# DRES2Market

## Active demand management approach based on energy market price

September 2022

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 952851

# DRES2Market validation processes
## Prosumers integration with wholesale market

Electricity market
Continuous and local markets

System Operator
Balancing market

Price signal (1)

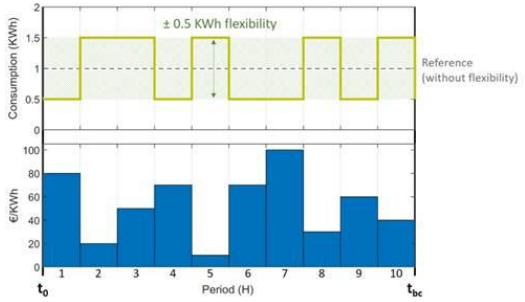
Offer/bid (3)

Aggregator
RES Market Desk

Interaction (4)

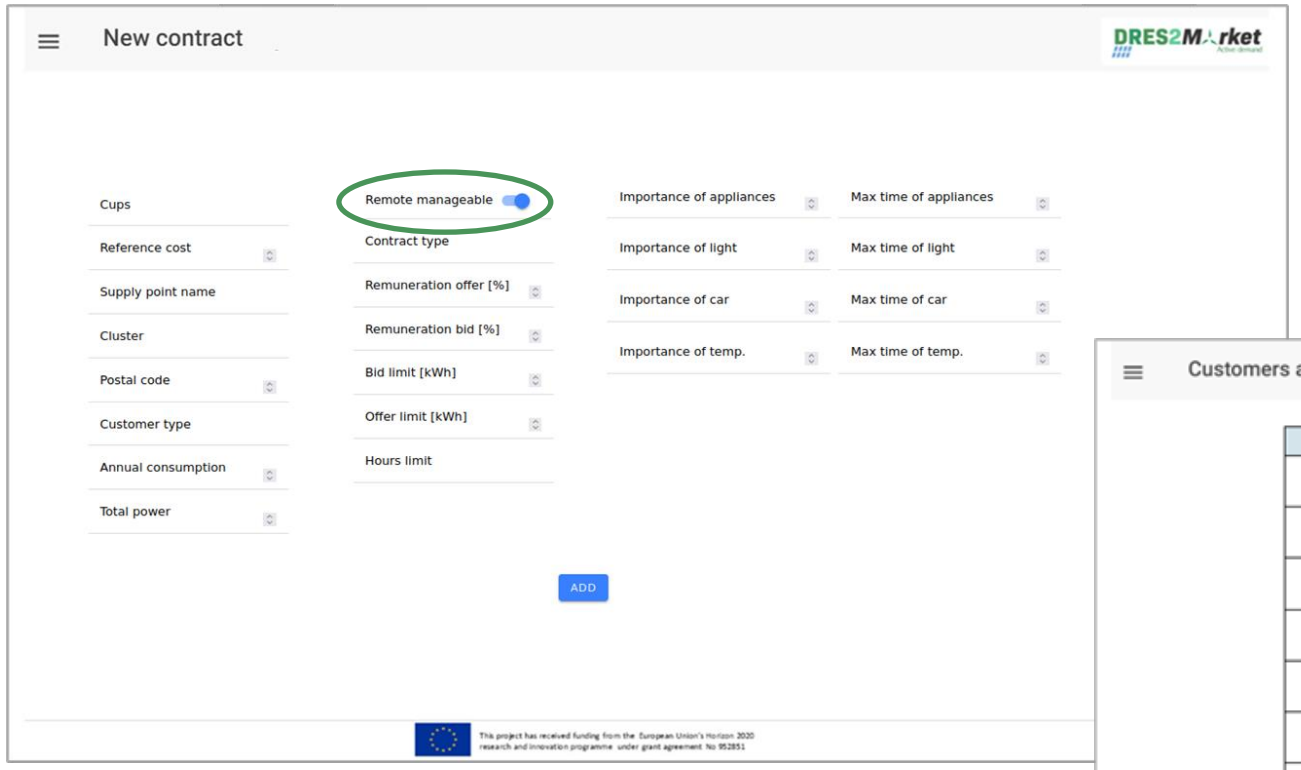
Prosumers

Prosumer analytics (2)

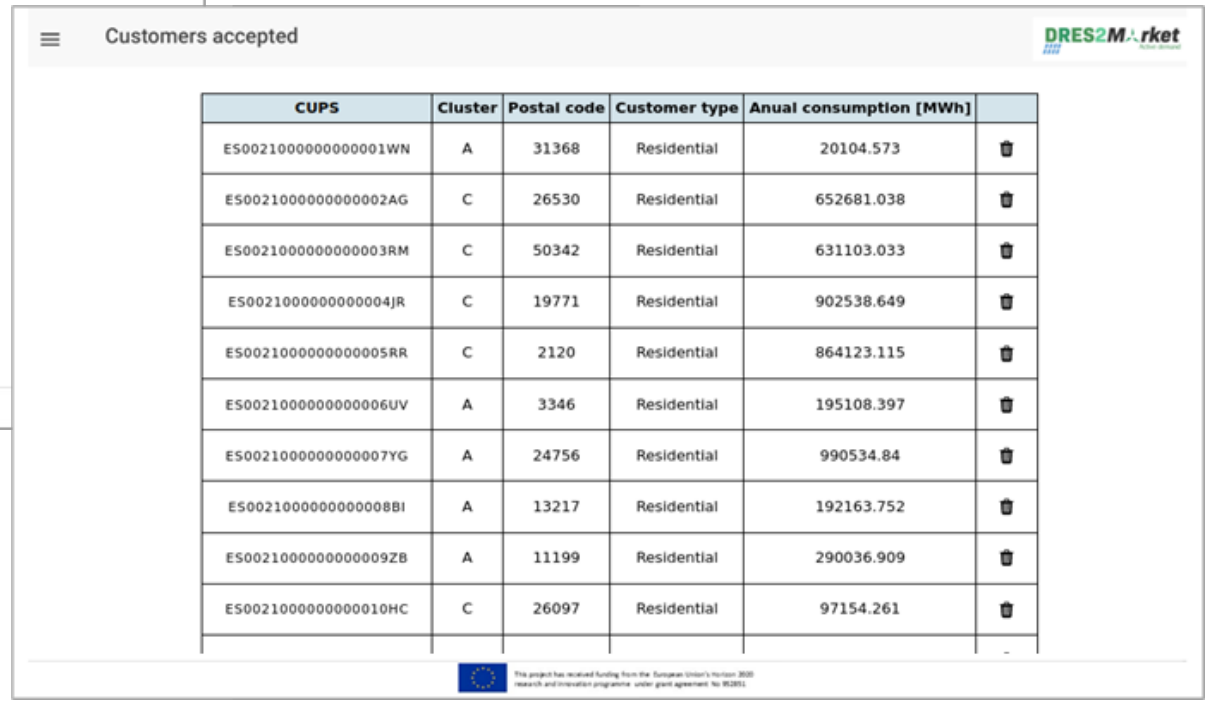



Controlling (5)

# Prosumers integration with wholesale market
## Customers




Customer interaction: Automated with IoT

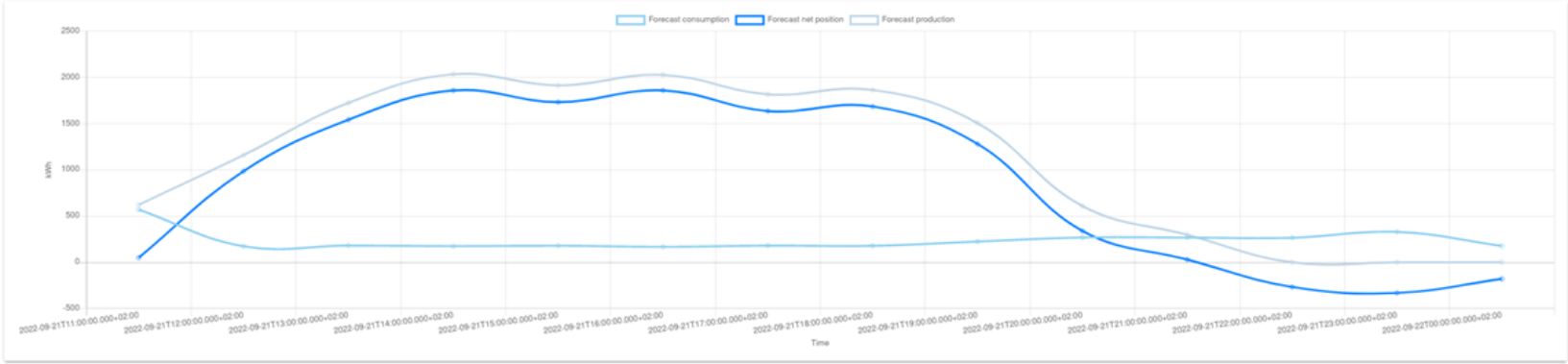



| CUPS | Cluster | Postal code | Customer type | Anual consumption [MWh] | |
|---|---|---|---|---|---|
| ES0021000000000001WN | A | 31368 | Residential | 20104.573 | |
| ES0021000000000002AG | C | 26530 | Residential | 652681.038 | |
| ES0021000000000003RM | C | 50342 | Residential | 631103.033 | |
| ES0021000000000004JR | C | 19771 | Residential | 902538.649 | |
| ES0021000000000005RR | C | 2120 | Residential | 864123.115 | |
| ES0021000000000006UV | A | 3346 | Residential | 195108.397 | |
| ES0021000000000007YG | A | 24756 | Residential | 990534.84 | |
| ES0021000000000008BI | A | 13217 | Residential | 192163.752 | |
| ES0021000000000009ZB | A | 11199 | Residential | 290036.909 | |
| ES0021000000000010HC | C | 26097 | Residential | 97154.261 | |

# Prosumers integration with wholesale market
## Customer profiles

Customers profile

| Date | Consumption [kWh] | Production [kWh] | Battery charge [kWh] | Battery discharge [kWh] | Initial bid [kWh] | Initial offer [kWh] | Net position [kWh] | Matching [MWh] |
|---|---|---|---|---|---|---|---|---|
| 2022-09-21T11:00:00.000+02:00 | 571 | 622 | 0 | 0 | 0 | 0 | 51 | 108.93% |
| 2022-09-21T12:00:00.000+02:00 | 174 | 1160 | 0 | 0 | 0 | 0 | 986 | 666.67% |
| 2022-09-21T13:00:00.000+02:00 | 182 | 1724 | 0 | 0 | 0 | 0 | 1542 | 947.25% |
| 2022-09-21T14:00:00.000+02:00 | 175 | 2033 | 0 | 0 | 0 | 0 | 1858 | 1161.71% |
| 2022-09-21T15:00:00.000+02:00 | 180 | 1913 | 0 | 0 | 0 | 0 | 1733 | 1062.78% |
| 2022-09-21T16:00:00.000+02:00 | 168 | 2027 | 0 | 0 | 0 | 0 | 1859 | 1206.55% |
| 2022-09-21T17:00:00.000+02:00 | 181 | 1817 | 0 | 0 | 0 | 0 | 1636 | 1003.87% |
| 2022-09-21T18:00:00.000+02:00 | 179 | 1864 | 0 | 0 | 0 | 0 | 1685 | 1041.34% |
| 2022-09-21T19:00:00.000+02:00 | 225 | 1505 | 0 | 0 | 0 | 0 | 1280 | 668.89% |
| 2022-09-21T20:00:00.000+02:00 | 269 | 609 | 0 | 0 | 0 | 0 | 340 | 226.39% |
| 2022-09-21T21:00:00.000+02:00 | 268 | 298 | 0 | 0 | 0 | 0 | 30 | 111.19% |
| 2022-09-21T22:00:00.000+02:00 | 266 | 0 | 0 | 0 | 0 | 0 | -266 | 0.0% |
| 2022-09-21T23:00:00.000+02:00 | 330 | 0 | 0 | 0 | 0 | 0 | -330 | 0.0% |
| 2022-09-22T00:00:00.000+02:00 | 178 | 0 | 0 | 0 | 0 | 0 | -178 | 0.0% |




Predictive data based on historic values

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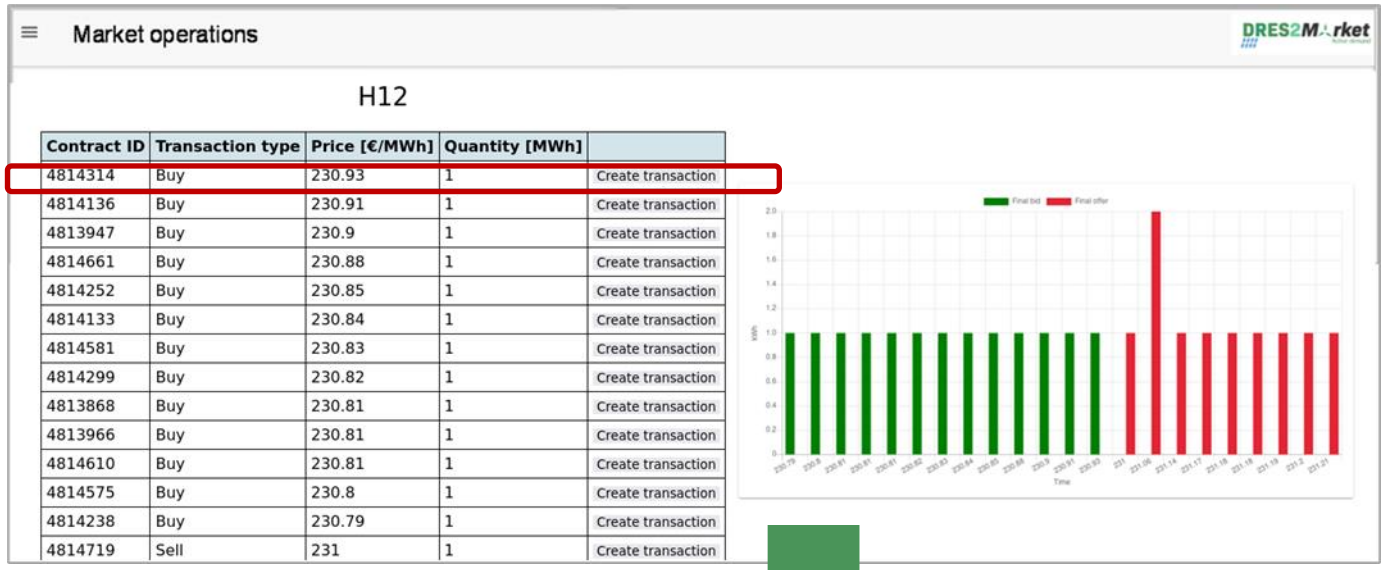
# Prosumers integration with wholesale market

## Market

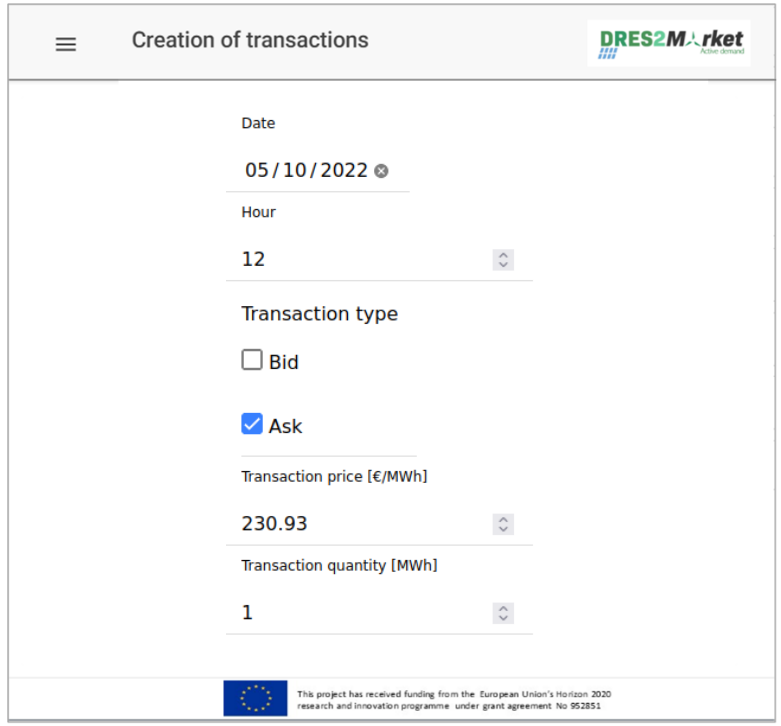
Market operations

| Contract | Date | Hour | Bid price [€/MWh] | Bid quantity [MWh] | Ask price [€/MWh] | Ask quantity [MWh] |
|---|---|---|---|---|---|---|
| H12 | 2022-05-10 | 12:00:00.000+02:00 | 230.93 | 1 | 231 | 1 |
| H13 | 2022-05-10 | 13:00:00.000+02:00 | 230.96 | 1 | 231.16 | 1 |
| H14 | 2022-05-10 | 14:00:00.000+02:00 | 230.91 | 1 | 231.1 | 1 |
| H15 | 2022-05-10 | 15:00:00.000+02:00 | 230.9 | 1 | 231.07 | 1 |
| H16 | 2022-05-10 | 16:00:00.000+02:00 | 231.02 | 1 | 231.09 | 1 |
| H17 | 2022-05-10 | 17:00:00.000+02:00 | 231 | 1 | 231.04 | 1 |
| H18 | 2022-05-10 | 18:00:00.000+02:00 | 231.01 | 1 | 231.11 | 1 |
| H19 | 2022-05-10 | 19:00:00.000+02:00 | 230.77 | 1 | | |
| H20 | 2022-05-10 | 20:00:00.000+02:00 | 230.9 | 1 | 231 | 1 |
| H21 | 2022-05-10 | 21:00:00.000+02:00 | 231.01 | 1 | 231.21 | 1 |
| H22 | 2022-05-10 | 22:00:00.000+02:00 | 230.82 | 1 | 231.02 | 1 |
| H23 | 2022-05-10 | 23:00:00.000+02:00 | 230.95 | 1 | 231.05 | 1 |

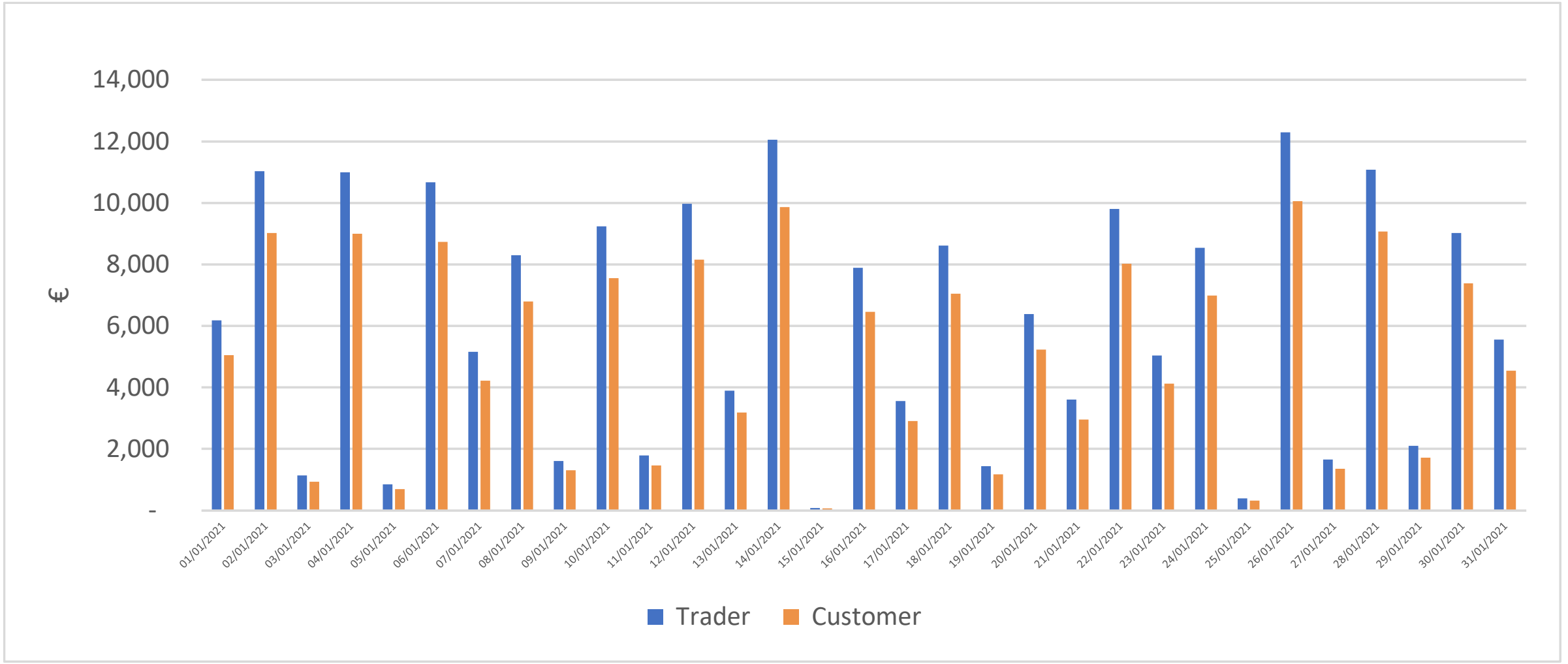
# Prosumers integration with wholesale market
## Transactions



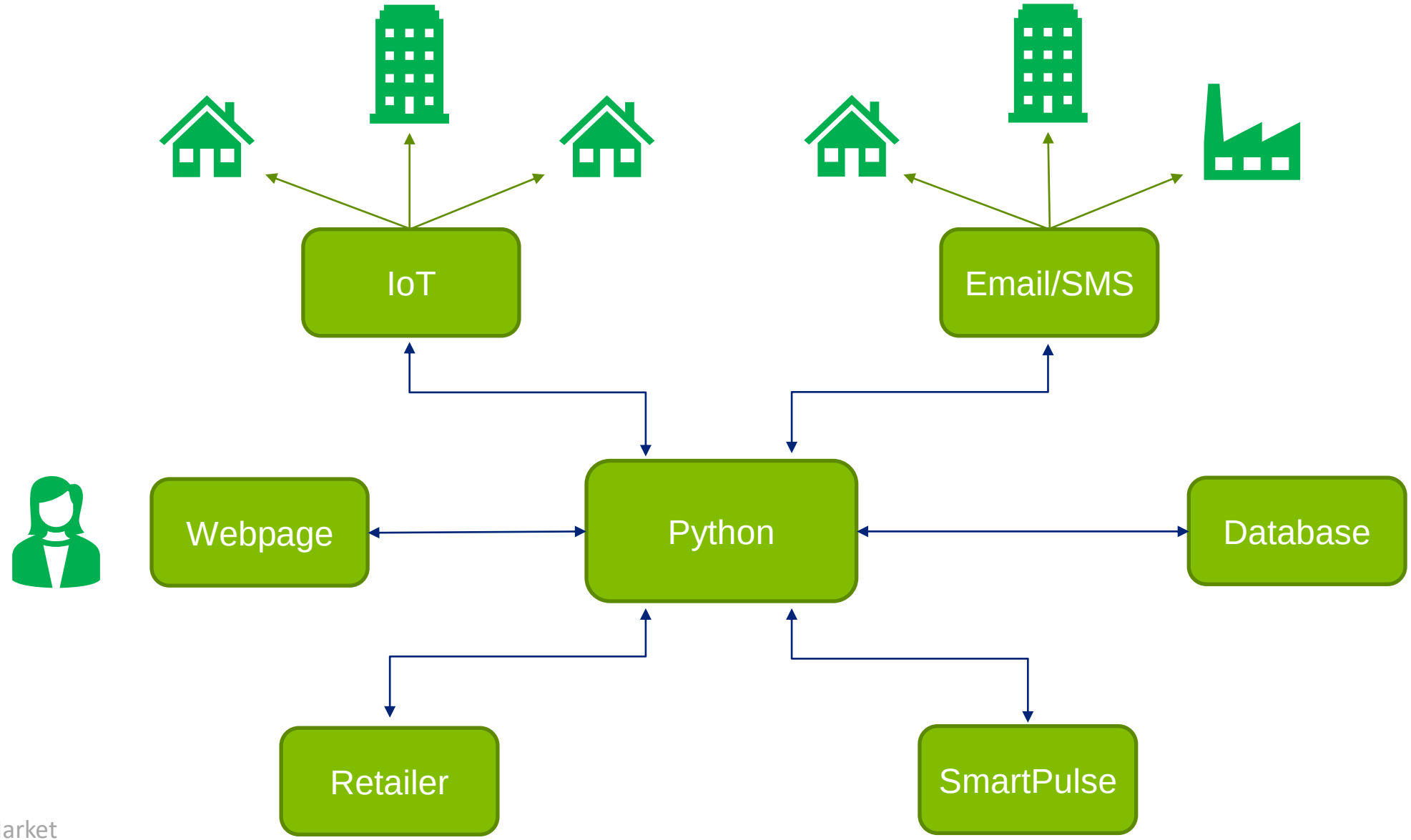

| CUPS | Capacity used [MWh] | Self-managed | Total benefit [€] | Capacity matched [MWh] |
|---|---|---|---|---|
| ES0021000002054843XC | 0 | Yes | 0.99 | 0.01 |
| ES0021000002060836HX | 0 | No | 1.49 | 0.01 |
| ES0021000002093012ZD | 0.1 | No | 1.49 | 0.01 |
| ES0021000002115821VW | 0.6 | Yes | 0.99 | 0.01 |
| ES0021000002148970DP | 0 | Yes | 1.24 | 0.01 |
| ES0021000002182428SR | 0 | No | 1.12 | 0.01 |
| ES0021000002234186BD | 0.4 | Yes | 0.74 | 0.01 |
| ES0021000003570766WJ | 0.3 | No | 1.49 | 0.01 |
| ES0021000003583139BN | 1.4 | Yes | 102.67 | 0.92 |
| ES0021000003627660SM | 0.3 | Yes | 1.24 | 0.01 |



# Prosumers integration with wholesale market
## Remuneration



# Prosumers integration with wholesale market
## Architecture



- Market conection ☑
- User interaction website completed ☑
- Forecasting systems completed ☑
- IoT prototype ☑
- Automatic trading ☑
- Testing and final development ☒

## Advantage of this approach

- Active participation of prosumers in the electricity wholesale market.
- Optimization in the use of distributed generation capacity: avoiding surpluses.
- Optimization in the use of energy storage devices.
- Promoting active demand management based on market signals.
- Economic signal for adapting demand patterns.
- Contribution for balancing at system and local levels.

DRES2Market

Deloitte.

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