

## 添付資料 4-7-2

### Phu Yen East 地点の概算工事費

## Total Project Cost Estimated for Phu Yen East PSPP site

Cost Items	Unit	Unit price (USD)	Phu Yen East (1,200MW)	
			Quantity	Cost
<b>I Construction Cost</b>				
<b>1.1 Preparatory Works</b>				
Operation Roads in area	km	360,000	14.0	5,040,000
Construction Roads in area	km	280,000	5.0	1,400,000
Roads to Project Area	km	570,000	7.3	4,161,000
Bridge	m <sup>2</sup>	2,015	2,300	4,634,500
Base camp	%	5.0		761,775
Construction power supply	km	42,718	7.3	311,845
Others	%	5.0		815,456
<b>Total</b>				<b>17,125,000</b>
<b>1.2 Civil Work</b>				
1) Site installation	%	5.0		12,425,900
2) Temporary river diversion				
#	m <sup>3</sup>	42.4	33,810	1,433,544
#	%	15.0		215,032
#	m <sup>3</sup>	116.5	3,220	375,066
#	t	790.0	322	254,380
#	m <sup>3</sup>	1.9	6,000	11,160
#	m <sup>3</sup>	4.5	24,000	107,040
#	%	10.0		239,622
<b>Sub Total</b>				<b>2,636,000</b>
3) Upper Dam/Reservoir				
#	m <sup>3</sup>	2.5	240,000	600,000
#	m <sup>3</sup>	6.0	4,560,000	27,268,800
#	m <sup>3</sup>	4.8	1,824,000	8,773,440
#	m <sup>3</sup>	11.6	1,824,000	21,213,120
#	m <sup>3</sup>	94.0	4,000	376,000
#	t	700.0	400	280,000
Asphalt pavement, flat	m <sup>2</sup>	65.3	152,000	9,925,600
Asphalt pavement, slope	m <sup>2</sup>	192.6	165,000	31,779,000
Excavation, tunnel (drainage)	m <sup>3</sup>	42.4	45,136	1,913,763
Tunnel supporting work	%	15.0		287,065
Concrete, lining	m <sup>3</sup>	116.5	16,444	1,915,372
Re-bar, tunnel	t	790.0	1,644	1,299,059
#	%	5.0		5,281,561
<b>Sub Total</b>				<b>110,913,000</b>
4) Lower Dam/Reservoir				
#	m <sup>3</sup>	2.5	4,500	11,250
#	m <sup>3</sup>	6.0	85,500	511,290
#	m <sup>3</sup>	82.0	200,000	16,400,000
#	m <sup>3</sup>	94.0	20,000	1,880,000
#	t	700.0	2,000	1,400,000
#	m	29.9	3,400	101,660
#	m	67.9	24,300	1,649,970
#	m <sup>2</sup>	2,000.0	1,140	2,280,000
#	%	5.0		1,211,709
<b>Sub Total</b>				<b>25,446,000</b>
5) Power intake				
Excavation, common	m <sup>3</sup>	2.5	1,700	4,250
Excavation, rock	m <sup>3</sup>	6.0	32,300	193,154
Excavation, tunnel	m <sup>3</sup>	42.4	1,110	47,064
Tunnel, shaft supporting work	%	15.0		7,060
Concrete, structure	m <sup>3</sup>	94.0	5,100	479,400
Concrete, tunnel	m <sup>3</sup>	116.5	370	43,098
Re-bar, open	t	700.0	510	357,000
Re-bar, tunnel	t	790.0	37	29,230
Others	%	10.0		116,026
<b>Sub Total</b>				<b>1,276,000</b>

## Total Project Cost Estimated for Phu Yen East PSPP site

Cost Items	Unit	Unit price (USD)	Phu Yen East (1,200MW)	
			Quantity	Cost
<b>6) Penstock</b>				
Excavation, common	m <sup>3</sup>	2.5	1,000	2,500
Excavation, rock	m <sup>3</sup>	6.0	3,000	17,940
Excavation, tunnel	m <sup>3</sup>	42.4	27,082	1,148,258
Excavation, inclined shaft	m <sup>3</sup>	62.0	55,517	3,442,066
Tunnel supporting work	%	15.0		688,549
Concrete, backfill, tunnel	m <sup>3</sup>	186.5	3,000	559,380
Concrete, backfill, shaft	m <sup>3</sup>	192.2	25,159	4,835,559
Re-bar, tunnel	t	790.0	300	237,000
Re-bar, shaft	t	790.0	2,516	1,987,561
Others	%	10.0		1,291,881
<b>Sub Total</b>				14,211,000
<b>7) Powerhouse and switchyard</b>				
Excavation, common	m <sup>3</sup>	2.5	2,100	5,250
Excavation, rock	m <sup>3</sup>	6.0	39,900	238,602
Excavation, tunnel	m <sup>3</sup>	42.4	31,700	1,344,080
Tunnel supporting work	%	10.0		134,408
Excavation, cavern	m <sup>3</sup>	34.9	185,000	6,456,500
Cavern supporting work	%	15.0		968,475
Concrete, structure, open	m <sup>3</sup>	94.0	1,050	98,700
Concrete, structure, cavern	m <sup>3</sup>	116.5	74,000	8,619,520
Re-bar, open	t	700.0	52.5	36,750
Re-bar, cavern	t	790.0	11,100	8,769,000
Others	%	10.0		2,667,129
<b>Sub Total</b>				29,338,000
<b>8) Surge tank (tailrace)</b>				
Excavation, tunnel	m <sup>3</sup>	42.4	60,000	2,544,000
Excavation, shaft	m <sup>3</sup>	78.0	52,060	4,060,680
Tunnel supporting work	%	15.0		990,702
Concrete, lining	m <sup>3</sup>	161.9	9,040	1,463,576
Re-bar	t	790.0	904	714,160
Others	%	10.0		977,312
<b>Sub Total</b>				10,750,000
<b>9) Tailrace</b>				
Excavation, tunnel	m <sup>3</sup>	42.4	146,810	6,224,744
Tunnel supporting work	%	15.0		933,712
Concrete, lining, tunnel	m <sup>3</sup>	116.5	45,790	5,333,619
Re-bar, tunnel	t	790.0	9,158	7,234,820
Work adit	m <sup>3</sup>	42.4	25,000	1,060,000
Others (Work adits etc.)	%	10.0		2,078,689
<b>Sub Total</b>				22,866,000
<b>10) Power outlet</b>				
Excavation, common	m <sup>3</sup>	2.5	926.5	2,316
Excavation, rock	m <sup>3</sup>	6.0	17,604	105,269
Excavation, tunnel	m <sup>3</sup>	42.4	1,110	47,064
Excavation, shaft	m <sup>3</sup>	62.0	2,490	154,380
Tunnel, shaft supporting work	%	15.0		30,217
Concrete, structure	m <sup>3</sup>	94.0	4,475	420,650
Concrete, tunnel	m <sup>3</sup>	116.5	950	110,656
Concrete, shaft	m <sup>3</sup>	161.9	150	24,282
Re-bar, open	t	700.0	224	156,625
Re-bar, tunnel	t	790.0	48	37,525
Re-bar, shaft	t	790.0	15	11,850
Others	%	10.0		110,083
<b>Sub Total</b>				1,211,000

## Total Project Cost Estimated for Phu Yen East PSPP site

Cost Items	Unit	Unit price (USD)	Phu Yen East (1,200MW)	
			Quantity	Cost
<b>11) Main Tunnels</b>				
Excavation, tunnel	m <sup>3</sup>	42.4	216,000	9,158,400
Excavation, shaft	m <sup>3</sup>	62.0	4,000	248,000
Tunnel, shaft supporting work	%	15.0		1,410,960
Concrete, tunnel	m <sup>3</sup>	116.5	93,510	10,891,987
Re-bar, tunnel	t	790.0	4,675	3,693,625
Others	%	10.0		2,540,297
<b>Sub Total</b>				<b>27,943,000</b>
<b>Total</b>				
				<b>259,016,000</b>
<b>1.3 Hydromechanical Works</b>				
Penstock	t	3,500	8,600	30,100,000
Bifercation	t	4,000	300	1,200,000
Draft	t	3,500	650	2,275,000
Draft gate	t	4,000	450	1,800,000
Outlet gate	t	4,000	450	1,800,000
Others	%	16.0		5,948,000
<b>Total</b>				<b>43,123,000</b>
<b>1.4 Hydroelectrical Works</b>				
1) Generating equipment/Transformer	LS			<b>256,310,000</b>
<b>Total Cost of Construction Works</b>				
				<b>575,574,000</b>
<b>II Engineering Service</b>	%	7.5		<b>43,168,000</b>
<b>III Administration Expense</b>	%	0.5		<b>2,878,000</b>
<b>IV Land compensation and Resettlement</b>				
<b>4.1 Resettlement</b>				
1) Land compensation and Resettlement		32,363	74	2,394,825
2) Other compensations	%	10.0		239,483
<b>4.2 Others</b>				
Others	%	10.0		263,431
<b>Total</b>				<b>2,898,000</b>
<b>V Tax (VAT 10%)</b>	%	10.0		<b>29,943,000</b>
<b>VI Physical Contingency</b>	%	10.0		<b>65,446,000</b>
<b>Total Project Cost (USD)</b>				
				<b>719,907,000</b>
<b>Construction Unit Cost (USD/kW)</b>				
				<b>600</b>

## 添付資料 4-7-3

### Phu Yen East 地点の FIRR 算出結果

## Computation of FIRR for Phu Yen East Project (at consumer's end)

**(Power Tariff of USc 12cents /kWh)**

**Pumping energy ; Coal Case**

(Unit: US\$ million)

No.	Year	Capital costs Total	O&M costs	Pumping costs	Total costs	Saleable energy (GWh)	Power rate (USc/kWh)	Financial revenue	Selling& general expenses	Resources tax & VAT	Current surplus	B - C
1		1.5			1.5							(1.5)
2		2.5			2.5							(2.5)
3		3.4			3.4							(3.4)
4		35.1			35.1							(35.1)
5		79.5			79.5							(79.5)
6		147.5			147.5							(147.5)
7		118.9			118.9							(118.9)
8		225.3			225.3							(225.3)
9		164.3			164.3							(164.3)
10		20.4			20.4							(20.4)
11		1.1			1.1							(1.1)
12	1		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
13	2		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
14	3		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
15	4		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
16	5		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
17	6		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
18	7		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
19	8		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
20	9		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
21	10		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
22	11		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
23	12		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
24	13		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
25	14		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
26	15		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
27	16		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
28	17		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
29	18		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
30	19		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
31	20		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
32	21		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
33	22		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
34	23		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
35	24		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
36	25		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
37	26		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
38	27		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
39	28		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
40	29		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
41	30		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
42	31		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
43	32		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
44	33		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
45	34		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
46	35		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
47	36		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
48	37		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
49	38		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
50	39		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
51	40		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
52	41	256.3	5.6	20.2	282.1	0	12.0	0.0	0.0	0.0	0.0	(282.1)
53	42		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
54	43		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
55	44		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
56	45		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
57	46		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
58	47		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
59	48		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
60	49		5.6	20.2	25.8	960	12.0	115.2	9.6	13.8	91.8	66.0
61	50	(228.9)	5.6	20.2	(203.1)	960	12.0	115.2	9.6	13.8	91.8	294.8
FIRR=												<b>6.1%</b>

**Computation of FIRR for Phu Yen East Project (at consumer's end)**

**(Power Tariff of USc 12cents /kWh)**

**Pumping energy ; Hydropower**

(Unit: US\$ million)

No.	Year	Capital costs Total	O&M costs	Pumping costs	Total costs	Saleable energy (GWh)	Power rate (USc/kWh)	Financial revenue	Selling& general expenses	Resources tax & VAT	Current surplus	B - C
1		1.5			1.5							(1.5)
2		2.5			2.5							(2.5)
3		3.4			3.4							(3.4)
4		35.1			35.1							(35.1)
5		79.5			79.5							(79.5)
6		147.5			147.5							(147.5)
7		118.9			118.9							(118.9)
8		225.3			225.3							(225.3)
9		164.3			164.3							(164.3)
10		20.4			20.4							(20.4)
11		1.1			1.1							(1.1)
12	1		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
13	2		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
14	3		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
15	4		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
16	5		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
17	6		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
18	7		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
19	8		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
20	9		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
21	10		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
22	11		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
23	12		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
24	13		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
25	14		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
26	15		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
27	16		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
28	17		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
29	18		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
30	19		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
31	20		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
32	21		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
33	22		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
34	23		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
35	24		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
36	25		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
37	26		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
38	27		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
39	28		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
40	29		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
41	30		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
42	31		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
43	32		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
44	33		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
45	34		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
46	35		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
47	36		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
48	37		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
49	38		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
50	39		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
51	40		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
52	41	256.3	5.6	0.0	261.9	0	12.0	0.0	0.0	0.0	0.0	(261.9)
53	42		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
54	43		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
55	44		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
56	45		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
57	46		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
58	47		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
59	48		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
60	49		5.6	0.0	5.6	960	12.0	115.2	9.6	13.8	91.8	86.2
61	50	(228.9)	5.6	0.0	(223.3)	960	12.0	115.2	9.6	13.8	91.8	315.0

FIRR=

**7.8%**