CONTEST

Innovative CONsumer aggregation to improve demand response and Tariff design for Energy and Services Transactions

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Main goals

- Development of the business models to support the implementation of a fully transactive energy system
- To explore the aggregation concept as the main connector between local communities and wholesale electricity markets
- To develop the means to enable small players to benefit from market opportunities
- To experiment and validate the developed business models and methods in a laboratorial prototype, through the integration in a simulation platform existing in ISEP, which combines multi-agent simulation with physical control of energy resources, and addresses the complementary fields of electricity markets and smart grids

Work plan

WP1 - Organization and management

WP7 - Communication and dissemination

WP2 - Problem and strategic vision

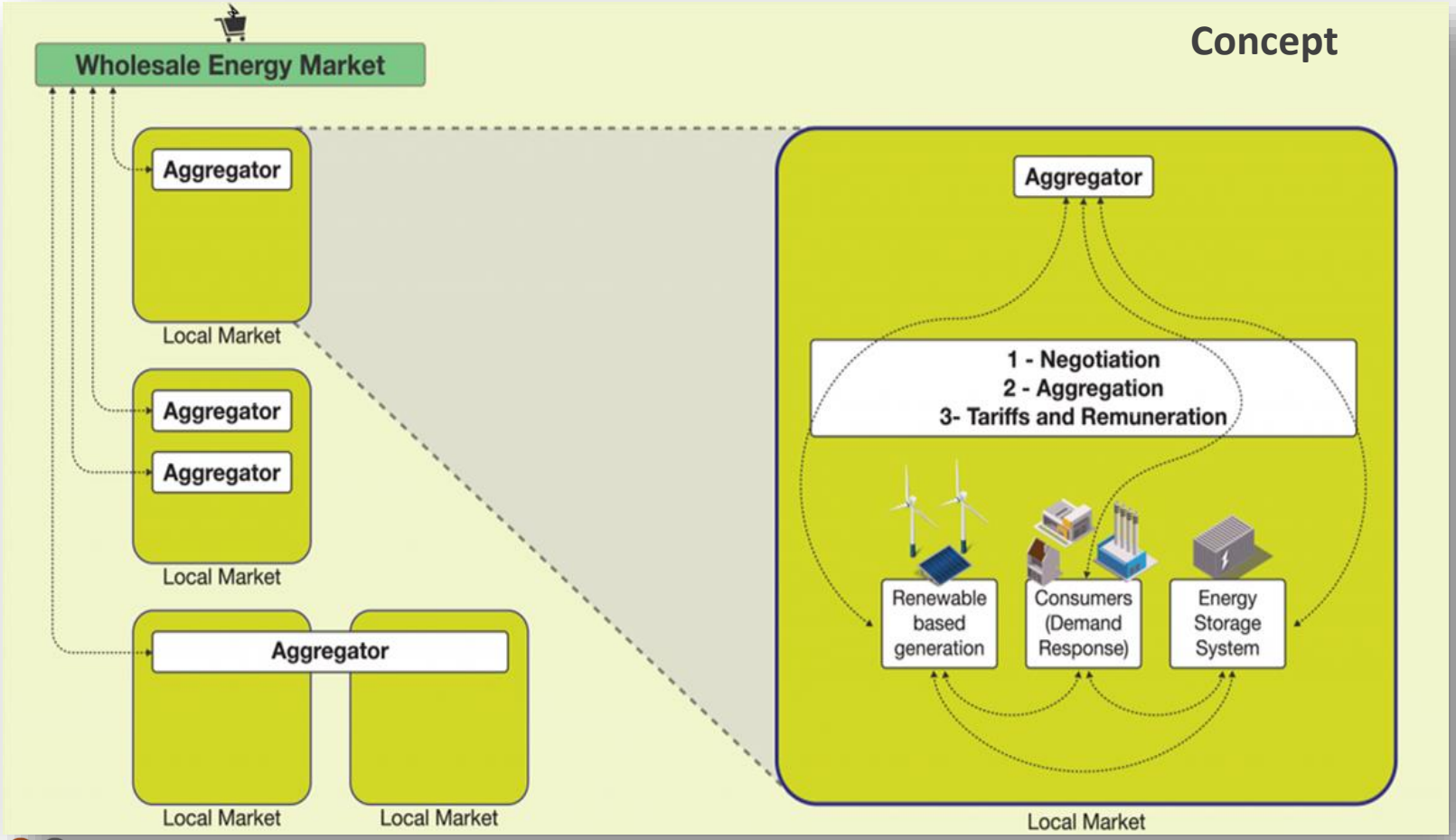
WP3 - Business models for energy transactions and services provision

WP4 - Methods for aggregation of consumers and resources

WP5 - Remuneration and tariffs

WP6 - Laboratorial simulation and result analysis

Concept


Wholesale Energy Market
Aggregator
Local Market
Aggregator
Aggregator
Local Market
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Local Market
Local Market
Aggregator
1 - Negotiation
2 - Aggregation
3- Tariffs and Remuneration
Renewable based generation
Consumers (Demand Response)
Energy Storage System
Local Market

Some results

> 20 000 consumers

> 600 distributed generators

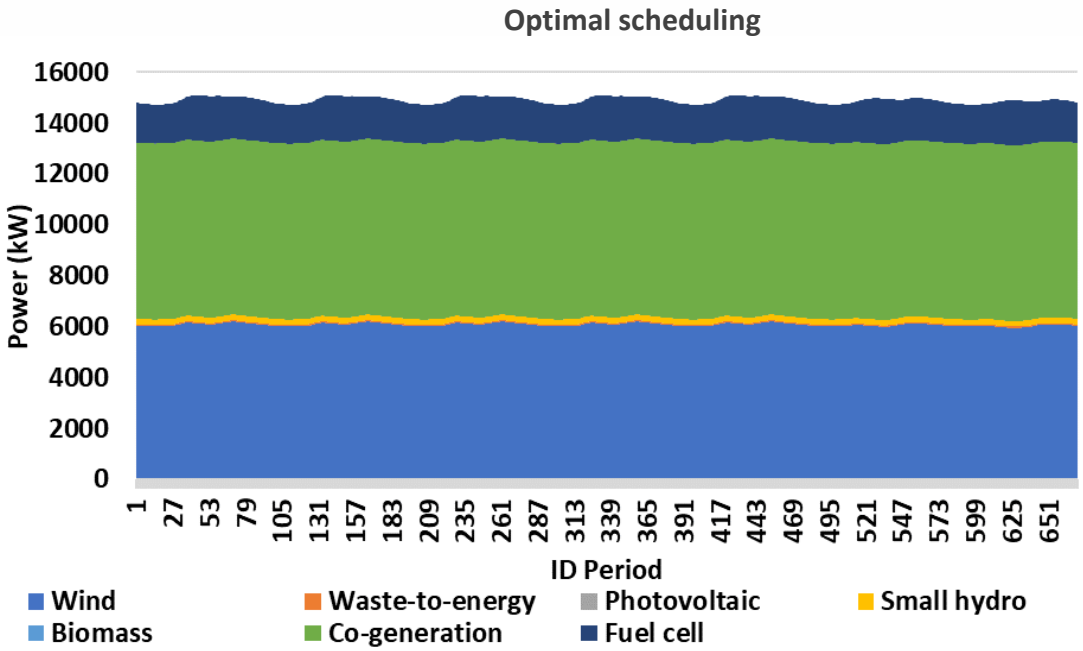
Small-size resources

Prosumers

Scalability

Schedule, aggregation, and remuneration

Large number of resources and consumers



Aggregation and Remuneration

Cluster definition

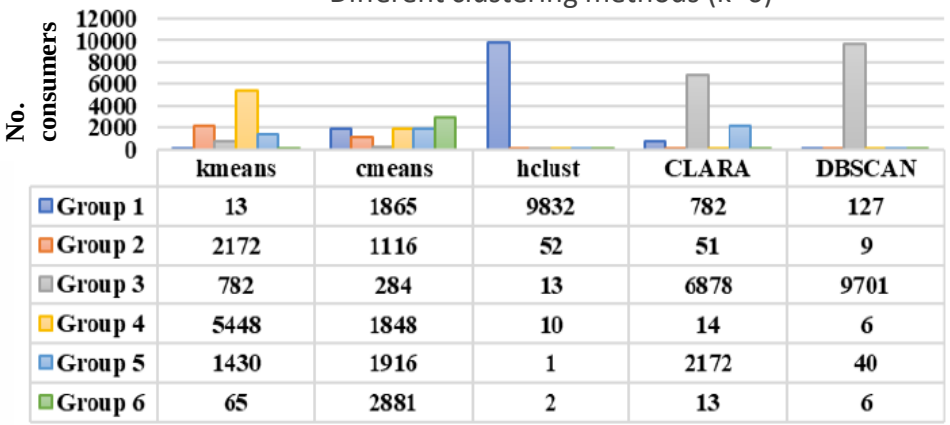
Number of clusters (k): optimum vs ideal

Similar response characteristics

Fair remuneration according to the actual performance

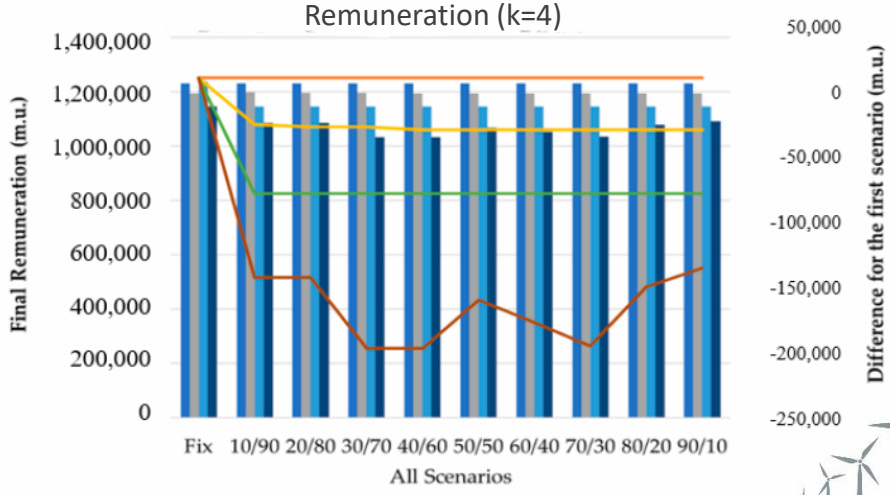
Different clustering methods

Different clustering methods (k=6)



	kmeans	cmeans	hclust	CLARA	DBSCAN
Group 1	13	1865	9832	782	127
Group 2	2172	1116	52	51	9
Group 3	782	284	13	6878	9701
Group 4	5448	1848	10	14	6
Group 5	1430	1916	1	2172	40
Group 6	65	2881	2	13	6

Remuneration (k=4)



Publications and dissemination

2 International Journals

2 Book Papers

6 International Conferences

6 International Conferences Participation

1 Workshop Organization

[1] João Soares, Fernando Lezama, Bruno Canizes, M. Ali Fotouhi Ghazvini, Zita Vale, Tiago Pinto, Day-Ahead Stochastic Scheduling Model Considering Market Transactions in Smart Grids: PSCC 2018 - Power Systems Computation Conference,Dublin, Ireland, 11-15 June, 2018
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[2] Francisco Silva, Ricardo Faia, Tiago Pinto, Isabel Praça, Zita Vale, Optimizing Opponents Selection in Bilateral Contracts Negotiation with Particle Swarm, Highlights of Practical Applications of Agents, Multi-Agent Systems, and Complexity: The PAAMS Collection, pp. 116-124, Communications in Computer and Information Science, vol. 887, Springer International Publishing, 2018
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[3] Brígida Teixeira, Francisco Silva, Tiago Pinto, Gabriel Santos, Isabel Praça, Zita Vale, Demonstration of Tools Control Center for Multi-agent Energy Systems Simulation, Advances in Practical Applications of Agents, Multi-Agent Systems, and Complexity: The PAAMS Collection, pp. 353-356 Lecture Notes in Computer Science, vol. 10978, Springer International Publishing, 2018
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[4] Cátia Silva, Pedro Faria and Zita Vale, Assessment of Distributed Generation Units Remuneration Using Different Clustering Methods for Aggregation, IEEE SmartGridComm 2018 - IEEE International Conference on Communications, Control, and Computing Technologies for Smart Grids, Aalborg, Denmark, 29 October - 01 November, 2018
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doi: 10.1109/SmartGridComm.2018.8587572
[6] Cátia Silva, Pedro Faria and Zita Vale, Classification Approaches to Foster the Use of Distributed Generation with Improved Remuneration, SSCI 2018 – The 2018 IEEE Symposium Series on Computacional Intelligence, Bengaluru, India, 18–21 November, 2018
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DOI: 10.1109/SSCI.2018.8628781
[8] Brígida Teixeira, Tiago Pinto, Francisco Silva, Gabriel Santos, Isabel Praça, Zita Vale, Multi-Agent Decision Support Tool to Enable Interoperability among Heterogeneous Energy Systems, Applied Sciences, vol. 8, no. 3, February 2018
doi: 10.3390/app8030328
[9] Ricardo Faia, Tiago Pinto, Zita Vale and Juan Manuel Corchado, Strategic Particle Swarm Inertia Selection for Electricity Markets Participation Portfolio Optimization, Applied Artificial Intelligence, Volume 32, Issue 7-8, August 2018
doi: 10.1080/08839514.2018.1506971
[10] Cátia Silva, Pedro Faria, Zita Vale, Clustering Support for an Aggregator in a Smart Grid Context, 18th International Conference on Hybrid Intelligent Systems, Porto, Portugal
DOI: 10.1007/978-3-030-14347-3_16

Thank you for your attention!

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Questions

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