/h	202	86	72	96	303	150	190	274	364	569	781	<u> </u>	1, <b>10</b> 7	1,431	1,663	1,903	2,171	2,448	2,734	3,030	3,336	3,632	3,935	4,45	4,562	
	15 Clark	Nm3/h	9	3	3	4		6	7	10	14	21	29	37	45	54		72	82	92	103	114	125	751	148	160	172	
	16 Dinakpikan	Nasta	0		Û	0	0	0	0	0	0	Û	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	
	17 Orian	Nm3/h	0		0	Q	6	0	0	0	C	0	0	<u> </u>	Û	· 0	0	0	0	9	0	0	Ģ	0	0	0	9	ļ
_	18 Liney	Nm37h	65	17	13	31	33	48	61	88	116	182	250	316	386	457	531	608	694	782	\$74	969	1,066	1,161	1,258	1,357	1,458	
	19 Subic	NmVh	4	1	1	2	1	3	4	5	7	11	в	19	IJ	27	પ્ર	36	41	"	51	57	ស	a	74	- 30	*	
									:	1																		

### Actual Demand (Area L: High Case / Option 1)

.

H-3

	/ Option 2		İ İ																	2017	2018	2019	2020	2021	2022	2023	2024
nd of Nap	naj ŝaz		2900	2001	2002	2003	2004	2005	2006	2007	2008	2009	2016	2011				2015	2016								
	Total		35,692	44,759	49,961	31,813	54,105	56,665	65,085	192,966	202,561	212,686	223,227	236,732	247,321	258,273	269,763	281,818	294,469	307,748	321,686	401,350	416,707	431,019	445,971	461,593	477,916
	1 Tabangao	Nm375	0	0	0	0	•	0	Ó	0	0	•	0	•	0	0	0	0	0	8	* <b>¢</b>	0	. 0	0	0	0	0
	2 Lips City	Rm3/h	0	0	0	0	O	0	. 0	D	0	•	0	0	0	0	0	0	0	0	9	0	0		0	0	
	3 Secto Tomas	Ra3h	442	131	145	300	213	314	396	567	6,770	100 - 1, <b>326</b>	7,09	3,044	11,908	13 261	13,729	14,213	14,753	15,311	15,896	16,481	17,995	17,686	18,289	12,907	19,539
	4 Caluyao	Nm3/h	410	167	137	125	197	291	367	526	696	1,082	1,423	1,877	1,203	1,703	3,137	3.585	4,086	4,603	5,136	5,687	6,257	6,304	7,363	7,936	8,522
	5 Canzona	Nm3/b		Û	0	0	0	0	. 0	0		12 - 12 <b>.</b>	0	1993 - 19 1	анан С	a	0	0	0	8	1	0	÷ 0	· 0	· 0	0	0
	6 Alabang	No.3/b	1.305	472	381	527	565	857	1,104	1.625	2.185	3.467	4,301	6.124	7,494	1,911	10,381	11,902	13,605	15,367	17,189	19,073	21,622	22,912	24,847	26,828	28,258
	ABacor	Na3/5		0	0										5 2 2 9			0	0	0		•		. 0	0	0	0
					¥	0												6	â		5	0	8			. 0	•
	8 Pasay	Nm3/h	0	0			U	-					1.11	1000		26.775	31,138	35.757	40.875	46,167	51,640	57,301	63.157	er.	74,549	<b>30,601</b>	36,699
	9 Macila	Nation	3,920	1,417		1,584	1,699	1,5%	3,317	4,881	6,565	10,416	1	11,399	23,514	1.1.1.1					61,747	81.516					103,667
	10 North NCR	Na3/b	4,687	1,695	1,369	1, <b>894</b>	2,03]	3,080	3,966	5,836	7,850	12,455		22,000				43,755	Sec. 1	55,203		1					
	11 Cavite	Na:34	447	183	150	202	215	318	401	574	760	<b>1,18</b> 1	1,619	2,049	1,612	1,950	5,424	3,913	4,460	5,024	5,607	6,308	6230	7,427			
	12 Sucel	Nm3th	396	163	133	179	191	282	355	508	57,008	113,896	114,284	114;664	115,057	115.463	115,90	116,316	116,000	117,300	117,815	112,548	111,299	119,017	119,968	720,522	111,088
	18 Linney	No:3/h	65	27	u z	31	33	4	61		116	192	250	316	386	457	.531	608	<u>6</u> 4	714	874	<u>\$69</u>	1,065	1,101	1,258	1,357	1,458
	13 Santa Rita	Nm34	344	129	107	144	153	225	226	412	54	854	Լ173	1, <b>48</b>	1,813	2,150	2,498	2,859	3,262	3,678	4,109	4,554	5,014	5,458	5,913	6379	6,856
	4 San Fernando	ManMa	292	86	72	×	102	150	190	274	364	569	781	. 590	1,207	1,431	1,663	1,903	2,171	2,448	2,734	3,030	3,336	3,632	3,935	4,245	4,562
1	15 Clark	Nm3/h	8	3	3	4	4	6	7	10	14	2]	29	37	45	54	63	72	22	92	103	114	125	137	248	160	172
1	16 Dinalupihan	Natio	0	0	· •	•	0	C	0	0	6	0			0	0	.0	0	0	C	C		0	0	0	. 0	
	7Orian	Nm3/A		0	0	a	•	٥	0	0	0	e			0	0	0	0	0	0	c		0	Ð	· · ·	D	
	19 Subic	Nm3/h			1	,	1	1		5	9	11	ь	19	23	27	31	36	41	46	51	57	63		74	30	*
		1.44.74	1																								
				··· ·· ··· ··· ··· ··· ··· ··· ··· ···						Actu	al Dem	and												···· ·····	·········	·	
	la na siy			·····			· · · · · ·	L				(a) 14													· •••••		

### Actual Demand (Area L: High Case / Option 2)

Low Case / Option 1	1														<u> </u>								<u> </u>				
lement of Natural gas		2000	2001	2002	2003	2004	2005	2006	2107	2904	2009	2010	2011	2012	2013	2014	2015	2016	2017	2013	2019	2025	2021	2022	2023	2024	+
Total		12,189	10,490	4,757	5,777	5,912	<b>4</b> 073	7247	<b>1,4</b> 53	15777	17,121	18,506	25,140	140,482	141,169	146,063	)49,1 <b>82</b>	152,636	150,331	160,285	161,743	169,534	176,304	183,209	190,647	192,676	207,3
i Teòangae	Nusta	0	D	0	0	0	0	Û	•	0	0	Ó		6	0	0	0	•	0	C	•		0	· •	•	0	<b>_</b>
2 Lipe City	Man37a	0	٥	0	0	0	0	0	•		0	9		0	0	0	0		0		0	•	0	î .		0	ļ
3 Santo Temas	Maila	442	405	189	227	231	237	277	319	6,383	6,429	6,477	10,884	10.972	11,966	11,167	11,2%	11,07	11,525	11,662	11,817	11,994	12,214	12,450	12,703	11,9%	i
4 Caboyao	Nm3A	410	376	175	210	314	219	257	295	337	380	435	<b>.</b>	591	<b>~</b>	762	100 - 100 100 - <b>120</b>	975	1,094	1,221	1,364	1,525	1,732	1,951	2,136	2,639	
5 Carmona	Handh		c	٥	9	C	0						•	•		0	0	•	200 <b>.</b>				•	. 8		0	
t Alabang	Nan37h	1.305	1.104	497	605	ഞ	637	763	83	1.033	117	1.327	1.574	1.502	2.130	2.441	1,776	3367	3,544	3,969	4,40	5,002	5,095	6,440	7,243	8,109	
7 Baccor	Nm3/h			0	0											8			6						0	. 0	Γ
	Nm3%	a		0	0		0			Self.														0	6		
1 Pasay	1					0			•								ji en je				34 4/4		17,110	19349	11,763	: 24,363	1 2
9 Mania	Maa Ma	<u>3,929</u>	3,318	1,492	1,518	1,861	1,913	2,293	1,983	3,115	3,539	3,987	4,730	5,533	6,399	7,333	8,339	9,651	10,648	11,925	13,366	15,039					t
10 North NCR	Madh	4,687	3,967	1,784	2,173	2,226	1,288	2,742	3,208	3,712	4,232	4,767	5,656	6,616		8,763	<u>9,971</u>		12,752		15,982	17,970	20,459		26,020	29,137	1
11 Cavite	Neist	447	4)0	191	229	234	240		322	341	412	43	546		730		<b>9</b> 6	1,064	1,194	1,333	1,489	1,669	· 1,991	2,130	2,386	2,663	
12 Sucet	Maath	396	363	169	203	207	212	- 248	205	326	34	410	ି 🛋	113,412	113,696	113,507	110 <b>/98</b> 5	113,792	113,908	114,031	114,169	114,328	114,525	114,736	114,963	115,208	11
13 Santa Rita	Nm37h	304	285	136	161	166	171	202	233	268	303	339	400	- 44	556	ព្	<b>6%</b>	74		983	1,099	1,233	1,396	153	1,767	1,973	_
14 San Temanako	N10376	203	190	90	108	ա	114	134	155	178	202	226	266	310	317	407	40	522		64	731	<b>82</b> 0	530	1,641	1,1%	1,313	
L5 Clark	Hat	3	7	3	4	4	4	5	6	7	8	8	10	11	a	ى	17	28	22	25	21	31	35	39	4		<b> </b>
le Dinakgihan	NaX	Q	0	0	0	0	0	ð.	0	o	0	0	0	•	0	0	чараў. 1910 — О	9	•	0	6	0	¢	1	0	0	ļ
17 Orion	Hm3h	a	C	0	0	0	0	o	Q	0	D	0	٥	0	0	0	0	0		0		. 0	. 8	Û	. 0	0	1
برمغا (1	NaaYa	65	61	29	35	35	36	43	50	57	64	'n	2	5 9	114	130	1. 1 <b>4</b>	<b>367</b>	187	209	234	362	297	335	3%	-20	
19 Subic	Nm3h	4	4	2	1	2	1	3	3	3	4	4	5		7	8	9	10	u	11	14	Ġ	17	20	22	25	
		1			-		-						:				:										

### Actual Demand (Area L: Low Case / Option 1)

nand of Natural	gu		2000	2001	2002	2003	2004	2005	2006	2907	2004	2009	2010	2011	2012	2013	2014	2015	2016	2017	2813	2019	2020	2021	2022	2023	2024	
	Total		35,692	48,759	49,961	51,813	54,105	54,665	65,085	192,966	202,561	212,686	mm	236,732	247,321	251,273	269,763	281,818	294,469	307,748	321.686	401,350	416,707	431,019	445,971	461,593	477,916	49
	Tadangao	Na3ħ	0	٥	٥	0	0	0	. <b>Q</b>		đ	0	0		0	0			4. A		0	0	0	0	. 0	0		
	Liza City	Na3b		0	0	0	0	0	0	0	•	Ø	9	,	C			0	0		. 0	·	9	0	0	0	0	ĺ
	Santo Tomas	Nm3/h	447	405	1269	127	291	237	177	319	6,383	6,429	6,477	) JA BA	10,972	11,066	11,167	11.276	11,397	11,525	11,662	11,817	11,994	12,234	12,450	12,703	12,976	
	Caburas	Nn3/h	410	376	175	210	214	219	257	295	337	390	425	500	581	- 60	762	863	975	1,094	1,221	1,364	1,529	1,732	1,951	2,186	2,639	
	Carmona	Nz2/5	0	0	0	0	C	0	0		0	D	0	0	0		0	8	¢	0	i ¢	. 0	0		0	0		-
	Alabace	Nallh	1,305	- 1,104	457	605	620	637	<b>1</b>	895	1,053	1,178	1,327	1,574	1,841	1,130	2,641	1.7%	3,147	3,544	3,969	4,48	5,802	5,695	5,440	7,243	8,109	
7	Bacoor	Na3h	0	0	0	0	0	0	0	1	0	0	0	0	0		0	a	0	0	0	0	0	0	°. O	· 0	8	Ŀ
8	Pasey	Na3b	0	0	0	0	C	0	0		0	0	0	0	0				0	0	0	0	0		. 0	0	0	ļ
	Mania	Ra3b	3,920	3,318	1,452	1,518	1,862	1,913	1,293	1,683	3,105	3,539	5,987	4,730	5,533	\$,399	7,333	8,339	9,454	30,648	11,525	13,366	15,029	17,110	19,349	21,763	24,363	
1	North NCR	Na35	4.687	3.967	1.754	2,173	3,226	2,259	1,70	3,208	3,712	4,332	4,747	5,656	6,616	7,652	8,768	9971	11,305	12,752	14,259	15,982	17,970	20,459	23,135	26,030	29,132	1
	Cavite	Kalik	447	410	191	229	234	240	<b>1</b> 6	333	368	415	<b>#</b> 3	ं. <b>56</b>	634	730	632	943	1,054	1,194	1,535	1,49	1,669	1,091	2,130	1,386	2,663	
12	Sucat	Nau3h	396	363	169	203	207	212	148	286	326	368	410	- - -	113,412	113,656	113,507	113,685	113,792	113,508	114,031	114,169	114,320	114,525	114,736	114,963	115,208	1
18	Linut	Na3b	85	ព	29	35	35	36	43	59	57	-	73	85	<del>,</del> 9	134	130	14	167	187	309	234	262	257	335	376	428	ļ
13	Sagta Rita	Mash	304	285	136	161	166	171	202	233	268	343	339	400	465	.536	612	694	784	880	983	1,099	1,233	<b>در</b> ا <sup>(</sup>	1,575	1,767	1,973	
14	Seo Fernando	Nm3th	202	190	90	105	ա	114	134	155	170	202	226	266	310	357	<b>4</b> 7	462	522	586	64	731	820	930	1048	1,176	מנג	-
15	Clark	Nm3/h	1	7	3	4	4	4	. 5	6	7	8	8	10	12	в	15	17	20	22	25	28	31	<u>5</u>	39	- 44	. 6	ŀ
16	Dinalapiban	Nm3/h	C	٥	Ð	ð	0	0	0	9	0	0	0	9	0	0	٥	0	٥	¢	0	¢	0	0	0	0	0	-
17	Crices	Nm3th	٥	•	0	ð	0.	0	0	9	0	0	0	0	0	0	0	0	0	0	0	9	0	:		0	0	<b> </b>
19	Suinc	Nalt	4	4	2	1	1	2	3	3	3	4	4	5	6	7	8	9	10	n	ย	14	ช	17	- 20	2	25	
-																												

# Actual Demand (Area L: Low Case / Option 2)

#### **Distribution Plan Sheet**

	1				Í	1	Distri	bution		Tra	ansmission Cost(	(fmr
				Gas Demand	Supply Area		1		Maintenance		I Sinsaon Obacc	
		1 1	Category			Category	UnitCost			Phase	Construction	Maintenance
ligh .	Option 1	Batangas	Ind	0.42		ind	66,829	7.35				
		Lagune	Com	4.20	110.00	Com	47,801	5.26	3.30	1	64.6	5.19
		Cavite	ResTra	11.69		Res Tra	322,286	35.45				
	1	Subtotal	al de la com	16.31						Length(m)	148,500	
	1	NCR	Ind	1.56		Ind	133,658	69.32			110,000	
		Rizal	Com	35.95	518.62		95,602	49.58	15.56	l.	71.4	6.10
	i		ResTra	100.06		Resia	644,572	334.29		• • • •	1. 103	0.10
• • • • • • • • • • • • • • • • • • • •		Subtotal		137.57	1.1	1404110		001.20		Length(m)	174,300	
		Bulacan	lind	024		Ind	66,829	7.50		arenika kuo	1/1,500	┢
		Pamcanga	Com	2.03	112.30		47,801	5.37		3		
		Bataen	ResTra	5.67	112.00	ResTa			1. 9.91	<b>A</b>		
···· ·····		Subtotal		7.94		1985.118	322,286	36.19			4	
				1.37			_			Length(m)	0	<u> </u>
		Total		101 00	71000	Ind		84.17				
				161.82	740.92			60,21		Total	136	11.3
					ļ	Res.Tra		405.93	ļ	Length(m)	322,800	ļ
	Uption 2	Betangas	Ind	0.42		ind	66,829	7.35				1. A. A.
	<b>.</b>	Lagune	Com	4.20	110.00		47,801	5.26	3.30	<u> </u>	64.6	5.11
	·	Cavite	Hes.Tra	11.69	ļ	Res.Tra	322,286	35.45		ļ	<u> </u>	
		Subtotal		16.31	[	ing a sing	<ul> <li>13.33926</li> </ul>	and Margaret		Longth(m)	148,500	1
	l .	NCR	Ind	1.56		Indi	133,658	69.32	I			
		Rza	Com	35.95	518.62	Com	95,602	49.58	15.56	1	71.4	1
	1		Res.Tra	100.06		Res.Tra	644,572	334.29				
•	1	Subtotal		137.57	1.191.00	$(a,b) \in \mathcal{A}$	n an an airtean			Length(m)	38,000	
		Bulacan	Ind	024	1	Ind	66,829	7.50			1 .	
	1	Parnoame	Com	2.03	112.30		47,801	5.37	3.37	1	0	4.8
		Betaen	ResTra	5.67		ResTra	322,286	3619	······································	<b>[</b>	·   · · · · · · · · · · · · · · · · · ·	
	1	Subtotal	Te and the second second second second second second second second second second second second second second s	7.94			ULL_DU		1.1.1.1.1.1	Length(m)	139,300	
		Total	Ind	1	1 · · · · · · · · · · · · · · · · · · ·	Ind		64.17			100,000	
			Com	161.82	740.92			60.21	00.00	Total	100	
·····			Res.Tra	101.02	144.96	Res.Tra	+		22,23		136	
	Ortine 1	Betanges		0.25	<u> </u>		68.000	405.93		Length(m)	325,800	
			Ind .			ind	66,829	2.18		1		
		Lagune	Com	2.50	32.66		47,801	1.56	0.98	1	64.6	5.1
		Cavite	Res.Tra	2.09	2024 - [254]	ResTra	322,286	10.53				
		Subtotal				• ••••		$(x_1,x_2) \in (x_1^{-1},x_2^{-1})$		Length(m)	148,500	
		NCR	ind.	0.95	· · ··	ind	133,658	20.26	· .			1.
		Rizal	Com	21.57	151.57	1	95,602	14.49	4.55	<b> I</b>		6.1
			Res.Tra	17.69		Resira	644,572	97.70	[	ļ		
		Subtotal		40.21			المراجعين الم			Length(m)	174,300	
		Bulacan	<u>lind</u>	0.14		Ind	66,829	2.24				
		Pampamga	Com	1.22	33.52	Com	47,801	1.60	1.01		0	
		Bataan	Res.Tra	1.01	L	Res.Tra	322,286	10.80				
		Subtotal		2.37		and a				Length(m)	0	
		Total	Ind			Ind		24,68				
			Com	47.42	217.75	Com		17.65	6.53	Total	136	11.5
			Res.Tra			Res.Tra		119.03		Length(m)	322,800	
	Option 2	Batangas	Ind	0.25		lind	66,829	2.16				1
		Laguna	Com	2.50	32.66		47,601	1.56	0.98	I	64.6	5.19
		Cavite	ResTra	2.09		Res.Tra	322,286	1053				
		Subtotal		4.84		1 / A 1	1 1.428404		· · · · · ·	Length(m)	148,500	
		NCR	Ind	0.95	<u> </u>	Ind	133,658	20.26		See and a route		•
••••••••	1	Rizal	Com	21.57	151.57	Com	95,602	14.49	4.55	   r	71.4	1
	1.1.1.1.		Res.Tra	17.69	1	Res.Tra	644,572	97.70	1.00	<b>1</b>	1	
·····		Subtotal	11621194	4021		Ines. I re	216,770	51.10		Length(m)	38,000	
		Bulacan	Ind		<u>+</u>	Ind				<u>Lengarkirv</u>	1 30,000	
				0.14	00.54		66,829	224			·   ··· ··· · · · · · · ·	
···· · · · · · · · · ·		Pampanga	Com	1.22	33.52		47,801	1.60	1.01	<b>"</b>	.   <sup>0</sup>	4.8
		Bataen	Res.Tra	1.01	<b> </b>	Res.Tra	322,286	10.80		L		
· ···· · ·		Subtotal		237	<u> </u>				ļ	Length(m)	139,300	
		Total	Ind			Ind		24.68				
			Com	47.42	217.75			17.65	6.53	Total	136	11,4
	1	1	Res Tra			Res.Tra		119.00		Length(m)	325,800	

