

# Hammarby Sjöstad and the rebundling of infrastructure systems in Stockholm

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## Introduction

Stockholm is at the vanguard of green urban policymaking on an international level, as shown by it winning the European Commission's first Green Capital of Europe award in 2010 and by the constant stream of global visitors the city attracts to its sites of 'sustainable urbanism'.<sup>1</sup> Infrastructure systems are central to this image and process, as underlined by the recent promotion of the 'SymbioCity' model (<http://www.symbiocity.org>), a trademarked joint government and business initiative branding "sustainability by Sweden", which drew inspiration in part from the role of Stockholm's socio-technical networks in "holistic and sustainable urban development".

This is a first draft of a more substantial and theoretically grounded paper currently being written which explores the complex and contested processes and practices involved in rebundling infrastructure systems in Stockholm, focusing on the well-known eco-district of Hammarby Sjöstad.<sup>2</sup> A number of stories and histories have been written about the ongoing development of Hammarby Sjöstad from various viewpoints, and it is not the intention here to provide a complete outline or overview of this project which can be found on the project website (<http://www.hammarbysjostad.se/>) and elsewhere (see, for example, Vestbro 2005; Bylund 2006; Pandis Iveroth and Brandt 2011; Svane et al. 2011). The focus here is on the 'environmental profiling' of the project and its enrolment of technologies, infrastructures and network-based services, not so much in some kind of identifiable (and measurable)

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<sup>1</sup> Including an average of 12 international study visits per week to the GlashusEtt information centre in Hammarby Sjöstad (Interview 2, August 2013).

<sup>2</sup> The paper draws mainly on research carried out for the ANR funded project 'Syracuse' which explores, in a broad industrial ecology approach, the extent to which "symbioses between urban services (energy, water, waste), based on emerging forms of socio-technical organization of these services which are susceptible to lead to alternative configurations to the inherited large centralized networks of the 20th century, may allow important progress to be made towards a more sober urban metabolism" (project summary).

‘sustainable’ urban planning, but more as emblematic of an ongoing politics of urban metabolism in which conflict and struggle over material and energy flows inherently shape the socio-ecological landscape and outcomes of urban development. I focus on the ‘closed loop’ objectives which became integral to this project (and influenced the SymbioCity initiative) and the plants, infrastructures and circulating energy and material flows which serve the area’s buildings and residents (e.g. figure 1). I look at the ‘official transcript’ of project development and aims in terms of environment and infrastructure (take 1), but move on to the actual performance and practices of infrastructure provision and use deviating somewhat from this transcript (take 2), and the wider, more recent (and ongoing) outcomes in terms of policy learning (take 3).

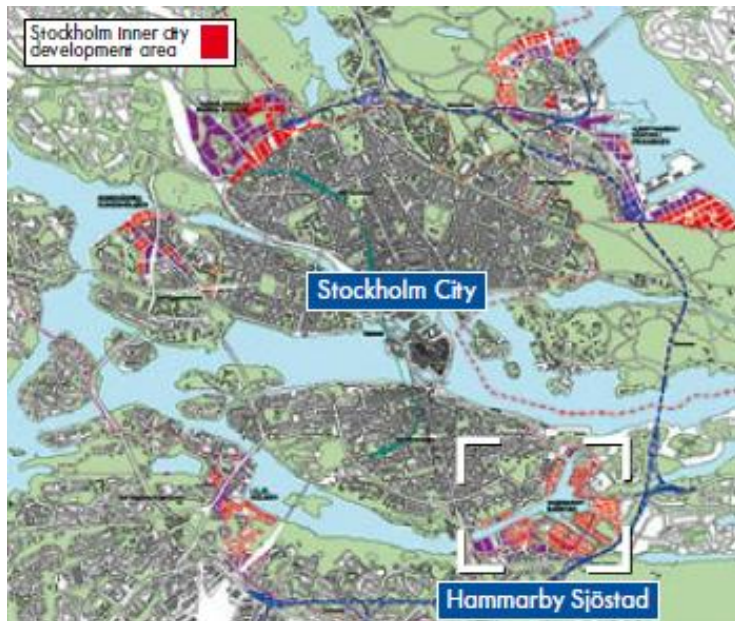
Indeed, more prosaically, through reading all the planning and promotional material on Hammarby Sjöstad and talking to City officials, one would think that the project was the very epitome of consensual sustainable urban development. But as Dick Urban Vestbro, a KTH planning professor and former City politician (Left party) during the making of the project, revealingly notes in a 2005 paper on the project’s conflicts: “Almost all the available documents on Hammarby Sjöstad fail to provide information about the political controversies in planning the area. The main explanation for this deficiency is probably the fact that these documents have been written by municipal civil servants who are afraid to write something that may offend either of the political blocs in the City. By ignoring the differences in perspectives the reasons for changes in policy become obscure” (Vestbro 2005, p.1). In short, foregrounding the politics of urban development is (also) the only way to focus on how urban change comes about (or not).

Figure 1: Mobilising symbioses in Stockholm: “your garbage, en route to becoming heat and electricity”



Source: <http://www.stockholm.se>

Figure 2: Hammarby Sjöstad and Stockholm



Source: (GlashusEtt and City of Stockholm Development Office n.d.)

### **Hammarby Sjöstad take 1: infrastructure systems and the creation of an exemplar eco-district**

The Hammarby Sjöstad project in Stockholm is the result of a failure. An urban regeneration initiative conceived in the early-mid 1990s as part of Stockholm's failed bid for the 2004 Olympics, it has transformed an old port and industrial area of around 180 hectares just to the south of the city centre (figure 2)<sup>3</sup> into a contemporary residential and work area which will host some 11,500 apartments<sup>4</sup> and 26,000 residents (Interview 2, August 2013) by 2018 when all areas in the district are due to be complete.<sup>5</sup> Had Stockholm won the Olympics, the site would have been the Olympic village and would have looked very different. Instead, over the last 10-15 years, it has become a cornerstone both in the municipality's plan during the 2000s to build 20,000 much-needed new apartments across the city and in the vision of creating an

<sup>3</sup> It was framed as "a natural extension of the city" (Hammarby Sjöstad website) in a period when urban planning policy in Stockholm was oriented by ideas of densification and 'building the city inwards'.

<sup>4</sup> Plus around 200,000 m<sup>2</sup> of office and commercial space (Tolf 2013).

<sup>5</sup> There are currently around 20,000 residents (GlashusEtt email). The last areas to be finished are Fredriksdal and Mårtensdal to the west around Hammerbyverket thermal power plant (<http://hs2020.se/>).

emblematic ‘sustainable’ urban district which would boost the visibility of Stockholm on the global stage.<sup>6</sup>

An Environmental Programme was created for the project because of the Olympics bid.<sup>7</sup> The Environmental Programme was constructed around the idea that the Hammarby project should be “twice as good” in terms of environmental impact as would be an equivalent urban planning project (or newly built house) in another part of the city at that time (the mid-1990s). “Twice as good” goals were set across the board for all sectors of the project, although only some quantitative indicators were mentioned (see box).

***Summary of environmental goals: “twice as good”***

Land usage: sanitary redevelopment, reuse and transformation of old brownfield sites into attractive residential areas with beautiful parks and green public spaces.

Energy: renewable fuels, biogas products and reuse of waste heat coupled with efficient energy consumption in buildings (maximum of 60 kWh/m<sup>2</sup>/year of supplied energy).

Water & sewage: as clean and efficient as possible - both input and output – with the aid of new technology for water saving (aim of 100 litres/person/day) and sewage treatment.

Waste: thoroughly sorted in practical systems, with material and energy recycling maximised wherever possible.

Transportation: fast, attractive public transport combined with car pools and beautiful cycle paths, in order to reduce private car usage.

Building materials: healthy, dry and environmentally sound.

Source: (Leifman 2009)

When work started in the mid-1990s, planners were able to build on the fact that the City of Stockholm owned the water, energy and waste companies which had been instructed by municipal politicians to work together with the planners on a district-level recycling model for

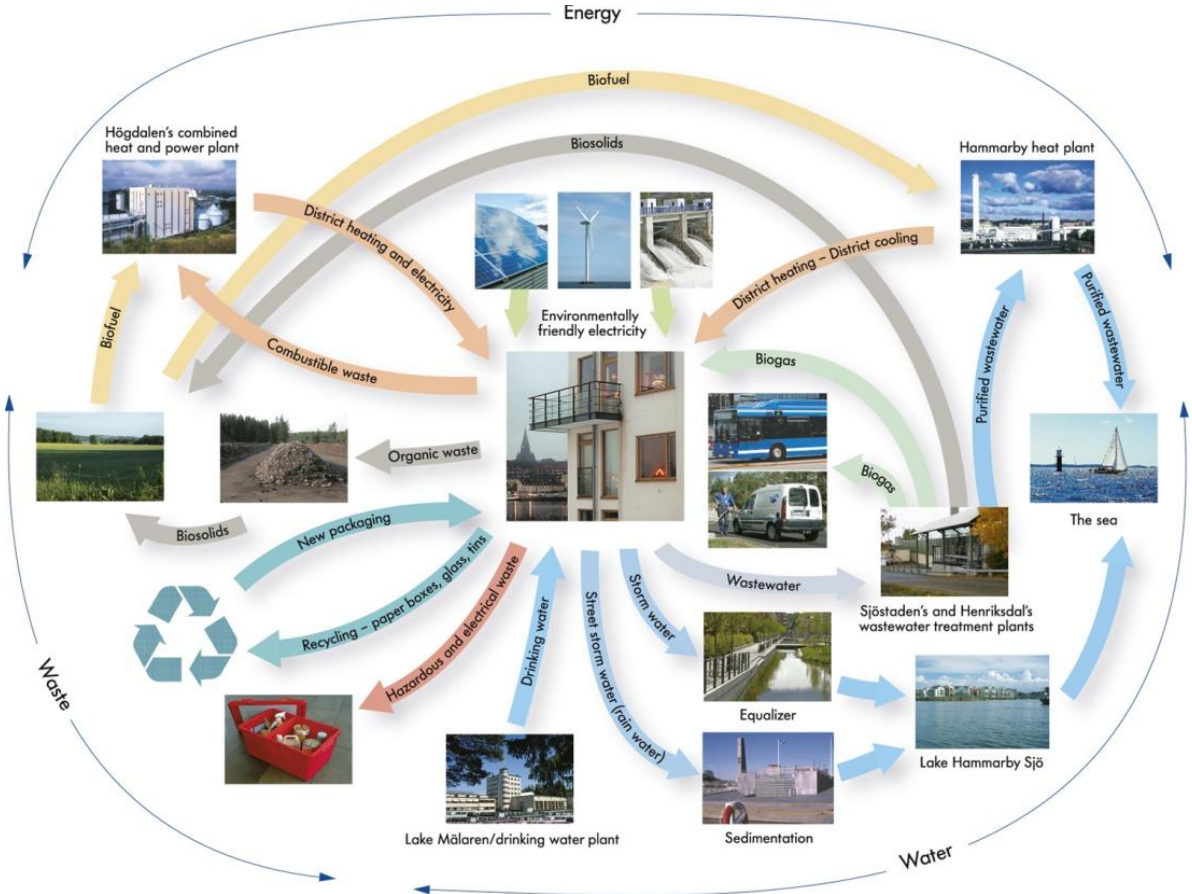
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<sup>6</sup> The Hammarby Sjöstad project undoubtedly benefited from the Swedish planning system which attributes a local planning and land use monopoly to municipalities, and from the Swedish tax system whereby local taxes are paid to municipalities. Both these points give great (political and economic) power to municipalities with regard to local planning strategy and investment capability and land use decision-making, and these have been cited by local actors as crucial elements in explaining the Hammarby process (Interviews 2 and 6, August 2013). Most of the land (around 90%) in Hammarby Sjöstad was owned by the City and for the remaining privately owned land (Lugnet and Sickla Udde) the City made agreements that owners would get land elsewhere in the city (Interview 2, August 2013) or ‘expropriated’ and paid compensation well above market rates to save time (Vestbro 2005, p.3).

<sup>7</sup> “The only reason they made the HS EP was because Sydney, one of the reasons they got it in 2000 was their EP, so Stockholm said they should make the EP bigger to win, but they didn’t” (Interview 2, August 2013).

the whole project.<sup>8</sup> One of the cornerstones of the project came to be therefore the creation of a recycling model based upon ‘systems integration’ (Pandis Iveroth et al. 2013b) and tailored localized infrastructural configuration for all housing developments (see figure 3). The resulting Hammarby model was therefore an important part of the Environmental Programme from the start “to show the cycles and how everything is connected”, but “a model building on what was already there” (Interview 2, August 2013) combined with new technologies and innovative system solutions.

Figure 3: The Hammarby model (final iteration)



Source: Lena Wettrén, Bumling AB

The model translated on the ground into a number of proposed ‘green technologies’ shown on a Hammarby Sjöstad environmental map (see table 1). This alternative technological system vision appeared to echo modernist rationales of infrastructure as harbinger of progress and emancipatory futures, but it instilled three (linked) major differences. First, its circular

<sup>8</sup> This ownership and control of utility companies was seen by some practitioners as crucial to the idea of constructing a recycling model: “I don’t think it would have been possible today, when we only still have one of them, and the other two are more or less private” (Hammarby Sjöstad planner interview, 2005).



economy and objectives of re-use and sobriety contrast with the traditional infrastructure model of linear flows (resource – use – waste) and ever increasing consumption and growth. Second, it is developed on (or at least gives an impression of being developed on) a much smaller, decentralized, geographical scale (working between that of the building and of the district) than modernist large centralized technical systems. Third, it rests on a much more systemic, inter-sectoral approach with the aim of promoting joined-up solutions for water, wastewater, waste and energy (involving the Stockholm Water Company, waste companies, and energy providers Fortum and Fortum Värme together).

Table 1: ‘Green technologies’ (to be) deployed within Hammarby Sjöstad

<b>WATER</b>	<b>WASTE</b> (see annex 1)	<b>ENERGY</b>
Prepared soil for filtration of storm water from streets	Envac automatic collection system by pneumatic tube infrastructure	Solar cells on GlashusEtt and other buildings
Storm water basin with wetland for storm water from streets	Collection centre for the stationary pneumatic waste disposal system	Solar panels on buildings to heat tap water
Storm water basin with filtration	Docking points where the refuse collection lorry connects to the pneumatic waste disposal unit	Fuel cell in GlashusEtt
Channel for storm water from buildings and gardens only	Collection point for hazardous waste	Biogas cookers in approx. 1,000 apartments
Green roofs and yards collect storm water locally		Passive houses
Sjöstadverket experimental wastewater treatment plant		Geothermal heat for one housing block
Henriksdal wastewater treatment plant		Fortum’s thermal power plant supplying district heating and district cooling from treated wastewater and biofuels
Pumpstation for wastewater		
Nutrient recovery through urine separation techniques		

Source: compiled from Hammarby Sjöstad environmental map (and other sources)

Monitoring of the gradual deployment of the Hammarby model throughout the district was to be required, and in particular, “Follow-up and evaluation can be done by measuring and recording of resource consumption for water, heat and electricity” (Hammarby Sjöstad project website, 2005). Mention was even made of an “individual measuring system for each apartment” (Watergy Hammarby project summary, 2005). The technologies and service systems put in place in Hammarby Sjöstad were clearly meant to deliver more sober resource consumption and thus contribute to the promotion of ‘sustainable’ lifestyles and a visibly ecological urban district.

Yet, whereas other local eco-projects have been more about developing a specific energy or environmental policy and solution for the whole locality, what importantly distinguishes Hammarby is its utility and (political) justification as a local ‘showcase’ for Stockholm (and Sweden) as a whole (Interview 6, August 2013). Contrary to popular belief (and many press articles), the politicians never had a vision at the time of creating Hammarby as an autonomous bit of the city (Interview 6, August 2013).

### **Hammarby Sjöstad take 2: practice, ‘ordinary’ performance and ‘extraordinary’ performativity?**

And yet, Hammarby Sjöstad is neither nothing new nor nothing particularly exceptional in itself.

There is not, never was, and never was planned to be, a closed loop at the Hammarby Sjöstad scale. The technical and functional boundaries of the district are thus extremely porous. Each iteration of the Hammarby model shows the central role of important components of the (proposed) urban metabolism of the district which are externally located (Pandis Iveroth et al. 2013b). In the final iteration (figure 3), the agricultural land on the left, Högdalen’s combined heat and power plant, the drinking water plants near Lake Mälaren<sup>9</sup>, environmentally friendly electricity production<sup>10</sup> and the sea are essential extra-local components without which

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<sup>9</sup> Water production takes place at Norsberg (60% of production for Stockholm) and Lovö (40% of production for Stockholm) drinking water plants close to Lake Malaren where the water is taken from (Myllymaa 2002).

<sup>10</sup> Electricity is produced, transported, distributed and sold based on the Nord Pool system, so it is impossible to trace the origin of electricity consumed in Stockholm in the Nordic countries (or further afield as Vattenfall have activities in Germany and Poland).

Hammarby's circular metabolic system would not function. In a recent paper, Pandis Iveroth et al conclude that the Hammarby model and its integrated infrastructural system has allowed some reduction in metabolic flow quantities, but that in terms of energy flows, more could be done and Hammarby Sjöstad is a long way from self-sufficiency because of the lack of local renewable energy production and limited success in reducing energy consumption of households in the district (Pandis Iveroth et al. 2013a). This is perhaps an obvious point that the district does not and could not function as a local closed loop, but one that bears mentioning given recent attention on mythical autonomous (or even autarkic) communities and spaces. "Hammarby was never meant to be an independent eco-city. When we were working with the planning, we didn't discuss a thing like eco-city. This sort of definition is given to us from outside" (Interview 6, August 2013).

Furthermore, the project was based to a very large extent on existing infrastructures, and to some extent on infrastructure systems or sectors which were already integrated (or at least talking to one another). This point has been emphasized by Pandis Iveroth et al who argue that "Because of widespread environmental awareness and the energy crisis of the early 1970s, the city of Stockholm had been undertaking various environmental measures to ensure the sustainability of its activities for decades. This was reflected in the technologies and infrastructure already in place in the southern parts of Stockholm prior to the development of the Hammarby Model and urban planning for Hammarby Sjöstad" (Pandis Iveroth et al. 2013b, p.224). They cite: the Högdalen combined heat and power plant which has been incinerating waste for heat production since around 1970; Hammarbyverket thermal power plant which opened in 1986 and has been connected to Högdalen since 1991 and to the central network of Fortum's district heating system (and its Värtaverket plant) for 3 or 4 years now<sup>11</sup>; Henriksdal wastewater treatment plant which has been operating since the 1940s<sup>12</sup> and which was sending treated wastewater to the Hammarby thermal power plant for heat production before the redevelopment project as well.<sup>13</sup>

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<sup>11</sup> The Fortum district heating system is calculated to run on a hierarchy of base load, mid load and peak load plants in which Hammarbyverket operates (only) as a mid load facility (base load plants for the central-south network are Värtaverket, which is still part run on coal, and Högdalenverket CHP plants). This means that it is high on impossible to distinguish which plant serves which part of Stockholm when (i.e. to follow exactly where the water molecules go) (Interview 4, August 2013).

<sup>12</sup> Around two thirds of Stockholm households were connected to Henriksdal plant around 2002 and a third to the Bromma treatment plant (Myllymaa 2002).

<sup>13</sup> The whole of the treated wastewater flow from Henriksdal is now sent to Hammarbyverket, where heat pumps recover heat for the district heating network (Email following Interview 2, August 2013).



And then the new ‘green technologies’ which were integrated into this existing infrastructure system (table 1) have also produced mixed results. Some work (stormwater channeling and treatment, the automatic waste collection system most of the time<sup>14</sup>), some do not (solar installations<sup>15</sup>, the fuel cell demonstrator) and some were never made fully operational (notably the Sjöstadsverket experimental wastewater treatment plant next to Henriksdal was downsized, as were the planned techniques for urine separation<sup>16</sup>). As a local official readily admitted: “All the big infrastructure and plants were already built. And the techniques for heating, water and sewage, that has been traditional, they aren’t new. The only new thing here for water is to take care of the stormwater locally” (Interview 2, August 2013). Little wonder then that one of the architects of the project suggests that “The recipe is quite simple...” (Interview 6, August 2013).

Infrastructure practices and behaviours have also not been significantly altered or made more sober. ‘Sustainability’ in Hammarby Sjöstad has been viewed as the outcome of innovative technical system deployment and residential behaviour. Indeed, according to local officials, 75% of this ‘sustainability’ comes from the urban infrastructure and 25% from the contribution of residents (Interview 2, August 2013) in a very particular form of socio-technical configuration.<sup>17</sup> Both local officials and City planners mention a figure of 30-40% for achieved reductions in environmental impact since the beginning of the project (i.e. not ‘twice as good’ but not that far off either) (Freudenthal 2010; Skillbäck 2010), but this figure (from a consultant report) is greatly contested (see below). The 60 kWh/m<sup>2</sup>/year objective for energy consumption in apartments was finally abandoned in 2007 and increased to 100 kWh because it was realized that 60 kWh was much too ambitious.<sup>18</sup> The 100 litres/resident/day for

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<sup>14</sup> But see annex 1.

<sup>15</sup> The total installed solar capacity is, in any case, extremely small at 55 kW, which pales in comparison with the far larger production facilities for heat or cogeneration. Part of the problem is the lack of a feed-in regulation in Sweden which currently stops small-scale decentralized energy systems from selling their production to the grid (Interviews 2 and 7, August 2013).

<sup>16</sup> Vestbro argues that this was a direct decision of the conservative right-wing majority because of its impact on urban form: “Another decision of the blue parties was to abandon the planned experiments with urine separation. Such facilities were favoured by the red-green majority on the grounds that valuable nutrients could be recovered and that wastewater treatment would be less harmful. Abandoning experiments with urine separation in multi-family housing meant that local access roads could be made more modest since they did not have to accommodate trucks emptying the urine tanks” (Vestbro 2005, p.8).

<sup>17</sup> “This is sort of an estimate, but I was looking through all the goals in the EP... Garbage, heating, water is residents’ behaviour... Because if you look at the EP that was taken by the politicians in the 90s, some of these targets were not measurable. I can’t give an example now, because we looked through these in 2006-2007 and took them away completely. And after that then I started to calculate how many are the people living here and how many are the buildings and infrastructure.” (Interview 2, August 2013).

<sup>18</sup> “At that time (mid 90s) that was very tricky... it’s like you set the bar for the high jump at 5 metres. So that has changed, and it’s now 100 kWh/m<sup>2</sup>, since 2007...” (Interview 2, August 2013). This decision has led to a slightly

water use has not been achieved either. As Vestbro noted in 2005: “It was implicitly assumed that by providing Hammarby Sjöstad with the best facilities for energy saving, waste separation, public transport and an environment information centre, the inhabitants’ behaviour would adapt to less consumerist lifestyles. Such an assumption cannot be made, however” (Vestbro 2005, p.9). Indeed, surveys of some of the first residents to move in to Hammarby Sjöstad illustrated that people appreciated the nice surroundings but were not prepared to make sacrifices to live there.<sup>19</sup> On this point, both Vestbro and local officials cite the resistance of residents (during 2-3 hour meetings in the evening in the environmental information centre building: Interview 2, August 2013) to moves to reduce the number of parking spaces in the district. Vestbro also questions the ‘high environmental standards’ that could possibly have been expected given the district’s large apartments with ‘oversized windows’ and multiple balconies, and the architects’ overall neo-modernist fascination with glass, steel and other metals which are energy intensive in production (Vestbro 2005, p.9).<sup>20</sup>

These observations about environmental impact and consumption practices are further nuanced by the relative lack of follow-up and measuring of the Environmental Programme and the deployment of the Hammarby model that has actually been carried out over the last 15 years. This was one of the principal critiques made by KTH researchers in the evaluation

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perverse situation where, instead of leading the way, the energy goal for the Hammarby Sjöstad project is actually now 10 kWh more than the Swedish national goal for new build (90 kWh/m<sup>2</sup>): “The reason is that this program is static while the goal for Sweden is evaluated from time to time” (Email following Interview 2, August 2013).

<sup>19</sup> “People moved to Hammarby Sjöstad not because of its environmental qualities, but because they wanted a house in an attractive area, close to the city centre and still with access to green spaces and pleasant views of an interesting water landscape” (Vestbro 2005, p.9).

<sup>20</sup> Project planners and officials failed therefore to understand the socio-technical complex of the infrastructure systems being deployed: that, for example, the aim of limiting energy consumption in apartments to a maximum of 60 kWh/m<sup>2</sup>/year required a series of technical choices (around type of insulation, quadruple-glazed windows, recycling of heat...), but is also obviously dependent on choices made by each resident around the indoor temperature setting, level of hot water consumption, use of domestic appliances, etc (as noted by KTH’s evaluation: Pandis and Brandt 2009). Following social practice theory and the work of Elizabeth Shove in particular, Hammarby residential practices here are inherently an assemblage of objects, skills and social meaning: they work through the engagement of residents with heating meters/thermostats, hot water tanks and all manner of electrical appliances; they rely on people’s ability to programme these devices to find the ‘right’ settings; they have a wider significance in the sense that individual heating choices influence supply side provision (the amount of heat provided through the network) and contribute to different degrees to the collective heating of apartment buildings (neighbours help to heat each other), but also that each energy practice works towards or constrains (in the case of ‘excessive’ use) the collective consumption goal in the Hammarby project of an average of 60 kWh/m<sup>2</sup>/year. We can also mention the amount of (free) labour that residents are expected to provide in engaging with infrastructure systems, e.g. in sorting their waste into the correct fractions and disposing of it correctly. Individual disposal and recycling behaviour is explicitly mentioned as contributing to the ecological status of the district which is one of the reasons for the location of waste inlets for the automatic waste system in front of residential buildings, where people can witness other people performing their green duty, which “provides a social check on how the system is used” (Interview 3, August 2013).

exercise of Hammarby Sjöstad they were asked to perform in 2008 by the City of Stockholm's executive office.

The Environmental Load Profile method on which practitioners had placed a lot of faith in its capacity to monitor accurately the performance of the district proved to be less than adequate. The 30-40% reductions mentioned above and used by the City to show reasonable performance (if not quite 'twice as good') derive from a report by Danish consultants Grontmij AB (2008). The graphs in this report appear to show effective reduced environmental impact, albeit for only four areas of the district. However, a number of limitations can be mentioned: data was obtained from the developers themselves so there is little means of independent verification; the reference level against which performance is compared is from "the technology level current in the early 1990s" whereas the district's buildings studied were developed much later; finally, and most importantly, the report refers to "the source data for calculating heating, electricity and water usage, and certain information regarding technical solutions employed in the buildings" which is vague and unclear about whether the figures for energy and water usage are actual figures of consumption from residents after the buildings were completed and occupied (but for when?), or 'calculations' anticipating what this usage could or should be. On this last point, responses to interviews carried out in August 2013 seemed to confirm that the data used in the report was a mix from different times and from different stages of construction and contains a heavy component of 'theoretical' projection rather than actual consumption measures.<sup>21</sup> In any case, the purported individual metering in apartments never materialized (various interviews, August 2013).

The evaluation report carried out by KTH researchers (Pandis and Brandt 2009; see also Pandis Iveroth and Brandt 2011) observes the general success of the Environmental Programme and its holistic, integrated approach in generating broad capacity and interest and in raising the profile of the project on a local, national and international scale. But it also makes a number of critiques of the Hammarby Sjöstad process:

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<sup>21</sup> "What happened was that the people working with the ELP, they were only focusing on the vision twice as good. And when they started gathering data, what was the problem? That the projects they were looking at, the different constructions, buildings, they were in different phases: some of them were not even initiated, some of them were already there, and... the construction companies, depending on where in the time phase they were, they had different kinds of data to give to the people collecting data. And they didn't have time to wait, so they gathered different kinds of data, mostly theoretical data based on projections..." (Interview 8, August 2013).

- The environmental program came late in the planning process, which resulted in contradictions between different goals in the project. This resulted in difficulties in the implementation of the environmental program.
- Also the technical systems in Hammarby Sjöstad were not sufficient in fulfilling all the operational goals, as the residents in the urban district by themselves affect consumption of energy, choice of transportation and material flows.
- The strengths of the vision are also its weaknesses. As a result of the holistic view, system based technical solutions were prioritized, but at the same time were not easy to join up system technologies with new environmental technology; such as solar cells, sun panels, fuel cells and other new technology.
- Some operational goals were unrealistic and some were not deeply rooted by all stakeholders.
- The governing of the City of Stockholm was not clearly manifested in the implementation of the environmental program; the goals of the environmental program were not clearly stated in written agreements between the City of Stockholm and the building contractors.
- Follow-up of the operational goals has shown a lack of systematic gathering of data and results, in relation to operational goals. It is also evident that there was nothing written in the environmental program of Hammarby Sjöstad from 1996, stating how the program was supposed to be followed-up, and the responsibility for that.

So it is difficult to evaluate how close to “twice as good” the project has actually come (all the more so given that it is not completed). But this may not greatly matter: interviews conducted in August 2013 made a distinction between ‘vision’ and ‘targets’ and highlighted that the “twice as good” objective was (is) in practice<sup>22</sup> merely the vision initiated at the demand of or for the attention of politicians to make it “quick and easy to understand”. Meanwhile the actual targets “were based on what the technicians within the Stockholm Vatten treatment plant, Fortum or Stockholm Energi as it was then, thought was possible. Sometimes it was close to twice as good, but... But what was twice as good... because often you didn’t even

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<sup>22</sup> This is highlighted by the fact that while the ‘twice as good’ goals were inserted into contracts with developers and architects in Hammarby Sjöstad, there was no legal requirement for the ‘goals’ to be achieved (or even attempted): “Er, it does not really happen like that. If they don’t follow it they can’t be fined and so on, but nevertheless it’s up to the developer to really follow it, because if they don’t the City can come back to them and say ‘how do we know you’re going to follow it next time?’” (Interview 2, August 2013).

know where the standard was at the moment, so... how to compare twice as good, twice as good compared to what?" (Interview 8, August 2013).

So in some way the green image of Hammarby Sjöstad circulates internationally almost by itself without any particular exceptional justification in terms of actual environmental performance, while many local actors are happy to sustain the image even though they are fully conscious of the functional limits of the project.

It is, however, also important to focus a little on what has been achieved through the project and process. With their expertise and experience from the outset of the development, local officials mentioned two things in particular.

First, there have been 'new' ways of working or doing, involving partnerships and collaborations between different (public and private) stakeholders. The water, waste and energy actors did work together to produce the Hammarby Model and they did try to put in place or to sustain existing pragmatic solutions for interlinking their respective infrastructures and flows. Furthermore, the City of Stockholm did manage to impose things on the developers:

"Unfortunately the Environmental Programme was not set right from the beginning when they began to build. It came in later. So some of the blocks of flats, the land had been sold to the developer, and then they started to build, and then they found out about this EP. And they said at first that they couldn't do it because there was stipulation for instance that there should be no copper tubes and PVC tubes for tap water; energy class A for machines; insulation of buildings; etc. So they said we can't do this, and it's going to be 25-30% more expensive. And the City planning dept said to them 'if you don't want to build here, we go somewhere else because we have to build it like this because it's in the Olympics application'. But they did do it. And now when they have built for many years, we have seen that it didn't cost 25-30% more. It's only 2-4% more for the whole EP" (Interview 2, August 2013).

Another interviewee mentioned that the construction company Skanska had said that it cost them 5% more to insert all the design measures (linked to the Environmental Programme), but that they then sold their buildings for 15% more (Interview 6, August 2013).

Second, while the initiation of an ambitious Environmental Programme for the project appears to have benefited from the presence of a left-green majority in Stockholm of the mid 1990s,

the fact that it was not abandoned by the subsequent right-wing majority (1998-2002) shows that it developed bipartisan support or could be aligned to quite different political goals and frameworks. Vestbro (2005, p.7) argues that the conservatives accepted the programme because of the involvement of major private developers in building Hammarby Sjöstad. Local officials are proud of how the project has managed to create and sustain bipartisan political will: “Even though the local government has changed, before it was every 4 years... but no-one changed it, because every one of the political parties decided that this was going to be the EP... The only thing that happens when it changed was whether they sold the land (right) or long leased the land (left)” (Interview 2, August 2013).

At the end of the day, even some of the people long involved in the Hammarby project offer a quite modest appraisal of what has been achieved in strictly local terms: “What is more impressive that we have such a big use of those infrastructure systems all over Sweden. That Hammarby is doing fine, but it is a showcase, an example, a good example, and then we can explain about the rest. It’s much more impressive that 80% of the energy use in Sweden is renewable than Hammarby’s doing fine. But we have to bring people there, to explain something that is more complicated and more important. And Hammarby is a little bit better. But I’m living in a building from the 1950s, and we have district heating, fibre into the building, 90 kWh or something per year, original double-framed windows, no extra insulation...” (Interview 6, August 2013).

### **Hammarby Sjöstad take 3: learning, policy transfer and Hammarby – the sequel**

“Hammarby Sjöstad was in many ways a forerunner in sustainable urban development; as such, its design is based on the ideas, knowledge, and technology of the 1990s. In contrast, Stockholm Royal Seaport is a much newer ‘eco-profiled’ city district in Stockholm” (Carlsson-Mård 2013, p.259).

As the above quote suggests, Hammarby Sjöstad belongs to the past, before it has even been completed. Planning and political attention (and resources) have moved on elsewhere. Its main role now is, in many respects, in policy learning and transfer of experience to the latest urban sustainability showcase or ‘demonstration project’ (Carlsson-Mård 2013, p.266). But what has been learned and what can be transferred? And what happens now in Hammarby Sjöstad to sustain sustainability?

According to some viewpoints, there appears to have been a lack of learning, or even willingness to set in place some kind of framework for promoting learning, through the project. It is frustrating and curious to say the least to find a project with explicit ‘goals’ or an overarching ‘vision’ for developing something which can be said to be “twice as good” as other comparable initiatives, only to find that no systematic monitoring or measuring process has been introduced to allow the practitioners and politicians to state the extent to which they have effectively achieved the objective.

Figure 4: Environmental measures in the new Royal Seaport project



Source: (City of Stockholm 2012a)

The new focus for the City’s sustainability attention (and that of the world) is the Norra Djurgårdsstaden (Royal Seaport) project to the north east of the city centre. This ‘Hammarby 2.0’ development for 10,000 new homes is in the process of construction with an overall aim for climate neutrality (‘fossil fuel free’) in 2030 (two decades in advance of the City’s same goal for the whole of Stockholm). The links between the two projects are explicitly stated by the municipality: “Stockholm Royal Seaport benefits from the environmental experiences drawn from the Hammarby Sjöstad city district. This area of Stockholm includes well-developed public transport links and advanced waste management and recycling options, implying a lifestyle change focusing on sustainability”.<sup>23</sup> The new project also has its own environmental programme (figure 4). But a few interviewees questioned in August 2013 the

<sup>23</sup> <http://bygg.stockholm.se/Alla-projekt/norra-djurgardsstaden/In-English/Stockholm-Royal-Seaport/>



extent to which the lessons from the Hammarby process had been effectively learned by those now planning the Royal Seaport, and whether some of the mistakes were not in danger of being reproduced...

Meanwhile, back in Hammarby 1.0, one recent initiative is seeing local citizens replacing the planners in a concerted effort to sustain sustainability when municipal attention and resources have moved on.

HS2020 is a local citizens' initiative offering "an innovation platform developing visions, ideas and concepts" in association with researchers, companies and public actors for how Hammarby Sjöstad might/should look like in 2020, when the district is fully built and the City's sustainable urban planning policy has moved on elsewhere in the city.<sup>24</sup> As the head of the HS2020 initiative summarises: "it's built on the concept that if you have an attractive town like this you should add new elements to it and not just let it go down. We talk about a living lab for the best ideas, bringing it to the next level of sustainable development" (Interview 7, August 2013). This sees the completion of the district as "a new starting point not an endpoint" for innovation and learning (<http://hs2020.se/>). "But when this is done, you can't stop and you have to take it to the next level and then the City is not the good way to do this, not the centralized planning, you need to have citizens involved in doing things... So a combination of strong City planning (building a new city) and citizens' initiatives (renewing a new city)..." (Interview 7, August 2013).

The initiative has outlined ideas and aims in eight areas including energy efficiency to bring residential annual energy use to below 100 kWh/m<sup>2</sup> (which the City has been unable to do) (Interview 7, August 2013).<sup>25</sup> They aim to do this by inviting 3 companies to compete on writing contracts for bringing consumption down beneath 100, and by building up energy competence within housing coops: "so in every board we're trying to get them to appoint one responsible for energy who should be as much focused on energy as about interest rates. And there is no one doing this today, or in most cases not..." (Interview 7, August 2013). HS2020

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<sup>24</sup> "Lots of people come to see what we thought about Stockholm in the 90s. But where will they go in 2020, and if they are going to come here then we must have new ideas" (Interview 7, August 2013).

<sup>25</sup> HS2020 has produced a report of a study of around 100 residential buildings in the district to look at energy performance: "So we know what mistakes they made when they built it, from the drawing board to the construction when they didn't follow the drawings, and what has been lacking in the management of the system" (Interview 7, August 2013). The findings showed performance varying between 55 and 185 kWh per m<sup>2</sup> with an average of 117 kWh/m<sup>2</sup>, highlighting the very diverse quality of buildings. HS2020 has therefore developed an objective to work towards an average performance of under 100 kWh/m<sup>2</sup>. This study has, however, been contested by KTH researchers for its reliance on performance data from a variety of different consultant firms which used different methods.

has 39 of the 55 housing coops in Hammarby as members so it has some influence and “a strong representation for the people living here and their interests” (Interview 7, August 2013).

So while the next stage of sustainable urban development for the City of Stockholm is a new project in another part of the city, local people in Hammarby Sjöstad are confident that their district can also constitute the next stage. Both are attempting to learn from the process of the last 15 years, but the objectives and outcomes may not be the same.

### **Conclusion: (towards) a green city or bourgeois urban metabolism?**

Hammarby Sjöstad is not and never was an exceptional space. It is a space of quite ordinary metabolic flows which constantly perforate the boundaries (in and out) of the district, of pre-existing infrastructure systems (and underperforming infrastructure innovations), and of (as far as we can see) practices of water and energy use and waste production which are barely distinctive from those of average Stockholm residents elsewhere in the city. The extraordinary aspect of the project is how a small group of local actors have been able to ‘market’ the district around the world based almost solely on environmental discourse and very little in the way of measurable results. As such, the project reveals more about the contested (and contestable) governance and politics of urban metabolisms (who does what, why, how, according to what rules...) than it does about the technical, optimal circulation of material and energy flows around a supposedly ‘sustainable’ city.

Furthermore, it is clear that any analysis of Hammarby Sjöstad’s metabolic flows and exchanges has to take into consideration the logics and processes of the wider political economy of urban development in the city, including the control, ownership and governance of land and infrastructure. The connections between the Environmental Programme, the rebundling of infrastructure systems and decisions about land use and property merit further clarification. From some perspectives (including within the municipality<sup>26</sup>), the Hammarby project constitutes a clear case of (at least partial) gentrification with the selling off of public

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<sup>26</sup> The ‘social integration’ department of the municipality was extremely critical of the progressive reorientation of the project away from the 50% provision of rental housing by municipal housing companies that had been outlined at the beginning of the project (City of Stockholm social integration department, interview, 2005).

land to developers and then to relatively wealthy households.<sup>27</sup> The amount of publically owned, leasehold housing has persistently been reduced in the face of a push towards privately owned properties. These kinds of logics must have inevitable, but uncertain, consequences on material and energy flows. The fact that the City imposed environmental measures on developers who pushed their prices up so that only wealthier households can now afford to buy an apartment in the district resembles a form of ‘bourgeois environmentalism’. What kinds of ecological urbanism or a ‘right to urban metabolism’ are being promoted here?

And then we have all the questions about privatization and commercialization of infrastructure and network services (see Rutherford 2008) and how this impacts on urban metabolism. The evolving business model of Fortum, based in recent years on extracting value from Stockholm households for Finnish shareholders through rising prices, cannot surely be dissociated from the technicalities of district heating provision in the city (its use of particular plants as base, medium and peak loads, its links with neighbouring heat companies...). The HS2020 group has mentioned the possibility of disconnection from the heat network and the installation of heat pumps for some properties in Hammarby Sjöstad if certain conditions about price and ecological quality of Fortum’s heat are not met (Interview 7, August 2013). Any widespread shift from district heating to decentralized heating systems would have serious repercussions on energy flows in the city.

Hammarby cannot then be delinked in any technically or politically metabolic sense from the wider Stockholm context. Land use, infrastructure provision, service consumption and the urban outcomes, winners and losers of these combined processes cannot be disarticulated on a local level in any meaningful way. Hammarby may or may not be more sustainable than anywhere else, but this means nothing without continued monitoring and analysis of the highly politicized struggles over urban development in Stockholm as a whole, of which contested material and energy flow configurations are one, relevant and emblematic, component.

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<sup>27</sup> “At the beginning it was modest, but now the prices have gone up. So the people living there have made a good business out of it” (Interview 7, August 2013).

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## **Annex 1: The waste management system in Hammarby Sjöstad**

The municipality decided that they wanted to have an automatic waste collection system in Hammarby Sjöstad with separation into fractions at source, and so a local bylaw was passed stating that developers had to connect apartment blocks to the system at their own cost (Interview 3, August 2013). It mandated the company Envac to deploy its vacuum tube system throughout the district for the collection of three fractions of waste (organic, paper, rest waste/garbage). The system sucks these fractions from inlet points located around the district through an underground pipe system to three collection stations/terminals (2 stationary terminals and 1 mobile collection point with trucks) situated at the edge of the district. The municipality provided the necessary initial investment for the collection terminals. After building the system Envac<sup>28</sup> sold the inlet points to the developers of each apartment building (who in turn sold them to the people who bought the apartments). So while the municipality owns the pipe system and terminals, the running of the service is the responsibility of the *samfälligheter* tenant owner associations (coops) of each apartment building which have joined together to form an association for utilities such as garbage collection. This association is then in charge of running the system and terminals, but this is contracted out to Envac. As responsibility for waste management lies with the municipality, it decides how much households pay for the service through bills to the tenant owner associations.<sup>29</sup>

This fragmented system of responsibility of individual coops for bits of the system has been contested by some, but it comes up against political ideology: “Each part owns it and is responsible for the system, so individual coops is not the best way to do this, so we try and change that... We haven’t been able to get Stockholm to... Letters sent to the mayor, so it’s on the highest level that it’s blocked as they don’t want to socialize, municipalize it...” (Interview 7, August 2013).<sup>30</sup>

At the collection stations, the municipality picks up the responsibility for processing the waste. So from here, organic waste goes for biocompost and biogas generation through

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<sup>28</sup> Envac is thus only the supplier of the automatic waste collection system and has no other responsibility other than ensuring that this system is functioning (because the neighbourhood association has contracted this to Envac).

<sup>29</sup> The municipality offers a small rebate to households connected to the automatic waste system (Interview 3, August 2013). The Envac system is only used by households, so offices, restaurants and shops must (legally) make their own waste collection arrangements (Interview 2013, August 2013).

<sup>30</sup> “Today it is communities who manage this infrastructure, but more and more people want to bring about a municipalization of the system to get a more powerful and coordinated management of the business” (<http://hs2020.se/>).

composting (provided the quality of the waste is suitable<sup>31</sup>), the paper goes to paper mills for recycling, and the rest waste is sent by truck for incineration and waste-to-energy production at Fortum's Högdalenverket plant to the south of Stockholm.<sup>32</sup>

Other fractions (bulk waste, packaging/plastic, glass) are collected from containers placed either in apartment block basements or in the streets by the respective City contractors (FTI AB: Interview 10, August 2013) who then transport their waste stream for recycling.

Over the last 15 years, a mixture of European Union directives and Swedish environmental regulations have transformed the waste management sector in Stockholm. The Swedish Environmental Code (1998:808) and Waste Act/Ordinance (2001:1063) banned combustible waste from landfills from January 1 2002, leading to 100% incineration for energy recovery. Since January 1 2005, there has also been a ban on disposing organic solid waste by landfill, which means food wastes from restaurants and institutional catering establishments are encouraged to be treated by biological methods. A tax on waste incineration was introduced in 2006. Together, this has led to a major reduction in the percentage of waste being sent to landfill from almost 25% in 1999 to around 1% in 2010 (while the quantity of waste is still on the rise: in Stockholm from 3.7 million tons in 1999 to 4.4 million tons in 2010). At the same time, there is a clear division of labour between municipalities and producer responsibility for taking charge of waste management (figure 5). In effect, producers of food packaging, glass, newspapers, etc are responsible for taking care of their waste fractions after household consumption.<sup>33</sup> Producers of packaging and newspapers created five material companies which cooperate under the name FTI AB (The Packaging and Newspaper Collection Service), with all operations managed on a non-profit basis: "Part of the financing may come from FTI

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<sup>31</sup> There have been constant problems with ensuring the 'quality' of organic waste collected as biogas production requires a very particular, 'pure' organic waste. Locks have even been placed on organic waste inlets in Hammarby Sjöstad at the demand of the City to stop residents putting non-organic waste in by mistake (Interview 3, August 2013). In fact, the City mentions that they had problems for a few years selling it as organic waste "so it ended up being burnt in Högdalen although all the efforts made by all the hh and the different tubes etc..." (Interview 10, August 2013).

<sup>32</sup> 90-95% of the waste incinerated at Högdalen is from the Stockholm region (email following Interview 4, August 2013), of which around 40% is from the city (email following Interview 10, August 2013). The City of Stockholm actually pays Fortum for the waste they take care of at Högdalenverket: "They have tremendous running costs. But it's probably a good business for them" (Interview 10, August 2013). Others remark that this effectively means that Fortum is receiving a double income: for taking care of the waste, and then from selling the heat produced from the waste (Interview 8, August 2013).

<sup>33</sup> The Swedish Government has decided that every company that produces, imports, fills or sells packaging or packaged goods and newspapers and waste paper must take responsibility for the existence of a collection system where their end customers can dispose of packaging for recycling. Packaging = glass, paper and cardboard, newspapers, metals, plastic





“The service of making biogas from Stockholm waste has gone to Uppsala 80 km north and Södertälje 50 km south and not to Henriksdal which is owned by the City and which is in the middle of everything... But they didn’t make a good enough offer, Stockholm Vatten. It’s a bit stupid but that’s the way it works” (Interview 10, August 2013).

In sum, a circular economy has been instigated throughout the waste sector to such an extent that “We are reusing all our waste in such a fashion that we have a lack of waste. Our plants are designed to handle more than they have access to so we are importing waste... from Italy for example for district heating production...” (Interview 3, August 2013). In effect, Fortum and the City of Stockholm have been experimenting with imports of waste from outside Sweden, including in one infamous case welcoming a ship carrying garbage from Naples in Italy (figure 6), the publicity around which forced Fortum to issue a statement denying it was in business with the Neapolitan Mafia.

Figure 6: Fortum’s importing of waste from Naples makes the news

The screenshot shows the Nordstjernan website interface. At the top, the site name 'NORDSTJERNAN' is displayed in large letters, with a 'SUBSCRIBE NOW' button to its right. Below the site name is a navigation menu with categories: News / Local / Places / Events / Blog / Video / True Swedish / Travel / Store. The date 'October 01' is shown on the right. A secondary navigation bar includes: Arts / Briefs / Education / Research / Emigration / Food / Nordic / People / Sports / Style / Sweden / Traditions. Below this is a search bar and a 'SEARCH' button. The main content area features a news article titled 'Sweden burns Mafia garbage' with a sub-headline: 'The Neapolitan Mafia's mountain of garbage has to be taken care of, and Sweden will do the job.' The article text begins: 'This year, energy company Fortum will burn 3000 tons of Italian household garbage in southern Stockholm.' It continues with a quote from Ulf Wikström, information manager at Fortum Värme, stating that allegations of business with the Mafia are grossly insinuating. The article also mentions that the garbage will be shipped through the Kiel channel in Germany to Nynäshamn, and later to its final destination: Högdalsverket in southern Stockholm. A photo of the Högdalsverket recycling energy plant is shown, with a caption: 'The Högdalsverket recycling energy plant in Stockholm's south - you can see the telltale Globen Arena profile clearly to the right of the chimney. Photo: Wikimedia commons/Holger Elgaard'. A 'Contribute' sidebar on the right contains buttons for 'CALENDAR OF EVENTS', 'SUBMIT EVENT', 'CONTRIBUTE STORY', and 'LISTINGS'. At the bottom of the article, there is a caption: 'From waste to energy... Fortum, which owns Högdalsverket is a'.

Source: <http://www.nordstjernan.com/news/sweden/4422/>