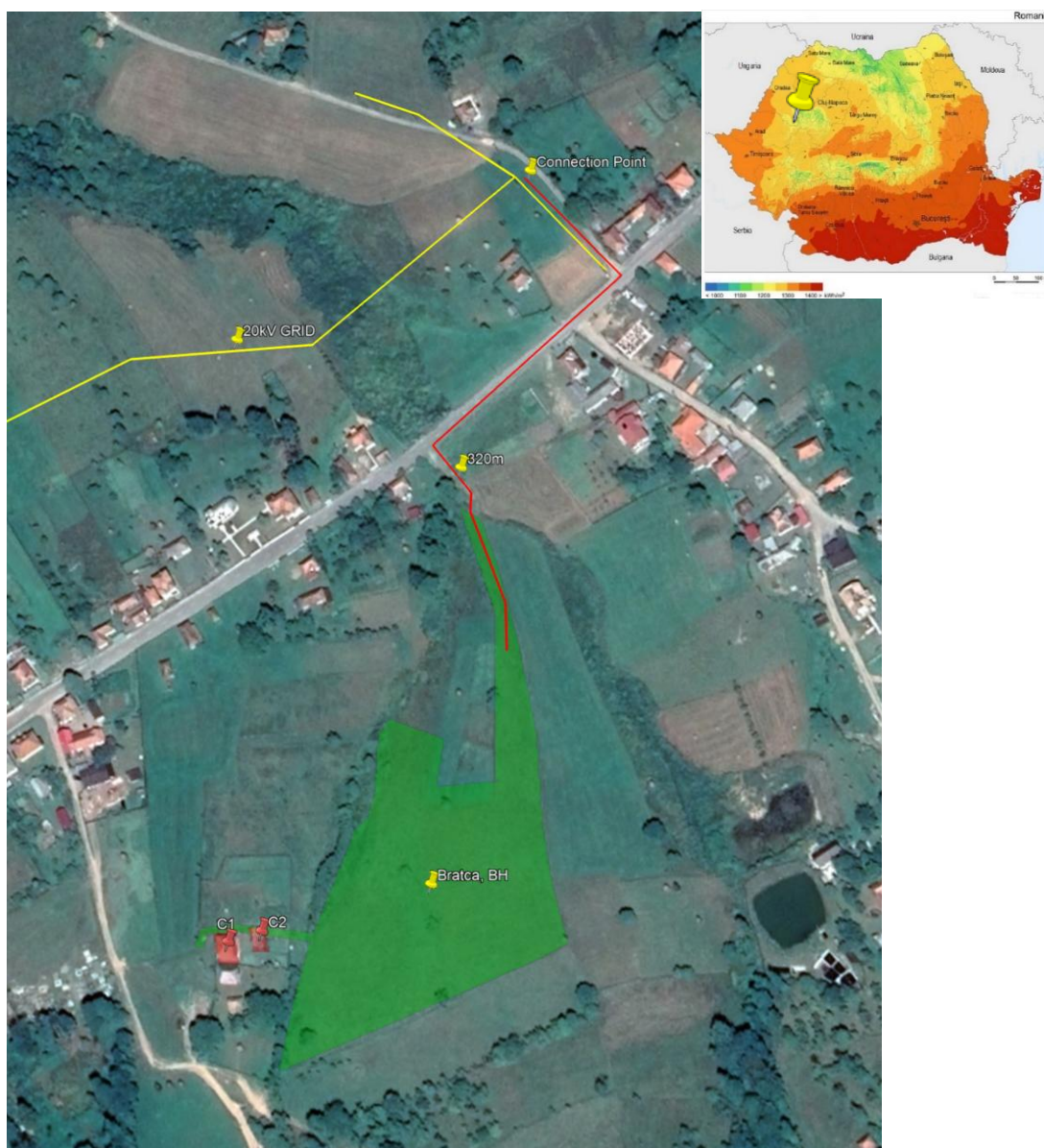




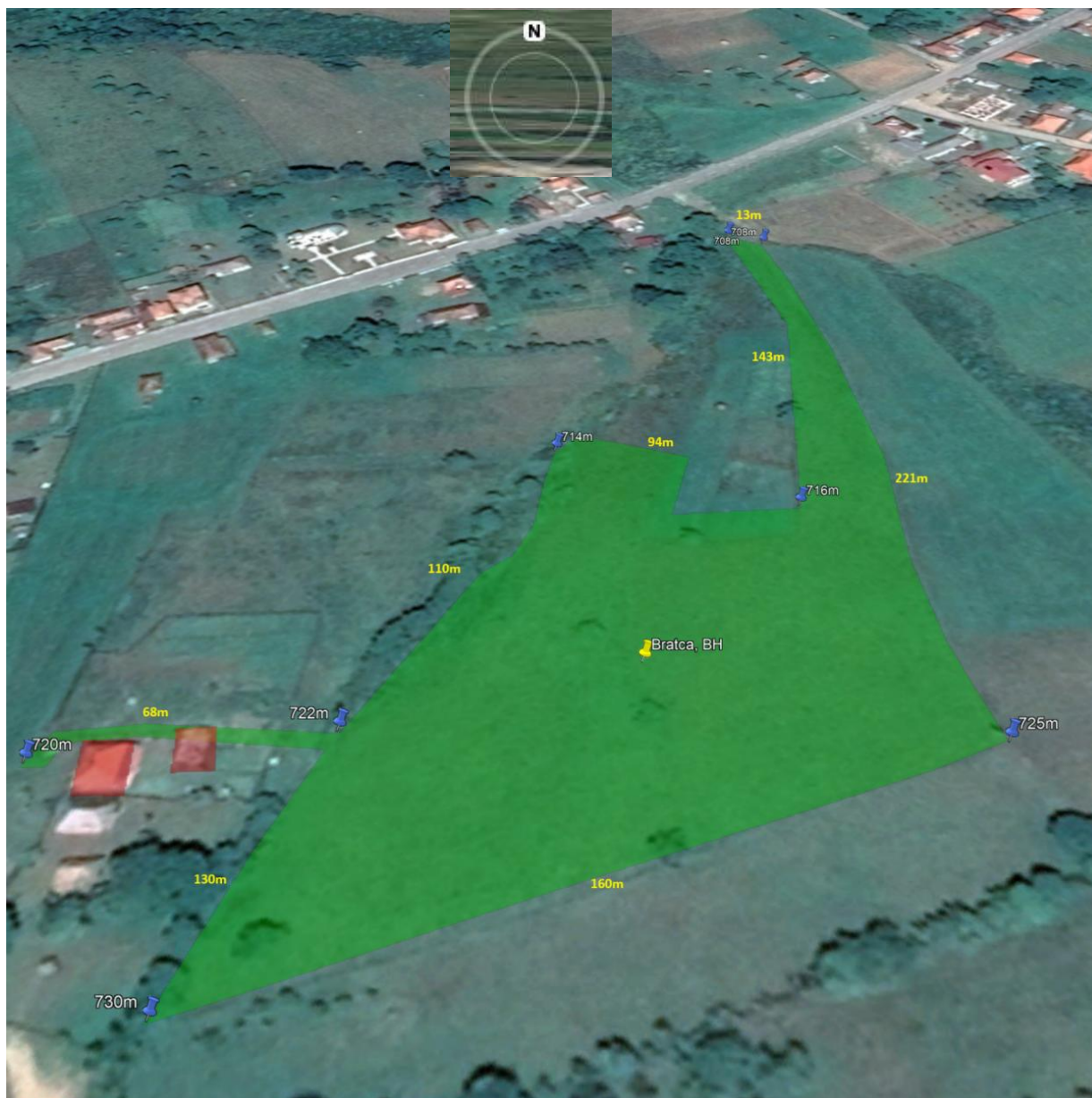
# PV Park + BESS

**Project: Bratca, BH**  
**Land Surface: 1.6 Ha**  
**Installed PV Power: 1.227 MWp**  
**BESS - Storage Capacity: 2.15 MWh**





## Curves Level



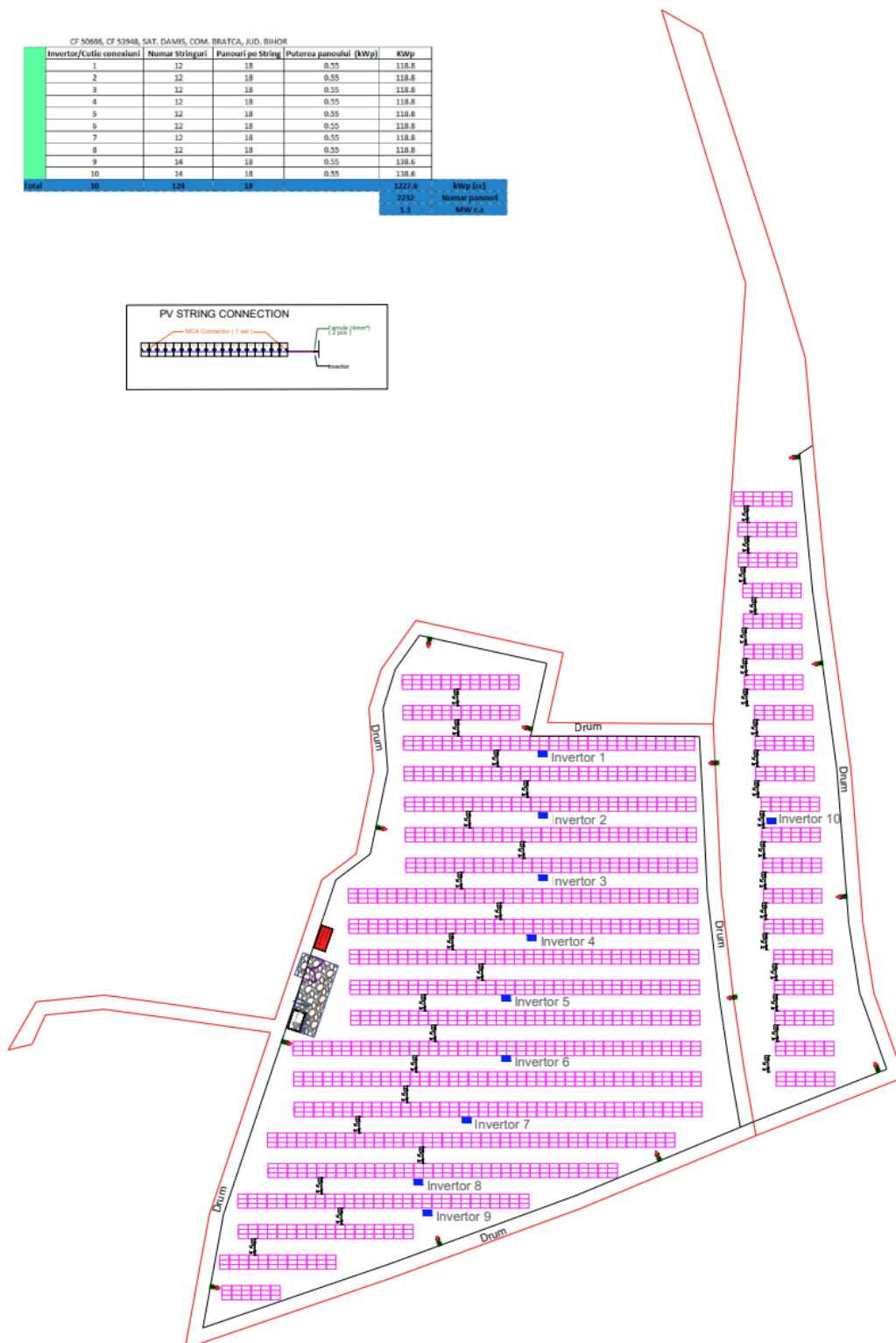
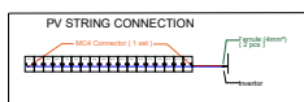


# Layout Photovoltaic Park

CF 50686, CF 53948, SAT. DAMIS, COM. BRATCA, JUD. BIHOR

| Invertor/Cutie conexiuni | Numar Stringuri | Panouri pe String | Puterea panoului (kWp) | KWp           |
|--------------------------|-----------------|-------------------|------------------------|---------------|
| 1                        | 12              | 18                | 0.55                   | 118.8         |
| 2                        | 12              | 18                | 0.55                   | 118.8         |
| 3                        | 12              | 18                | 0.55                   | 118.8         |
| 4                        | 12              | 18                | 0.55                   | 118.8         |
| 5                        | 12              | 18                | 0.55                   | 118.8         |
| 6                        | 12              | 18                | 0.55                   | 118.8         |
| 7                        | 12              | 18                | 0.55                   | 118.8         |
| 8                        | 12              | 18                | 0.55                   | 118.8         |
| 9                        | 14              | 18                | 0.55                   | 138.6         |
| 10                       | 14              | 18                | 0.55                   | 138.6         |
| <b>Total</b>             | <b>10</b>       | <b>108</b>        | <b>18</b>              | <b>1227.6</b> |

1227.6 kWp (cc)  
 2232 Numar panouri  
 1.1 MW c.a.

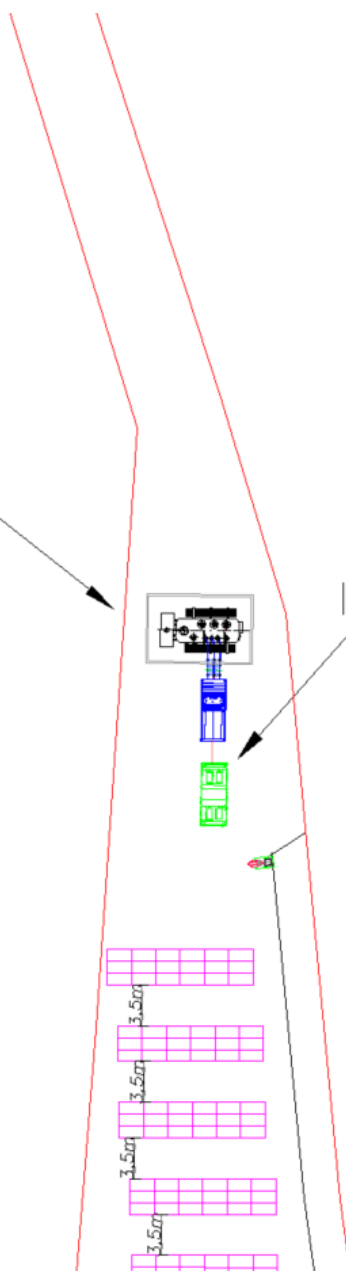




## Layout BESS

Post de transformare

Instalatie de stocare





## PV Productions

**Peak power: 1.23 MWp**

**Module surface: 5 021.5 m<sup>2</sup>**

**Total number of modules: 1 859**

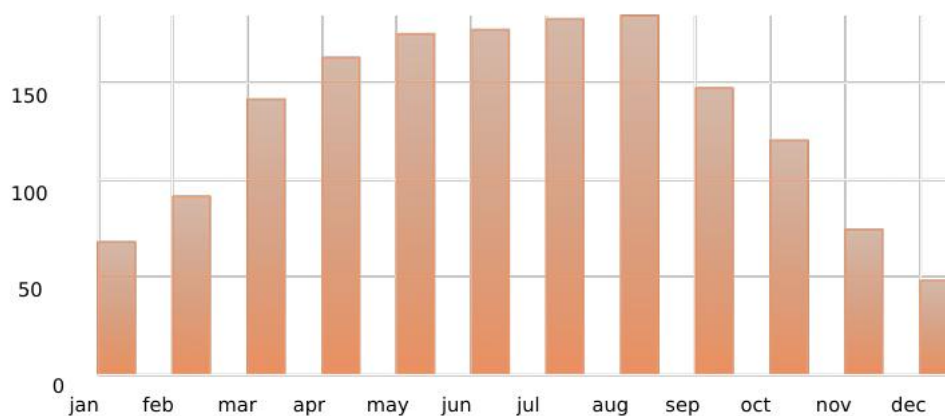
**Total number of inverters: 11**

### Average values:

Annual production (DC) : 1 683 MWh

Annual production (AC) : 1 577 MWh

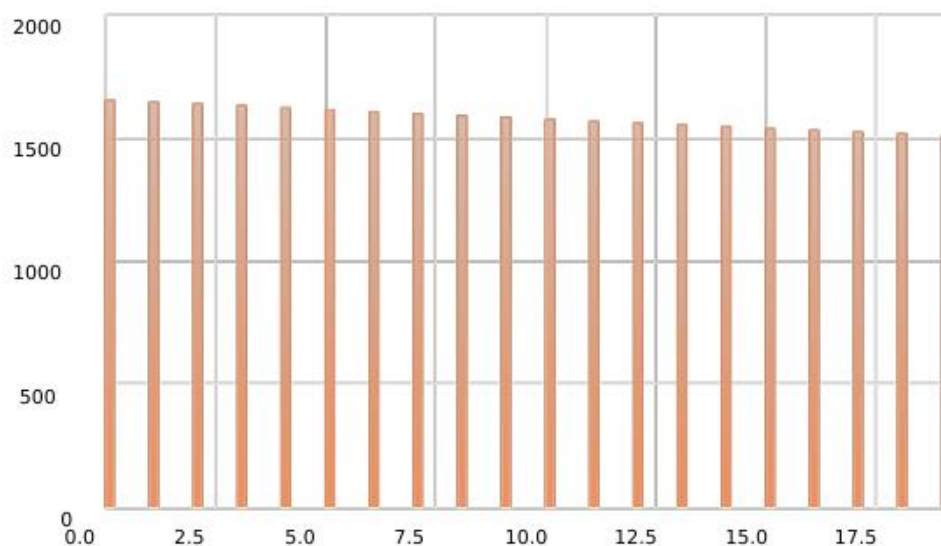
### Monthly AC production (MWh/month):



| Months | Jan | Feb | Mar | Apr | May | June | Jul | Aug | Sep | Oct | Nov | Dec |
|--------|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|
| MWh    | 68  | 92  | 142 | 164 | 176 | 178  | 183 | 185 | 148 | 121 | 75  | 48  |



#### AC production year by year (MWh):



| Years | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| MWh   | 1 652 | 1 644 | 1 636 | 1 628 | 1 620 | 1 613 | 1 605 | 1 597 | 1 589 | 1 582 |

| Years | 11    | 12    | 13    | 14    | 15    | 16    | 17    | 18    | 19    | 20    |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| MWh   | 1 574 | 1 566 | 1 559 | 1 551 | 1 544 | 1 536 | 1 529 | 1 521 | 1 514 | 1 507 |

EMISSIONS AVOIDED: 631 CO<sub>2</sub> equivalent (ton) \*

\* Quantity of greenhouse gases that would have been emitted during the observation period if this electricity had been generated through conventional means (20 g eq CO<sub>2</sub>/kWh)

\* Important: this does not mean that all the emissions would be avoided, since the process of manufacturing and transporting PV modules also generates greenhouse gas emissions.



**Costs:**

Investment: 730 065 EUR  
Inverter renewal: 76 834 EUR  
Maintenance: 1.00 %

**Bank loan:**

Amount: 730 065 EUR  
Interest rate: 3.50 %

**Discounting:**

Inflation rate: 2.00 %  
Equity rate: 3.00 %

**Project type:**

Total sale

**Energy sales price produced:**

0.0700 EUR/kWh

**Price evolution:**

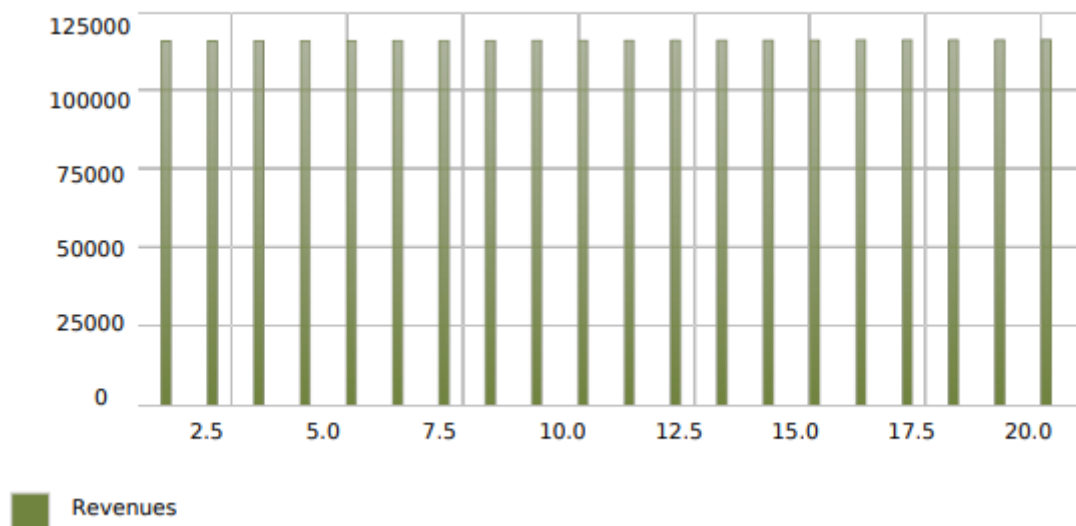
+ 0.5 %/year

**Economic results:**

Annual revenue: 116 015 EUR/year  
Cumulated revenues: 2.320 million EUR  
Maintenance cost: 9 047 EUR/year

LCOE: 0.034 EUR/kWh  
Net present value: 740 178 EUR  
Payback period: 7 year(s)  
Discounted payback period: 8 year(s)  
Internal rate of return: 13.20 %

**Revenues year by year (EUR):**





**\*\*According to www.opcom.ro**



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stepping forward to the future*

**opcom** Romanian gas and electricity market operator

**25opcom**



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Important for prosumers!  
DAM weighted average price for December 2025: 607.92 lei/MWh

|                    | ROPEX_DAM_15min |        |        |        |        |        |        |        |        |        |        |        |        |
|--------------------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|                    | 1               | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10     | 11     | 12     |        |
| ROPEX_DAM_Base     | 202.93          | 84.77  | 82.85  | 85.83  | 92.66  | 85.57  | 84.51  | 87.71  | 87.67  | 88.94  | 87.79  | 87.78  | 87.30  |
| ROPEX_DAM_Peak     | 272.36          | 49     | 50     | 51     | 52     | 53     | 54     | 55     | 56     | 57     | 58     | 59     | 60     |
| ROPEX_DAM_Off_Peak | 133.50          | 209.51 | 221.49 | 227.08 | 236.60 | 249.93 | 247.96 | 252.85 | 231.81 | 229.55 | 243.73 | 254.26 | 282.97 |

|               | Forward Market 2024-2026 [Euro/MWh] |        |        |        |        |        |        |        |        |        |        |        |        |
|---------------|-------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|               | jan                                 | feb    | mar    | apr    | may    | jun    | jul    | aug    | sep    | oct    | nov    | dec    |        |
| ROPEX_FM_2024 | 100.66                              | 115.62 | 114.80 | 95.31  | 95.74  | 92.81  | 94.10  | 98.20  | 100.33 | 100.40 | 102.81 | 102.96 | 103.18 |
| ROPEX_FM_2025 | 105.99                              | 105.97 | 105.80 | 104.49 | 101.60 | 101.50 | 101.93 | 107.96 | 107.01 | 106.61 | 107.56 | 109.51 | 110.30 |
| ROPEX_FM_2026 | 113.47                              | 115.80 | 114.83 | 114.36 | 112.55 | 112.12 | 111.90 | 112.89 | 112.88 | 112.89 | 113.02 | 113.02 | 113.03 |

|            | Green Certificates (GCACSM) 2024-2025 [Euro/GC] |       |       |       |       |       |       |       |       |       |       |       |
|------------|-------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|            | jan                                             | feb   | mar   | apr   | may   | jun   | jul   | aug   | sep   | oct   | nov   | dec   |
| ROPEX_GC_M | 29.40                                           | 29.40 | 29.40 | 29.40 | 29.40 | 29.40 | 29.40 | 29.40 | 29.40 | 29.40 | 29.40 | 29.40 |

**70 EUR / MWh**  
**Price for 5-years average-PPA (Public Purchase Agreement)**

**Announcements**

- **08/01/2026**  
The new limit values for trading green certificates
- **08/01/2026**  
The new limit values for trading green certificates
- **05/01/2026**  
In accordance with the provisions of ANRE Order no. 15/2022, OPCOM publishes the weighted average price of the Day Ahead Market for December 2025 amounting to 607.92 lei/MWh
- **05/01/2026**  
In accordance with the provisions of ANRE Order no. 15/2022, OPCOM publishes the weighted average price of the Day Ahead

**Press Releases**

- **23/12/2025**  
CMBC-EA-flex – Trading record
- **18/12/2025**  
Successful launch of the Intra-Day Market from Republic of Moldova
- **11/12/2025**  
Successful launch of the DAM from Republic of Moldova

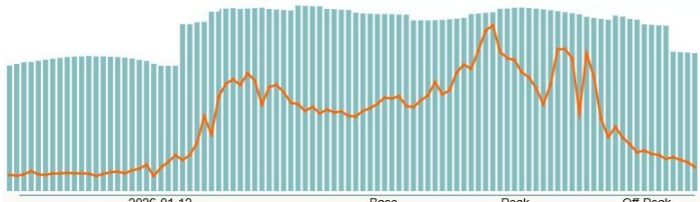
**News**

- **24/03/2025**  
Energynomics: Maria De Melo (EBRD) sees the Romanian renewable energy market as a model for Europe
- **10/03/2022**  
Initial Europex reaction to Commission communication on joint European action for more

Day-Ahead (SDAC)  
Intra-Day (SIDC CT/IDA)



**DAM Results**



|                      | Base     | Peak     | Off-Peak |
|----------------------|----------|----------|----------|
| ROPEX_DAM [euro/MWh] | 202.93   | 272.36   | 133.50   |
| Volume [MWh]         | 52,608.4 | 28,720.9 | 23,884.5 |



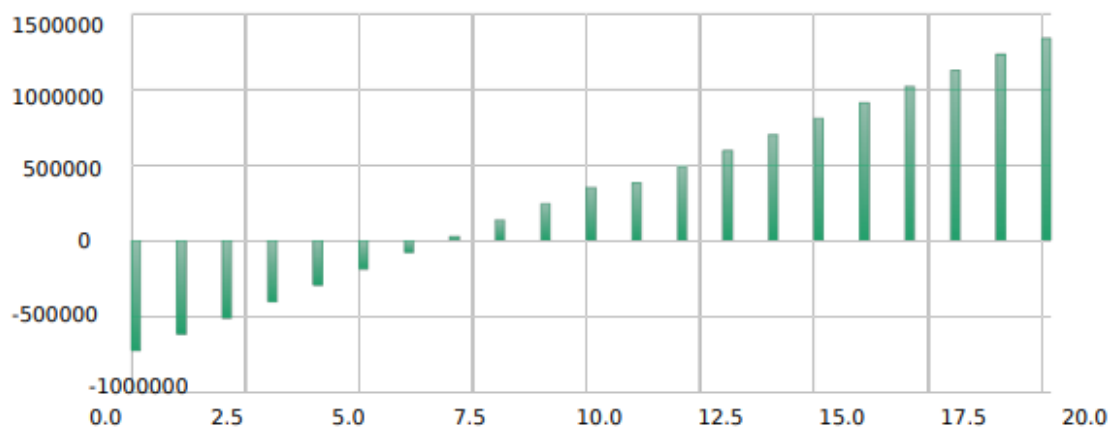
## Estimated results

| Year                | 1                | 2                | 3                | 4                | 5                | 6                | 7                | 8                | 9                | 10               |
|---------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Production (kWh)    | 1 646 455        | 1 638 651        | 1 630 844        | 1 623 054        | 1 615 284        | 1 607 537        | 1 599 813        | 1 592 113        | 1 584 437        | 1 576 793        |
| <b>Selling</b>      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| Prices (EUR/kWh)    | 0.0704           | 0.0707           | 0.0711           | 0.0714           | 0.0718           | 0.0721           | 0.0725           | 0.0728           | 0.0732           | 0.0736           |
| Sales revenue (EUR) | 115 828.1        | 115 855.5        | 115 880.1        | 115 903.1        | 115 925.1        | 115 945.9        | 115 965.7        | 115 984.6        | 116 002.6        | 116 020.1        |
| <b>Total (EUR)</b>  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| <b>Revenues</b>     | <b>115 828.1</b> | <b>115 855.5</b> | <b>115 880.1</b> | <b>115 903.1</b> | <b>115 925.1</b> | <b>115 945.9</b> | <b>115 965.7</b> | <b>115 984.6</b> | <b>116 002.6</b> | <b>116 020.1</b> |
| Maintenance         | 7 446.7          | 7 595.6          | 7 747.5          | 7 902.5          | 8 060.5          | 8 221.7          | 8 386.2          | 8 553.9          | 8 725.0          | 8 899.5          |
| Inverter renewal    | 0.0              | 0.0              | 0.0              | 0.0              | 0.0              | 0.0              | 0.0              | 0.0              | 0.0              | 0.0              |
| <b>Results</b>      | <b>108 381.5</b> | <b>108 259.9</b> | <b>108 132.6</b> | <b>108 000.7</b> | <b>107 864.6</b> | <b>107 724.2</b> | <b>107 579.6</b> | <b>107 430.7</b> | <b>107 277.6</b> | <b>107 120.7</b> |

| Year                | 11               | 12               | 13               | 14               | 15               | 16               | 17               | 18               | 19               | 20               |
|---------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Production (kWh)    | 1 569 179        | 1 561 585        | 1 554 012        | 1 546 461        | 1 538 936        | 1 531 446        | 1 523 992        | 1 516 571        | 1 509 183        | 1 501 817        |
| <b>Selling</b>      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| Prices (EUR/kWh)    | 0.0739           | 0.0743           | 0.0747           | 0.0751           | 0.0754           | 0.0758           | 0.0762           | 0.0766           | 0.0770           | 0.0773           |
| Sales revenue (EUR) | 116 037.2        | 116 053.0        | 116 067.7        | 116 081.2        | 116 094.0        | 116 106.5        | 116 119.1        | 116 131.5        | 116 143.5        | 116 154.5        |
| <b>Total (EUR)</b>  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| <b>Revenues</b>     | <b>116 037.2</b> | <b>116 053.0</b> | <b>116 067.7</b> | <b>116 081.2</b> | <b>116 094.0</b> | <b>116 106.5</b> | <b>116 119.1</b> | <b>116 131.5</b> | <b>116 143.5</b> | <b>116 154.5</b> |
| Maintenance         | 9 077.4          | 9 259.0          | 9 444.2          | 9 633.1          | 9 825.7          | 10 022.2         | 10 222.7         | 10 427.1         | 10 635.7         | 10 848.4         |
| Inverter renewal    | 76 833.9         | 0.0              | 0.0              | 0.0              | 0.0              | 0.0              | 0.0              | 0.0              | 0.0              | 0.0              |
| <b>Results</b>      | <b>30 125.9</b>  | <b>106 794.0</b> | <b>106 623.5</b> | <b>106 448.2</b> | <b>106 268.2</b> | <b>106 084.3</b> | <b>105 896.4</b> | <b>105 704.3</b> | <b>105 507.9</b> | <b>105 306.2</b> |



### Cash flow illustration (EUR):



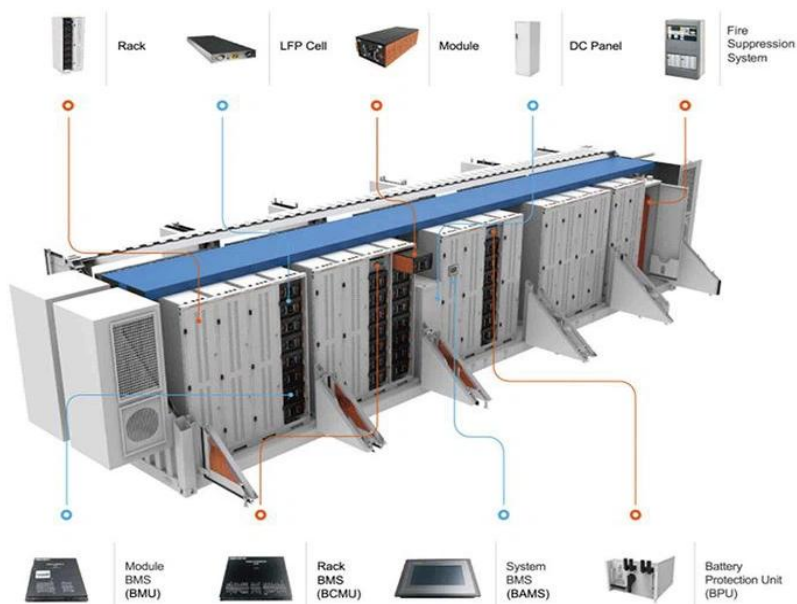
| Years | 1        | 2        | 3        | 4        | 5        | 6       | 7      | 8       | 9       | 10      |
|-------|----------|----------|----------|----------|----------|---------|--------|---------|---------|---------|
| EUR   | -621 684 | -513 424 | -405 291 | -297 290 | -189 425 | -81 701 | 25 879 | 133 310 | 240 588 | 347 709 |

| Years | 11      | 12      | 13      | 14      | 15      | 16      | 17        | 18        | 19        | 20        |
|-------|---------|---------|---------|---------|---------|---------|-----------|-----------|-----------|-----------|
| EUR   | 377 835 | 484 629 | 591 253 | 697 701 | 803 969 | 910 053 | 1 015 949 | 1 121 653 | 1 227 161 | 1 332 467 |



## Technical description of the storage facility

- (Battery container)**



- Transformation unit - (MV SKID)**





## Economic Data Storage Facility

### 1. Investment cost

|            |                           |            |
|------------|---------------------------|------------|
|            | Storage Capacity 2,15 MWh |            |
| Investment | EUR                       | 430.000,00 |

### 2. Income

For an energy storage facility, there are several opportunities to utilize its electricity storage capacity, including:

- Balancing Market:
  - Revenues: €800–1,000/MWh
  - Charge/discharge cycles per day: ~0.2
- Day-Ahead Market (DAM) Arbitrage:
  - Revenues: ~€100/MWh
  - Charge/discharge cycles per day: ~1
- Intra-Day Market (IDM) Arbitrage:
  - Revenues: ~€200/MWh
  - Charge/discharge cycles per day: ~0.5–1
- Peak Production Curtailment Reduction:
  - Revenues: ~€100/MWh
  - Charge/discharge cycles per day: ~0.3–0.5
- Imbalance Compensation:
  - Revenues: ~€65/MWh
  - Charge/discharge cycles per day: ~1

For a combined scenario of using the storage facility, the following calculation will result, per MWh:

| Combined scenario usage per MWh of storage |                |               |                  |
|--------------------------------------------|----------------|---------------|------------------|
|                                            | Cycles per day | Price [€/MWh] | Daily income [€] |
| Balancing market arbitrage                 | 0,2            | 600           | 120              |
| DAM arbitrage                              | 0,7            | 100           | 70               |
| IDM Arbitrage                              | 0,75           | 132           | 99               |
| Reduction of peak production losses        | 0,3            | 80            | 24               |
| Imbalance compensation                     | 0,8            | 64            | 51,2             |
| <b>Total</b>                               |                |               | <b>364,2</b>     |



## Revenues produced by the storage facility

| Year                                        |                   | 1                 | 2                 | 3                 | 4                 | 5                 | 6                 | 7                 | 8                 | 9                 | 10                |
|---------------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 2,15 MWh<br>2.75 Cycles<br>Charge/Discharge | Income            | EUR<br>281.890,80 | EUR<br>276.252,98 | EUR<br>270.615,17 | EUR<br>264.977,35 | EUR<br>259.339,54 | EUR<br>253.701,72 | EUR<br>243.102,63 | EUR<br>242.426,09 | EUR<br>236.788,27 | EUR<br>231.150,46 |
|                                             | Operational costs | EUR<br>19.732,36  | EUR<br>19.337,71  | EUR<br>18.943,06  | EUR<br>18.548,41  | EUR<br>18.153,77  | EUR<br>17.759,12  | EUR<br>17.017,18  | EUR<br>16.969,83  | EUR<br>16.575,18  | EUR<br>16.180,53  |
|                                             | Profits           | EUR<br>262.158,44 | EUR<br>256.915,28 | EUR<br>251.672,11 | EUR<br>246.428,94 | EUR<br>241.185,77 | EUR<br>235.942,60 | EUR<br>226.085,44 | EUR<br>225.456,26 | EUR<br>220.213,09 | EUR<br>214.969,92 |

## Cashflow

| An                                              | 1             | 2           | 3            | 4            | 5            | 6              | 7              | 8              | 9              | 10             |
|-------------------------------------------------|---------------|-------------|--------------|--------------|--------------|----------------|----------------|----------------|----------------|----------------|
| 2,15 MWh<br>2.75 Cycles<br>Charging/Discharging | -167.841,56 € | 89.073,72 € | 340.745,83 € | 587.174,76 € | 828.360,53 € | 1.064.303,13 € | 1.290.388,57 € | 1.515.844,83 € | 1.736.057,93 € | 1.951.027,85 € |



## Economics PV + BESS

| Project assumptions                          |           |              |
|----------------------------------------------|-----------|--------------|
| Project name                                 | Damis, BH |              |
| PV Installed Capacity                        | 1,227     | MWp          |
| Annual energy production AC/MWp              | 1.398     | MWh/Mwp/year |
| Annual PV panel degradation                  | 0,5%      | p.a.         |
| Installed Storage Capacity                   | 2,15      | MWh          |
| Charge-Discharge Battery cycles/days         | 2         | hours        |
| Annual BESS degradation                      | 3%        | a            |
| Energy produced base price                   | 70        | €/MWh        |
| Balancing Market energy price                | 900       | €/MWh        |
| DAM energy price                             | 100       | €/MWh        |
| IDM energy price                             | 200       | €/MWh        |
| Inflation rate                               | 3%        | p.a.         |
| Project cost                                 |           |              |
| Storage equipment cost                       | 150.000   | €/MWh        |
| Other cost related to storage (connection et | 50.000    | €/MWh        |
| Cost PV park per MWp                         | 595.000   | €/MWp        |
| Cost Storage Batteries (BESS)                | 430.000   | €            |
| Cost PV park                                 | 730.065   | €            |
| Customer-Side Works Tu                       | 500       | €            |
| Grid Connection Installations Tr             | 54.771    | €            |
| Grid Reinforcement Ti specific               | 122.410   | €            |
| Grid Connection Route                        | 12.000    | €            |
| TOTAL COST PV park + Storage                 | 1.349.747 | €            |
| Operational cost                             |           |              |
| Land lease                                   | 3.000     | €/MWp/year   |
| Insurance/ MW/year                           | 3.000     | €/MWp/year   |
| Operation& Maintenance/ MW/year              | 3.000     | €/MWp/year   |
| Balancing & forecasting services             | 1.000     | €/MWp/year   |
| Accounting, bank, legal, Opcom fees etc      | 6.000     | €/year       |
| Utilities (energy and water)                 | 2.000     | €/MWp/year   |
| Contingencies/year                           | 5%        | p.a.         |
| Security services                            | 1.000     | €/MWp/year   |
| Tax on land and construction                 | 2.500     | €/year       |
| Financial assumptions                        |           |              |
| Equity                                       | 404.924   | €            |
| Loan Amount                                  | 944.823   | €            |
| Leverage                                     | 70%       | %            |
| VAT credit line (21% of CAPEX hard cost)     | 283.447   | €            |
| Interest rate loan - Euribor 1 M             | 2,68      | %            |
| Interest Margin                              | 4,00      | %            |
| Loan Maturity                                | 10        | years        |
| Grace period                                 | 12        | months       |
| Monthly Instalments                          | 108       | months       |
| Nominal cost of equity                       | 15%       | % p.a.       |
| Cost of debt                                 | 6,4%      | % p.a.       |
| Tax rate                                     | 16%       | % p.a.       |
| WACC                                         | 8,3%      | % p.a.       |
| Financial ratios project                     |           |              |
| IRR project                                  | 12%       | %            |
| IRR equity                                   | 28%       | %            |
| NPV project                                  | 195.441   | €            |
| Payback period                               | 6         | years        |

According to the approved Engineering Solution Study, the indicative cost of grid reinforcement works (TI) is estimated at approximately 122.410,45€. This value will be reassessed at the commissioning stage, and experience from similar projects shows that the final reinforcement costs tend to decrease significantly.

