

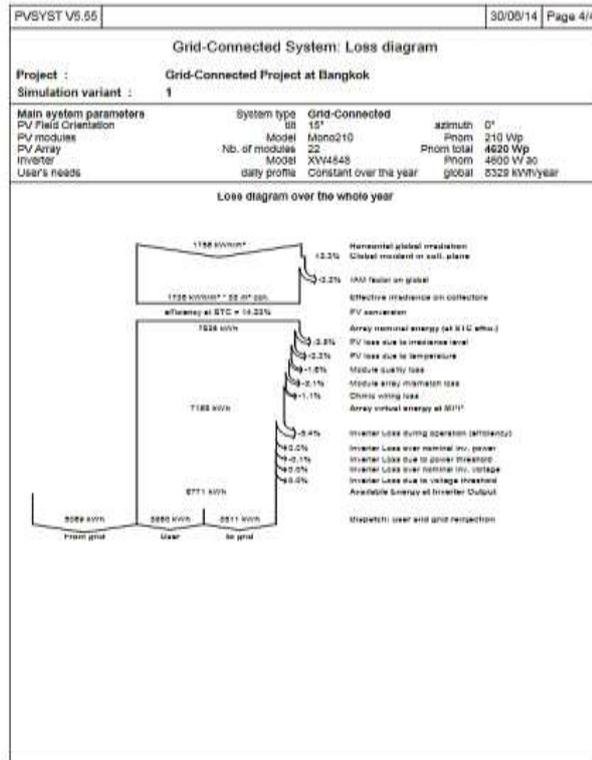
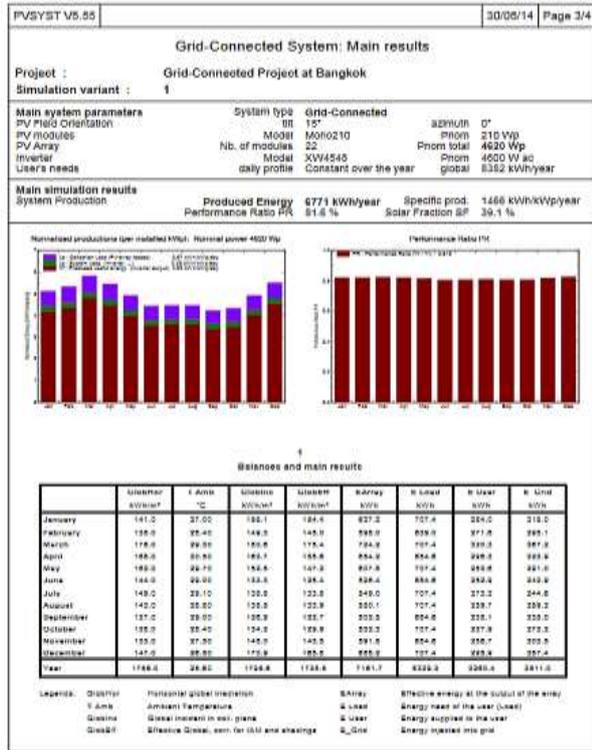
ภาคผนวก ก.

รายละเอียดการจำลองการผลิตไฟฟ้า

แผง Monocrystalline silicon ที่มุมเอียง 15 องศา

PVSYST V5.55		30/05/14 Page 1/4												
Grid-Connected System: Simulation parameters														
Project :	Grid-Connected Project at Bangkok													
Geographical site	Bangkok	Country	Thailand											
Situation	Latitude 13.7°N Longitude 100.5°E Altitude 10 m	Time defined as	Legal Time Time zone UT+7 Altitude 0.20											
Meteo data :	Bangkok, Synthetic Hourly data													
Simulation variant :	1													
	Simulation date 30/05/14 22h14													
Simulation parameters														
Collector Plane Orientation	Tilt 15°	Azimuth 0°												
Horizon	Free Horizon													
Near Shadings	No Shadings													
PV Array Characteristics														
PV module	Si-mono	Model Mono210	Manufacturer Ekart											
Number of PV modules		In series 11 modules	In parallel 2 strings											
Total number of PV modules		Nb. modules 22	Unit Nom. Power 210 Wp											
Array global power		Nominal (STC) 4620 Wp	At operating cond. 4486 Wp (80°C)											
Array operating characteristics (80°C)		U mpv 303 V	I mpv 17 A											
Total area		Module area 32.0 m²												
Inverter														
		Model XW4548	Manufacturer SMA Solar											
Characteristics		Operating Voltage 195-550 V	Unit Nom. Power 4.80 kW AC											
PV Array loss factors														
Thermal Loss factor	U0 (const) 20.0 W/m²°C	U1 (Wind) 0.0 W/m²°C / m/s	NOCT 55 °C											
=> Nominal Oper. Coll. Temp. (G=600 W/m², Tamb=20°C, Wind=1 m/s.)														
Wiring Ohmic Loss	global array res. 280 mOhm	Loss Fraction	1.5 % at STC											
Module Quality Loss		Loss Fraction	1.5 %											
Module Mismatch Losses		Loss Fraction	2.0 % at MPP											
Incidence effect, ASHRAE parametrization	IAM = 1 - b0 (1/cos i - 1)	b0 Parameter	0.05											
User's needs :														
	daily profile	Constant over the year												
	average	22.9 kWh/Day												
		0 h	1 h	2 h	3 h	4 h	5 h	6 h	7 h	8 h	9 h	10 h	11 h	
Hourly load	1.07	1.27	1.17	1.59	3.08	3.08	0.38	3.32	0.20	0.10	3.08	0.08	0.08	kW
	1.08	2.82	2.29	2.25	2.85	1.88	1.38	0.82	0.88	0.71	0.42	0.11	kW	

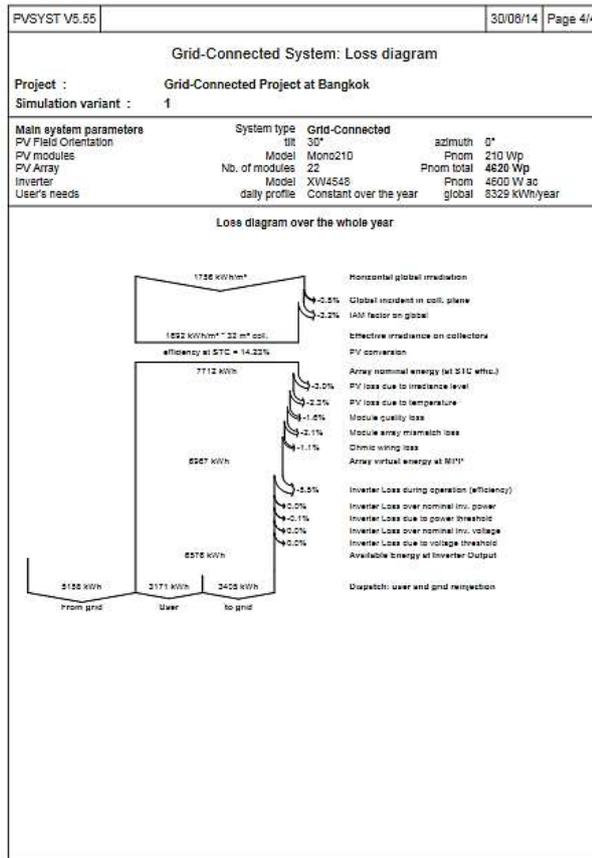
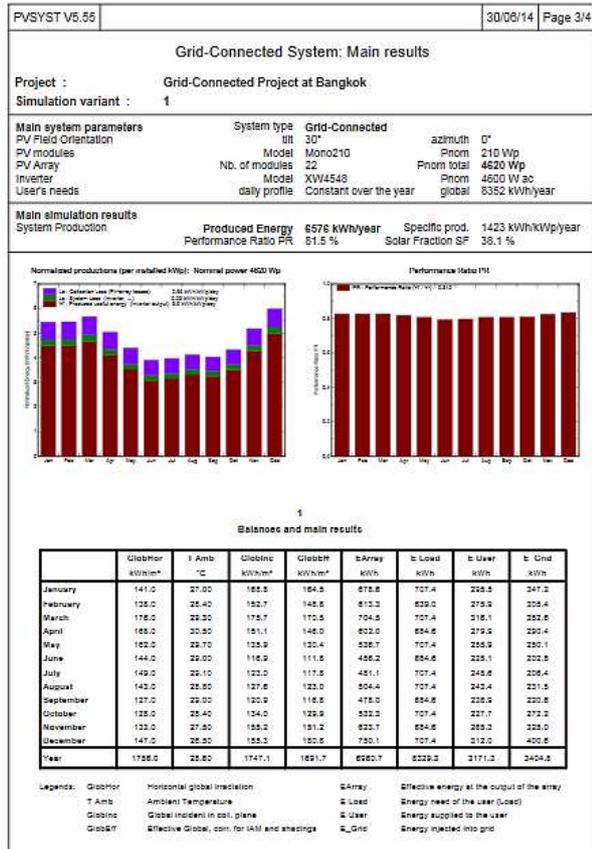
PVSYST V5.55		30/05/14 Page 2/4												
Grid-Connected System: Detailed User's needs														
Project :	Grid-Connected Project at Bangkok													
Simulation variant :	1													
Main system parameters														
PV Field Orientation	System type Grid-Connected	tilt 15°	azimuth 0°											
PV modules	Model Mono210	From 210 Wp												
PV Array	Nb. of modules 22	From total 4620 Wp												
Inverter	Model XW4548	From 4800 W ac												
User's needs	daily profile	Constant over the year	global 8352 kWh/year											
daily profile, Constant over the year, average = 22.9 kWh/day														
	0 h	1 h	2 h	3 h	4 h	5 h	6 h	7 h	8 h	9 h	10 h	11 h		
Hourly load	1.07	1.27	1.17	1.59	3.08	3.08	0.38	3.32	0.20	0.10	3.08	0.08	0.08	kW
	1.08	2.82	2.29	2.25	2.85	1.88	1.38	0.82	0.88	0.71	0.42	0.11	kW	
User's needs (daily profile, Constant over the year, Average = 22.9 kWh/day)														



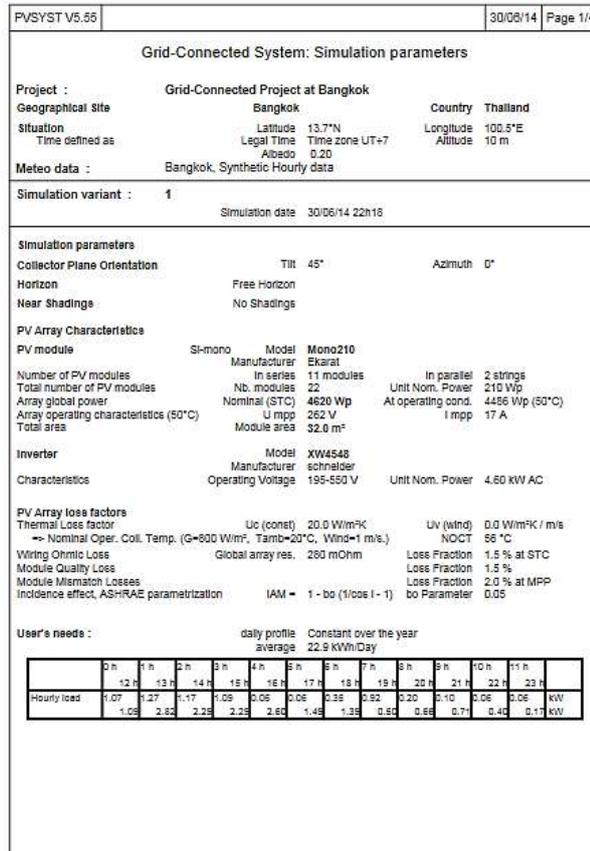
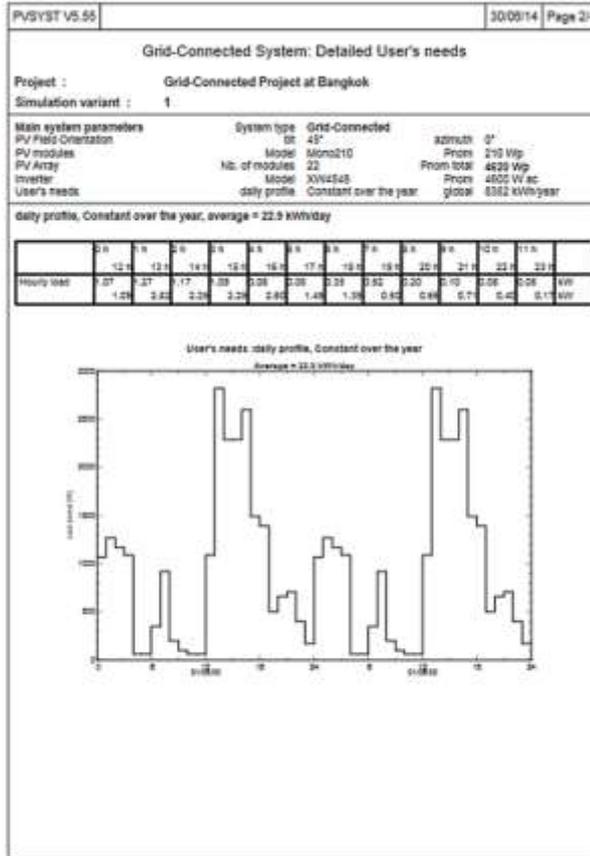
แผง Monocrystalline silicon ที่มุมเอียง 30 องศา

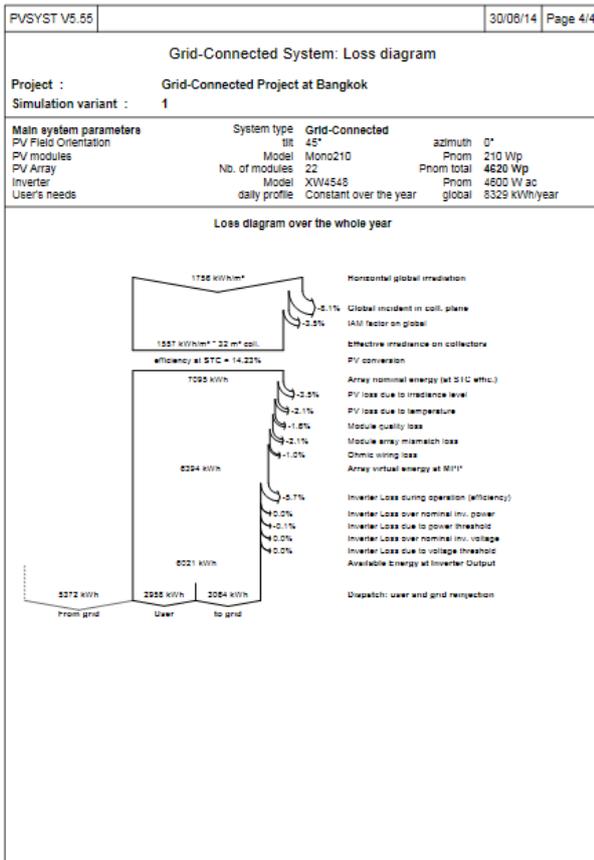
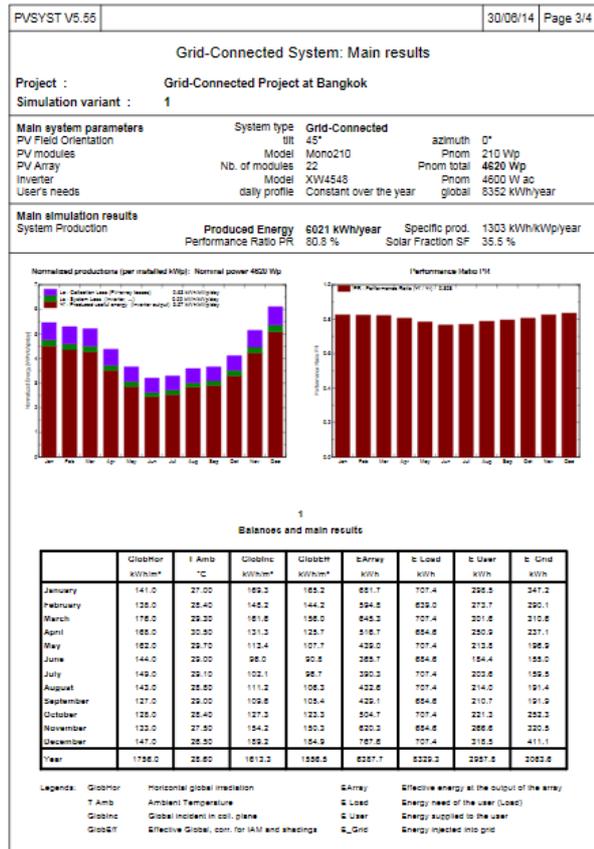
PVSYST V5.55		30/08/14 Page 1/4												
Grid-Connected System: Simulation parameters														
Project : Grid-Connected Project at Bangkok														
Geographical site		Bangkok												
Situation		Latitude	13.7°N											
Time defined as		Legal Time	Time zone UT+7											
		Altitude	100.5°E											
		Altitude	10 m											
Metro data : Bangkok, Synthetic Hourly data														
Simulation variant : 1		Simulation date 30/08/14 22h18												
Simulation parameters														
Collector Plane Orientation	Tilt	30°	Azimuth 0°											
Horizon	Free Horizon													
Near Shadings	No shadings													
PV Array Characteristics														
PV module	Si-mono	Model Mono210												
		Manufacturer Ekarat												
Number of PV modules		In series 11 modules	In parallel 2 strings											
Total number of PV modules		Nb. modules 22	Unit Nom. Power 210 Wp											
Array global power		Nominal (STC) 4620 Wp	At operating cond. 4486 Wp (80°C)											
Array operating characteristics (80°C)		V mpp 282 V	I mpp 17 A											
Total area		Module area 32.0 m²												
Inverter														
		Model XW4548												
		Manufacturer schnaider												
Characteristics		Operating Voltage 193-550 V	Unit Nom. Power 4.60 kW AC											
PV Array loss factors														
Thermal Loss factor		Lic (const) 20.0 W/m²K	Lv (wind) 0.0 W/m²K / m/s											
=> Nominal Oper. Coll. Temp. (G=600 W/m², Tamb=20°C, Wind=1 m/s.)			NOCT 56 °C											
Wiring Ohmic Loss		Global array res. 280 mOhm	Loss Fraction 1.8 % at STC											
Module Quality Loss			Loss Fraction 1.9 %											
Module Mismatch Losses			Loss Fraction 2.0 % at MPP											
Incidence effect, ASHRAE parameterization		IAM = 1 - ba (1/cos I - 1)	ba Parameter 0.05											
User's needs :														
		daily profile	Constant over the year											
		average	22.9 kWh/Day											
	0 h	1 h	2 h	3 h	4 h	5 h	6 h	7 h	8 h	9 h	10 h	11 h		
Hourly load	1.07	1.27	1.17	1.09	0.06	0.06	0.35	0.32	0.20	0.10	0.06	0.06	0.11	kW
	1.05	2.82	2.25	2.25	2.80	1.45	1.35	0.80	0.66	0.71	0.40	0.11	kW	

PVSYST V5.55		30/08/14 Page 2/4												
Grid-Connected System: Detailed User's needs														
Project : Grid-Connected Project at Bangkok														
Simulation variant : 1														
Main system parameters		System type Grid-Connected												
PV Field Orientation		Tilt 30°	azimuth 0°											
PV modules		Model Mono210	Pnom 210 Wp											
PV Array		Nb. of modules 22	Pnom total 4620 Wp											
Inverter		Model XW4548	Pnom 4500 W ac											
User's needs		daily profile	Constant over the year											
		global	8332 kWh/year											
daily profile, Constant over the year, average = 22.9 kWh/day														
	0 h	1 h	2 h	3 h	4 h	5 h	6 h	7 h	8 h	9 h	10 h	11 h		
Hourly load	1.07	1.27	1.17	1.09	0.06	0.06	0.35	0.32	0.20	0.10	0.06	0.06	0.11	kW
	1.05	2.82	2.25	2.25	2.80	1.45	1.35	0.80	0.66	0.71	0.40	0.11	kW	
User's needs : daily profile, Constant over the year														
Average = 22.9 kWh/day														



แผง Monocrystalline silicon ที่มุมเอียง 45 องศา

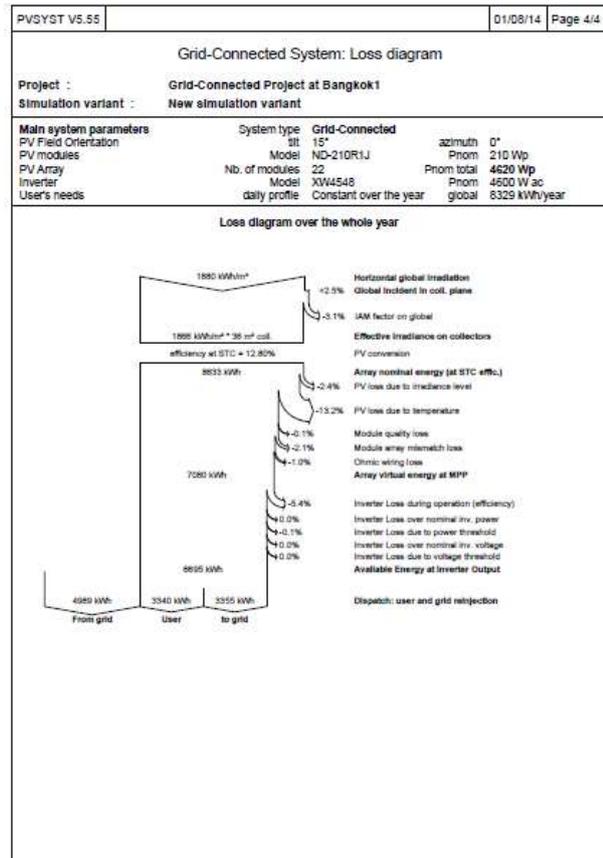
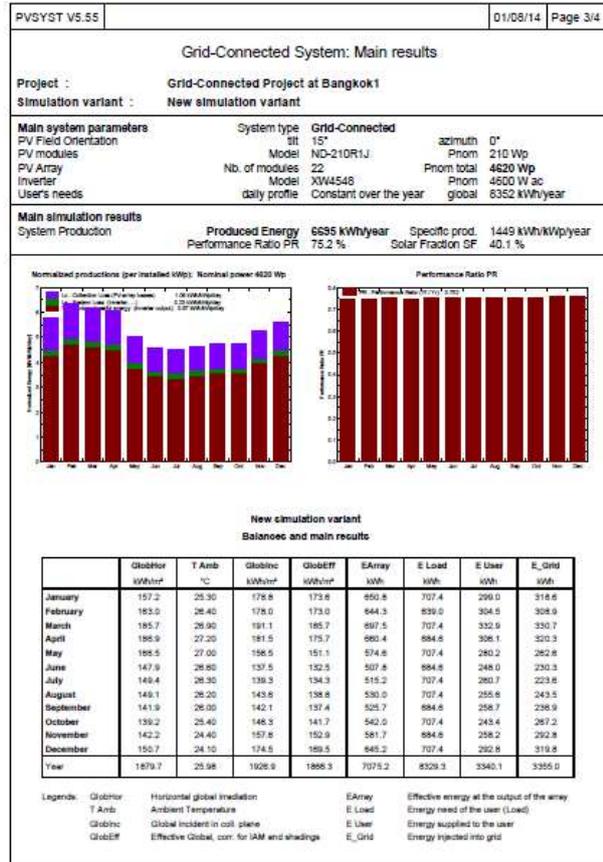




แผง Polycrystalline silicon ที่มุมเอียง 15 องศา

PVSYST V5.55	01/08/14 Page 1/4												
Grid-Connected System: Simulation parameters													
Project :	Grid-Connected Project at Bangkok1												
Geographical Site	Bangkok1	Country Thailand											
Situation	Latitude 13.5°N	Longitude 100.5°E											
Time defined as	Legal Time Time zone UT+7	Altitude 10 m											
Meteo data :	Bangkok1, Synthetic Hourly data												
Simulation variant :	New simulation variant												
	Simulation date 01/08/14 10h57												
Simulation parameters													
Collector Plane Orientation	Tilt 15°	Azimuth 0°											
Horizon	Free Horizon												
Near Shadings	No Shadings												
PV Array Characteristics													
PV module	Si-poly	Model ND-210R1J											
	Manufacturer Sharp												
Number of PV modules	In series 11 modules	In parallel 2 strings											
Total number of PV modules	Nb. modules 22	Unit Nom. Power 210 Wp											
Array global power	Nominal (STC) 4620 Wp	At operating cond. 4122 Wp (50°C)											
Array operating characteristics (50°C)	U mpp 285 V	I mpp 14.4 A											
Total area	Module area 36.1 m²												
Inverter	Model XW4548												
	Manufacturer schneider												
Characteristics	Operating Voltage 195-550 V	Unit Nom. Power 4.60 kW AC											
PV Array loss factors													
Thermal Loss factor	Uc (const) 20.0 W/m²K	Uv (wind) 0.0 W/m²K / m/s											
-> Nominal Oper. Coll. Temp. (G=800 W/m², Tamb=20°C, Wind=1 m/s.)		NOCT 56 °C											
Wiring Ohmic Loss	Global array res. 323 mOhm	Loss Fraction 1.5 % at STC											
Module Quality Loss		Loss Fraction 0.1 %											
Module Mismatch Losses		Loss Fraction 2.0 % at MPP											
Incidence effect, ASHRAE parametrization	IAM = 1 - bo (1/cos I - 1)	bo Parameter 0.05											
Users needs :	daily profile Constant over the year												
	average 22.9 kWh/Day												
	0 h	1 h	2 h	3 h	4 h	5 h	6 h	7 h	8 h	9 h	10 h	11 h	
Hourly load	1.07	1.27	1.17	1.09	0.96	0.96	0.35	0.52	2.20	0.10	0.06	0.06	
	1.05	2.62	2.29	2.29	2.62	1.49	1.35	0.62	0.65	0.71	0.42	0.17	

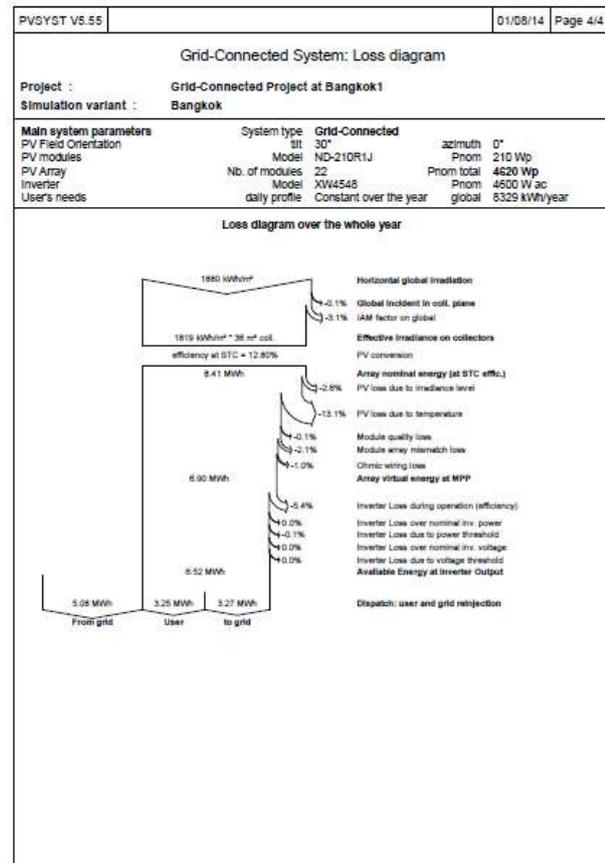
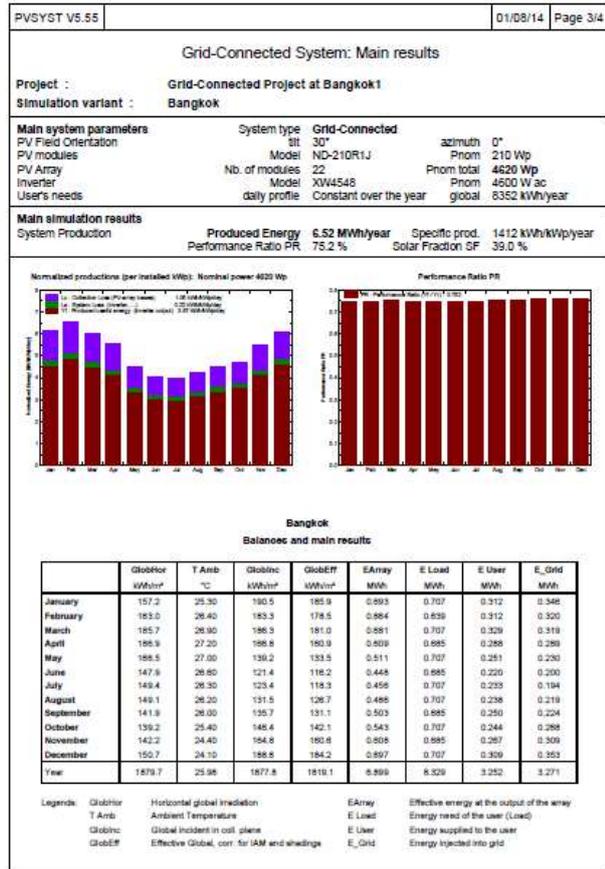
PVSYST V5.55	01/08/14 Page 2/4												
Grid-Connected System: Detailed User's needs													
Project :	Grid-Connected Project at Bangkok1												
Simulation variant :	New simulation variant												
Main system parameters													
PV Field Orientation	System type Grid-Connected	azimuth 0°											
PV modules	Tilt 15°	Pnom 210 Wp											
PV Array	Model ND-210R1J	Pnom total 4620 Wp											
Inverter	Nb. of modules 22	Pnom 4600 W ac											
User's needs	Model XW4548	global 8352 kWh/year											
	daily profile	Constant over the year											
daily profile, Constant over the year, average = 22.9 kWh/day													
	0 h	1 h	2 h	3 h	4 h	5 h	6 h	7 h	8 h	9 h	10 h	11 h	
Hourly load	1.07	1.27	1.17	1.09	0.96	0.96	0.35	0.52	2.20	0.10	0.06	0.06	
	1.05	2.62	2.29	2.29	2.62	1.49	1.35	0.62	0.65	0.71	0.42	0.17	
User's needs :daily profile, Constant over the year													
Average = 22.9 kWh/day													



แผง Polycrystalline silicon ที่มุมเอียง 30 องศา

PVSYST V5.55	01/08/14 Page 1/4																																										
Grid-Connected System: Simulation parameters																																											
Project : Grid-Connected Project at Bangkok1																																											
Geographical Site	Bangkok1 Country Thailand																																										
Situation	Latitude 13.5°N Longitude 100.5°E																																										
Time defined as	Legal Time Time zone UT+7 Altitude 10 m																																										
Meteo data :	Bangkok1, Synthetic Hourly data																																										
Simulation variant : Bangkok																																											
Simulation date 01/08/14 11h18																																											
Simulation parameters																																											
Collector Plane Orientation	Tilt 30° Azimuth 0°																																										
Horizon	Free Horizon																																										
Near Shadings	No Shadings																																										
PV Array Characteristics																																											
PV module	Si-poly Model ND-210R1J																																										
	Manufacturer Sharp																																										
	In series 11 modules In parallel 2 strings																																										
Total number of PV modules	Nb. modules 22 Unit Nom. Power 210 Wp																																										
Array global power	Nominal (STC) 4620 Wp At operating cond. 4122 Wp (50°C)																																										
Array operating characteristics (50°C)	U mpp 285 V I mpp 14 A																																										
Total area	Module area 36.1 m²																																										
Inverter	Model XW4548																																										
	Manufacturer schneider																																										
Characteristics	Operating Voltage 195-550 V Unit Nom. Power 4.50 kW AC																																										
PV Array loss factors																																											
Thermal Loss factor	Uc (const) 20.0 W/m²K Uv (wind) 0.0 W/m²K / m/s																																										
-> Nominal Oper. Coll. Temp. (G=600 W/m², Tamb=20°C, Wind=1 m/s.)	NOCT 56 °C																																										
Wiring Ohmic Loss	Global array res. 323 mOhm Loss Fraction 1.5 % at STC																																										
Module Quality Loss	Loss Fraction 0.1 %																																										
Module Mismatch Losses	Loss Fraction 2.0 % at MPP																																										
Incidence effect, ASHRAE parametrization	IAM = 1 - bo (1/cos(i) - 1) bo Parameter 0.05																																										
User's needs :																																											
daily profile Constant over the year																																											
average 22.9 kWh/Day																																											
	<table border="1" style="width:100%; border-collapse: collapse; text-align: center;"> <tr> <td></td> <td>0 h</td><td>1 h</td><td>2 h</td><td>3 h</td><td>4 h</td><td>5 h</td><td>6 h</td><td>7 h</td><td>8 h</td><td>9 h</td><td>10 h</td><td>11 h</td><td></td> </tr> <tr> <td>Hourly load</td> <td>1.07</td><td>1.27</td><td>1.17</td><td>1.09</td><td>0.06</td><td>0.06</td><td>0.35</td><td>0.92</td><td>0.20</td><td>0.10</td><td>0.06</td><td>0.06</td><td>kW</td> </tr> <tr> <td></td> <td>1.09</td><td>2.82</td><td>2.29</td><td>2.29</td><td>2.60</td><td>1.49</td><td>1.35</td><td>0.50</td><td>0.66</td><td>0.71</td><td>0.40</td><td>0.17</td><td>kW</td> </tr> </table>		0 h	1 h	2 h	3 h	4 h	5 h	6 h	7 h	8 h	9 h	10 h	11 h		Hourly load	1.07	1.27	1.17	1.09	0.06	0.06	0.35	0.92	0.20	0.10	0.06	0.06	kW		1.09	2.82	2.29	2.29	2.60	1.49	1.35	0.50	0.66	0.71	0.40	0.17	kW
	0 h	1 h	2 h	3 h	4 h	5 h	6 h	7 h	8 h	9 h	10 h	11 h																															
Hourly load	1.07	1.27	1.17	1.09	0.06	0.06	0.35	0.92	0.20	0.10	0.06	0.06	kW																														
	1.09	2.82	2.29	2.29	2.60	1.49	1.35	0.50	0.66	0.71	0.40	0.17	kW																														

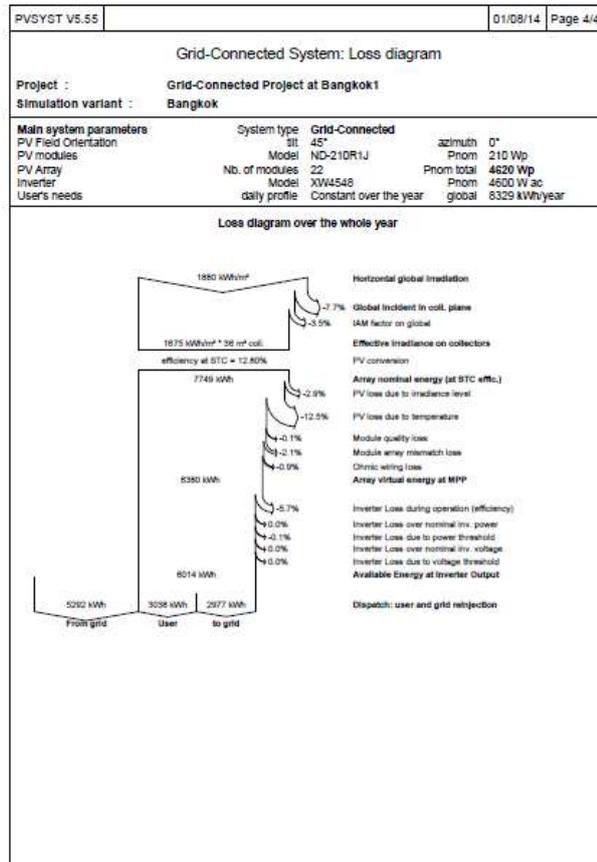
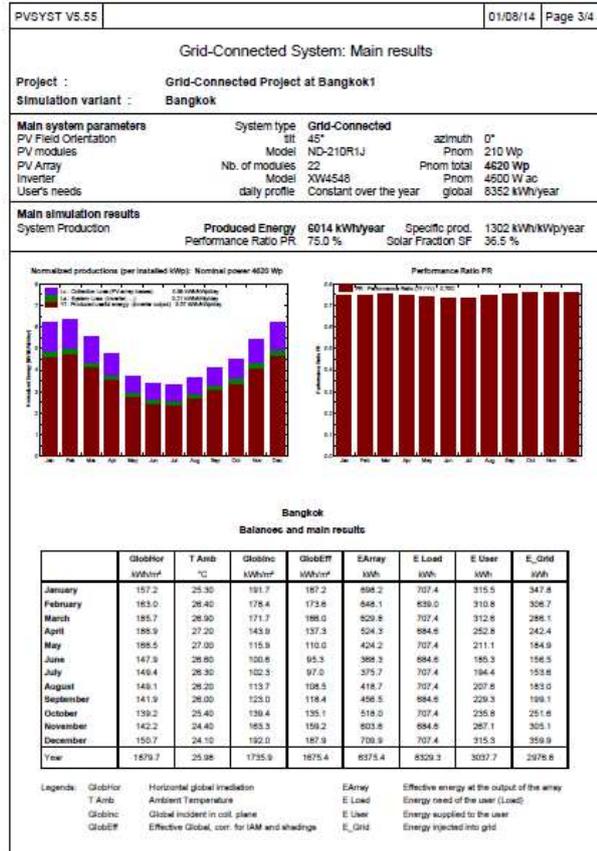
PVSYST V5.55	01/08/14 Page 2/4																																										
Grid-Connected System: Detailed User's needs																																											
Project : Grid-Connected Project at Bangkok1																																											
Simulation variant : Bangkok																																											
Main system parameters																																											
PV Field Orientation	System type Grid-Connected																																										
PV modules	Tilt 30° Azimuth 0°																																										
PV Array	Model ND-210R1J Pnom 210 Wp																																										
Inverter	Nb. of modules 22 Pnom total 4620 Wp																																										
User's needs	Model XW4548 Pnom global 6352 kWh/year																																										
daily profile, Constant over the year, average = 22.9 kWh/day																																											
	<table border="1" style="width:100%; border-collapse: collapse; text-align: center;"> <tr> <td></td> <td>0 h</td><td>1 h</td><td>2 h</td><td>3 h</td><td>4 h</td><td>5 h</td><td>6 h</td><td>7 h</td><td>8 h</td><td>9 h</td><td>10 h</td><td>11 h</td><td></td> </tr> <tr> <td>Hourly load</td> <td>1.07</td><td>1.27</td><td>1.17</td><td>1.09</td><td>0.06</td><td>0.06</td><td>0.35</td><td>0.92</td><td>0.20</td><td>0.10</td><td>0.06</td><td>0.06</td><td>kW</td> </tr> <tr> <td></td> <td>1.09</td><td>2.82</td><td>2.29</td><td>2.29</td><td>2.60</td><td>1.49</td><td>1.35</td><td>0.50</td><td>0.66</td><td>0.71</td><td>0.40</td><td>0.17</td><td>kW</td> </tr> </table>		0 h	1 h	2 h	3 h	4 h	5 h	6 h	7 h	8 h	9 h	10 h	11 h		Hourly load	1.07	1.27	1.17	1.09	0.06	0.06	0.35	0.92	0.20	0.10	0.06	0.06	kW		1.09	2.82	2.29	2.29	2.60	1.49	1.35	0.50	0.66	0.71	0.40	0.17	kW
	0 h	1 h	2 h	3 h	4 h	5 h	6 h	7 h	8 h	9 h	10 h	11 h																															
Hourly load	1.07	1.27	1.17	1.09	0.06	0.06	0.35	0.92	0.20	0.10	0.06	0.06	kW																														
	1.09	2.82	2.29	2.29	2.60	1.49	1.35	0.50	0.66	0.71	0.40	0.17	kW																														
<p>User's needs :daily profile, Constant over the year</p> <p>Average = 22.9 kWh/day</p>																																											



แผง Polycrystalline silicon ที่มุมเอียง 45 องศา

PVSYST V5.55	01/08/14	Page 1/4										
Grid-Connected System: Simulation parameters												
Project : Grid-Connected Project at Bangkok1												
Geographical Site	Bangkok1	Country Thailand										
Situation	Latitude 13.5°N	Longitude 100.5°E										
Time defined as	Legal Time	Time zone UT+7										
	Albedo 0.20	Altitude 10 m										
Meteo data :	Bangkok1, Synthetic Hourly data											
Simulation variant : Bangkok												
	Simulation date	01/08/14 11h22										
Simulation parameters												
Collector Plane Orientation	Tilt 45°	Azimuth 0°										
Horizon	Free Horizon											
Near Shadings	No Shadings											
PV Array Characteristics												
PV module	Si-poly	Model ND-210R1J										
	Manufacturer Sharp											
Number of PV modules	In series 11 modules	In parallel 2 strings										
Total number of PV modules	Nb. modules 22	Unit Nom. Power 210 Wp										
Array global power	Nominal (STC) 4620 Wp	At operating cond. 4122 Wp (50°C)										
Array operating characteristics (50°C)	U mpp 235 V	I mpp 14 A										
Total area	Module area 36.1 m²											
Inverter												
	Model XW4548											
	Manufacturer schneider											
Characteristics	Operating Voltage 195-550 V	Unit Nom. Power 4.60 kW AC										
PV Array loss factors												
Thermal Loss factor	Uo (const) 20.0 W/m²K	Uv (wind) 0.0 W/m²K / m/s										
Thermal Oper. Coll. Temp. (G=800 W/m², Tamb=20°C, Wind=1 m/s.)		NOCT 56 °C										
Wiring Ohmic Loss	Global array res. 323 mOhm	Loss Fraction 1.5 % at STC										
Module Quality Loss		Loss Fraction 0.1 %										
Module Mismatch Losses		Loss Fraction 2.0 % at MPP										
Incidence effect, ASHRAE parametrization	IAM = 1 - bo (1/cos i - 1)	bo Parameter 0.05										
User's needs :												
	daily profile	Constant over the year										
	average	22.9 kWh/Day										
	Average = 22.9 kWh/Day											
	0h	1h	2h	3h	4h	5h	6h	7h	8h	9h	10h	11h
Hourly load	1.07	1.27	1.17	1.09	0.06	0.06	0.35	0.92	0.20	0.10	0.06	0.06
	1.09	2.82	2.29	2.29	2.60	1.49	1.38	0.62	0.69	0.71	0.40	0.17
	kW											

PVSYST V5.55	01/08/14	Page 2/4										
Grid-Connected System: Detailed User's needs												
Project : Grid-Connected Project at Bangkok1												
Simulation variant : Bangkok												
Main system parameters												
PV Field Orientation	System type Grid-Connected	azimuth 0°										
PV modules	Model ND-210R1J	Pnom 210 Wp										
PV Array	Nb. of modules 22	Pnom total 4620 Wp										
Inverter	Model XW4548	Pnom 4600 W ac										
User's needs	daily profile	Constant over the year global 8352 kWh/year										
daily profile, Constant over the year, average = 22.9 kWh/day												
	0h	1h	2h	3h	4h	5h	6h	7h	8h	9h	10h	11h
Hourly load	1.07	1.27	1.17	1.09	0.06	0.06	0.35	0.92	0.20	0.10	0.06	0.06
	1.09	2.82	2.29	2.29	2.60	1.49	1.38	0.62	0.69	0.71	0.40	0.17
	kW											
User's needs :daily profile, Constant over the year												
Average = 22.9 kWh/day												



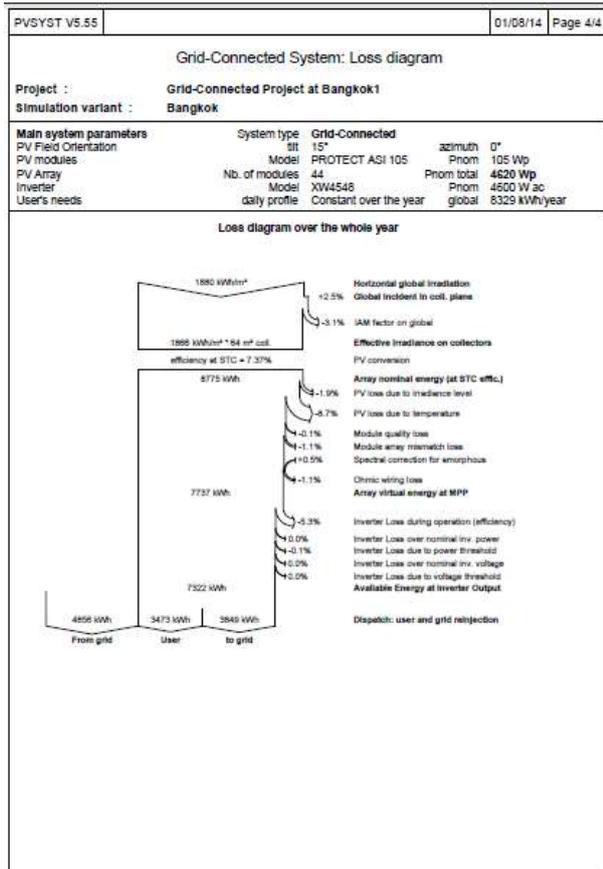
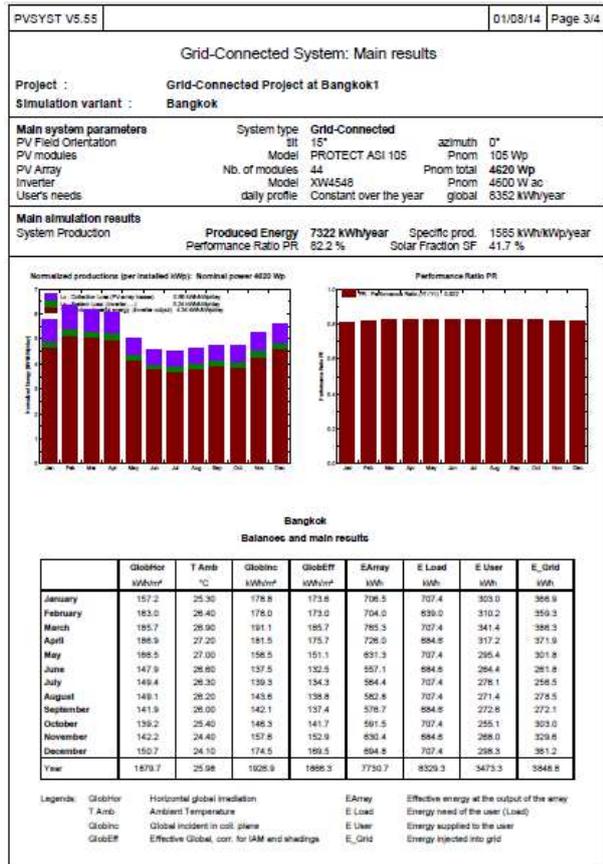
แผง Amorphous silicon ที่มุมเอียง 15 องศา

PVSYS V5.55		01/08/14 Page 1/4											
Grid-Connected System: Simulation parameters													
Project : Grid-Connected Project at Bangkok1													
Geographical Site	Bangkok1	Country	Thailand										
Situation	Latitude 13.5°N	Longitude	100.5°E										
Time defined as	Legal Time Time zone UT+7	Altitude	10 m										
Meteo data :	Bangkok1, Synthetic Hourly data												
Simulation variant :	Bangkok												
	Simulation date 01/08/14 11h25												
Simulation parameters													
Collector Plane Orientation	Tilt 15°	Azimuth	0°										
Horizon	Free Horizon												
Near Shadings	No Shadings												
PV Array Characteristics													
PV module	a-Si:H tandem	Model	PROTECT ASI 105										
		Manufacturer	Schott Solar AG										
Number of PV modules	In series 11 modules	In parallel	4 strings										
Total number of PV modules	Nb. modules 44	Unit Nom. Power	105 Wp										
Array global power	Nominal (STC) 4620 Wp	At operating cond.	4421 Wp (50°C)										
Array operating characteristics (50°C)	U mpp 322 V	I mpp	14 A										
Total area	Module area 63.8 m²												
Inverter													
	Model	XW4548											
	Manufacturer	sonneder											
Characteristics	Operating Voltage	195-550 V	Unit Nom. Power 4.60 kW AC										
PV Array loss factors													
Thermal Loss factor	Uc (const) 20.0 W/m²K	Uv (wind)	0.0 W/m²K / m/s										
--> Nominal Oper. Coll. Temp. (G=800 W/m², Tamb=20°C, Wind=1 m/s.)			NOCT 56 °C										
Wiring Ohmic Loss	Global array res. 388 mOhm	Loss Fraction	1.5 % at STC										
Module Quality Loss		Loss Fraction	0.1 %										
Module Mismatch Losses		Loss Fraction	1.0 % at MPP										
Incidence effect, ASHRAE parametrization	IAM = 1 - bo (1/cos i - 1)	bo Parameter	0.05										
User's needs :													
	daily profile		Constant over the year										
	average		22.9 kWh/Day										
	0 h	1 h	2 h	3 h	4 h	5 h	6 h	7 h	8 h	9 h	10 h	11 h	
	12 h	13 h	14 h	15 h	16 h	17 h	18 h	19 h	20 h	21 h	22 h	23 h	
Hourly load	1.07	1.27	1.17	1.09	0.06	0.06	0.35	0.92	0.20	0.10	0.06	0.06	0.06
	1.05	2.82	2.29	2.28	2.60	1.49	1.39	0.50	0.66	0.71	0.40	0.17	0.17

PVSYS V5.55		01/08/14 Page 2/4											
Grid-Connected System: Detailed User's needs													
Project : Grid-Connected Project at Bangkok1													
Simulation variant : Bangkok													
Main system parameters													
PV Field Orientation	System type	Grid-Connected											
PV modules	Tilt 15°	azimuth	0°										
PV Array	Model PROTECT ASI 105	Pnom	105 Wp										
Inverter	Nb. of modules 44	Pnom total	4620 Wp										
User's needs	Model XW4548	Pnom	4600 W ac										
	daily profile	Constant over the year	global 8352 kWh/year										
daily profile, Constant over the year, average = 22.9 kWh/day													
	0 h	1 h	2 h	3 h	4 h	5 h	6 h	7 h	8 h	9 h	10 h	11 h	
	12 h	13 h	14 h	15 h	16 h	17 h	18 h	19 h	20 h	21 h	22 h	23 h	
Hourly load	1.07	1.27	1.17	1.09	0.06	0.06	0.35	0.92	0.20	0.10	0.06	0.06	0.06
	1.05	2.82	2.29	2.28	2.60	1.49	1.39	0.50	0.66	0.71	0.40	0.17	0.17

User's needs :daily profile, Constant over the year

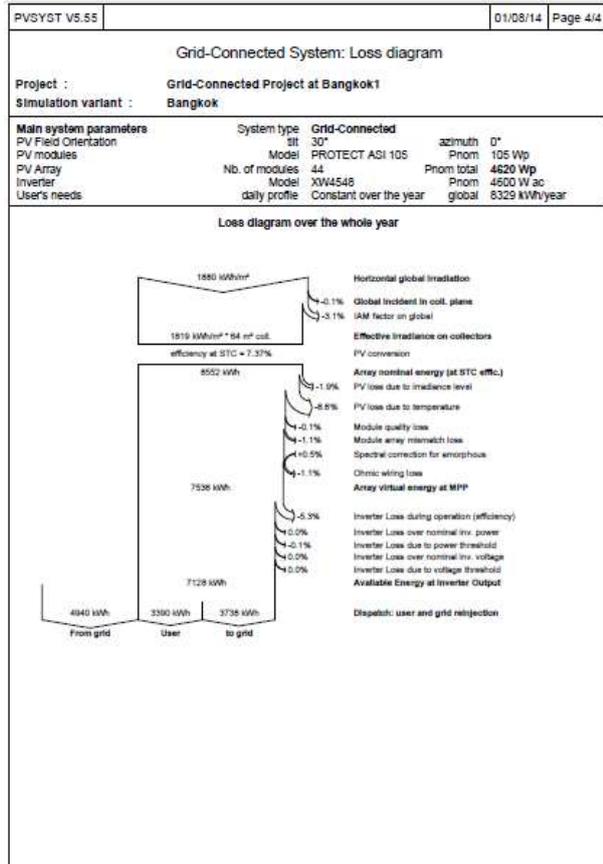
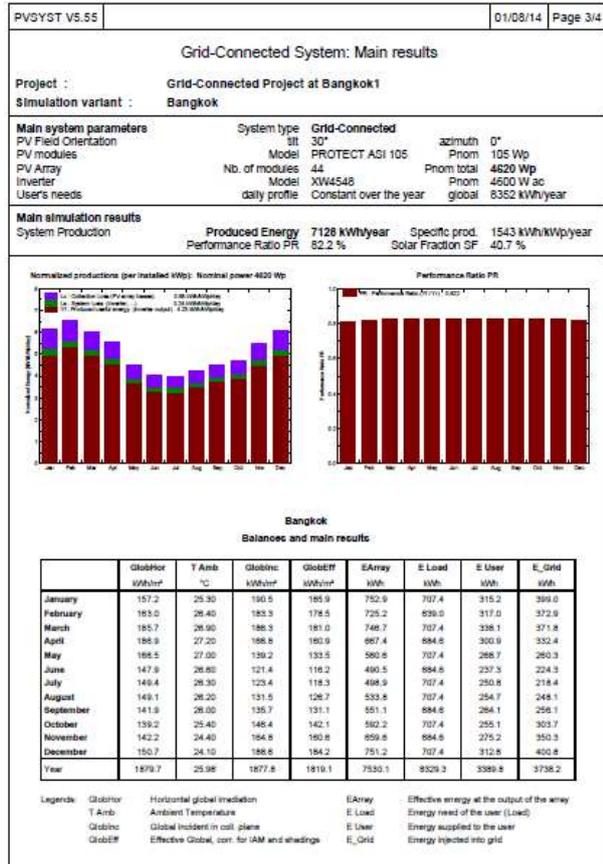
Average = 22.9 kWh/day



แผง Amorphous silicon ที่มุมเอียง 30 องศา

PVSYS V5.55		01/08/14	Page 1/4										
Grid-Connected System: Simulation parameters													
Project : Grid-Connected Project at Bangkok1													
Geographical site	Bangkok1	Country	Thailand										
Situation	Latitude 13.5°N	Longitude	100.5°E										
Time defined as	Legal Time	Time zone	UT+7										
	Albedo 0.20	Altitude	10 m										
Meteo data : Bangkok1, Synthetic Hourly data													
Simulation variant : Bangkok													
Simulation date: 01/08/14 11h28													
Simulation parameters													
Collector Plane Orientation	Tilt 30°	Azimuth	0°										
Horizon	Free Horizon												
Near Shadings	No Shadings												
PV Array Characteristics													
PV module	a-Si:H tandem	Model	PROTECT ASI 105										
		Manufacturer	Schott Solar AG										
Number of PV modules	In series 11 modules	In parallel	4 strings										
Total number of PV modules	Nb. modules 44	Unit Nom. Power	105 Wp										
Array global power	Nominal (STC) 4620 Wp	At operating cond.	4421 Wp (50°C)										
Array operating characteristics (50°C)	U mpp 322 V	I mpp	14 A										
Total area	Module area 63.8 m²												
Inverter													
	Model	XW4548											
	Manufacturer	schneider											
Characteristics	Operating Voltage	195-550 V	Unit Nom. Power 4.60 kW AC										
PV Array loss factors													
Thermal Loss factor	U _c (const) 20.0 W/m²K	U_v (wind)	0.0 W/m²K / m/s										
→ Nominal Oper. Coll. Temp. (G=800 W/m², Tamb=20°C, Wind=1 m/s.)			NOCT 55 °C										
Wiring Ohmic Loss	Global array res. 368 mOhm	Loss Fraction	1.5 % at STC										
Module Quality Loss		Loss Fraction	0.1 %										
Module Mismatch Losses		Loss Fraction	1.0 % at MPP										
Incidence effect, ASHRAE parameterization	IAM = 1 - bo (1/cos i - 1)	bo Parameter	0.05										
User's needs :													
		daily profile	Constant over the year										
		average	22.9 kWh/Day										
	0 h	1 h	2 h	3 h	4 h	5 h	6 h	7 h	8 h	9 h	10 h	11 h	
	12 h	13 h	14 h	15 h	16 h	17 h	18 h	19 h	20 h	21 h	22 h	23 h	
Hourly load	1.07	1.27	1.17	1.09	0.95	0.96	0.35	0.92	0.20	0.10	0.06	0.06	kW
	1.05	2.82	2.25	2.25	2.60	1.49	1.35	0.50	0.66	0.71	0.40	0.17	kW

PVSYS V5.55		01/08/14	Page 2/4										
Grid-Connected System: Detailed User's needs													
Project : Grid-Connected Project at Bangkok1													
Simulation variant : Bangkok													
Main system parameters													
PV Field Orientation	System type	Grid-Connected											
	tilt	30°											
	azimuth	0°											
PV modules	Model	PROTECT ASI 105											
	Pnom	105 Wp											
PV Array	Nb. of modules	44											
	Pnom total	4620 Wp											
Inverter	Model	XW4548											
	Pnom	4600 W ac											
User's needs	daily profile	Constant over the year											
	global	8352 kWh/year											
daily profile, Constant over the year, average = 22.9 kWh/day													
	0 h	1 h	2 h	3 h	4 h	5 h	6 h	7 h	8 h	9 h	10 h	11 h	
	12 h	13 h	14 h	15 h	16 h	17 h	18 h	19 h	20 h	21 h	22 h	23 h	
Hourly load	1.07	1.27	1.17	1.09	0.95	0.96	0.35	0.92	0.20	0.10	0.06	0.06	kW
	1.05	2.82	2.25	2.25	2.60	1.49	1.35	0.50	0.66	0.71	0.40	0.17	kW
User's needs :daily profile, Constant over the year													
Average = 22.9 kWh/day													



แผง Amorphous silicon ที่มุมเอียง 45 องศา

PVSYST V5.55	01/08/14		Page 1/4											
Grid-Connected System: Simulation parameters														
Project :	Grid-Connected Project at Bangkok1													
Geographical Site	Bangkok1	Country	Thailand											
Situation	Latitude 13.5°N	Longitude	100.5°E											
Time defined as	Legal Time	Time zone	UT+7											
	Albedo 0.20	Altitude	10 m											
Meteo data :	Bangkok1, Synthetic Hourly data													
Simulation variant :	Bangkok													
	Simulation date 01/08/14 11h29													
Simulation parameters														
Collector Plane Orientation	Tilt 45°	Azimuth	0°											
Horizon	Free Horizon													
Near Shadings	No Shadings													
PV Array Characteristics														
PV module	a-Si:H tandem	Model	PROTECT ASI 105											
		Manufacturer	Schott Solar AG											
Number of PV modules	In series 44	In parallel	4 strings											
Total number of PV modules	11 modules													
Array global power	Nominal (STC) 4620 Wp	At operating cond.	4421 Wp (50°C)											
Array operating characteristics (50°C)	U mpp 322 V	I mpp	14 A											
Total area	Module area 63.8 m²													
Inverter														
	Model	XW4548												
	Manufacturer	sonnecder												
Characterstics	Operating Voltage	195-550 V	Unit Nom. Power 4.60 kWAC											
PV Array loss factors														
Thermal Loss factor	Uc (const) 20.0 W/m²K	Uv (wind)	0.0 W/m²K / m/s											
-> Nominal Oper. Coll. Temp. (G=800 W/m², Tamb=20°C, Wind=1 m/s.)	NOCT 56 °C													
Wiring Ohmic Loss	Global array res. 388 mOhm	Loss Fraction	1.5 % at STC											
Module Quality Loss		Loss Fraction	0.1 %											
Module Mismatch Losses		Loss Fraction	1.0 % at MPP											
Incidence effect, ASHRAE parametrization	IAM = 1 - bo (1/cos i - 1)	bo Parameter	0.05											
User's needs :	daily profile Constant over the year													
	average 22.9 kWh/Day													
	0 h	1 h	2 h	3 h	4 h	5 h	6 h	7 h	8 h	9 h	10 h	11 h		
Hourly load	1.07	1.27	1.17	1.09	0.06	0.06	0.35	0.92	0.20	0.10	0.06	0.06	0.17	kW
	1.09	2.82	2.25	2.25	2.60	1.49	1.39	0.50	0.66	0.71	0.40	0.17	kW	

PVSYST V5.55	01/08/14		Page 2/4											
Grid-Connected System: Detailed User's needs														
Project :	Grid-Connected Project at Bangkok1													
Simulation variant :	Bangkok													
Main system parameters														
PV Field Orientation	System type	Grid-Connected												
PV modules	Tilt 45°	azimuth	0°											
PV Array	Model PROTECT ASI 105	Pnom	105 Wp											
Inverter	Nb. of modules 44	Pnom total	4620 Wp											
User's needs	Model XW4548	Pnom	4600 W ac											
	daily profile Constant over the year	global	8352 kWh/year											
daily profile, Constant over the year, average = 22.9 kWh/day														
	0 h	1 h	2 h	3 h	4 h	5 h	6 h	7 h	8 h	9 h	10 h	11 h		
Hourly load	1.07	1.27	1.17	1.09	0.06	0.06	0.35	0.92	0.20	0.10	0.06	0.06	0.17	kW
	1.09	2.82	2.25	2.25	2.60	1.49	1.39	0.50	0.66	0.71	0.40	0.17	kW	

User's needs: daily profile, Constant over the year

Average = 22.9 kWh/day

