



# The Danish system of electricity policy-making and regulation

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**Abstract:**

Denmark is a global leader in transforming its energy system to a more sustainable model, with high levels of renewable electricity and heat, and high energy efficiency. Its transformation is not slowing; rather the country is now committed to a complete decarbonisation of its energy system by 2050. This paper examines the policy-making process and regulatory framework that has facilitated this system change, focusing in particular on electricity. It gives an overview of the main actors in the sector and their inter-relationships. It then gives a brief assessment of the quality of the policy-making and regulatory system against some commonly used criteria.

**Keywords:** governance, regulation, electricity, institutions, Denmark, Great Britain

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## 1. Introduction

Denmark is widely recognised as a world leader in the transformation to a more sustainable energy future (Sovacool 2013).<sup>1</sup> Since 1990 it has developed one of the highest proportions of wind power in electricity generation in the world (40% of generation came from wind in 2014).<sup>2</sup> It has highly efficient heat supply through district heating (DH), which supplies 65% of Danish buildings and around half the demand for space heating in the country. Thermal generation of electricity is largely from combined heat and power, with the waste heat going to district heating. The use of coal in electricity generation has declined sharply since 2006 and is being phased out. End use energy efficiency is also high in both industry and households. The result is a highly efficient, relatively low carbon economy. It is also an innovative system; for example CHP, thermal stores and electric boilers in district heating are now being used to help balance the electricity system by offsetting the intermittency of wind output (e.g. Anderson 2015)

There are also clearly stated ambitions to maintain the momentum of transformation. In 2012 an Energy Agreement was reached by almost all the political parties in Denmark, which includes targets to generate 50% of electricity from wind by 2020, to produce 35% of renewable energy overall by 2020, and 100% by 2050 (DEA 2012). To manage greater intermittent generation, Denmark also has a strategy to develop smart grids and flexible demand and storage capacities as part of an 'intelligent' energy system (Danish Ministry of Climate, Energy and Buildings 2013).

Outcomes in a particular energy system are the product of immediate rules and incentives for actors in the system, but these in turn are generated through policy and regulation, which are ultimately produced by the institutions governing that system (Lockwood et al 2013). A key question for understanding the Danish experience is what kind of institutional arrangements for policy-making and regulation have produced the outcomes seen there. This issue is of particular interest in the light of comparative experience in Britain,<sup>3</sup> and below a comparison of arrangements between the two countries is made. In this context, this paper may be seen as a companion to Mitchell et al's (2015) critique of energy governance in Britain.

The focus in this paper is on the electricity system. It is also largely on formal governance arrangements in the sector. While the informal influence of industry associations, NGOs,

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<sup>1</sup> See also, for example, [http://blogs.worldbank.org/energy/energy-future-seen-denmark?cid=EXT\\_WBBlogSocialShare\\_D\\_EXT](http://blogs.worldbank.org/energy/energy-future-seen-denmark?cid=EXT_WBBlogSocialShare_D_EXT)

<sup>2</sup> <http://www.energinet.dk/EN/EI/Nyheder/Sider/Vindmoeller-slog-rekord-i-2014.aspx>

<sup>3</sup> Since the focus is on electricity, the relevant comparison is with Great Britain, as Northern Ireland is part of the Eire market and has its own regulator.

consumer organisations and other stakeholders is touched upon, the main focus is on the main official regulatory and policy-making actors and institutions. The description and analysis presented here are based on relevant literature, information available from the websites of the organisations involved, and interviews carried out in Denmark over 2014 and 2015 (see Annex).

The rest of the paper is organised as follows. Section 2 briefly provides some of the wider context for understanding the energy policy and regulatory set-up, especially the nature of politics in Denmark and the nature of commercial actors in the sector. The main description of institutional arrangements for the governance of electricity is in section 3, which concludes with a summary comparison of Danish arrangements with those in Britain. In section 4 I make an assessment of the Danish model based on a set of five criteria for regulation put forward by Baldwin et al 2012. Section 5 concludes.

## 2. The wider institutional and discursive context

To fully understand the Danish policy and regulatory system for electricity, it is useful to consider the wider context briefly. Danish politics and policy-making is characterised by a number of features that arise out of its history and make it somewhat different from the UK:

- The experience of being a small country surrounded by more powerful neighbours has fostered a ***spirit of cooperation*** for survival (Katzenstein 1985). As a result, ‘the political system is still characterized by a culture of compromise and consensus’ (Campbell and Hall 2006: 24). A foundational principle for any major policy decision in Denmark is that it should work in the ‘common interest’, and any group placing sectional interest above national interest is likely to be dismissed by other actors.<sup>4</sup> This discourse also produces a degree of pragmatism, making it difficult for strongly ideologically policy paradigms, either statist or neo-liberal, to become established (Kjær and Pedersen 2001).
- Up until the early 19<sup>th</sup> century, Denmark had significant overseas territories along with benign absolutist rule at home, meaning that it ‘built a state apparatus that was very well developed compared to many other European states both in terms of its administrative and its revenue-collecting capacities’ (Campbell and Hall 2006: 21-22). State capacity continued to be built throughout the 19<sup>th</sup> Century, with a strong centralised bureaucracy and unified systems of finance and administration, roads etc. This institutional legacy is means that there is ***relatively strong capacity in the state and within the public***

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<sup>4</sup> Interview with Ove Kaj Pedersen, 10 November 2014

*sphere* for assessing technology costs, analysing technical problems and designing policy. Following the decision to intervene in the sector in the wake of the 1970s oil crisis (see below), Denmark followed a planning approach in energy for many years (Lund 2000). The capacity to plan was built up over several decades. There has been a decisive shift away from planning to the market in electricity but relative to the UK, capacity in the public sphere remains strong.<sup>5</sup>

- The strong role of organised civil society in Danish life, especially in the form of cooperatives, has meant a preponderance of **local ownership of energy companies**. With the exception of DONG, a large state-owned and relatively recently created supply company, commercial energy actors in Denmark are small-to medium sized companies, many of which are either municipally owned or are owned as consumer cooperatives. Thus there are 73 distribution system operators (down from 89 in 2008 – see DEA 2008), mostly consumer-owned cooperatives or municipally owned. There are some 80 suppliers. Many of these were bundled with distribution networks until 2006 [check]. Following unbundling many were still owned by cooperative or municipal parent companies, although there has been a trend to adoption of a limited company structure under a board, as opposed to town council control as in the past. There are also multiple electricity generators, including many small combined heat and power operators, which have come to play an increasing role in balancing as intermittent wind generation has expanded (Anderson 2015).

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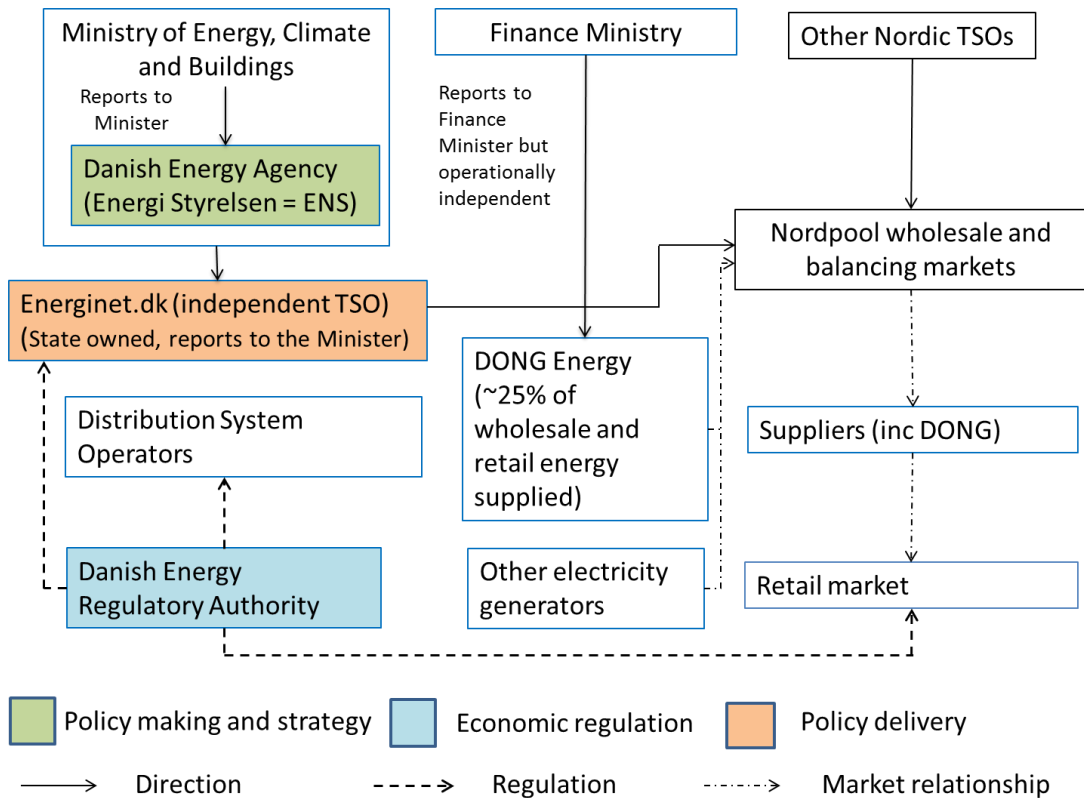
<sup>5</sup> Interviews with Ove Kaj Pedersen, 10 November 2014 and Poul Erik Morthorst 26 June 2014

### 3. The electricity governance system

#### 3.1 Overview

A simplified representation of the arrangements for formal policy-making and regulation in electricity is shown in Figure 1.

**Figure 1: Current institutional arrangements in electricity in Denmark**



A more detailed description of the main actors and institutions, and their inter-relationships, is given below, but in summary:

- Political agreement on major policy frameworks is handled through a **parliamentary process**, often involving cross-party committees, with parallel processes involving input from industry and civil society actors.
- The **Danish Energy Agency**, which sits inside the Ministry for Climate, Energy and Buildings, supports the political process through undertaking or commissioning analysis, and coordinating consultative processes. Ultimately its role is policy development. It has overall responsibility for decarbonisation, costs and long-term security of supply.

- **Energinet.dk**, the TSO, is the delivery body for electricity system policy and change, and also has responsibility for short-term system security, within the wider context of the Nordpool wholesale electricity market, which Energinet.dk co-owns and operates together with the other Nordic and Baltic SOs. In practice it has taken on several other roles, which include elements of policy development.
- The **Danish Energy Regulatory Authority** is an economic regulator with a strict remit of implementing the law on regulation, setting regulatory parameters such as allowed rate of return, benchmarking etc. It has no environmental brief, and does not make policy, including changes to the regulatory regime.
- Denmark has a large number of electricity generating and supply companies, many of whom are quite small. However, it also has a large publicly-owned company, **DONG Energy**, which has about 25% of total electricity generation (including about half of generation from thermal plants) and 26% of distribution.<sup>6</sup> DONG is owned 80% by the state, through the Ministry of Finance, but since 2014 a 20% share has been owned by Goldman Sachs and a number of Danish pension funds.

Electricity governance arrangements have evolved into their current form over the last 15 years. Up until the mid-2000s, Denmark had two transmission operators (TOs), Elsam and Elkraft for Western and Eastern Denmark respectively which were owned collectively by a number of what were then combined supply and distribution companies. The 2003 European Directive on electricity (2003/54/EC) required unbundling, so the transmission arms of the two regional TOs were taken over by the state and Energinet.dk was created in the 2009 Consolidation Act.<sup>7</sup> Supply and distribution were also unbundled (although in many cases parent companies retained overall ownership of both areas), and retail markets were liberalised.

In response to market liberalisation, DONG, which at that stage was mainly a gas wholesaling business, entered the electricity generation and supply market (also acquiring a distribution business). This was because, partly based on the experience of UK market liberalisation, the company feared that relying solely on gas wholesaling would leave it vulnerable to

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<sup>6</sup> *DONG Energy 2014 Annual Report*, [http://assets.dongenergy.com/DONGEnergyDocuments/com/Investor/Annual\\_Report/2014/dong\\_energy\\_annual\\_report\\_en.pdf](http://assets.dongenergy.com/DONGEnergyDocuments/com/Investor/Annual_Report/2014/dong_energy_annual_report_en.pdf)

<sup>7</sup> <http://www.energinet.dk/SiteCollectionDocuments/Engelske%20dokumenter/Om%20os/Danish%20Act%20on%20Energinetdk.pdf>. This decision to create a publicly owned rather than a private TSO was based on a view 'deeply rooted in Denmark' that decisions about very large investments should be based on their overall social value, rather than on private profit (Interview with Poul Erik Morthorst, 11 March 2015). This is consistent with the strong concept of the 'common interest' discussed in section 2 above.

marginalisation in the new market situation.<sup>8</sup> To satisfy the unbundling requirements of the 2003 Directive, while Energinet.dk is owned by and reports to the Ministry of Climate, Energy and Buildings, DONG Energy is owned by and reports to the Ministry of Finance.<sup>9</sup>

Other aspects of the system are older. Denmark joined the regional electricity wholesale market Nordpool in 2000. The country has also had an energy regulatory function since 2000, but this was housed within the overall Competition Authority until the creation of the Danish Energy Regulatory Authority as a separate body in 2012 as part of requirements under the EU Third Package.

Thus while the Danish system is entirely compliant with EU energy directives, it is different from the UK system in several respects, including public ownership of energy production and of the TSO, a regulator with a different role, and a different set of relationships (see below for further details). This contrast supports Thatcher's (2007) observation that convergence of regulatory institutions across Europe at a formal level does not necessarily mean substantive convergence.

### **3.2 The key institutions**

This section describes the main institutions in the Danish system, and the interrelationships between them. How the system functions in relation to various criteria is then assessed in section 4.

#### **Ministry of Climate, Energy and Buildings**

Major changes to policy in the energy sector go through a political process. This will often involve extensive negotiations between political parties, not only within the government (which has always taken the form of a coalition since the early 20<sup>th</sup> century) but also with the opposition, usually through a parliament committee. This kind of process is common in countries with proportional representation systems and coalition politics (Lijphart 1984, Powell 2000).

A good example of this is the 2012 Energy Agreement, which sets high-level targets for greenhouse gas emissions, renewable energy and energy efficiency to 2020 and 2050, but also includes specific policies and roadmaps for action (DEA 2012). This framework is explicitly described as a 'political agreement', and was negotiated and agreed not only within parties

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<sup>8</sup> Interview with Anders Eldrup, 11 March 2015

<sup>9</sup> Interview with Ulrik Stridbaek 24 June 2014

within the coalition government elected in 2011, but across all but one of the 8 parties represented in the Folketing (Ministry of Energy, Climate and Buildings 2013).<sup>10</sup> The Agreement was negotiated over a one and a half year process through a Parliamentary Committee, and more than 40 background analyses were commissioned to inform the debate.<sup>11</sup> Because it includes quite specific targets, this kind of agreement provides a degree of political stability for the continuing transformation of the Danish energy system, but it does not fully guarantee it. Costs concerns, especially about offshore wind, continue to be relevant and there is a possibility that a new government following elections in 2015 might seek to revisit the 2012 Agreement targets.<sup>12</sup>

Policy making at more granular levels also typically involves many external actors, with the process often led by an independent committee or commission (*udvalg* in Danish) with a chair and sometimes members selected by the Minister, and participants from universities, civil society organisations, consumer representatives, energy companies and other stakeholders. Bach (2013) describes the example of the development of the strategy for building renovation, which took place over the period March 2012 to December 2013 and involved three conferences and various working groups comprising representatives of 45 organisations.<sup>13</sup> Such processes make only recommendations, with decision making remaining within government and the political process, and civil servants from the DEA will typically act as a secretariat for such processes, exercising a degree of control over the process, but they still reflect the long-standing recognition of the legitimacy and role of organised groups in Denmark (see above).

## Danish Energy Agency

Overall policy development, including support to the political process and coordination of inputs from other actors, is undertaken by the Danish Energy Agency (DEA) or *Energi Styrelsen* (ENS) in Danish. The DEA sits within the Ministry of Energy, Climate and Buildings and covers not only electricity policy but also heat, gas, oil and natural gas, energy efficiency, building regulations, and climate policy.

The Agency works in a number of different modes. It plays a key role in coordinating debate by acting as the secretariat for commissions and committees (*udvalg*) set up by the Minister (see above). Where broad agreement on a policy direction has been reached, then the Agency may

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<sup>10</sup> The Agreement was signed by all political parties except the Liberal Alliance, which at the time held 9 out of the Folketing's 175 seats (i.e. around 5%).

<sup>11</sup> Interview with Kamilla Thingvad, 14 November 2014

<sup>12</sup> Interview with Poul Erik Morthorst, 11 March 2015

<sup>13</sup> See <https://www.youtube.com/watch?v=r1IDKHZkfHq> for a video of the presentation.



itself undertake more detailed analysis; it has a staff of around 340 and houses considerable technical capacity for policy and technology evaluation. It may also commission specific studies from other bodies. Within the wider public sphere, while Denmark does not have the network of independent institutes found in Germany, its universities do have a strong technical capacity in energy technologies, planning and system analysis, including the Danish Technical University and Aalborg University.<sup>14</sup>

The DEA shares responsibility for security and system transformation with Energinet.dk, however the DEA is responsible for the overall policy framework, ensuring long-term security of supply and handling trade-offs. The capacity and pivotal role played by the DEA partly reflects the legacy of planning in the Danish energy system from the 1970s and 1980s, especially in heat. It also partly reflects the wider political model, where the concept of consensual collective decision making through the political process has relatively strong legitimacy, but then requires translation into concrete policies.

## **Energinet.dk**

Energinet.dk is the transmission system operator in Denmark. Together with other Nordic and Baltic system operators it owns and operates the electricity wholesale market organisation, Nordpool, and is also responsible for electricity system balancing in the two Danish areas (East and West). Energinet.dk is a key actor for the implementation of policy in Denmark. It is a state-owned not-for-profit enterprise, formally regulated by the DERA (see below), and governed by an independent Supervisory Board but also under the ultimate authority of and reporting to the Minister.<sup>15</sup>

The Supervisory Board has 11 members, of which 8 are appointed by the Minister (including the Chair), 2 'on the recommendation of the electricity industry' and 1 by the gas industry, although all members should be 'independent of commercial interests' in electricity and gas. In addition, 3 members out of the 11 are elected by Energinet.dk employees. The Board 'is in charge of the overall and strategic management of Emnerinet.dk', and can dismiss the executive management of the organisation.

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<sup>14</sup> Within this broad picture, some observers see a gradual weakening of public capacity as staff leave and set up commercial consultancy companies (Interview with Peter Karnøe, 24 June 2014). This is part of a wider realignment of what Campbell and Pedersen (2014) call 'knowledge regimes', i.e. capacity for analysis, with the rise in private think tanks and consultancies from the 1990s onwards

<sup>15</sup> Energinet.dk Articles of Association, <http://www.energinet.dk/SiteCollectionDocuments/Engelske%20dokumenter/Om%20os/ARTICLES-OF-ASSOCIATION-energinet-dk.pdf>

As described in section 3.1 above, Energinet.dk was created in 2009, ultimately as the result of the transposition of the EU Directive on electricity liberalisation. Its official objective is 'to ensure the efficient operation and expansion of the main electricity and gas infrastructure and to ensure open, equal access for all users of the grids', within the context of relevant legislation on gas, electricity and the promotion of renewable energy.<sup>16</sup>

It is a large organisation, employing almost 700 people, and has gradually taken on new roles as they arise.<sup>17</sup> As TSO it is tasked with maintaining the overall short-term security of electricity and gas supply systems. The system operator function, including balancing and settlement, are handled by the operational department.<sup>18</sup> Energinet.dk is also responsible for developing the main Danish electricity and gas transmission infrastructure, carrying out planning, and taking account of future transmission capacity requirements and long-term security of supply. Energinet.dk also holds and enforces the technical and commercial electricity codes and regulations, including Regulation E on environmentally friendly technology which translates Denmark's high-level direction of travel towards a low-carbon system into the details of priority access. Energinet.dk also runs the process for code revision, which happens roughly once every 5 years.

In its role as the Danish partner in the regional electricity market Nordpool,<sup>19</sup> Energinet.dk also has a role in ensuring objective and transparent conditions for competition in wholesale electricity markets and monitoring that competition is working. It also has a role in operationalising much of the higher-level policy decisions about transforming the Danish system.

However, in addition to these basic TSO roles, Energinet.dk also sees itself as playing a key role in translating the high-level targets for decarbonisation and development of renewables into reality.<sup>20</sup> It supports eco-friendly power generation, calculates the environmental impact of the energy system as a whole and plays a major role in the development and demonstration of green energy production technologies. For example, Energinet.dk has funded and led various smart grid R&D projects (including the 'cell controller' project (Martensen et al 2011)), even though these were in the domain of electricity distribution. It has worked closely with the electricity industry association, Dansk Energi, to promote the smart grid agenda (Dansk

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<sup>16</sup> *ibid*

<sup>17</sup> As one interviewee put it, because Energinet.dk has demonstrated its competence and efficiency that when a new issue or problem arises, there is somewhat of an attitude amongst energy policy makers to say: 'Well, they [i.e. Energinet.dk] are doing fine, could we not leave it to them to handle these issues as well?'

<sup>18</sup> Unlike in the UK where National Grid sub-contracts settlement to Elexon

<sup>19</sup> <http://www.nordpoolspot.com/#/nordic/table>

<sup>20</sup> Interview with Poul Erik Morthorst, 11 March 2015

Energi/Energinet.dk 2010). This is one example of how Energinet.dk has on occasion moved from simply delivering policy into also seeking to help develop or influence policy making.

Energinet.dk has also taken the lead in a number of complex reform projects in the sector. These include the development of the DataHub (Energinet.dk 2014), in which all data on generation, network and supply are handled by a new centralised system held within Energinet.dk, and the move to a 'supplier-centric model' in which the sole point of contact for consumers will be suppliers (i.e. the supplier hub principle as in the UK) (*ibid.*).

However, the reach of Energinet.dk into so many areas has produced a reaction. A regulatory review process is currently underway in Denmark. A commission was established in 2014 to examine the regulatory approach and made recommendations for change (Udvalg for el-reguleringseftersynet 2014). One aspect of the review has covered the role of Energinet, and the initial report concluded, in the words of one interviewee, that Energinet.dk 'wears too many hats', and there are proposals to remove some of those hats. For example, it is proposed that DERA take over the role of resolving disputes between parties that may arise in the use of the DataHub. Another proposal is that Energinet.dk no longer provide a default service as a Balancing Responsible Party (see the Nordpool section below) – effectively an aggregator of last resort for small generators – and that this role be played by commercial companies instead.

### **The Danish Energy Regulatory Authority**

Like Britain's regulator Ofgem, the Danish Energy Regulatory Authority (DERA) (*Energitilsynet* in Danish) is an economic regulator, but unlike Ofgem (which has a mix of economic efficiency, social and environmental objectives), its remit is solely one of economic efficiency. Also unlike Ofgem, DERA does not do any policy development work or makes any changes to the regulatory regime itself (although it may sometimes send analyses of issues to the DEA).<sup>21</sup> Instead, it focuses solely on implementing regulations enshrined in law, i.e. setting regulatory parameters and enforcing compliance. Decisions made by DERA can be appealed to an independent Energy Board of Appeal (*Energiklagenævnet*).

DERA has quite a small staff (relative to Ofgem) of around 60, with some 20 people working on electricity. The function of energy regulation was previously located within the Danish Competition Authority, but following the European Third Package on energy liberalisation, DERA was established as a separate independent regulator in 2012. As an independent

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<sup>21</sup> This section draws heavily on an interview with Rune Moesgard 10 March 2015

regulator it is formally governed by a Board whose members are appointed for 4 year terms by the Minister for Climate, Energy and Buildings, but over whom the Minister has no powers of instruction.<sup>22</sup> Board members are supposed to be independent of any public or private entity, and represent 'professional skills in the areas of law, technical matters, environment, and trade/consumer matters'. Current DERA Board members include academic lawyers and scientists, and consultants with previous energy industry or energy ministry experience.

DERA regulates a number of different aspects of the electricity system. It conducts benchmarking exercises for electricity distribution network companies and sets revenue caps for them, which are currently based on allowed rates of return. DERA also regulates Energinet.dk as TO and SO in a 'light touch' form. Energinet.dk is legally a not-for-profit company, so it can only set charges to cover what are designated as legitimate costs by the regulator. While DERA monitors prices in the retail market, suppliers are not regulated by DERA. Here, the Danish Competition Authority can intervene against market abuse. However, DERA has regulated the default service part of the market, under which suppliers can bid to provide price-regulated electricity. This arrangement is now being phased out and the market fully liberalised.

DERA also plays a role in the review of electricity codes. Reviews are led by Energinet.dk, but proposals then have to be submitted to DERA (and ultimately the DERA Board), which bases its assessment of proposals on legislation. In this process it appears that DERA does sometimes challenge certain decisions and push for clarification and that there is sometimes some iteration, but it is then rare for the Board to reject proposals for change outright.

In 2014 a review of the regulatory framework for electricity was initiated in Denmark. Unlike in GB, where Ofgem conducted the RPI-X@20 review itself, the Danish review started with an independent commission appointed by the Minister and now involves an overall process led by the DEA and two further commissions on more detailed areas. DERA provides analysis, but is not leading policy making.

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Generally speaking, the picture that emerges from interviews with stakeholders in the Danish system is one of close and mainly friendly working relationships between the different actors, especially the DEA, Energinet.dk and the industry in the form of Dansk Energi. Denmark is a small country, so most participants in policy debates know one another. At the same time, the

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<sup>22</sup> <http://energitilsynet.dk/tool-menu/english/members-of-dera/>

strong norms of the importance of pursuing the common interest and achieving consensus through inclusive debate help drive constructive processes.

While policy making is recognised as ultimately the prerogative of the Minister, the DEA appears to have a pivotal role in policy development. However, in developing policy, the DEA often draws on the expertise of Energinet.dk and sometimes DERA, as well as the industry and other stakeholders. Thus while Energinet.dk plays a major role in delivering policy (as implied in Figure 1 above), in practice it has increasingly become involved in influencing policy through analysis, reports and inputs into commissions appointed to review policy areas. Nevertheless its primary role is the delivery of system operation and transmission operation and planning functions, as well as other large complex projects that have been approved at the political level.

As noted above, the role of DERA as an economic regulator in the Danish system is quite narrowly defined. DERA is independent of other bodies, and of the Minister. It regulates markets and network actors, including Energinet, according to the law. Effectively, while overall policy aims for a transformation of the system in an environmentally-friendly direction, DERA plays the specific role not of blocking this transformation, but rather, ensuring that it is done in a cost-effective manner.<sup>23</sup> This does not mean that there are no tensions; for example in the 2014 review of electricity regulation, DERA was keen on ensuring a focus on shorter-term efficiency incentives, whereas others wanted to prioritise the development of a smart grid, leading to a 'difficult' debate. However, DERA does not have the wider institutional power that Ofgem does in Britain (see Mitchell et al 2015 Figure 1).<sup>24</sup>

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<sup>23</sup> Interviews with Rune Moosegard, 10 March 2015 and Poul Erik Morthorst, 11 March 2015

<sup>24</sup> DERA does not necessarily play the key role even in debates about cost-effectiveness. For example, in recent debates on the cost of offshore wind the decisive role in raising cost concerns, resulting in postponements to planned expansion, appears to have been played not by DERA but by the Danish Council of Environmental Economists (DCEE 2014).

## 4. Assessing the model

In this section, I make a brief assessment of the arrangements for policy-making and regulation described in section 3. This assessment is based on five criteria for ‘good’ regulation identified by Baldwin et al (2012: 26-32) as ‘arguments that have general currency when regulatory arrangements and performance are discussed in the public domain’ (*ibid*: 26). These arguments are expressed in the form of questions as follows:

- A. Is the action or regime supported by legislative authority?
- B. Is there an appropriate scheme of accountability?
- C. Are procedures fair, accessible and open?
- D. Is the regulator acting with sufficient expertise?
- E. Is the action or regime efficient?

In Baldwin et al’s framework the greater the extent to which these questions can be answered in the affirmative, the better is the regulatory system being assessed (while acknowledging that there may be some trade-offs between these criteria).

This framework is designed for assessing *regulatory* institutions in a narrow sense. However, I would argue that the same fundamental principles can be used to evaluate any institutional arrangements for the implementation of a set of goals defined by a legitimate political authority, and so can be applied to the wider set of policy development and delivery institutions, including regulatory regimes, that are being discussed here.

### **A. Is the action or regime supported by legislative authority?**

The first criterion is about whether regulators, or more broadly, policy implementing bodies that have been given a set of objectives, have a clear mandate that is traceable back to a legislative body, i.e. a parliament, and how successful regulators are in fulfilling that mandate. The underlying issue here is about the clarity of mandate. As Baldwin et al (2012: 27) note: ‘regulators are seldom, if ever, involved in the mechanical transmission of statutory objectives into results on the ground’. In many cases, regulators and other implementing bodies have multiple or ambiguous mandates meaning that they have to interpret these and make decisions about how to handle trade-offs between objectives. This has certainly been the case in Britain, where the regulator has a great deal of discretion and trade-offs within the energy policy trilemma of cost, security and environmental objectives have been left to the regulator to resolve. Even with the most recent attempts to specify Ofgem’s mandate more clearly, this

remains the case.<sup>25</sup> The effective delegation of policy decisions to delivery bodies in Britain is also evident in the case of National Grid. For example, National Grid is dominant in the governance of system security standards and the trade-offs between cost and system security (e.g. Strbac 2010).

By comparison with this British arrangement, in which interpretation of mandates is relatively delegated, the Danish system appears quite *directive*, in two senses. The first is literal, in the sense that more implementation of policy and regulation appears to take place in bodies that are under the direction of political authorities. This is especially the case for Energinet.dk. As noted above, while Energinet.dk is a separate non-profit enterprise with its own board, it is at the same time owned by the state and reports directly to the Minister for Climate, Energy and Buildings. At the same time, some of the functions carried out by Ofgem in Britain are carried out by Energinet.dk in Denmark (such as overseeing the review of codes) as well as others carried out by other bodies in the UK (such as the creation of a central data system, handled by the DCC in the UK, smart grid R&D and project such as the shift to a supplier centric model).

The second sense in which the Danish system is more directive than the British system is that mandates for implementing bodies tend to be more well-defined, involving less ambiguity, fewer requirements for handling trade-offs and discretion in interpretation by the implementing bodies. Thus DERA has a single remit, unlike Ofgem, and does not have to deal with trade-offs between economic efficiency and environmental objectives. Energinet.dk is tasked not simply with the decarbonisation of the electricity system in general, but with ensuring that particular targets for the expansion of wind power are reached. Where DECC has a smart grid vision that has to be interpreted by others, Denmark has a smart grid strategy with specific tasks allotted to specific actors.

This is not to say that the Danish system involves no interpretation of mandates at all.<sup>26</sup> However, it does mean that the boundaries between what is handled within the political process and what is left for regulatory and policy delivery bodies (and indeed energy companies) to exercise discretion over are located differently in Denmark and the UK. More decisions are taken in the political sphere in Denmark than in Britain. This fact means that more trade-offs are resolved before policy and regulation reaches implementing bodies. While there are strong arguments for believing that this arrangement is more appropriate for democratic legitimacy and

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<sup>25</sup> <http://projects.exeter.ac.uk/igov/new-thinking-the-odd-couple-will-a-new-strategy-and-policy-statement-help-sort-out-the-relationship-between-government-and-ofgem/>

<sup>26</sup> Energinet.dk has initiated projects that were not directly requested from the Ministry, and which might be seen as beyond their main scope of action. An example might be the 'cell controller' project, which was aimed at innovation in distribution network management.

for the political sustainability of policy and regulation, it also means that more rests on the ability of politicians and civil servants to specify mandates correctly. Indeed the British system of delegation is justified by commonly used arguments from regulatory economics that decisions should be taken out of the hands of politicians because they either do not have the technical expertise to take good decisions, or that their decisions will not be in the public good because they will be distorted by the incentives of the short-term electoral cycle.<sup>27</sup>

In fact the evidence from the transformation of the electricity system so far, and the evidence on efficiency examined below, suggests that the Danish institutional arrangements have overcome these problems. This is likely to be for two reasons. One is that, as noted above, the political process in Denmark is more inclusive and cross-party, so decisions taken within the political sphere are less affected by electoral considerations (which are in any case not so sharp because of the inevitability of coalitions). The second is that, as discussed below, there is considerable technical capacity and information within the public sphere available to politicians, enabling better decision making. While the British government can build up such capacity sporadically (as was the case for the development of the EMR in DECC, for example), generally this is not the case for the UK.

Within this context, much of Denmark's progress on the expansion of renewable electricity can be linked to the directness and specificity of mandates for implementing bodies. For example, wind was not simply supported by subsidies; distribution companies and Energinet.dk are required to make network capacity available to them (Pobłocka et al 2009). By comparison in Britain decisions about network connection were delegated first to Ofgem and then to network companies themselves, until lack of action led the government to step in and impose a solution at the transmission level in the form of Connect and Manage. At the distribution level a distributed generation incentive was tried and then abandoned and connections arrangements are still largely in the hands of DNOs (Shaw et al 2010, Lockwood 2013). Energinet.dk explicitly bases its transmission network planning on a target for wind expansion.

In Britain, the delegation of more implementation via a regulator whose main tools are incentive structures, also makes for a more complex system, especially where energy sector actors are large companies driven by shareholder value with sophisticated systems for gaming regulation and deriving maximum value from regulatory frameworks, and hold a lot more information than do regulators. For example, Strbac et al (2014: 302) argue that for on-shore transmission 'Ofgem has recognised the difficulty in defining an efficient enduring NETSO incentive scheme, as this requires an in-depth understanding of transmission operation and options for managing

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<sup>27</sup> See Helm et al (2003) for an example in the sphere of energy



the corresponding costs.’ The relative simplicity of the Danish system may partly rest on the fact that the TSO is state-owned and most commercial energy sector actors apart from DONG and one or two other exceptions are small companies, often not-for-profits that are focused on service provision rather than shareholder value.

There are some areas where direction based on environmental concerns has not reached, mainly in areas governed by DERA. The current framework for distribution network regulation, which is based on rate of return regulation on a fixed RAV set in 2000 and applied annually has not incentivised innovation, and little innovation in networks has happened to date.<sup>28</sup> Indeed the main actors driving R&D on distribution networks have been Dansk Energi and Energinet.dk. In Britain, concerns about innovation in networks was one driver for the 2009-2010 RPI-X@20 review, which was initiated and run by Ofgem, and the subsequent change to the new RIIO framework, which Ofgem also decided on. In Denmark, DERA’s remit is solely on economic efficiency as defined by legislation, and it cannot initiate a review of its own regulatory framework. Rather, the response has been to run this review within the political sphere.

## **B. Is there an appropriate scheme of accountability?**

This criterion is about how far a regulatory or policy body is accountable to a representative institution for its interpretation of the policy or regulatory mandate it is given (Baldwin et al 2012: 28). Because such mandates tend to be more clearly specified in Denmark, and involve less interpretation, accountability is arguably less of an issue. For DERA, accountability is to their Board, and ultimately to the Danish Energy Board of Appeal. For Energinet.dk, accountability is to their Board and to the Minister for Climate, Energy and Buildings.

Precisely as a result of the directed nature of the institutional relationships, the Danish system gives more power to the state, with less independence or recourse to parliament than in the British system. The potential dangers of this system are at least partially offset however, by the nature of the political process, and the difficulty that any one political party, and hence any one section of society, faces in imposing policies or regulations on the system unilaterally. Because the political process is by necessity more consensual and based on compromise, while the government may have a greater role in enforcing decisions, those decisions have (mostly) not been reached by the government alone.

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<sup>28</sup> Interview with Rune Mooesgard, 10 March 2015

### C. Are procedures fair, accessible and open?

The key issue for this criterion is how far regulatory and policy implementation procedures are accessible, fair and open for the public, consumers and other affected parties (Baldwin et al 2012: 28). Insofar as the Danish electricity regulation and policy is relatively *simple*, it is arguable that it meets these qualities. One example is the regulations governing participation in the balancing mechanism (in the Denmark known as the regulating market). The relevant regulation in Britain, the Balancing and Settlement Code, is 870 pages long. The Danish equivalent, Regulation C1 on Terms of Balance Responsibility, is 23 pages long. Codes covering other areas, such as network access and charging also show similar contrasts.

The accessibility of the governance of the electricity system in Denmark is also enhanced by the *availability and accessibility of data*. Data on overall trends on energy and related issues such as emissions are available on the Danish Energy Agency website.<sup>29</sup> DECC provides similar kinds of information. However, Energinet.dk also provides readily accessible data on the electricity system, including balancing, use and prices, plus assumptions used in planning analysis.<sup>30</sup> Detailed data on wholesale electricity market volumes and prices are also available on the Nordpool website.<sup>31</sup> Data generation by individual generators, such as some CHP plants, are even available, for example through the website of EMD.<sup>32</sup> For market participants, all hourly metered data is now freely available through the DataHub (as opposed to the UK system of access via a commercial company for a payment).

Accessibility within electricity regulation is even further reinforced through the institution of the Balancing Responsible Party (BRP). Kitzing et al (2014: 11) define as BRP as follows:

‘A balancing responsible party is economically responsible towards the TSO to have a balanced portfolio in every single hour. All production and all consumption has to be registered with a balancing responsible party in order to allocate metered volumes to a balancing account.’

Thus to participate *directly* in Nordpool within Denmark (indeed to either generate or supply electricity), actors have to sign up to Regulation C2 on balancing settlement and become what is known as a Balancing Responsible Party (BRP). Although they are lower than participating in the GB electricity system, there are still costs associated with becoming a BRP. There are

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<sup>29</sup> <http://www.ens.dk/en/info/facts-figures/energy-statistics-indicators-energy-efficiency>

<sup>30</sup> <http://www.energinet.dk/EN/EI/Sider/default.aspx>

<sup>31</sup> <http://www.nordpoolspot.com/Market-data1/Eisport/Area-Prices/ALL1/Hourly/?view=table>

<sup>32</sup> <http://www.emd.dk/plants/>

different types of BRP for consumption, production and trading. Some BRPs are large generating companies, trading companies or large suppliers. However, there are also some BRPs which essentially act as aggregators for smaller actors. These aggregator BRPs facilitate the *indirect* involvement of small generators and suppliers in electricity markets, by taking on the regulatory costs. According to Kitzing et al (2012), only 5 of Denmark's 80 or so suppliers are BRPs themselves, while the rest assign the BRP tasks to a trading company. On the generation side, 4 main aggregators play the role of intermediation between the hundreds of CHP operators and small wind farms on the one hand and Nordpool on the other.<sup>33</sup> Overall, in 2009 there were 44 BRPs in Denmark (Nord REG 2009 cited in Kitzing et al 2012: 11); this number is now down to 21.<sup>34</sup>

The combination of relative simplicity, data availability and aggregation does make the system more accessible to actors who in the UK would require more resources to understand codes and access data. This is certainly true of smaller generators, network companies and suppliers. There also appear to be strong norms about fairness of treatment for these smaller companies, especially in relation to DONG Energy, which is much larger than any other commercial actor in the Danish electricity sector.<sup>35</sup>

DONG Energy was formed by the state-owned upstream gas trading company DONG in the mid-2000s through the acquisition of generation and supply companies. DONG builds and owns wind farms, especially off shore wind, as well as 9 large thermal plants and some district heating capacity. It generates around a quarter of Danish electricity. It also owns two distribution networks (DONG Nord and DONG City) serving almost a million customers, many in the Greater Copenhagen area.

Because DONG is such a large company, it can play a more active direct role in policy influencing compared with the many small actors, and is able to support its own R&D wing. However, because, in the words of one interviewee, 'Danes don't like big things', there appears to be a lot of caution both within the industry association Dansk Energi and within policy making and regulatory bodies not to privilege DONG. The company itself appears to believe that it would be counter-productive to try to force its views on the rest of the industry or on government, again reflecting the power of the 'common interest' concept outlined in section 2.<sup>36</sup>

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<sup>33</sup> Interview with Anders Anderson, 16 March 2015

<sup>34</sup> *Ibid*

<sup>35</sup> Vattenfall and E.ON are the other major corporately owned energy companies in Denmark, but they play a relatively small role and are currently trying to divest assets and exit the Danish market.

<sup>36</sup> Interview with Ulrik Stridbaek, 24 June 2014

Beyond energy sector participants, it is arguable that the Danish system is about accessible, fair and open as the British system for the public, consumers and other stakeholders on an individual basis. There is no explicit consumer organisation representative on the Board of the Danish Energy Regulatory Authority. However, there is an Energy Supplies Complaint Board (*Ankenævnet på Energiområdet*) which exists to deal with disputes between consumers and suppliers which are not settled in the courts (for details see Kitizing et al 2012: 12). In 2011, the Board settled 94 complaints on electricity and answered 467 inquiries. By comparison there were just over 11,000 complaints to Ofgem in 2011, rising to over 52,000 in 2014.<sup>37</sup> While the UK population is roughly 11 times that of Denmark and the Ofgem complaints cover gas as well as electricity, this does appear to suggest that levels of consumer dissatisfaction in Denmark are somewhat lower than in the UK. This may also reflect higher levels of trust in energy companies in Denmark, and greater transparency about price, since Nordpool provides more clearly identifiable signals from a much more liquid wholesale market than in Britain.

#### **D. Are implementing bodies acting with sufficient expertise?**

As noted above, the more directive energy governance system in Denmark has some advantages, but is also more exposed to the risks of poor decisions made by government, especially in the form of the energy ministry. Certainly, in the UK, where much decision –making about implementation is delegated, there is more expertise and experience in the delegating bodies (often in the private sector) than in government. In this context, three aspects of the Danish arrangements are important. The first is the in-house expertise of the Danish Energy Agency and expertise available to it via the *udvalg* approach and commissioned studies, described in section 3 above. The second is the availability and transparency of electricity market data noted in this section. The third is the fact that the TSO is a public sector organisation, whose expertise and data on network planning and system operation is also available to the Ministry.

Beyond these factors, there is the more subtle effect that to a greater extent than in the UK, where commercial objectives play a more dominant role, in Denmark there appears to be more of a commonly held commitment amongst most energy sector actors that the system needs to be transformed and that this is a common venture, encouraging these actors to share their expertise and information with policy makers.

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<sup>37</sup> <http://www.theguardian.com/money/2015/jan/10/complaints-uk-energy-watchdog-triple-ofgem>

## E. Is the action or regime efficient?

Given that Denmark's strength in system transformation is apparent, the efficiency of that transformation is a key test of its governance arrangements. There are various ways of approaching this question. The wholesale price of electricity in Denmark is amongst the lowest in Europe, while that in the UK is the most expensive apart from Belgium. This may partly reflect lower balancing and constraint costs, because of differences in wholesale market design. But Denmark's low wholesale prices also reflect the effects of large amounts of wind, along with Norwegian hydro-electricity, which have low marginal costs but high capital costs. For wind, these capital costs are reflected in the Public Service Obligation. To make a valid comparison between the two countries, it is necessary to capture policy costs as well as energy market (and network) costs.

One direct measure of policy costs is provided by the OECD (2013). In 2010, renewable sources provided 32% of electricity generated in Denmark, while the figure for the UK was just under 7% (IEA 2013). At that time, according to the OECD, the cost of Denmark's renewable energy programme was 0.09% of GDP. The cost of the UK's renewable energy certificate scheme was 0.06%. In comparative proportionate terms then, Denmark's programme was roughly three times more cost-effective than the UK's.

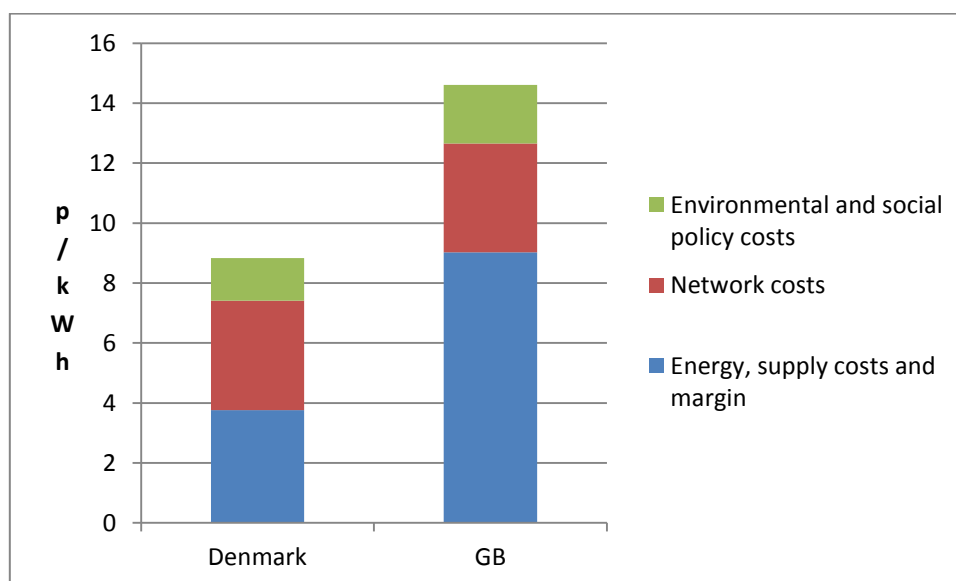
Another approach is to compare final prices. Eurostat data for 2012 show that Denmark has the highest retail prices in Europe, at almost €0.3/kWh. However, a large portion of retail price (over half) in Denmark is tax, whereas the UK has low rates of tax on electricity. To get an indicator of system efficiency it is therefore necessary to take tax differences out of the comparison. At the same time, as noted above, wholesale prices are not sufficient to capture system costs. Thus the appropriate comparison of system efficiency is those elements of price that reflect wholesale and supply costs of energy, network costs, and environmental and social policy costs, but not tax.

These are shown in Figure 2, based on data from Ofgem and the Danish Energy Agency. These data use different currencies, and to convert Danish øre to British pence the appropriate exchange rate is purchasing power parity, for which OECD data are used.<sup>38</sup> On this analysis, the overall production and supply of Danish electricity, including its higher level of renewables, looks highly efficient compared with that for the UK. Despite a considerably higher proportion of renewable generation, the levy for environmental policies is smaller than in the UK.

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<sup>38</sup> Using the nominal exchange rate for 2013 would produce slightly higher Danish costs in p/kWh, but not significantly.

**Figure 2: Retail electricity costs for households Denmark and Great Britain, 2013**



Sources: Denmark data from Danish Energy Agency (cited in Kitzing et al 2014), GB data from Ofgem (2015), Exchange rate from OECD

This price analysis is for households, and differences in the costs of environmental and social policies also reflect differences in how far larger customers are exempt from these costs. In Denmark, consumers with consumption of more than 1GWh a year pay a reduced PSO rate. This implies that households (along with other smaller users) pay a proportionately higher PSO rate. In the UK, exemptions from the costs of the RO, FiT and CfDs for energy-intensive industry were only proposed in 2014 (BIS/DECC 2014). Thus the difference in the environmental and social costs element in Figure 2 understates the degree to which costs are lower in Denmark

Network costs in Denmark are slightly higher than in Britain, and make up a much greater proportion of the cost elements analysed here. It is difficult to make a rigorous evaluation of this contrast without a considerable amount of information. First, there are differences of scale and topology between the two countries. The UK serves a population approximately 7 times larger than Denmark, and arguably would benefit from economies of scale, with a much larger network size. On the other hand, Denmark is small, flat and densely settled by comparison with Britain, especially Scotland. However, there is some evidence to support the view that network regulation in Britain has incentivised efficiency to a greater degree than in Denmark. Distribution networks are regulated through allowed rate of return regulation, which does not provide such a sharp incentive for efficiency as Britain's revenue cap regulation framework.<sup>39</sup> The Danish regulator oversees Energinet.dk's costs but does not provide incentives for efficiency *per se*.

<sup>39</sup> Interview with Rune Mooesgard, 10 March 2015

Concerns about the efficiency of Energinet.dk as a TSO have been voiced in Denmark, especially early on after its creation. An initial assessment against other European TSOs showed some problems. However, a more recent review found that Energinet.dk was performing well on economic efficiency relative to average performance of a number of European TSOs (Frontier Economics 2012). Ultimately, the fact that network costs make up a higher proportion of final prices in Denmark reflects the decline in wholesale prices in a merit order market as zero- or low-marginal cost technologies enter and expand.

Overall then, with the possible exception of network costs, the Danish system of regulation and policy making in electricity does appear to be highly efficient.

## **5. Conclusions**

This paper has outlined and assessed some aspects of the institutional arrangements for policy-making, implementation of policy and regulation in electricity in Denmark, comparing the Danish system at various points with that in place in Britain.

The Danish system appears to have worked well. It has delivered high levels of renewable generation and ease of access for small actors in both generation and supply combined with good levels of efficiency. However, it should also be noted that current arrangements have only been in place since the late 2000s, and much of the growth of renewable generation to date evolved under a different set of arrangements.

There are both similarities and differences between the Danish and British set-ups. Both have an independent economic regulator, and both have transmission operation and planning combined with the system operator role in a single organisation. In broad terms in both countries policy is made via a political process involving government and opposition parties and a bureaucratic process involving a combined climate and energy ministry.

However, these formal similarities mask considerable contrasts in substantive terms. In Denmark negotiated agreement across all (or almost all) political parties on major policy is far more common. More detailed policy targets and more decisions about trade-offs are defined within the political sphere, leaving less interpretation required of implementing bodies. This more directive system is also supported by a TSO under public ownership and reporting directly to the climate and energy minister, contrasting with the double delegation in Britain to National Grid via Ofgem. The powerful role played by Ofgem contrasts with the narrow remit of the Danish regulator.

Relative to Britain, the Danish system appears to have a number of benefits. Political decisions are taken at a political, not a regulatory level. There is no need for a regulator to devise complex incentive schemes designed to overcome information asymmetries and drive appropriate behaviour by a privately owned system operator whose primary allegiance is to shareholders. Policy development and delivery is not dominated by any one single body (although recently the seemingly ever-expanding role of Energinet.dk has come under scrutiny), but rather is seen as a shared enterprise. Risks of duplication appear to be managed by high levels of coordination and communication that are partly driven by the wider political culture. Economic regulation for efficiency is part of the institutional landscape but does not dominate to the exclusion of other objectives.

Overall, in certain respects, especially in the role of public bodies and the relatively clear prioritisation of environmental goals, the Danish system appears to come close to 'public value energy governance' as defined by Mitchell et al; (2015). However, it is important to note that this arrangement relies on a supportive political process, data transparency and significant analytical and technical capacity in the public sphere. These last points are particularly important for drawing out lessons for re-thinking institutional design in Britain. Indeed the main conclusion of this paper is that much would be lost in the translation of formal institutional reform without also thinking how to change the context within which institutions work.



## Annex 1 – Interviews

1. Ulrik Stridbaek, Head of Group Regulatory Affairs, DONG Energy, 24 June 2014
2. Professor Peter Karnoe, Center for Design, Innovation and Sustainable Transition, Aalborg University, 24 June 2014
3. Professor Poul Erik Morthorst, Department of Management Engineering, DTU 26 June 2014 and 11 March 15
4. Professor Ove K Pedersen, Copenhagen Business School, 10 November 2014
5. Signe Horn Røsted , Head of Market, Retail market development, Energinet.dk, 11 November 2014
6. Jeannette Jørgensen, R&D coordinator, Energinet.dk, 11 November 2014
7. Jonas Katz, Department of Management Engineering, DTU, 12 November 2014
8. Kamilla Thingvad, Consultant, Dansk Energi, 14 November 2014
9. Knud Johanesen, Energinet.dk, 4 March 2015
10. Rune Mooesgard, Danish Energy Regulatory Authority, 10 March 2015
11. Anders Eldrup, CLEAN (previously Finance Ministry and CEO DONG Energy), 11 March 2015
12. Anders Anderson, EMD, 16 March 2015

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