



LUND UNIVERSITY

Sustainability objects as performative definitions of sustainability: The case of food waste-based biogas and biofertilizers

Corvellec, Hervé

2015

[Link to publication](#)

Citation for published version (APA):

Corvellec, H. (2015). *Sustainability objects as performative definitions of sustainability: The case of food waste-based biogas and biofertilizers*. (GRI report-Managing the Big City; Vol. 2015, No. 1). Gothenburg Research Institute School of Business, Economics and Law at the University of Gothenburg.
<https://gupea.ub.gu.se/handle/2077/38259>

Total number of authors:

1

General rights

Unless other specific re-use rights are stated the following general rights apply:

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

Read more about Creative commons licenses: <https://creativecommons.org/licenses/>

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

LUND UNIVERSITY

PO Box 117
221 00 Lund
+46 46-222 00 00

Gothenburg Research Institute

GRI-rapport 2015:1

Managing Big Cities

**Sustainability objects as performative definitions of sustainability:
The case of food waste-based biogas and biofertilizers**

Hervé Corvellec

© Gothenburg Research Institute
All rights reserved. No part of this report may be
reproduced without the written permission from
the publisher.

Gothenburg Research Institute
School of Business, Economics and Law
at the University of Gothenburg
P.O. Box 603
SE-405 30 Göteborg
Tel: +46 (0)31 - 786 54 13
Fax: +46 (0)31 - 786 56 19
E-post: gri@gri.gu.se

ISSN 1400-4801

Layout: Lise-Lotte Walter

Sustainability objects as performative definitions of sustainability: The case of food waste-based biogas and biofertilizers

Hervé Corvellec

Department of Service Studies, Lund University
& GRI, University of Gothenburg

Abstract

This article introduces the notion of sustainability objects to label objects that come with a claim to promote a more sustainable mode of living. The purpose is to show that organizations that develop such objects contribute to defining sustainability. A case study of the development of a food waste-based biogas and biofertilizers production facility serves as empirical example of sustainability objects development. The analysis demonstrates that this development has involved situating biogas and biofertilizers socially, entangling them in nets of relations and endowing them with an agency of their own. The study also shows that developing sustainability objects entails constructing performative definitions of sustainability. With sustainability objects embodying local definitions of sustainability, the success or failure of sustainability objects is also the success or failure of these definitions. Asking why sustainability objects gain or lose ground is therefore suggested as a way to understand the state and nature of sustainability transition.

Keywords

Sustainability objects; Food waste; Biogas; Biofertilizers; Sweden

Introduction

A measure of the actual efforts that are being made to promote a more sustainable capitalism (e.g. Hawken *et al.*, 1999), and a more sustainable consumption (e.g. Jackson, 2006) is the ever increasing development of objects to which are attached the qualifier “sustainable”: from mundane products such as pens to societal mainstays such as energy; through food, plastics, apparel, packaging, cellular phones, and carpets; even to less tangible objects such as tourism destinations, urban renewal projects, and fishing policies.

By labelling these objects *sustainability objects* to underscore that they come with a claim to promote a more sustainable mode of living, I show that the development of such objects involves more than an ambition to reduce the negative impact of human activities on the environment. By offering substitutes to conventional objects and opening possibilities for more sustainable behaviours, the development of sustainability objects also involves the invention of local and *ad-hoc* definitions of sustainability. In contradistinction to theoretical efforts at defining sustainability (e.g. Dobson, 1996, Faber *et al.*, 2005, Christen and Schmidt, 2012), the development of sustainability objects stands for efforts at developing definitions of what it means to be sustainable in practice—so called, performative definitions (Latour, 1986) of sustainability.

To support my claim that developing *sustainability objects* entails developing *performative definitions* of sustainability, I present a case study of the development of two interrelated sustainability objects: food waste-based biogas and biofertilizers serve as empirical support. I have followed the development process of a food waste-based biogas and biofertilizers production unit at the Swedish municipally-owned waste management company, to analyse how managers have turned food waste-based biogas and biofertilizers into expressions of sustainable waste management. I single out three major ways this has been done: positioning biogas and biofertilizers in supportive contexts; inserting them in dynamic networks of people, plans, and practical imperatives; and exploiting their material agency. Contextualising, networking, and endowing with agency converge to explain the coming into being of sustainability objects and the corresponding construction of performative definitions of sustainability.

My analysis takes stock of Appadurai’s (1986) insight that objects have a social life. In short, object studies (e.g., Star and Griesemer, 1989, Latour, 1996, Knorr Cetina, 1997, Mol, 2002, Suchman *et al.*, 2002, Bennett, 2010) show that objects derive their meaning from being intertwined with people’s everyday and life-worlds (Sandberg and Dall’Alba, 2009), their definitions being produced, but also contested, in and for new uses (Lindberg and Walter, 2013). They come into being and remain only if they allow actors to translate their concerns, interests, and benefits to other actors, and only if all their elements are brought together and held in place by other objects and people (Latour, 2005). Inversely, if the relations upon which they rest break down or dissolve, objects lose their

order, fall into decay and become ruins (Edensor, 2005). Objects also prove to have an agency of their own. They act on people, modify behaviors and thereby contribute to shape the social contexts that they so crucially depend on. As Knappett (2008) explains, the agency of objects is symmetrical to human agency in the sense that “the two are mutually constituted, each being transformed by the other in their conjunction”. Agency resides neither in the human being alone nor in the non-human object alone. It emerges from what the two can achieve together, for example when a skipper sails around the world on a trimaran, supported by all the other humans and non-humans that they rely on. Humans and things entrap each other in a dialectic of dependence and dependency that Hodder (2012) renders by the term of entanglement.

The aims of the study’s object-centred approach are three. First, it is to introduce the notion of *sustainability object* as a label for objects that come with a promise to support a more sustainable mode of living. Second, it is to show organizations develop such objects, with a focus on this development resting on intertwining political, technical, legal, symbolic, and behavioral concerns. Third, it is to show that the development of a sustainability object leads to the development of local, ad-hoc, and temporary definitions of sustainability and sustainability transition. This third aim reminds of studies of how one constructs the environmental friendliness of products (e.g., Reijonen and Tryggstad, 2012, Fuentes, 2014). But instead of following objects to analyse the construction of green markets, as these studies do, the purpose here is to underscore the definitional role of objects for sustainability and sustainability transition. Taking stock of literature on the performativity of organizational practice (Callon *et al.*, 2007, Muniesa, 2014), the study shows that sustainability objects are not merely answering to a demand for more sustainability; they are also making propositions about how to understand sustainability and how to work for sustainability transitions. To put it briefly, the success or failure of sustainability objects is also the success or failure of definitions of sustainability, and inversely. Therefore, understanding how sustainability objects are developed and why they succeed and fail provides unique ways to understand the actual state and dynamics of sustainability transition.

Case company, fieldwork and methodology

This is a single-case study (Ahrens and Dent, 1998, Flyvbjerg, 2011) of the development of a separate collection of food waste for the production of biogas and biofertilizers at Sysav (*Sydskaånes avfallsaktiebolag*, in translation: South Scania Waste Company, Ltd). The study is part of two consecutive research projects on the organizing of waste management and waste prevention (see acknowledgements).

Sysav is a waste management company owned by a consortium of 14 municipalities in Scania, the southernmost part of Sweden. These owner

municipalities are also Sysav's primary customers. Through them, the company serves a joint population of about 720 000 from which it has collected 385 300 tonnes of household waste in 2013, out of which 22 950 tonnes was food waste (Sysav, 2014). Like most municipally-owned waste management companies in Sweden, Sysav is a dual company that enjoys a monopoly on household waste within the jurisdiction of its owners, but can also collect waste from companies or other municipalities on a commercial basis up to 20% of its turnover. In 2013, the Sysav group received 12 580 tonnes of food waste that came from companies, for example a local dairy plant. From 2005 to 2011, food waste activities were developed within a fully owned-subsiary, Sysav Biotec. Then this subsidiary was merged with the mother company and turned into an eponym department.

The specific data for this study has been generated in three different ways to provide a rich understanding (Silverman, 2011) of the dynamic of developing the production of biogas and biofertilizers from food waste. First, data were gathered in face-to-face open interviews (Kvale, 1996) with the head of Sysav Biotec: three times alone and once together with the then head of research and development at Sysav. Interviews also took place with: the manager in charge during the first years of the development process of introducing the idea of a separate collection of food waste and production of biogas to the municipalities served by Sysav; the manager in charge of the relationship between Sysav Biotec and its customers at the time of the interview; and the administrative head of the mother company. These interviews were conducted between 2011 and 2014, a period that corresponded to the final years of the development process. Interviews lasted from 45 to 90 minutes, were recorded and transcribed verbatim.

Second, data was gathered from listening to three presentations by the head of Sysav Biotec about how the case company had developed a separate collection of food waste, a production of slurry and, later, a production of biogas and biofertilizers. The researcher has collected copies of the presentation's hand-outs. Third, data were obtained from the study of documents. Some came from Sysav, for example the co-owners' directive, annual reports, promotional texts, the sysav.se website, or internal document handed out by informants. Other documents came from municipalities in the Sysav area: local waste ordinances, advertisements to households about the whys and hows of a separate collection of waste, and a presentation at Sysav Day 2012 about being the first municipality to introduce a separate food waste collection among the Sysav's co-owning municipalities. Yet other documents come from the local press and reports on food waste collection in Sweden and abroad.

The data were analysed manually. The field material was searched for indications about how something as emblematic of non-sustainability as food waste can be turned into an object of sustainability if collected and processed separately. More specifically, the author focussed on how the actors proceeded, what retained their focus, what they built on, and, more generally, how they gave meaning and direction (Corvellec and Risberg, 2007) to their project. The

purpose was to write a biography (Humphries and Smith, 2014) of the project to transform food waste into biogas and biofertilizers, with a focus on the singularity (Passeron and Revel, 2005) of the case, but also with an ambition to bring forth how this singularity can shed light on other efforts that go in the same direction.

Developing a biogas and biofertilizers production unit

The development of a biogas and biofertilizers production unit has taken about 15 years. After a failed attempt in the late 1990s to develop a biogas plant for biowaste from industry and agriculture, Sysav ran a few pilot projects with schools and households. It created Sysav Biotec in 2005 and, after a series of tests and consultations with the municipalities it serves, a pre-treatment plant was opened in December 2008. Thanks to the introduction of a separate collection of food waste in nearly all municipalities in the region, volumes received increased rapidly: from 2115 tonnes in 2007, to 15 400 tonnes in 2010 and 35 350 tonnes in 2013. In 2011, Sysav decided to build a biogas and biofertilizers plant for food waste. This plant is due to open in 2015.

Socially situated objects

Sysav Biotec's facility was developed thanks to a multisided contextualization of food waste- based biogas and biofertilizers to fit the objectives, concerns, demands and interests of the project's stakeholders, for example the Swedish Parliament, farmers, biofertilizers experts, municipalities, householders, or the mother company. What are called boundary objects (Star and Griesemer, 1989, Lainer-Vos, 2013, Lindberg and Walter, 2013) were created: something plastic enough to find use and support among stakeholders with different interests, yet stable enough to be acknowledged a recognizable identity.

First, Sysav managers put their project in the context of European and Swedish waste policy. The European Waste Directive (The European Parliament and the Council of the European Union, 2008/98/EC) recommends a separate collection and proper treatment of bio-waste to reduce greenhouse gas emissions, the composting and digestion of bio-waste and the use of environmentally safe materials produced from bio-waste. Likewise, the Swedish waste national plans (Swedish Environmental Protection Agency, 2005, Swedish Environmental Protection Agency, 2012) consider the production of biogas and biofertilizers as a way to promote a more sustainable waste management. Thus, Sysav's project stands in line with European and national efforts to set in place a societal narrative on waste (Corvellec and Hultman, 2012) that features turning food waste into biogas and biofertilizers as a practical way to contribute to sustainability. The successive quantified national targets for collection and processing of food waste have proved to be an invaluable support to the development process.

It provided a legitimacy to work with the issue. It showed that it was not only the Sysav waste company that had found out that it is good for the environment and made a decision. There was even a national goal involved in this environmental collaboration. (Sysav Biotec manager; interview; April 9, 2013; all translations from interviews are mine)

National objectives created a context within which local actors could inscribe the objects under construction (Reijonen and Tryggestad, 2012, Fuentes, 2014). These objectives drew a roadmap that told politicians, civil servants and the public at large that developing a biogas unit was a local effort aimed at serving the national, European and global environmental objective of climbing the waste hierarchy.

Second, Sysav Biotec needed to learn more about how to transform food waste into biogas and biofertilizers. At the outset of the development process, food waste-based biogas and biofertilizers were epistemic objects (Knorr Cetina, 1997, Ewenstein and Whyte, 2009) in the sense of a quest for knowledge. There were many questions: How much food waste is there in household waste in our region? How many of the fourteen municipalities in the Sysav area will join the project? How much food waste do restaurants, institutional catering and shops produce? Would it be enough to collect these? And, should one collect food waste through holding tanks, disposal machines or conventional containers?

A working group was therefore created to assess the region's food waste potential and compare advances. A series of studies explored the efficiency of collection devices (Kärrman *et al.*, 2005, Bernstad, 2010, Bernstad, 2010) and a minor consultancy study (Bisaillon, 2011) confirmed that biogas is an energy of better quality than incineration since it can be used as vehicle fuel and that it is therefore preferable from a climate change perspective. Having in mind a failed attempt in the late 1990s of developing a biogas production unit due to local objections, the developers opted for siting the new installation on Sysav's main operations site that has no close neighbours. Developers opted for a two-step strategy that allowed them to adapt to the evolution of the volume received, thereby reducing economic and operational risks.

Third, the development project gained acceptance among stakeholders. Municipalities were free to join the food waste program and needed to be convinced to join the scheme. Households had to provide space for new containers, learn how to use the paper bag for the sorting job, and sometimes even pay higher waste collection fees, something that surprisingly few resisted. Experts who certify biofertilizers, authorities that grant permits to use these fertilizers, and farmers who use them on their fields had to be convinced of the quality of the biofertilizers produced. And an internal acceptance had to be gained for large scale biological treatment of waste within Sysav, a company with a long tradition in waste incineration; this proved to be easy, informants declare, especially when Sysav Biotec can show that food waste volumes

become important enough to secure positive economic returns. Political efforts, behavioural changes, institutionalised acceptance and green strategic choices joined to let objects multiple (Mol, 2002, Law and Mol, 2008) take form—i.e. objects that are understood in different, changing and not necessarily coherent versions by different publics. Different stakeholders to the project have very different views about what matters when it comes to food waste-based biogas and biofertilizers, and it is a challenge to combine these views.

It is noteworthy that the development project has met remarkably little opposition. When two municipalities in the Sysav area introduced a compulsory scheme of separate food waste collection, a householder complained to the Ministry of Environment about nuisances such as blowflies and maggots; but he was referred back to the municipal sanitation department. Punctual protests by householders against the obligation to separate food waste in 2014 were met by promises not to fine householders who do not comply with the separate collection scheme. And objections of a neighbouring municipality to having yet another waste installation on its territory forced Sysav to move the planned biogas and biofertilizers plant a few hundred meters to the territory of the municipality of Malmö, which welcomed the biogas plant.

An effective way to promote the transformation of food waste into biogas and biofertilizers is the semantic choice of the Swedish term *matavfall*, literally “food waste”. Several terms were in competition: compostable waste, organic waste, or biowaste. But Sysav Biotec and municipal representatives settled for food waste. As the head of Sysav Biotec explains:

Food waste is food. Not houseplants; not cut flowers; it is not kitchen paper, but food. We thought this was easy to communicate. And we needed this since we were planning a pre-treatment plant, so we were forced to know exactly which kind of waste we were going to collect. What came immediately after that were waste sorting instructions: what is food waste and maybe what it is not food waste and why. (...) At the beginning, we did not have coffee grounds as food waste, but after some investigation we changed our mind and now we have coffee grounds as food waste. (Interview; October 9, 2012)

The term food waste enables a clear distinction between what is food waste and what is not. The term *matavfall* proved to be a stepping stone in providing food waste-based biogas and biofertilizers with a material agency able to serve the development project.

The need for another semantic innovation emerged when it became clear that considering biogas as the main product, biofertilizers are implicitly defined as a bi-product. Any association to sewage sludge was to be avoided if the farmers were to accept using biofertilizers: farmers do not want to risk being accused of introducing potentially dangerous substances into the food chain. To increase the tolerance for their project, Sysav Biotec managers therefore started inverting

the hierarchy of their outputs. “Today, we say that biofertilizers are our main products” explains Sysav Biotec’s head (Interview; October 9, 2012). They increasingly had to feature biogas as an ancillary production. The rationale is that producing biofertilizers requires stricter quality control than producing biogas and that focusing on biofertilizers underscores more clearly that it is a matter of closing the loop of nutrients, which the production of biogas does not evoke. Eventually, the purpose was to make clear that biofertilizers are not matter that derives from waste, but a product in their own right, carefully controlled and risk-free, to use for food production. Priorities, like words, matter as they reflect and promote different versions of objects: one that gives priority to mobility vs. another that gives priority to food production. The multiple and changing nature of food waste-based biogas and biofertilizers as objects proved to be a condition of the development process.

Objects in relations

To come into being and continue to exist, sustainability objects, like objects in general, need to be inserted in strong networks of humans and non-humans (Latour, 1996, Suchman, Trigg et al., 2002, Latour, 2005). For example, food waste-based biogas and biofertilizers had to be brought in line with waste collection trucks, climate change mitigation, municipal waste plans and sanitation contracts, together with all the people busy with these plans, machines and policies.

Garbage trucks are central to waste collection and a realisation of the project’s environmental ambitions goes through answers to operational questions such as:

Which kind of trucks are there? Which kind of two-chamber truck is there [to collect food waste and unsorted waste at the same time, my note]? Some trucks have four chambers [and can collect four different waste stream at the same time, my note], but can one also use trucks with one chamber only? Which kinds of problems, technical problems, can one encounter? Trucks that collect food waste run a higher risk to leak since food waste contains more water and when you concentrate it, you get more water than with unsorted waste: How do you manage this? (Sysav Biotec manager; interview; April 9, 2013)

Feasibility is a political argument. The pilot studies, the lack of problems met by pioneering municipalities and rapidly increasing volumes showed that the national objective of a 35% collection of food waste was within reach. This helped convincing municipal representatives that a separate food waste collection could serve their environmental policy, communication and image without alienating householders and thus voters.

Likewise, an increased interest for climate change in the mid-2000s made it easier for Sysav Biotec representatives to put forward that:

We produce a local fuel from our rest-products; we reduce emissions from car transportation; and we reduce the impact of CO₂ when we join this system of biological treatment of food waste. (Sysav Biotec manager; interview; April 9, 2013)

A rising awareness of the effects of greenhouse gases made it possible for developers to stress the sustainability dimension of the project and present the food waste-based biogas and biofertilizers as something positive for the environment.

Putting down a separate collection of food waste in municipal waste plans was critical. These plans are obligatory passage points (Callon, 1986) since they determine how the municipality organizes the management of waste. In particular, waste plans lay ground for the public procurement of collection services and thus sanitation contracts. Since municipal waste plans are renewed every 6 or 7 years, the pace of any change in waste collection is set by the pace of these renewals. Synchronicity surfaces as a condition to the development of sustainability objects. Managers noted as helpful that several municipal waste plans were renewed just after Sysav's own long-term plan since owner municipalities could refer to Sysav's plans to develop a biogas and biofertilizers transformation capacity. The development project benefitted from the intertextual correspondences that could be established between these plans. Objects gain momentum from being linked to texts with strong social status (Corvellec, 2007), in the case at hand, not only the municipal waste plans of Sysav's owners, but also the European waste directive (The European Parliament and the Council of the European Union, 2008/98/EC), the national waste plans (Swedish Environmental Protection Agency, 2005, Swedish Environmental Protection Agency, 2012), or the *An Inconvenient Truth* documentary (Guggenheim *et al.*, 2006).



Picture 1: Food waste-based slurry as cocktail. Courtesy of Sysav AB.

Sysav Biotec managers were keen to associate their project with the regional public transportation plans to rely entirely on biogas as fuels for buses by 2020 and thus contribute to sustainable mobility and climate change mitigation. But they were also cautious to keep at bay that spores and worms can be threats to the health of sanitation workers or that water in food waste corrodes truck chambers. Biogas is not to be associated with smell nor biofertilizers to sewage sludge.

Instead, Sysav humorously features its slurry as a cocktail drink (see Picture 1).

The purpose was to put in place a new social order (Preda, 1999) around food waste. Municipalities, households, private contractors and Sysav were faced with a moral and practical imperative to engage with the environmental consequences of food consumption. New individual and organizational behaviours were suggested. An expertise was developed about how to design waste plans, sort food waste from non-food waste, organize dual waste collection systems, or prevent hazardous substances from finding their way into biofertilizers. A different map of energy production emerged. Food waste-based biogas and biofertilizers created novel entanglements between humans, between objects and between humans and objects (Hodder, 2012). A new way of ordering people and waste was put in place – Carlile *et al.* (2013) speak of sociomaterial order – without anyone knowing how long this order would last and which consequences it would have. The long term challenge is to make food waste-based biogas and biofertilizers situation independent objects (Meijers, 2000) that are as self-evident as waste bins or flushing toilets thanks to their insertion in strong and established networks. In the meanwhile, the associations and dissociations that turn food waste-based biogas and biofertilizers into expressions of sustainability remain less than steady. Their stability is relative. For example, a reduction in the maximum allowed halt of cadmium or phosphor in biofertilizers can at any time put an abrupt end to combined biogas and biofertilizers production. The “affiliative powers” of food waste-based biogas and biofertilizers as sustainability objects, as Suchman (2005) calls the ways in which objects are fraught with significance for the relation that they materialize, are contingent and changeable.

Objects with agency

Biowaste slurry is a very active product. Sysav Biotec showed around small slurry-filled glass tubes that emitted a soft but slightly nauseating odour but let people experience through sight and smell the reality of Sysav’s plan to produce renewable energy from food waste. Likewise, the paper bag for separate food waste collection did more than ensure an actual presence in kitchens of Sysav’s plans for sustainability. Acting as a school for recycling, the bag provides guidance. The head of Sysav Biotec describes its texture as of crucial importance:

A plastic bag, but even a bag made of corn starch, does not return as clean food waste [as a paper bag, my note]. A plastic bag tells that it is okay to put other stuff in it and people do not understand that a bag is made of corn starch when it looks like a plastic bag. (Head of Sysav Biotec; interview; October 9, 2012)



Picture 2: Paper bag for a separate collection of food waste. The plastic holder, which is to be placed under the sink, for example, enables a circulation of air under and around the bag to avoid moisture. Photography by the author.

In words reminiscent of the vibrancy that Bennett (2010) considers lay the groundwork for the agency of matter, the head of Sysav Biotec underscores that paper bags determined disposal behaviour by signalling “food waste only”. Correspondingly, the fact that introducing a separate collection of food waste improves recycling behaviours for other waste streams reminds of Rennstam’s (2012) observation that material arrangements both stabilize and rearrange the social organization around them. The paper bag exerts what Carlile, Nicolini et al. (2013) call a moral agency. It distinguishes between what is sustainable and thus right and what is not sustainable and thus wrong. Douglas (2002 [1966]) oft cited claim that dirt is matter out of place finds with the food waste paper bag a purposive illustration. These bags constitute not only a very concrete pragmatic of engagement (Thévenot, 2002) with food waste-based biogas and biofertilizers. They give consumers the possibility of engaging with green morality (Fuentes, 2014) and express a moral commitment to sustainability.

The agency of things derives from their being assemblages (Bennett, 2010): it becomes effective when several elements operate in conjunction with one another. It is not possible to isolate any specific element that acts alone. Every element acts with the help of, together with, through, against or other forms of interplay with others. In this interplay, every element depends and exerts control on the other elements in the whole. At the same time, as Law and Mol (2008) note, actors are always being acted upon, and they can only act if others act with them. The trucks, contracts, pumps and organizational routines have a collective but also bounded agency that results from but also conditions the organization of food waste collection. For example, the ability of the pre-treatment plant to process cucumbers and other vegetables in individual plastic packaging enabled Sysav Biotec to collect food waste from retailers and restaurants, an ability deemed necessary early in the process when it was unclear whether enough food waste could be collected from households to reach the national objectives. Technical choices are made to orient future actions. They create affordances (Gibson, 1977) and routines (Leonardi, 2011) as much as entanglements (Hodder, 2012),

path dependences (Schreyögg and Sydow, 2010) and lock-ins (Liebowitz and Margolis, 1995, Unruh, 2000, Corvellec *et al.*, 2013). The food waste-based biogas and biofertilizers *depend* on sorting, collecting and processing activities but also *orient* the contracting, controlling and other organizational practices in the specific direction of its political and technical characteristics.

Moreover, objects develop a temporality of their own to which they subject other actors. Pilot projects and pioneering municipalities have an entailing effect. But much learning was needed to handle the uncertainty of whether enough waste could be collected, how and when. Questions like “Which steps do we have to take?” and “In which order shall we take these steps?” give a structuring role to bets on the future but also look into the past. And the renewal of municipal waste plans set the pace of the project since it was necessary that they take up a separate food waste collection. The frequent use by informants of terms such as “being ahead” or “coming a long way” underscores the need for developers and other stakeholders to think of sustainability objects in a processual manner, as something in a state of becoming rather than of being (Chia and Holt, 2009, Hernes, 2014). The agency of sustainability objects cannot be thought of outside its temporal dimension.

Finally, sustainability objects are mutable. For example, biofertilizers are surpassing biogas as Sysav Biotec’s main product on the grounds of the following argumentative chain: a) you can only produce biogas on a large scale and claim that this production is sustainable if you can take care of the nutrients in food waste; b) Taking care of nutrients involves producing and selling biofertilizers; c) To sell biofertilizers you need to gain an acceptance among farmers and supervision authorities; d) Your primary focus should therefore be on producing fertilizers of high quality; e) Biogas is therefore your secondary focus. The project of transforming food waste into biogas is becoming the project of transforming food waste into biofertilizers. Closing the loop for nutrients between cities and the countryside takes the lead before mitigating climate change in the contribution of this transformation to sustainability. And this is more than a matter of word choices since focusing on biofertilizers requires techniques that are more complex, demanding and risky than for biogas. This shift in priorities demonstrates the fluid character of sustainability objects.

Concluding discussion: Performative definitions of sustainability

Socially situating food waste-based biogas and biofertilizers, inserting them in strong networks, and making use of their material agency have been Sysav Biotec managers’ ways to create sustainability objects. They have also been ways to enact a local definition of sustainable waste management—in Latour’s (1986) terminology: a performative definition of sustainable waste management.

The notion of performative definition derives from the philosophy of ordinary language, especially Austin's (1975) idea of performative statements, that is, utterances that have the power of making real what they say. Performative definitions, Latour (1986) explains, are constructed *in practice*, when acting defines the act; for example when a skateboarder performs an Ollie and tells you that this is an Ollie. They stand in contradistinction to ostensive definitions that are constructed *in principle*: for example when one develops a theoretical definition of love or the State.

Food waste-based biogas and biofertilizers are performative expressions of sustainable waste management on the grounds that biogas is a renewable fuel that can replace fossil fuels and thus can have mitigating effects on climate change since biofertilizers make it possible to return nutrients to the earth and close the agricultural loop. One could demur that biogas does not necessarily replace fossil fuels as nothing says that bio- and fossil fuels are in a zero-sum game; that even biogas driven cars are not a sustainable mode of transportation due to all the other resources consumed by cars; or that biofertilizers are only a second best option to food waste prevention. And the transformation of food waste into biogas and biofertilizers may of course fall apart. If people stop separating their food waste from other waste, if legislation limits the use of biofertilizers, or if economic conditions force the Sysav group to put an end to the production of biogas and biofertilizers, the definition of sustainability attached to the transformation of food waste into biogas and biofertilizers will lose its validity and become, at best, something that one has tried to do for the environment. But for the time being, in the Sysav area, the specific enmeshments of machines, policies, semantic creations, social innovations, existing infrastructures, argumentative practices, geographical maps, legally binding regulations, corporate strategies, local political traditions and managerial practices that characterise the transformation of food waste into biofertilizers and biogas stand for a *de facto* local definition of sustainable waste management.

Food waste-based biogas and biofertilizers point here to a general characteristic of sustainability objects. These are not merely bringing a *contribution* to sustainability transition. At least for those who accept their claim to contribute to sustainability, they provide a local, temporary, and applied *definition* of sustainability. Claiming to be a sustainable option is declaring that the other options are less or not sustainable. It is delimiting what is sustainable from what is not, which amounts to providing an operational definition of what sustainability is. I am not speaking here of theoretical (or ostensive in Latour's (1986) terminology) definitions, but of narrow, practical and transient definitions. Sustainability objects, and I opened this article by underscoring how many and diverse they are, come with a definition of their own of what a more sustainable mode of living entails. This definition may refer to reuse or recycling, to bio-material or renewable energy, and to emissions or toxic matters—depending on the sustainability objects under consideration. Each sustainability object

offers a practice of sustainability that amounts to defining what it means to act sustainably within the object's own domain or range of uses.

Emphasising that sustainability objects create performative definitions of sustainability links to the observation made in the new economic sociology (Callon, 1998, MacKenzie *et al.*, 2007, Callon, 2010) and management and organization studies (Cochoy *et al.*, 2010, Mason *et al.*, 2014) that economic and management models shape reality rather than describe it. For example, the ethnography of arbitrage shows that a price is a social thing (Beunza *et al.*, 2006). The Black-Scholes-Merton model of option pricing proves to not simply represent the financial market for derivatives; it drives this market in the sense that market actors act according to the model, which therefore makes it prescriptive as much as descriptive (MacKenzie, 2006). And performance indicators are constructions as much as measurements of organizational performance (Corvellec, 1997, Muniesa, 2014).

In a circular manner, sustainability objects and definitions of sustainability have an agency that affects organizational practices, stakeholder relationships and the definitions of contexts on which they rest. Sustainability objects and definitions prompt new ways of seeing, speaking or behaving and lay the groundwork for new individual and collective practices. They induce new relations between people, between objects, and between people and objects (Hodder, 2012). They are political in the sense that they participate to establish a social order, with material, moral, economic and practical consequences for organizations and the economy (Fuentes, In Press).

Focussing on the development of a sustainability object makes it possible to address on its own terms the diversity of efforts there exist today to promote sustainability. It invites to follow which definitions and objects of sustainability come into being, gain visibility and become emblematic of ecological transition. It is a way to delve into the variety of actual sustainability practices and understand which practices gain legitimacy and enforcement and why. A sustainability object-centred approach is a way to enter the actual dynamic of sustainability transition. Not transition as one may define it in theory or wish it politically, but as individual and organizational practices are actually forming it—viewing transition as it happens.

References

- Ahrens, T. & Dent, J. F. (1998) Accounting and organizations: Realizing the richness of field research. *Journal of Management Accounting Research* 10: 1–39.
- Appadurai, A. (1986) *The social life of things: Commodities in cultural perspective*. Cambridge: Cambridge University Press.
- Austin, J. L. (1975) *How to do things with words: The William James lectures delivered at Harvard university in 1955*. Oxford: Clarendon.
- Bennett, J. (2010) *Vibrant matter: A political ecology of things*. Durham (NC): Duke University Press.
- Bernstad, A. (2010) *Insamling av matafall från flerfamiljsbus: Erfarenheter från Lund*. Lund: Lunds Renhållningsverk (LRV).
- Bernstad, A. (2010) *På väg mot en mer hållbar avfallshantering: Resultat och slutsatser från Augustenborgsprojektet*. Malmö: Sysav.
- Beunza, D., Hardie, I., & MacKenzie, D. (2006) A Price is a Social Thing: Towards a Material Sociology of Arbitrage. *Organization Studies* 27(5): 721–745.
- Bisaillon, M. (2011) *Energi- och klimataspekter på utsortering av matafall i Sysav-regionen*. Mölndal: Profu.
- Callon, M. (1986) Some elements of a sociology of translation: domestication of the scallops and the fishermen of St Brieuc Bay. *Sociological Review Monograph* 32: 196–233.
- Callon, M. (1998) An essay on framing and overflowing: Economic externalities revisited by sociology. *Sociological Review Monograph* 46: 244–269.
- Callon, M. (2010) Performativity, misfires and politics. *Journal of Cultural Economy* 3(2): 163-169.
- Callon, M., Millo, Y., & Muniesa, F. (2007) *Market devices*. Oxford: Blackwell.
- Carlile, P. R., Nicolini, D., Langley, A. & Tsoukas, H. (2013) How matter matters: Objects, artifacts, and materiality in organization studies: Introducing the third volume of “Perspective on Organization Studies”. In: Carlile PR, Nicolini D, Langley A and Tsoukas H. (Eds.) *How matter matters: Objects, artifacts, and materiality in organization studies*. Oxford: Oxford University Press, 1–15.
- Chia, R. C. H. & Holt, R. (2009) *Strategy without design: The silent efficacy of indirect action*. Cambridge: Cambridge University Press.
- Christen, M. & Schmidt, S. (2012) A Formal Framework for Conceptions of Sustainability – a Theoretical Contribution to the Discourse in Sustainable Development. *Sustainable Development* 20(6): 400–410.
- Cochoy, F., & Giraudeau, M., & McFall, L. (2010) Performativity, economics and politics. *Journal of Cultural Economy* 3(2): 139–146.

- Corvellec, H. (1997) *Stories of achievements: Narrative features of organizational performance*. New Brunswick (NJ): Transaction Publishers.
- Corvellec, H. (2007) Arguing for a license to operate: The case of the Swedish wind power industry. *Corporate Communications* 12(2): 129–129.
- Corvellec, H., & Hultman, J. (2012) From ‘Less Landfilling’ to ‘Wasting Less’: societal narratives, socio-materiality and organizations. *Journal of Organizational Change Management* 25(2): 297–314.
- Corvellec, H., & Risberg, A. (2007) Sensegiving as mise-en-sens: The case of wind power development. *Scandinavian Journal of Management* 23(3): 306–326.
- Corvellec, H., Zapata Campos, M. J. & Zapata, P. (2013) Infrastructures, lock-in, and sustainable urban development: The case of waste incineration in a Swedish metropolitan area. *Journal of Cleaner Production* 50(1): 32–39.
- Dobson, A. (1996) Environment sustainabilities: An analysis and a typology. *Environmental Politics* 5(3): 401–428.
- Douglas, M. (2002) [1966] *Purity and danger: An analysis of concept of pollution and taboo*. London: Routledge.
- Edensor, T. (2005) Waste matter: The debris of industrial ruins and the disordering of the material world. *Journal of Material Culture* 10(3): 311–332.
- Ewenstein, B., & Whyte, J. (2009) Knowledge practices in design: The role of visual representations as ‘epistemic objects’. *Organization Studies* 30(1): 07–30.
- Faber, N., Jorna, R., & Van Engelen, J. O. (2005) The sustainability of “sustainability”: A study into the conceptual foundations of the notion of “sustainability”. *Journal of Environmental Assessment Policy & Management* 7(1): 1–33.
- Flyvbjerg, B. (2011) Case study. In: Denzin NK and Lincoln YS. (Eds.) *The Sage handbook of qualitative research*. Thousand Oaks (CA): Sage, 301–316.
- Fuentes, C. (2014) Green Materialities: Marketing and the Socio-material Construction of Green Products. *Business Strategy and the Environment* 23(2): 105–116.
- Fuentes, C. (In Press) How green marketing works: Practices, materialities, and images. *Scandinavian Journal of Management*.
- Gibson, J. J. (1977) The Theory of Affordances. In: Shaw R and Bransford J. (Eds.) *Perceiving, Acting, and Knowing*. Hillsdale (NJ): Lawrence Erlbaum Associates: 67–82.
- Guggenheim, D., David, L., Bender, L., & Gore, A. (2006) An inconvenient truth: a global warning [Documentary]. Beverly Hills (CA): Lawrence Bender Productions.
- Hawken, P., Lovins, A. B. & Lovins L. H. (1999) *Natural capitalism: The next industrial revolution*. London: Earthscan.

- Hernes, T. (2014) *A process theory of organization*. Oxford: Oxford University Press.
- Hodder, I. (2012) *Entangled : an archaeology of the relationships between humans and things*. Malden, (MA): Wiley-Blackwell.
- Humphries, C., & Smith, A. C. T. (2014) Talking objects: Towards a post-social research framework for exploring object narratives. *Organization* 21(4): 477–494.
- Jackson, T. (2006) *The Earthscan reader in sustainable consumption*. London: Earthscan.
- Knappett, C. (2008) The neglected networks of material agency: Artefacts, pictures and texts. In: Knappett C and Malafouris L. (Eds.) *Material Agency: Towards a non-anthropocentric approach*. New York: Springer, 139–156.
- Knorr Cetina, K. (1997) Sociality with Objects: Social Relations in Postsocial Knowledge Societies. *Theory, Culture & Society* 14(4): 1–30.
- Kvale, S. (1996) *Interviews: An introduction to qualitative research interviewing*. Thousand Oaks: SAGE.
- Kärroman, E., Baky, A., Edström, M., Magnusson, Y., Malmqvist, P-A., Palm, O. & Rogstrand, G. (2005) *Systemstudie rörande insamling och behandling av lättnedbrytbart organiskt avfall i Malmö*. Stockholm: ecoloop.
- Lainer-Vos, D. (2013) Boundary Objects, Zones of Indeterminacy, and the Formation of Irish and Jewish Transnational Socio-Financial Networks. *Organization Studies* 34(4): 515–532.
- Latour, B. (1986) The Power of Association. In: Law J. (Eds.) *Power, action and belief: A new sociology of knowledge?* London: Routledge, 264–280.
- Latour, B. (1996) *Aramis or the love of technology*. Cambridge (MA): Harvard University Press.
- Latour, B. (2005) *Reassembling the social: An introduction to actor-network-theory*. Oxford: University Press .
- Law, J. & Mol, A. (2008) The actor-enacted: Cumbrian sheep in 2001. In: Knappett C and Malafouris L. (Eds.) *Material Agency: Towards a non-anthropocentric approach*. New York: Springer, 57–77.
- Leonardi, P. M. (2011) When flexible routines meet flexible technologies: affordance, constraint, and the imbrication of human and material agencies. *MIS Quarterly* 35(1): 147–167.
- Liebowitz, S. J. & Margolis, S. E. (1995) Path Dependence, lock-in, and history. *Journal of Law, Economics, & Organization* 11(1): 205–226.
- Lindberg, K. & Walter, L. (2013) Objects-in-use and organizing in action nets: a case of an infusion pump. *Journal of Management Inquiry* 22(2): 212–227.
- MacKenzie, D. A. (2006) *An engine, not a camera: How financial models shape markets*. Cambridge (MA): MIT Press.
- MacKenzie, D. A., Muniesa, F. & Siu, L. (2007) *Do economists make markets? On the performativity of economics*. Princeton: Princeton University Press.

- Mason, K., Kjellberg, H. & Hagberg, J. (2014) Exploring the performativity of marketing: Theories, practices and devices. *Journal of Marketing Management* 31(1-2): 1–15.
- Meijers, A. W. (2000) The relational ontology of technical artifacts. *Research in philosophy and technology* 20: 81–98.
- Mol, A. (2002) *The body multiple: Ontology in medical practice*. Durham (NC): Duke University Press.
- Muniesa, F. (2014) *The provoked economy: Economic reality and the performative turn*. London: Routledge.
- Passeron, J.-C. & Revel, J., (Eds.) (2005) *Penser par cas*. Paris. Éditions de l'École des hautes études en sciences sociales.
- Preda, A. (1999) The turn to things: Arguments for a sociological theory of things. *The Sociological Quarterly* 40(2): 347–366.
- Reijonen, S., & Tryggestad, K. (2012) The dynamic signification of product qualities: On the possibility of “greening” markets. *Consumption Markets and Culture* 15(2): 213–234.
- Rennstam, J. (2012) Object-control: A study of technologically dense knowledge work. *Organization Studies* 33(8): 1071–1090.
- Sandberg, J., & Dall’Alba, G. (2009) Returning to practice anew: A life-world perspective. *Organization Studies* 30(12): 1349–1368.
- Schreyögg, G. & Sydow, J. (2010) *The Hidden Dynamics of Path Dependence: Institutions and Organizations*. Houndmills, Basingstoke: Palgrave Macmillan.
- Silverman, D. (2011) *Interpreting qualitative data: A guide to the principles of qualitative research*. London: SAGE.
- Star, S. L. & Griesemer, J. R. (1989) Institutional ecology, ‘translations’ and boundary objects: Amateurs and professionals in Berkeley’s Museum of Vertebrate Zoology, 1907-39. *Social Studies of Science* 19(3): 387–420.
- Suchman, L. (2005) Affiliative Objects. *Organization* 12(3): 379–399.
- Suchman, L., Trigg, R. & Blomberg, J. (2002) Working artefacts: ethnomethods of the prototype. *The British Journal of Sociology* 53(2): 163–179.
- Swedish Environmental Protection Agency (2005) *A strategy for sustainable waste management: Sweden’s waste plan*. Stockholm: Naturvårdsverket.
- Swedish Environmental Protection Agency (2012). *From waste management to resource efficiency: Sweden’s Waste Plan 2012–2017*. Stockholm: Naturvårdsverket.
- Sysav (2014) *Annual report 2013*. Malmö: Sysav.

The European Parliament and the Council of the European Union. 2008/98/EC.
Directive 2008/98/EC of the European Parliament and the Council on waste
and repealing certain documents. *Official Journal of the European Union L 312/3*:
0003–0030.

Thévenot, L. (2002) Which road to follow? The moral complexity of an “equipped”
humanity. In: Law, J. & Mol, A. (Eds.) *Complexities: social studies of knowledge
practices*. Durham: Duke University Press, 53–87.

Unruh, G. C. (2000) Understanding carbon lock-in. *Energy Policy* 28(12): 817–830.