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.

Table 4.34 Capital plan block for pipeline sector

Items 1	Items 2	Item 3	Unit	Value	2006	2007	2008	2009	2010
Income Stat	Sales	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	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
		Total	1000US$		193,908	361,090	431,355	531,154	596,653
	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$		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$		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	0	0
		Retained earnings	1000US$		550	43,916	32,955	46,818	72,784
		(Accumulatice)	1000US$		550	44,466	77,420	124,238	197,022

(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.

Table 4.35 Cash flow block of the LNG sector

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 smal	1000 US$		21,526	30,714	41,732	54,676	71,575
		(+) Equity	1000 US$		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
		(+) 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	0
		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

(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、0)" in EXCEL functions.

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

Table 4.36 FIRR calculation block

Items 1	Items 2	Item 3	Unit	Value	2006	2007	2008	2009	2010
FIRR	Capex	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
		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
		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
		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
		FIRR	%	12.3%					

(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.

$$DCR = \frac{\text{Capability for loan repayment}}{\text{Principal loan}}$$

Table 4.37 Debt Coverage Ratio(DCR) table

Items 1	Items 2	Item 3	Unit	Value	2006	2007	2008	2009	2010
DCR	Income	Sales	1000 US$		443,371	798,484	920,445	1,143,359	1,301,018
		Equity	1000 US$		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			110,843	88,778	30,490	55,729	39,415
		Total	1000 US$		820,561	987,950	1,355,440	1,357,932	1,365,454
	Expenditure	Opex	1000 US$		307,182	572,281	662,891	830,805	947,583
		Interest	1000 US$		79,568	94,734	127,054	141,315	142,001
		Equipment	1000 US$		532,693	201,376	809,010	317,688	50,042
		Working capital	1000 US$		110,843	88,778	30,490	55,729	39,415
		Repayment	1000 US$		266,346	100,688	404,505	158,844	25,021
		Total	1000 US$		1,296,632	1,057,858	2,033,950	1,504,380	1,204,062
	Cpital surplus		1000 US$		-476,071	-69,908	-678,510	-146,448	161,392
	Capability o	Capital surplus(PV)	1000 US$	-843,320	-270,135	-35,417	-306,924	-59,148	58,200
		Interest(PV)	1000 US$	791,853	45,149	47,995	57,473	57,075	51,207
		Repayment(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
	Principal loan(PV)		1000 US$	640,787	75,566	25,506	91,489	32,077	4,511
	DCR			1.9					

(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
EIRR	Capex	LNG terminal	1000 US$		0	0	0	0	0
		- Import duty to 60% of Investi	1000 US$	60%	0	0	0	0	0
		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 Investi	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$		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$		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$		163,692	173,099	356,687	676,488	859,056
		- others	1000 US$	0%	0	0	0	0	0
		Gas sales for gas users	1000 US$		23,039	33,240	45,671	60,507	80,098
		- 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

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

Table 4.39 Effects on GDP

Items 1	Items 2	Item 3	Unit	Value	2006	2007	2008	2009	2010
Content	Items	Operation	Unit	Value	2006	2007	2008	2009	2010
Without	Private consumption		Billion pesos		8,974	9,994	11,085	12,249	13,490
	Government consumption		Billion 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		Billion pesos		6,712	7,479	8,297	9,170	10,102
	Imports		Billion pesos		7,165	7,984	8,857	9,789	10,784
	Stock		Billion pesos		-1,237	-1,355	-1,496	-1,645	-1,791
	GDP		Billion pesos		11,383	12,709	14,107	15,601	17,211
With	Value added	+GDP			11,383	12,709	14,107	15,601	17,211
		+Sales Value	Billion pesos		26	47	54	67	76
		-LNG Imported	Billion pesos		6	6	7	12	16
		Net	Billion pesos		11,403	12,749	14,154	15,655	17,271
Changes	PV GDP without		Billion pesos	139,272	6,459	6,439	6,381	6,301	6,206
	PV GDE with		Billion pesos	139,644	6,470	6,459	6,403	6,323	6,228
	With / Without on GDE		%	0.3	0.2	0.3	0.3	0.4	0.3

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:

Government revenue without- project

Government revenue forecasted in the macro-economic model

Government revenue with- project

Government revenue + Tax revenue from project sectors

(Custom tax, property tax, corporate tax, business tax and VAT)

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

Table 4.40 Effects on Government Revenues

Items 1	Items 2	Item 3	Unit	Value	2006	2007	2008	2009	2010
Contant	Items	Operation	Unit	Value	2006	2007	2008	2009	2010
Without	Government revenue		Billion pesos		2,038	2,275	2,525	2,792	3,079
With	Government revenue		Billion pesos		2,040	2,280	2,530	2,798	3,086
Changes	Without government revenue		Billion pesos	24,878	1,157	1,152	1,142	1,127	1,110
	With government revenue		Billion pesos	24,942	1,158	1,155	1,144	1,130	1,113
	With/ Without		%	0.3	0.1	0.2	0.2	0.2	0.2

(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

Table 4.41 Effects on government revenues and un-employment rate

Items 1	Items 2	Item 3	Unit	Value	2006	2007	2008	2009	2010
Content	Items	Operation	Unit	Value	2006	2007	2008	2009	2010
Without	Labor productivity		Million Peso/		343	376	410	445	482
	Number of Labor Force		Million perso	1,026	37	37	38	38	39
	Employees		Million perso	948	33	34	34	35	36
	Unemployment rate		%	8.2	10.3	10.0	9.9	9.8	9.6
With	Labor productivity		Million Peso/		343	376	410	445	482
	Number of Labor Force		Million perso	1,026	37	37	38	38	39
	Employees		Million perso	950	33	34	35	35	36
	Unemployment rate		%	7.9	9.2	8.8	8.7	8.6	8.5
Changes	With - without on unemployment		%	-0.3	-1.1	-1.2	-1.2	-1.2	-1.2

Appendix F

Economic Evaluation (Pay Back Period)

For

Absorption Chiller, Cogeneration

and Gas Heat Pump

(1) Absorption Chiller

Economic Evaluation (Air Conditioning) — Evaluation Year: 2010
Absorption Chiller vs. Turbo-Chiller

(1) Conditions/Assumptions

				Absorption chiller	Turbo-chiller	
<Case>	High		<Power price>			
<Scenario>	Gas Use & Gas Promotion		Source	Meralco Model		
<Facility> Type	Hotel		Type	Non-industrial Service		
Floor area	10,000	m^2	Facility peak load	441	636	kW
Operation	24	hr/day	Power charge	6.65	6.65	Peso/kWh
	365	day/year	<Fuel gas price>	21.8		Peso/Nm^3
Avr. Load	20.5	kcal/m^2/hr	<Motor capacity>	4	200	kW/unit
	68	RT	<Gas consumption>	163,000	-	Nm^3/year
Avr./Max.	0.301	-	<Equipment cost>	6.3	5.7	Mill. Peso
< Chiller> Design load	68.0	kcal/m^2/hr				
Capacity/unit	225	RT				
No. of operation	1	unit				
No. of stand-by	0	unit				

(2) Economic Analysis

	Absorption chiller	Turbo-chiller
<Annual running cost> 1,000Peso		
Variable cost		
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
Sub-total	1,072.7	969.5
Total	20,280.6	20,907.2

<Economic Evaluation>
Pay-back period (New facility): 0.9 years
Pay-back period (Replacement): 9.5 years

Economic Evaluation (Air Conditioning) — Evaluation Year: 2010
Absorption Chiller vs. Turbo-Chiller

(1) Conditions/Assumptions

				Absorption chiller	Turbo-chiller	
<Case>	High		<Power price>			
<Scenario>	Gas Use & Gas Promotion		Source	Meralco Model		
<Facility> Type	Hotel		Type	Non-industrial Service		
Floor area	48,000	m^2	Facility peak load	2,113	3,054	kW
Operation	24	hr/day	Power charge	6.65	6.65	Peso/kWh
	365	day/year	<Fuel gas price>	21.8		Peso/Nm^3
Avr. Load	20.5	kcal/m^2/hr	<Motor capacity>	18	959	kW/unit
	325	RT	<Gas consumption>	782,399	-	Nm^3/year
Avr./Max.	0.301	-	<Equipment cost>	19.5	17.3	Mill. Peso
< Chiller> Design load	68.0	kcal/m^2/hr				
Capacity/unit	1,079	RT				
No. of operation	1	unit				
No. of stand-by	0	unit				

(2) Economic Analysis

	Absorption chiller	Turbo-chiller
<Annual running cost> 1,000Peso		
Variable cost		
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

<Economic Evaluation>
Pay-back period (New facility): 0.7 years
Pay-back period (Replacement): 5.9 years

Economic Evaluation (Air Conditioning)
Absorption Chiller vs. Turbo-Chiller

Evaluation Year: 2010

(1) Conditions/Assumptions

				Absorption chiller	Turbo-chiller	
<Case>	High		<Power price>			
<Scenario>	Gas Use & Gas Promotion		Source	Meralco Model		
<Facility> Type	Hospital		Type	Non-industrial Service		
Floor area	10,000	m^2	Facility peak load	523	732	kW
Operation	24	hr/day	Power charge	6.65	6.65	Peso/kWh
	364	day/year	<Fuel gas price>	21.8		Peso/Nm^3
Avr. Load	33.6	kcal/m^2/hr	<Motor capacity>	5	213	kW/unit
	111	RT	<Gas consumption>	266,955	-	Nm^3/year
Avr./Max.	0.463	-	<Equipment cost>	6.5	5.9	Mill. Peso
< Chiller> Design load	72.6	kcal/m^2/hr				
Capacity/unit	240	RT				
No. of operation	1	unit				
No. of stand-by	0	unit				

(2) Economic Analysis

	Absorption chiller	Turbo-chiller
<Annual running cost>	1,000Peso	
Variable cost		
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
Sub-total	1,112.5	1,004.6
Total	14,770.2	15,858.9

<Economic Evaluation>

Pay-back period (New facility)	0.6	years
Pay-back period (Replacement	5.8	years

Economic Evaluation (Air Conditioning)
Absorption Chiller vs. Turbo-Chiller

Evaluation Year: 2010

(1) Conditions/Assumptions

				Absorption chiller	Turbo-chiller	
<Case>	High		<Power price>			
<Scenario>	Gas Use & Gas Promotion		Source	Meralco Model		
<Facility> Type	Hospital		Type	Non-industrial Service		
Floor area	45,000	m^2	Facility peak load	2,352	3,293	kW
Operation	24	hr/day	Power charge	6.65	6.65	Peso/kWh
	364	day/year	<Fuel gas price>	21.8		Peso/Nm^3
Avr. Load	33.6	kcal/m^2/hr	<Motor capacity>	18	960	kW/unit
	500	RT	<Gas consumption>	1,201,296	-	Nm^3/year
Avr./Max.	0.463	-	<Equipment cost>	19.5	17.3	Mill. Peso
< Chiller> Design load	72.6	kcal/m^2/hr				
Capacity/unit	1,080	RT				
No. of operation	1	unit				
No. of stand-by	0	unit				

(2) Economic Analysis

	Absorption chiller	Turbo-chiller
<Annual running cost>	1,000Peso	
Variable cost		
Fuel cost	26,191.2	
Power cost	35,133.2	66,779.2
Sub-total	61,324.5	66,779.2
Fixed cost		
Depreciation	1,169.8	1,038.7
Maintenance cost	584.9	519.3
Interest	1,559.7	1,384.9
Sub-total	3,314.4	2,942.9
Total	64,638.9	69,722.2

<Economic Evaluation>

Pay-back period (New facility)	0.4	years
Pay-back period (Replacement	3.7	years

Economic Evaluation (Air Conditioning)
Absorption Chiller vs. Turbo-Chiller

Evaluation Year: 2010

(1) Conditions/Assumptions

				Absorption chiller	Turbo-chiller	
<Case>	High		<Power price>			
<Scenario>	Gas Use & Gas Promotion		Source	Meralco Model		
<Facility> Type	Office Building		Type	Non-industrial Service		
Floor area	9,000	m^2	Facility peak load	333	607	kW
Operation	11	hr/day	Power charge	6.65	6.65	Peso/kWh
	261	day/year	<Fuel gas price>	21.8		Peso/Nm^3
Avr. Load	56.6	kcal/m^2/hr	<Motor capacity>	17	291	kW/unit
	169	RT	<Gas consumption>	132,884		Nm^3/year
Avr./Max.	0.515	-	<Equipment cost>	7.9	7.1	Mill. Peso
< Chiller> Design load	110.0	kcal/m^2/hr				
Capacity/unit	327	RT				
No. of operation	1	unit				
No. of stand-by	0	unit				

(2) Economic Analysis

	Absorption chiller	Turbo-chiller
<Annual running cost>	1,000Peso	
Variable cost		
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>
Pay-back period (New facility): 2.1 years
Pay-back period (Replacement): 21.0 years

Economic Evaluation (Air Conditioning)
Absorption Chiller vs. Turbo-Chiller

Evaluation Year: 2010

(1) Conditions/Assumptions

				Absorption chiller	Turbo-chiller	
<Case>	High		<Power price>			
<Scenario>	Gas Use & Gas Promotion		Source	Meralco Model		
<Facility> Type	Office Building		Type	Non-industrial Service		
Floor area	38,000	m^2	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^3
Avr. Load	56.6	kcal/m^2/hr	<Motor capacity>	17	1,228	kW/unit
	712	RT	<Gas consumption>	561,064		Nm^3/year
Avr./Max.	0.515	-	<Equipment cost>	24.2	21.4	Mill. Peso
< Chiller> Design load	110.0	kcal/m^2/hr				
Capacity/unit	1,382	RT				
No. of operation	1	unit				
No. of stand-by	0	unit				

(2) Economic Analysis

	Absorption chiller	Turbo-chiller
<Annual running cost>	1,000Peso	
Variable cost		
Fuel cost	12,232.6	
Power cost	8,120.2	22,975.0
Sub-total	20,352.7	22,975.0
Fixed cost		
Depreciation	1,449.0	1,284.5
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

<Economic Evaluation>
Pay-back period (New facility): 1.2 years
Pay-back period (Replacement): 10.4 years

Economic Evaluation (Air Conditioning) — Evaluation Year: 2010
Absorption Chiller vs. Turbo-Chiller

(1) Conditions/Assumptions

				Absorption chiller	Turbo-chiller	
<Case>	High		<Power price>			
<Scenario>	Gas Use & Gas Promotion		Source	Meralco Model		
<Facility> Type	Store		Type	Non-industrial Service		
Floor area	7,500	m²	Facility peak load	324	645	kW
Operation	11	hr/day	Power charge	6.65	6.65	Peso/kWh
	362	day/year	<Fuel gas price>	21.8		Peso/Nm³
Avr. Load	84.2	kcal/m²/hr	<Motor capacity>	7	328	kW/unit
	209	RT	<Gas consumption>	228,721	-	Nm³/year
Avr./Max.	0.565	-	<Equipment cost>	8.5	7.7	Mill. Peso
<Chiller> Design load	149.0	kcal/m²/hr				
Capacity/unit	370	RT				
No. of operation	1	unit				
No. of stand-by	0	unit				

(2) Economic Analysis

	Absorption chiller	Turbo-chiller
<Annual running cost> 1,000Peso		
Variable cost		
Fuel cost	4,986.7	
Power cost	2,219.8	8,237.7
Sub-total	7,206.5	8,237.7
Fixed cost		
Depreciation	512.4	460.0
Maintenance cost	256.2	230.0
Interest	683.2	613.3
Sub-total	1,451.8	1,303.2
Total	8,658.3	9,540.9

<Economic Evaluation>
Pay-back period (New facility): 0.9 years
Pay-back period (Replacement): 9.1 years

Economic Evaluation (Air Conditioning) — Evaluation Year: 2010
Absorption Chiller vs. Turbo-Chiller

(1) Conditions/Assumptions

				Absorption chiller	Turbo-chiller	
<Case>	High		<Power price>			
<Scenario>	Gas Use & Gas Promotion		Source	Meralco Model		
<Facility> Type	Store		Type	Non-industrial Service		
Floor area	38,000	m²	Facility peak load	1,636	3,268	kW
Operation	11	hr/day	Power charge	6.65	6.65	Peso/kWh
	362	day/year	<Fuel gas price>	21.8		Peso/Nm³
Avr. Load	84.2	kcal/m²/hr	<Motor capacity>	31	1,663	kW/unit
	1,059	RT	<Gas consumption>	1,158,853	-	Nm³/year
Avr./Max.	0.565	-	<Equipment cost>	31.7	28.1	Mill. Peso
<Chiller> Design load	149.0	kcal/m²/hr				
Capacity/unit	1,872	RT				
No. of operation	1	unit				
No. of stand-by	0	unit				

(2) Economic Analysis

	Absorption chiller	Turbo-chiller
<Annual running cost> 1,000Peso		
Variable cost		
Fuel cost	25,265.8	
Power cost	11,165.0	41,701.1
Sub-total	36,430.9	41,701.1
Fixed cost		
Depreciation	1,902.3	1,683.5
Maintenance cost	951.1	841.8
Interest	2,536.4	2,244.7
Sub-total	5,389.8	4,769.9
Total	41,820.7	46,471.0

<Economic Evaluation>
Pay-back period (New facility): 0.7 years
Pay-back period (Replacement): 6.5 years

Gas Price: 21.8 Ps/Nm3
Case: High
Scenario: Gas Use & Gas Promotion
(2010 Base)

Pay-back Period (Year)	Hotel 10,000 Required Gas Price Ps/Nm3 New	Replace	Hotel 48,000 Required Gas Price Ps/Nm3 New	Replace	Hospital 10,000 Required Gas Price Ps/Nm3 New	Replace	Hospital 45,000 Required Gas Price Ps/Nm3 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	19.9	25.7	22.1
Pay-back Period (Year)	**Office Building 9,000 Required Gas Price Ps/Nm3 New**	**Replace**	**Office Building 38,000 Required Gas Price Ps/Nm3 New**	**Replace**	**Store 7,600 Required Gas Price Ps/Nm3 New**	**Replace**	**Store 38,000 Required Gas Price Ps/Nm3 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							(2010 Base)
Case:	Low								
Scenario:	Gas Use & Gas Promotion								
Pay-back Period (Year)	Hotel	10,000	Hotel	48,000	Hospital	10,000	Hospital	45,000	
	Required Gas Price Ps/Nm3		Required Gas Price Ps/Nm3		Required Gas Price Ps/Nm3		Required Gas Price Ps/Nm3		
	New	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 Period (Year)	Office Building	9,000	Office Building	38,000	Store	7,500	Store	38,000	
	Required Gas Price Ps/Nm3		Required Gas Price Ps/Nm3		Required Gas Price Ps/Nm3		Required Gas Price Ps/Nm3		
	New	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	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	19.7	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 (Cogeneration) — Evaluation Year: 2010

(Gas Engine Cogeneration + Absorption Chiller: CGS) vs.
(Power Company Supply Electricity + Conventional Chiller: Conv.)

(1) Conditions/Assumptions

<Case>	High		<Cogeneration Max. Efficiency>				
<Scenario>	Gas Use & Gas Promotion		Power	35.0	%		
<Facility> Type	Hotel		Steam	28.0	%		
Floor Area	10,000	m2	Hot Water	17.0	%		
<Capacity>	130	kW	Total	80.0	%		
<No. of Unit>	2		<Boiler Efficiency>	85.0	%		
Stand-by	0		<Power Price>	CGS	Conv.		
<Equipment Cost>			Source	Meralco Model			
CGS Unit Cost	0.043	Mill. Ps/kW	Type	Non-industrial Service			
Eq. Cost	11.2	Mill. Ps	Facility peak load	130	536	kW	
Others	0.6	Mill. Ps	Power charge	7.02	6.94	Peso/kWh	
Total	11.8	Mill. Ps	<Accounting Conditions>				
Absorption Chiller	4.4	Mill. Ps	Labor Cost	0.20	Mill. Ps/Operator		
Conv. Chiller	4.0	Mill. Ps	No. of Operator	0.5			
H-water boiler (CGS	0.0	Mill. Ps	Depreciation Year	14	years		
H-water boiler (Conv.)	0.2	Mill. Ps	Salvage Value	10	%		
<Fuel> Gas Price	21.8	Ps/Nm^3	Interest	8.0	%		
			Maintenance cost	0.4	Ps/kWh		

(2) Result

<Economic Calculation (Mill. Ps/year)>

<Amount (-/y)>	CGS	Conv.	CGS Benefit		CGS	Conv.	CGS Benefit
Power Demand MWh	2,318	2,846	527	Power Charge	2.1	19.8	17.6
CGS Power MWh	2,018	-	-2,018	CGS Fuel	12.5	-	-12.5
Purchased Power MW	301	2,846	2,545	Boiler Fuel	1.1	2.4	1.2
Steam Demand Gcal	1,790	-	-1,790	Sub-total	15.7	22.1	6.4
H-water Demand Gcal	1,003	1,003	0	Labor & Interest	1.0	-	-1.0
CGS Steam Util'd Gca	1,301	-	-1,301	Maintenance	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	Depreciation	0.4	-	-0.4
Boiler Fuel Nm3/1,000	53	108	55				

<CGS Operation>		<Power cost (Ps/kWh)>		<Economic Evaluation>		
Power Self-generated %	87.0	Variable Cost	5.6	Pay-back period (New facility)	2.5	year
Heat Self-supplied %	82.5	Fixed Cost	1.1	Pay-back period (Replacement	3.6	year
Heat Utilized %	97.0	Sub-total	6.7			
Operation time %	100.0	Purchased Power C	7.0			
Average Load %	93.2	Average Cost	6.7			
Operating Efficiency %	79.0	Conventional Cost	6.9			

**Remarks: H-water/Hot Water, Utilz'd/Utilized, CGS/Cogeneration System, Conv./Conventional System

Economic Evaluation (Cogeneration)　　Evaluation Year: 2010

(Gas Engine Cogeneration + Absorption Chiller: CGS) vs.
(Power Company Supply Electricity + Conventional Chiller: Conv.)

(1) Conditions/Assumptions

<Case>	High			<Cogeneration Max. Efficiency>			
<Scenario>	Gas Use & Gas Promotion			Power	35.0	%	
<Facility> Type	Hospital			Steam	28.0	%	
Floor Area	10,000	m2		Hot Water	17.0	%	
<Capacity>	180	kW		Total	80.0	%	
<No. of Unit>	1			<Boiler Efficiency>	85.0	%	
Stand-by	0			<Power Price>	CGS	Conv.	
<Equipment Cost>				Source	Meralco Model		
CGS Unit Cost	0.043	Mill. Ps/kW		Type	Non-industrial Service		
Eq. Cost	7.8	Mill. Ps		Facility peak load	91	488	kW
Others	0.4	Mill. Ps		Power charge	7.02	6.94	Peso/kWh
Total	8.2	Mill. Ps		<Accounting Conditions>			
Absorption Chiller	5.5	Mill. Ps		Labor Cost	0.20	Mill. Ps/Operator	
Conv. Chiller	5.0	Mill. Ps		No. of Operator	0.5		
H-water boiler (CGS	0.0	Mill. Ps		Depreciation Year	14	years	
H-water boiler (Con	0.2	Mill. Ps		Salvage Value	10	%	
<Fuel> Gas Price	21.8	Ps/Nm^3		Interest	8.0	%	
				Maintenance cost	0.4	Ps/kWh	

(2) Result

<Amount (-/y)>	CGS	Conv.	CGS Benefit	<Economic Calculation (Mill. Ps/year)>	CGS	Conv.	CGS Benefit
Power Demand MWh	1,148	2,016	869	Power Charge	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 Fuel	5.2	1.3	-3.9
Steam Demand Gcal	2,952	-	-2,952	Sub-total	12.8	15.3	2.5
H-water Demand Gcal	548	548	0	Labor & Interest	0.8	-	-0.8
CGS Steam Util'd Gca	751	-	-751	Maintenance	0.4	-	-0.4
CGS H-water Util'd Gcal	548	-	-548	Sub-total	1.1	-	-1.1
CGS Purged Gcal	0	-	0	Total	13.9	15.3	1.3
CGS Fuel Nm3/1,000	297	-	-297	Depreciation	0.3	-	-0.3
Boiler Fuel Nm3/1,000	237	59	-178				

<CGS Operation>		<Power cost (Ps/kWh)>		<Economic Evaluation>		
Power Self-generated %	85.6	Variable Cost	10.5	Pay-back period (New facility)	6.4	year
Heat Self-supplied %	37.1	Fixed Cost	1.4	Pay-back period (Replacement	10.2	year
Heat Utilized %	100.0	Sub-total	12.0			
Operation time %	100.0	Purchased Power C	7.0			
Average Load %	65.6	Average Cost	11.3			
Operating Efficiency %	74.8	Conventional Cost	6.9			

**Remarks: H-water/Hot Water, Utilz'd/Utilized, CGS/Cogeneration System, Conv./Conventional System

Economic Evaluation (Cogeneration)　　Evaluation Year: 2010

(Gas Engine Cogeneration + Absorption Chiller: CGS) vs.
(Power Company Supply Electricity + Conventional Chiller: Conv.)

(1) Conditions/Assumptions

<Case>	High			<Cogeneration Max. Efficiency>			
<Scenario>	Gas Use & Gas Promotion			Power	35.0	%	
<Facility>	Type	Hospital		Steam	28.0	%	
	Floor Area	45,000	m2	Hot Water	17.0	%	
<Capacity>		400	kW	Total	80.0	%	
<No. of Unit>		2		<Boiler Efficiency>	85.0	%	
	Stand-by	0		<Power Price>	CGS	Conv.	
<Equipment Cost>				Source	Meralco Model		
CGS	Unit Cost	0.043	Mill. Ps/kW	Type	Non-industrial Service		
	Eq. Cost	34.5	Mill. Ps	Facility peak load	418	2,192	kW
	Others	1.7	Mill. Ps	Power charge	6.94	6.65	Peso/kWh
	Total	36.2	Mill. Ps	<Accounting Conditions>			
Absorption Chiller		15.0	Mill. Ps	Labor Cost	0.20	Mill. Ps/Operator	
Conv. Chiller		13.3	Mill. Ps	No. of Operator	0.5		
H-water boiler (CGS		0.0	Mill. Ps	Depreciation Year	14	years	
H-water boiler (Con		0.5	Mill. Ps	Salvage Value	10	%	
<Fuel>	Gas Price	21.8	Ps/Nm^3	Interest	8.0	%	
				Maintenance cost	0.4	Ps/kWh	

(2) Result

<Amount (-/y)>	CGS	Conv.	CGS Benefit
Power Demand MWh	5,155	9,059	3,904
CGS Power MWh	4,392	-	-4,392
Purchased Power MW	764	9,059	8,296
Steam Demand Gcal	13,289	-	-13,289
H-water Demand Gcal	2,464	2,464	0
CGS Steam Util'd Gca	3,354	-	-3,354
CGS H-water Util'd Gcal	2,464	-	-2,464
CGS Purged Gcal	0	-	0
CGS Fuel Nm3/1,000	1,328	-	-1,328
Boiler Fuel Nm3/1,000	1,068	265	-803

<Economic Calculation (Mill. Ps/year)>

	CGS	Conv.	CGS Benefit
Power Charge	5.3	60.2	54.9
CGS Fuel	28.9	-	-28.9
Boiler Fuel	23.3	5.8	-17.5
Sub-total	57.5	66.0	8.5
Labor & Interest	3.0	-	-3.0
Maintenance	1.8	-	-1.8
Sub-total	4.8	-	-4.8
Total	62.3	66.0	3.7
Depreciation	1.2	-	-1.2

<CGS Operation>		<Power cost (Ps/kWh)>	
Power Self-generated %	85.2	Variable Cost	10.6
Heat Self-supplied %	96.9	Fixed Cost	1.3
Heat Utilized %	100.0	Sub-total	11.9
Operation time %	100.0	Purchased Power C	6.9
Average Load %	66.0	Average Cost	11.2
Operating Efficiency %	74.9	Conventional Cost	6.6

<Economic Evaluation>

Pay-back period (New facility)	10.1	year
Pay-back period (Replacement	13.8	year

**Remarks: H-water/Hot Water, Utilz'd/Utilized, CGS/Cogeneration System, Conv./Conventional System

Economic Evaluation (Cogeneration) — Evaluation Year: 2010

(Gas Engine Cogeneration + Absorption Chiller: CGS) vs.
(Power Company Supply Electricity + Conventional Chiller: Conv.)

(1) Conditions/Assumptions

<Case>	High		<Cogeneration Max. Efficiency>			
<Scenario>	Gas Use & Gas Promotion		Power	35.0	%	
<Facility> Type	Office Building		Steam	28.0	%	
Floor Area	60,000	m2	Hot Water	17.0	%	
<Capacity>	700	kW	Total	80.0	%	
<No. of Unit>	2		<Boiler Efficiency>	85.0	%	
Stand-by	0		<Power Price>	CGS	Conv.	
<Equipment Cost>			Source	Meralco Model		
CGS Unit Cost	0.043	Mill. Ps/kW	Type	Non-industrial Service		
Eq. Cost	60.4	Mill. Ps	Facility peak load	1,474	4,121	kW
Others	3.0	Mill. Ps	Power charge	6.94	6.65	Peso/kWh
Total	63.4	Mill. Ps	<Accounting Conditions>			
Absorption Chiller	17.7	Mill. Ps	Labor Cost	0.20	Mill. Ps/Operator	
Conv. Chiller	15.7	Mill. Ps	No. of Operator	0.5		
H-water boiler (CGS	0.0	Mill. Ps	Depreciation Year	14	years	
H-water boiler (Con	0.1	Mill. Ps	Salvage Value	10	%	
<Fuel> Gas Price	21.8	Ps/Nm^3	Interest	8.0	%	
			Maintenance cost	0.4	Ps/kWh	

(2) Result

<Amount (-/y)>	CGS	Conv.	CGS Benefit
Power Demand MWh	10,811	14,067	3,256
CGS Power MWh	6,727	-	-6,727
Purchased Power MW	4,084	14,067	9,983
Steam Demand Gcal	11,081	-	-11,081
H-water Demand Gcal	0	0	0
CGS Steam Util'd Gca	4,044	-	-4,044
CGS H-water Util'd Gcal	0	-	0
CGS Purged Gcal	4,027	-	-4,027
CGS Fuel Nm3/1,000	1,965	-	-1,965
Boiler Fuel Nm3/1,000	757	0	-757

<Economic Calculation (Mill. Ps/year)>

	CGS	Conv.	CGS Benefit
Power Charge	28.4	93.5	65.2
CGS Fuel	42.8	-	-42.8
Boiler Fuel	16.5	0.0	-16.5
Sub-total	87.7	93.5	5.8
Labor & Interest	5.2	-	-5.2
Maintenance	2.7	-	-2.7
Sub-total	7.9	-	-7.9
Total	95.6	93.5	-2.0
Depreciation	2.0	-	-2.0

<CGS Operation>		<Power cost (Ps/kWh)>	
Power Self-generated %	62.2	Variable Cost	8.8
Heat Self-supplied %	36.5	Fixed Cost	1.5
Heat Utilized %	50.1	Sub-total	10.3
Operation time %	83.3	Purchased Power C	6.9
Average Load %	57.7	Average Cost	9.0
Operating Efficiency %	73.7	Conventional Cost	6.6

<Economic Evaluation>

Pay-back period (New facility)	-31.9	year
Pay-back period (Replacement	-39.6	year

**Remarks: H-water/Hot Water, Utilz'd/Utilized, CGS/Cogeneration System, Conv./Conventional System

Gas Price: 21.8 Ps/Nm3
Case: High
Scenario: Gas Use & Gas Promotion

(2010 Base)

Pay-back Period (Year)	Hotel 10,000		Hotel 48,000		Hospital 10,000		Hospital 45,000		Office Buildi 60,000	
	Required Gas Price Ps/Nm3		Required Gas Price Ps/Nm3		Required Gas Price Ps/Nm3		Required Gas Price Ps/Nm3		Required Gas Price Ps/Nm3	
	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: 18.3 Ps/Nm3
Case: Low
Scenario: Gas Use & Gas Promotion

(2010 Base)

Pay-back Period (Year)	Hotel 10,000		Hotel 48,000		Hospital 10,000		Hospital 45,000		Office Buildi 60,000	
	Required Gas Price Ps/Nm3		Required Gas Price Ps/Nm3		Required Gas Price Ps/Nm3		Required Gas Price Ps/Nm3		Required Gas Price Ps/Nm3	
	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 Conditioning) — Evaluation Year: 2010
GHP vs. Package

(1) Conditions/Assumptions

				GHP	Package	
<Case>	High		<Power price>			
<Scenario>	Gas Use & Gas Promotion		Source	Meralco Model		
<Facility> Type	Office Building		Type	Non-industrial Service		
Floor area	1,000	m^2	Facility peak load	35	78	kW
Operation	11	hr/day	Power charge	7.09	7.02	Peso/kWh
	261	day/year	<Fuel gas price>	21.8		Peso/Nm^3
Avr. Load	56.6	kcal/m^2/hr	<Motor capacity>	-	43	kW/unit
	19	RT	<Gas consumption>	49,216	-	Nm^3/year
Avr./Max.	0.515	-	<Equipment cost>	1.7	1.0	Mill. Peso
<Chiller> Design load	110.0	kcal/m^2/hr				
Capacity/unit	36	RT				
No. of operation	1	unit				
No. of stand-by	0	unit				

(2) Economic Analysis

	GHP	Package
<Annual running cost>	1,000Peso	
Variable cost		
Fuel cost	1,073.0	
Power cost	367.6	915.9
Sub-total	1,440.7	915.9
Fixed cost		
Depreciation	99.3	58.6
Maintenance cost	49.7	29.3
Interest	132.4	78.2
Sub-total	281.4	166.1
Total	1,722.0	1,082.0

<Economic Evaluation>
Pay-back period (New facility): 1.1 years
Pay-back period (Replacement): 2.8 years

Pa/m3	Pay-Back Years New	Replace
3	4.0	9.4
5	12.6	29.8

Economic Evaluation (Air Conditioning) — Evaluation Year: 2010
GHP vs. Package

(1) Conditions/Assumptions

				GHP	Package	
<Case>	High		<Power price>			
<Scenario>	Gas Use & Gas Promotion		Source	Meralco Model		
<Facility> Type	Restaurant		Type	Non-industrial Service		
Floor area	1,100	m^2	Facility peak load	243	306	kW
Operation	12	hr/day	Power charge	6.65	6.65	Peso/kWh
	292	day/year	<Fuel gas price>	21.8		Peso/Nm^3
Avr. Load	84.2	kcal/m^2/hr	<Motor capacity>	-	64	kW/unit
	31	RT	<Gas consumption>	98,396	-	Nm^3/year
Avr./Max.	0.565	-	<Equipment cost>	2.4	1.4	Mill. Peso
<Chiller> Design load	149.0	kcal/m^2/hr				
Capacity/unit	54	RT				
No. of operation	1	unit				
No. of stand-by	0	unit				

(2) Economic Analysis

	GHP	Package
<Annual running cost>	1,000Peso	
Variable cost		
Fuel cost	2,145.3	-
Power cost	1,382.4	2,428.3
Sub-total	3,527.7	2,428.3
Fixed cost		
Depreciation	143.3	83.8
Maintenance cost	71.6	41.9
Interest	191.0	111.8
Sub-total	405.9	237.5
Total	3,933.6	2,665.8

<Economic Evaluation>
Pay-back period (New facility): 0.8 years
Pay-back period (Replacement): 2.0 years

Economic Evaluation (Air Conditioning) — Evaluation Year: 2010

GHP vs. Package

(1) Conditions/Assumptions

					GHP	Package	
<Case>	High			<Power price>			
<Scenario>	Gas Use & Gas Promotion			Source	Meralco Model		
<Facility> Type	Store			Type	Non-industrial Service		
Floor area	1,000	m^2		Facility peak load	42	100	kW
Operation	11	hr/day		Power charge	7.02	7.02	Peso/kWh
	362	day/year		<Fuel gas price>	21.8		Peso/Nm^3
Avr. Load	84.2	kcal/m^2/hr		<Motor capacity>	-	58	kW/unit
	28	RT		<Gas consumption>	101,654	-	Nm^3/year
Avr./Max.	0.565	-		<Equipment cost>	2.2	1.3	Mill. Peso
<Chiller> Design load	149.0	kcal/m^2/hr					
Capacity/unit	49	RT					
No. of operation	1	unit					
No. of stand-by	0	unit					

(2) Economic Analysis

	GHP	Package
<Annual running cost>	1,000Peso	
Variable cost		
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
Maintenance cost	65.6	38.4
Interest	174.8	102.5
Sub-total	371.5	217.8
Total	2,876.4	1,646.8

<Economic Evaluation>

Pay-back period (New facility)	-0.8 years
Pay-back period (Replacement)	-1.9 years

Ps/m3	Pay-Back Years New	Replace
5	5.6	13.1
6	20.6	

Gas Price: 21.8 Ps/Nm3
Case: High
Scenario: Gas Use & Gas Promotion

(2010 Base)

Pay-back Period (Year)	Restaurant 1,100 Required Gas Price Ps/Nm3 New	Replace	Office Building 1,000 Required Gas Price Ps/Nm3 New	Replace	Store 1,000 Required Gas Price Ps/Nm3 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
Case: Low
Scenario: Gas Use & Gas Promotion

(2010 Base)

Pay-back Period (Year)	Restaurant 1,100 Required Gas Price Ps/Nm3 New	Replace	Office Building 1,000 Required Gas Price Ps/Nm3 New	Replace	Store 1,000 Required Gas Price Ps/Nm3 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

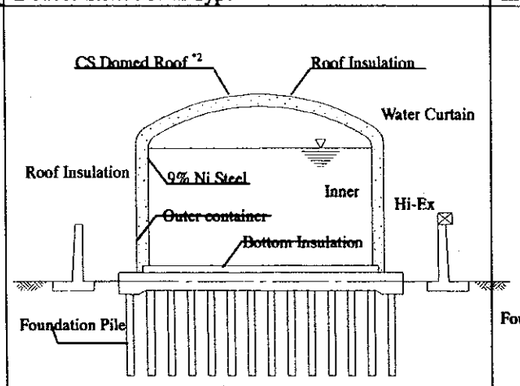
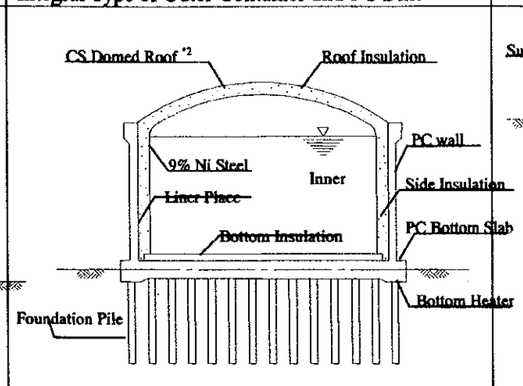
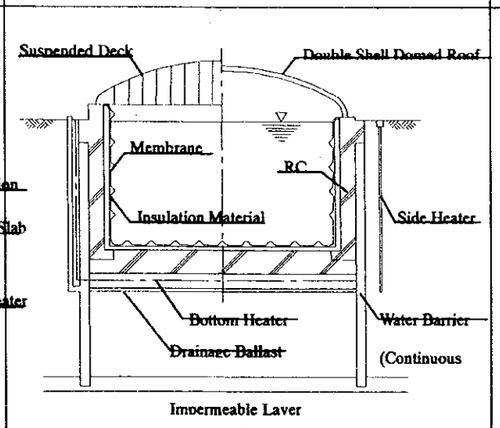
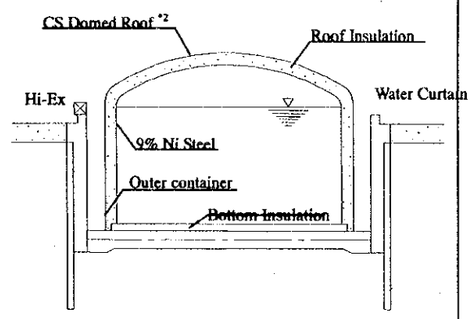
Appendix G

LNG System Configuration

And

Construction Schedule

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

TYPE / ITEMS	Aboveground Storage Double Shell Metal Type	Aboveground Storage Integral Type of Outer Container and PC Dike	Inground Storage	Pit-in Storage
1.Sketch of Construction				
2.Installation Experience *1	50% (24%)	16% (39%)	25% (31%)	2% (4%)
3.Design	Well established with respect to design, field work and inspection procedures	The same as the left	Subject to soil condition	The same as the left
4.Operation & Maintenance	Good operability and maintainability	The same as the left	Inferior operability and maintainability	The same as the left
5.Construction Cost Index	1.05	1.0	1.1～1.25	1.15～1.3
6.Appearance	-	-	Less coercive appearance	The same as the left
7.Safety Aspect	* In event of LNG leakage, affected zone is minimized inside dike by effects of Hi-Ex facility and Water curtain system.	* Extremely small affected zone even in event of LNG leakage of slight possibility. * Effective for protection against flying object.	* Low possibility of LNG flooding onto the ground	* In event of LNG leakage, affected zone is minimized inside dike by effects of Hi-Ex facility and Water curtain system.
8.Specification Inner Shell Outer Container Dike Nozzle Location	 9% Ni steel Carbon steel PC Side and roof	 9% Ni steel Carbon steel PC Roof	 Membrane RC, Carbon steel (roof) Not required Roof	 9% Ni steel Carbon steel RC Roof
9.Construction Period	38 months	36 months	41 months	46 months

*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.

Appendix B Comparison of Three LNG Vaporiser Types

	ORV	STV	SMV
General	1. Stable heat exchange. 2. For base load.	1. For base load. 2. Excellent in the heat transfer characteristic of the heat medium.	1. High heat-changing performance. 2. Low NOx. 3. As a countermeasure against peak gas demand. 4. Great pressure loss due to heat transfer tubes with multi-step bends
Con-struction	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).
Operability	1. Easy to operate (due to simple construction) 2. Rapid start/stop possible.	1. Easy to operate 2. Starting speed restricted a little.	1. Easy to operate 2. Water quality control needed.
Main-tenance	1. Easy maintenance (due to simple construction) 2. Panel appearance check is allowed even while running. 3. No maintenance is required for tube inner.	1. Sea water tube is corrosion free, because of its high corrosion resistance. (But periodic cleaning is needed.)	1. Used as a temporary countermeasure against peak gas demand. Hence, less running hours and simple functional check only.
Cost	1. Construction cost: Middle level (smaller capacity type --- cheaper than STV) 2. Maintenance cost: Low 3. Running cost: Middle level	1. Construction cost: Low 2. Maintenance cost: Middle level 3. Running cost: Middle level	1. Construction cost: Middle level 2. Maintenance cost: Middle level 3. Running cost: High
Required installation area (for 150t/h)	Vaporiser + piping : 630m² Maintenance area : 220m² Total : 850m² (New type ORV See *1) Vaporiser + piping : 380m² Maintenance area : 150m² Total : 530m²	Vaporiser + piping : 315m² Maintenance area : 315m² Total : 630m²	Vaporiser + piping : 260m² Maintenance area : 130m² Total : 490m²

*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).

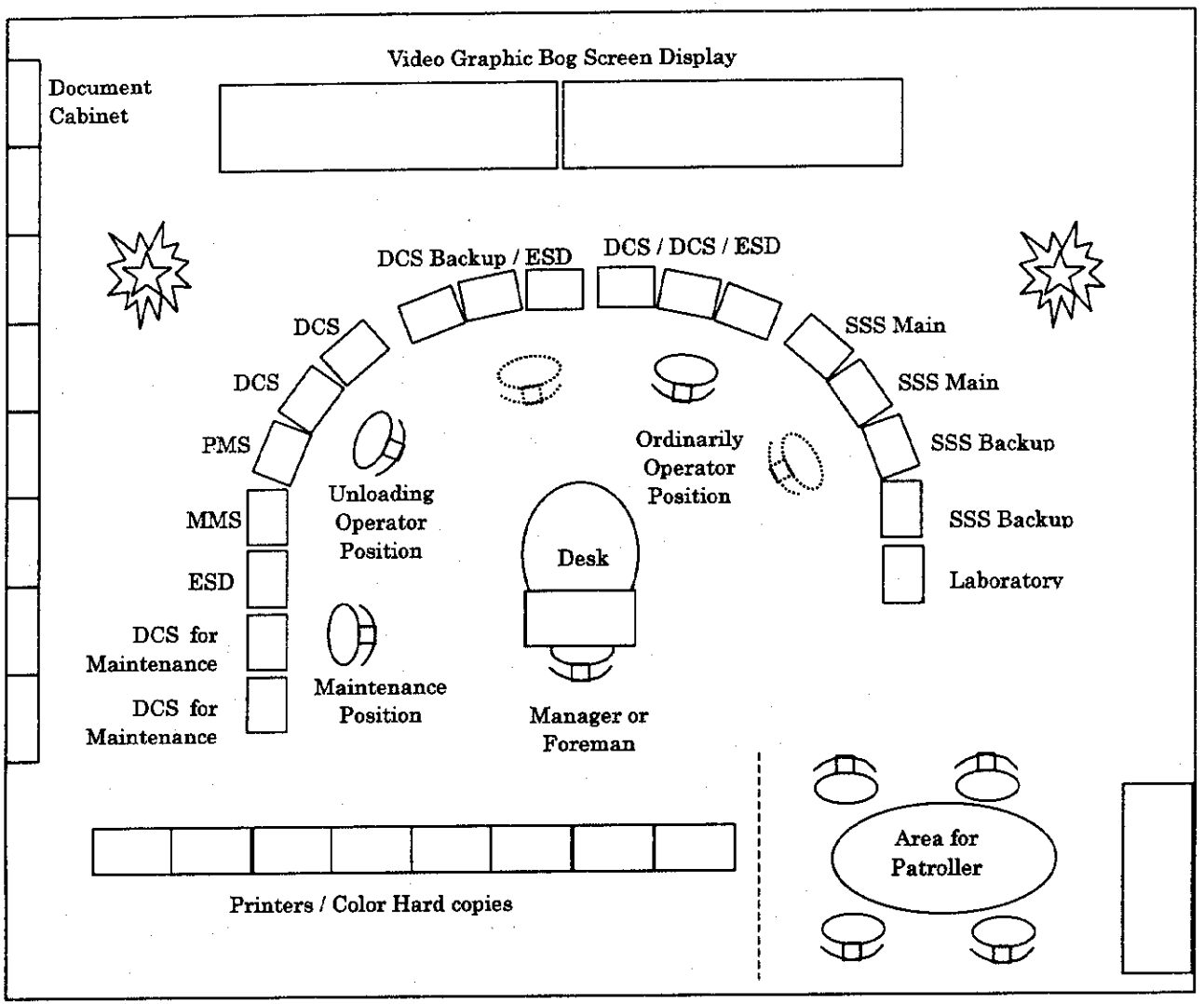
Appendix C Comparison of Compressor Types

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

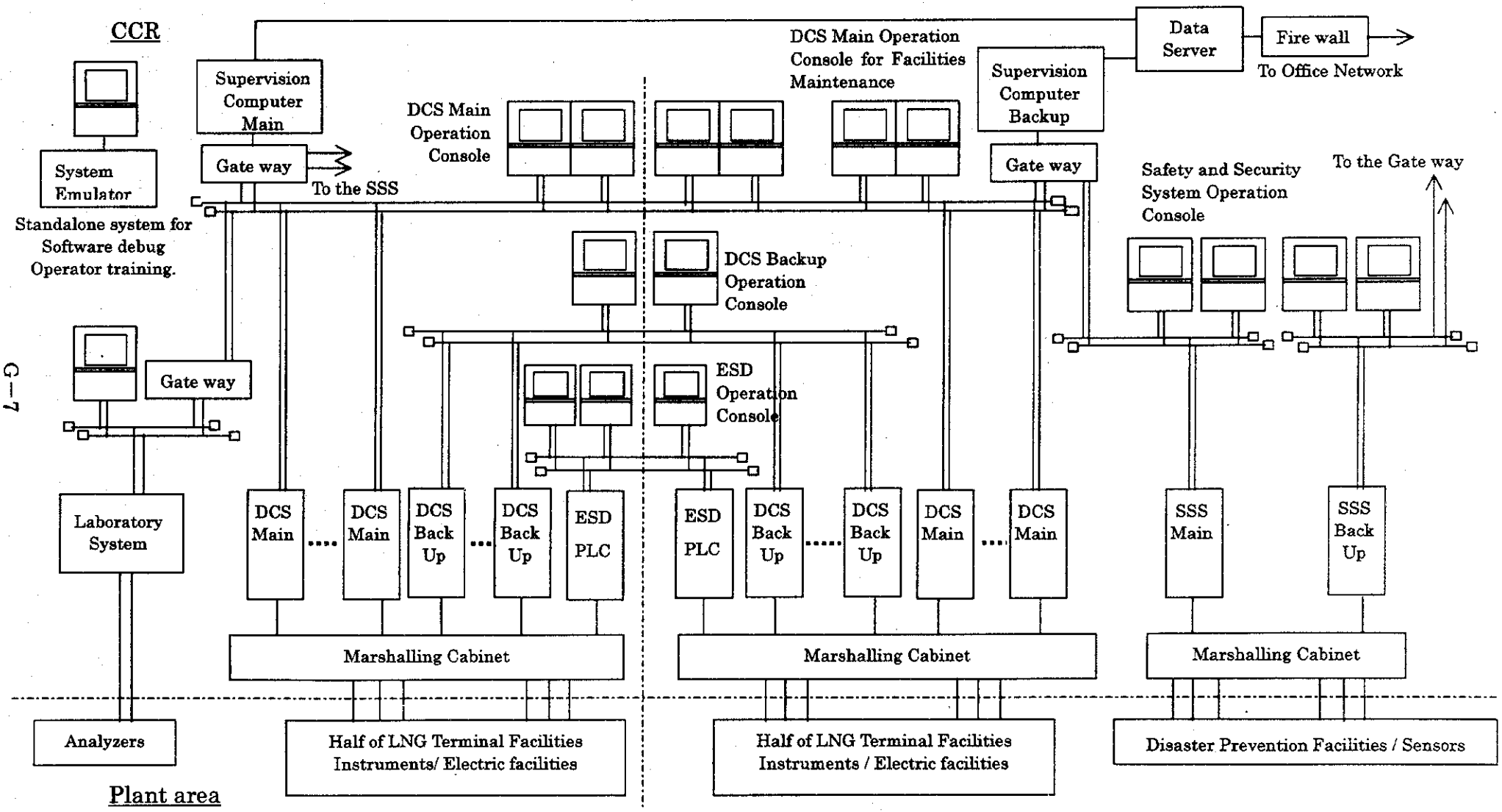
		RECIPROCATING	CENTRIFUGAL
Const-ruction	Others	1. Many mechanical contact parts. Wear in these portions causes reduced efficiency.	1. No contact parts, except the bearing units. No reduced efficiency due to wear. 2. Comparatively simple construction.
Operability		1. Quick start (starts up in approx. 2 minutes.) 2. Capacity adjustable range → 5-stepped adjust (0 ~100%)	1. Bypass start (starts up in approx. 15 minutes) 2. Capacity adjustable range → stepless (0 ~100%) 3. Narrow operating range 4. High running noise
Maintenance		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) 2. Other costs (lubricant, consumables, personnel, etc.) ··· high	1. Power cost ··· high (Large capacity type: approximate to RECIPRO) 2. Others (lubricant, consumables, personnel, etc.) ··· low

Appendix D

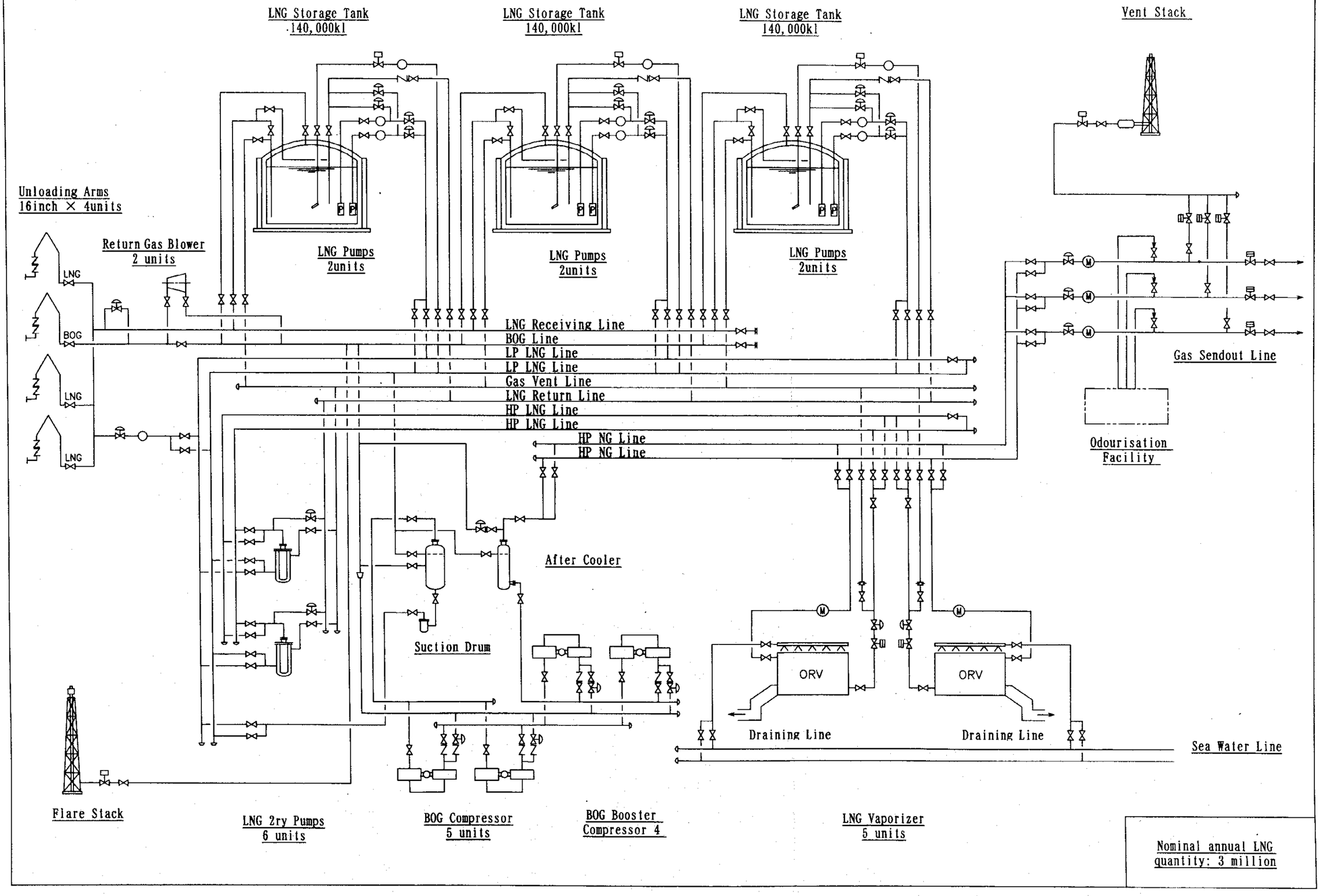
Central Control Room Plot Plan (For the Reference only)



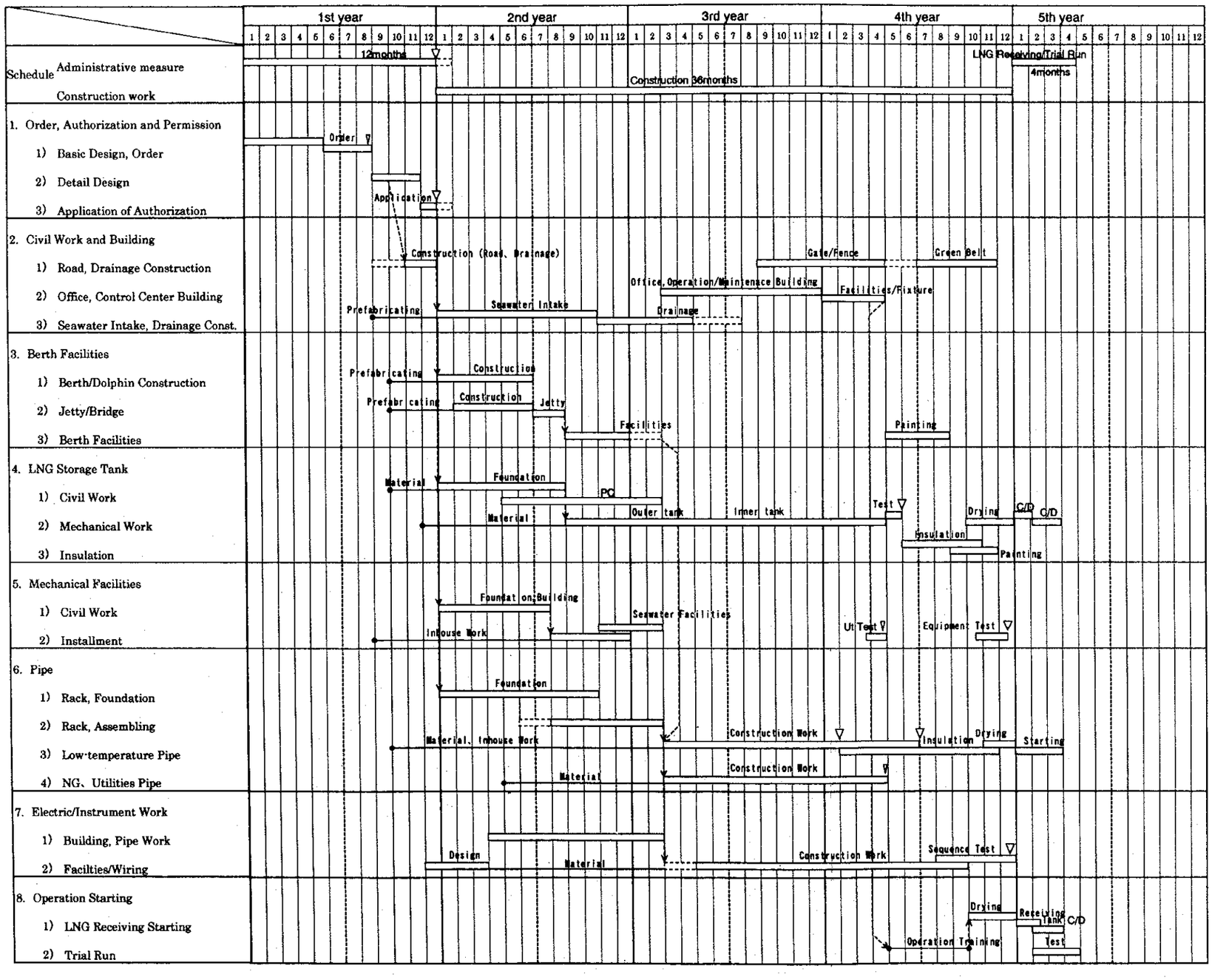
Appendix E System Configuration



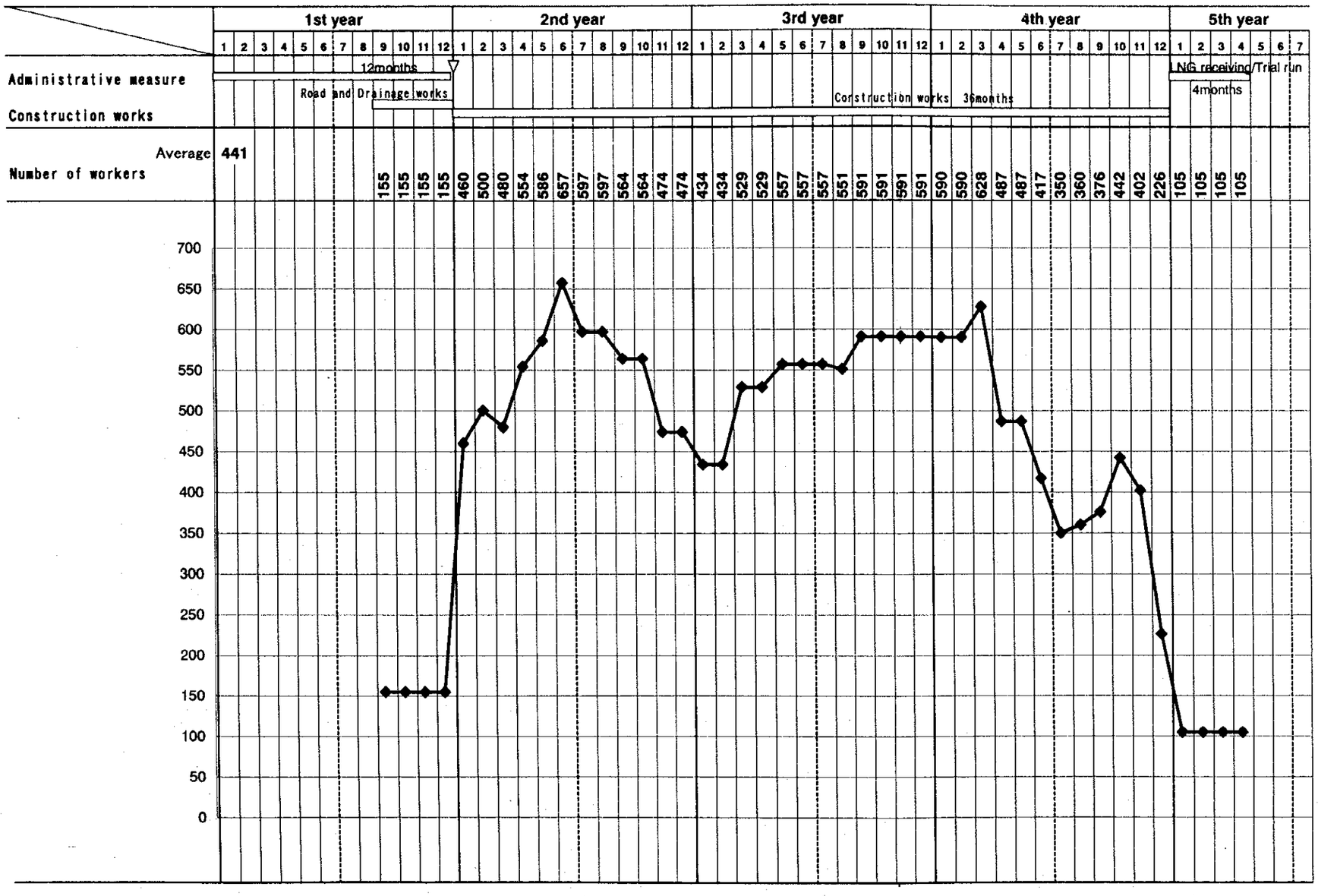
Appendix F Process Flow Diagram



Appendix G　Construction Schedule



Appendix H　Required Construction Workers for an LNG Receiving Terminal

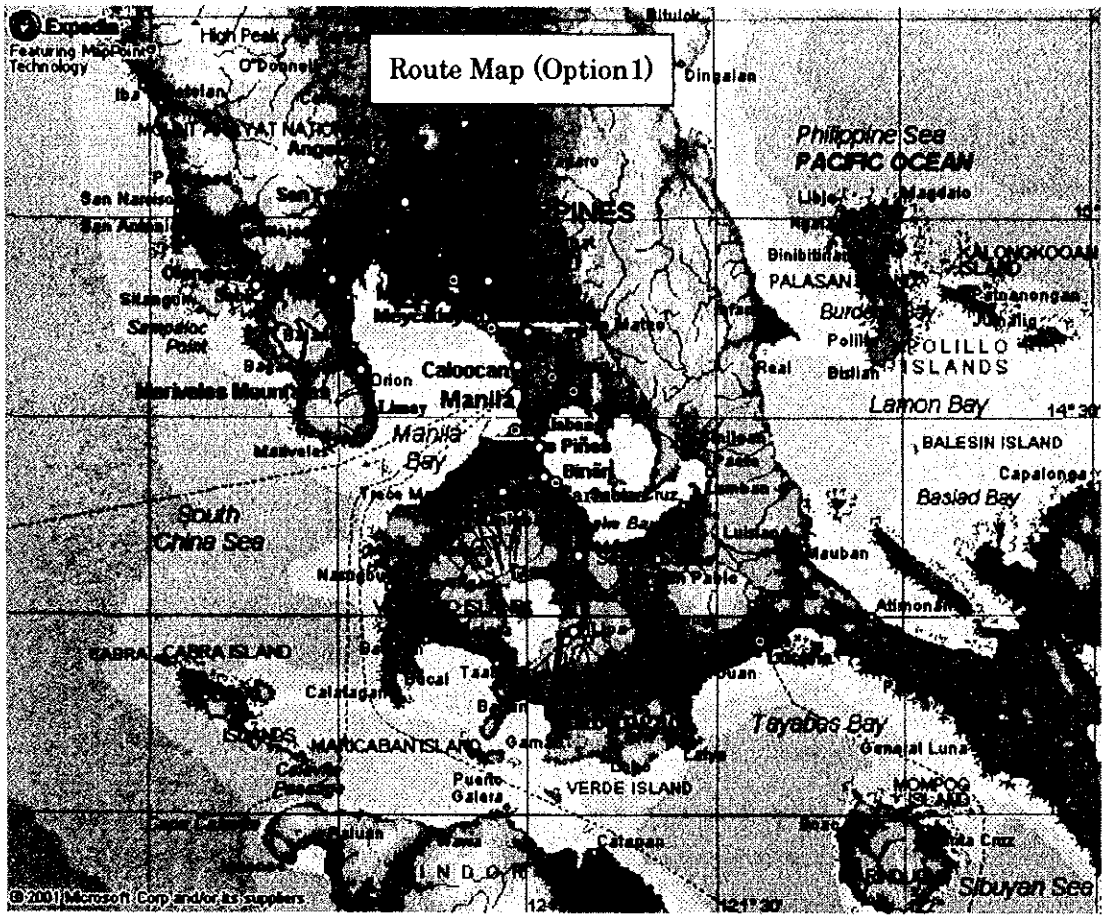


Appendix H

Gas Pipeline Route Map

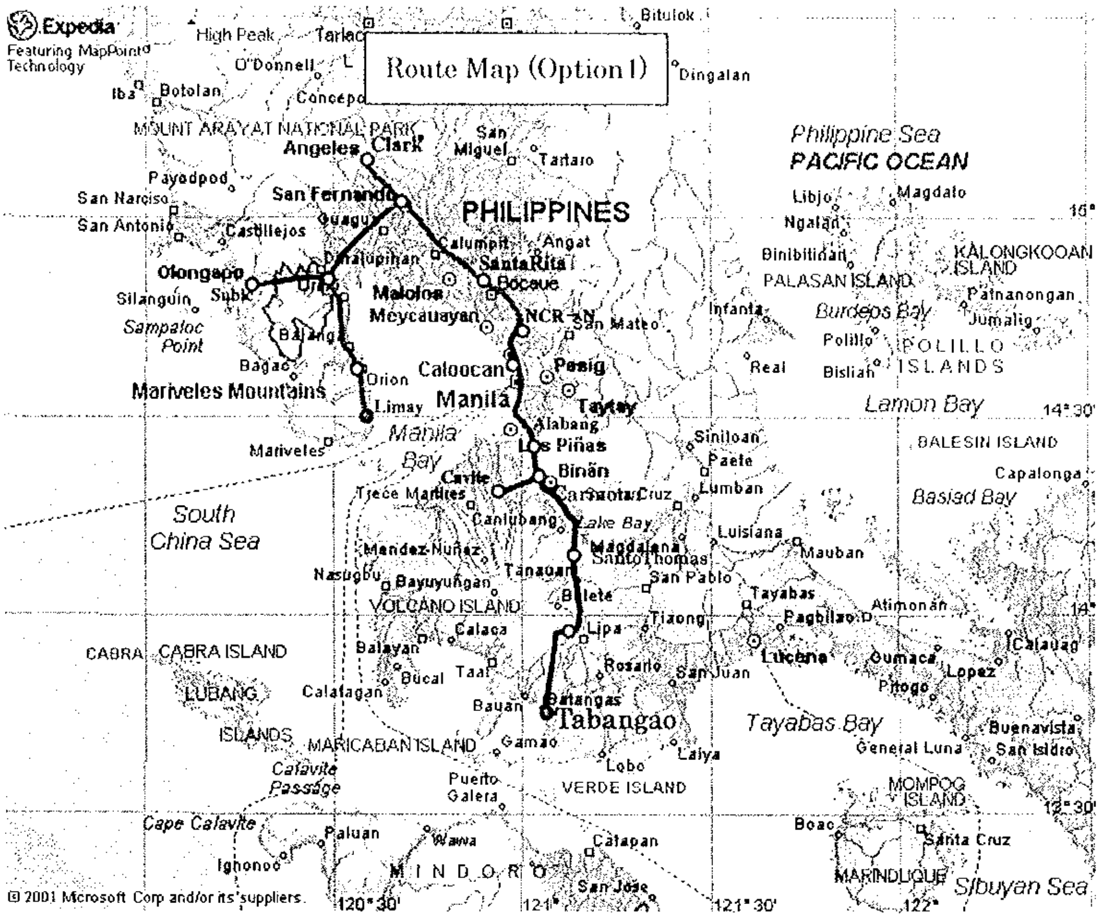
and

Gas Distribution Plan



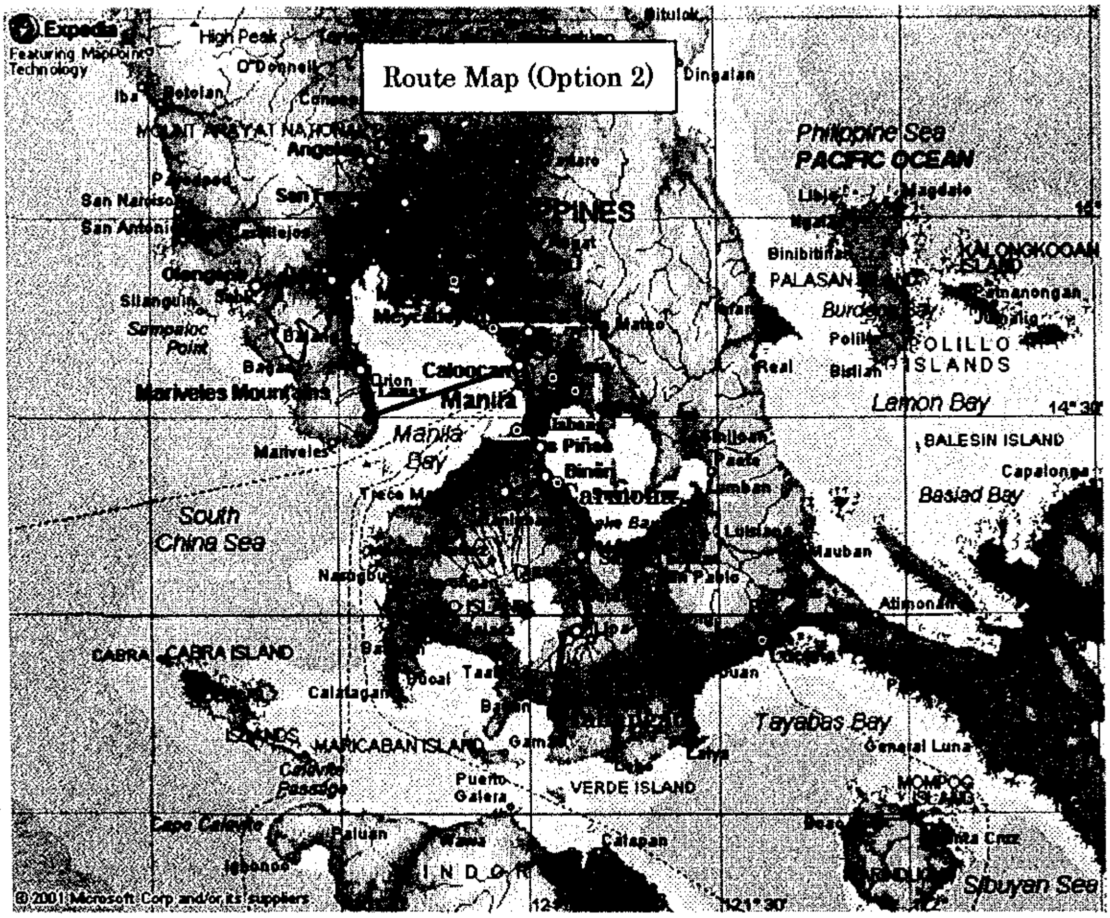
Outline of Transmission Pipeline

From	To	Length (m)	Pipe Diameter (Inch)	
			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



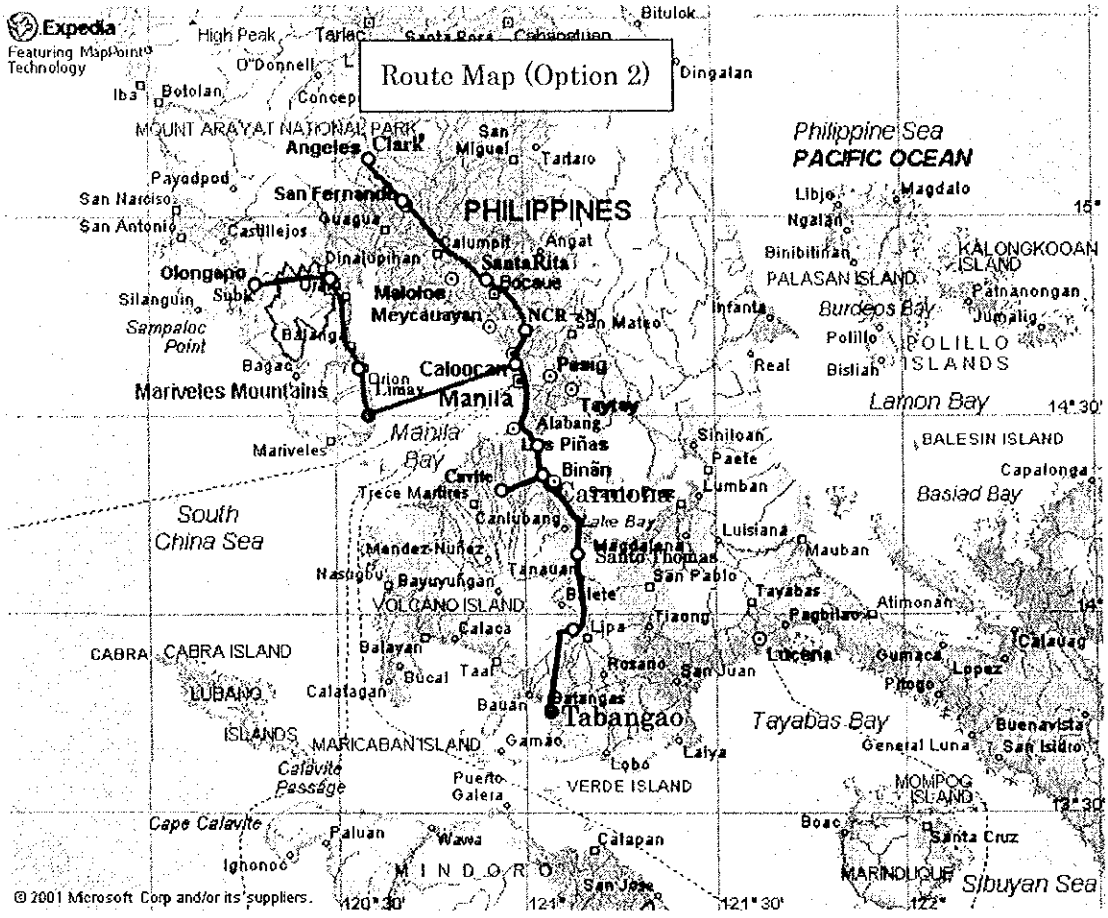
Outline of Transmission Pipeline

From	To	Length (m)	Pipe Diameter (Inch)	
			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	To	Length (m)	Pipe Diameter (Inch)	
			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 Pipeline

From	To	Length (m)	Pipe Diameter (Inch)	
			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

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

Area-L: High Case/ Option 1

Total demand of Natural gas			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
	Total		12,189	4,524	3,670	5,045	5,406	8,149	10,455	15,306	82,972	151,321	163,723	176,006	193,043	206,199	219,818	233,917	249,703	266,021	282,892	300,338	318,381	335,855	353,739	372,052	390,809	409,607
1	Tabangao	Nm3/h							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	Lipa City	Nm3/h							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Santo Tomas	Nm3/h	442	181	148	200	213	314	396	567	6,770	7,186	7,619	8,044	12,808	13,261	13,739	14,213	14,753	15,311	15,886	16,481	17,095	17,686	18,289	18,907	19,539	20,172
4	Calaysc	Nm3/h	410	167	137	185	197	291	367	526	696	1,082	1,483	1,877	2,283	2,703	3,137	3,585	4,086	4,603	5,136	5,687	6,257	6,804	7,363	7,936	8,522	9,108
5	Carmona	Nm3/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Alabang	Nm3/h	1,305	472	381	527	565	857	1,104	1,625	2,185	3,467	4,801	6,124	7,494	8,912	10,381	11,902	13,605	15,367	17,189	19,073	21,022	22,912	24,847	26,828	28,858	30,892
7	Bacoor	Nm3/h	0	0	0	0	0	0	0	0	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	Manila	Nm3/h	3,920	1,417	1,145	1,584	1,699	2,576	3,317	4,881	6,565	10,416	14,423	18,399	22,514	26,775	31,188	35,757	40,875	46,167	51,640	57,301	63,157	68,836	74,649	80,601	86,699	92,811
10	North HCR	Nm3/h	4,687	1,695	1,369	1,894	2,031	3,080	3,966	5,836	7,850	12,455	17,246	22,000	26,921	32,016	37,291	42,755	48,875	55,203	61,747	68,516	75,518	82,307	89,258	96,376	103,667	110,976
11	Cavite	Nm3/h	447	183	150	202	215	318	401	574	760	1,181	1,619	2,049	2,492	2,950	3,424	3,913	4,460	5,024	5,607	6,208	6,830	7,427	8,037	8,662	9,302	9,942
12	Sucat	Nm3/h	396	162	133	179	191	282	355	508	57,098	113,896	114,284	114,664	115,057	115,463	115,882	116,316	116,800	117,300	117,815	118,348	118,899	119,427	119,968	120,523	121,088	121,655
13	Santa Rita	Nm3/h	304	129	107	144	153	225	286	412	568	854	1,173	1,488	1,813	2,150	2,498	2,859	3,262	3,678	4,109	4,554	5,014	5,458	5,913	6,379	6,856	7,334
14	San Fernando	Nm3/h	202	86	72	96	102	150	190	274	364	569	781	990	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	4,880
15	Clark	Nm3/h	8	3	3	4	4	6	7	10	14	21	29	37	45	54	63	72	82	92	103	114	125	137	148	160	172	184
16	Dinalupihan	Nm3/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	Orion	Nm3/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	Limay	Nm3/h	65	27	23	31	33	48	61	88	116	182	250	316	386	457	531	608	694	782	874	969	1,066	1,161	1,258	1,357	1,458	1,560
19	Subic	Nm3/h	4	2	1	2	2	3	4	5	7	11	15	19	23	27	31	36	41	46	51	57	63	68	74	80	86	92

: Actual Demand

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

Area-L: High Case / Option 2

Total demand of Natural gas			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
	Total		35,692	42,756	49,961	31,813	54,105	56,665	65,085	192,966	202,581	212,686	223,227	234,732	247,321	258,273	269,763	281,818	294,469	307,741	321,686	401,350	416,767	431,019	445,971	461,593	477,916	494,736
1	Tabangao	Nm3/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	Lipa City	Nm3/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Santo Tomas	Nm3/h	442	181	148	100	213	314	396	567	6,770	7,186	7,619	8,044	11,808	13,261	13,729	14,213	14,733	15,311	15,886	16,481	17,095	17,686	18,289	18,907	19,539	20,173
4	Calauan	Nm3/h	410	167	137	185	197	291	367	526	696	1,082	1,483	1,877	2,283	2,703	3,137	3,585	4,086	4,603	5,136	5,687	6,257	6,804	7,363	7,936	8,522	9,108
5	Carmona	Nm3/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Alabang	Nm3/h	1,305	472	381	527	565	857	1,104	1,625	2,185	3,467	4,801	6,124	7,494	8,911	10,381	11,902	13,605	15,367	17,189	19,073	21,022	22,913	24,847	26,828	28,858	30,892
7	Bacoor	Nm3/h	0	0	0	0	0	0	0	0	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	Manila	Nm3/h	3,920	1,617	1,145	1,584	1,699	2,576	3,317	4,881	6,565	10,416	14,423	18,399	22,514	26,775	31,188	35,757	40,875	46,167	51,640	57,301	63,157	68,836	74,649	80,601	86,699	92,813
10	North NCR	Nm3/h	4,687	1,695	1,369	1,894	2,031	3,080	3,966	5,836	7,850	12,455	17,246	22,000	26,921	32,016	37,291	42,755	48,875	55,203	61,747	68,516	75,518	82,307	89,258	96,376	103,667	110,976
11	Cavite	Nm3/h	447	183	150	202	215	318	401	574	766	1,181	1,619	2,049	2,492	2,950	3,424	3,913	4,460	5,024	5,607	6,208	6,830	7,427	8,057	8,663	9,302	9,943
12	Sucat	Nm3/h	396	163	133	179	191	282	355	508	57,098	113,896	114,284	114,664	115,057	115,463	115,882	116,316	116,880	117,300	117,815	118,348	118,899	119,427	119,968	120,522	121,088	121,655
13	Lamay	Nm3/h	65	27	23	31	33	48	61	88	116	182	250	316	386	457	531	608	694	783	874	969	1,066	1,161	1,258	1,357	1,458	1,560
14	Santa Rita	Nm3/h	304	129	107	144	153	225	286	412	548	854	1,173	1,488	1,813	2,150	2,498	2,859	3,261	3,678	4,109	4,554	5,014	5,458	5,913	6,379	6,856	7,334
15	San Fernando	Nm3/h	292	86	72	96	102	150	190	274	364	569	781	990	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	4,880
16	Clark	Nm3/h	8	3	3	4	4	6	7	10	14	21	29	37	45	54	63	72	82	92	103	114	125	137	148	160	172	184
17	Dinalupihan	Nm3/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	Orion	Nm3/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	Subic	Nm3/h	4	2	1	1	1	3	4	5	7	11	15	19	23	27	31	36	41	46	51	57	63	68	74	80	86	92

: Actual Demand

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

Area L: Low Case / Option 1

Total demand of Natural gas			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
	Total		12,189	10,498	4,757	5,777	5,912	6,073	7,247	8,453	15,777	17,121	18,506	25,140	140,482	143,169	146,063	149,182	152,636	156,331	160,285	164,743	169,384	176,304	183,209	190,647	198,676	207,155
1	Tabangao	Nm3/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	Lipa City	Nm3/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Santo Tomas	Nm3/h	442	405	189	227	231	237	277	319	6,583	6,429	6,477	10,884	10,972	11,066	11,167	11,276	11,397	11,525	11,662	11,817	11,994	12,214	12,450	12,703	12,976	13,265
4	Calaca	Nm3/h	410	376	175	210	214	219	257	295	337	380	425	500	581	669	762	863	975	1,094	1,221	1,364	1,529	1,732	1,951	2,186	2,439	2,707
5	Carmona	Nm3/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Alabang	Nm3/h	1,305	1,104	497	605	620	637	763	893	1,033	1,178	1,327	1,574	1,842	2,130	2,441	2,776	3,147	3,564	3,969	4,449	5,002	5,695	6,440	7,243	8,109	9,026
7	Bacoor	Nm3/h	0	0	0	0	0	0	0	0	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	Manila	Nm3/h	3,929	3,318	1,492	1,818	1,862	1,913	2,293	2,685	3,105	3,539	3,987	4,730	5,533	6,399	7,333	8,339	9,454	10,648	11,925	13,366	15,029	17,110	19,340	21,761	24,363	27,117
10	North NCR	Nm3/h	4,687	3,967	1,784	2,173	2,226	2,288	2,742	3,208	3,712	4,233	4,767	5,656	6,616	7,653	8,768	9,971	11,305	12,732	14,259	15,982	17,970	20,459	23,135	26,020	29,132	32,424
11	Cavite	Nm3/h	447	410	191	229	234	240	280	322	368	415	463	546	634	730	832	943	1,064	1,194	1,333	1,489	1,669	1,891	2,130	2,386	2,663	2,954
12	Sucat	Nm3/h	396	363	169	203	207	212	248	286	326	368	410	483	113,412	113,696	113,987	113,685	113,791	113,908	114,031	114,169	114,328	114,525	114,736	114,963	115,208	115,466
13	Santa Rita	Nm3/h	304	285	136	162	166	171	202	233	268	303	339	400	466	536	612	694	784	880	983	1,099	1,233	1,398	1,575	1,767	1,973	2,191
14	San Fernando	Nm3/h	202	190	90	108	111	114	134	155	178	202	226	266	310	357	407	461	522	586	654	731	820	930	1,048	1,176	1,313	1,458
15	Clark	Nm3/h	8	7	3	4	4	4	5	6	7	8	8	10	12	13	15	17	20	22	25	28	31	35	39	44	49	55
16	Dinalupihan	Nm3/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	Orion	Nm3/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	Limay	Nm3/h	65	61	29	35	35	36	43	50	57	64	71	85	99	114	130	148	167	187	209	234	262	297	335	376	420	466
19	Subic	Nm3/h	4	4	2	2	2	2	3	3	3	4	4	5	6	7	8	9	10	11	13	14	15	17	20	22	25	27

: Actual Demand

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

Area L: Low Case / Option 2

Total demand of Natural gas			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
	Total		35,692	44,759	49,961	51,813	56,105	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	445,973	461,593	477,916	494,716
1	Tabangao	Nm3/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	Lipa City	Nm3/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Santo Tomas	Nm3/h	442	405	189	227	291	237	377	339	6,383	6,429	6,477	10,884	10,972	11,066	11,167	11,276	11,397	11,525	11,662	11,817	11,994	12,214	12,450	12,703	12,976	13,265
4	Calaysa	Nm3/h	410	376	175	210	214	219	257	295	337	380	425	500	581	669	762	863	975	1,094	1,221	1,364	1,529	1,732	1,951	2,186	2,439	2,707
5	Carmona	Nm3/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Alabang	Nm3/h	1,305	1,104	457	605	620	637	763	895	1,033	1,178	1,327	1,574	1,842	2,130	2,441	2,776	3,147	3,544	3,969	4,449	5,002	5,695	6,440	7,245	8,109	9,036
7	Bacoor	Nm3/h	0	0	0	0	0	0	0	0	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	Manila	Nm3/h	3,910	3,318	1,492	1,818	1,861	1,913	2,293	2,683	3,105	3,539	3,987	4,730	5,535	6,399	7,333	8,339	9,454	10,648	11,925	13,366	15,029	17,110	19,349	21,761	24,363	27,117
10	North NCR	Nm3/h	4,687	3,967	1,784	2,173	2,226	2,288	2,743	3,208	3,712	4,232	4,767	5,656	6,616	7,652	8,768	9,971	11,305	12,732	14,259	15,982	17,970	20,459	23,135	26,020	29,132	32,424
11	Cavite	Nm3/h	447	410	191	229	234	240	280	321	368	415	463	546	634	730	832	943	1,064	1,194	1,333	1,489	1,669	1,891	2,139	2,386	2,663	2,954
12	Sucat	Nm3/h	396	363	169	203	207	212	248	286	326	368	410	483	113,412	113,496	113,587	113,685	113,792	113,908	114,031	114,169	114,328	114,525	114,736	114,963	115,208	115,466
13	Limay	Nm3/h	65	61	29	35	35	36	43	50	57	64	72	85	99	114	130	148	167	187	209	234	262	297	335	376	420	466
14	Santa Rita	Nm3/h	304	285	136	162	166	171	202	233	268	303	339	400	466	536	612	694	784	880	983	1,099	1,233	1,398	1,575	1,767	1,978	2,191
15	San Fernando	Nm3/h	202	190	90	108	111	114	134	155	178	202	226	266	310	357	407	462	522	586	654	731	820	930	1,048	1,176	1,313	1,458
16	Clark	Nm3/h	8	7	3	4	4	4	5	6	7	8	8	10	12	13	15	17	20	22	25	28	31	35	39	44	49	55
17	Dinalupihan	Nm3/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	Orion	Nm3/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	Subic	Nm3/h	4	4	2	2	2	2	3	3	3	4	4	5	6	7	8	9	10	11	12	14	15	17	20	22	25	27

: Actual Demand

Distribution Plan Sheet

						Distribution				Transmission Cost(mm$)		
			Category	Gas Demand (mmscfd)	Supply Area (km2)	Category	UnitCost	Cost(mm$)	Maintenance Cost(mm$)	Phase	Construction	Maintenance
High	Option 1	Batangas	Ind.	0.42		Ind.	66,829	7.35				
		Laguna	Com.	4.20	110.00	Com.	47,801	5.26	3.30	I	64.6	5.1975
		Cavite	Res.Tra	11.69		Res.Tra	322,286	35.45				
		Subtotal		16.31						Length(m)	148,500	
		NCR	Ind.	1.56		Ind.	133,658	69.32				
		Rizal	Com.	35.95	518.62	Com.	95,602	49.58	15.56	II	71.4	6.1005
			Res.Tra	100.06		Res.Tra	644,572	334.29				
		Subtotal		137.57						Length(m)	174,300	
		Bulacan	Ind.	0.24		Ind.	66,829	7.50				
		Pampanga	Com.	2.03	112.30	Com.	47,801	5.37	3.37	III	0	0
		Bataan	Res.Tra	5.67		Res.Tra	322,286	36.19				
		Subtotal		7.94						Length(m)	0	
		Total				Ind.		84.17				
				161.82	740.92	Com.		60.21	22.23	Total	136	11.298
						Res.Tra		405.93		Length(m)	322,800	
	Option 2	Batangas	Ind.	0.42		Ind.	66,829	7.35				
		Laguna	Com.	4.20	110.00	Com.	47,801	5.26	3.30	I	64.6	5.1975
		Cavite	Res.Tra	11.69		Res.Tra	322,286	35.45				
		Subtotal		16.31						Length(m)	148,500	
		NCR	Ind.	1.56		Ind.	133,658	69.32				
		Rizal	Com.	35.95	518.62	Com.	95,602	49.58	15.56	II	71.4	1.33
			Res.Tra	100.06		Res.Tra	644,572	334.29				
		Subtotal		137.57						Length(m)	38,000	
		Bulacan	Ind.	0.24		Ind.	66,829	7.50				
		Pampanga	Com.	2.03	112.30	Com.	47,801	5.37	3.37	III	0	4.8755
		Bataan	Res.Tra	5.67		Res.Tra	322,286	36.19				
		Subtotal		7.94						Length(m)	139,300	
		Total	Ind.			Ind.		84.17				
			Com.	161.82	740.92	Com.		60.21	22.23	Total	136	11.403
			Res.Tra			Res.Tra		405.93		Length(m)	325,800	
Low	Option 1	Batangas	Ind.	0.25		Ind.	66,829	2.18				
		Laguna	Com.	2.50	32.66	Com.	47,801	1.56	0.98	I	64.6	5.1975
		Cavite	Res.Tra	2.09		Res.Tra	322,286	10.53				
		Subtotal		4.84						Length(m)	148,500	
		NCR	Ind.	0.95		Ind.	133,658	20.26				
		Rizal	Com.	21.57	151.57	Com.	95,602	14.49	4.55	II	71.4	6.1005
			Res.Tra	17.69		Res.Tra	644,572	97.70				
		Subtotal		40.21						Length(m)	174,300	
		Bulacan	Ind.	0.14		Ind.	66,829	2.24				
		Pampanga	Com.	1.22	33.52	Com.	47,801	1.60	1.01	III	0	0
		Bataan	Res.Tra	1.01		Res.Tra	322,286	10.80				
		Subtotal		2.37						Length(m)	0	
		Total	Ind.			Ind.		24.68				
			Com.	47.42	217.75	Com.		17.65	6.53	Total	136	11.298
			Res.Tra			Res.Tra		119.03		Length(m)	322,800	
	Option 2	Batangas	Ind.	0.25		Ind.	66,829	2.18				
		Laguna	Com.	2.50	32.66	Com.	47,801	1.56	0.98	I	64.6	5.1975
		Cavite	Res.Tra	2.09		Res.Tra	322,286	10.53				
		Subtotal		4.84						Length(m)	148,500	
		NCR	Ind.	0.95		Ind.	133,658	20.26				
		Rizal	Com.	21.57	151.57	Com.	95,602	14.49	4.55	II	71.4	1.33
			Res.Tra	17.69		Res.Tra	644,572	97.70				
		Subtotal		40.21						Length(m)	38,000	
		Bulacan	Ind.	0.14		Ind.	66,829	2.24				
		Pampanga	Com.	1.22	33.52	Com.	47,801	1.60	1.01	III	0	4.8755
		Bataan	Res.Tra	1.01		Res.Tra	322,286	10.80				
		Subtotal		2.37						Length(m)	139,300	
		Total	Ind.			Ind.		24.68				
			Com.	47.42	217.75	Com.		17.65	6.53	Total	136	11.403
			Res.Tra			Res.Tra		119.03		Length(m)	325,800