PLANT SUMMARY 408.48 kWp (Meter-01)

Mono-crystalline Module	: AKCOM (690Wp)
Number of PV Module	: 592 sets
Total Installed Capacity	: 408.48 kWp
Grid-Tie Inverter	: SUN2000-100KTL-M2
Number of Inverter	: 4 Set
Generation Power	: 400 kWac

CLIENT:

มหาวิทยาลัยเทคโนโลยีราชมงคลล้านนา ตาก
41/1 หมู่ 7 ถนนพหลโยธิน ตำบลไม้งาม อำเภอเมือง
จังหวัดตาก 63000

CONTRACTOR:

วันชัยการไฟฟ้า

REV.	DATE	DISCRIPTION	DRAWN	CHECKED	APPROVED
A	29/01/2024	For-Review	Ms. Wanmai K.	Ms. Wanmai K.	Ms. Wanmai K.

CIVIL ENGINEER	
ELECTRICAL ENGINEER	
MECHANICAL ENGINEER	-
PROJECT MANAGER	
DATE	29 Jan 2024

FOR REVIEW

SOLAR ROOFTOP 408.48 kWp (Meter-01) PROJECT

DRAWING NAME: PV MODULE LAYOUT

DRAWING NO.: –

REV.: A

SHEET: 1 Of 1

SCALE: N/A

DESIGNED BY วันชัยการไฟฟ้า

BOQ มหาวิทยาลัยเทคโนโลยีราชมงคลล้านนา ตาก 408.48 kW Meter-01 Rev.1 (2024)

Item	Description	Model / Brand	Quantity	Unit	Price / Unit		Total Price	Remark
					Material	Installation		
1	Permit Coordination	Government	1	Set		120,000.00	120,000.00	
2	Engineering / Design Work	Skylink/ PV Syst	1	Set		50,000.00	50,000.00	
3	Procurement / Installation	Skylink	1	Set			-	
							-	
3.1	PV Module 690 W	AKCOM	592	Panel	3,676,320.00	148,000.00	3,824,320.00	
3.2	String Inverter SUN2000-100KTL-M2	Huawei	4	ea	773,960.00	24,000.00	797,960.00	
3.3	Rapid shutdown for comply with EIT standard with Emergency Botton	Projoy	296	ea	2,960,000.00	29,600.00	2,989,600.00	ตามมาตราฐาน วศท.กำหนดให้ต้องติดตั้ง Rapid shutdown ตั้งแต่วันที่ 1 ก.ค. 2566
3.3	Controller Box for DC24V กล่องควบคุมไฟฟ้า (Rapid Shutdown Device)	Projoy	8	ea	80,000.00	1,600.00	81,600.00	
3.3	สายไฟเลี้ยง Rapit shutdown	Thai Yazaki	3000	m	165,000.00	75,000.00	240,000.00	
3.3	DC Fuse(Inline Fuse)	Uriarte	0	set	-	-	-	
3.4	DC Connector	Multi Contact	120	ea	24,000.00	6,000.00	30,000.00	
3.5	DC Extension Cable (Solar Cable) FD depends on calculation	Helukabel/JJ Lap/Prysmian/Link	25,000.00	m	900,000.00	150,000.00	1,050,000.00	
3.6	AC Cable						-	
3.6.1	AC Cable CV Cable size …1C x 70.. Sq.mm.(Inverter to MDB Solar)	Thai Yazaki	300	m	238,800.00	54,000.00	292,800.00	
3.6.2	AC Cable CV Cable size …150.. Sq.mm. (MDB Solar to MAIN MDB)	Thai Yazaki	200	m	190,000.00	20,000.00	210,000.00	
3.6.4	AC Cable THW Cable size …35.. Sq.mm. (AC Collection Ground)	Thai Yazaki	100	m	23,800.00	8,000.00	31,800.00	
3.6.5	AC Cable THW Cable size …16.. Sq.mm. (AC Collection Ground)	Thai Yazaki	1000	m	63,000.00	25,000.00	88,000.00	
3.6.5	AC Cable THW Cable size …6.. Sq.mm. (DC Ground)	Thai Yazaki	500	m	31,500.00	12,500.00	44,000.00	
3.6.6	Acc . AC Cable (cable lag,Terminat lag,support cable grend)	Thai Yazaki	1	Set	15,000.00	7,500.00	22,500.00	
3.7	Main Distribution Board	Precise					-	
3.7.1	Main Distribution Board (MDB)	Precise	1	ea	95,000.00	5,000.00	100,000.00	
3.8	Grounding System	Kumwell	1	Set	15,000.00	6,000.00	21,000.00	
							-	
3.9	Mounting Structure (408.48 kWp)	Skylink Solar	1	Set	408,480.00	122,544.00	531,024.00	
3.10	Cable Tray	Perforated Tray					-	
3.10.1	Cable Tray 100x100x2400	Perforated Tray	150	ea	231,000.00	22,500.00	253,500.00	
3.10.3	Cable Tray 200x100x2400	Perforated Tray	100	ea	135,000.00	20,000.00	155,000.00	
3.10.4	Cable Tray 300x100x2400	Perforated Tray	20	ea	39,500.00	6,000.00	45,500.00	
3.10.5	Cable ladder 400x100x2400	Perforated Tray	0	ea	-	-	-	
3.10.6	Conduit and Flexible, Support Cable Tray		1	Lot	35,000.00	10,000.00	45,000.00	
							-	
3.11	Metering System						-	
3.11.1	PQM Meter (UMG 512 Pro)	Janitza	1	ea	150,000.00	20,000.00	170,000.00	
3.11.2	Revenue Meter	EDMI ATLAS ,MK10E	0	ea	-	-	-	
3.12	Protection System						-	
3.12.1	Relay Protection System (SEL-751)	SEL-751	0	lot	-	-	-	
3.13	Other Accessories						-	
3.13.1	Transformer 360 kVA Std.Loss		1	ea	350,000.00	30,000.00	380,000.00	
3.13.2	22kV For Transformer	STC,Precise	1	Set	120,000.00	50,000.00	170,000.00	
3.13.3	22 kV Sac Cable		70	m	15,750.00	3,500.00	19,250.00	
3.13.4	Current Transformer MV	Precise	3	ea	96,000.00	15,000.00	111,000.00	
3.13.5	Potential Transformer MV	Precise	1	ea	51,700.00	10,000.00	61,700.00	
3.13.6	Concret Pole and Support CT,VT and Acc.	STC	1	ea	35,000.00	25,000.00	60,000.00	
3.13.7	Concret Pole For Riser Pole Incomming + Outgoing	STC	0	ea	-	-	-	
3.13.8	Drop Out Fuse	Precise	3	ea	9,000.00	3,000.00	12,000.00	
3.13.9	Lightning Arrester 21 kV 10 kA	Precise	3	ea	12,000.00	3,000.00	15,000.00	
3.13.10	Electrical Distribution Box	Schneider	1	ea	15,000.00	8,000.00	23,000.00	
3.13.11	Electrical System (Lighting Fixture, Receptacle)	Philips	1	Set	8,000.00	2,000.00	10,000.00	
3.14	Monitoring System						-	
3.14.1	Smart Logger 3000A	Huawei	1	ea	30,000.00	10,000.00	40,000.00	
3.14.2	RS485 for Zero Export	lapp	1	Set	20,000.00	5,000.00	25,000.00	
3.14.3	LAN Wiring System	TP Link	1	Set	10,000.00	3,500.00	13,500.00	
3.14.4	UPS	Leonic	1	ea	5,000.00	1,000.00	6,000.00	
4	Safety System						-	
4.1	Warning Sign,Fire Extinguisher 1 Sets ,Equipment Name Plate (Acrylic)	Skylink	1	Set	10,000.00	3,000.00	13,000.00	
4.2	Ladder For Service	Skylink	0	Set	-	-	-	
4.3	Inverter Support Structure and Fence	Skylink	1	Set	70,000.00	25,000.00	95,000.00	
5	Test and Comissioning System						-	
5.1	Commissioning Work	Skylink	1	Set		35,000.00	35,000.00	
6	Others						-	
6.1	Hand rail Lifegrad	Skylink		Set	-	-	-	
6.2	Walkway	Skylink		Set	-	-	-	
6.3	Water Cleaning system	Skylink	1	Set	80,000.00	20,000.00	100,000.00	
6.4	Mobilization	Skylink	1	Set	-	80,000.00	80,000.00	
6.5	Unload and Transportation	Skylink	1	Set	150,000.00	100,000.00	250,000.00	
6.6	Insurance	Skylink		Set	-		-	
6.7	Management and Overhead	Skylink	1	Set		150,000.00	150,000.00	
	Total				11,337,810.00	1,525,244.00	12,863,054.00	
						Total	12,863,054.00	
	System Size (KWdc) = Q'ty Panel x PV Module Rate							
	THB/W				27.76	3.73	31.49	

Solar PV Rooftop 408.48 kWp. มหาวิทยาลัยเทคโนโลยีราชมงคลล้านนา ตาก Meter-01

Total PV Plant Capacity (DC)	**408.48**	**kWp**
Daily Electricity Production	1,143.74	kWh/day
Monthly Electricity Production	34,312.32	kWh/month
Annual Electricity Production	411,747.84	kWh/year
Investment	12,863,054.0	Batt
Tariff	4.00	Bath/unit

Year	Degradation of PV Module		Annual Electricity Production (kWh/Year)	Estimated Yearly Saving (@ 4.00 Baht/kWh)	Accumulated Saving (Baht)	Payback Period (Baht)
0		100%		-12,863,054.00		-12,863,054.00
1	2.50%	97.50%	411,748	1,646,991	1,646,991	-11,216,063
2	0.60%	96.90%	401,454	1,605,817	3,252,808	-9,610,246
3	0.60%	96.30%	399,045	1,596,182	4,848,990	-8,014,064
4	0.60%	95.70%	396,651	1,586,605	6,435,594	-6,427,460
5	0.60%	95.10%	394,271	1,577,085	8,012,679	-4,850,375
6	0.60%	94.50%	391,906	1,567,622	9,580,302	-3,282,752
7	0.60%	93.90%	389,554	1,558,217	11,138,518	-1,724,536
8	0.60%	93.30%	387,217	1,548,867	12,687,386	-175,668
9	0.60%	92.70%	384,894	1,539,574	14,226,960	1,363,906
10	0.60%	92.10%	382,584	1,530,337	15,757,297	2,894,243
11	0.60%	91.50%	380,289	1,521,155	17,278,451	4,415,397
12	0.60%	90.90%	378,007	1,512,028	18,790,479	5,927,425
13	0.60%	90.30%	375,739	1,502,956	20,293,435	7,430,381
14	0.60%	89.70%	373,484	1,493,938	21,787,373	8,924,319
15	0.60%	89.10%	371,244	1,484,974	23,272,347	10,409,293
16	0.60%	88.50%	369,016	1,476,064	24,748,412	11,885,358
17	0.60%	87.90%	366,802	1,467,208	26,215,620	13,352,566
18	0.60%	87.30%	364,601	1,458,405	27,674,024	14,810,970
19	0.60%	86.70%	362,414	1,449,654	29,123,679	16,260,625
20	0.60%	86.10%	360,239	1,440,956	30,564,635	17,701,581
21	0.60%	85.50%	358,078	1,432,311	31,996,946	19,133,892
22	0.60%	84.90%	355,929	1,423,717	33,420,663	20,557,609
23	0.60%	84.30%	353,794	1,415,175	34,835,837	21,972,783
24	0.60%	83.70%	351,671	1,406,684	36,242,521	23,379,467
25	0.60%	83.10%	349,561	1,398,243	37,640,764	24,777,710
Total			**9,410,191**	**37,640,764**	**37,640,764**