

CHAPTER 1

Introduction

1.1 THE DEVELOPMENT OF HIGH-VOLTAGE SYSTEMS

Electricity has become a fundamental form of energy in industrialised societies. Its use is steadily increasing, not only in those countries that are in earlier stages of developing energy-dependent systems, but also in those countries whose energy consumption is already high (International Energy Agency 2001, World Bank 2000).

The use of electricity depends on the transfer of electricity from a point of generation to a point of consumption. Although it is possible for generation to take place on a localised level for local use, integrated systems of electricity generation and transfer have now developed on regional, national and even international scales. This has been brought about by the increasingly centralised organisation of the electricity industry, in which nationalisation has played a major part (Patterson 1999). Large power stations are now generally connected to long-distance transmission networks, which then feed into more localised networks of electricity distribution for direct supply to consumers. These interconnected systems of transmission and distribution are generally judged to be more economic and reliable than the unconnected local systems that they replaced (Messing *et al.* 1979, National Grid 1999a).

Transmission and distribution systems consist mostly of linear features: overhead power lines supported on towers or poles of various kinds, and underground insulated cables used mostly for lower voltage distribution. Substations are also located at points where voltage changes occur. The longer-distance transfer of electricity is achieved most efficiently at high voltage; this requires the equipment involved to be of a relatively large scale. As systems have extended to cover larger areas, the voltages used also have increased; typically, a transmission system operates on two or three voltage levels between 100 and 500 kV (kilovolts), sometimes higher.

The transmission component of an electricity network is generally referred to as a *grid*. In the United Kingdom, a national grid system was first established in the 1930s, operating at 132 kV. This was upgraded in the 1950s, with the introduction of a “supergrid” operating at 275 kV, which was, in turn, upgraded in the 1960s to a system incorporating 400 kV equipment. The remaining components of the original 132 kV system subsequently became part of the system of electricity distribution to consumers, leaving the 275 kV and 400 kV equipment as the “transmission” system proper (Carruthers 1987). This supergrid was developed under public ownership of the electricity industry, by the Central Electricity Generating Board.

In 1990, the UK electricity industry was privatised and broken up into its component parts. The transmission grid in England and Wales became the responsibility of National Grid (NG), while the distribution systems were handed over to 12 regional electricity companies (now referred to as *distribution network operators* (DNOs)) (different arrangements were applied in Scotland and Northern Ireland). In England and Wales, therefore, NG now owns all 275 kV and 400 kV equipment (Figure 1.1), and the DNOs own nearly all 132 kV equipment, along with lower voltage equipment for electricity distribution to customers. The transmission network currently allows excess electricity generation in the north and midlands to be exported to the south of England (National Grid 1999a).

This book will concentrate on, for reasons given below (Section 1.5), the land-use planning concerns of local authorities regarding:

- the 275 kV and 400 kV transmission grid and
- the 132 kV element of the distribution systems

throughout England and Wales. For convenience, the combined components of transmission and high-voltage distribution will be referred to throughout this text as “high-voltage distribution and transmission” (HVDT) (see also Section 1.5). This term will usually refer to the elements of the electricity network throughout England and Wales specified above. It is also occasionally used (in the following section, for example) to refer to the equivalent elements of electricity networks more generally throughout the world, although precise voltages vary between different systems.

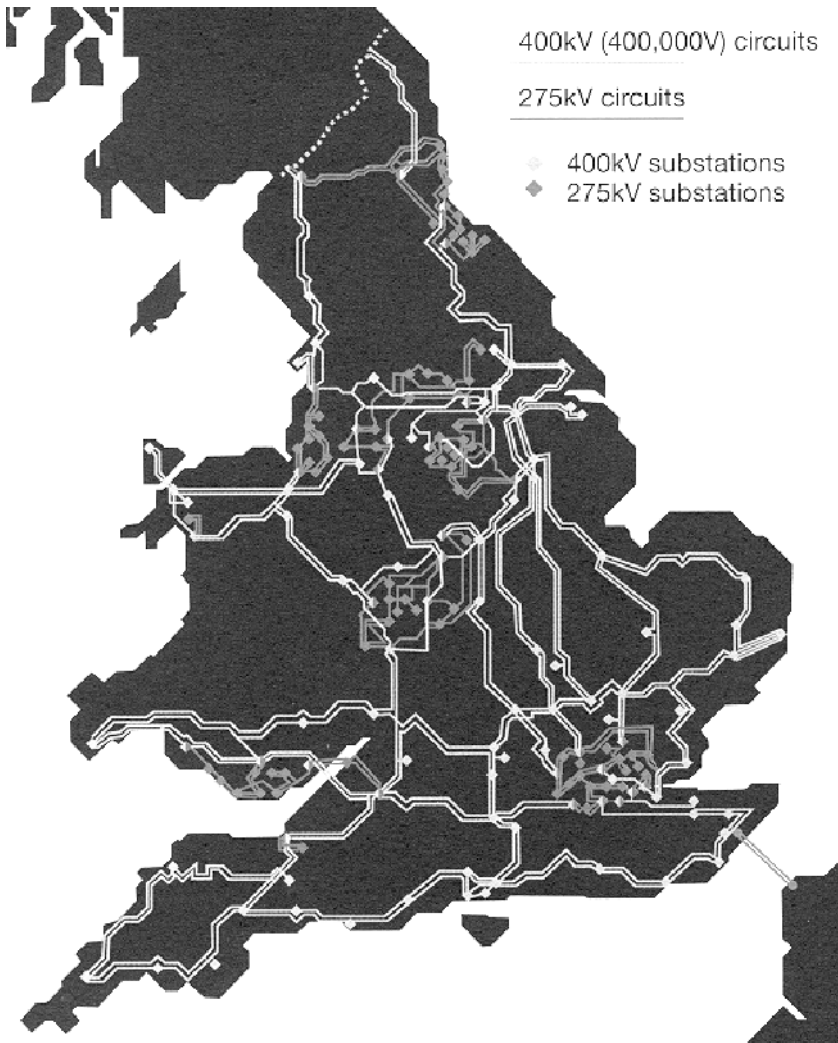


Figure 1.1 The present transmission system in England and Wales (Courtesy National Grid Company unpublished.d)

1.2 LAND-USE PLANNING RELATING TO HVDT INSTALLATIONS

Given their extensive nature and scale, the siting of HVDT installations is a major land-use planning exercise. Planning procedures are usually necessary both in relation to the construction of new equipment and significant replacement or upgrading of existing equipment. These procedures generally involve a range of bodies. Authorisation may lie at the level of local, state, regional or national

government; procedures for gaining consent may include consultation with various organisations and the participation of affected communities and individuals; agreements may need to be reached with landowners regarding the placing of equipment and access for both its construction and maintenance.

The development of HVDT systems has generally been justified on the basis of public service provision. In the United Kingdom, the instrumental bodies, the Central Electricity Generating Board, and now NG and the DNOs, have operated as statutory undertakers; when seeking planning consents, they have been able to call upon the notion of "public utility", the provision of essential services (Ernst 1994), in support of their applications. The proposed routeing and location of new or replacement installations has been largely influenced by technical and economic matters, but has also had regard to environmental considerations. However, over the last decade or two, in many parts of the world, increasing attention to environmental issues is being paid during the planning of HVDT equipment. This reflects growing disquiet with the adverse effects of industrial developments generally, but also indicates increasing public concern regarding HVDT in particular. This trend has acted as a challenge to the assumption that "public utility" can be used as an overriding argument in favour of proposed developments (Rogier *et al.* 1996).

The particular public concerns that have been raised in relation to electricity HVDT are focused on two main areas. Firstly, the direct physical effects of installations, the visual effects of overhead lines and their supporting structures, and of substations, have been of most concern in this regard, particularly in areas of valued landscape and in residential areas. Other related matters have also been given attention, such as ecological, archaeological, recreational, effects and so on. These have given rise to opposition to new installations, particularly in designated areas, and have led to calls for the alternative routeing of lines, or for them to be placed underground.

The second main area of concern has been the perceived risk to human health from the electromagnetic fields (EMF) generated by power lines. This has led to growing anxieties about the proximity of lines to other forms of development, especially where people spend significant periods of time, such as residential development. These anxieties have, like the visual and other effects mentioned above, led to opposition towards proposed HVDT installations; for example, in areas where they would be placed near to housing. But they have also provoked opposition to proposed other development, such as housing, where it would be in close proximity to *existing* HVDT installations. This issue therefore opens up questions regarding the planning not just of HVDT equipment but also of other forms of development that must take into account the presence of HVDT installations.

Concentration on these issues has led to increasing public attention being paid to planning applications relating to HVDT. This has typically led to protests from local communities, often represented by interest groups and local politicians, and has involved local authorities in disputes with proponents of certain projects. With regard to proposals for projects involving new installations, for example, this has led to increasing lengths of time being required for the planning phase. For

instance, a new transmission line project in the Netherlands requiring only two years for construction involved a 14-year lead time for planning, owing to local opposition and consequent problems in obtaining consents (Adema *et al.* 1996). Electricity utilities throughout the world are increasingly reporting difficulties of this kind, and are, as a result, turning their attention to technical means of alleviating some of the environmental effects of their proposed actions (e.g. Bascom *et al.* 1996, Bohme *et al.* 1998, Doyen-Viguiet *et al.* 1996).

1.3 LOCAL PLANNING AUTHORITIES AND HVDT INSTALLATIONS

In the United Kingdom, local planning authorities (LPAs) have a key role to play in the land-use planning issues outlined above. Applications regarding overhead lines (above a certain voltage) are determined by central government (currently by the Secretary of State for Trade and Industry), under the Electricity Act 1989. The Act provides, however, for LPAs to act as statutory consultees with respect to applications for overhead lines in their areas. Moreover, should an LPA raise any objection to a proposed line, the Secretary of State is obliged to call a public inquiry into the application. LPAs have, therefore, a significant, if not determining, part to play in the planning of high-voltage overhead lines. Proposals for new electricity substations, on the other hand, come before LPAs as planning applications under the Town and Country Planning Act 1990; LPAs are therefore authorised to approve these installations. Similarly, the planning of other forms of development that may be affected by the presence of existing electricity installations, such as housing or schools, normally comes within the domain of ordinary planning applications, for which the LPA may grant approval.

One of the means by which LPAs in the United Kingdom have recently been seeking to bring their influence to bear on planning matters relating to HVDT has been the introduction of specific policy in this regard. This is seen as an anticipatory measure providing LPAs with their own guidance on any future applications concerning HVDT that may affect them. This has been in the form of policies and supporting statements incorporated into statutory development plans that the local authorities are required to prepare as a framework for land-use planning decisions in their areas (Department of the Environment, Transport and the Regions (DETR) 1999a). The last decade or so has therefore seen an increasing number of local authorities establishing, or attempting to establish, policy relating to HVDT through the preparation of their development plans.

The use of development plans as an expression of LPA attitudes on this particular set of issues has coincided with the renewed emphasis that has been placed more generally on development plans in the planning system over this period. The Planning and Compensation Act 1991 asserted the importance of development plans in local planning decisions, and set off a new wave of plan preparation in England and Wales (Adams 1994). This instrument has therefore provided a means by which LPA concerns regarding HVDT installations have been articulated.

The policies and supporting statements relating to HVDT that have been drawn up during the preparation of development plans have concentrated on the concerns outlined above (Section 1.2). They have sought primarily to protect local environmental quality rather than, for example, to make a contribution to the establishment of an efficient national electricity network. As such, proposed policies and supporting statements have become the focus of some conflict with other interests, especially sections of the electricity industry and, occasionally, the house-building industry and other developers. Struggles over development plan wording have taken place in a number of the processes of plan preparation, through representations and responses made during consultations, and also through evidence presented at public inquiries and examinations in public. In general, groups opposing LPAs, especially representatives of the electricity industry, have been successful in bringing about changes to proposed policies and supporting statements, making them more acceptable to their interests.

1.4 THE FORMATION OF HVDT-RELATED POLICY BY LPAS

There is, therefore, a growing trend for LPAs in the United Kingdom to advance policy through their development plans that aim to defend the local environment against the effects of HVDT installations. The emergence of this body of policy provokes a number of questions about the particular concerns being raised and the influences at work in the formulation of policy. For example, what are the issues that are being addressed by LPAs, and why? To what extent do they reflect broader environmental concerns, or are they principally related to local circumstances? Can policy formation be explained in terms of geographical, social, economic, and other factors? Who are the principal actors involved in policy formation? Does group or individual activism play a major part? Why is it that certain LPAs advance this policy area while others do not? This book explores these questions, with the overall aim of investigating the processes by which LPA policy on planning aspects of HVDT has recently been coming to expression. This book therefore presents a study on the formation of local policy on a discrete and environmentally sensitive subject, while at the same time raising a number of highly topical issues relevant to wider environmental planning.

In general terms, public policy can be thought of as a political statement, or "a set of political purposes" (Parsons 1995, p. 14), the formation of which is a complex process, subject to many possible influences and the involvement of many different actors. Consequently, a host of theoretical understandings has arisen of the ways in which public policy comes to expression (Hill, 1997). Adherence to a particular model of policy-making is not, however, a prerequisite for the empirical study of a specific policy area; indeed, presupposing the means by which policy is formed may constrain an empirical study too tightly. Nonetheless, some kind of conceptual framework of policy formation is necessary in order to organise the investigation of interacting elements (John 1998).

With regard to understanding LPA policy that deals with the effects of HVDT installations, particular attention has been given to

- the external features being brought to bear upon the process of policy formation, and their inter-relation;
- the role of actors, whether institutions, groups or individuals, and the interaction between them;
- the concerns expressed in specific policy content, and their inter-relation;
- the formal procedures by which concerns are brought to expression in development plans.

These elements are represented diagrammatically in Figure 1.2. This figure suggests that various geographical, social, environmental and other features that are external to the immediate policy process are influential upon actors involved in formulating policy. Their concerns and interests are given expression through the content of more specific policies and statements, which form part of development plan documentation. This overall process is both initiated by and mediated through the formal procedures of preparing development plans.

This book therefore describes research into the emerging formation of HVDT-related policy as advanced by LPAs through the preparation of their development plans. It investigates in detail the motivating interests and forces that have brought about and shaped this developing body of policy throughout England and Wales. In addition, the essentially empirical work described here gives rise to a generalised model of policy formation, which has the potential for wider applicability. The research was carried out between 2000 and 2002, and was based on the expression of policy in development plans being prepared, or that had recently been completed, at the time of the analysis.

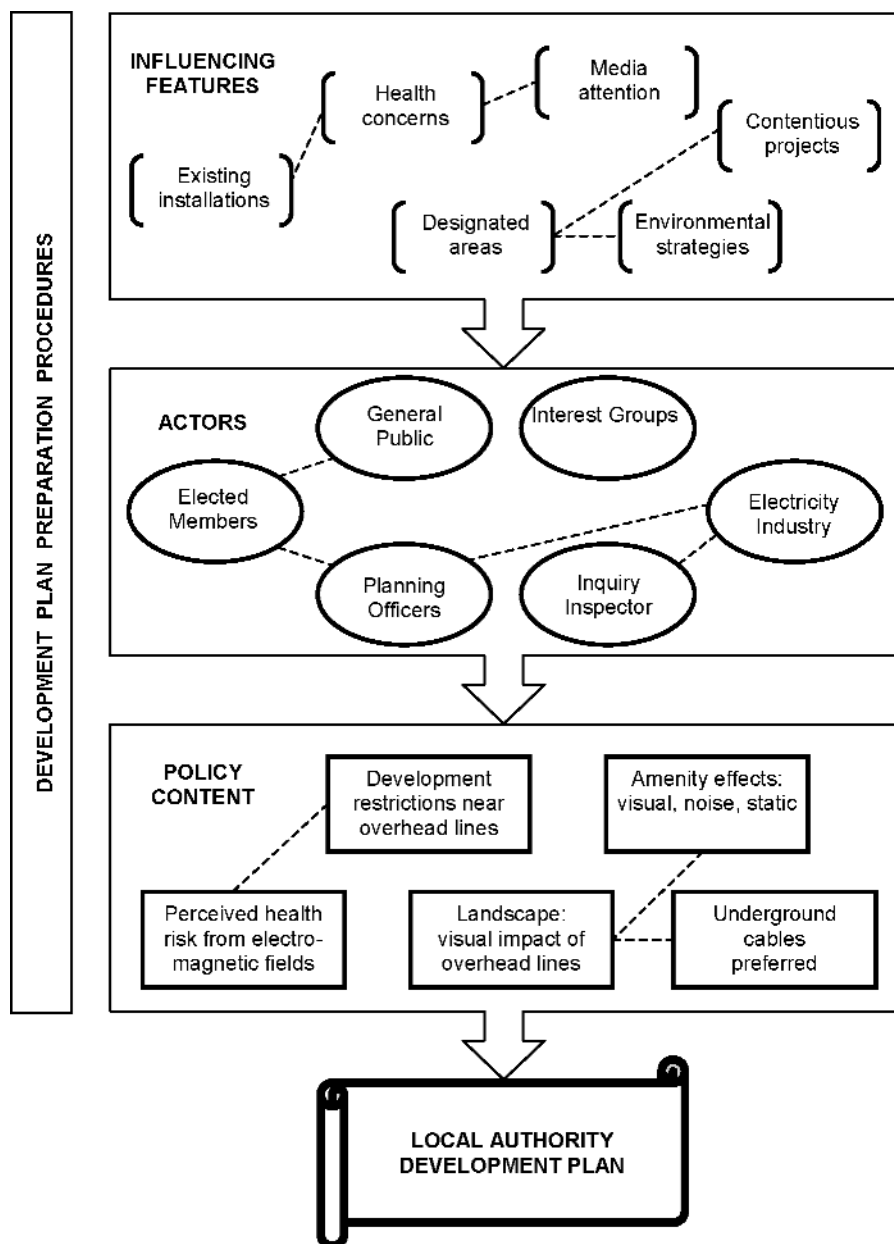


Figure 1.2 A representation of the formation of HVDT-related policy

1.5 SCOPE AND ORGANISATION OF THE BOOK

The geographical scope of the research described here was determined firstly by the need to consider as wide a range of LPAs as possible, both in the sense of policy positions adopted by LPAs, and (given the variety of forms of LPA following local government reorganisations) in the sense of different types of planning authority. A national, rather than regional, level of study was therefore chosen, in order to ensure a wide coverage of possible influences on policy formation. The second aspect of the geographical scope of this research is the nature of the electricity industry. As mentioned above (Section 1.1), the transmission grid in England and Wales became a separate enterprise with privatisation of the industry in 1990, NG becoming the relevant licence holder. This transmission system (along with its associated supply and distribution systems) provides a convenient boundary for this study, incorporating the nine regions of England and Wales. Working within NG's area of responsibility also provides an institutional focus to the study, which is itself relevant to policy formation, as LPAs in England and Wales will often have NG specifically in mind (along with more local components of the industry) when drawing up policy.

Local authority policy is expressed in statutory development plans. A development plan is a document that sets out a local authority's policies and proposals for the use of land in their area (DETR 1999a); different types of plan are prepared by different authorities. This research is based upon HVDT installations that have been treated as a policy area in the following types of plan in England and Wales:

- structure plans, prepared by county councils and some unitary and national park authorities in England;
- unitary development plans, prepared by London boroughs, metropolitan and some other unitary authorities in England, and most Welsh unitary authorities;
- local plans, prepared by district councils, national park authorities and some unitary authorities in England.

The system of plans is, in fact, currently undergoing radical reform (DTLR 2001a), but as this has yet to be fully implemented, this research focuses on policy formation within these existing types of plan (waste and minerals local plans were not considered).

In addition to containing policies and proposals, a development plan document also contains the local authority's reasoning for its policies. This is referred to as "*reasoned justification*" in the case of unitary development and local plans, and "*explanatory text*" in the case of structure plans. These two forms of supporting statements do not carry the same status, as government guidance indicates that the explanatory text of a structure plan does not form part of the plan (though it may be included in the document); this is in contrast to the reasoned justification of unitary development and local plans (DETR 1999a). Despite this lack of equivalent legal standing to reasoned justification, explanatory text does carry an equivalent function of enlarging upon the wording of policies.

More generally, both a development plan's "policies" on a particular subject and the accompanying supporting statements are expressive of a local authority's policy on that matter. It is, therefore, the statements as a whole relating to HVDT within development plans that are the focus of this book.

As indicated above (Section 1.1), the topic areas of this book are both electricity transmission and the highest voltage level of distribution, referred to as *HVDT*. This is because local authority policy tends to take as its area of concern installations operating at 132 kV and above; this suggests that 132 kV equipment is perceived to be the threshold at which problematic planning issues are encountered. This does not equate with the electricity industry's demarcation between transmission and distribution, but this is of no great significance to land-use planning issues as viewed by LPAs. Furthermore, wording in some development plans suggests that LPAs are not always aware of the distinction drawn by the electricity industry between "transmission" and "distribution". The policy scope of this research is therefore taken to be policy relating to HVDT installations as defined above.

The following chapters are organised as follows. Chapters 2 and 3 explore two distinct contexts within which HVDT-related policy is situated. Chapter 2 considers HVDT as an industrial sector. It begins by looking at the legislative procedures governing the land-use planning of HVDT installations, with emphasis on those provisions designed to ensure environmental protection. This leads on to an examination of the environmental effects that are associated with HVDT, some of which underlie the concerns currently being expressed by LPAs. Chapter 3 turns to the means by which these concerns are being articulated, the system of development plan preparation. The current importance of development plans is investigated, as are the trends and priorities that have been emerging in the practice of plan-making. The importance of plan preparation as a process, with considerable opportunity for the involvement of different actors, is underlined. These two chapters therefore provide an understanding, firstly, of the policy topic itself, and, secondly, of the procedures by which it is being advanced.

Chapter 4 sets out a methodological approach for the investigation of HVDT-related policy throughout England and Wales, on the basis of the framework shown in Figure 1.2. A two-level approach is developed, consisting of a study of policy content across the whole of England and Wales, and an in depth examination of policy formation in a number of localities. These are seen as complementary means of building up an overall picture of LPA concerns and the influences that are shaping them.

Chapters 5 to 9 describe the empirical work that is at the heart of the research described in this book. Chapter 5 sets out the results of the first level of study, identifying patterns in HVDT-related policy across England and Wales as a whole. This provides the basis for the second, more qualitative, phase of study, the examination of policy formation in 10 case study authorities. These are individually described in Chapters 6 to 8. Chapter 9 presents an analysis of the body of case studies, and identifies a number of key policy themes in common between them.

Chapter 10 draws on the results of the empirical work as a whole, and discusses the dominant elements and influences found to be at work in the formation of HVDT-related policy. This discussion refers back to the contexts described in Chapters 2 and 3, and also to wider literature and policy developments relevant to the particular points in question. Finally, Chapter 11 considers the overall forces that are acting upon the formation of HVDT-related policy. Recommendations are also made by which LPA concerns might be better accommodated.

