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Global Observatory
on Peer-to-Peer
Energy Trading

BioZon Energy Community

Technology Collaboration Programme
by IEA

Global Observatory on Peer-to-Peer Energy Trading

Author(s), Date

Key facts

Location (town + country)	Zelhem, Netherlands
Duration (start/end dates)	*1/1/2022 - now*
Funding source	*Data here*
Project lead (organisation)	*Agem Gemeentelijke Energie*
Project partners	*Data here*
No. of participants	*50 residents*
Case study type	*Commercial demonstration*

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Commented [1]: It is recommended for the case study author team to first fill in the templates (this Word template + the Excel workbook) through desk research, followed by an interview of case study stakeholders to fill in any missing data gaps.

Commented [2]: Please try to fill in as many sections of this document as possible. If a section is not applicable, please indicate N/A under it.

Commented [3]: In case of any questions on how to fill template, please join the monthly Zoom drop-in session or join the dedicated slack channel. To receive more information on how to join those, please email the GO-P2P team: go-p2p@userstcp.org.

Case study statistics

Parameter	As designed	As built
No. of participants		50
Generation (kWp)		Landfill gas generator (85 kWp)
Storage (kWh)		0
Unit price ($/kWh)		*€0,55/kWh*
Project cost ($)		€45.000

Summary of case (~200 words)

Please provide a short summary paragraph of the case study.

The market actors within the simulation are based on the BioZon pilot, in which there are a total of 50 households participating. Next to that, electricity is produced by a landfill gas generator (85 kW). The following market actors are involved in the energy community:

- Citizen investors: 50 households invested a total of €43.350
- Consumers: A total of 30 households participate in the pilot for self-supply of electricity produced by the project.
- Landfill gas generator: The landfill gas generator is modelled as a large-scale fixed generator with a peak power production of 85 kW (constant 1 p.u. over time).
- ENTRNCE Platform: ENTRNCE operates a LEM platform which significantly lowers market entry barriers, enabling their users to become active market participants.

This LEM platform facilitates direct peer-to-peer transactions while market access to wholesale markets is facilitated as well. ENTRNCE facilitates the market access for the Biozon energy community to the wholesale market, to trade residual volumes and settle the imbalance.

Impact highlights (~4*50 words)

- In the Biozon pilot the end-user pays no more than the cost price + for their energy. This Local4Local framework is developed and implemented bottom-up. Community model for a sustainable, collective energy supply, where end-users pay no more than the cost price + for their energy, all while minimizing the impact on the local energy infrastructure. The cost price + is calculated by considering the total cost of generating, purchasing, distributing, storing, sharing, and delivering renewable energy, balanced against revenues from flexibility markets and surplus sales of renewable electricity or heat.
- The participants in the Biozon energy community are member of the energy cooperative BioZon. BioZon is 100% owner of the landfill gas generator, thereby implementing a cooperative model.
- Over the first 10 months of 2023, end-consumers participating in BioZon had a discount of 37% on average on their energy price, compared to a regular market contract.
- Participants also receive an interest of 7% on their investment in BioZon.

Project aims and objectives (~250 words)

- What problem(s) does the case study aim to resolve?
  - Promote or include RES generation
- What were the social objectives (if any)?
  - Participants have greater control over preferences; self-sufficiency (autarky); autonomy
  - Improvement to local economy (job creation etc); independence from other regions; community as focal point for engagement; shared benefits across the community
  - Economic incentives for participants; access wholesale, balancing and ancillary service markets
- What were the environmental objectives (if any)?
  - None
- To what degree were participants actively involved in design or operation?
  - Users are represented by a board, board members were very engaged in the design process. This was a co-creation process.
- Was participation financially or socially incentivised or both?
  - Return on investment and reduced consumer price (cost-price), lower then the market price
- What degree of demand response flexibility was provided?
  - None

Bennie Wisselink – chairman BioZon:

“Market prices are high, but we have our own generator, and produce our own electricity at a cost price much lower than the market price. If we supply the energy to ourselves, we can determine the price we pay.”

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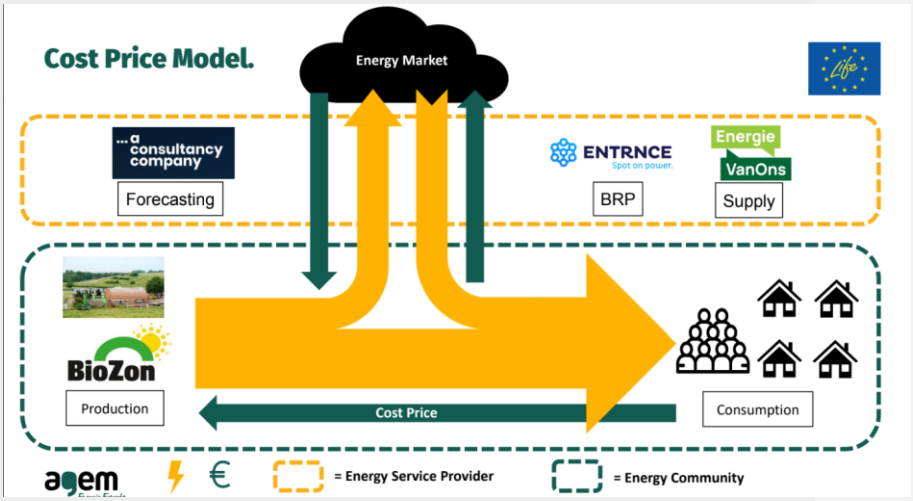
Description of case (≤ 6 pages)

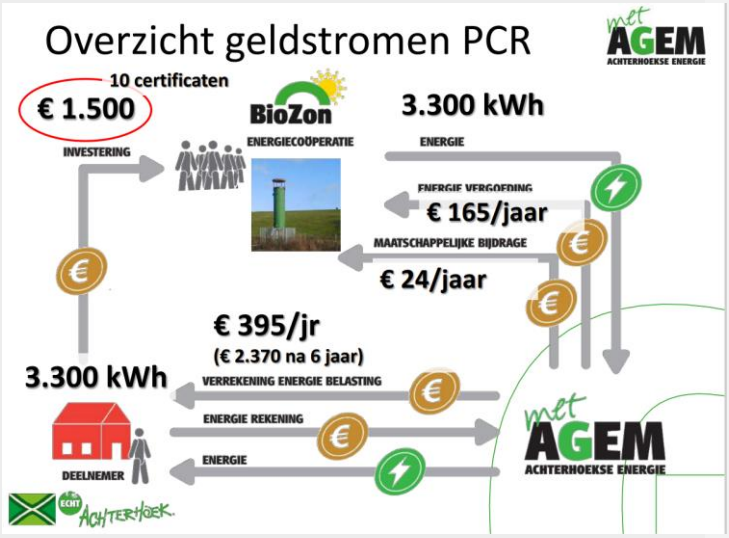
- Market value proposition and key activities
  - The end-users pay no more than the cost price plus, ensuring a sustainable, collective energy supply. This model aims to minimize the impact on local energy infrastructure while considering various factors such as generation, distribution, storage, and flexibility market revenues. Bid and offer creation occur based on forecasts, with data sharing between participants including volume and price. The market operates on a forward-facing (day-ahead) basis. Participants can request the cost price per 15 minutes. Information shared on the market is not relevant for fraud prevention. Overall, the project strives for a bottom-up community model with transparent and equitable energy pricing.
- Financing/funding (who contributed funding and under what terms)
  - Most (but not all) members of BioZon have financially participated in the project to fund the necessary investments of 45K.
  - A national subsidy scheme called “postcode roos regeling” was used to create an interesting business case for the end-users. Participants in the project would have a tax deduction on their energy bill resulting in a return on investment of 8% per year.
  - A provincial subsidy for energy communities of 10K was also granted.
- Legal structure (co-operative; partnership; social enterprise; etc)
  - The participants are members of the energy cooperative BioZon, which owns 100% of the landfill gas generator. The internal governance rules within the cooperative are determined by the general assembly, and participants face no liability for non-performance in energy supply. The cooperative takes responsibility for system failures, accidents, or errors, with some risks being insured. Legal ownership of assets lies with the cooperative, and there are internal rules for dispute resolution outlined in its statutes. Participation in the community is geographically constrained, and the cooperative has established rules for share trading and community exit. Corporate governance involves a board and general assembly. While SMEs and municipalities can theoretically participate, they do not do so in practice.
- Timeframes including for project initiation; funding cycles; detailed design; legals and contracts; participant recruitment; trial duration; decommissioning; etc
  - 2017 – Existing generator needs replacing – location is offered to Agem.
  - 2018 – design - founding cooperative BioZon, fundraising, building
  - 2019 – 2022 – Exploitation, electricity sold to municipalities at fixed price.
  - 2022 – current – Start cost price pilot with self-consumption model for 30 participants.
- Stakeholders/project partners involved (organogram)
  - Consumers (citizens): members of cooperative Biozon and clients of energy supplier Energy van Ons
  - Biozon: producer (and seller) of electricity

  - Agem Gemeentelijke Energy: Municipal energy company that buys part of the produced electricity.
  - ENTRNCE: LEM platform
  - Energy van Ons: Energy supplier that facilitates the self-consumption model.
  - 

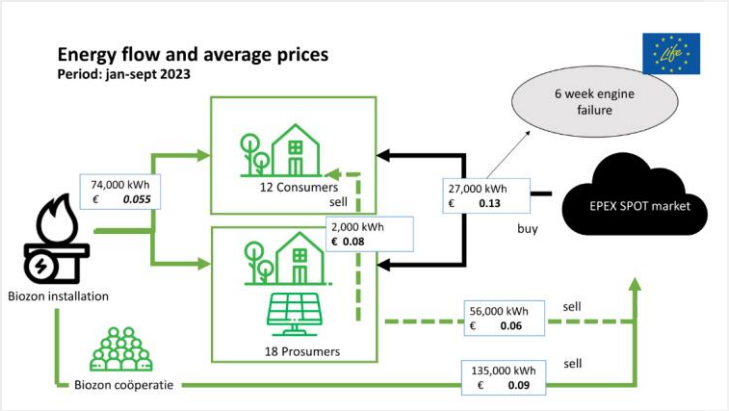
- Participant types and characteristics: residents (social housing, private rented, private ownership; socioeconomic status); SMEs (types and loads); social institutions (schools, etc). What were the inclusion/exclusion criteria for participating in the case?
  - A total of 50 households are involved in the Biozon Energy community, with a varying socioeconomic status. The end-users are represented by a board, board members were very engaged in the design process of the energy community. This was a co-creation process.
  - 30 members of BioZon participate in the self-consumption pilot.
- Participant recruitment methods, incentives and protection (opt-in or opt-out; were participants paid to participate; were they exposed to financial losses or other risks; etc)
  - Participants were recruited by using media outlets and meetings.
  - The main incentive was a return on investment
  - Consumers and prosumers have no liability, not responsible for their own imbalance position.
  - The cooperative is responsible for any failures. Some of these risks are insured. For example the landfill gas turbine has a full service contract.
  - The legal ownership lies with the cooperative
- Participants' role in co-creation of project and objectives (if any)
  - The Biozon Energy Community is a cocreation project that was set up together with the local residents.
  - Data architecture (including data ontology/standards where used)



- Financial model (representation of financial flows and markets)
  - Participant type A invests in shares of Biozon. This gives them the right to an energy tax deduction provided by the state through the “postcode roos” subsidy scheme. The tax deduction represents an interesting return on investment.
  - Participant type B does not invest in Biozon, but does become a member of the cooperative by paying a yearly membership fee. This gives them the right to an energy tax deduction provided by the state through the “postcode roos” subsidy scheme. The tax deduction is higher than the membership fee. Therefore, becoming a member is financially beneficial.
  - Financial flows explained for the customer



- The produced electricity is sold, covering the running cost of the installation.
  - Part is sold to the municipality at a fixed rate.
  - Part is sold directly to the members of the cooperative
  - Part is sold on the EPEX SPOT Day ahead market.
  - See below for energy flows (volumes) and average prices for a set period between January and September 2023



- Geographical scale
  - Energy community members should be located in geographical proximity of the Biozon energy community in Zelhem. The constraints are marked by the zip code of the installation and all adjoining zip codes (a so-called postal code rose). This is due to the subsidy scheme rules.

- Electricity network ownership (public or private)
    - Public
- Management of changes in case study over time (i.e. participants leaving; assets failing; data losses; etc)
    - Agem, an energy cooperative that functions as an umbrella organisation for energy communities in the region, whom was one of the initiators of the project, was a special member in the initial stages of the project and also functioned as board member. In 2023, the statutes were changed so the BioZon Cooperative only new one member type and Agem lost its status as special member. At the same time Agem stepped down from the board.
    - There was an engine failure in the fall of 2023. In this period, energy had to be bought from the market to supply to the participants.
    - Due to a higher-than-expected production rate, it was possible to allocate part of the production for the self-consumption pilot, and still meet the existing contract terms (PPA) with the municipality.

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Outcomes and achievements (~1 page)

What outcomes are anticipated from the pilot?
What outcomes were delivered by the pilot?

What was the primary goal of the project? (please tick one) *

☐ **Grid integration** - e.g. management of grid constraints; balancing of demand and supply; promote/include distributed energy resources (DER) generation; optimisation of energy behaviour to benefit system; aggregation of participant energy loads.

☐ **Environmental benefits** - e.g. promote or include renewable energy (RES) generation.

☐ **Empowering individuals** - e.g. participants have greater control over preferences; self-sufficiency (autarky); autonomy.

■ **Local benefits** - e.g. improvement to local economy (job creation etc); independence from other regions; community as focal point for engagement; shared benefits across the community.

☐ **Creating market value** - e.g. economic incentives for participants; access wholesale, balancing and ancillary service markets.

Were there any secondary goals of the project? (please tick as many as apply) *

☐ **Grid integration** - same description as above

☐ **Environmental benefits** - same description as above

■ **Empowering individuals** - same description as above

☐ **Local benefits** - same description as above

☐ **Creating market value** - same description as above

☐ If other, please give a brief description

** These questions are compulsory to answer*

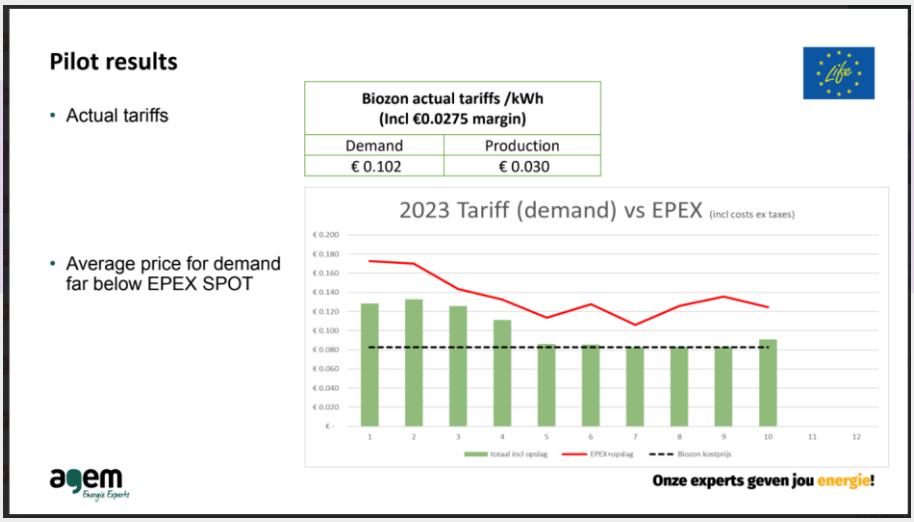
Obstacles encountered when conducting the pilot (~1 page)

During the pilot phase, several obstacles were encountered, reflecting the complex nature of implementing community-based energy projects. One significant challenge was navigating the regulatory landscape and obtaining necessary permissions. The project had to adhere to stringent regulations governing energy production and distribution, which required extensive coordination and compliance efforts.

Interoperability of systems also emerged as a key obstacle. Integrating various hardware and software components to enable seamless energy trading and management posed technical complexities. Ensuring compatibility and smooth operation across different systems demanded significant resources and expertise.

The performance of hardware and software solutions further presented challenges. Technical glitches and malfunctions (the fixed gas turbine of BioZon broke down at a certain point) impacted the reliability and efficiency of energy generation and distribution processes, necessitating troubleshooting and optimization efforts.

In summary, the pilot phase encountered various obstacles ranging from regulatory hurdles to technical complexities. Addressing these obstacles required a comprehensive approach encompassing regulatory compliance, community engagement, technical expertise, and financial sustainability



Key learnings for other pilots (~250 words)

If you were repeating the pilot project: what would you have done differently, what are your key lessons learned and key takeaways?

Market value proposition and key activities:

- Implement a pricing model where end-users pay no more than the cost price plus, ensuring a sustainable and equitable energy supply.
- Consider various factors such as generation, distribution, storage, and flexibility market revenues when determining the cost price for energy
- Operate the market on a forward-facing (day-ahead) basis, allowing participants to submit bids per 15 minutes.
- Foster a bottom-up community model with transparent and equitable energy pricing to encourage community engagement.
- Encourage financial participation from community members to fund necessary investments, leveraging national and provincial subsidy schemes to create an attractive business case.
- Establish an energy cooperative where participants have ownership and governance rights, with clear rules for internal governance, dispute resolution, and geographical constraints on participation.
- Ensure diverse representation among participants, including households with varying socioeconomic statuses, and engage participants in the co-creation of project objectives to foster community ownership and engagement.

Recommendations for policymakers (~400 words)

Please fill in the table below, by including recommendations for policymakers based on your experience of conducting the pilot (in particular obstacles encountered).

What?	Who?	Why - Example from case study?	How?	When?
Supportive Regulatory Frameworks	Policymakers	To encourage community-based energy initiatives and provide clarity on energy trading.	Develop regulatory frameworks that incentivize peer-to-peer energy trading and ensure fair market access for community energy projects.	Ongoing
Streamlined Permitting Processes	Regulatory Authorities	To accelerate project development timelines and lower transaction costs for participants.	Simplify permitting processes and reduce administrative burdens for community energy projects.	Ongoing
Capacity Building and Education	Government/ NGOs	To empower communities to actively engage in energy transition initiatives.	Invest in technical assistance, training, and informational resources to enhance community understanding of energy systems.	Ongoing
Collaborative Governance Models	Local Authorities/ Energy Cooperatives	To promote inclusive decision-making and resource sharing.	Foster partnerships between local authorities, energy cooperatives, utilities, and community stakeholders.	Ongoing
Data Accessibility and Transparency	Regulatory Authorities	To improve market efficiency and enable data-driven innovation.	Establish open data platforms and standards to promote data accessibility and transparency.	Ongoing
Social Equity and Inclusion	Government	To address energy poverty and promote equitable distribution of benefits from renewable energy projects.	Prioritize social equity and inclusion in energy transition policies by promoting energy access for marginalized communities.	Ongoing
Flexibility and Adaptability	Regulatory Authorities	To respond to changing needs and emerging opportunities in the energy sector.	Design flexible policies that can adapt to diverse local contexts and evolving market conditions.	Ongoing

Further information

- Website
  - https://biozon.nu/uitleg/agem/
  - https://www.binnenlandsbestuur.nl/ruimte-en-milieu/entrnce/project-biozon-tegen-kostprijs-energie-leveren-aan-leden
  - https://www.entrnce.com/nl/waarom-lokale-energie
- Public data sources
- Other relevant documents

References

SOURCES

Author A., 2018b: Case Study Analysis – *Publication name and information*

Author B., 2019b: Case Study Analysis – *Example here of a publication online*

Author C., 2020b: Case Study Analysis – *Publication name and information*

FURTHER INFORMATION

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