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Reflections on the role of energy network companies in the energy transition

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Abstract

Background: Energy network companies are commonly attributed the public task to help society in becoming greener in the domain of energy. This extra public task has high costs and comes with high uncertainties. It may also compete with existing public tasks of network companies. When network companies are involved in local green initiatives, they encounter dilemmas and need to arrange trade-offs among multiple public values. It may also compete with existing tasks of network companies. Therefore, these network companies can face dilemmas when involved in local green initiatives. The aim of this paper is to reflect on the role of energy network companies in the face of these dilemmas. What is the role of energy network companies in coping with conflicting public values when helping local initiatives that create a greener energy system?

Methods: We answer this question via an essay that reflects on existing research in the Dutch energy sector. Our answer is derived from the fields of law, politics, policy, economics and engineering about the role of network companies.

Results and discussion: We argue that these five perspectives leave the role of energy network companies in the energy transition under-articulated. Our additional answer is based on our own empirical research that focuses on how network companies currently deal with dilemmas between multiple public tasks.

Conclusion: We provide an analytical framework that enables a way of understanding the role of network companies in the struggle with dilemmas and raise several points of discussion to that might refocus efforts of researchers and practitioners to elucidate the role of network companies.

Keywords: Energy network companies; Energy transition; Law; Politics; Policy; Economics; Engineering

Background

Companies managing public energy networks play a critical role in facilitating the energy transition for both gas and electricity. This paper is based on our research experience in the Netherlands where these network companies are public by law. We reflect on the role of network companies when facilitating the energy transition also requires compromising or re-organizing their other legal tasks.

In the Netherlands, on a regional level, network companies contribute to the energy transition, for example, by installing public charging stations for electric vehicles in the regional electricity grid or by helping to realize an energy neutral residential area. On a national level, a high voltage connection has been devised primarily to accommodate local sustainable energy production applications in the network. Similar projects can be identified in the gas industry where network companies participate in numerous pilot projects, study the possibilities of a new type of gas grid and realize green gas connections.

Given these many projects, network companies in the Netherlands certainly play a role in the energy transition, but it is hard to see why this role. It is also hard to assess whether this is the role society wants them to play. The report 'Net voor de toekomst' [1] (translation: 'The future network') published in 2011 claims that the role of network companies in the energy transition is crucial. At the same time, the energy transition is crucial for the future role of network companies. This mutual interdependency creates chances as well as threats, such as high investment risks. If Dutch network companies reasonably contribute to the energy transition,

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the report calculates that an investment is needed between 20 and 71 billion euros up to 2050. In comparison, all network companies together currently invest 800 million euros annually in their networks.

The need for and the scale of the investments confront network companies with fundamental dilemmas. The energy transition calls for substantial, proactive investments by network companies. But the current regulatory regime is primarily focussed on efficiency. This may stimulate them to postpone investments for as long as possible. If network companies nevertheless seek to invest, they are confronted with a great deal of uncertainties. Innovations, regulations, societal and political support and energy demand constantly develop, and often in unpredictable ways. One only needs to consider the impact of the Energiewende in Germany, shale gas developments or the earthquakes in Groningen to realize the enormous potential effects uncertainties might have. A wait-and-see strategy may seem to save costs but may just as well have increased costs in hindsight. This is a dilemma for network companies that is more comprehensive than the usual cost benefit trade-offs of any company. Their dilemmas also include multiple, sometimes competing, legal tasks and a possibly even larger variety of public values relevant to their performance. Being publicly owned, Dutch network companies are averse to a role as reckless investor as well as one where they are held responsible for slowing down the transition towards a more sustainable energy system. Both options may bring legitimacy problems from a societal point of view.

Prioritization, deliberation and accountability

Facilitating the energy transition is full of dilemmas for network companies. We further introduce this theme by looking at three critical decision-oriented activities, i.e. the prioritization, deliberation and accountability of decisions that might speed up or hamper the transition towards a more sustainable energy system.

Priorities

Network companies generally claim on their websites to be 'as sustainable as possible' (cf. Liander) and to strive for 'the highest standards in the domains of safety, reliability, efficiency and sustainability' (cf. Gasunie). These claims are quite common but nevertheless ignorant with respect to the necessity to prioritize. Maximizing sustainability has huge costs and may simultaneously hamper the realization of other public values [2]. A gas network company can decide not to facilitate green gas when this implies certain safety risks or discriminatory treatment of gas producers. Even within the ideal of facilitating the energy transition, goals may conflict. Helping electric mobility may at the same time hamper the introduction of the hydrogen car. Helping specific sustainable applications may hamper the level playing field of competing applications. Therefore, the current ambitions of network companies to facilitate the energy transition should have limits and nuances. It means that network companies may need to compromise other public values and re-organize the way they used to be realized. 'In the end, it is casuistic where you draw the line', an insider explains in an interview with us. But transparency and consistency are hard to uphold when 'where you draw the line' can be reconsidered in every single case. Network companies are challenged to find ways to prioritize the energy transition. This process of prioritization presumably requires advanced competences to articulate priorities and deliberate about them with a large variety of stakeholders.

Deliberation

In economic literature, the role of network companies is often reduced to facilitating the energy market. Though many may disagree with this reduction, it already implies that the activities of a network company and many market parties are to a large extent interdependent. Dealing with these interdependencies requires deliberation. Facilitating 'the energy transition' adds many new interdependencies, some of them inside the energy market and some of them outside of it. The newly created interdependencies require new forms of deliberation and cooperation. Examples are the implementation of charging stations for electric vehicles or experimenting with green gas. In these cases, facilitating the energy transition directly links to new services, new market parties and market developments. This raises questions with respect to what a network company and what the market should do, which costs of facilitating the transition should be socialized and to what extent network companies should provide tailor made services to the market. Network companies constantly interact with a large variety of stakeholders to deal with these questions: market parties, various types of governments such as local and regional governments as well as national ministerial policy makers, oversight bodies, regulators, media, interest groups and the public at large. Answers to these questions are always plural, temporary and contestable.

Accountability

Complex deliberative processes constantly produce priorities how to invest and how not to. End users of the energy networks generally pay for these investments, often without knowing and without being consulted. Indirectly, network companies do require societal support for the priorities they set. Public indignation and distrust about priorities may activate democratic leaders in various ways and roles to judge and affect network companies. The same may apply to the regulator when formally approving with the planned investments of network companies. Accounting for priorities is a struggle for various reasons.

We mention two. First, end users of the networks and other stakeholders will seldom if ever agree on how to evaluate an investment. Those who experience the effects of network investments make out a highly heterogenic group of actors. A specific investment may easily be considered way too costly and way too little ambitious at the same time. Sufficient support for investments is a thing hard to define in this plural context. Second, facilitating the energy transition will not only improve the networks but may also make them more vulnerable. Many new technologies, new assets and new products will be introduced, experimented with and interact in not fully foreseen ways with all the existing system elements. A more complex energy network increases the chance of unexpected events like 'unknown unknowns', 'black swans', 'systemic risks' or 'normal accidents'. Such highly uncertain as well as highly negative consequences are hard to account for and make the role of network companies in the context of the energy transition anything but easy [3].

What is the role of network companies?

'A transition to sustainability has to hurt', says Jan Rotmans [4]. The idea is that transitions will always heavily affect stakeholder interests. We accordingly believe that a realistic view on the role of network companies in the energy transition has to reflect 'pain', in the sense that it requires trade-offs [3]. Somewhat similar to Rotmans, we consider struggling with dilemmas as a crucial characteristic of transitions. Perhaps different from Rotmans, we do not consider this characteristic as problematic per se. We argue that dilemmas may enable stakeholders to enter into meaningful interaction about what exactly the role of network companies is and how to prioritize the transition. This is important because we claim this role in prioritization is inherently complex, more so than is readily admitted.

How to define the role of network companies in the face of dilemmas, i.e. conflicting public values? It may seem a simple question, but it is not. From an economic, legal, technological, political or policy point of view, indeed, there are several clear roles defined for network companies. These monodisciplinary answers generally describe what network companies ought to do. These answers, however, say little about how network companies should deal with competing public values. Empirical studies of how network companies arrange trade-offs show that there also is a more ambiguous and casuistic story on the actual role that network companies have when dealing with these dilemmas [3, 5].

In this paper, we start with an argument why it is problematic to define the role of network companies on the basis of the economic, legal, technological, political and policy points of view. Next, we plead for a deeper, empirical understanding of the role of network companies in the face of dilemmas. This additional argument is based on previous research within a large variety of Dutch network companies and in a variety of research projects under the umbrella of Next Generation Infrastructures, Empowering Networks and EDGaR TransGasID (cf. [3, 6–9]).

The paper is built up by subsequently answering two basic questions. What is generally considered to be the role of network companies? How do network companies deal with these dilemmas? In answering these questions, the energy transition serves as our main source of illustration, as the implications are currently most significant for this case in energy industries. In conclusion, we sketch a new way of understanding the role of network companies in the face of struggle with dilemmas.

Methods

This essayistic paper is an original piece of research but an argumentative reflection after more than 10 years of empirical research in the Dutch energy sector and inside network companies (cf. [3, 6–9]). A constant research focus has been to create a sector-wise empirical understanding of how network companies contribute to and compromise public values. The core research approach has been to trace public values from their articulation in political arenas up to their realization in operational practice inside network companies (cf. [10, 9]). The three main data sources in these researches are semi-structured interviews, formal documents in the domains of politics, policy and management and participatory observation in infrastructure operations. For an introduction to our method, we refer to Steenhuisen and Van Eeten [9]. On the basis of these data, we try to understand how trade-offs occur by linking the perspectives of all actors involved. This results in qualitative descriptions and, after analysing them, conceptualizations of actual decision-making, including a general overview of the interplay between strategies, processes, operational activities and related governance issues (cf. [11]).

In this paper, we reflect on our research results in the past with a focus on the question how to define the role of Dutch network companies in facilitating the energy transition given that it requires compromising other public values. Focusing on the Netherlands makes out an interesting case for this question. Dutch network companies are required to be publicly owned by law because of their public interest. In contrast with this explicitly institutionalized public interest, the role of Dutch network companies in the energy transition remains relatively underarticulated, for example, compared to Germany.

Results and discussion

What could be the role of network companies? Five clear monodisciplinary answers

Five clearly articulated answers can be given to describe the role of the public network company. They come

from the legal, political, policy, economic and technical perspective. However, we argue each answer in itself seems unable to provide guidance for the dilemmas of network companies as discussed in the introduction above.

A legal answer

The role of network companies is firmly grounded in legislation, rules and regulations. Legislation, rules and regulations exist or can be produced to provide clarity about roles and responsibilities. For the Dutch national and regional electricity network companies, for example, their role is firmly grounded in national law (Elektriciteitswet 1998, article 16). For the Dutch national and regional gas network companies, their role is similarly articulated in the law as well (Gaswet, articles 10 and 10a). In these articles, one can find many requirements that network companies should fulfil. Proper network operation requires taking care of maintenance and providing quality of service and availability of the network. However, it is striking that even among these clear requirements and goals countless dilemmas can co-exist and remain hidden. All network companies are considered to provide both security of supply as well as safety. And furthermore, they are also required to be efficient at the same time. In practice, these values have to be balanced and traded off against each other, how this should be done exactly remains unclear.

Based upon the abovementioned legal requirements, much more detailed rules and regulations can be found in which much is written about the role of network companies. However, even in these highly detailed rules and regulations, little if anything exists that would enable a network company to define its role with regard to the energy transition. According to Netbeheer Nederland [12], the representative body of the network companies, '[f]acilitating the energy transition (…) is currently not formally part of the tasks that network companies are required to fulfil'. So, from a legal perspective, there is no explicit role for the network company in the energy transition, and so in a legal sense, no dilemma exists. Legislation and regulation does provide a framework in which network companies can define their roles. Legislation even provides exemptions to support local, sustainable experiments (e.g. Gaswet, article 1i).

The legal perspective provides even less clarity when dynamics and more innovative developments are discussed [13]. Legislation, rules and regulations are primarily descriptive and oftentimes too static to keep up with current developments. Think about the role of the network company in the electricity industry with regard to electric vehicles and the role of network companies in setting up a network of electric charging stations. In the Netherlands, they did play a significant role in practice, but the legal framework did not specify a clearly designated role. So, innovations and market developments may overtake the legal role of network companies, and 'victims' of these practices have a valid point when they argue that network companies operating under these circumstances lack a clear public mandate to justify their actions.

Another example can be found in the requirement for coordination between national and regional network companies or between network companies and suppliers of electricity. European regulations have separated the roles of network companies and suppliers of electricity, but from an innovation or sustainability point of view, close cooperation and coordination between these roles can be required.

In short, legislation, rules and regulation may help determine the boundaries and thus help identify the role of the network companies in the energy transition. But exactly how network companies should conduct their behaviour, and specifically which trade-offs and choices they have to make, remains to a certain extent open to the network companies. From a legal perspective, network companies only have been given a fixed solution space from which to plan their role in the energy transition. The question is whether this solution space can satisfy what is needed in view of the demands from society. Netbeheer Nederland [12] concludes that the market which has been prescribed via European laws and regulations currently fails to deliver on sustainability and to achieve appropriate sustainability goals. It is further said that network companies can contribute much to these ends, but they are allowed a relatively small role. Function-based legal analyses might make these issues more transparent and serve as a framework for political decision-making [14, 15], but they do not deliver the required political mandate for the trade-offs and choices that have to be made.

A political answer

The precise role of a public network company is also a political issue. Like the legal answer, the political answer claims that the choices and ways in which the network company chooses its role should be primarily decided outside of the network companies, in the public domain. A classic perspective on public policy argues that Parliament translates societal demands into policy and ensures that acceptable policies exist for network companies to base their choices on [10].

However, it is interesting to observe how unclear parliamentary discussions are about the specific role of the network companies in the energy transition. For example, during Parliamentary discussions about the vertical separation of the electricity network companies, little emphasis is placed on the issue of sustainability [16]. Even more remarkable, a coherent priority of values that network companies should aspire to—a political

issue if ever there was one—can hardly be identified in parliamentary debates. The reason is obvious. The very nature of the political process disables clear political guidelines for network companies, for it is in these issues that political unity dissolves beyond the so-called motherhood values (cf. [17]). Most politicians tend to agree that sustainability is something that network companies should aspire to, and they should do that efficiently as well. However, as soon as dilemmas and tensions arise between sustainability and efficiency, consensus on clear answers dissolve. The 'and-and' message that is provided in the political arena towards network companies is the well-known political norm, providing them with no guidance in the face of dilemmas.

Confronted with specific issues or developments, national politics sometimes do produce a clear and unified stand on particular tasks or desired actions of the network companies, for example, when dealing with the issue of connecting a remotely located sustainable energy supplier to the grid. However, more often than not, political discussions fail to provide network companies with clear guidelines and frameworks for action. Political attention moreover can be volatile, incident-driven and susceptible to industrial lobbying [18].

Moreover, the political answer simply does not exist for the simple fact that politics is fragmented. Questions about the role of the network company play a role at various levels within government and politics. At each level, political actors aspire to different outcomes when addressing energy transition issues. At each level, the underlying public values and interests are also interpreted differently. At the national level, issues of efficiency and affordability of electricity play a larger role in the Netherlands, whereas sustainability plays a more important role at the local level. At the regional and local political levels, we have seen a continuous stream of visions, claims and desires with regard to sustainable initiatives in the Netherlands [19]. The role of local and regional politicians in these initiatives is often highly significant. They form a necessary condition for the successful launch of a large variety of local and creative sustainable initiatives and pilots to stimulate the energy transition. However, these initiatives do not necessarily correspond well with the national political outcomes of debates about the role of the network company and the financing of sustainable projects.

We have to conclude that a proper choice and trade-off with respect to the contribution of network companies to the energy transition is seldom based on a clear, unilateral political verdict. So, is the choice up to the minister then?

A policy answer

Ministers have a central role in defining the role of national and to a lesser extent regional network companies. How does public policy refine the role of network companies in facilitating the energy transition? What is the policy answer to the question how network companies should deal with dilemmas?

In the case of regional network companies, regional and local governments have a major say in how these network companies realize their public tasks. These governments, however, act as their shareholders, and shareholders are generally not involved or interested in the details of dilemmas that network companies deal with on a daily basis [20].

The main national energy policy report in 2011 briefly refers to the energy transition. It is considered necessary, as long as it supports the 'Dutch economy' [21]. It is mentioned also that the tasks of network companies may be affected by technological developments that come with an energy transition. In general, the Minister articulates that the core role of network companies is 'to guarantee sufficient network capacity of a constantly good quality' [21]. The energy report does not explicitly speak of a specific role for network companies in facilitating the energy transition. Implicitly, the policy report seems to consider the market as leading in shaping the transition, but mentioned is neither the intricate interdependencies between leading and facilitating roles nor the potential and identified conflicts between the goals of an efficient market and of creating a sustainable energy industry.

A subsequent observation is that the policy instruments of the Minister do not always match the governance structure of the energy sector. Particularly, the relation between the Minister and network companies is problematic. National network companies, TenneT and GTS, are public but Ministers do not manage them as owners. Regulation is used as the primary instrument to influence the behaviour of network companies. But the regulator functions as an independent entity and is primarily oriented towards the legally defined goals, those of a properly functioning market. The Minister can theoretically only influence the regulator by changing the law. This indirect route, however, takes years to implement certain changes. For example, the energy report in 2011 proposed to integrate long-term interests in the perspective of the regulator. This proposal still awaits further formalization.

Another problem of policy is that its discourse is generally not specific about how to deal with dilemmas. Policy principles for future changes in gas quality, for example, simply are a list of demands that should be met [22]. Again, we come across the 'and-and' approach. The safety of consumers and the safety of employers need first priority. The present and the future security of supply should not be at risk. And the advantages of natural gas for the Dutch economy should remain guaranteed. And the current emission norms should not

change. And the changing gas quality should not lead to extra risks for investors. And the total costs of dealing with new gas qualities should be as low as possible. Policy principles like these typically neglect to discuss trade-offs between all these demands.

We gave some impressions how policy makers further fill in and define the role of network companies. Again, the examples and arguments illustrate that network companies are provided with little guidance when facilitating the energy transition and simultaneously realizing other public tasks.

An economic answer

Network companies should act economically rational when investing in their networks. This clear role description serves as the foundation of the current regulatory framework of network companies. Economically rational investments have a feasible return on investment within a reasonable term. The cost-benefit ratio has to be clear and ex ante positive.

If network companies would strictly comply with this economic guidance, it is questionable whether any big investment or innovation would pass the test, because the future benefits of these investments are often highly uncertain, while the costs are known, immediate and irreversible. What is more, infrastructures have many positive externalities, i.e. the benefits are dispersed over many actors. The tariffs for network capacity will only reflect the investment costs and not all the dispersed benefits. Yet, these benefits should somehow be part of the investment decisions of network companies in order to make economically rational decisions. Another problem is that not all benefits and costs can actually be quantified in monetary units. If not, economically rational is not the same anymore as optimal for society. When investing and innovating to facilitate the energy transition, these objections are particularly relevant.

Systematically overinvesting can be optimal for society but at the same time economically irrational. Economically rational network companies may prefer wait-and-see behaviour that could lead to structural underinvestment. From a societal point of view, underinvestment is way more costly than overinvestment.

What is the role of network companies when economically rational investment decisions do not appear to be optimal from a societal point of view? How can network companies arrange for trade-offs without knowing how their regulator will eventually answer the previous question?

A technical answer

A network company is required to manage the network in accordance with regulatory approved technical guidelines to balance supply and demand in a reliable way. This answer is clear and leading in the daily operations of network companies. However, these technical guidelines also do not provide much help in trading off interests in view of the energy transition. The current guidelines are a codification of the many demands that the infrastructures are required to fulfil. When new values and developments enter this equation, as is the case with the energy transition, the technical guidelines may need a fundamental reorientation. This reorientation requires an intricate procedure which allows some room for initiative for the network company with the goal of seeking approval of the regulator. The technical discourse of the detailed, operation-oriented guidelines, however, is not able to function as a compass in this process, as they are primarily safeguarding the technical perspective from single value perspectives and do not codify how to trade off values.

How do the answers add up?

The desired role of network companies is commonly considered to be a combination of the abovementioned answers. The desired trade-offs that the network company should make, then, should at least be consistent with technical requirements, fed by political decisions and its volatile, short-term attention span, subject to a highly detailed policy-oriented top-down governance approach and predominantly dependent on the economic governance of the regulator.

These five answers can also be found in the environment of the network company, and the answers to a large extent determine the way in which various actors define a role for the network company and evaluate the behaviour of a network company. However, all of these answers have proven 'hollow', i.e. without guidance, when it comes to dealing with dilemmas. The role characteristics derived from these five answers fail to provide a coherent framework in which interests and values can be traded off against each other. This means that network companies are unable to legitimate or account for the choices that they actually make in their day-to-day operations, choices that follow from the confrontation between the various disciplines on the operational level.

At first sight, the absence of such a coherent framework seems to indicate a relatively advantageous position for network companies. The absence of a coherent framework provides a lot of freedom and professional decision power to decide on and account for investments that would contribute to a sustainable energy transition. They can be justified as long as it is 'consistent with the current technical guidelines', 'economically rational', 'legally required' or 'part of the minister's policy agenda'. Legitimacy would then be no problem. However, this is only part of the story. When a network company uses one of the five answers to account for its

own decisions, and thus one of the underlying perspectives to approach the issue, the other four answers may be used by one or more of the stakeholders to criticize these decisions. For example, decisions taken by the network company may be found in contradiction to the regulatory framework, that is, at odds with the economic paradigm that is implicit in this answer. At the same time, the regulator is struggling with similar trade-offs, albeit dealing with its own perspective and dynamics. If we conclude that many perspectives exist to legitimize certain trade-offs, we also agree to the proposition that there are many potentially conflicting perspectives on the role of the network company. In the end, it can be highly contestable what the role of network companies should be. Whatever a cabinet Minister can propose from a governmental policy perspective can be technically challenging or even impossible from an engineering point of view. European laws and regulations can be at loggerheads with national policy goals or political demands, for instance, the Dutch 'gas hub' policy with regard to the gas network. By challenging the assumptions underlying such a national policy, a seemingly responsible economic investment can be politically challenged as a potential threat to the financial viability of the gas industry. In short, we claim that the very fact that multiple perspectives can exist simultaneously means that disagreement on the role of network companies must be considered unavoidable.

At the same time, all answers fall short in explaining how a network company should deal with dilemmas. Therefore, we will describe our empirical reflections on the role of network companies in the next section. This provides new insights, as it appears that the role that network companies perform in practice is more than the sum of the five perspectives discussed above.

How do network companies fill in their role? An empirical perspective

We discuss three generic observations that follow from our previous investigations in how network companies deal with dilemmas. We will conclude with some potential implications for the role of the network companies, in particular with regard to the energy transition.

Observation 1: network companies have lots of dilemmas

Studying network companies in the energy sector, as well as in other network-based sectors, we have come across many dilemmas. The many public tasks that network companies fulfil may conflict at any one moment in time. For example, we have experienced how a network company in the drinking water sector deals with the dilemma that an increased diameter of a pipe segment has two different conflicting effects. On the one hand, enlarging the diameter increases the risk of health hazards. On the other hand, narrowing the diameter reduces the capacity to fight fire considerably [23].

Similarly, a network company in the railway sector annually decides on the schedule of services that is to be provided across the rail network. The supply and thus the capacity for passenger railway transportation increases when trains are scheduled more tightly. However, at the same time, this would reduce the operational redundancy, i.e. the ability to deal with disturbances and delays in the train operations [24]. Countless dilemmas like these can be discussed in which heavily regulated public values clash with each other in and around network operations.

In the gas industry in the Netherlands, we have recently interviewed stakeholders of the national gas network. In seven explorative, semi-structured, in-depth interviews with researchers, gas experts, shippers and regulators, we asked what dilemmas the network company experienced with regard to the execution of the publicly stated goals of the network company. These interviews confirmed our preliminary findings that network companies face many dilemmas and in particular with respect to facilitating the energy transition. Examples include the recovery of long-term (network) investments, the reorientation of operational procedures, the product portfolio and the sharing of operational knowledge of the system.

Observation 2: network companies do not recognize all dilemmas

Network companies continuously struggle with a wide range of dilemmas but do not always recognize, pinpoint and label these dilemmas. The reason may be simple. Being explicit about dilemmas may reduce the authority of the network company, increase its vulnerability and increase conflicts among the stakeholders about the role of the network company. 'The network company should not have any dilemmas', one stakeholder said. Some stakeholders simply consider having a dilemma as inexcusable. By demanding absolute safety, minimal costs, non-discrimination and legal clarity, many stakeholders assume positions in the debate which rule out the possibility of compromises over these issues. In doing so, stakeholders implicitly assume that dilemmas are a sign of incompetence or would lead to societally undesirable effects.

A central notion from the principal-agent literature is that agents deliberately hide their dilemmas to make their own trade-offs. A recurrent observation in our research, however, is that network companies are not always capable to acknowledge or recognize dilemmas. The reason for this inability to deal with dilemmas is partly found in the fact that many dilemmas are not clearly visible to the management of a network company.

Instead, many dilemmas have gradual and dispersed effects on the operational level. This makes dilemmas less insightful at the strategic level. In our research, we have also encountered many operational workers in network companies who do not consider it part of their job to deal with dilemmas even though we saw them practically doing it. Operational professionals often indicated that talking about their daily work in terms of dilemmas was unnatural or inappropriate. They preferred to explain what they did without this dilemma-confirming terminology [3].

If network companies are unable or unwilling to acknowledge and communicate the dilemmas they face when facilitating the energy transition, the question rises how they can deal with these dilemmas in a way that enjoys sufficient support.

Observation 3: network companies may deal with dilemmas implicitly

The dominant view on how network companies should deal with dilemmas can be summarized in two steps. First, these companies should organize themselves in such a way that conflicts between public tasks do not occur. Second, if dilemmas do persist, they should become political issues and require a political mandate or a legal guideline.

Reality appears less simple. When dilemmas are not recognized fully, they cannot always be communicated to the political level. Instead, there is a large variety of coping strategies to deal with competing public values within network companies [3]. Network companies, like all other companies, constantly produce trade-offs in many different ways. When realizing competing public values, we discovered that trade-offs are often dealt with in implicit ways.

For example, a standard reflex is to 'decouple' competing public values beforehand. This means that all values are prioritized separately by different managers, procedures or departments. This decoupling strategy was often found in network companies. It can probably also be found in many other large bureaucratic organizations. When realizing public values in infrastructure operations, however, the ambiguous and ubiquitous nature of these values makes it especially hard to oversee the actual consequences of decoupling in terms of trade-offs [25, 3]. Prioritizing sustainability may inspire a big project that contributes to sustainability, for example, a wind farm, a series of green gas connections or a smart grid development. But the project will also affect the realization of other public values. After the project is realized, controllers and dispatchers experience the consequences in gradual and dispersed ways. The project may later interact with other developments and eventually lead to new, perhaps unforeseen, effects and risks for safety, reliability and efficiency. In response, the network company may adapt some procedures in order to protect individual public values, neutralizing the new effects or mitigating new risks. Again these adaptations, on an incremental or more structural basis, will aim for one but affect other public values simultaneously and eventually trigger new adaptations and so on. This cycle of 'decoupled' interventions is for network companies, a common way to deal with dilemmas implicitly. The total sum of all these interventions is hard to oversee at any time during this eternal cycle.

Implicitly dealing with competing public values evidently does not correspond with an economically rational approach. On the one hand, this seems to create a legitimacy problem. On the other hand, if network companies cannot directly explain how they trade off public values, this does not directly imply that they have a problem to be effective in realizing many public values simultaneously. Research shows that implicitly dealing with dilemmas does not necessarily imply ineffectiveness [26]. On the contrary, network companies appear able to improve their performance for many competing public values separately with a decoupled strategy [3]. Blessed are the ignorant, or so it seems.

Implications

The implications for facilitating the energy transition are significant. Sustainability is of all possible public values one of the most ambiguous and ubiquitous. The interdependencies between sustainability and other values are complex and hard to oversee at any point in time. The more complex values are, in this sense, the harder it is to realize them and not to harm them when decoupling is a dominant strategy [27]. In other words, sustainability does not fit well in a highly compartmentalized governance structure. Sustainability must be considered a public value that does not allow itself to be realized in 'splendid isolation'. It is, accordingly, to be expected that the trade-offs triggered by facilitating an energy transition are especially hard to oversee and, yet, especially important to address. To actually dialogue these intricate trade-offs with stakeholders requires a highly advanced deliberative process accordingly.

It is to be welcomed that network companies are currently active in a variety of dialogues on how to facilitate the energy transition. But dialoguing does not obviously solve the problem sketched above. Stakeholder management in itself will not lead to clear answers on the role of network companies in facilitating the energy transition as long as it remains hard to identify and oversee the complex interdependencies with other public values. It is certainly advisable to involve stakeholders in the process of understanding how to facilitate the transition, how to invest and how to prioritize, but this approach is

probably too instrumental to attain a deeper understanding of the underlying dilemmas. Who will represent future end users and market parties? How will new technological innovations influence the dilemmas?

Conclusions

We see Dutch network companies struggling in defining their role when facilitating the energy transition. This struggle has two levels. First, the extra public task to facilitate a transition is not clearly defined. Second, the role of network companies is more fundamentally ambiguous when it comes to conflicts between facilitating the energy transition versus other public tasks. The dominant views on the role of network companies hardly allow us to see why this ambiguity should be there and how to deal with dilemmas, since these views are primarily monodisciplinary. Following these views does not enable network companies to discuss the more multidisciplinary dilemmas that are intrinsic to their role. Entering in dialogues with stakeholders without addressing these dilemmas is bound to result in distrust, unproductive interaction and dissatisfaction.

This paper has put forward several points of discussion to help reconsider the role of network companies. First, it seems essential to include, instead of exclude, struggling with competing public tasks in our understanding of the role of network companies. Second, it is to be questioned to what extent network companies actually know their dilemmas and whether they should make all dilemmas explicit. Making dilemmas more insightful can be a priority though. Dealing with them implicitly can also be a reality to accept or even prefer. Third, the role of network companies does not seem to be a constant through time. This role should be adaptable and open for discussion. But at the same time, redefining this role incrementally should be more than an intermediate result of stakeholder management alone. Parallel to the many discussions and negotiations on the desired role of network companies in concrete cases, we plead for a similar continuous meta-dialogue on what this role could and should be. When facilitating the energy transition, this reflection appears particularly urgent.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

BS was the main author of the empirical perspective, and MdB was the main author of the five multidisciplinary perspectives. Both authors read and approved the final manuscript.

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