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An empirico-legal analytical and design model for local microgrids: applying the 'ILTIAD' model, combining the IAD-framework with institutional legal theory

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Abstract: This article presents a new framework for the analysis and design of legal-governance settings for collective action challenges, particularly of local (smart) microgrids, with a focus on related local planning. The framework connects Ostrom's IAD-Framework with Institutional Legal Theory (ILT), to foster proper understanding of both empirical and legal-prescriptive elements. This is relevant to state of affairs analyses, but also to design-oriented analysis towards institutional change of legal settings for local smart microgrid systems. The proposed framework connection (named 'ILTIAD') contributes to a proper empirico-legal understanding of existing and possible improvements in public-private arrangements relevant to bring about innovations of the said local microgrids. A three-step conceptual approach is presented. The first step is about relating local smart microgrids to the concept of a collective action and explaining the relevance of adding an ILT perspective to the IAD-framework. The second step is to frame the connection between IAD and ILT (as ILTIAD) with a view on relevant action situations. To this end, Ostrom's 'rules-in-use' are connected to legal 'rules-in-form'. This institutional rule-perspective is then aligned with action situations at Ostrom's four analytical levels, considering that different legal institutions are relevant to the content of action situation rules. In the third step, the institutional rule-perspective is placed in the specific legal setting of an example for a Dutch Crown Decree on experiments for decentralized renewable energy projects. We demonstrate how the abstract ILTIAD-framework provides a lens to identify legal

aspects as constraints and opportunities within action situations. Furthermore, we show from a design perspective how the framework can help identify gaps and conflicts when establishing and maintaining particular local smart microgrids. In doing so, we also connect to dynamic aspects of underlying transition justice concerns, following energy expansion versus energy democratisation frames. In conclusion the article reflects inter alia on some analytical and methodological aspects of ILTIAD as compared to the IAD-framework.

Keywords: Common pool resource, design, empirico-legal analysis, heuristic model, institutional change, legal governance, local energy system, microgrids, rules-in-form and rules-in-use

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1. Introduction

“Without serious upgrading of existing grids and metering, renewable energy generation will be put on hold, security of the networks will be compromised, opportunities for energy saving and energy efficiency will be missed, and the internal energy market will develop at a much slower pace.” (European Commission 2011, 2). The reason behind this is that instead of the centralised production of electricity from fossil fuel resources, electricity is increasingly generated from small-scale renewable energy technologies in decentralised locations (called distributed generation, DG). The increase in variable renewable-based electricity generation as well as changing load patterns (e.g. due to the electrification of transport and space heating/cooling) challenge the operation and management of the electricity grid. Smart grids are considered an energy-efficient and sustainable solution for accommodating these developments in supply and demand (European Commission 2011). “Smart grids enable increased demand response and energy efficiency, integration of variable renewable energy resources and electric vehicle recharging services, while reducing peak demand and stabilising the electricity system” (IEA 2011, 5). This ‘smart’ balancing of supply and demand happens with the help of information and communication technologies (ICT), for instance through real-time remote control of smart appliances (e.g. smart washing machines¹), heat-pumps or the batteries of electric cars (Hakvoort and Huygen 2012). In this article we focus on such developments in community projects with (smart) microgrids, which are local electricity grids that only have one connection to the central electricity grid. In order to ensure the sustainable use and management of natural resources in

¹ These appliances become ‘smart’ when they are equipped with communication and steering interfaces, i.e. when chips are integrated into them (Wissner 2011).

local electricity grids, fitting institutional arrangements are needed on the design and functioning of these local electricity systems. In this article we address the following question: *'How can the empirico-legal ILTIAD model support analysis and design of microgrids, and what does this reveal when applied to Dutch (legal) experiments about the future of community microgrids?'* This leads us to first explain the (merits of the) ILTIAD model in more abstract terms, to next demonstrate how it can indeed support analysis and design in a particular context, of the Dutch experimental legal regime. By derogation from (inter alia prohibitive) rules of the existing regime, microgrid experiments are now allowed to try out practices with may lead to legal regime change, also in respect of whether community involvement is a (mere) means to expansion of renewable energy use or (also) as a means to energy democratisation (Szulecki 2018).

Looking at that Dutch context, its current legal setting comes with two main constraints that reflect a divide between desired rules-in-use for and of a flourishing microgrid practice, and existing rules-in-form that stand in the way of such practice. These constraints exemplify the concept of 'regulatory disconnect' between regulation and innovation, and are known to "arise when innovation in the market develops in a faster tempo or differently than envisaged compared to respective regulation (Butenko 2016, 702)." Such disconnects need not but can "in certain cases (...) lead to regulatory failure and should (then) be eliminated" (Butenko 2016, 702).

The first main constraint amounts to a prohibitive disconnect between the *standard* rules-in-form that prescribe vertical unbundling as cornerstone of the existing energy market, and a desired microgrid rules-in-use practice whereby single legal entities (e.g. a community) combine the functions of energy generation, grid management and consumption. To allow experimentation with microgrids that do involve such single entity mix of functions, the current Dutch Electricity Act does already hold a regime that provides the legal powers to, by Crown Decree create powers to derogate (only) from this particular existing prohibition and, upon a case-to-case assessment and with strict conditions, grant experimental licenses for setting up the desired microgrids.

The second constraint amounts to a facilitative disconnect, as even within the aforementioned current experimental regime, no rules-in-form (i.e. legal rules) exist that allow newly emerging actors (e.g. business project developers, real estate companies, aggregators, storage operators) to play a role in smart microgrids (Lammers and Diestelmeier 2017). Furthermore, no facilitative exemptions are made possible to the existing standard rules-in-form of the Dutch Electricity Act that specify the involvement of regional Distribution System Operators (DSOs) and energy suppliers, thereby limiting their opportunities, as a matter of desired rules-in-use (i.e. generally accepted practice), to continue to play a central role in smart microgrids, e.g. by providing residents with smart appliances. In fact, DSOs have been receiving warnings from the Dutch Authority for Consumers and Markets for doing so (ACM 2015). On the issue of this second constraint legislation is now on its way, to further flexibility by allowing various actors, particularly DSOs, temporary and/or experimental possibilities of derogation from the Electricity Act (Wet VET 2018).

To identify and analyse the core issues of the current divides/disconnects between rules-in-use of desired practice and rules-in-form (limiting either prohibitively on standard practice or facilitatively on experimental practice), it is essential to understand the institutional setting and to be aware of a need for institutional change (Wolsink 2012; Edomah et al. 2017).

As indicated, and to identify new institutional arrangements for (smart) microgrids, attempts have already been undertaken in the Netherlands to achieve evidence-based institutional change through legally facilitated experimentation for smart microgrids: within licenses to experiment, under the abovementioned Crown Decree for Decentralised Renewable Electricity Generation, introduced in 2015. In Section 2 we provide background information on the need of collective action for these microgrids, and place the experiments in their institutional context. To analyse and design this legal experimentation, we see the need for adding a normative dimension to the institutional analysis and development (IAD) framework (Ostrom 2005). We therefore draw on Institutional Legal Theory [ILT, (MacCormick and Weinberger 1986; Ruiters 1993, 2001; MacCormick 2008)], and more specifically on the ILTIAD framework (Lammers and Heldeweg 2016) in theory in Section 3 and an explanation of its heuristic benefits in Section 4. In the fifth section we analyse what has happened in terms of rules-in-use and rules-in-form in the experiments and discuss possible avenues of institutionalised experimental design towards new futures. The article ends with a conclusion in Section 6.

2. Background

In order to obtain an understanding of the institutional setting two aspects have to be considered first: the need for collective action to operate and manage local electricity grids sustainably and the multiplicity of institutional levels. These institutional levels, together with the elements of rules-in-use and rules-in-form are the main components of the IAD framework that we draw upon in this article. At the end of this section, to explain the normative aspect of the ILTIAD framework, a brief description of ILT is provided.

2.1. Microgrids and collective action problems

Establishing (smart) microgrids and sustainable operation and management of such grids involves the need for collective action. This article focusses on (smart) microgrid projects because the projects ('project grids') that fall under the Dutch Crown Decree can only have one connection to the central electricity grid, and are limited to a maximum of 500 connected consumers. A microgrid is a local energy system that consists of a variety of distributed energy sources. This microgrid can operate in an integrated way with the main electricity grid, or independently from it. "During disturbances, the generation and corresponding loads can separate from the distribution system to isolate the microgrid's load from the disturbance (and thereby maintaining high level of service) without harming the transmission grid's integrity" (Lasseter and Paigi 2004, 4285). A prime example is the microgrid on

the campus of the University of Princeton. When hurricane Sandy caused a black-out in the New York area in 2012, the University of Princeton did not suffer from a power outage: the microgrid on campus was separated from the main power grid and continued to operate independently based on its gas-turbine generator and solar PV panel park. Microgrids can thus function in autarky, or in connection with the central power grid; the latter seems to be the case for the projects that applied for experimental status under the Dutch Experimentation Decree. A microgrid is 'smart' when automated demand response is part of the electricity system, that is the balancing of demand and supply are automated with the help of ICT (e.g. via real-time remote control); where this ICT layer is not present we speak of a 'dumb' grid (e.g. when gas-powered turbines are switched on and off manually). Another important element of an automated local electricity market is peer-to-peer delivery of electricity because it can contribute to increasing flexibility on the demand side and eventually to a high level of local self-sufficiency (Mengelkamp et al. 2018).

For establishing (smart) microgrid projects, and for the sustainable use and management of natural resources in such grids, institutional arrangements (founded in constitutive underpinnings) for collective action have to be created in order to enable the factual operation of (smart) microgrids. These institutional arrangements are needed to facilitate the collective action required for the co-production in local microgrids. This collective action involves two aspects: collective production (co-production) and collectively balanced and managed consumption. Wolsink (2018) explains that co-production covers, on the one hand, the generation of electricity and on the other hand the decision-making on establishing the infrastructure. This article is concerned with the latter aspect, particularly with the collective action for the establishment of the experimental microgrids projects that can be created under the Dutch Crown Decree analysed in this article. First, these projects are allowed to take place under the Electricity Act, but outside of some prohibitive standard electricity sector rules, applicable by default, and by virtue of such partial exemptions they are aimed at experimentally making stakeholders collectively create (co-produce) new practices that may lead to new default/standard rules. Second, these experimental microgrid projects are to be based on electricity generated from high levels of variable renewable energy sources and the management and use of electricity in such grids requires collective action. The sustainable use and management of electricity in microgrids can happen through balancing supply and demand of electricity locally; this prevents the need for installing higher capacity technologies (i.e. cables and power converters) to accommodate peaks in demand and supply, as well as the need for using e.g. gas turbines during times of high demand. For example, if prosumers act individually, they are likely to feed-in solar energy without further considering its impact on the grid infrastructure and might charge their electric vehicles when arriving home from work, that is, in the evening hours when residential electricity demand is highest. To prevent this, collective rules need to be created for the (co-)production as well as withdrawal of electricity. Demand-side management, e.g. in the form of the remote-control of household devices, can automate the balancing of supply and demand, but only once rules have been

created that, for instance, specify the time-parameters during which the battery of an electric vehicle can be used for load balancing. Storing electricity can increase predictability and decrease fluctuations in supply, but due to the finite capacity of storage, and especially when storage facilities are shared, appropriation rules are also essential. Collective action rules are most needed when a local electricity grid operates independently from the main power grid, that is when only peer-to-peer supply of electricity is the case, because common pool resource problems are more likely to manifest themselves due to the finite amount of resources as well as the difficulty of excluding resource users (Ostrom 2005; Wolsink 2012). Due to the need for institutional rules, we draw on the IAD Framework which places emphasis on the importance of rules, being rules-in-use and rules-in-form, as well as on institutional levels. Moreover, Aligica and Boettke (2011) state that the IAD framework is useful for the analysis of complex polycentric institutional arrangements; decision-making arenas on the establishment of smart microgrids have such polycentric characteristics (Lammers and Arentsen 2016).

2.2. Institutional levels of analysis

Secondly, and consequent to the above-mentioned ideas, it is important to consider all (analytical) levels of the institutional setting that Ostrom (2005, 2007) refers to in relation to the IAD framework: the constitutional choice level (establishing that projects may be established), the collective choice level (establishing projects) and the operational level (projects/experiments take place). In this article, we analyse the Dutch Crown Decree for experiments with decentralised renewable electricity generation as an example of evidence-based institutional change through legally facilitated experimentation. For this analysis—and for the design of such settings—all three institutional levels have to be taken into account.

The existing Dutch Experimentation Decree entered into force on 1 April 2015. It empowers the Dutch Minister of Economic Affairs to, by license, allow experiments (only) where associations take over the grid operation responsibilities of DSOs in local, small grid projects (Heldeweg 2016; Lammers and Diestelmeier 2017). In analytical terms, this governmental decree is located at the constitutional choice level, and provides the possibility for smart microgrid-projects to be established and take place (on the collective choice level and operational level respectively) outside of the standard rules of the current Dutch legal framework. This can be summarised as ordinary projects being established on the collective choice level in ‘standard’ action situations² (AS; under the current rule of law), and smart microgrid projects in ‘experimental action situations’ (AS – 1) that derive from the Experimentation Decree. The main goal of the experiments is to obtain information. This information might in the end be

² An action situation is “an analytic concept that enables an analyst to isolate the immediate structure affecting a process of interest to the analyst for the purpose of explaining regularities in human actions and results, and potentially to reform them” (Ostrom 2011).

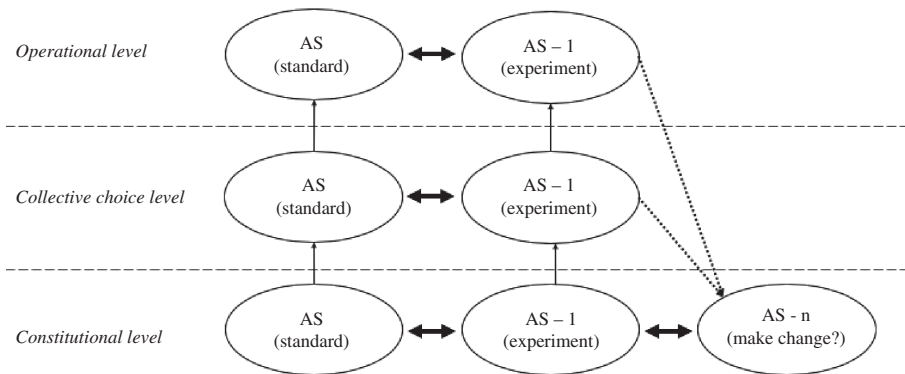


Figure 1: Institutional levels and experimentation.

Vertical, upward arrows present legal build-up towards operational practice; horizontal arrows depict distinction between vertical legal arrangements (standard-experimental-towards new standard) and dotted diagonal arrows present flow of information about experiments to reconsideration of constitutional settings.

used to change the current legal framework at the constitutional choice level (AS – n; make change?). As exemplified in the graphic (Figure 1) below.

For the analysis, and especially for the design of (experimental) smart microgrids, the ‘rules of the game’ have to align inside each action situation, for it to bring desired outcomes, as well as align across action situations at the three analytical levels, to secure necessary abilities (e.g. legal powers) and desired freedoms to operate. This alignment is a key requirement of legal systems, because in essence these are ‘about channelling types of human behaviour through normative positions that provide a clear direction of ought’, as explained in Lammers and Heldeweg (2016, 12). Currently however, while licenses to experiment have meanwhile been issued for a very limited number of cases, to overcome the prohibitive regulatory disconnect, no standard nor experimental permissive rules-in-form exist for actors, other than associations, wanting to participate in smart microgrids at the collective choice or operational level (e.g. newly emerging actors like ‘aggregators’), or actually pursuing such involvement in conflict with the rules-in-form (e.g. DSOs), as shown in Section 4—and so the facilitative regulatory disconnect remains in place.

The legal requirement of normative alignment, within action situations (e.g. DSOs not being allowed to involve themselves in setting-up microgrids) and across levels (e.g. the minister granting an experimental license to an association), can constitute a considerable normative lock-in situation, which legally blocks (i.e. prohibitively) or at least impedes (i.e. facilitatively) the introduction of experimental practices as a functional reality, through the outcome of an effective microgrid. To unlock such a situation poses the challenge of re-aligning rules to allow and facilitate functionally desired experiments, by providing matching legal rules to experiment. This challenge calls for combining the IAD collective

action approach, to determine what rules make for a functional experiment, and the ILT normative analysis and design approach, to analyse and design the fitting rules-in-form—as will be explained in the next subsection.

To sum up, because of need for collective action in smart microgrids, institutional arrangements are needed for the design of these systems. The IAD Framework is therefore useful. Furthermore, as the design of legal experimentation involves as change of rules-in-form to accommodate (desired) rules-in-use, it is useful to add a normative dimension to the IAD perspective in form of institutional legal theory (ILT). We therefore chose for the ILTIAD Framework, as explained in the next section.

2.3. Institutional legal theory

Before moving to that next section, a brief description of ILT may be helpful to some readers. According to MacCormick and Weinberger (1986) ILT allows for a “realistic analysis, explanation, or description of the legal sphere and indeed of all those distinctively human and social institutions and phenomena which correlate with, depend upon, or presuppose legal or other rules or norms”. In ILT, law is regarded in terms of normative systems generating valid rules that project prescribed patterns of behaviour which, as institutional facts, purport to be accepted and adhered to in corresponding social behaviour, as if they are real facts. Attention to legal institutionalisation of patterns of behaviour, such as around contracting, ownership, and legal personality, is a key element of ILT and lifts the analysis of legal systems beyond (interpretation of) individual rules to the level of ‘coherent sets of interrelated rules’. (MacCormick and Weinberger 1986, 51–52). These sets operate as regimes that determine how to instantiate, change or terminate the related patterns of behaviour, as within an action situation about agreeing on signing, changing or ending a contract. The same regimes also prescribe the legal consequences of an existing legal institution, as in an action situation where actors interact upon rights and obligations following from a particular contract agreed between them. Ruiter (1994) emphasises that “according to institutional legal theory, institutions are not mental constructs that account a posteriori for actual behavior, but a priori given normative entities guiding correspondent behavior” (100). Significantly Ruiter (1994, 112) notes that: “Where institutional legal theory conceptualizes decisions as enactments of rules, constitutional political economy (such as IAD, MAH/IL) conceives of them as agreements on rules.”, adding that “constitutional political economy would be well advised to seriously study the far-reaching consequences of its assumption that rules precede games. Mere agreement as it is reflected in individual transactions and collective choice processes is insufficient to account for the actual results of choice processes. Rather, it is a necessary requirement that agreed upon meta-rules exist that empower the participants to call for and bring about the results in question.”, and finally, “This means, however, that constitutional political economy must drop the restrictive concept of rules as requirements, prohibitions and permissions (...) in favor of a wider concept

that also includes power-conferring rules” Ruiter (1994, 112–113). While the latter point will be addressed in the further below, Ruiter’s earlier point about ‘meta-rules’, refers to the fact that legally prescriptive guidance on (un)desired patterns of behaviour builds upon how legal systems demand a valid and consistent normative alignment between rules of conduct, providing guidance, and underpinning rules of power, constituted at a deeper institutional level. For example, knowledge about what experimental microgrid activity is legally allowed at operational level behaviour, follows from the content of an experimental license granted by executive acts at collective choice level, upon a power granted by legislative acts at constitutional level (Heldeweg 2017). Thus the heuristic merit of applying ILT to the collective action problems in establishing microgrids lies especially in analysing behavioural patterns, on the basis of an understanding of the relevant legal order as a validity generating normative system, operating across different levels of collective action. Thus the understanding of patterns of actual, agreed behaviour in action situations, as identified by applying IAD, for example the desired but illegal involvement of DSOs in microgrid experiments, can be complemented with a proper understanding of the prescriptive conditions behind relevant rules, and how rules are legally configured within regimes as patterns of prescribed behaviour. Behaviour following rules of legal institutions—across different levels—, in the same example, in the form of a regime of standard versus of experimental rules of licensed generation of electricity under the Dutch Electricity Act. Framed as ILTIAD, the mere ILT-analysis is enriched by moving beyond a mere formal understanding of rules, of legal conditions and consequences, by including *inter alia* contextual and actor characteristics that drive or impede real interactions, and IAD is enriched by an understanding of the legal design of the relevant legal order. Given its inclusion of the latter understanding, the ILTIAD approach is pertinent to our domain of study, given that the introduction and operation of microgrids takes place in an already heavily regulated domain. This domain comes with many systemically locked-in legal obstacles, which can be overcome only upon a regime-level analysis and design perspective, coherently combining empirical and legal parameters, as the next section will clarify in more detail.³

3. Theory

The current divide between desired microgrid rules-in-use and existing rules-in-form may perhaps be bridged through legislative experimentation involving action situations at several levels to align towards institutional change. Proper understanding of the involved institutional mechanism is necessary to arrive at successful design of such desired institutional settings. We will first look more closely at the relation between rules-in-use and rules-in-form, more particularly with legal rules-in-form. Next we will apply the institutional levels of analysis to

³ This study is a first in applying ILTIAD. As example of applying ILT, merely as a matter of legal analysis, we name the dissertation by R.A. Wessel (Wessel 1999).

relations between legal rules-in-form and to patterns of behaviour across these levels as legal institutions. Finally, we will specify how a design perspective rests upon various lines of normative consistency.

3.1. Relating rules-in-use to legal-rules-in-form

Together with biophysical conditions and attributes of the community, rules-in-use structure action situations as exogenous factors that enable and constrain interactions towards particular outcomes. Our primary focus is on the seven types of rules-in-use which structure action situations—i.e. position, boundary, choice, information, aggregation, payoff and scope rules. These rules-in-use may, but need not only, follow from rules-in-form. Ostrom (2011) defines rules-in-form as written statements, resulting from formal legal procedures, and rules-in-use as rules to which participants would refer if they had to explain and justify their behaviour to other participants in the action situation. The latter justification may follow (desired) adherence to rules-in-form, but may also have a different origin, such as of shared/agreed informal actor preferences. In turn, rules-in-form may differ in character, such as on legal bindingness—including for example, non-binding policy-guidelines, when resulting from legal procedure. Clearly legal rules are rules-in-form,⁴ but of course not all of them will in practice be present as rules-in-use. When the Dutch Electricity Act prescribes who can(not) engage in operating a microgrid, this is meant to be reflected in a corresponding (choice) rule-in-use, but the existence of such rules-in-use need not be the case, not even as an institutional state of affairs. Legal rules-in-form⁵ are prescriptive institutional statements/facts projecting a normative state of affairs, and rules-in-use are descriptive institutional statements/facts about an empirically observable state of affairs about certain rules-in-use, as generally accepted (justification of) behaviour in some action situation. Both rule-types cannot be reduced to one another (Ruiter 1994, 100; 1997, 361–363). Then again, both rule-types are likely to meet in many action situations: the legal rules-in-form prescribe actions that can(not) or shall/may (not) be undertaken, while, as said, rules-in-use describe the rules that actors in the action situation may call upon in justification (Ostrom 2011). That justification may then be sought and found in acting in accordance with prescriptive rules-in-form, so that their legal status provides a cause to act according to justification.⁶ For the sake of conceptually consistent analysis we will, in this article, assume that most of the actors will most of the time find that following

⁴ As far as we are concerned, also legal principles, customary law and oral contracts.

⁵ We do not describe these as legal rules-in-use as this excludes the category of legal rules that are not followed up in structuring the action situation – but if all is lawful, then indeed the legal rules-in-form will also function as legal rules-in-use.

⁶ Not as prescription, but as adherence. We are setting aside that there may be other incentives that may de facto lead to a match between practices rules-in-use and prescribed rules-in-form, such as when the latter, aside from their legal status, are coherent with a pattern of behaviour that is instigated by other (aligning) concerns, such as sustainable resource management.

Table 1: Connecting rules-in-form to rules-in-use.

Rule-in form	Action situation	Rule-in-use
– Result of legal procedure – Written form	Rules-in-use that actors rely on or refer to may be (in)consistent with rules-in-form, either accidentally or intentionally	– Known to participants – Affecting participants' behaviour
Rules with normative validity following a legal system		Empirical evidence of rules agreed upon in practice

legal rules makes for proper, justifiable, behaviour. Table 1 schematises the relationship between rules-in-use and rules-in-form.⁷

In the IAD understanding of rules-in-use a distinction is made between three modes of ought, also known as 'deontic', expressed by three modal verbs: 'may' (i.e. permitted), 'must' (i.e. obliged) and 'must not' (i.e. forbidden) (Crawford and Ostrom 1995; Ostrom 2005).⁸ From a legal theory perspective these deontic modes are not only about the mode of ought, i.e. the 'norm-operator' (von Wright 1963), but are implicitly connected to a mode of action/outcome, known in IAD as 'Aim' and as 'norm object' in legal theory, with two basic modes: to do or to not do (i.e. to refrain).⁹ Thus in legal theory there are four possible normative positions: command (i.e. 'shall do'), prohibition (i.e. 'shall not do/refrain'), permission (i.e. 'may do'), and dispensation (i.e. 'may not do/refrain'). The verb 'shall' is reserved for obligations (i.e. command and prohibition), instead of the IAD deontic verb 'must', while the verb 'may' is used for two types of being allowed (i.e. permission and dispensation), while this duality is implicit to the IAD deontic of 'may'.¹⁰ Aside from thus adding to proper, and legally significant nuance in types of behavioural liberty, ILT is of particular relevance, as already indicated in the above, to the distinction between norm-operators concerning such liberty and those that concern the legal power (i.e. legal ability) to validly determine the boundaries of liberty.

3.2. Legal rules-in-form: rules of conduct and rules of power

Considering the need for a proper normative underpinning of legal rules, to secure their validity,¹¹ we need to make note of the fact that the above taxonomy

⁷ This table is taken from par. 4.1.1 of Heldeweg and Lammers (2015).

⁸ Mode of ought or 'deontic' is referred to in ILT as 'norm operator' (von Wright 1963, 85).

⁹ Ostrom and Crawford seem more interested in the substantive range of 'Aim' than the abstract legal theory distinction between 'to do X' versus 'to not do/refrain from X'.

¹⁰ Further, when in reality no legal rule (in-form) exists, in legal theory this is understood as a 'weak permission' (i.e. not addressed by any norm-authority), whereby actors are not under any obligation and thus 'free' to take and refrain from any action (von Wright 1963). Such a position counts as a mere freedom, from which no legal claim or privilege may be derived applicable to a given legal relation (Hohfeld 1964). Ostrom (2005, 145–146) does not seem to have picked up on the notion of privilege (as right versus no-claim) and instead reasons in terms of some rights not having a correlative duty.

¹¹ While rules-in-use are (ex post) descriptive of a justified practice, following from the empirically observable fact of adherence, legal rules-in-form are (ex ante) prescriptive of a certain projected practice and valid regardless of whether this practice actually unfolds.

is descriptive only of one particular type of legal rules: rules of conduct. Rules of conduct concern the lawfulness of performing factual actions or establishing certain factual outcomes; they construe normative positions as regards factual behaviour. These rules of conduct are so-called primary rules (Hart 1961, 91–99). To create but also to change and perhaps terminate primary rules, we need secondary rules, more specifically rules of power; rules that allocate to particular actors (perhaps under certain conditions) the power to validly introduce, change and terminate rules of conduct. Further, secondary rules of adjudication are needed to enable enforcement of rules of conduct (and power) against transgression. Moreover, secondary rules of recognition specify on what grounds the former rules count as valid/legal rules within a generally accepted legal system. Consequently, we should always look ‘behind’ the primary rules, prescribing a (desired) normative fact, to see if we can identify a secondary rule of power, to determine: 1.) if there is one such relevant and valid rule of power; 2.) if a legal act has been performed or is performable upon this rule of power to validly introduce, alter or terminate the given or desired rule of conduct. Put differently, legal rules of conduct can only be established validly upon proper legal powers, as without validity there is no resulting (and legally enforceable) bindingness of purported legal consequence. To apply IAD without such ILT understanding of power relations risks, particularly in regulated domains as that of the energy sector, a neglect of the boundaries of actors’ (private) liberties in shaping the energy transition, and of the ways in which these boundaries can be changed.

The distinction between primary and secondary rules, or the need, particularly, for rules of power does not explicitly follow from the abovementioned taxonomy of norms in the work by Ostrom. This should not surprise, given her focus on rules-in-use as descriptions of allegedly existent acceptance of or agreement within some institutional social practice, given that the truth of such existence lies in the fact of such accepted/agreed institutional social practice indeed being the case.¹² Of course one may assume that part of the thinking in terms of action situations existing at vertically adjacent levels is to frame that outcomes at a lower level support the existence of decision-making power at a higher level, such as when a legislator at constitutional level allocates new licensing powers to an energy regulator, to be exercised at the collective choice level (McGinnis 2011). Nonetheless, we believe that, if rules-in-use of a given action situation derive their justifying effect from corresponding legal rules-in-form, rules of power should be explicitly integrated in the IAD Framework. Not only to avoid what in law would be a grave misunderstanding, that a freedom of constraints to conduct is a sufficient basis to assume a power to introduce, change or terminate rules, but especially to foster a proper and nuanced understanding of how conditions of legal powers, shape the scope of making legal changes. As we will explain in the below, such conditions often influence the workings of clusters of interconnected rules—close to factual operations, as in contract

¹² In her 2005 book, there is a suggestion (on 144–146) that permission is understood to also include the option to ‘add new action options to the action situation’ and ‘attributing a right to take an action’, but nowhere does the elaboration fully express what is at stake in rules of power.

rules, or on the level of major regime changes, such as the legislative changes that are at stake in the current energy transition. For this purpose, the ‘ILTIAD’ Framework that incorporates elements of IAD and of ILT can offer greater heuristic value to institutional analysis and design, particularly with regards to the dynamics in the relationship between rules-in-form and legal rules-in-use. The latter is not only relevant in any given action situation at any given institutional level, but, as we will argue below, also in analysing/understanding or designing relations between action situations at various levels (see Section 4).

The above lawfulness assumption, of rules-in-use (for single legal entities/associations combining electricity generation, system operation and consumption) remaining within the boundaries of legal-rules-in-form (of a vertically unbundled electricity market) is a point of departure in this article. This assumption is the reason behind looking at how legally arranged experimentation can be a lawful means of avoiding or repairing a prohibitive or facilitative regulatory disconnect—which implies that there may currently be unlawful practices and that there is a desire to introduce microgrid operations that are currently unlawful. Under an assumption of lawfulness, rules-in-use are not in conflict with legal-rules-in-form. There exists a proper match between a relevant ‘legal space’ and ‘social space’. Such ‘legal space’ is, determined by primary legal-rules-in-form (as ‘legal liberty space’) and by secondary legal-rules-in-form (as ‘legal ability space’) (Lindahl 1972, 2006), and available to interactions between actors within a given action situation. Rules-in-use structure interactions within the same action situation as a ‘social space’ (Ostrom 2005, 14).

3.3. Relating rules of power and rules of conduct across institutional levels

The legal relationship between rules of power and rules of conduct, also implies that there is a normative side to there being and having to be various institutional levels of connected action situations: meta-constitutional, constitutional, collective choice and operational action situations. The basic normative logic of this is that first there needs to be a foundation for a legal order at metaconstitutional level, to establish a constitution or constitutional conventions as a rule or rules of recognition upon which the general acceptance of the legal system rests – as falsifiable assumption (Ruiter 1994, 106). Upon this acceptance, basic rules of power and basic rules of conduct are established within the legal order, at its constitutional level; conferring power to actors at higher constitutional and at collective choice levels (as a legal ‘ability space’) and defining the scope of lawful factual action, as a legal ‘liberty space’.¹³ Thus, the latter actors at these levels are legally empowered to introduce additional rules of conduct, specifying legal ‘liberty space’, to detail the scope for lawful factual activity at operational level.

In the second subsection of Section 2, we already applied the logic of rules of power and rules of conduct to the institutional levels. Table 2 offers a more detailed

¹³ Within the constitutional level, there may also be sublevels as general legal powers may, in various steps, be used to create more specified legal powers, ultimately of the kind to actually establish rules of conduct.

Table 2: Levels as lawfully interconnected action arenas.

Level of action arena	Interaction within (towards certain outcomes)	Rules structuring the action situation (for Interaction)
OS-level (Operational Action Situations)	Performance of factual activities, e.g.: <ul style="list-style-type: none"> • establish smart microgrid • manage a neighbourhood cooperative 	Rules-in-use upon rules-of-conduct of CS-/CCS-level origin: <ul style="list-style-type: none"> • prohibitions, commands, permissions and dispensations
	↑ CCS-level made rules-of-conduct for OS-level use ↑	
CCS-level (Collective Choice Action Situations)	Introducing, altering, terminating (<i>only</i>) rules-of-conduct, e.g.: <ul style="list-style-type: none"> • licensing energy generators (rules-of-conduct for licencees at OS-level) • contracting between OS-level participants for implementation at OS-level) 	Rules-in-use following rules-of-power of CS-level origin, about: <ul style="list-style-type: none"> • how to make/change rules-of-conduct at CCS-level, for OS-level rules-in-use
	↑ CS-level made rules-of-power for CCS-level and rules-of-conduct for CCS and OS level use ↑	
CS-level (Constitutional Action Situations)	Making, altering, terminating rules-in-form, e.g.: <ul style="list-style-type: none"> • rules-of-power for CCS-level (e.g. Civil Law Code; Electricity act, crown decree) experimentation • rules-of-conduct for CCS- and OS-level (ditto) 	Rules-in-use following rules-of-recognition of MCS-level origin, with constitutional rules-of-power about: <ul style="list-style-type: none"> • how to make/change rules-of-power at CS-level, for rules-in-use at CCS-level • to make/change rules-of-conduct directly relevant to OS-level, upon rules-of-power at higher CS-level
	↑ MS-level established rules-of-recognition for CS-level interactions ↑	
MCS-level (Metaconstitutional Action Situations)	Making rules-in-form, e.g.: <ul style="list-style-type: none"> • constitutions and bills of rights • conventions, custom 	Rules-in-use expressing rules-of-recognition about makingg rules-in-form (no prior Rules-in-forms exist at this point)

All upward connections between rules-of-recognition to rules-of-power to rules-of-conduct and all translations of rules-in-form in rules-in-use are portrayed as lawful(ly consistent).

picture of how levels relate on the basis of legal-rules-in-form, with upward arrows to emphasise the systemic integrity of the legal order as validating legal rules-in-form (of power and of conduct), to underpin rules-in-use in action situations at consecutive levels.¹⁴ By starting from the bottom, the reader moves from the level

¹⁴ This Table can also be found in Lammers and Heldeweg (2016) and Heldeweg and Lammers (2015); it has been slightly modified here.

where the foundation of a legal order is laid, to the level of legislative action, then to the level of implementing (upon) legislation, and finally to the (top) operational level where, for example, microgrids are being factually established and managed.

The table demonstrates the normative logic of lawful consistency of legal systems, in which legal acts performed at higher levels shall not conflict with deeper levels, and how, from constitutional to collective choice level, constitutional legal powers underpin the production of legislative and executive rules of power and finally of rules of conduct that ultimately structure factual actions at operational level. In that sense, the legal requirement of normative consistency—that legal rules of conduct can only be established validly upon proper legal powers and that rules of power and rules of conduct at higher levels shall not conflict with rules at lower levels—should not be understood as if the constitutional level imposes a hierarchical type of regulation upon the collective choice and operational level interactions. As we shall discuss later, this normative logic of layering is equally important when it comes to enabling governance modes for legal self-regulation, as in markets and networks of civil society; by providing suitable legal powers, and defining a broad liberty space for actors to determine their own legal relations. Thus the demand for legal consistency allows for different modes of governance, also non-hierarchical, and more importantly, through the existence at different levels of rules of power allows for change of rules of power and rules of conduct at higher levels. Rules of power are the legal ‘change agents’ which enable an escape from an everlasting legal lock-in. Their use can bring legal support for or perhaps even command a shift in governance, as by the introduction of the prohibition of vertical bundling, as a precondition for the shift to a regulated energy market, and may thus facilitate a societal transition, such as currently concerning sustainable energy provision.¹⁵ Whether such change happens is of course largely a matter of non-legal factors, including the factual powers of incumbents, which is why, as said in the above, in understanding collective action an ILT-approach benefits from being combined with IAD.

This table also shows that one and the same piece of legislation or regulation,¹⁶ established in one action situation at one institutional level, can hold rules with relevance at various higher (sub)levels. For example, power-conferring rules (i.e. rules of power) made at constitutional level, such as in the Dutch Electricity Act, may underpin the performance of a legal act, such as establishing the Experimentation Decree. Furthermore, other constitutional level power-conferring rules, such as those within the latter Decree, would empower authorities to, at collective choice level, grant licenses and thus set specified rules of conduct for concrete experimental projects. At the same time, legal acts performed at consti-

¹⁵ See Hart (1961) about the function of rules of power in relation to the need for legal change—to overcome the static character of rules of conduct.

¹⁶ Legislation is often divided into primary and secondary legislation—being introduced either by the highest/primary legislator (immediately below the constitutional legislator) and lower legislators (often from the executive branch of government). Regulation is generally understood to encompass secondary legislations as well as non-legislative legal acts (e.g. non-general and abstract acts; orders for individual cases and/or persons).

tutional level, such as the above two examples, may also hold rules of conduct binding within the ‘liberty space’ at collective choice level (e.g. about sharing information), and at operational level (e.g. about metering) without any intermediary collective choice level legal acts.

It is essential that rules of power and rules of conduct in one and the same legal acts are not confused, if only because the former are exclusively there to enable legal change through legal acts, while the latter are static, setting aside interpretation, and prescribe the scope for factual acts. Of the total of seventeen rules of the aforementioned Experimentation Decree, twelve are rules of power about the competence to grant/refuse project licenses, and five are rules of conduct directly relevant to licensees at the operational level, once a license is granted to them at collective choice level. Furthermore, one should not confuse conditions to (the use of) rules of power with rules of conduct in such legislation or regulation. The conditions of power-use determine the scope of possible future rules of conduct, but to instantiate the latter rules requires a legal act yet to be performed (e.g. granting a license), while the rules of conduct have ‘direct effect’.¹⁷

In the next subsection this ordering will be discussed further in relation to the phenomenon of legal institutions.

3.4. Relating patterns of behaviour across levels: legal institutions

The making of legal regimes of the abovementioned Electricity Act, the Experimentation Decree and licenses to experiment with particular microgrids, happens by following prescribed social patterns of behaviour that count as performance of legal acts upon relevant rules of power. Each statute, decree or license that results from such performances is an instance of a decision-type which may ultimately allow microgrid experimentation. Aside from these types of decisions there are many other institutionalised patterns of behaviour behind recurring functional social practices, with matching legal regimes. These are established mostly upon concluding that the informal rules-in-use of social practice were in need of supporting, modifying or transforming legal-rules-in-form. Contract law, for example, came to channel patterns of social behaviour involving concluding and implementing agreements about sales, to create legal certainty, and so to foster economic efficiency. Legal regimes that establish rule-sets for such patterns of behaviour to be (repeatedly) instantiated (following ‘institutive rules’), to function (according to ‘consequential rules’) and to perhaps be terminated (following ‘terminative rules’) are known as ‘legal institutions’ (Ruiter 1997), as introduced in section 2. To be granted, for example, a license to experiment follows institutive

¹⁷ Keep in mind that when rules of power and rules of conduct are part of the same piece of legislation or regulation, the former cannot underpin the latter, as both are part of the same legal act, or, phrased alternatively: a rule-establishing decision (i.e. a legal act) requires a separate decision-constituting-rule (i.e. rule of power)—there is no ‘Baron Von Munchhausen act’ of lifting himself (plus his horse!) out of the quicksand.

rules and creates an institutional fact that comes with constraining and enabling legal effects that ought to be treated as if the license is a real fact.¹⁸

The Dutch Electricity Act, its related Crown decree and the related licenses to experiment with microgrids are examples of instances of different types of legal institutions. As suggested, there are many such types, with each regime-type allowing for producing (possibly many) instances of their kind. Following Ruiter (1997), we see three orders of legal institutions (Lammers and Heldeweg 2016). First order legal institutions concern prescriptive patterns of behaviour regarding the legal quality of persons (e.g. public authority), the status of objects (e.g. nature conservation park) and the nature of relations between persons (e.g. contracts), between objects (e.g. right of way) and between persons and objects (e.g. ownership). Second order legal institutions are legal persons (e.g. enterprises) and legal objects (e.g. tradable rights). Third order legal institutions are contextualisations, as environments of typical-of-type legal relations, such as of states, markets and civil society. Legal institutions are established only when there is a societal need to do so. While creating institutions such as contracts, licenses, legal persons and competitive markets, this is not to say that there are no longer agreements, permissions, organisations and markets that remain informal (Heldeweg 2017).

The relevance of legal institutions to our subject will be clear almost at face value. In 1st order, the public authority of a Minister to grant a license or of the legislator to introduce the Electricity Act and of government in establishing the Experimentation Decree is clearly relevant to successfully performing legal acts concerning person-to-person legal relations. In 2nd order, the existence of associations engaged in experimenting with a microgrid is an example of a subtype of legal personality. In 3rd order, the EU regulation to liberalise the former public hierarchy order of (state owned and operated) energy production and distribution, to become, not a competitive market order, but a hybrid regulated market, in-between public hierarchy and competitive market, presents a type of an institutional environment, that is to be implemented/instantiated in all EU member states. Once instantiated, these regulated energy markets operate as regimes (i.e. patterns of rules) that prescribe which actors can be engaged in energy production, distribution and provision, and which freedoms there are in terms of engaging in relations between them. The playing field for energy actors is thus regulated in a way that, ideal typically, can be seen to legally strike the presently best possible balance in the energy trilemma—between (affordable) access, reliability and sustainability—with or without allowing space for experimenting with different modes.

Legal institutions always work across institutional levels. Firstly, there needs to be metaconstitutional ‘support’ for their existence, perhaps indirectly through basic legal principles (e.g. private individual autonomy and the fundamental right

¹⁸ As mentioned in the above (final subsection of section 2). Compare, for example, the real enabling and constraining fact of a building’s architecture that ‘allows’ certain ways (e.g. by hallways, stairs and doors) of getting from one side to the other side of the building, while excluding others (e.g. through walls, windows and ceilings).

of assembly underpinning the existence of legal personality). Secondly, their basic workings need to be designed, primarily at constitutional level, through the characteristic three types of rules (i.e. institutive, consequential and terminative rules)—based upon information from (actors at) lower levels as feedback about factual and desired action situation performance at those levels, and the resulting achievements (Williamson 2000). Thirdly and fourthly, they are meant to be instantiated, ultimately at collective choice level, and then operate at, indeed, operational level. So from inception to factual operation, they link together (interactions and outcomes at) action situations at different levels, as taking place consecutively over time. Starting with a shared general recognition of the need for legal institutionalisation, next the the desired type of legal institutions are designed/conceptualised, whereupon instantiation takes place, mostly upon rules of power, and finally instantiations are being put into practice following rules of conduct. Instantiations can follow each other in a connected way, such as when upon agreeing on a contract to have a legal person established, this person is actually established, and upon its application for a license to experiment, such license is granted, upon which the legal person can establish the microgrid and commence its operation.

4. Heuristic relevance

As explained in Section 2, combining a legal institutions approach with IAD—complementing IAD with ILT (to become ‘ILTIAD’)—brings several heuristic benefits. Firstly, because of the abstract character of ILTIAD, its analysis or design is not expressed in mere doctrinal/positive law terms, but in a way that allows transcending local/national jurisdictions and may thus be more helpful to (a methodology for) comparative evaluation and design. Secondly, the ILTIAD-approach focuses attention on the aspect of legally required consistency (as normative alignment between rules)¹⁹ within and between action situations at a given institutional level, or across various levels. This is particularly helpful to identifying and explaining, and to designing existing and new patterns of action situation behaviour, as these reflect relations between (rules-in-use causally following) rules-in-form as part of legal institutions. Patterns may well reflect regimes of rules-in-form, single rules-in-form almost never stand alone, and changing a single rule-in-form can cause severe disruption within and across various action situations, even across levels – legally and also otherwise, such as in terms of how functional relations and how trust may depend on certain (single) rules being in place. Hence this heuristic benefit of ILTIAD deserves a further elaboration.

¹⁹ See the reference in the final segment of section 2 about ILT. A lack of normative alignment results either in invalid legal acts (e.g. failing to properly contract—leading, at best, to a non-binding agreement) or unlawful factual acts (e.g. not complying with obligations of a valid contract).

4.1. Threefold consistency

The requirement of legally required consistency is already manifest in the fabric of interrelated rules of power and rules of conduct, as institutive, consequential or terminative rules. These should express in configurations of the IAD-types of rules-in-use, with relevance to action situation effectiveness (of achieving outcomes) and lawfulness (of interactions and outcomes).²⁰ The ILTIAD approach provides a focus on ensuring, to the benefit of all involved constructive actors,²¹ consistency in three regards (Lammers and Heldeweg 2016, 5).

- 1) ‘Legal institution consistency’ is about rules-in-use in a given action situation with regard to individual legal institutions. Each institution has to be properly instantiated, changed, operated and terminated – such as to have the right position, choice and aggregation rules in place to conclude a contract. Mostly action situations come with several legal institutions, each of which is to function properly, as with the above contracting example. It may be that an action situation is completely structured as one legal institution, such as that of decision-making by a board of a legal person about corporate social responsibility, in which case all rules-in-use (following rules-in-form) need to also consistently align, to make for the set of necessary rules that enables legally valid decision-making.
- 2) ‘Action situation consistency’ is about rules-in-use in a given action situation that relate separate legal institutions to operate in a concerted manner—such as to ensure that a functional legal person with public authority can issue a permit. Thus, similar to the above example of signing a contract, not only does the rule-set for instantiation of the relevant institutions need to be in order, but the rules-in-use also need to legally align across institutions when instantiation of the one institution requires the presence of another legal institution, so to make (proposed) interactions (lawfully) performable with desired (legal) effect. For example, to grant a license as legal institution, there needs to be public authority as a legal

²⁰ To be clear, the legal insistence on consistency and coherence relates in part to the requirement of validity (is there a rule of power underpinning existing rules of conduct?) and for another part in ensuring lawfulness, to avoid contrary or contradictory requirements (e.g. something at the same time being both prohibited and commanded). Notabene, various types of IAD rules-in-use express either rules of power (e.g. choice rules about decision-making power) and/or rules of conduct (e.g. information rules about having to provide information), also depending on the level of the action situation—we cannot (and need not) elaborate on this here.

²¹ Constructive in terms of willingness to act lawfully (see Section 2), and to secure a functional action situation, which is legally and otherwise suitable and adequate in achieving outcomes that fit the action situation’s purpose. Of course those who would prefer a project to fail would perhaps not care about legal consistency, or even prefer inconsistencies, as these would enhance the chances at such failure.

- institution, and to be granted a license to experiment, the licensee needs to possess the legal form of an association as a type of legal institution.²²
- 3) ‘institutional level consistency’ is about how rules-in-use in various action situations at different levels (should) secure the proper functioning of legal institutions from their conceptualisation at one level, and instantiation and operation at other levels—such as of the institutional environment of a regulated energy market across constitutional, collective choice and operational levels. The relevance of this was discussed already in Section 2 about how legally accommodated experimentation regarding microgrids requires legally aligned interactions across all institutional levels, such as in the fulfilment of the requirement of vertical unbundling, or the restricted scope of allowed actions for DSOs (Lammers and Heldeweg 2016, 5).²³

On each of these three demands for consistency, the demand for normative alignment is legally strict because when interactions within or across action situations do not legally match with rules of power or rules of conduct interactions within action situations will fail either because they are legally impossible (e.g. interactions do not lead to a valid contract) and/or because they are unlawful as a matter of not being legally compliant. It is factually up to those who shape action situations (e.g. legislators) and act within them (e.g. energy communities), to secure such consistency.

4.2. Institutional environments

The issue of consistency also manifests with regards to (the choice of) institutional environment, such as that of a regulated energy market. As a 3rd order legal institution this environment affects the legal space available to the use of 1st and 2nd order legal institutions. An important example is that of whether DSOs can be involved in microgrid initiatives and whether communities involved in such microgrids could operate as energy company, selling their surplus to third parties in the energy market.

The key basic forms of institutional environments—public hierarchy, competitive market and civil society (Powell 1990; Thompson et al. 1991; Rhodes 2007)—do, especially through their consequential rules, carry a particular normative orientation. Their distinctive modes of governance are conceptualised around different types of interests-interactions: unilateral public interest interventions next to private interest exchanges and community interest cooperation. Upon these orientations different sets of legal opportunities and constraints have

²² When an action situation is completely shaped as one legal institution, which applies particularly in the case of legal persons, then there is no relational issue between legal institutions and the functioning of this institution is a matter of the above discussion (see 1).

²³ As indicated in the main text below Table 2, this normative consistency requirement should not be taken to suggest that the lower/constitutional level forces a hierarchical legal regime upon the higher level (as public hierarchy), but only that legal powers to instantiate, alter or terminate legal institutions need to root at constitutional level, which could equally be to facilitate a competitive market of civil society.

Table 3: Three key basic types of institutional environments.

Inst. Environment → Characteristics ↓	Public hierarchy	Competitive market	Civil society
– Key relation type:	Command	Exchange	Cooperation
– Key interest type:	Public interest	Private interest	Community interest
– Key justification:	Voice	Exit	Loyalty
– Key legal regime:	Constitutional and administrative law	Competition and consumer protection law	Law of association and societal enterprise

evolved, such as requirements of legitimacy, such as of democratic government (voice), competitive exchange (exit), voluntarism (loyalty), aside from specific legal requirements, such as of administrative law, competition law and law of social enterprise and free association. This also brings that governments should respect human rights, that companies in a market may not form cartels and that community networks shall put stakeholder interests first. By way of a very concise summary, Table 3 presents the three basic types of legal institutions.

The aforementioned regulated energy market is a hybrid that seeks to best combine command (e.g. regulations and licenses) and exchange (i.e. buying and selling of energy), and thus serving both public and private interests of reliable, affordable and sustainable energy provision. Liberalisation of energy provision, as a move away from public energy hierarchy towards a competitive energy market, was not fulfilled, because public hierarchy safeguards where deemed necessary to avoid (short term) private interest neglect particularly of the (long term) interests of universal access and reliability. While hierarchical public control of the functioning of the competitive energy market is seen as providing the necessary safeguards, the desire to introduce microgrids as a means to enhance sustainability as element of the energy trilemma, now challenges the regulated energy market balance. This is particularly the case when microgrids are regarded as intrinsically being about a community undertaking, fitting with the basic rules of civil society—involving a coming together of the roles of producer and consumer, as prosumers, and of decentralised cooperative action. Such a perspective is at odds with the current legally locked-in separation/unbundling of the roles of producers and consumers in energy provision and their competitive exchange mode of allocating energy services. It begs the question whether microgrid energy provision is seen as guided by ‘democratisation’ or by ‘expansion’ (Szulecki 2018). Democratisation would emphasise procedural justice (of a key cooperative mode of decision-making) and substantive justice (of the community as key beneficiary) that empower and benefit communities. Guidance by ‘expansion’ would lead to a focus on creating as many microgrids as possible while retaining competitive exchange, such as by microgrids as commercial undertakings, perhaps as ‘micro energy markets’ of a limited set of households, basically fitting the model of the existing regulated energy market (Hoffman and High-Pippert 2015; Simcock 2016; Sovacool et al. 2017). The below graphic, Figure 2, pictures the question

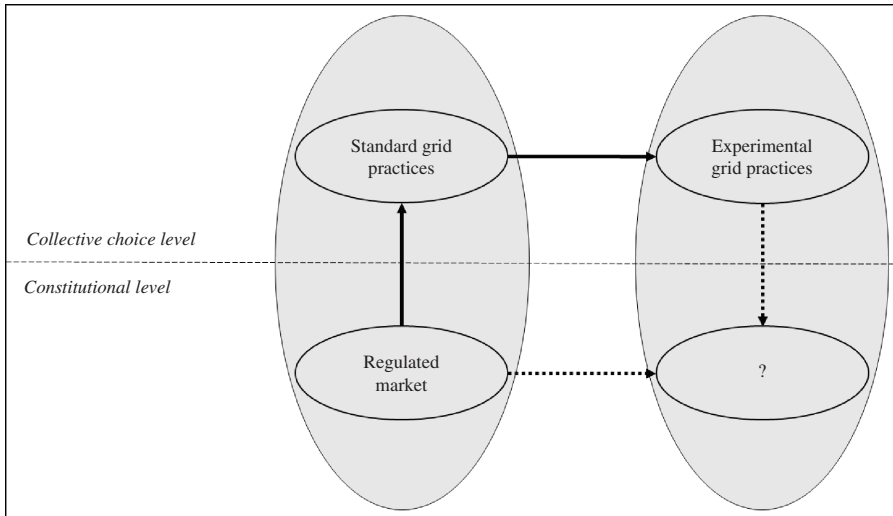


Figure 2: Institutional choice.

that is at stake here. It presents the interaction between Collective Choice level and Constitutional level action situations. The latter action situation has resulted in prescribing basic legal rules that make for a regulated market. While the former action situation has resulted in legal implementation of such market, by establishing fitting ‘standard grid practices’, it is confronted with a call by some actors to allow ‘experimental microgrid practices’ that conflict with the former rules and practices, and can only be made to legally match if, to legally unlock restrictions, changes are made, firstly, at constitutional level (see ‘?’) to legally allow for (by removing the prohibitive regulatory disconnect) and perhaps also legally support such experiments (by removing the facilitative regulatory disconnect), upon which experimental practices can be regulated in detail at collective choice level.

It is this choice that is making it interesting to see, following our research question, through the lens of the empirico-legal ILTIAD model, what is happening in the way of Dutch (legal) experimentation with microgrids. What is experimentation trying to prove? Is it about the future of community microgrids as one of civil energy society, or is it about a possible modification of the regulated energy market, or perhaps a hybridisation in between the former and the latter? The institutional legal framing of the experimentation, across various institutional levels, is vital to what evidence-based future may ensue. Therefore we will next look into the Dutch example of such experimentation.

5. Dutch experiments seen through the ILTIAD lens

In this section we demonstrate the heuristic value of the ILTIAD framework concerning analysis and design of microgrids by considering the possible future of

community microgrids based on the Dutch model. As explained in Section 2, the Dutch Experimentation Decree constitutes a change at the constitutional level that provides the legal power to (only) allow associations to experiment with new institutional settings at the collective choice and operational level. In fact there are multiple constitutional levels, because the Electricity Act grants the power to establish a Crown decree which empowers the Minister of Economic Affairs to grant licenses to experiment—and so there is a second constitutional level on the making of this Crown decree.

5.1. Experimentation in practice

In total nine projects received experimental status in 2015 and 2016. Lammers and Diestelmeier (2017) summarise the main changes that these projects (experimental action situations) entail. We draw on the ILTIAD framework to analyse these changes in terms of the divide between rules-in-form (those rules that are specified in the Experimentation Decree) and rules-in-use (those rules that are used in the experiments).

This analysis shows that the rules-in-form and rules-in-use are in essence contradictory, as the former do not legally allow practices to take place following the latter. Although the current Experimentation Decree specifies that (only) associations are to be responsible for generation, supply and grid operation, in practice in many projects it was other stakeholders such as professional project developers, companies, research centres and a real estate company that led those projects. Furthermore, although the current rules-in-form state that DSOs cannot exercise control in projects and associations must be entirely controlled by their members, DSOs and energy suppliers still seem to exercise control. While this is legally managed by having the latter actors become members, their factual influence exceeds the underlying legal objective.

Given this state of experimental affairs, when comparing experimental rules-in-use with legal-rules-in-form to experiment, our ILTIAD-approach reveals that experimental practice seems to de facto build on the regulated energy market type of energy provision, rather than to move towards a civil energy society mode. The latter seems to be the objective of the experimentation, as the way actors are positioned, particularly the exclusively exempted associations, emphasises the democratisation objective, driven by both procedural justice (of having the key say in the project) and substantive justice (of sharing the benefits of the project). Practice, however, paints a picture in which the position of associations is rather 'superficial', while commercial interest driven actors are in charge.

With respect to the facts of the matter, this state of affairs raises the question how to move forward with experimentation. Should the legislator 'get real', place expansion of renewable energy upfront and regard experimentation as one that should be about how microgrids can be best reconciled with the institutional environment of the regulated energy market? Thus participation of associations would merely be about reducing local opposition to deliver on a set project objective,

Table 4: Three institutional designs for experimentation.

Expansion*	Hybrid	Democratisation*
Participation and sharing only in as much as efficient towards expansion**	Only input or only output legitimacy (as value in itself)	Input and output legitimacy (as value in itself): procedural and substantive justice is key

*Of renewable energy use ** involve communities only to reduce local opposition.

than about having a key ‘say’, as seeking co-production in decision-making on establishing the infrastructure?²⁴ Or do the experiments require stronger institutional support to indeed strengthen (support for) the role of associations and find a pathway towards ‘true’ energy democratisation, with an accompanying institutional legal framework?

With respect to the use of ILTIAD the above question brings to the fore that ILTIAD offers an analytical lens to evaluate collective action in the energy sector, particularly as regards microgrids as CPRs and to find out if there is a consistent framework of legal rules that ensures proper—i.e. effective and legitimate/lawful – functioning of interaction in action situations at different levels. At the point where we find that experimentation paints a diffuse picture, ILTIAD can assist in arriving at a proper design of the experimentation rules. In practical terms this is to say that the legislator has to consider objectives, particularly as regards the choice between democratisation and expansion. As Table 4 suggests there are basically three options.

Clearly, ‘democratisation’ would be a course where experimentation would need to be channelled to enable an evidence-based legislative decision on the desirability of establishing a community energy society—aside the regulated energy market—with consequences for the use of 1st and 2nd order legal institutions (contracting, permitting, ownership, legal personality, transferable legal objects/rights) within. All of these would have to bring input-legitimacy as procedural justice to the involved associations, and output-legitimacy as substantive justice to the associations—as said: having both the ‘key say’ about and the main benefits from the projects.

Should ‘expansion’ be the key objective then the existing regulated energy market could be the governance point of departure, and experimentation should be channelled towards evidence about the need for minor rather than major legal modifications. Clearly the position of associations would not be one of being the key or prime stakeholder in terms of procedural and substantive justice, but rather one that merely ensures reducing local opposition to enable a pre-determined effective and efficient rollout of microgrids. The in-between hybrid

²⁴ We could use the label ‘NIMBY-ism’, but do not do so, as this suggests opposition on biased grounds, while opposition could (also) be on (and perhaps mostly follows from) well-considered arguments that are just not in agreement with the project that the developers are set to deliver, accepting only arguments that better fit their purpose.

governance position would only bring input-legitimacy as procedural justice to associations (without a major stake in benefits), or only output-legitimacy/substantive justice, without the key say in the project undertaking. This may be the ‘best of both worlds’, but the hybrid character brings an intrinsic complexity, of reconciling private interest driven behaviour of commercial actors and community interest driven behaviour by associations—with a complex detailing on fitting 1st and 2nd order legal institutions in its instrumentation. Again, the legal arrangement for experimentation would have to reflect to include this option if it is to yield useful information to consider this mode of governance as a viable future option.

As mentioned in the above, the Dutch prime legislator is currently pursuing a more expansionist approach, enabling DSOs to foster the energy transition through projects that private actors within the market are unlikely to undertake (Wet VET 2018). It is too early to tell what this means in terms of the frame of the Dutch energy transition, as this largely depends on the yet to be proposed changes in the current experimental decree. The Dutch Authority for Consumers and Markets has meanwhile provided a more nuanced advice, fitting with the intent to create temporary and experimental niches for DSOs within the energy market (ACM 2017).

6. Conclusion

The leading question to this article reads: *‘How can the empirico-legal ILTIAD model support analysis and design of microgrids, and how is this demonstrated when considering the possible future of community microgrids based upon the Dutch experimental model?’* To this end this article has presented the background of an energy transition that includes a strong increase in the number (and perhaps scale) of smart grids in the form of community microgrids and how such increase may be at odds with existing energy legislation—as is currently the case in the Netherlands. Experimentation may be a means to bridge/remedy the regulatory disconnect that stands in the way of the aspired increase. To understand what is involved in proper legal arrangements towards such experimentation, and demonstrate the use of the ILTIAD-approach, a theoretical expose was presented to clarify the empirico-legal lens that may improve our understanding of how rules-in-use and legal rules-in-form interact and what this means in terms of the institutional modes of (experimental) governance, including relevant legal institutions.

By applying this lens to the first findings of Dutch experimental microgrid projects, it is hoped that this article clarifies that a choice in policy objectives—on the spectrum from renewable energy expansion to energy democratisation—requires thorough consideration of institutional aspects, first and foremost in the design of the legal arrangements for the relevant experimentation. The answer to the leading question would thus be to apply ‘ILTIAD’, with particular concern for normative alignment and the consequences of choice as regards the institutional environment (as third order legal institution).

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