

# PVsyst - Simulation report

## Grid-Connected System

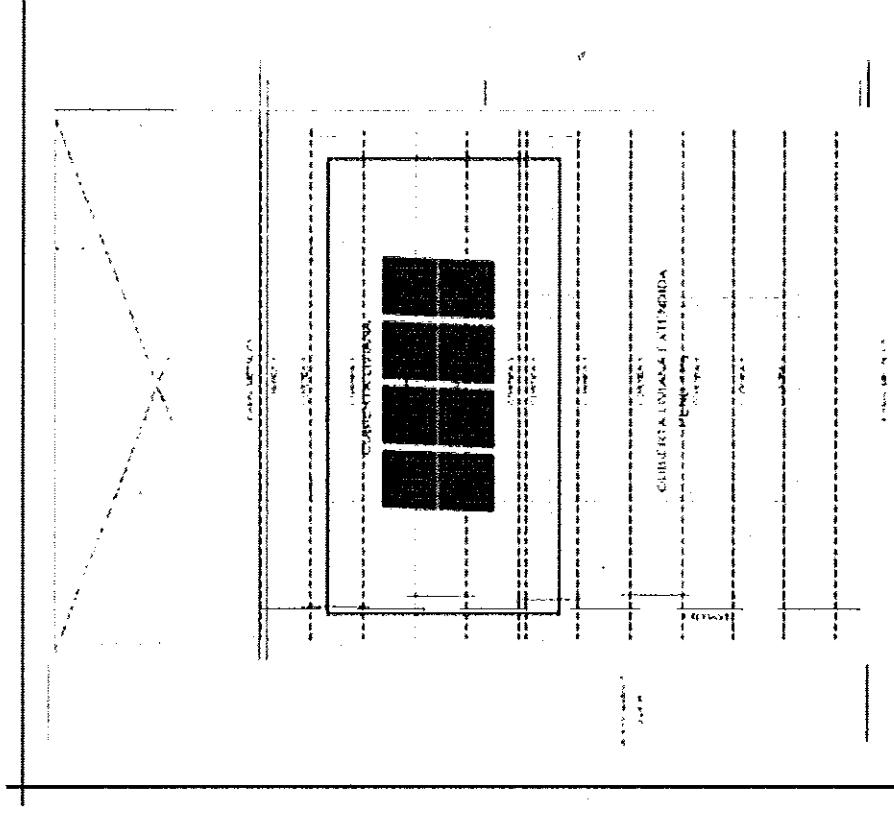
Proyecto: **CREACIONES MONACHITOS SAS** Evento148176

Variant: Creaciones Monachitos

Sin escena 3D definida, sin sombras, Localidad Antonio Nariñ

System power: 2400 Wp

Santiago Pérez - Colombia



JULIO DARÍO FUENTES  
GIMECOL SOLAR (Colombia)



**Gimecol Solar**



**PVsyst V7.3.2**

VC3, Simulation date:  
14/04/23 11:21  
with v7.3.2

**Project summary**

| Project summary                                 |  |                  |
|-------------------------------------------------|--|------------------|
| Geographical Site                               |  | Project settings |
| Santiago Pérez                                  |  | Albedo           |
| Colombia                                        |  | 0.20             |
| Situation                                       |  |                  |
| Latitude                                        |  | 4.59 °N          |
| Longitude                                       |  | -74.11 °W        |
| Altitude                                        |  | 2585 m           |
| Time zone                                       |  | UTC-5            |
| Meteo data                                      |  |                  |
| Santiago Pérez                                  |  |                  |
| Meteonorm 8.1 (2016-2021), Sat=100% - Sintético |  |                  |

**System summary**

| System summary        |           |                                                              |         |
|-----------------------|-----------|--------------------------------------------------------------|---------|
| Grid-Connected System |           | Sin escena 3D definida, sin sombras, Localidad Antonio Nariñ |         |
| PV Field Orientation  |           | Near Shadings                                                |         |
| Fixed plane           |           | No Shadings                                                  |         |
| Tilt/Azimuth          | 15 / 45 ° |                                                              |         |
| System information    |           |                                                              |         |
| PV Array              |           | Inverters                                                    |         |
| Nb. of modules        | 6 units   | Nb. of units                                                 | 6 units |
| Prom total            | 2400 Wp   | Prom total                                                   | 1740 W  |
|                       |           | Prom ratio                                                   | 1.379   |

**Results summary**

|                 |                  |                     |                   |                   |         |
|-----------------|------------------|---------------------|-------------------|-------------------|---------|
| Produced Energy | 3420.44 kWh/year | Specific production | 1425 kWh/kWp/year | Perf. Ratio PR    | 83.80 % |
| Used Energy     | 3215.00 kWh/year |                     |                   | Solar Fraction SF | 39.55 % |

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# Project: GRUPO LÍNEA BARBARELLA Evento148176

Variant: Creaciones Monachitos

PVsyst V7.3.2

VC3, Simulation date:

14/04/23 11:21

with V7.3.2

GIMECOL SOLAR (Colombia)

## General parameters

### Grid-Connected System

Sin escena 3D definida, sin sombras, Localidad Antonio Nariñ

### PV Field Orientation

#### Orientation

Sheds configuration

#### Models used

No 3D scene defined

Transposition  
Diffuse  
Circumsolar

Perez  
Perez, Meteonorm  
separate

15 / 45 °

#### Horizon

Free Horizon

#### Near Shadings

No Shadings

#### User's needs

Monthly values

| Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sep. | Oct. | Nov. | Dec. | Year    |
|------|------|------|------|-----|------|------|------|------|------|------|------|---------|
| 210  | 280  | 285  | 200  | 205 | 210  | 200  | 205  | 250  | 580  | 320  | 290  | 3215    |
|      |      |      |      |     |      |      |      |      |      |      |      | kWh/mth |

## PV Array Characteristics

### PV module

#### Manufacturer

JA solar

#### Inverter

#### Model

JAM72-S03-400-PR

#### Manufacturer

(Original PVsyst database)

400 Wp

6 units

2400 Wp

6 Strings x 1 In series

2184 Wp

37 V

59 A

Enphase

IQ7PLUS-72-x-208

0.290 kWac

6 units

1.7 kWac

16-48 V

0.300 kWac

1.38

1.7 kWac

1.8 kWac

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1.7 kWac



# Project: GRUPO LÍNEA BARBARELLA Evento148176

Variant: Creaciones Monachios

GIIMECOL SOLAR (Colombia)

PVsyst V7.3.2  
VC3, Simulation date:  
14/04/23 11:21  
with V7.3.2

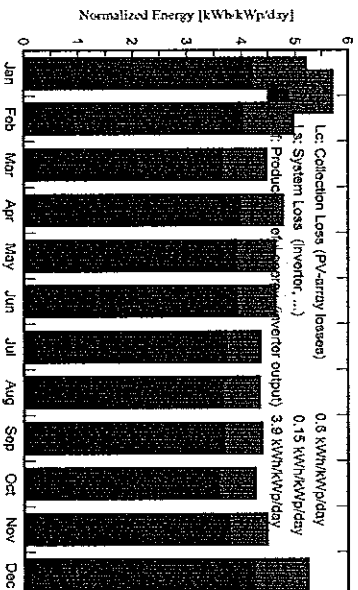
## Main results

### System Production

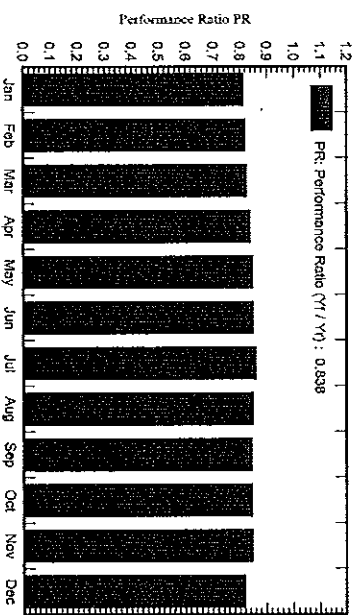
Produced Energy 3420.44 kWh/year  
Used Energy 3215.00 kWh/year

Specific production 1425 kWh/kWp/year  
Performance Ratio PR 83.80 %  
Solar Fraction SF 39.55 %

### Normalized productions (per installed kWp)



### Performance Ratio PR



## Balances and main results

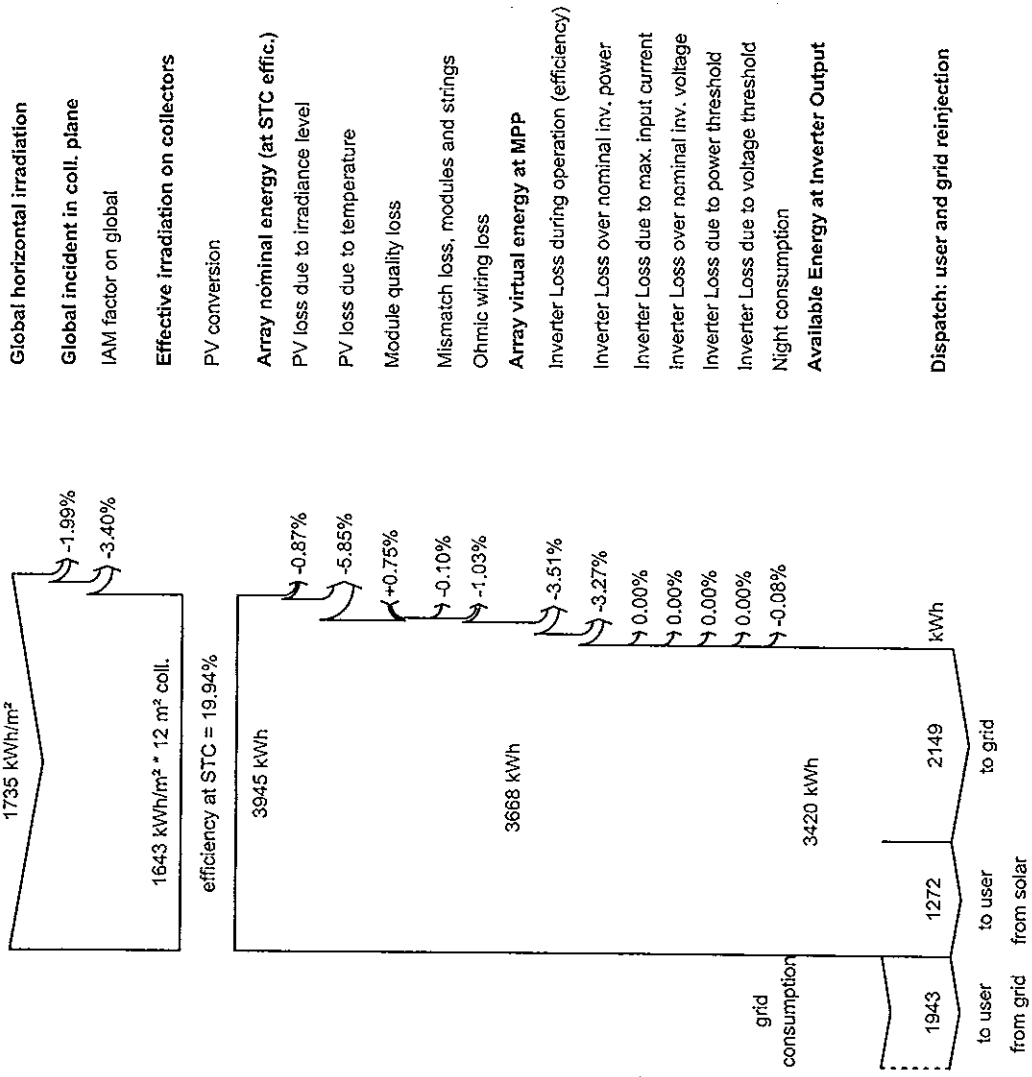
|           | GloboHor<br>kWh/m² | DiffHor<br>kWh/m² | T_Amb<br>°C | GlobInc<br>kWh/m² | GlobEff<br>kWh/m² | EArray<br>kWh | E_User<br>kWh | E_Solar<br>kWh | E_Grid<br>kWh | EFrGrid<br>kWh |
|-----------|--------------------|-------------------|-------------|-------------------|-------------------|---------------|---------------|----------------|---------------|----------------|
| January   | 153.1              | 66.82             | 13.20       | 161.6             | 156.7             | 327.5         | 210.0         | 86.7           | 229.7         | 124.3          |
| February  | 134.1              | 54.79             | 13.51       | 139.3             | 135.2             | 284.8         | 280.0         | 109.6          | 164.5         | 170.4          |
| March     | 140.4              | 66.68             | 13.75       | 139.1             | 134.4             | 286.3         | 285.0         | 113.8          | 161.8         | 171.2          |
| April     | 149.7              | 65.85             | 13.78       | 143.8             | 139.2             | 300.7         | 200.0         | 84.4           | 205.1         | 115.6          |
| May       | 156.4              | 66.82             | 13.95       | 144.2             | 138.9             | 305.1         | 205.0         | 86.1           | 207.7         | 116.9          |
| June      | 152.9              | 64.20             | 13.49       | 139.7             | 134.0             | 295.9         | 210.0         | 91.3           | 193.6         | 118.7          |
| July      | 148.6              | 67.87             | 13.58       | 135.5             | 129.8             | 290.7         | 200.0         | 85.5           | 194.4         | 114.5          |
| August    | 146.3              | 77.54             | 13.51       | 135.2             | 129.9             | 286.3         | 205.0         | 87.4           | 188.3         | 117.6          |
| September | 135.6              | 67.51             | 13.18       | 132.1             | 128.0             | 278.2         | 250.0         | 102.2          | 165.6         | 147.8          |
| October   | 132.6              | 78.29             | 13.44       | 132.8             | 128.4             | 279.9         | 560.0         | 188.6          | 81.0          | 371.4          |
| November  | 132.6              | 68.57             | 13.40       | 135.1             | 130.6             | 285.3         | 320.0         | 120.9          | 153.9         | 199.1          |
| December  | 153.2              | 65.76             | 13.37       | 162.5             | 157.8             | 331.4         | 290.0         | 116.0          | 203.3         | 174.0          |
| Year      | 1735.4             | 812.69            | 13.51       | 1700.8            | 1642.9            | 3552.0        | 3215.0        | 1271.6         | 2148.8        | 1943.4         |

### Legends

|          |                                              |         |                                             |
|----------|----------------------------------------------|---------|---------------------------------------------|
| GloboHor | Global horizontal irradiation                | EArray  | Effective energy at the output of the array |
| DiffHor  | Horizontal diffuse irradiation               | E_User  | Energy supplied to the user                 |
| T_Amb    | Ambient Temperature                          | E_Solar | Energy from the sun                         |
| GlobInc  | Global incident in coll. plane               | E_Grid  | Energy injected into grid                   |
| GlobEff  | Effective Global, corr. for IAM and shadings | EFrGrid | Energy from the grid                        |



### Loss diagram





# Project: GRUPO LÍNEA BARBARELLA Evento148176

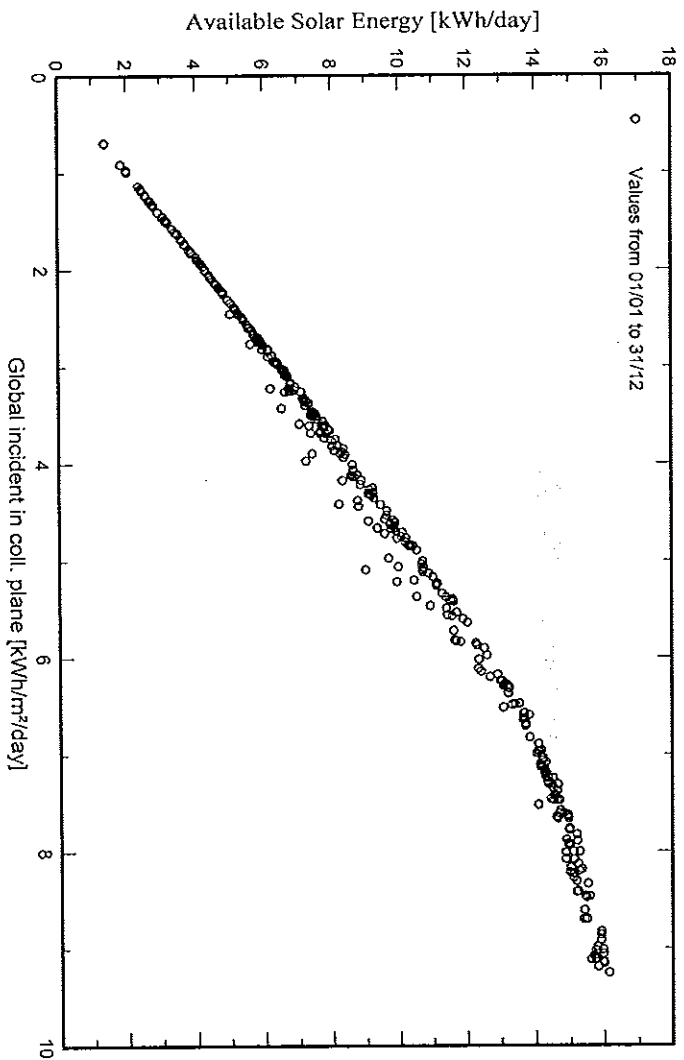
Variant: Creaciones Monachitos

GIMECOL SOLAR (Colombia)

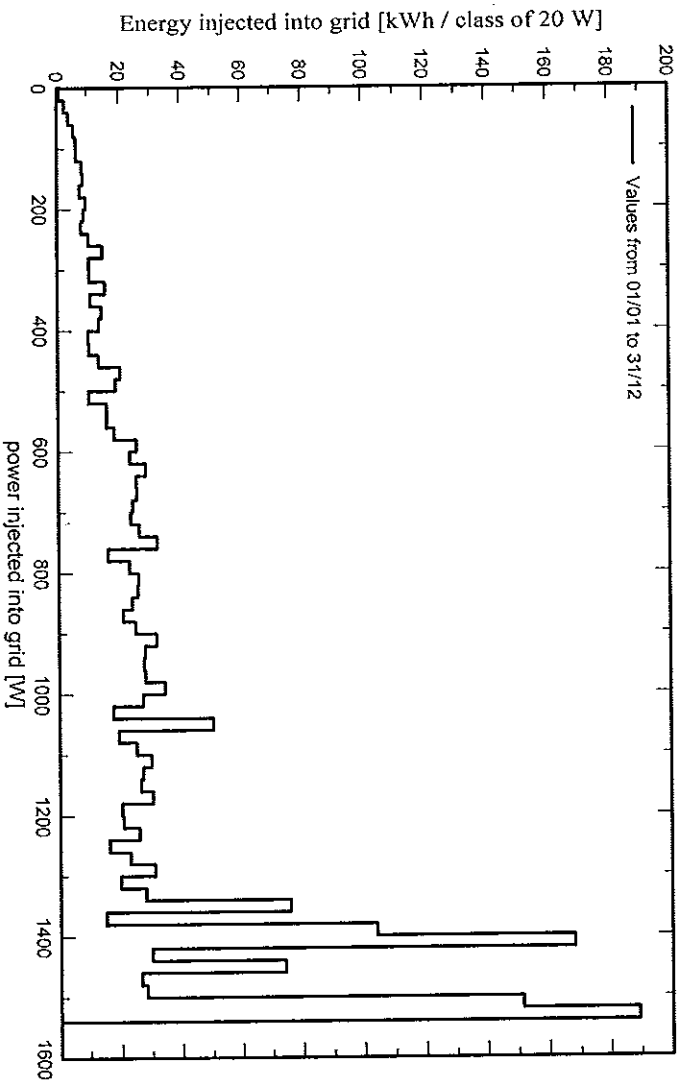
PVsyst V7.3.2  
VCS3, Simulation date:  
14/04/23 11:21  
with V7.3.2

## Predef. graphs

### Diagrama entrada/salida diaria



### Distribución de potencia de salida del sistema



# PVsyst - Simulation report

## Grid-Connected System

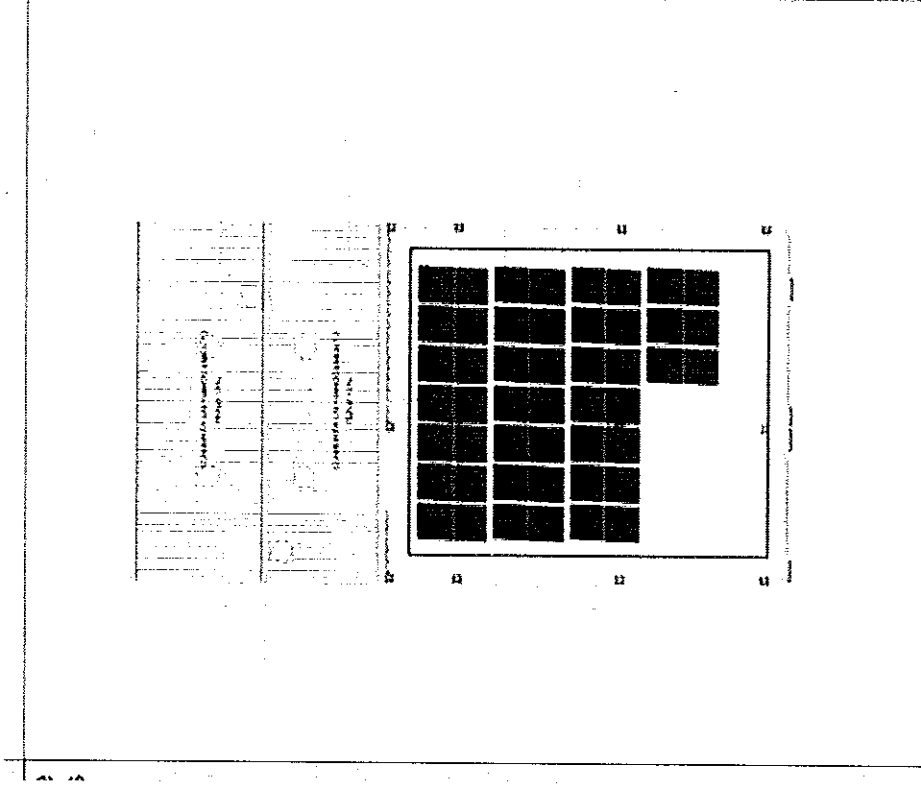
Project: **GRUPO LÍNEA BARBARELLA Evento148176**

Variant: Grupo Línea Barbarella sas

Sin escena 3D definida, sin sombras, localidad Antonio Nariñ

System power: 13.20 kWp

Santiago Pérez - Colombia



JULIO DARIO FUENTES  
GIMECOL SOLAR (Colombia)



**Gimecol Solar**



# Project: GRUPO LINEA BARBARELLA Evento148176

Variant: Grupo Línea Barbarella sas

GIMECOL SOLAR (Colombia)

## PVsyst V7.3.2

VC2, Simulation date:  
14/04/23 10:45  
with v7.3.2

| Project summary                                                                       |                  | Project settings |
|---------------------------------------------------------------------------------------|------------------|------------------|
| <b>Geographical Site</b><br>Santiago Pérez<br>Colombia                                | <b>Situation</b> | 4.59 °N          |
|                                                                                       | Latitude         | -74.11 °W        |
|                                                                                       | Longitude        | 2585 m           |
| <b>Meteo data</b><br>Santiago Pérez<br>Meteonorm 8.1 (2016-2021), Sat=100% - Simético | Altitude         | UTC-5            |
|                                                                                       | Time zone        |                  |

| System summary               |                                                              | User's needs     |
|------------------------------|--------------------------------------------------------------|------------------|
| <b>Grid-Connected System</b> | Sin escena 3D definida, sin sombras, localidad Antonio Nariñ | Monthly values   |
| <b>PV Field Orientation</b>  | <b>Near Shadings</b>                                         |                  |
| Fixed plane                  | No Shadings                                                  |                  |
| Tilt/Azimuth                 | 15 / 45 °                                                    |                  |
| <b>System information</b>    |                                                              |                  |
| <b>PV Array</b>              |                                                              | <b>Inverters</b> |
| Nb. of modules               | 33 units                                                     | Nb. of units     |
| Pnom total                   | 13.20 kWp                                                    | Pnom total       |
|                              |                                                              | Pnom ratio       |
|                              |                                                              | 33 units         |
|                              |                                                              | 9.57 kWac        |
|                              |                                                              | 1.379            |

| Results summary |                   |                     |                   |
|-----------------|-------------------|---------------------|-------------------|
| Produced Energy | 18812.94 kWh/year | Specific production | 1425 kWh/kWp/year |
| Used Energy     | 18209.21 kWh/year |                     | Perf. Ratio PR    |
|                 |                   |                     | Solar Fraction SF |
|                 |                   |                     | 83.80 %           |
|                 |                   |                     | 40.02 %           |

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| General Parameters, PV Array Characteristics, System losses | 3 |
| Main results                                                | 4 |
| Loss diagram                                                | 5 |
| Prefef. graphs                                              | 6 |
| Single-line diagram                                         | 7 |



# Project: GRUPO LÍNEA BARBARELLA Evento148176

Variant: Grupo Línea Barbarella sas

PVsyst V7.3.2

VC2, Simulation date:

14/04/23 10:45

with v7.3.2

GIMECOL SOLAR (Colombia)

## General parameters

### Grid-Connected System

Sin escena 3D definida, sin sombras, localidad Antonio Nariñ

### PV Field Orientation

Orientation

Fixed plane

Tilt/Azimuth

15 / 45 °

Sheds configuration

No 3D scene defined

Models used

Transposition

Diffuse

Circumsolar

Perez

Perez, Meteonorm

separate

### Horizon

Free Horizon

Near Shadings

No Shadings

User's needs

Monthly values

| Jan. | Feb. | Mar. | Apr. | May  | June | July | Aug. | Sep. | Oct. | Nov. | Dec. | Year    |
|------|------|------|------|------|------|------|------|------|------|------|------|---------|
| 1.51 | 0.80 | 1.55 | 1.50 | 1.50 | 1.50 | 1.50 | 1.58 | 1.54 | 1.69 | 1.65 | 1.90 | 18.2    |
|      |      |      |      |      |      |      |      |      |      |      |      | MWh/mth |

## PV Array Characteristics

### PV module

Manufacturer

Model

JA solar

JAM72-S03-400-PR

Inverter

Model

Enphase

IQ7PLUS-72-x-208

(Original PVsyst database)

Unit Nom. Power

Number of PV modules

Nominal (STC)

Modules

At operating cond. (50°C)

Pmpp

U mpp

I mpp

400 Wp

33 units

13.20 kWp

33 Strings x 1 In series

12.01 kWp

37 V

325 A

(Original PVsyst database)

Unit Nom. Power

Number of inverters

Total power

Operating voltage

Max. power ( $\geq 60^{\circ}\text{C}$ )

Pnom ratio (DC/AC)

0.290 kWac

33 units

9.6 kWac

16-48 V

0.300 kWac

1.38

### Total PV power

Nominal (STC)

Total

Module area

Cell area

Total inverter power

Total power

Max. power

Number of inverters

Pnom ratio

9.6 kWac

9.9 kWac

33 units

1.38

## Array losses

### Thermal Loss factor

Module temperature according to irradiance

Uc (const)

Uv (wind)

Global array res.

Loss Fraction

1.9 mΩ

1.5 % at STC

Module Quality Loss

Loss Fraction

-0.8 %

### Module mismatch losses

Loss Fraction

0.0 % at MPP

Strings Mismatch loss

Loss Fraction

0.1 %

### IAM loss factor

Incidence effect (IAM): Fresnel smooth glass, n = 1.526

| 0°    | 30°   | 50°   | 60°   | 70°   | 75°   | 80°   | 85°   | 90°   |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.000 | 0.998 | 0.981 | 0.948 | 0.862 | 0.776 | 0.636 | 0.403 | 0.000 |



# Project: GRUPO LINEA BARBARELLA Evento148176

Variant: Grupo Linea Barbarella sas

GIMECOL SOLAR (Colombia)

PVsyst V7.3.2  
VC2, Simulation date:  
14/04/23 10:45  
with v7.3.2

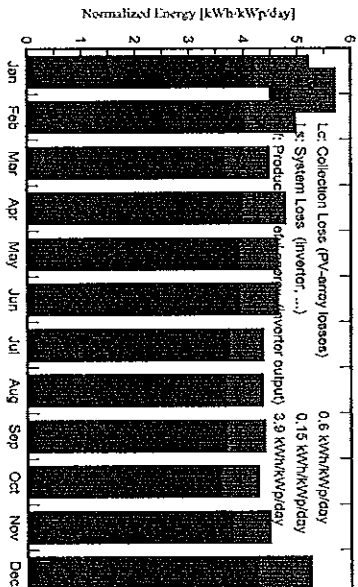
## Main results

### System Production

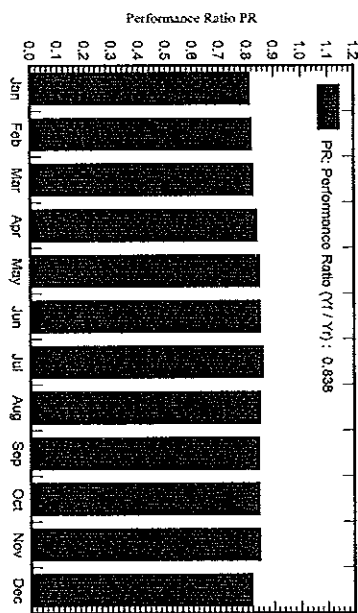
Produced Energy 18812.94 kWh/year  
Used Energy 18209.21 kWh/year

Specific production 1425 kWh/kWp/year  
Performance Ratio PR 83.80 %  
Solar Fraction SF 40.02 %

### Normalized productions (per installed kWp)



### Performance Ratio PR



## Balances and main results

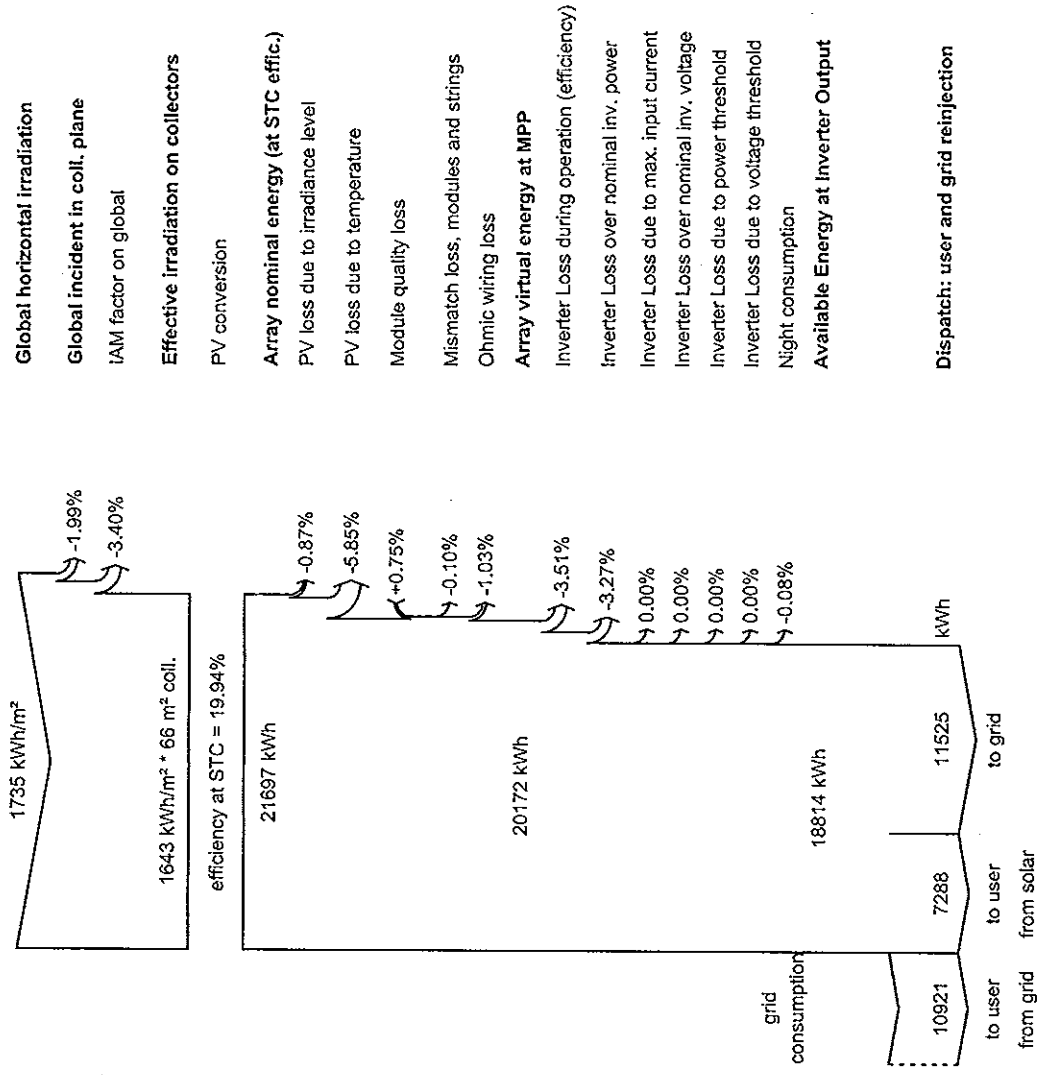
|           | GloboHor<br>kWh/m² | DiffHor<br>kWh/m² | T_Amb<br>°C | GloboInc<br>kWh/m² | GloboEff<br>kWh/m² | EArray<br>kWh | E_User<br>kWh | E_Solar<br>kWh | E_Grid<br>kWh | EFGrid<br>kWh |
|-----------|--------------------|-------------------|-------------|--------------------|--------------------|---------------|---------------|----------------|---------------|---------------|
| January   | 153.1              | 66.82             | 13.20       | 161.6              | 156.7              | 1802          | 1510          | 596.6          | 1139          | 914           |
| February  | 134.1              | 54.79             | 13.51       | 139.3              | 135.2              | 1566          | 800           | 344.7          | 1163          | 455           |
| March     | 140.4              | 68.68             | 13.75       | 139.1              | 134.4              | 1575          | 1550          | 620.1          | 895           | 930           |
| April     | 149.7              | 65.85             | 13.78       | 143.8              | 139.2              | 1654          | 1500          | 600.4          | 992           | 899           |
| May       | 156.4              | 66.82             | 13.95       | 144.2              | 138.9              | 1678          | 1495          | 600.6          | 1015          | 894           |
| June      | 152.9              | 64.21             | 13.49       | 139.7              | 134.0              | 1627          | 1495          | 620.2          | 947           | 874           |
| July      | 148.6              | 67.87             | 13.58       | 135.5              | 129.8              | 1599          | 1500          | 607.4          | 932           | 892           |
| August    | 146.3              | 77.54             | 13.51       | 135.2              | 129.9              | 1575          | 1580          | 639.2          | 878           | 941           |
| September | 135.6              | 67.51             | 13.18       | 132.1              | 128.0              | 1530          | 1540          | 619.1          | 854           | 921           |
| October   | 132.6              | 78.29             | 13.44       | 132.8              | 128.4              | 1539          | 1690          | 667.7          | 815           | 1022          |
| November  | 132.6              | 68.57             | 13.40       | 135.1              | 130.6              | 1569          | 1650          | 630.9          | 881           | 1019          |
| December  | 153.2              | 65.76             | 13.37       | 162.5              | 157.8              | 1823          | 1900          | 741.4          | 1015          | 1159          |
| Year      | 1735.4             | 812.69            | 13.51       | 1700.8             | 1642.9             | 19536         | 18209         | 7288.2         | 11525         | 10921         |

### Legends

|          |                                              |         |                                             |
|----------|----------------------------------------------|---------|---------------------------------------------|
| GloboHor | Global horizontal irradiation                | EArray  | Effective energy at the output of the array |
| DiffHor  | Horizontal diffuse irradiation               | E_User  | Energy supplied to the user                 |
| T_Amb    | Ambient Temperature                          | E_Solar | Energy from the sun                         |
| GloboInc | Global incident in coll. plane               | E_Grid  | Energy injected into grid                   |
| GloboEff | Effective Global, corr. for IAM and shadings | EFGrid  | Energy from the grid                        |



## Loss diagram





PVsyst V7.3.2  
VC2. Simulation date:  
14/04/23 10:45  
with V7.3.2

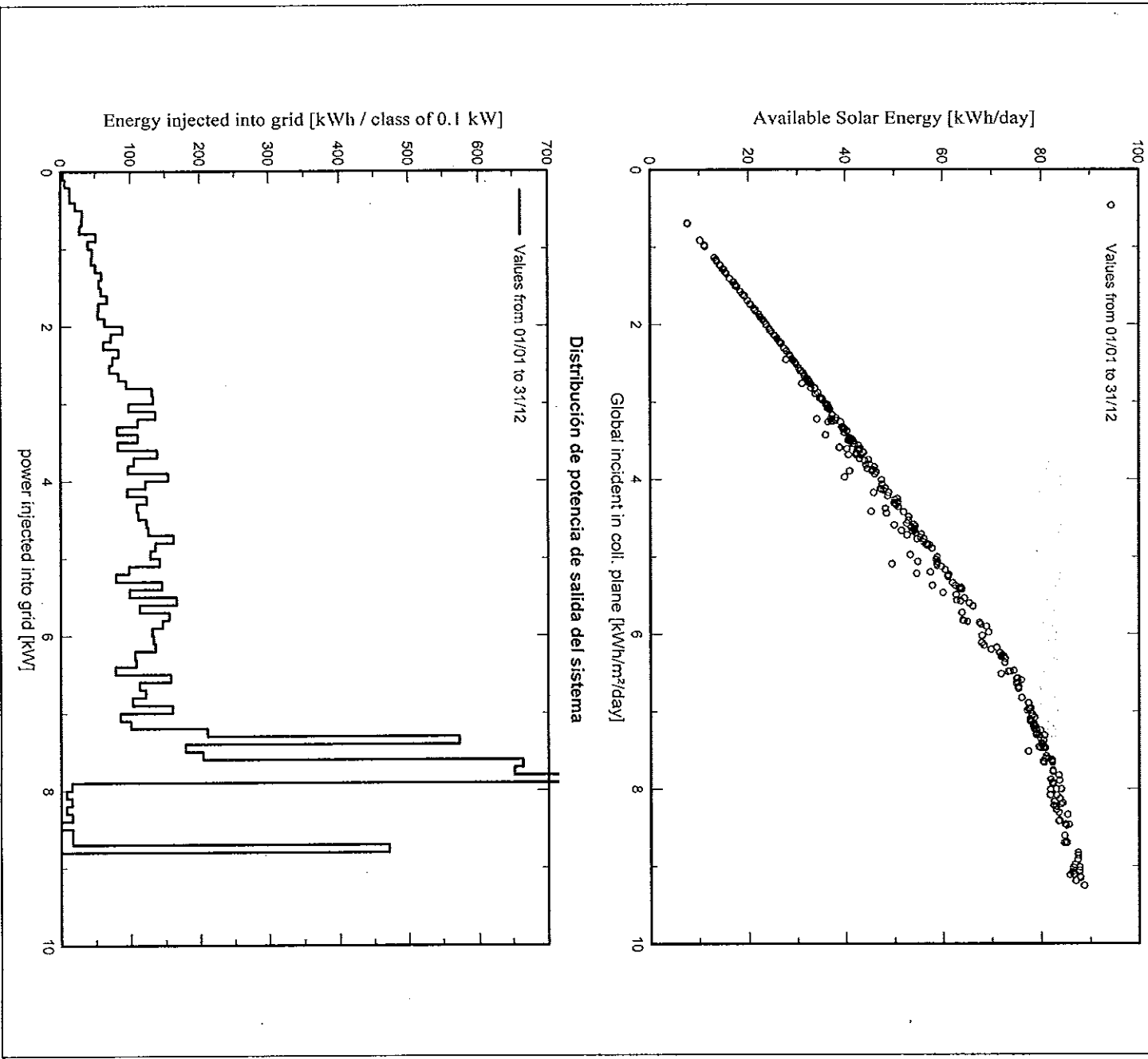
# Project: GRUPO LINEA BARBARELLA Evento148176

Variant: Grupo Línea Barbarella sas

GIMECOL SOLAR (Colombia)

## Preddef. graphs

### Diagrama entrada/salida diaria



# Gimecol Solar



# Project: CREACIONES MONACHITOS SAS Evento148176

Variant: Inversiones Oleo

GIIMECOL SOLAR (Colombia)

**PVsyst V7.3.2**  
V04, Simulation date:  
14/04/23 12:13  
with V7.3.2

## Project summary

| Geographical Site                               |  | Situation |           | Project settings |      |
|-------------------------------------------------|--|-----------|-----------|------------------|------|
| Santiago Pérez                                  |  | Latitude  | 4.59 °N   | Albedo           | 0.20 |
| Colombia                                        |  | Longitude | -74.11 °W |                  |      |
|                                                 |  | Altitude  | 2585 m    |                  |      |
|                                                 |  | Time zone | UTC-5     |                  |      |
| <b>Meteo data</b>                               |  |           |           |                  |      |
| Santiago Pérez                                  |  |           |           |                  |      |
| Meteonorm 8.1 (2016-2021), Sat=100% - Sintético |  |           |           |                  |      |

## System summary

|                              |           |                                                              |          |
|------------------------------|-----------|--------------------------------------------------------------|----------|
| <b>Grid-Connected System</b> |           | Sin escena 3D definida, sin sombras, Localidad Antonio Nariñ |          |
| <b>PV Field Orientation</b>  |           | <b>Near Shadings</b>                                         |          |
| Fixed plane                  |           | No Shadings                                                  |          |
| Tilt/Azimuth                 | 15 / 45 ° | <b>User's needs</b>                                          |          |
| <b>System information</b>    |           | Monthly values                                               |          |
| <b>PV Array</b>              |           | <b>Inverters</b>                                             |          |
| Nb. of modules               | 16 units  | Nb. of units                                                 | 16 units |
| Pnom total                   | 6.40 kWp  | Pnom total                                                   | 4640 W   |
|                              |           | Pnom ratio                                                   | 1.379    |

## Results summary

|                 |                   |                     |                   |                   |         |
|-----------------|-------------------|---------------------|-------------------|-------------------|---------|
| Produced Energy | 9121.16 kWh/year  | Specific production | 1425 kWh/kWp/year | Perf. Ratio PR    | 83.80 % |
| Used Energy     | 16750.00 kWh/year |                     |                   | Solar Fraction SF | 33.89 % |

## Table of contents

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## PVsyst V7.3.2

VC4, Simulation date:

14/04/23 12:13

with v7.3.2

GIMECOL SOLAR (Colombia)

## General parameters

## Grid-Connected System

Sin escena 3D definida, sin sombras, Localidad Antonio Nariñ

## PV Field Orientation

Orientation  
Fixed plane  
Tilt/Azimuth  
15 / 45 °Sheds configuration  
No 3D scene definedModels used  
Transposition  
Diffuse  
Circumsolar  
Perez  
Perez, Meteonorm  
separate

## Horizon

Free Horizon

Near Shadings  
No ShadingsUser's needs  
Monthly values

| Jan. | Feb. | Mar. | Apr. | May  | June | July | Aug. | Sep. | Oct. | Nov. | Dec. | Year    |
|------|------|------|------|------|------|------|------|------|------|------|------|---------|
| 1.50 | 0.90 | 1.20 | 1.40 | 0.80 | 1.30 | 1.35 | 1.40 | 1.30 | 1.80 | 1.70 | 2.10 | 16.8    |
|      |      |      |      |      |      |      |      |      |      |      |      | MWh/mth |

## PV Array Characteristics

| PV module                  |                          | Inverter                   |  | Enphase             |                  |
|----------------------------|--------------------------|----------------------------|--|---------------------|------------------|
| Manufacturer               | JA solar                 | Manufacturer               |  | Manufacturer        |                  |
| Model                      | JAM72-S03-400-PR         | Model                      |  | Model               | IQ7PLUS-72-x-208 |
| (Original PVsyst database) |                          | (Original PVsyst database) |  |                     |                  |
| Unit Nom. Power            | 400 Wp                   | Unit Nom. Power            |  | Unit Nom. Power     | 0.290 kWac       |
| Number of PV modules       | 16 units                 | Number of inverters        |  | Number of inverters | 16 units         |
| Nominal (STC)              | 6.40 kWp                 | Total power                |  | Total power         | 4.6 kWac         |
| Modules                    | 16 Strings x 1 In series | Operating voltage          |  | Operating voltage   | 16-48 V          |
| At operating cond. (50°C)  |                          | Max. power (=>60°C)        |  | Max. power (=>60°C) | 0.300 kWac       |
| Pmpp                       | 5.82 kWp                 | Phom ratio (DC:AC)         |  | Phom ratio (DC:AC)  | 1.38             |
| U mpp                      | 37 V                     |                            |  |                     |                  |
| I mpp                      | 158 A                    |                            |  |                     |                  |
| Total PV power             |                          | Total inverter power       |  |                     |                  |
| Nominal (STC)              | 6 kWp                    | Total power                |  | Total power         | 4.6 kWac         |
| Total                      | 16 modules               | Max. power                 |  | Max. power          | 4.8 kWac         |
| Module area                | 32.1 m²                  | Number of inverters        |  | Number of inverters | 16 units         |
| Cell area                  | 28.8 m²                  | Phom ratio                 |  | Phom ratio          | 1.38             |

## Array losses

| Thermal Loss factor                        |               | DC wiring losses  |              | Module Quality Loss |  |
|--------------------------------------------|---------------|-------------------|--------------|---------------------|--|
| Module temperature according to irradiance |               | Global array res. |              | Loss Fraction       |  |
| Uc (const)                                 | 20.0 W/m²K    | Loss Fraction     | 3.9 mΩ       | -0.8 %              |  |
| Uv (wind)                                  | 0.0 W/m²K/m/s |                   | 1.5 % at STC |                     |  |

## Module mismatch losses

Loss Fraction

Strings Mismatch loss

Loss Fraction

0.1 %

## IAM loss factor

Incidence effect (IAM): Fresnel smooth glass, n = 1.526

| 0°    | 30°   | 50°   | 60°   | 70°   | 75°   | 80°   | 85°   | 90°   |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.000 | 0.998 | 0.981 | 0.948 | 0.862 | 0.776 | 0.636 | 0.403 | 0.000 |



# Project: CREACIONES MONACHITOS SAS Evento148176

Variant: Inversiones Oleo

GIMECOL SOLAR (Colombia)

PVsyst V7.3.2  
VC4, Simulation date:  
14/04/23 12:13  
with V7.3.2

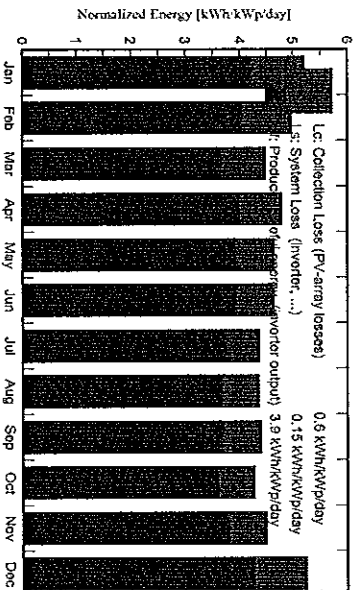
## Main results

### System Production

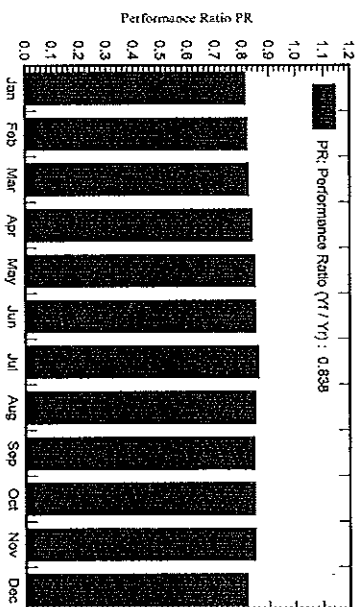
Produced Energy 9121.16 kWh/year  
Used Energy 16750.00 kWh/year

Specific production 1425 kWh/kWp/year  
Performance Ratio PR 83.80 %  
Solar Fraction SF 33.89 %

### Normalized productions (per installed kWp)



### Performance Ratio PR

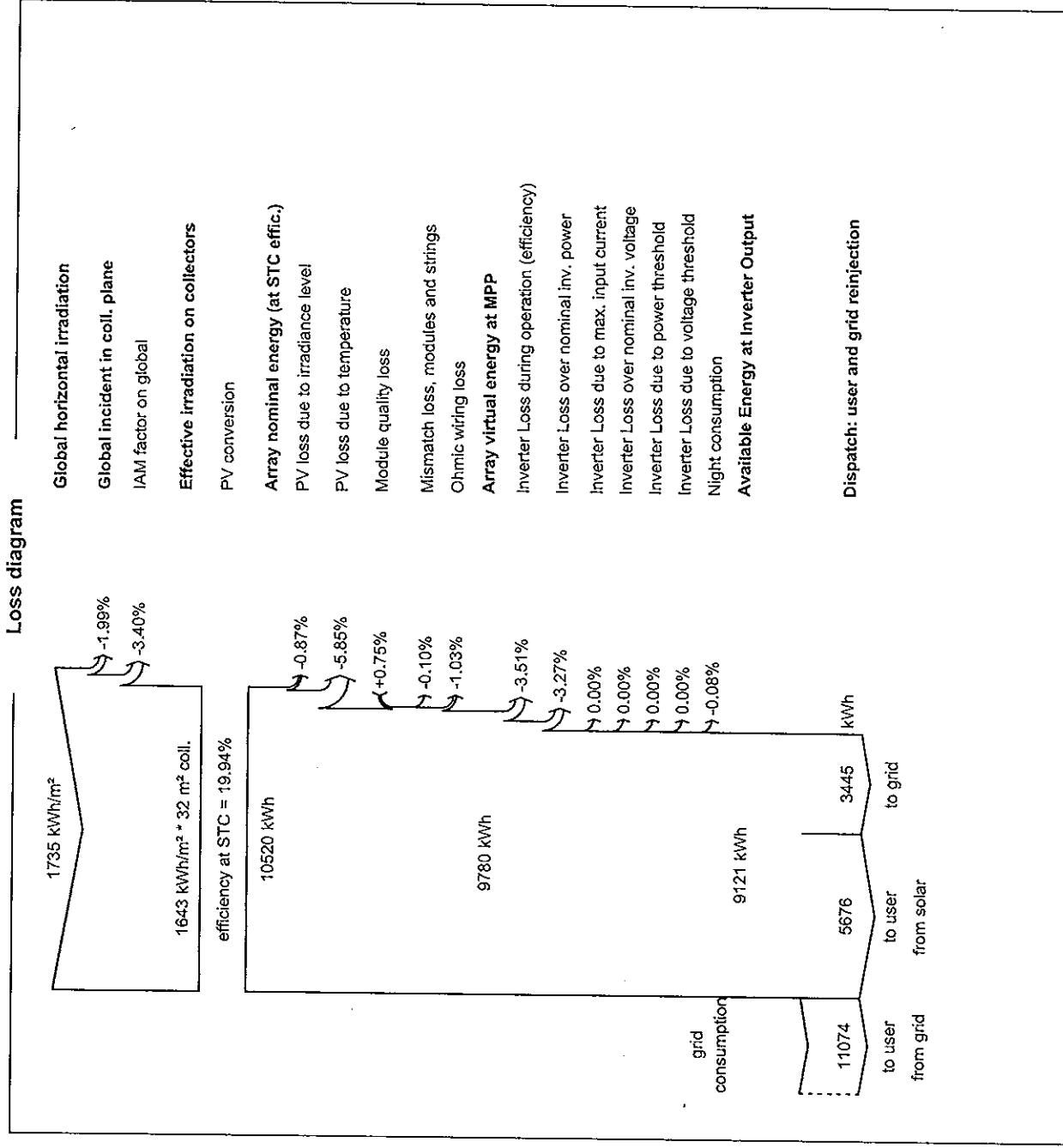


## Balances and main results

|           | GloboHor<br>kWh/m² | DiffHor<br>kWh/m² | T_Amb<br>°C | GloboInc<br>kWh/m² | GloboEff<br>kWh/m² | EArray<br>kWh | E_User<br>kWh | E_Solar<br>kWh | E_Grid<br>kWh | EFGrid<br>kWh |
|-----------|--------------------|-------------------|-------------|--------------------|--------------------|---------------|---------------|----------------|---------------|---------------|
| January   | 153.1              | 66.82             | 13.20       | 161.6              | 156.7              | 873.5         | 1500          | 513.9          | 327.3         | 986           |
| February  | 134.1              | 54.79             | 13.51       | 139.3              | 135.2              | 759.4         | 900           | 338.3          | 392.5         | 562           |
| March     | 140.4              | 68.68             | 13.75       | 139.1              | 134.4              | 763.5         | 1200          | 421.5          | 313.2         | 778           |
| April     | 149.7              | 65.85             | 13.78       | 143.8              | 139.2              | 802.0         | 1400          | 470.7          | 301.2         | 929           |
| May       | 156.4              | 66.82             | 13.95       | 144.2              | 138.9              | 813.5         | 800           | 315.0          | 468.5         | 485           |
| June      | 152.9              | 64.20             | 13.49       | 139.7              | 134.0              | 789.0         | 1300          | 466.8          | 293.0         | 833           |
| July      | 148.6              | 67.87             | 13.58       | 135.5              | 129.8              | 775.1         | 1350          | 466.9          | 279.5         | 883           |
| August    | 146.3              | 77.54             | 13.51       | 135.2              | 129.9              | 763.5         | 1400          | 482.2          | 253.1         | 918           |
| September | 135.6              | 67.51             | 13.18       | 132.1              | 128.0              | 741.8         | 1300          | 451.2          | 263.0         | 849           |
| October   | 132.6              | 78.29             | 13.44       | 132.8              | 128.4              | 746.3         | 1800          | 558.8          | 160.3         | 1241          |
| November  | 132.6              | 68.57             | 13.40       | 135.1              | 130.6              | 760.9         | 1700          | 532.4          | 200.5         | 1168          |
| December  | 153.2              | 65.76             | 13.37       | 162.5              | 157.8              | 883.7         | 2100          | 658.7          | 192.7         | 1441          |
| Year      | 1735.4             | 812.69            | 13.51       | 1700.8             | 1642.9             | 9472.1        | 16750         | 5676.3         | 3444.9        | 11074         |

### Legends

|          |                                              |         |                                             |
|----------|----------------------------------------------|---------|---------------------------------------------|
| GloboHor | Global horizontal irradiation                | EArray  | Effective energy at the output of the array |
| DiffHor  | Horizontal diffuse irradiation               | E_User  | Energy supplied to the user                 |
| T_Amb    | Ambient Temperature                          | E_Solar | Energy from the sun                         |
| GloboInc | Global incident in coll. plane               | E_Grid  | Energy injected into grid                   |
| GloboEff | Effective Global, corr. for IAM and shadings | EFGrid  | Energy from the grid                        |





# Project: CREACIONES MONACHITOS SAS Evento148176

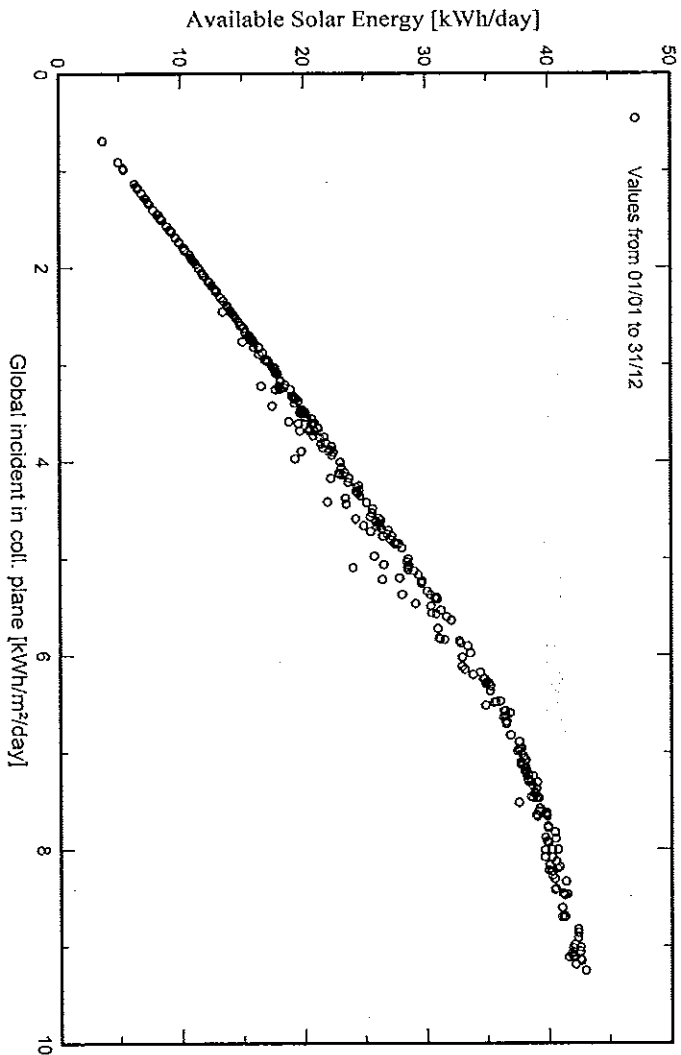
Variant: Inversiones Oleo

GIMECOL SOLAR (Colombia)

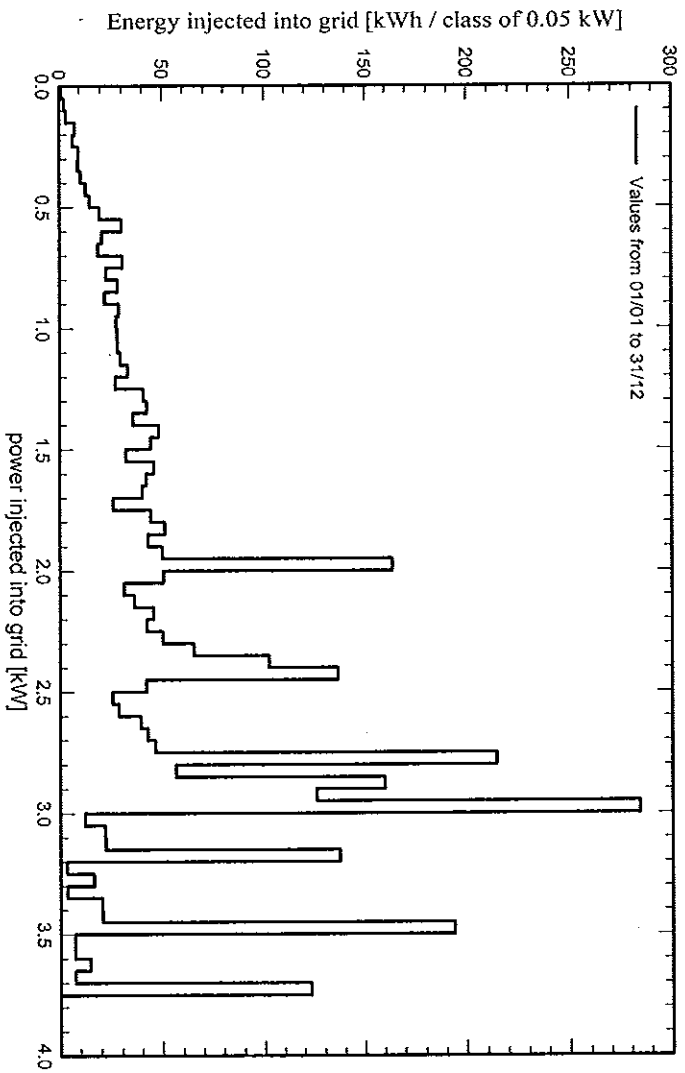
PVsyst V7.3.2  
VCA, Simulation date:  
14/04/23 12:13  
with V7.3.2

## Predel. graphs

### Diagrama entrada/salida diaria



### Distribución de potencia de salida del sistema



# PVsyst - Simulation report

## Grid-Connected System

Project: **Gabriel Fonseca y Cia Evento148176**

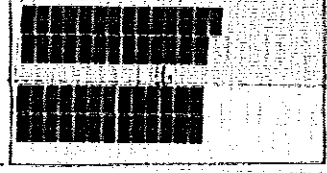
Variante: Simulación Colombia Compra Eficiente

localidad Antonio Nariño Colombia Compra Eficiente

System power: 29.20 kWp

Santiago Pérez - Colombia

### 1. GABRIEL FONSECA Y CIA SAS / CALZADO TAURO

|                                                                                                                                  |                                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Región en donde será instalado el Sistema Fotovoltaico                                                                           | Bogotá D.C. (Región andina)                                                         |
| Área que dispone la entidad/sede para instalar el Sistema Fotovoltaico:                                                          | 138 metros cuadrados                                                                |
| Tipo de Instalación a realizar (si es en techo o piso)                                                                           | Techo                                                                               |
| Coordenadas geográficas en donde se hará la Instalación (latitud y longitud)                                                     | 4°35'14"N 74°06'25"W                                                                |
| Fotografías, mapas o diagramas que la entidad considere necesarios para la elaboración del estudio por parte de los proveedores. |  |



# Project: Gabriel Fonseca y Cia Evento148176

Variant: Nueva variante de simulación

GIMECOL SOLAR (Colombia)

## PVsyst V7.3.2

VCO, Simulation date:  
13/04/23 16:28  
with v7.3.2

### Project summary

| Geographical Site                              |  | Situation |           | Project settings |      |
|------------------------------------------------|--|-----------|-----------|------------------|------|
| Santiago Pérez                                 |  | Latitude  | 4.59 °N   | Albedo           | 0.20 |
| Colombia                                       |  | Longitude | -74.11 °W |                  |      |
|                                                |  | Altitude  | 2585 m    |                  |      |
|                                                |  | Time zone | UTC-5     |                  |      |
| <b>Meteo data</b>                              |  |           |           |                  |      |
| Santiago Pérez                                 |  |           |           |                  |      |
| Meteonorm 8.1 (2016-2021), Sat=100% - Simético |  |           |           |                  |      |

### System summary

|                              |           |                                                    |                     |
|------------------------------|-----------|----------------------------------------------------|---------------------|
| <b>Grid-Connected System</b> |           | localidad Antonio Nariño Colombia Compra Eficiente |                     |
| <b>PV Field Orientation</b>  |           | <b>Near Shadings</b>                               |                     |
| Fixed plane                  |           | No Shadings                                        | <b>User's needs</b> |
| Tilt/Azimuth                 | 15 / 45 ° |                                                    | Monthly values      |
| <b>System information</b>    |           |                                                    |                     |
| <b>PV Array</b>              |           | <b>Inverters</b>                                   |                     |
| Nb. of modules               | 73 units  | Nb. of units                                       | 73 units            |
| Pnom total                   | 29.20 kWp | Pnom total                                         | 21.17 kWac          |
|                              |           | Pnom ratio                                         | 1.379               |

### Results summary

|                 |                |                     |                   |                   |         |
|-----------------|----------------|---------------------|-------------------|-------------------|---------|
| Produced Energy | 41633 kWh/year | Specific production | 1426 kWh/kWp/year | Perf. Ratio PR    | 83.83 % |
| Used Energy     | 40360 kWh/year |                     |                   | Solar Fraction SF | 39.89 % |

### Table of contents

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## PVsyst V7.3.2

VC0, Simulation date:

13/04/23 16:28

with V7.3.2

## GIMECOL SOLAR (Colombia)

## General parameters

## Grid-Connected System

Localidad Antonio Nariño Colombia Compra Eficiente

## PV Field Orientation

Orientation

Fixed plane

Tilt/Azimuth

15 / 45 °

Sheds configuration

No 3D scene defined

Models used

Transposition

Diffuse

Circumsolar

Perez

Perez, Meteonorm

separate

## Horizon

Free Horizon

Near Shadings

No Shadings

User's needs

Monthly values

| Jan. | Feb. | Mar. | Apr. | May  | June | July | Aug. | Sep. | Oct. | Nov. | Dec. | Year    |
|------|------|------|------|------|------|------|------|------|------|------|------|---------|
| 2.15 | 2.58 | 3.45 | 3.39 | 2.36 | 3.15 | 3.25 | 3.36 | 3.48 | 3.89 | 3.98 | 5.30 | 40.4    |
|      |      |      |      |      |      |      |      |      |      |      |      | MWh/mth |

## PV Array Characteristics

## PV module

Manufacturer

Model

JA Solar

JAM72-S10-400-PR

## Inverter

Manufacturer

Model

Enphase  
IQ7PLUS-72-x-208

(Original PVsyst database)

Unit Nom. Power

Number of PV modules

Nominal (STC)

Modules

400 Wp

73 units

29.20 kWp

73 Strings x 1 In series

At operating cond. (50°C)

Pmpp

U mpp

I mpp

26.64 kWp

37 V

714 A

(Original PVsyst database)

Unit Nom. Power

Number of inverters

Total power

Operating voltage

Max. power ( $\approx 60^{\circ}\text{C}$ )

Pnom ratio (DC:AC)

0.290 kWac

73 units

21.2 kWac

16-48 V

0.300 kWac

1.38

## Total PV power

Nominal (STC)

Total

Module area

## Total inverter power

Total power

Max. power

Number of inverters

Pnom ratio

21.2 kWac

21.9 kWac

73 units

1.38

## Array losses

## Thermal Loss factor

Module temperature according to irradiance

Uc (const)

Uv (wind)

## DC wiring losses

Global array res.

Loss Fraction

## Module Quality Loss

Loss Fraction

0.87 m $\Omega$ 

1.5 % at STC

-0.8 %

## Module mismatch losses

Loss Fraction

0.0 % at MPP

## Strings Mismatch loss

Loss Fraction

0.1 %

## IAM loss factor

Incidence effect (IAM): Fresnel smooth glass, n = 1.526

| 0°    | 30°   | 50°   | 60°   | 70°   | 75°   | 80°   | 85°   | 90°   |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.000 | 0.998 | 0.981 | 0.948 | 0.862 | 0.776 | 0.636 | 0.403 | 0.000 |



# Project: Gabriel Fonseca y Cia Evento148176

Variant: Nueva variante de simulación

GIMECOL SOLAR (Colombia)

PVsyst V7.3.2  
VCO, Simulation date:  
13/04/23 16:28  
with V7.3.2

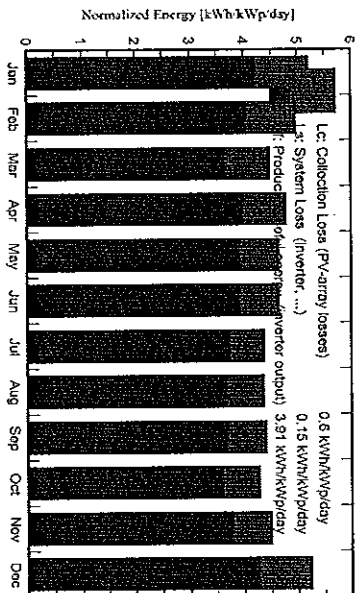
## Main results

### System Production

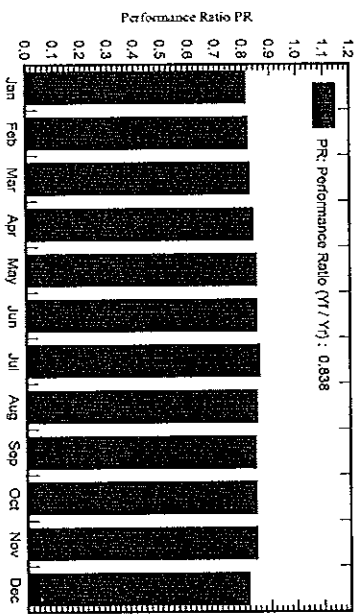
Produced Energy 41633 kWh/year  
Used Energy 40360 kWh/year

Specific production 1426 kWh/kWp/year  
Performance Ratio PR 83.83 %  
Solar Fraction SF 39.89 %

Normalized productions (per installed kWp)



Performance Ratio PR

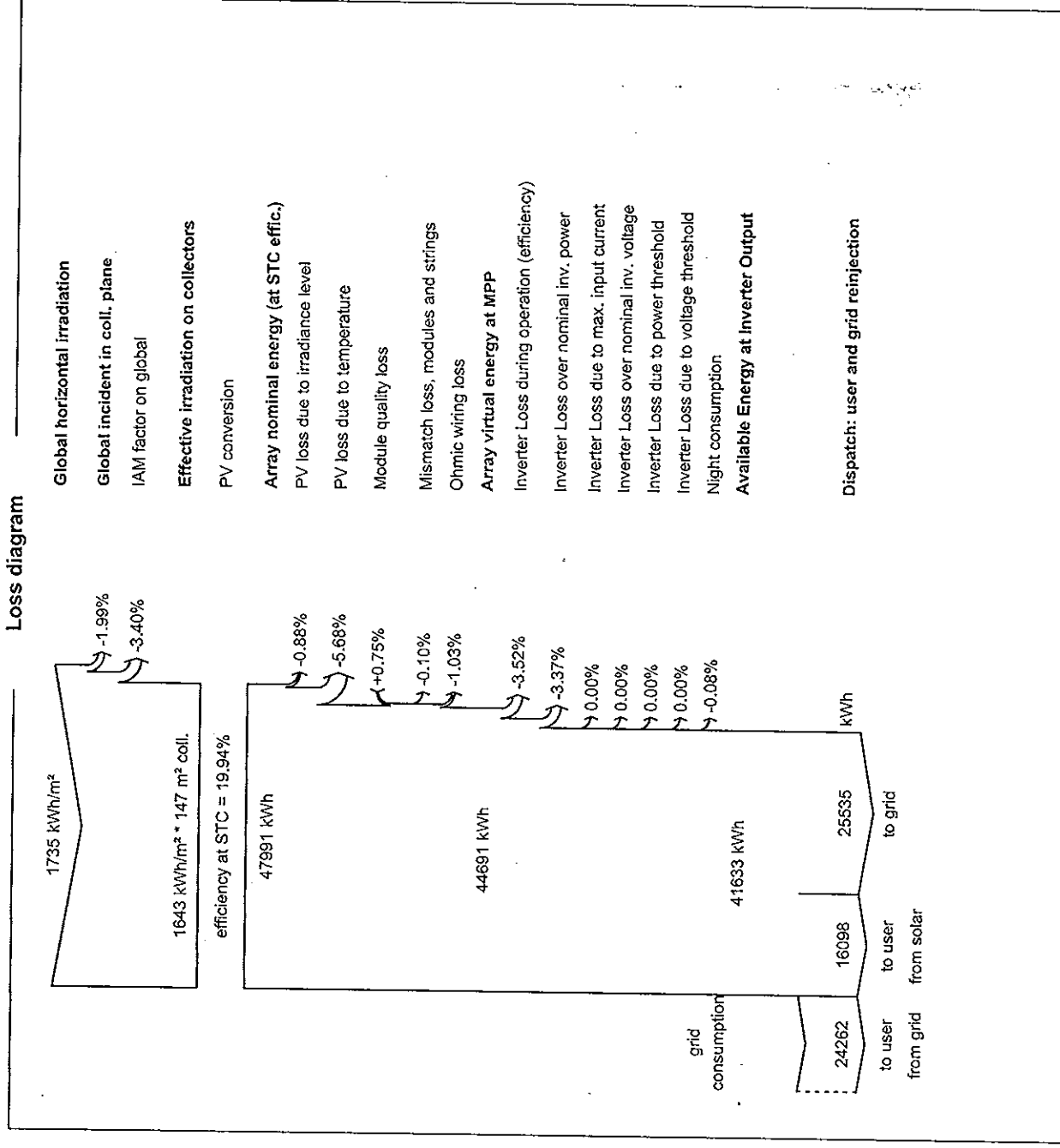


## Balances and main results

|           | GloboHor<br>kWh/m² | DiffHor<br>kWh/m² | T_Amb<br>°C | Globlnc<br>kWh/m² | GloBEff<br>kWh/m² | EArray<br>kWh | E_User<br>kWh | E_Solar<br>kWh | E_Grid<br>kWh | EFrGrid<br>kWh |
|-----------|--------------------|-------------------|-------------|-------------------|-------------------|---------------|---------------|----------------|---------------|----------------|
| January   | 153.1              | 66.82             | 13.20       | 161.6             | 156.7             | 3987          | 2150          | 892            | 2948          | 1258           |
| February  | 134.1              | 54.79             | 13.51       | 139.3             | 135.2             | 3466          | 2580          | 1063           | 2273          | 1517           |
| March     | 140.4              | 68.68             | 13.75       | 139.1             | 134.4             | 3485          | 3450          | 1378           | 1975          | 2072           |
| April     | 149.7              | 65.85             | 13.78       | 143.8             | 139.2             | 3661          | 3390          | 1350           | 2173          | 2040           |
| May       | 156.4              | 66.82             | 13.95       | 144.2             | 138.9             | 3714          | 2360          | 998            | 2579          | 1362           |
| June      | 152.9              | 64.20             | 13.49       | 139.7             | 134.0             | 3602          | 3150          | 1321           | 2147          | 1829           |
| July      | 148.6              | 67.87             | 13.58       | 135.5             | 129.8             | 3539          | 3250          | 1322           | 2086          | 1928           |
| August    | 146.3              | 77.54             | 13.51       | 135.2             | 129.9             | 3485          | 3380          | 1376           | 1980          | 2004           |
| September | 135.6              | 67.51             | 13.18       | 132.1             | 128.0             | 3386          | 3460          | 1394           | 1865          | 2086           |
| October   | 132.6              | 78.29             | 13.44       | 132.8             | 128.4             | 3407          | 3890          | 1528           | 1754          | 2362           |
| November  | 132.6              | 68.57             | 13.40       | 135.1             | 130.6             | 3473          | 3980          | 1498           | 1848          | 2482           |
| December  | 153.2              | 65.76             | 13.37       | 162.5             | 157.8             | 4034          | 5300          | 1979           | 1907          | 3321           |
| Year      | 1735.4             | 812.69            | 13.51       | 1700.8            | 1642.9            | 43239         | 40360         | 16098          | 25535         | 24262          |

### Legends

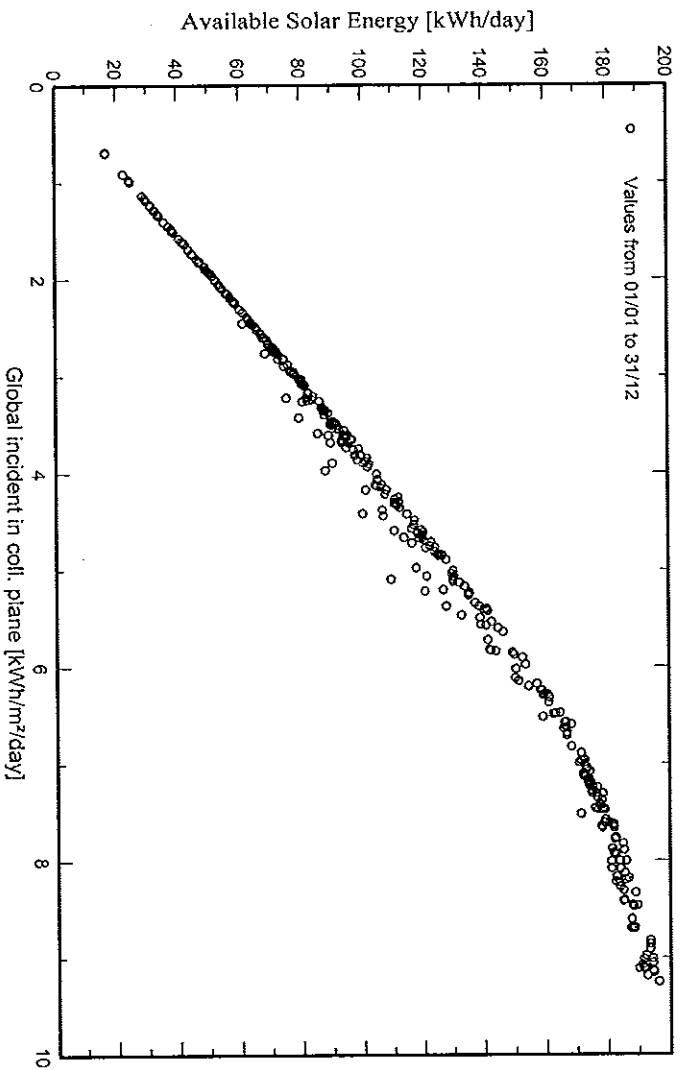
|          |                                              |         |                                             |
|----------|----------------------------------------------|---------|---------------------------------------------|
| GloboHor | Global horizontal irradiation                | EArray  | Effective energy at the output of the array |
| DiffHor  | Horizontal diffuse irradiation               | E_User  | Energy supplied to the user                 |
| T_Amb    | Ambient Temperature                          | E_Solar | Energy from the sun                         |
| Globlnc  | Global incident in coll. plane               | E_Grid  | Energy injected into grid                   |
| GloBEff  | Effective Global, corr. for IAM and shadings | EFrGrid | Energy from the grid                        |



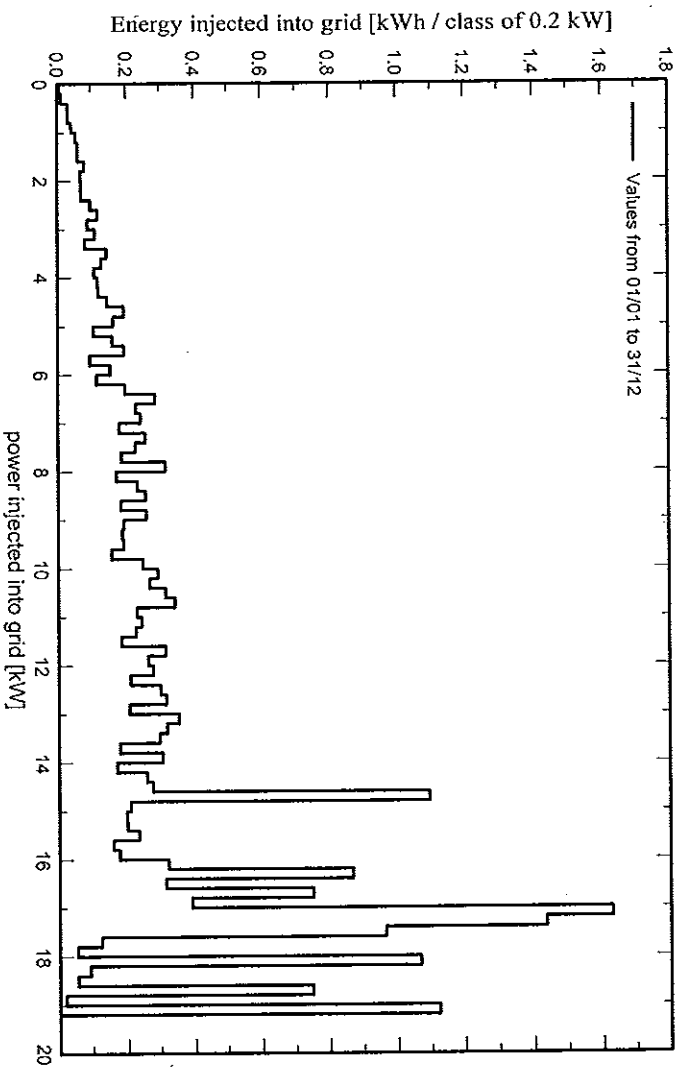


Predif. graphs

Diagrama entrada/salida diaria



Distribución de potencia de salida del sistema





**PVsyst V7.3.2**

VCO, Simulation date:  
13/04/23 16:28  
with V7.3.2

GIMECOL SOLAR (Colombia)

**CO<sub>2</sub> Emission Balance**

Total: 107.8 tCO<sub>2</sub>

**Generated emissions**

Total: 58.14 tCO<sub>2</sub>

Source: Detailed calculation from table below

**Replaced Emissions**

Total: 191.2 tCO<sub>2</sub>

System production: 41.67 MWh/yr

Grid Lifecycle Emissions: 153 gCO<sub>2</sub>/kWh

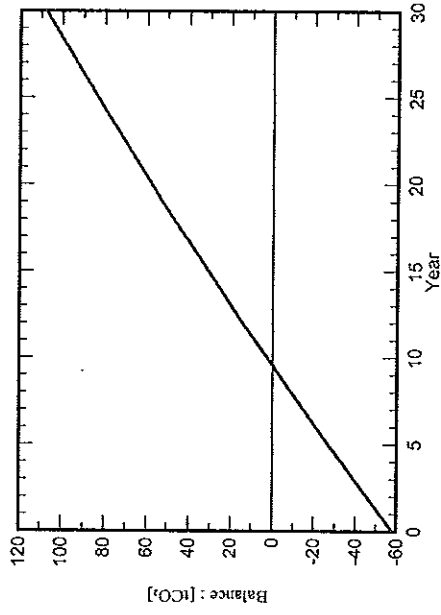
Source: IEA List

Country: Colombia

Lifetime: 30 years

Annual degradation: 1.0 %

**Saved CO<sub>2</sub> Emission vs. Time**



**System Lifecycle Emissions Details**

| Item      | LCE                         | Quantity | Subtotal<br>[kgCO <sub>2</sub> ] |
|-----------|-----------------------------|----------|----------------------------------|
| Modules   | 1713 kgCO <sub>2</sub> /kWp | 29.2 kWp | 50011                            |
| Supports  | 1.02 kgCO <sub>2</sub> /kg  | 730 kg   | 745                              |
| Inverters | 101 kgCO <sub>2</sub> /     | 73.0     | 7380                             |

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