



Biodigestion at the Neighbourhood Level: From community participation to waste separation

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Photo by The Beach Amsterdam

High energy bills and litter on the streets caused a group of residents of the Wildeman neighbourhood in the district of Osdorp in Amsterdam to act. Expecting no solution from the municipality, they decided to take care of it themselves and tackled these two problems with one solution: using the technology of biodigestion to produce energy from municipal food waste - a perfect example of the urban food-waste-energy nexus.

The Wildeman neighbourhood has a relatively low socio-economic profile. Hence, sustainable energy is not on the priority list of most of its residents. Moreover, coordinated waste separation is non-existent in the neighbourhood. An active group of neighbourhood residents, calling themselves 'the Energy Shop' took up these challenges. Supported by "The Lucas Community" and "The Beach", two local social incubators, they decided to bring a biodigester to the Wildeman neighbourhood. In addition to addressing the food-waste-energy nexus, their motivation was to create employment and to improve social cohesion in the neighbourhood. For example, one input for the biodigester is leftover bread, a specific litter problem in some neighbourhoods, as many residents leave this bread for animals as their Muslim belief does not permit them to waste bread.

For the assessment, the Energy Shop contacted Wageningen University and Research (WUR) Science Shop to undertake

research. Two MSc students of the research group Knowledge, Technology and Innovation and a WUR student consultancy team (1) took up the challenge, investigating the feasibility of an organic waste separation scheme, the technical requirements for a biodigester at the neighbourhood level, and the overall social conditions and impact of the project.

Community participation in waste separation

The installed biodigester is actually a pilot and is mainly for demonstration purposes. The current pilot is too small to really serve as a viable alternative energy source for the neighbourhood, but the students assessed the technical and social conditions for scaling up the technology to a locally-owned energy production unit. The technical assessment showed that a constant organic waste flow is required and, to make it profitable, the input should at least include all organic waste from the neighbourhood including the bread. To make it work in the absence of municipal collection facilities for organic waste, the collection of organic waste must be organised at the neighbourhood level. The participation of the community in the separation of their organic waste is thus crucial for the project to succeed. One of the observations was that waste collected separately, like glass, paper and textiles, is only reaching a small percentage of its potential capacity. Improving awareness about separate waste collection thus is one of the challenges to be faced.

Convenience

A review of the literature on waste separation behaviour and interviews with residents showed that convenience, knowledge and seeing some kind of benefit from the effort

are the most important factors determining the willingness of the residents to participate in a separation scheme for organic waste. At this stage, we talk about *willingness* to participate, as it is not possible to measure the real participation of the participants since the scheme has not yet been implemented. The results are based on the statements the respondents made in interviews about their actual behaviour as well as their intended behaviour in future, supported by a literature review. Convenience in waste separation seems an obvious factor, but residents stated that current recycling facilities do not respond to this demand; the distance to the facility was too big according to the residents.

Experience in Utrecht: “Bread = Energy” By Jan Deurloo

Care institutions Reinaerde, housing associations Mitros and Portaal collaborated in the autumn of 2014 to tackle the nuisance of leftover bread in Utrecht Zuilen district, sustainably and socially by introducing a bread pick-up and processing service. The municipality of Utrecht is also actively involved as a partner.

Bread = Energy aims for:

- A clean neighbourhood
- An involved neighbourhood
- Awareness on food and waste
- And energy of own residual waste.

In Kanaleneiland district the first fermenter is placed in a container in the community garden of Food for Good. The gas will be connected to a stove that can heat the garden house and to a cooking appliance that can be used to prepare garden produce. In Overvecht district an application for an environmental permit is submitted to place a fermenter there. In Zuilen district, they have similar intentions but they have not yet managed to find a suitable place.

They are committed to strengthening social cohesion between vulnerable and non-vulnerable district residents. The bread pick-up service can also be a first step in joining the labour market and closely adheres to the social and sustainable ambitions for the district where the fermenter is located. Participation creates sense and structure in daily life and the low-threshold entry leads to earlier signalling of (increase of) vulnerability and social isolation. With respect for religious and cultural beliefs, they encourage district residents to take the lead: affecting liveability in their own neighbourhood and making energy of collective residual waste.



Photos by Brood = Energie/ Facebook

Knowledge and visibility

The initiator of the project reported that in the beginning he met only disbelief when he tried to explain that energy could be produced from leftover bread. Only after seeing the process of transforming waste into energy were people convinced such a thing is possible. As such, the demonstration biodigester has itself already contributed to increasing awareness in the neighbourhood, confirming the findings of other research that knowledge has a positive effect on recycling intentions (e.g. Ebreo and Vining, 2007). The visibility of a biodigester in the neighbourhood also proved to the residents that their efforts to separate their organic waste does make sense and is important in further support. But when one resident found out about the low energy production of the demonstration biodigester compared to the amount of effort he put in recycling their bread, his optimism about the project dropped. In addition, the research showed that face-to-face promotion was the best way to inform residents about the project. Previous research confirms that awareness of the recycling behaviour of others already triggers people to act similarly (Barr et al., 2003).

Rewarding good behaviour

People want to see the benefit from their behaviour. A reward for good behaviour was therefore also identified as a tool to increase participation. Earlier research showed that low-income groups recycle more when they personally



benefit from it, and this was confirmed by our findings. One respondent mentioned that economic rewards will only work in the short-term. When the consequence of the behaviour is fixed, motivation decreases after a while. Therefore, a feedback mechanism in the incentive system proves to be more successful. Such a feedback loop also stimulates involvement and increases knowledge on one's behaviour, which in turn contributes to participation (Timlett and Williams, 2007).

Social cohesion and social impact

Apart from addressing waste separation and local energy production, the project also has a beneficial social impact. Community participation and collective awareness-raising is in itself considered an important outcome of the intervention. The biodigester demonstration unit only produces gas for a single facility. A small kitchen is used for social cooking activities for residents, closing the circle in bringing people together (see figure). Community bonds are indeed identified as an important factor for future participation in waste separation. Residents liked the idea of producing their own 'Osdorp gas' together with their neighbours. They said that if their neighbours participated, they would do so as well. Social pressure seems to be strong in this neighbourhood.

Benefit of the local

The small-scale character turns out to be an asset in this project. It increases the possibilities for circular solutions because of the short distance between the waste disposal and the user of this waste as a source of energy. In addition, circular initiatives work better on a local level because people can see the process directly in their own environment. This may increase participation rates in waste separation schemes. Moreover, organising things locally creates extra opportunities to connect other community facilities to a project that can contribute to social cohesion in a neighbourhood. Based on the results of the technical feasibility study it is recommended that the energy produced by the biodigester is used for a community facility, for example a restaurant, to follow up on the cooking function of the demonstration unit.

Role of social incubators in the food-waste-nexus

The social incubators played a crucial role in this project. As they are anchored in the community, they receive more trust from its members than public institutions such as the municipality or the waste collection company. This applies to the Wildeman neighbourhood in particular, because trust levels in the government were found to be strikingly low in this area (OIS Amsterdam, 2016). Cooperation with social incubators could therefore be an opportunity for public institutions as it may benefit the acceptance and thus the success of their policies. While intervening in environmental issues such as the food-waste-energy nexus, social incubators intrinsically address community involvement. This case shows that they could serve as a basis for further development of innovations in the food-waste-energy-nexus.

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References

- Barr, S., Ford, N.J. and Gilg, A.W. 2003. Attitudes towards Recycling Household Waste in Exeter, Devon: Quantitative and qualitative approaches. *Local Environment*. 8(4), pp.407-421.
- Ebreo, A. and Vining, J. 2007. Motives as Predictors of the Public's Attitudes Toward Solid Waste Issues. *Environmental Management*. 25(2), pp.153-168.
- OIS Amsterdam. 2016. Gebiedsanalyse 2016. Osdorp. Stadsdeel Nieuw-West. Amsterdam: Municipality of Amsterdam.
- Timlett, R.E. and Williams, I.D. 2007. Public participation and recycling performance in England: A comparison of tools for behaviour change. *Resources, Conservation and Recycling*. 52(2008), pp.622-634.

Notes

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More information:

www.thebeach.nu
www.wur.nl/nl/project/Energieopwekking-uit-brood-en-giftafval-op-buurniveau-.htm