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COMPLEX SYSTEM NORMATIVITY:

Hungarian Energy Law as an Example of Using Complex System Viewpoints to Understand Risks in Public Administration Normativity

*THESIS of doctoral dissertation and short summary*

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## 1. Research focus and definitions

The history of the **Hungarian energy sector** was turbulent and even its present is indeed still thunderous; it is perhaps enough in this sense to refer to three occasions of state intervention: (i) the overhead charge reduction campaign (“*rezsicsökkentés*”), (ii) the reintroduction of regulated electricity production prices to the free market and the so-called luxury profit scandal and (iii) the forced termination of the long-term contracts of power generators. To understand the complexity of the energy sector is neither a task purely of natural sciences (i.e. energy as a physical phenomenon) nor purely legal (i.e. subject to strict and often cogent regulation) nor purely an economical as several disciplines are affected.

These three specific types of state interventions as well as the turbulency of the considered sector in general are **associated with and manifest in certain risks** of transdisciplinary nature: *country risk*, *decreasing trust in (the quality of) public administration* and, beyond these, *systemic risk*. Transdisciplinarity of the sector becomes apparent through these risks, where multiple levels of the same reality cross each other from legislation and public administration to the interest of the market players affected regarding their financial operation, making losses and, allegedly, fizzled out legitimate expectations, as well as to the public interest and social aspects. Risks are of course evident and inevitable consequences of any activity. According to Heidegger, the essence of existence is being at risk (Heidegger 2006). Though risk is as old as the world itself, new way of thinking about risks is often claimed to be needed (e.g. Wang et al. 2020). Thus, thinking about risks and re-shaping our thoughts about emerging risks and risk management is a *must*, so it is in the emerging Hungarian energy sector.

**Country risk** commonly refers to the risk of investing (or lending, accordingly) in a certain country (Cosset et al., 1992) whilst in a multidimensional, even interdisciplinary character willingness to service its debt should also be taken into account (Mondt and Despontin 1986), and the potential economic and financial losses due to the difficulties that are raised from the macroeconomic and/or political environment of a country (Calverley 1990). Country risk is the biggest risk and concern for investors, especially investors in regulated markets, thus our focus in the dynamics of the energy sector cannot avoid to consider it.

**Trust issue of the quality of public administration is less evident or defined whilst even the notion of the quality of public administration** is a harder thing to identify, and thus requires comparative, at least a multidisciplinary approach to tackle. While it is hard to dispute

that expectations largely differ what is high quality public service, the assessment of quality in public administration is even more difficult. Stakeholder and citizen participation became a must for the West, and in order to permit such, deliberative democracy, e-democracy, public conversations, participatory budgeting, citizen juries, study circles, collaborative policy making, and alternative dispute resolutions are promoted (Bingham, Nabatchi and O’Leary 2005, 547-558). These democratization (egalitarian) tendencies are apparently driven by one articulated psychological fear: losing public trust. Some scholars expressly identify as a primary challenge confronted by public administrators to maintain broad-based support for an agency and its activities (Carpenter and Crause 2012, 26) whilst others warningly conclude that improving the quality of services may not necessarily increase trust in policy makers and the civil service (Löffler 2013, 12). All of the quality measures, i.e. the quality excellence models, the ISO 9000 series and the so-called *citizen’s charters* are applied internally, i.e. within the hierarchy of public administration bodies, however, they alone do not made enforceability claims possible to clients. In legal terms both distinct approaches of the authoritative public administration of the East and the democratic-business like public administration of the West belong to the cogent normative essence of law *de lege lata* as much as the regulation does. The cogent normative essence, being the utmost typical feature of public law, is the one being the most apparently linked to the issue of power and enforceability. This essential nature makes the issue of the public administration’s quality as well as robustness of law a public law question even in the era of democratic and business visions. In line with this, vast majority of public administrative organs does not operate in a (business-like) competitive environment neither in the West, nor in the East (Halachami 1995, 9-23); the vast majority of public administrative organs does not operate in a (business-like) competitive environment, thus their structure is mainly stable, constant, linear-functional with clear responsibility hierarchy and command of chain. Expectations are therefore still attached to these functions.

The third, **systemic risk** is the risk of having not just statistically independent failures, but “*interdependent, so-called ‘cascading’ failures in a network of N interconnected system components. That is, systemic risks result from connections between risks (‘networked risks’)*” (Helbing, 2013). Whilst legal scholars have written about systemic risk occurring in financial systems as early as in the 1980s (Gruson 1983, 303), identifying systemic risk within the legal system is a quite recent field of investigation (Ruhl 2014). Law is a system among the multitude of social systems and subsystems and its aim is, expectedly and allegedly, to regulate constraints

and failures the other social (sub)systems face; as being such, it is a fail-safe strategy for other social systems. However, risks cannot only be caused *in other social systems* by the law, but *within* the legal system itself, as in case of any other complex adaptive systems. It is exactly the potential for cascading that is so dangerous in case systemic risk is high. Ruhl asks the fundamental question: how is it that a robust complex adaptive system such as law, with all its fail-safe mechanisms guarding against failure, nonetheless fails? (Ruhl 2014, 583).

In order to evaluate these risks associated with the Hungarian energy sector it is of course necessary to precisely identify and sharpen the research focus, i.e. in what are we looking for these types of risks and their possible implications. As not regulation and purely regulation is to be considered as the legal systems in question, it seems for us to be the right approach from a practical viewpoint to focus on its normativity, with the *possibility of enforceability*. Given that public law is apparently the field of unequal connections with vertical enforceability relations, the focus on normativity (enforceability) and its core nucleus, the ‘norm’ is of utmost importance for understanding this complicated public sector field. Concerning normativity, there is a lack of clarity regarding the definition. Based on teleological interpretation with reference to Stammler (1922) Jhering (1898) and Szilágyi (1998), normativity can perhaps be defined as *regulated relationships by vertical means based on the capability of enforceability* thus being a matter of power (and thus law) (own definition). Of course, this approach focuses on norm and normativeness. We had to separate the phenomena of social normativeness from other, non-normative formations suitable for controlling behaviors: from the world of ideas, moral and other values, worldviews, and then we can specify what within the normativeness makes law to be law (Szigeti 2006, 206). A legal norm is the smallest, yet meaningful unit of law in itself (Szilágyi 1998, 221). Social norms are linguistic-mental objectivations, they contain a pattern of behavior, they express necessity, they are characterized by validity, sanction/coercion and hypothetical structure (Szilágyi 1998, 206-2011). Szigeti’s theory of the norm continuum, which presents the normative nature of law as a specific part of the total norm system of society, provides very important clarifications for the understanding (Szigeti and Takács 1998). Genetically, normativity is a product of social life, but functionally we get to something else, distinguishing between norm (in Hungarian: ‘*norma*’) and rule (‘*szabály*’) (Szigeti 2006, 204). The concept of a rule is used to describe repetition, while the concept of a *norm is used to describe a requirement*. Approaching the issue in this way shows why the legal norm should be placed in the overall norm system of society, pointing to common moments

before moving towards a normative, philosophical, value or logical analysis of differences (Szigeti 2006, 205). Norm as the smallest and the biggest in the same time, i.e. being the “nucleus” and simultaneously being placed to the overall norm system of society is in fact a practical and also transdisciplinary approach.

In this way, and turning back to our research focus, normativity (in the energy industry) consists regulation and public administration together *describing requirements* (towards energy market licensees), i.e. the umbrella under which business entities operate, and in which certain risks associated with their operation occur (in the energy industry). To all this, I recommend to consider the regulation of the energy sector in order to present it as a robust, yet fragile, non-linearly interconnected system with the unity of different levels of reality resulting in systemic risks, where energy legislation and the public administration implementing it are to be treated in one large unit of normativity as the practical appearance of regulation in the sector.

Sharpening the research focus to normativity, the clear direction of the present thesis should automatically reach its next stage via following the enactment path of the norms. The Hungarian energy normativity as a typical semi-autonomous industry-specific public law field is governed by laws and bylaws enacted by Parliament, by the Cabinet (Government), by certain ministries and by the Hungarian Energy and Public Utility Regulatory Authority (**HEA**), whilst there are also directly enforceable EU regulations. Though it is not ‘law’ as a piece of legislation, but as a sense of normativity, the public administrative resolutions of HEA and certain other bodies of the public administration also matter, so do the network codes enacted by the transmission and the distribution system operators (who are market players) operating as ‘quasi laws’. This is indeed complicated – but is it complex as well? The application of the complex system theories in social sciences is still very limited or even rare (Baumol and Benhabib 1989). Complex networks and complex adaptive systems theories come from hard sciences, but some contemporary legal thinkers outlined the relevance of complex system theories concerning *law*, especially complex adaptive systems, “*in which large networks of components with no central control and simple rules of operation give rise to complex collective behavior, sophisticated information processing, and adaptation via learning or evolution*” (Mitchell 2009). However, to the extent one can get acquainted with the available literature, there is still a significant resistance to the application of complex system and complex adaptive system approaches, methods and theories in legal thinking. The question arises whether these viewpoints can add anything to the understanding of the operation and failures of continental normativity governing

the public sector. Therefore the dissertation intends to demonstrate for the first time via industry-specific examples that Hungarian energy law, one of the absolute extremes of the rigid continental law is per se following complex adaptive system attributes as being implemented by the public administration, thus refuting any reductionist and linear concepts of ‘classical’ continental public law routines and prejudice. Normativity is unique in a sense that it aims to regulate other social (complex) systems; or as Szigeti puts it, the nature of the idea of jurisprudence is the ‘approach to approach and its sociologicum’ (Szigeti 2006, 168).

As the dissertation alleges, approaching the normativity of the Hungarian energy sector as a complex system could lead us to novel considerations and provides us with useful tools in understanding the transdisciplinarity of risks occurred in the energy sector. This drives us to such essential features of complex systems like emergence, the ‘robust yet fragile’ (RYF) dilemma and the issue of systemic risk that the dissertation also investigate covering unpublished case studies, letting us closer to identify risks within the law applied by public administration, i.e. normativity. The dissertation intends to prove that complex systems theories, not yet investigated in full for continental law systems would likely add to this in in three points: to understand the nature of normativity, to understand and handle risks (country risks, public administration-related risk and systemic risks), and connecting the two, in understanding the RYF dilemma, the *key dilemma of normativity*, providing a new approach to the legislator and of course also to the market players concerned.

## **2. Governing methodology and methods applied**

The dissertation is of economic and legal focus being thus governed by business and public administration methodology. Therefore, as to the governing and applied *methodology the dissertation is consequently of legal, business and public administration nature* and hence the research analysis is significantly based on the nomenclature of public administration itself. Under this consequent governing methodology however, legal, economical, and, *partially*, also statistical and hard science-based (complex system) approaches, issues and considerations are intentionally crossed in this research, affecting the *methods* of the research as well, under and within the applied governing methodology. These are however not only theoretical, but real concerns too. The issues identified with state intervention in the energy sector resulting in (i) country risk, (ii) quality concerns of public administration and (iii) systemic risk are not only

legal, public administrative, economic or theoretical, but real and very serious *operational business concerns too*. These real, massive concerns determined our research approach and fine-tuned the chosen methodology. Therefore and in line with our doctoral school's fundamental principle I chose a transdisciplinary approach in line with Nicolescu's (2014a) conceptual formulation. Transdisciplinarity is an ideal approach evaluating the complex relationship between society, normativity governing society and science, as transdisciplinarity looks the world more holistically (Max-Neef 2005). Therefore I based the whole research especially on Nicolescu's transdisciplinary methodology concept with its three axioms. The first is the ontological axiom: there are, in nature and society and in our knowledge of nature and society, different levels of reality of the object and, correspondingly, different levels of reality of the subject. The second one is a logical axiom: the passage from one level of reality to another is ensured by the logic of the included middle. Finally, the third one is a complexity axiom: the structure of the totality of levels of reality or perception is a complex structure, every level is what it is because all the levels exist at the same time. (Nicolescu 2014b, p. 21).

This complexity axiom is especially taken seriously throughout the whole research as world is often and mistakenly considered "linear" and, therefore, it is assumed that it is conducted by very clear "causal relationships" (Alagidede, Panagiotidis and Zhang 2011). Majority of studies of economic science are based idea of equilibrium systems: for example, the symmetry between supply and requirement (Wu et al. 2017), risk and benefit (Levin and Smith 1994) price and quantity (Kelly 2005). The law is especially a field of binary logic: legal/illegal, either/or, right/wrong, enforceable/unenforceable. The classical type of norm is hypothesis – disposition – sanction, even if certain norms do not necessarily contain all the three. However, all the three operates with an exclusive binary logic identifying whether a hypothesis is met, a disposition is to be applied and/or sanction to be imposed. The purely binary logic of law clearly belongs to the Aristotelian galaxy, reaching its peak with Carl Schmitt (Schmitt 2007, p. 5). The transdisciplinary theory is an ambitious experiment to go beyond the binary logic.

Transdisciplinarity as a concept and way of thinking aims the understanding of the present world through the consequent unity of knowledge as well as the unity of knowledge with the unity of being. This derives from the concept that 'reality' does not only exist as a one single level but possibly on an endless number of levels. Whilst in this sense transdisciplinarity is a revolutionary idea, it has no impact yet on our rather conservative legal systems and on how we investigate issues connected to normativity, emerging risks included. With Nicolescu's

methodological guidelines of transdisciplinarity, the dissertation observes the different levels of reality through the investigation of the emergence of risks in the system. In line with the logical axiom of non-contradiction by the transgression of duality (Nicolescu, 2014a), the dissertation identifies several A, non-A, and T states. These logical connections led to and manifested in the robust yet fragile (RYF) dilemma, discussed later in details.

Finally, transdisciplinary knowledge production is described by a constant flow between fundamental and applied, theoretical and practical, where the disciplinary boundaries and distinctions between applied and pure research become less relevant; the focus rather shifts to the problem area (Gibbons et al, 2010). This is in line with that as Szigeti highlights, Max Weber did not differentiate either between theoretical and practical in his *Legal sociology*, therefore also Szigeti speaks about applied jurisprudence (Szigeti 2006, 172). This is the required approach to tackle the multidimensional issue of the normativity-related risks in the energy sector crossing borders of disciplines. Therefore, for the Hungarian energy normativity evaluation (3.1-3.2) and testing its borders (3.2.2-3.2-4) the dissertation uses this transdisciplinary approach crossing the border of disciplines, especially law and economy through the simultaneous analysis of a huge number of case studies. Thus, a comparative analysis of case studies was used in chapter 3.2 in this sense, with a constant flow of considerations between practical and theoretical. For the framework of a part of the study (3.2.4.3) a tentative problem solving was applied, meaning a trial and error elimination process as defined by Popper (1992).

In order to prove the hypothesis connected to the applicability of complex system theories into the normativity of the energy sector, the dissertation utilizes complex system findings and considerations, namely investigation of the question heterogeneity, removing elements and non-linearity through outstanding and partially unpublished case studies (4.3) as well as evolvability (4.4) RYF dilemma (4.5) and complex constraints (4.6).

For the identification of error in the utilization of norms as a possible indicator of implied systemic risks the dissertation uses statistical distributions (Farber 2003) and mapping based on a transdisciplinary coordinate system developed by us, uniting legal hierarchy (i.e. a legal term) with utilization via public administration. For the utilization of norms we considered both network mapping and also possible *power-law event distribution*, a typical effect of the existence of complex systems as well. It is enumerated as a complex system feature that overall



behaviour characterized by mathematical “power-laws” that do not follow “familiar bell-curve” statistical distributions (Farber 2003, 152). Power-law is a typical product of scale-free network science patterns. However, based on recent publications the dissertation is cautious or even critical to the unconditional applicability of power-law (Holme 2019, Jacomy 2020, Tanaka 2005, Newman 2003, Broido 2009, Clauset, Shalizi, and Newman (2009).

With the above research focus, considerations and methodological clarifications, the dissertation provides for a preposition and three gradual hypotheses built on each other:

**Proposition:** in order to grab the transdisciplinary reality of the risks emerging in the energy sector’s regulation it is justified in a practical approach to threat Hungarian energy law and public administration together as ‘*normativity*’ based on their enforceability and to have them re-defined as such unity of reality (transdisciplinarity axiom).

**Hypothesis 1:** certain economical risks in the energy sector can be identified via a transdisciplinary investigation of its *normativity*, whilst the borders of the normativity’s autonomy are tacitly recognizable through the investment protection test (and legitimate expectation) concerning the emergence of these risks.

**Hypothesis 2:** Hungarian energy law is not only complicated but complex as well; the complexity axiom and the methods of complex systems can be used to describe the behavioural patterns of normativity being robust yet fragile and to describe the phenomena of the three risks whilst also refuting linear casualities of classical legal thinking.

**Hypothesis 3:** by coupling the frequency of references to law in public administrative resolutions by the HEA (as the public administration body of the Hungarian energy sector) with the place of these referred laws in the legal hierarchy (as defined by law) we can see the utilization of public administrative resolutions by the HEA as expected from complex adaptive systems and by the complexity axiom of transdisciplinarity, and ideally this should follow a scale-free power-law distribution.

### 3. Results/findings of research

The **proposition** is justified that in order to grab the transdisciplinary reality of the risks emerging in the energy sector’s regulation there are valid grounds to threat Hungarian energy law and public administration together as ‘normativity’ in a practical approach, based on their

enforceability and nature “to describe a requirement” (Szigeti 2006) and to have them re-defined as such unity of reality in line with the transdisciplinarity axiom. With the HEO/HEA’s role in the energy sector, utilization of legislation can only be properly observed through the investigation of public administration: all the tree thoroughly considered occasions of state interventions proved this, though also connecting country risk(s) and public administration (quality)-related concerns together, especially as systemic risk. Concerning the evolvement of the energy normativity, it is observed that code-type regulation was not only a step for reasons of rule of law, but it proved essential in terms of country risk mitigation, whilst country risk was considered obviously to be very high in a country just recently changing its regime and liberated from military occupation. The 1995 Pricing Decree and similar acts also aimed to increase predictability decreasing risks associated with Hungary, its energy sector and normativity. Likewise, the establishment of HEO was indeed necessary in order to establish a trust in the public administration of the energy industry, as well as to cautiously set competences and procedures of the HEO in order set a quality standard of its operation. With all these, providing normativity robustness through official prices administered by public administration whilst mitigating country risk is generally observed, whilst introducing EU-requirements into the disequilibrium of energy normativity resulted in a different “T-state” of the pairs of opposites also to the biggest contradiction, robustness (“A”) and fragility (“non-A”) of the system.

The comparative analysis of case studies also proves **hypothesis 1** that certain economical risks in the energy sector can be identified via a transdisciplinary investigation of its normativity, whilst the borders of the normativity’s autonomy are tacitly recognizable through the investment protection test (and legitimate expectation) concerning the emergence of these risks. First, the risks associated with normativity became apparent elements on different levels of reality by the investors inquiring to enter the Hungarian energy sector on an ontological stage (see the ontologic axiom of transdisciplinarity); the risk evaluations about bidding even resulted in certain investors’ exit. As a part of the acquisition, the foreign investors entered into shareholders’ agreements with APV: the different levels of reality met in the “T-state” of transdisciplinarity, as they were connected by these privatisation agreements. Anyway, risks associated with normativity were not affected by this passing through this “T-state”, as neither of these contained a “stabilization clause.”

Second, based on our proven observations, fragility perpetuated an imbalance created by the non-competitive and inflexible pricing regime of the PPAs in an increasingly liberalized market: imminent systemic risks were increasing, including regulation (the 2001 Electricity Act and the Government decree on stranded costs), public administration (HEO initiating re-negotiations) and the state-owned wholesale trader, who, undoubtedly, was bounded by state interest more than foreign-owned power plants. The treasuring cascade of failures are identified in the form of EU investigation, obstacles of market opening and high enduser prices required intervention. To eliminate these, Hungary intervened in all levels of reality first with the reintroduction of regulated prices, and second with a two-step intervention violating the *pacta sunt servanda* principle and not paying net stranded costs to generators, at the end of the day increasing again country risk, decreasing trust in public administration and thus adding to the fragility of the system. Concerning the Gas Tariff Crisis, here Gazprom contract was the “T-state”, where different and normally unconnected levels of reality crossed and the crisis hit Hungary. Here the systemic risk hidden throughout the complex system of normativity became apparent and started to cause a cascade of failures, the first stage of which was the level of HEO-resolutions on overhead charge reduction (“*rezsicsökkentés*”), where the Parliament intervened with formally revising HEO’s status in order to stop the cascade of failures of the systemic risk event, but its long-term consequences are still inevitable.

Third, as to the borders of normativity’s autonomy, the international investment protection was exclusively identified as such, with the observation that the expropriation standard of investment protection is ineffective due to its unattainably high practice. The other standard, FET is proven as a real border, as one component, the issue of legitimate expectation is capable in light of an extensive comparative case study of evaluating country risk, stable business, change of law and regulatory autonomy (i.e. sovereignty). Anyway, I finally concluded that international investment law makes investors – rather than taxpayers in host states – primarily responsible for managing the risks of their own investments in the absence of a specific state (privatization) guarantee, whilst through tentative problem analysis we can justifiably state neither transparency requirements nor the guarantee of “effective means” was allegedly violated in a historical context of the normativity of Hungary’s energy sector.

**Hypothesis 2** is justified. Hungarian energy law is not only complicated but complex as well; the complexity axiom and the criteria of complex systems can be used to describe the behavioural patterns of normativity being robust yet fragile and to describe the phenomena of

the three risks whilst also refuting linear casualities of classical legal thinking. As it can be seen from the examples of Hungarian energy (public administrative) law, heterogeneity (wholesale gas pricing), complexity above complicatedness (electricity production licensing) and system interconnectedness (on component level: Novenergia case, on level of legal branches: MAVIR case) show complex adaptive system features. Thus, even though there are significant differences compared to common law where such approaches are well-received, there are valid grounds to consider continental law and the public administration administering it as a complex system. Based on these findings, there are also valid grounds to investigate Hungarian energy (public administrative) law dynamics through such complex system phenomena like evolvability and the RYF dilemma (HEO changing role, the ‘rezsicsökkentés’ case) as well as complex constraints and systemic risks (the wind park licensing case). These are the aspects where complex system approaches may add a lot to the understanding of normativity and the operation of public administration, as well as to the identifying of systemic risk within the law. This should be applicable to other jurisdictions as well, especially in other countries with similar regulatory and public administration structures, both in CEE/SEE and beyond. Hence it is a promising new field for further interdisciplinary studies concerning public administration. In our belief, this should be a new direction of scientific and practical investigation in all regulated industries like energy, pharma, health care and financial institutions and in all jurisdictions with similar regulatory logic.

**Hypothesis 3** is *not justified* in the sense that by coupling the frequency of references to law in public administrative resolutions by the HEA (as the public administration body of the Hungarian energy sector) with the place of these referred laws in the legal hierarchy (as defined by law) we will get a power-law model of the utilization of public administrative resolutions by the HEA as expected from complex adaptive systems and by the complexity axiom of transdisciplinarity in case we consequently remain bounded by the legal hierarchy. There were deviations from or “errors” in this expected “ideal” power-law distribution in both directions, i.e. (i) law-ranked legal references frequently cited and (ii) high-ranked legal references seldom used. These justified the critical voices against unconditional applicability of scale-free power-law distributions in social sciences.

However, these identified “errors” let us closer to the failures of the legal and public administrative system by identifying regulatory systemic risk and quality concerns of public administration. Thus, our analysis of coupling references of norms in HEA resolutions with

their alleged place in the legal hierarchy was accurate and successful in pointing out a significant systemic risk in form of a deviation from the expected (and flawed) pattern of references, identifying an industrial code (ÜKSZ) as an overrepresented (level 6) public administrative resolution operating in practice as a quasi-law, in relation to which serious EU-investigation was conducted, and HEA pricing decrees (i.e. law) underrepresented, in connection to which even infringement proceeding and investor protection arbitral litigation were also initiated. Hence this is a promising kind of 'implied systemic risks indicator in public administration'. Though with the important reservation of the pilot sampling project's fragmentary nature, the implied systemic risk indicator was also effective in the sampling pilot project identifying a deviation in two directions: a level 6 (i.e. law-ranked) norm approving MAVIR's Operational Code, that is exactly the same problem in nature than the ÜKSZ-related one; and a HEA decree (level 3) on price setting seldom referred that against points to a real systemic risk, the highly disputed change of role of the HEA discussed above in details. This change, i.e. consequently HEA's role as a lawmaker was outstandingly concerned by an EU infringement proceeding initiated against Hungary,<sup>1</sup> as well as investment protection arbitral case too.<sup>2</sup>

In sum, we can say that the errors to the ideal state points to systemic risks in two directions:

- (i) proliferation of norms: too low status in the legal hierarchy but high utilization
- (ii) sleeping norms: too high status in legal hierarchy, not used/referred proportionally.

Both errors identified are not only legal errors, i.e. not only the problem of the level of regulation not accurately chosen but norms being in connection with the RYF problem and systemic risks, representing complex constraints in the public administration. The errors (diversions) in frequency of references during public administration utilization (by HEA) compared to the "expected" frequency based on the legal hierarchy pointed to real issues (manifested risks): preliminary ruling by the European Court of Justice, EU infringement proceeding and international investment protection dispute, the real hot topics of the energy industry. This is indeed a very promising correlation.

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<sup>1</sup> <http://abouthungary.hu/news-in-brief/ecj-rules-that-hungarys-law-on-utility-fees-does-not-violate-eu-regulations/> (last access: 30 January 2021)

<sup>2</sup> <https://investmentpolicy.unctad.org/investment-dispute-settlement/cases/712/engie-and-others-v-hungary> (last access: 30 January 2021)

Of course, further research is highly necessary; we are also conducting a more extensive research project both for natural gas and electricity-related practice of the HEA with the very same model. However, our results so far even show that there is a clear room for identification of systemic risks via investigation of utilization patterns of norms through the HEA's public administrative practice. However, the dissertation's findings may add to a new consideration where complex system approaches and even the axioms of transdisciplinarity could assist identifying and handling systemic risk within the law, also helping to understand and hopefully to mitigate country risk issues of the regulation and quality concerns of public administration. It is hence a promising new field for transdisciplinary experiences to use complex system approaches to understand normativity governing the public sector as a complex system.

The findings can be generalized widely: (i) to other industries with single regulatory authorities in Hungary, e.g. pharma, monetary (ii) to other countries with regulated industries, especially with one-stop-shop public administration.

#### 4. My publications relating to the research topic

**Máté Tóth, Gyula Vastag:** 'Hungarian Energy Law as an Example of Using Complex System Viewpoints to Understand Risks in Public Administration Normativity' (Pro Publico Bono, English, 2020/2) <https://folyoirat.ludovika.hu/index.php/ppbmk/article/view/648/4151>

**András Herczeg, Máté Tóth, Gyula Vastag:** 'A megújuló villamosenergia-termelés térnyerésének hatása a magyarországi szénbányászat helyzetére, szabályozási kitekintéssel' (The effect of the renewable energy production expansion on the Hungarian coal mining status with a regulatory outlook, magyar, Magyar Tudomány, 2020/3) Magyar Tudomány 2020/3 - A megújuló energia termelésének hatása a magyarországi szénbányászat helyzetére - MeRSZ

**Fehér Alexandra, Máté Tóth:** 'In whose interest? The Nord Stream 2 in an interdisciplinary approach' (Kinek az érdeke? Az Északi Áramlat 2 interdiszciplináris megközelítésben, magyar, in: Magyar Energetika, ISSN 1216-8599 2020/2, 22-32. p. [https://matarka.hu/cikk\\_list.php?fusz=170891](https://matarka.hu/cikk_list.php?fusz=170891)

**Máté Tóth:** 'Watch out for Brussels: EU regulatory trends in the energy sector' (Vigyázó szemetek Brüsszelre vessétek: az EU szabályozási tendenciái az energiaszektorban, magyar) – Magyar Energetika ISSN 1216-8599; 2019/3, 33-43. pp

**Miklós Rátky, Máté Tóth:** 'Energy investment protection: is it worth?' (English) Almanac of the Hungarian Commercial Court of Arbitration by the Hungarian Chamber of Commerce and Industry and Hvg Orac, 2019 (406-430 pp.) (book chapter, English)

**András Herczeg, Máté Tóth:** 'The status of the Hungarian coal mining is highly dependent on the international market trends and the regulatory policies' (A magyarországi szénbányászat helyzete a megújuló energiatermelés térnyerésének tükrében); XXI. International Mining, Metallurgical



and Geology Conference, May 9-12, 2019, Baia Mare (Nagybánya), Romania, 6 pg.  
(conference presentation + publication)

**Máté Tóth, Gyula Vastag: 'Hungarian energy law as an example of using complex system viewpoints for the public sector'**, EUROMA conference issue, Budapest, 2018 June (conference presentation + publication, English)

**Herczeg, András, Máté Tóth:** 'Legal and financial challenges of PaksII and future power plants planned in the territory of the European Union' (**Jogi és finanszírozási kihívások Paks II és az Európai Unió területén tervezett jövőbeli atomerőművek előtt**); ENELKO Energy and Electrical Engineering Conference 2017, October 12-15, 2017, Oradea (Nagyvárad), Romania, 6 pg.  
(conference presentation + publication)

**Máté Tóth, Norbert Bálint, Andras Herczeg, Gábor Gebhardt:** 'On certain regulatory aspects of the organisation of communal public utility services' (**A közösségi közműszolgáltatás megszervezésének egyes szabályozási kérdéseiről**, magyar) – Pro Publico Bono - Magyar Közígazgatás, April 2015, ISSN 2063-9058  
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