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The Nordic welfare model providing energy transition?

A political geography approach to the EU RES Directive

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ABSTRACT

The EU Renewable Energy Strategy (RES) Directive requires that each member state obtain 20% of its energy supply from renewable sources by 2020. If fully implemented, this implies major changes in institutions, infrastructure, land use, and natural resource flows. This study applies a political geography perspective to explore the transition to renewable energy use in the heating and cooling segment of the Swedish energy system, 1980–2010. The Nordic welfare model, which developed mainly after World War Two, required relatively uniform, standardized local and regional authorities functioning as implementation agents for national politics. Since 1980, the welfare orientation has gradually been complemented by competition politics promoting technological change, innovation, and entrepreneurship. This combination of welfare state organization and competition politics provided the dynamics necessary for energy transition, which occurred in a semi-public sphere of actors at various geographical scales. However, our analysis, suggest that this was partly an unintended policy outcome, since it was based on a welfare model with no significant energy aims. Our case study suggests that state organization plays a significant role, and that the EU RES Directive implementation will be uneven across Europe, reflecting various welfare models with different institutional prerequisites for energy transition.

Keywords: EU, renewable energy, welfare model

1. Introduction: The European energy transition and the role of the member states

This case study focuses on the role of governance arrangements in the transition of energy systems. We examine the rather successful transformation of the Swedish heating and cooling sector into renewables. Our findings suggest that it was both an unintended policy outcome from the Swedish welfare model and an intended result of the competition model that developed from the 1980´s. Institutional arrangements stand out as central to understand the options for a successful implementation of the European energy policy.

The International Energy Agency (IEA) (OECD/IEA, 2009) has highlighted the dramatic challenges that the global energy system is facing in attempting to avoid environmental, economic, and social catastrophe. Expected price increases following from supply shortages and the de-carbonization of the energy system prompted by climate change (IPCC, 2007) both call for massive investments in renewable energy.

In the EU, energy is becoming a central field of policy, bringing together a multitude of objectives related to geopolitics, economic competitiveness, internal harmonization, environmental concern, and the low-carbon transition (Westholm, 2010). A general tension implicit in the EU's commitment to "sustainable development" encompassing, for example, both climate change mitigation and market integration/economic growth, is part of this context (Baker, 2007). Several studies have examined the inherent contradictions between the multiple energy-related objectives (e.g., Adelle et al., 2009; Hildingsson et al., 2010;

Vogler, 2009). One major division separates the *energy supply* orientation, aiming at securing cheap energy, and the *energy transition* orientation, aiming at transitioning from currently dominant fossil fuels to renewable energy carriers.

An important EU initiative was the adoption of the Renewable Energy Strategy (RES) (European Council, 2009), which requires that each member state increase its use of renewable energy, such as solar, wind, hydro, or bio energy, to 20% of overall energy consumption between 2005 and 2020. This entails a radical transformation, in reality a transition, to a different energy system. As part of the RES Directive, the EU has imposed responsibilities on member states and allocated country-specific targets based on per capita GDP. Article 4 of Directive 2009/28/EC (European Parliament and Council, 2009) requests that each Member State provide a National Renewable Energy Action Plan (NREAP) by 2010, describing how it expects to meet its 2020 target, including the technology mix and the means to achieve it. In total, the NREAPs call for 20.7% of final energy consumption to come from renewable sources by 2020 (Beurskens and Hekkenberg, 2011).

The implementation of the RES Directive is supported by the EU by 1) market-based tools (mainly taxes, subsidies, and the CO_2 emissions trading scheme), 2) development of energy technologies (especially technologies for energy efficiency and renewable or low-carbon energy), 3) European Community financial instruments and 4) by imposing legally binding policy targets (for example for biofuels and other bio liquids). The Commission has identified a need to involve public authorities, energy regulators, infrastructure operators, the energy industry, and citizens in the transition (Memo 08/703, Commission of the European Communities, 2008). Integration between the EU's RES strategies and other policy areas is also considered crucial for implementation (Söderberg, 2008).

The timetable for the energy transition up to 2020, including financing, planning procedures, technological development and transfer, education, and physically establishing new infrastructure, indicates that the Directive requires that the member states rapidly transform their energy systems. Are the member states in any condition to meet the requirements? The differences between the member states in the EU 27 are currently huge due to various historical dynamics or reasons. Countries with significant populations, such as the UK, Germany, and Poland, all have less than 7% renewable energy in their final consumption mix, while some member states consume virtually no renewable energy. In contrast, the Scandinavian countries and Baltic states are already approaching the 20% target, Sweden being at the top with 49% renewables in the final energy consumption as of 2010.

The RES directive reflects EU:s expectation that the member states are the key institutions in carrying out the energy transition an that institutional arrangements are crucial for realizing this policy. The divergent responses of member states to the RES directive reflect differences, for example, in supply options, infrastructure, pricing mechanisms and policies.

This paper explores the role of the state in this energy transition. Our focus on national policy is based on the general experience in the climate and energy fields that states constitute the necessary link between international agreements and their implementation (Westholm, 2009): international arrangements are established via negotiations between nation states, treaties are generally based on national contexts and data provided by nation states, and implementation is heavily dependent on national government´s ability to translate them into laws and regulations. Finally, state agencies monitor and supervise international policy implementation. Nation states have the potential to organize a multi-level process involving local communities and regions. Further, any achievement in a

politically promoted energy transition must include a system of incentives directed towards spatial planning and land use largely managed within national legal frameworks and procedures. Finally, in the case of the European Union, the democratic legitimacy of national level politics is notably high (Larsen et al., 2011).

The present case study employs a political geography approach in analyzing the transition of the Swedish heating and cooling segment of the energy system over the 1980–2010 period. We analyze the institutional arrangements of the state and its roles in the Swedish energy transition. The term "institution" here refers to "the double process of framing and defining the issues at stake and implementing organizational structures to support the process" (Larsen et al., 2011). We use the ideas/concepts of the *welfare state* and the *competition state* as an analytical framework to explore the role of state organization in the transition of a segment of Swedish energy system. What made this relative successful transformation possible? Was it the result of purposeful energy ambitions or an unintended outcome from other policies?

Based on our case study, we discuss the prospects of a broad European energy transition ten years into the future.

2 From welfare to competition politics – implications for energy transition

When the welfare models developed in Europe during the 1950`s and 1960´s there were no intentions from the states to govern the energy consumption in any direction. Cheap oil was accessible for industrial and household use and focus was on the distribution of increasing economic wealth. In Sweden, the welfare model was aiming to ensure equal conditions and allow citizens to control and consciously steer their own lives (Palme et al., 2001). It was clearly a modernization project linked to the shift from the primary sector to industrialization and increased household purchasing power should function as a driver of economic growth (Andersson, 2003). However, the welfare model produced some

prerequisites for a future energy transition when establishing the relatively uniform, standardized administrative structure with local authorities and county councils that raised their own taxes and operated as powerful implementation agents for the state. Urban and regional space was increasingly organized for infrastructural improvements and state intervention increased gradually.

In the 1970s energy security and energy supply came gradually into focus following from global supply crisis and increasing oil prices. In the same period growth rates slowed down and forced the states to engage in competition politics. Political priorities shifted from the national focus of the traditional welfare state, competitiveness became the driving principle in political fields such as education, the labour market, regional development, and R&D in many European countries (Brenner 2004).

Jessop (2002, pp. 94) describes the emergence of a *competition state*, a state that aims to secure economic growth within its borders and to secure competitive advantages for nationally based capital. The "competition state" developed different strategies for different parts of its territory, each region being encouraged to mobilize its own unique physical and institutional resources (Jessop, 2002, p. 176). This development went together with globally increasing oil prices which opened for energy initiatives visavi local resources such as bio energy, peat, household waste and industrial surplus heat.

Empirical studies indicate that competition politics and the idea of regions as drivers of economic growth were established in many European countries (Sörensen, 2002; Wood and Valler, 2004, Héritier et al. 1996; Wishblade, 2003). Especially in small economies, like those of the Nordic countries, this meant an orientation towards the supply side of the economy; the policy focus shifted from households and consumption to firms and

production. The regional politics emphasized the role of the state in promoting the development of regional innovation systems and industrial clusters.

The traditional welfare state is a *national* state insofar as the national territory is the basis for providing prosperity to all households, localities, and regions. The focus on competition politics was guided by the fact that states could no longer act as if national economies were more or less closed. The competitiveness of cities and regions was seen as dependent on localized interdependence, knowledge assets, regional competence, social capital, trust, and collective learning capacity as well as on distinctive and attractive local amenities and culture (Maskell et al., 1998, Amin, 1999,). As the promotion of technological change, innovation, and entrepreneurship must be executed at a sub-national level, the decentralization of regional/industrial policy was a key element of emerging competition policy.

These changes have also been described in terms of *governance* (Kickert et al., 1999; Pierre and Peters, 2000). In decentralizing, the state provides the arena: deregulating and building institutions that support but do not micro- manage regional activities (Westholm, 2000). A top–down rationale were replaced by a complex fabric of actors involved in giving the cause of events its direction and content (e.g., Sörensen, 2002, pp. 45–62).

It is of key importance to see that the state was still driving but in a less interventionist mode and acting as a network manager (Gossas, 2008). The state governs the framework – legal, economic, organizational, or otherwise – within which networks are formed. This kind of governance has been referred to as "network managing" (Jensen and Sörensen, 2003). Network managing means that a central actor (i.e., the state) tries to get other actors to collaborate to enhance their problem-solving abilities or administrative capacity. When

practicing network management, the state performs many roles: providing the legal framework for both public and private actors, promoting public–private partnerships, and co-acting in networks (Montin, 2006).

In many countries, these changes went together with marketization of policy. New Public Management (NPM) introduced in social democratic regimes during the 1990´s was a soft kind of privatization emphasizing values such as user choice, quality, effectiveness, and efficiency (Giddens, 2003). Decentralizing decision-making, planning, and service delivery had been considered a central way to enhance the quality of existing social services.

Many of the characteristics of the competition state appear to be possible driving forces for a transition of the energy system from being based on imported fossil fuels to being based on renewables, especially if local natural resources such as bio energy can be exploited.

Another discourse that played an important role in bridging the objectives of competition politics and an increasingly influential environmental agenda was "sustainable development". The "Bruntland report" *Our Common Future* – (Bruntland, 1987) – had a widespread impact on the debate while calling for a sustainable path of development. Politics responded to the combined pressure to address environmental concerns *and* economic growth by adopting the idea of *ecological modernization*. Originally developed as an analytical approach, the idea developed into a policy strategy and environmental discourse (Hajer, 1995).

The ecological modernization concept supports the notion of rational progress and promises the continuity of modernity, with its principles of growth, profits, and consumerism (Blühdorn, 2001). Although the concept and its possible contribution to solving

environmental problems is greatly disputed (see, e.g., Blühdorn 2000a,b), it offered a political reform strategy by which industrialized countries could frame and tackle their ecological problems (Baker, 2007). Ecological modernization has often been associated with decentralized, flexible, and consensual policy styles. This approach comes close to Beck's notion (1998) of the need for new forms of environmental governance/sub politics or political modernization in which the environmental movement, community groups, businesses, and other stakeholders increasingly have roles in the transformation. New Public Management and ecological modernization are two strands of ideas that became integrated parts of the competition state model.

3. Analytical framework

The analytical concepts, the *welfare model* and *the competition model,* will now be applied as a framework in our case study of the transformation of the Swedish heating and cooling sector from 1980 to 2010. We explore this transition and discuss the role of the different state models: what were the enabling contributions from the welfare model and from the competition model and what opportunities where created in the interaction between the two models? Of key importance for this analysis is to recognize that the welfare model, which was the dominating project from the Second World War until the end of the 1970s, was not replaced at that time by a competition model. Rather, the competition orientation was a complement, progressively changing the welfare model during the 30 years of energy transition. In the beginning of this period, the welfare model entirely hosted the competition model, which gradually affected and transformed the welfare model into a competition state model. Therefore, we can trace various elements of the energy transition to the two models and see how they interacted.

4. A Swedish case study

The energy shift that took place in Sweden started with increasing oil prices in combination with energy security concerns following the oil supply crisis of the 1970s. Sweden was 70% dependent on imported fossil fuels, and the government responded with policies to promote alternatives, mainly domestic biomass resources. Within the national energy policy framework, diverse instruments targeting regional and local levels have been part of a shift resulting in 30% fossil fuels in the final consumption mix in 2010.

The most extensive transition took place in the district heating segment of the energy system. Between 1975 and 1980, more than 600 large-scale heating systems were converted (Swedish Energy Agency, 2009). In total, the final energy consumption for heating and cooling in Sweden shifted between 1980 and 2008, from being 90% oil dependent to 90% based on renewable energy. The district heating system encompasses 60% of the national building stock, including all urban agglomerations. The energy carriers used in the system are 50% biomass, 15% garbage, 10% fossil fuels, and 7% industrial waste heat; the remaining share is mainly supplied by electricity (for heat pumps) and peat (Swedish Energy Agency, 2009)

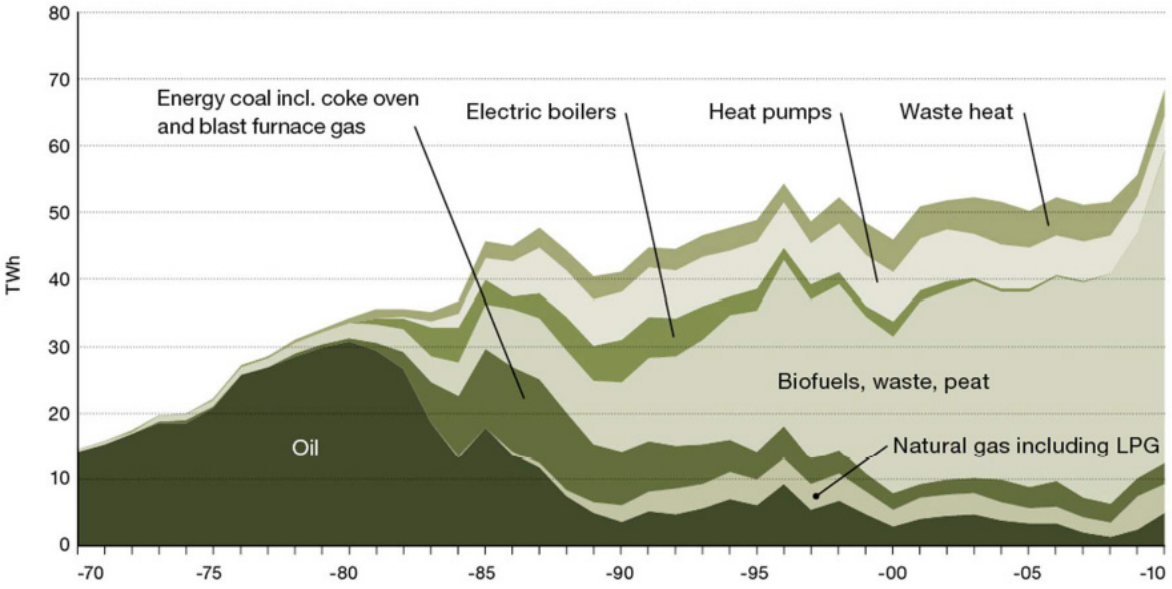

Fig 1. Energy supplied to district heating in Sweden 1970-2010 in TWh. Sources: Swedish Energy Agency and Statistics Sweden.

Fig 1 illustrates the timing of the transition and also provides an overview over the various renewables entering the system. The peak at the end of the period reflects two unusually cold winters and indicates robustness and a potential for further growth in renewables.

Some studies on the reasons for this energy transition stress the absence of hindering economic interests in fossil fuels (Swedish Energy Agency, 2009). Larsen et al. (2011) focus on deliberative processes and stakeholder participation in energy planning, while Uba (2010) examines the actors involved in the implementation of Swedish energy policy, highlighting the dominance of politicians, civil servants, and representatives of state agencies in the policy process. Uba calls for greater attention to networks and the role of state employees in seeking a better understanding of energy policy formulation.

Another possible explanation to the relative success in the energy transition is access to bio mass. However, access to considerable domestic biomass resources seems to have limited

significance in explaining the progress of energy transition across Europe. Countries such as France, Germany, and Poland, with substantial forest biomass have not yet seen their energy systems radically transformed. In a comparative study of five European countries, Henning and Mårdsjö (2009) conclude that the most prominent barriers are often related to institutional conditions. Fragmented value chains, lack of financing mechanisms, fragmented ownership structure, etc. all hamper the realization of political intentions. All these findings emphasize the role of institutional arrangements. Values, discourses, norms and their manifestations in rules and regulations and organizational structures seems to be of key importance.

The transition on a national level

When the energy transition started in 1970s it was founded on an institutional structure related to the model of the welfare state. The establishment of the welfare state demanded politics and planning in localities and regions. Regional authorities were equipped to implement state policies and supervise the development of equal conditions across the country. Complementary county councils with locally elected assemblies and rights to impose income tax produced health care, regional development, public transport, culture, etc. At the local level, municipalities expanded, taking on commitments for spatial planning and supplying welfare services, for example, child and elder care, schools, and social services in direct contact with individuals. Parliamentary decisions often delegated to local authorities freedom to devise activities and commitments rooted in local society (Ekström von Essen, 2003). Altogether, a relatively uniform, standardized administrative structure developed, in which both local authorities and county councils raised their own taxes. This was the prevailing organizational structure at the time for the energy transition.

The welfare model was established with no intentions directed to energy policy and before

the time when energy supply became a political issue. However, the institutional arrangements created for the welfare model, later proved to be essential building blocks for the energy transition which was directed by intended policy.

By the late 1970s, international competitiveness and economic growth became burning issues in politics and spatial planning in Sweden. The energy transition was an ideal project for these new policies. It took place within a semi-public sphere of activities and responded to a desire for economic competitiveness while addressing environmental and energy security concerns. The competition orientation brought efforts to identify possible knowledge-based niches in expanding sectors of the economy. Regional strategies were developed based on ideas of innovation systems, actor networks and partnerships.

The expansion of renewable energy was initiated and supported by a political process activating the national, regional, and local levels of the state to discharge various functions. The expansion of renewable energy in Sweden was also deliberately initiated and supported by a political process activating the national, regional, and local levels of the state to discharge various functions. The national framework comprised a combination of regulations, economic incentives, information, and R&D. On some occasions, the energy policy decisions resulted from political negotiations that were primarily directed to other political fields, for example, general tax reform.

At this point of time the energy transition was steered by a combination of intended national policy and external drivers such as policies at other levels emerging from the context of global energy developments.

Table 1 provides a summary of the milestones of the policy initiatives shift induced from the national level.

Year	Regulatory milestones	Economic incentive milestones
1973		- Introduction of state subsidies for using peat and biomass for heating
1979	Decision to phase out nuclear energy gradually until 2010	- Subsidies for peat and bioenergy used in district heating systems
1981	- Mandatory (and subsidized) energy advisory service to households in local authorities	- Introduction of "oil reduction fund" to support technological progress in using biomass as fuel
1983	- State agency established for energy policy implementationn	
1985	- Mandatory oil reduction programmes presented to local authorities	
1991		- General tax on carbon emissions that increased bioenergy competitiveness - Subsidies for cogeneration of bio-
1996	- Deregulation: from monopoly to market-based electricity production	

1997	- Mandatory climate and energy advisory service extended to households and the building sector	- State subsidies to local authorities for climate programmes - Energy advisory service directed to households and the building sector - Comprehensive R&D programme for
1998		- Nationally funded local investment programmes in renewable energy
2003		- Introduction of green electricity certification scheme - Subsidies to increase investments in
2006	- Mandatory declaration on the energy performance of buildings	
2009	- Law open the way to new nuclear power production	

Table 1. The national policy framework to promote renewable energy (for a detailed description of Swedish energy policy se Energy in Sweden 2010, Swedish Energy Agency)

The role of the regional level in energy transition

At the regional level, county councils and regional authorities worked the renewable agenda into development programs and regional strategies, making the energy transition a basis for networking activities according to the competition model. These programs linked EU and

national parliament decisions to planning processes in localities and regions. At the local level, the emerging renewable energy agenda was integrated into spatial planning and became both a driver and an effect of the expansion of district heating systems in combined power/heating plants. The necessary organizational structure for political decisions on public investments, for the implementation of physical planning and for the necessary learning processes already existed and was based on the welfare model.

The regional authorities had few direct obligations in relation to the energy transition. Their energy-related efforts followed from obligations to promote the 16 national environmental objectives, several of which concern producing renewable energy carriers and lowering energy consumption. The role of the regions were less operational, being primarily oriented towards interpreting the national objectives and adapting them to regional contexts and establishing networks and co-operation in the interest of policy promotion. The regions discursively framed the energy transition. Also at the regional level, the organizational structure which formed the basis for the energy transition was based on the symmetric welfare model, although much of the dynamics necessary for the transition arrived with the dynamics of the competition model.

In Region Dalarna, a rural region in Sweden's interior with only 280,000 inhabitants, the energy transition has been prioritized by the regional authorities since 2000. Several strategic networks have been established, all managed by public-sector agencies and including public–private partnerships. For example, the "building dialogue" incorporates

130 organizations, including state agencies, university colleges, local authorities, private companies, and consultancies (www.byggdialogdalarna.se). The activities in these networks mainly concern information, education, knowledge networks, etc. The region facilitates the

vertical integration of policy and operates as a link between international/national policy and the activities by which energy policy is translated into physical infrastructure. The instruments used generally concern knowledge dissemination. A few examples are advisory services to private firms on energy efficiency, ongoing dialogue with housing companies, schemes for monitoring energy use in buildings, and support to local authorities regarding public procurement.

Also regional policy in Sweden was gradually reformulated from welfare distribution to economic growth from 1980 to 2010. By the end of the period, it was intimately linked to EU regional policy and new European regionalism. The recognition that natural, social, and economic resources varied over space ("regional capital") and should be developed in the regions formed the basis for a growth-oriented policy (Westholm, 1999). It was stated that "growth is created on the local and regional levels by actors from the private and public sectors" (Ministry of Enterprise, Energy and Communications, 2001). However, the formulation of regional development plans was in practice controlled by state agencies at the regional level (Hallin and Lindström, 1998). Sustainable development and ecological modernization were key imperatives to be addressed in the "growth contracts" established between regional partnerships and the government as the basis for economic support within the regional policy framework.

These changes from welfare to competition orientation also challenged the organizational structures of the regions established under the welfare model. When the energy transition started in the 1980s, Sweden had 24 regional authorities representing the state, all with the same responsibilities to facilitate the implementation of state policies in the regions. The two ideas of the competition model, increased competition as the main task and the regions as the main agents, formed the basis for a gradual institutional reform of the regional level

in Sweden during the 1990s. The regions could make proposals to the national government regarding their own political organization. Specific local and regional contexts strongly affected the roles of local authorities, county councils, and regions. For example, while some regions now have directly elected assemblies responsible for regional development, others are based on the traditional regional authorities (Länsstyrelsen) legitimated by the national parliament.

To conclude on the regional perspective, the relatively standardized spatial organization of the welfare model that initially triggered the energy transition was gradually replaced by a patchwork of organizational structures. This was reflected also in the variety of the energy transition in terms of technologies, energy carriers, scales of production plants etc.

Local authorities as the local state

The effective power of the nationally imposed energy policy instruments is dependent on effective local implementation. Sweden is divided into 290 local authorities governed by locally elected assemblies. The local authorities have considerable autonomy and independent powers of taxation. They play an authoritative role in politics and planning and their activity corresponds to a substantial share of GDP. Despite their relative autonomy, the local authorities should be seen as integral parts of the state, with executive functions linked to political projects at the national level (Westholm, 2008). Their relatively strong position as political and administrative units is a result of their importance in the welfare state project (Bergmark, 2001). In particular, the expansion of social policy demanded forceful implementation at the local level, and the system of local authorities was reformed in 1952 and 1970 to realize the aims of the welfare state. In these reforms, the local authorities were consolidated into fewer and larger units. The local sphere was integrated in the national welfare concept to such a degree that the local authorities were referred to as “welfare

localities" (*välfärdskommuner*; Premfors, 1996).

The local authorities have a monopoly on spatial planning and direct the expansion of basic infrastructure, such as electricity grids and district heating systems, mainly under local public-sector ownership. The transition of the heating sector since 1980 has mainly been managed by local authorities. The swift response to regulatory measures such as the mandatory oil reduction planning, energy efficiency declarations etc, was natural, since local authorities in Sweden are intimately related to the state or, rather, are integral parts of the state. Besides the fact that they are legally obliged to act, local authorities have a tradition of loyalty to parliamentary decisions. This tradition is based on an institutionalized interplay that makes Swedish local authorities generally willing to implement national policy even without sanctions or compulsion (Montin, 2006). Local authorities are both implementers of national policies and independent actors with executive powers over infrastructure (Granberg, 2006).

Under the re-orientation towards a competition model, the standardized political organization was challenged. To increase cost efficiency and economies of scale as well as to boost their development efforts through participation in regional development projects, EU programmes, lobbying other political levels, etc., local authorities became increasingly involved in a complex pattern of intra-local co-operation. These efforts cover all fields of local politics and planning, forming a landscape of numerous overlapping regions, each based on thematic projects/collaborations. This project-based landscape of "thin regions" (Westholm, 2010) is highly dynamic and provides an important institutional base for a multi-actor energy transition.

The economic incentives issued by the state to stimulate energy transition at the local

level have embraced the carbon tax, implemented in 1991. It promised stable price relationships and was gradually complemented by a number of schemes, such as loans and grants, investment aid, financial support to advisory services, and electricity certificates. The economies of scale made district heating and power production economically competitive in relation to any other system solution.

Local decisions regarding the expansion of renewable energy carriers in district heating systems were often based on a combination of the economic competitiveness of renewables and market supports/subsidies. Local authorities have had a double function, possessing executive powers over infrastructure and promoting local actor networks. In line with the general shift towards a system in which the state sets general frameworks for private and public actors, numerous local public–private partnerships in energy-related activities have developed. The idea of ecological modernization has legitimated political aims concerning renewable energy, connecting these with the promise of business opportunities (Gustavsson, 2008).

District heating is a comprehensive concept for heat/power production from source to consumption. Its strength lies in scale and durability and its ability to carry costs for emissions reductions. Neverteheless, district-heating systems require large investments and may have long payback times with negative cash flow during a long establishment phase. Public involvement may be necessary for their deployment, modernization, and long-term development (Henning and Mårdsjö, 2009).

Were there any system costs/contradictions in the energy transition? Obviously, there are lock-in effects following from the huge investments. Once the district heating is at place, the incentives for energy savings in the area are radically reduced. In fact, at many occasions the

district heating companies have obstructed measures to increase energy efficiency in their supply area. Therefore it is of key importance to take all possible steps to reduce energy consumption before investments in district heating are made.

Another important remark is that the privatization of the energy system gradually eroded the strong role of the state. The state monopoly on electricity trade was succeeded by open access for market operators. During the 1990s there was a rapid restructuring of ownership in energy production in Sweden, and in 2010 three major corporations, i.e., Vattenfall, Fortum, and Eon, controlled 90% of Swedish electricity production while the local authorities controlled less than 10%. Although Vattenfall is state owned, it is run on market principles in competition with other actors. The previously powerful local authorities left much of their influence to the oligopoly. Hence, the powerful role of the state gradually eroded which may be an explanation to the low ambitions that Sweden have within the RES Directive to go from 49% to 50,5% renewables until 2020. The implications for the further development of renewable energy must be explored in a broader study of capitals flows and the interplay between politics and markets.

8. Conclusions

The Renewable Energy Strategy (RES) Directive passes the main responsibility for the European energy transition to the member states. The national plans expose huge differences in current energy consumption and production patterns between the member states. These differences may originate in variations in supply options, physical infrastructure, national energy-related policies, culture, and energy system traditions. We have anticipated in our analysis that the form of the state follows from the dominant political project, which varies over time. To understand the energy transition in a limited segment of the Swedish energy system, we examined the changing model of the welfare state established during the

1950´s and 1960´s in the direction of a competition state during the period 1980-2010.

The welfare model was established with few intentions related to energy policy and before the time when drivers for energy transition were affecting the energy system. It was not until 1980, after the first global oil supply crisis, that the state initiated a more consistent policy process with clear intentions to transform the energy system. However, the institutional arrangements of the welfare state, established mainly for the welfare services, provided the building blocks necessary for the intentional energy transition. Over a longer period, the specific combination of welfare and competition politics made the transition of the heating and cooling segment of the Swedish energy system possible.

So what was it that changed the state operations? Two strands of ideas framed the policy shift: the need to respond to increased international competition and the need for ecological solutions. The state was under pressure to activate itself at various levels, from the local to the global. In the Swedish case, the local and regional institutions were already at place, providing a capacity for building new infrastructures. The combination of welfare state organization and intentional competition politics offered the dynamics necessary for an energy transition which occurred in a semi-public sphere of actors at various geographical scales.

Regional and local authorities developed their role as implementation agents for national politics. Energy policy was vertically integrated when they translated regulative and economic measures into place-based actions. The relatively strong position of the local authorities in local planning procedures allowed the expansion of district heating systems in urban areas. Neighboring local authorities established multiple co-operation initiatives, *thin regions*, facilitating economies of scale and efficient resource use. Both regional and local authorities also played a role in establishing public–private co-operation and providing a

market for locally produced energy carriers, and utilizing their planning monopoly to integrate energy infrastructure into town and city planning. The regional level played a crucial role in establishing the necessary networks.

We have discussed a case of relative success in a segment of the Swedish energy system. The role of local authorities as implementation agents and drivers in an inclusive local process involving public and private actors in a physical change of resource use has been a key to the transition. We argue that the state's capacity to respond along a continuum from the local to the global is a main driver of the Swedish energy policy in the heating and cooling sector. This capacity, in turn, can be attributed to the combination of welfare state organization and dynamics of competition politics.

In the case of Sweden, the welfare state is most accurately described by Esping-Andersen (1990) as the Nordic welfare model, a socialist model recognizable by a high level of resource redistribution and primary service provision by the state. A key to understanding a possible European energy transition in accordance with the RES Directive may be to explore other welfare models, and their transformations in a similar way. The Anglo-Saxon welfare model was traditionally based on a more extensive role for private and market-based solutions and thus produced less powerful local authorities. In conservative welfare regimes, like those of Germany and Italy, welfare policies were generally based on the family as the core unit. Our study indicates that these welfare models may provide essentially different preconditions for an energy transition.

Beyond the Swedish case, the study highlights policy implications at the European level:

- The EU's RES target of achieving 20% renewable energy in the final energy mix by 2020

represents a challenge. In Sweden, where renewable energy resources were accessible from the start and where implementation occurred via institutions operating both vertically and horizontally to integrate policies from the national to local levels, it took 30 years to achieve the transition in the most favourable segment.

- Institutional arrangements stand out as central among the questions that NREAPs must address. The various state models models in Europe provide different institutional preconditions for the energy transition. Therefore, the spatially uneven introduction of renewable energy in EU member states is likely to continue. This pattern, however, is something that must be empirically investigated in comparative studies.

- Changing markets and technological developments will affect the energy transition, and further case studies are required at both the European and member-state levels before more general conclusions can be drawn regarding the roles of institutions and multi-level governance. The future of the RES process must also be scrutinized in relation to the privatization agenda now dominating European energy policy.

- In all, our analysis suggests that the expansion of renewable energy in Europe will continue to be a geographically uneven process in which intentions and directions vary widely between member states.

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