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**Development of sustainable energy system in Swedish
municipalities**
– a matter of path-dependency and power relations

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Abstract Case studies of two Swedish municipalities indicate that the general energy area was divided into three independent policy areas: one dealing with supply, one with conservation, and one with environmental questions related to the *Agenda 21* vision of an ecologically sustainable energy system. However, the dominant energy policy area in the municipalities was supply policy. This article discusses why supply policy is dominant and the consequences of this for energy system development. Analysis of this pattern reveals that powerful actors, such as local energy companies, were able to mobilise support for supply policies, not least because they owned the energy plants and distribution networks. These actors were also represented in many different decision arenas; in contrast, actors representing the other energy policy areas often lacked power and resources, and were represented in only a few decision arenas.

Introduction

Sweden has a tradition of strong local self-government, and municipalities are expected to play important roles in implementing national energy strategies and formulating municipal ones (Gustavsson, 1996). In the energy area, municipalities have traditionally played key roles as suppliers of gas, electricity, and district heating to the public sector and end-use consumers (business/industry as well as household consumers). Large technical systems, such as water, sewage, and energy supply systems, have also usually been organised in municipally owned companies. The first municipal companies are as old as the Swedish municipalities themselves, and date from 1862. Public ownership was then and is still motivated by the fact that these systems represent a huge public interest and strategic need, and because it was in the public interest to ensure that these utilities were provided at low prices (Kaijser, 1986; Hallgren, 1997).

Swedish municipalities have been responsible for energy supply, and have thus become key actors in areas such as energy planning, energy advice activities, energy issues handled by municipally owned energy and building companies, and more recently *Local Agenda 21* activities (Kaijser, 1986; Summerton, 1992; Palm, 2004).

This article emanates from case studies of two Swedish municipalities, Linköping and Norrköping (Palm, 2004). In Linköping and Norrköping the overall energy area was divided into three independent policy areas, one dealing with supply, one with conservation, and one with environmental questions related to the *Agenda 21* vision of an ecologically sustainable energy system. These three parallel policy processes focused on energy from different viewpoints. One reason for this division was that it reflected the practical and formal division of responsibility in the municipalities. *Energy conservation* was managed by the office of the

town planner and the housing companies. *Energy supply* was handled by the energy companies. *Environmental policy* was handled by the *Agenda 21* co-ordinators. But even though all these actors were present in the same municipalities, they did not particularly co-ordinate with each other or adopt any comprehensive strategy. In both Linköping and Norrköping, the energy supply policy proved to be the dominant energy policy. It was the goals and visions of the supply policy process that were implemented and that determined the future direction of the local energy systems.

This article discusses why supply policy has come to be the dominant energy policy in municipalities, and what consequences this has for energy system development. I will focus on which actors have power and make decisions concerning future energy systems and why some actors have power and others do not.

The structure of the paper is as follows. The next section outlines the analytical framework and discusses large technical systems and how actors have different power resources in the local policy process. The subsequent section presents the results of the case studies of Norrköping and Linköping; here I present an overview of the three competing policy processes (supply, efficiency, and environmental policy) in the two municipalities. The actors included in each policy process and the central issues are identified. The last section contains conclusions as to why supply policy became the dominant energy policy in both municipalities.

Power in the policy process of a large technical system

Energy systems are here considered as socio-technical systems. The term *socio-technical* indicates that both the material and social/human parts of a system are the focus. As such, the term encompasses technical components, individual actors and organisations, legal frameworks, and institutional and political structures that are so closely intertwined that distinguishing between them is often not meaningful. Technologies are according to Hughes seamless webs (Hughes, 1983; Hughes, 1986; Summerton, 1998; Ingelstam, 2002).

In the large technical system field many studies have examined the strong coupling that exists among the different parts of a system. Change in one part of a system must take account of the pre-existing parts in order to obtain a working whole. A common example is that new technology cannot be introduced into a system without the prior existence, within the system, of knowledge of the new technology (Hughes, 1983). The close links between the various parts of a system means that once a particular technology is chosen, it will continue to affect

the development of the system for a long time. This is often described in terms of technological path dependence (David, 1988).

Hughes also stressed the importance of history in the evolution of systems, using the concept of momentum in doing so. Momentum points to the impact of the past on the future direction of a system. Interaction between technical and non-technical components means that after a certain length of time, large technical systems will acquire a certain direction because institutions, strong organisations, interests, and actors all mobilise support for the system. People and organisations that have a dominant influence on a system gradually develop a common outlook on what is desirable in its development. Momentum occurs in the system because economical, political, and cultural resources have been invested while the system is developing and growing (Hughes, 1983; Bladh, 2003).

An energy system's direction is discussed and determined via local policy processes. Hill regards policy as 'a web of decisions taking place over a long period of time' and not as the product of one single decision. Policy thus changes over time in relation to former and related policies. Policy includes both content and process, since both changes every time an actor negotiates the policy (Hill 1997). In local policy processes actors mobilise support and exploit their various power resources to gain influence. Local politicians, for example, have political resources in that they have formal authority over issues such as budgeting. Administrators can exercise power through their professional knowledge of an area. Knowledge often leads to influence, and actors with professional competence can demand that an activity be drawn up according to their specifications. Actors with professional knowledge occupy a strong position in the process of defining a problem. Municipal administration often initiates and prepares new political proposals. It is well known that professional administrators also have a strong influence on the production and dissemination of information and on the interpretation and implementation of policy (Peters, 1989; Palumbo & Callista, 1990; Lundquist, 1992; Gustavsson, 1996; Pierre, 1994).

Previous Large Technical system research has shown that such systems have qualities that are important for power relations and policy shaping. For example, the expected high cost of changing an LTS might cause actors to lock themselves into a particular policy, a policy that then becomes resistant to change.

Energy policy in Linköping and Norrköping

The case studies

Linköping and Norrköping are in a Swedish context two large municipalities, that also are similar in many respects. Both are situated in the same region, are of similar size (with approximately 130,000 inhabitants), owned as many Swedish municipalities an energy company, have a district heating system, and produced electricity. Despite these similarities the municipalities have chosen quite different strategies for their energy systems. Linköping started using household waste as fuel already in the late 1950s. In the mid 1980s household waste represented the major part of the fuel mix. During the period studied Norrköping made changes in fuel use at short notice. It changed from oil to coal in the 1980s and from coal to bio fuel during the 1990s. The changes in the fuel mix in Norrköping were a result of changes in fuel prices and taxation. After the deregulation of the electricity market in Sweden in 1996, Linköping and its energy company, Tekniska Verken in Linköping (TVL), chose to co-operate with other municipally owned energy companies in expanding their activities on the electricity market. Norrköping, in contrast, sold Norrköping Miljö och Energi (NME) to a private buyer, Sydkraft, in 2001 (Palm, 2004, pp. 57–58). The case studies cover the period 1977-2001, thus the studies ends with Norrköping selling out the energy company, NME.

The case studies are based on multiple sources of data, namely written primary sources (such as minutes, notes, and documents) and in-depth interviews with actors in public municipal organisations. I have focused on four categories of actors to interview, namely elected politicians who are members of the energy company board and/or member of the municipal council; representatives of the local energy companies; officials of the municipal housing companies; and municipal officials, such as those at the town planning office and environment office.

Linköping and Norrköping as owners of energy companies

The municipally owned energy companies, TVL and NME, both produced and distributed electricity and district heating. Historically, the municipalities amassed their energy knowledge in these energy companies. These energy companies were subject to guidelines and regulations drawn up by municipal decision-making bodies such as the municipal council and municipal board. TVL and NME were limited companies in which municipalities, during the period studied, owned all or at least a majority of the shares.

TVL and NME had to adhere to ordinary legislation governing private limited companies. Both had boards of representatives appointed by the municipality, based on proportional representation of the elected members of various political parties. The appointed board was given the responsibility for day-to-day operations. The municipal council decided the purpose and objectives of the companies, and both NME and TVL had to have the formal endorsement of the municipal council before deciding on, for example, large investments, tariff changes, and major policy issues. As the board members assume their seats, they no longer represent their political parties but rather the company, and thus must act in the best interests of the company; this often raises conflicts of interests and values (Hallgren, 1997; Paulsson, Riberdahl & Westerling, 1997; Sturesson & Gunnarsson, 2003).

The boards of the local energy companies played slightly different roles in Linköping and Norrköping. Linköping had a more independent, self-regulating energy company with a strong board. Board members often actively mobilised support from the members of the municipal council. Several actors were of the opinion that Linköping had something like an ‘energy board party’ on its council. The members of the TVL board acted as a unit, a party, on the city council, regardless of the positions of the individual board members’ own political parties on energy issues. In contrast, Norrköping undertook several reorganisations of the energy area, and activities there were less focused. Here, the members of the NME board were often criticised for not building support in their political parties and in the city executive. Consequently, the energy company’s management could not be sure that an issue supported by the company board would also be supported by the municipal executive board. Company management often had to mobilise support from the municipal executive board. In 2001 the company was sold to a private buyer (Palm, 2004, pp. 187–190).

The domination of the supply policy

Actors in the municipal administration often regarded the energy system as only consisting of the supply function. The domination of the supply side in the energy system was, for example, indicated by the fact that most energy issues on the municipal council agenda were related to energy *supply*. Energy conservation and behaviour were less frequently on the agenda. Energy issues discussed in municipal council included planned large investments in energy production, expansion of the district heating system, and environmental issues related to discharge standards. One explanation of this focus may be institutional. The local energy company was legally obliged, for example, to seek municipal council approval of major

investments in energy production. When it came to energy-related bills in the municipal council, most of these also concerned energy supply.

The domination of the energy supply side was revealed by the local energy plans, which mainly focused on energy supply. The Swedish government approved a law regarding municipal energy planning in 1977, so as to make the municipalities increase their efforts to conserve energy and secure local energy distribution. The law was a consequence of the energy crisis of the 1970s, and the national government wanted to use municipalities as tools with which to achieve their energy policy ends. The law required municipalities to take action to promote a reliable and sufficient energy supply, stimulate energy conservation, and develop an energy plan (SFS 1977:439).

In both Linköping and Norrköping the energy companies were given the responsibility to formulate the energy plan. At this time, both TVL and NME were established local actors that had amassed competence concerning local energy systems. For this reason it was officials from the energy companies themselves who were given the responsibility for municipal energy planning. TVL and NME both were granted power over the contents of the plans. Even if other actors were formally given responsibility for energy planning in the 1980s and 1990s, it was obvious that it was the energy companies that wrote the energy plan. The explanation for this was that the energy companies already had the information needed for the planning and possessed both the personal and economic resources to undertake the planning task. Most respondents interviewed in Linköping also described the local energy plans as the energy company's production plans. These energy plans focused on how energy should be produced and distributed in the future; energy efficiency goals were seldom discussed in them.

By controlling the municipal energy planning process, the energy companies could control how problems and solutions were articulated in the plans. For example, NME and TVL could point out the problematic fact that energy conservation strategies were implemented at the expense of increased energy production, which led to a reduction in company profit (see e.g. Energiplan [energy plan]1988, Linköping). Thus, the energy plans were not powerful control instruments for the politicians, but rather served to inform local actors about the energy system and to put energy issues on the local agenda.

Both TVL and NME were generally regarded as important technical resources with the capacity, knowledge, and interest to assume responsibility for energy-related technical support in their municipalities. In both municipalities, the energy companies' technical competence was cited as an important reason for their power over the local energy system.

Common explanations of why the politicians often could not or did not exercise their power were that they lacked technical knowledge and that electricity market deregulation had shifted the power from the politicians to the customers. The energy companies could also exercise power in the policy process, because they had the resources to gather basic data that supported their arguments, a capacity other actors often lacked.

Energy efficiency policy

In the municipalities, energy efficiency and conservation became more common concepts in the 1980s and were articulated in plans, policies, and studies. The concepts were often taken to refer to economic improvements or to a more efficient use of various technologies. The purpose of energy efficiency was to achieve environmental improvements and economic benefits, and also to reduce or at least not increase the peak load on electricity and district heating production. Energy companies that had significant capacity constraints often also engaged in and supported energy reduction measures in the municipality. In this sense, energy efficiency was simply a part of the energy supply policy; it responded to the same kinds of problems and goals discussed in the supply policy process.

Starting in 1978, municipalities began to receive government subsidies to help them offer energy inspections of buildings and run information centres dispensing energy advice. Many municipalities conducted building inventories together with the energy inspections, and the data gathered were later referred to in formulating municipal energy conservation plans (Gov. bill 1977/78:76).

Local energy conservation strategies generally reflected national strategies. When the national government financed various conservation measures, the municipalities also prepared energy conservation plans and employed energy conservation advisors. When those government subsidies disappeared in 1985, the energy advice bureaus in both cities were closed. The government subsidies were reinstated in 1998, with the result that both Linköping and Norrköping employed energy advisors (Gov. bill 1991/91:133; Energimyndigheten, 1999). In Norrköping the energy company formally took over the giving of energy advice in 1992; energy advice eventually became an additional service offered to electricity customers.

Both municipalities experienced problems actually achieving the planned energy efficiency goals. The energy advisors often occupied a rather weak position in the municipalities: they often lacked support and were regarded by many as simply representing the state, because they were financed by government subsidies. Also, the energy advice given to homeowners had little effect, because homeowners paid low prices for electricity and

heating and thus perceived no particular benefit in conservation measures. The difficulties finding profitable energy efficiency measures were compounded by the fact that many proposed solutions required rather large initial investments.

The energy advisors in Norrköping and Linköping tried to increase the priority of energy reduction measures, but other issues were most often regarded as more important by the municipalities. One explanation as to why energy conservation goals not were achieved in Norrköping or Linköping was revealed in discussions of energy plans and investigations of how energy conservation goals would be treated vis-à-vis energy supply goals. It was then discussed whether it was suitable from a supply perspective to reduce energy consumption. The energy companies returned to the fact that the municipalities gained nothing by reducing, for example, district heating consumption. The energy companies' negative view of reducing heat consumption was motivated by the fact that district heating costs mainly consist of fixed costs that remained the same regardless as to how much district heating was produced and distributed. A reduction in production did not lower company costs, but rather lowered income. Both municipalities had also invested in combined heat and power plants that simultaneously produce both electricity and heat, and the energy company repeatedly stated that lower heat consumption also meant lower electricity production. It can also be noted that during this period here studied neither of the energy companies had any significant capacity constraints, which, as mentioned above, otherwise was a common reason for energy company to support energy reduction measures.

Both municipalities harboured a basic assumption, for example, in energy plans that energy consumption would constantly increase. This assumption determined the problems the municipalities identified in the energy area and the goals they formulated. Energy conservation strategies were not prioritised and were more or less out competed by other municipal goals. There were energy reduction goals in the municipalities but there were no actors to mobilise support for their achievement.

Environmental policy

In the 1990s there was an increased focus on global environmental conditions, and several international environmental agreements reached at that time have affected local energy policy. Municipalities were given a key role in implementing the *Agenda 21* agreement formulated at the Rio Conference. The Swedish government came to expect municipalities to play an important role in implementing actions leading to ecologically sustainable development. Most Swedish municipalities have approved a local *Agenda 21* plan, which includes visions and

goals for the future energy system (United Nations, 1993; Gov. bill 1992/93:13; Gov. bill 1993/94:111).

These local *Agenda 21* efforts created an arena where it was possible to discuss the role of the energy end-users. A practice with a different purpose was created that treated energy as not necessarily coupled to the traditional decision-making bodies.

Through the *Agenda 21* co-ordinators the municipalities acquired new actors whose purpose was to influence municipalities, companies, organisations, etc., to change the direction of society towards that of more sustainable development. To establish municipal *Agenda 21* activities among citizens, organizations, and companies, the *Agenda 21* co-ordinators created networks and contacts that both could redefine the concepts of the local *Agenda 21* program to suit local practices and implement the goals in the program (Linköpings kommun, 1998; Norrköpings kommun, 1998).

The municipal *Agenda 21* activities caused the energy system to be discussed starting from new premises. The starting point of the supply policy process, that energy consumption would constantly increase, was challenged by the *Agenda 21* co-ordinators and local politicians involved in the *Agenda 21* activities.

The energy goals in both Linköping's and Norrköping's *Agenda 21* plans stressed that energy should be supplied by renewable energy sources and emphasised the importance of reducing energy consumption.

It was emphasised that the energy needed in a sustainable society could be no more than that provided by renewable energy sources such as water, wind, sun, and bio fuel. In Linköping this resulted in open conflict between the local *Agenda 21* co-ordinators and TVL. The company board and management thought that it was not self-evident that Linköping should use bio fuel that was seen as a scarce resource considering the pollution abatement equipment that was installed in Linköping's energy plants made it possible to use other "less clean" fuel. TVL's representatives also opposed the goal of lowering energy production. Compared with most European power plants, those in Linköping had low levels of ecologically harmful emissions. TVL representatives wanted to export 'surplus' electricity produced in Linköping to the continent; they thought it made better sense to *increase* electricity production, and export the 'surplus' to Europe so that their 'more harmful' plants could be closed down. The *Agenda 21* co-ordinators in Linköping stated that increased energy production could never be in line with an ecologically sustainable society. Sweden, as well as the rest of Europe, had to change direction in terms of their energy systems to achieve a sustainable society (Palm, 2004, pp. 109–115).

The energy companies' implementation of environmental management systems also came into conflict with *Agenda 21* goals and vision. By introducing these environmental management systems, TVL and NME could have shown that they were acting in an environmentally friendly way, even without changing the direction of their energy production. The basic principle of environmental management systems is to make small, continuous improvements in routines, control systems, emission levels, etc. The management of both companies emphasized that the plants already had good pollution abatement equipment, that their production operations did not exceed determined emission norms, and that they had certified their activities. What the managing directors of the energy companies meant was that even though they had not implemented *Agenda 21* goals, they were still contributing to the development of an ecologically sustainable energy system. The local *Agenda 21* co-ordinators in both cities wanted to change the direction of the energy system by choosing bio fuel and increasing the use of wind power and solar cells. They realised, however, that merely implementing environmental management systems helped legitimise the existing energy supply system without making any major changes. The energy companies could show that they were promoting a sustainable society through their environmentally certified activities.

Politicians made statements and produced documents supporting the *Agenda 21* plans, but failed to provide support when it came to implementation. The *Agenda 21* co-ordinators felt powerless. Their only weapon was arguments. In other words, all they could do was try to convince the energy company and other actors that they should behave in a certain way. They ran into the major problem that while everyone expressed verbal support for *Agenda 21*, it was very hard to get people actually to *behave* in a way that supported the *Agenda 21* goals and visions. Neither Linköping's nor Norrköping's co-ordinator succeeded in mobilising support from the boards of the local energy companies.

Even though the *Agenda 21* activities have not yet led to any major shift in the development of the energy systems in either Linköping or Norrköping, *Agenda 21* has contributed in that there now are actors in the municipal policy process who discuss the energy system based on other premises. A policy process has been established in the local arena that focuses on other issues and that has other goals and visions. This have not yet had any major influence on the energy system, but may prove to be important in the long run.

Conclusions

The supply policy had built strong support for the various ways in which energy was already being handled. The direction of the energy systems in both Linköping and Norrköping can be

explained by Hughes momentum conception that highlights the importance of history in the evolution of the energy systems and the interconnection between technical and non-technical artefacts. The local energy company boards were important arenas where most energy discussions were held. The energy companies were formally responsible for and owned the infrastructure, i.e. the power plants and distribution networks. The investments made in these plants and networks will exist for a long time and will be hard to change (Kaijser, Mogren & Steen, 1988; Summerton, 1992). When the *Agenda 21* co-ordinator formulated new and different goals for the energy systems, the energy companies and their allies thought that the co-ordinator was trespassing on their turf.

The energy companies' managements and boards had an interest in – not least for economic reasons – continuing to use the existing plants and distribution network and, for example, continuing with waste incineration. The representatives of the energy company could argue that at least in short term it was economic to continue to use the existing technical infrastructure. The energy companies could use their control over networks and plants as a resource in the struggle over how the energy system should develop. The energy companies showed that changing system direction would involve great costs, costs that no actor wanted to cover.

These resources gave the energy companies the preferential right to interpret energy issues and gave them power in the policy process – something shown in other ways as well. The municipal energy plans mostly focused on energy supply, in particular on how the energy companies could meet the continuously increased energy demand.

The supply-side goals and vision of the energy systems also dominated how the municipal councils regarded and discussed their systems. Local politicians had budgetary power over the administration, and could determine the financial resources available to the energy advisers, energy reduction measures, and *Agenda 21* activities. In this way the municipal board could influence the power relationships between various municipal actors. The domination of the energy supply side in the municipal boards might have contributed to the low priority municipalities gave to energy conservation. At the same time, the municipal boards' budgetary power over energy advisory activities was limited, as central government subsidies periodically financed parts of these activities. This is an example of how municipal energy systems are a part of a larger national system, and of how municipal actions are influenced by decisions made by the national government.

The energy companies have been established actors since the beginning of the twentieth century, while the energy advisers and *Agenda 21* co-ordinators only became established in

the municipalities in the 1980s and 1990s. By then TVL and NME were already long-established organisations with long experience and much knowledge in the energy area. The civil servants in TVL (and in NME until its sale) were involved in almost every energy-related political decision and event in the municipalities.

Overall, the ideas that humans could change their behaviour or that there might be alternative ways to develop energy systems were regarded as unrealistic. This unfair assessment meant that energy consumers and producers never engaged in any deeper discussion. Instead, energy use was made into a 'black box'; it was treated as something one might not, should not, or could not determine intentionally. It was regarded as something that should only be regulated by individual consumers; possible means of control were defined from a supply perspective or treated as an information issue – e.g. turn off the light when leaving a room, do not waste water.

The energy efficiency goals and vision suffered from a lack of actors who could mobilise support for making them a higher municipal priority. Energy conservation strategies were thus implemented only when buildings were being renovated and only if the energy conservation goals were not in conflict with other goals, such as aesthetic design. Potential policy entrepreneurs, such as energy advisers, did not occupy strong positions in the municipalities and did not continuously participate in the municipal administration. In the periods when the municipalities did employ energy advisors, they usually were not involved in investigations, planning, or other contexts in which they could have mobilised support for making energy efficiency goals a higher priority.

The conflict between energy supply and efficiency goals was highlighted when, in discussion, it was stated that it was not beneficial for a municipality that produced both electricity and district heating to encourage energy efficiency measures, not least because that would lead to lower income for the energy companies. This is an example of how path dependence, here defined by high fixed costs and pre-existing investments, contributes to upholding an established system. That these disparate policy areas existed simultaneously in the municipalities was indicated by the fact that the decisions and goals formulated in one policy area were not dependent on those formulated in another. Environmental goals in the supply policy process were limited to keeping emissions within the limits determined by the government. The cheapest fuel was chosen, providing that prevailing emission standards were upheld. The local *Agenda 21* goals of using bio fuel and installing new wind power capacity had no influence on the goals of the supply policy process.

The dominance of the supply actors can be explained by the amount of power and resources at their disposal: they owned the energy infrastructure, could use their considerable competence in planning and investigating, and could formulate the energy systems' problems, objectives, and visions in ways they desired when drafting energy plans and conducting investigations. The energy companies were also economically independent because they obtained their income directly from the consumers. Actors representing other interests could not exercise such power, because they were represented in only a few decision arenas and lacked economic resources.

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